EXPERT DECLARATION OF VIJAY K. MADISETTI, PH.D.

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I, Vijay K. Madisetti, Ph.D., declare as follows:

I. INTRODUCTION

A. Engagement

1. I make this declaration based upon my own personal knowledge and, if called upon to testify, would testify competently to the matters contained herein.

2. I have been asked to provide technical assistance in in connection with the *Inter Partes* Review that certain claims from seven related U.S. Patents: U.S. Patent Nos. 7,633,524 (the "'524 patent"; Ex. 1001, IPR2017-02054); 7,907,172 (the "'172 patent"; Ex. 1001, IPR2017-02052); 8,134,600 (the "'600 patent"; Ex. 1001, IPR2017-02056); 8,477,197 (the "'197 patent"; Ex. 1001, IPR2017-02053); 8,581,991 (the "'991 patent"; Ex. 1001, in each of IPR-02058, IPR2017-02059); 8,947,542 (the "'542 patent"; Ex. 1001, IPR2017-02055); and 9,197,806 (the "'806 patent"; Ex. 1001, IPR2017-02057). I refer to all of the patents together as "the patents-at-issue." I understand that the following claims have been challenged in eight Petitions for *Inter Partes* Review are the following:

3. **Petition 1**: *Inter Partes* Review of claims 1, 4, 5, and 14 of the '524 patent (IPR2017-02054).

4. **Petition 2**: *Inter* Partes Review of claims 1, 2, 4, 7-9, and 12-26 of the '172 patent (IPR2017-02052).

5. **<u>Petition 3</u>**: *Inter Partes* Review of claims 1, 2, 3, 4, 5, 8, 9, 10, 12 and 13 of the ‘600 patent (IPR2017-02056).

6. **<u>Petition 4</u>**: *Inter Partes* Review of claims 1-4 and 7-19 of the ‘197 patent (IPR2017-02053).

7. **<u>Petition 5</u>**: *Inter Partes* Review of claims 1, 2, 3, 10, 11, 12, 13, 14, and 21 of the ‘991 patent (IPR2017-02058).

8. **<u>Petition 6</u>**: *Inter Partes* Review of claims 22, 23, 25, 27, 28, 29, 32, 33, 35, 36, 37, and 38 of the ‘991 patent (IPR2017-02059).

9. **<u>Petition 7</u>**: *Inter Partes* Review of claims 1, 2, 10, 11, 19 and 20 of the ‘542 patent (IPR2017-02055).

10. **<u>Petition 8</u>**: *Inter Partes* Review of claims 1, 2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13 and 16 of the ‘806 patent (IPR2017-02057).

11. This declaration provides my opinions on issues related to the unpatentability of the claims identified in Petitions 1 through 8.

B. <u>Background and Qualifications</u>

12. In formulating my opinions, I have relied upon my knowledge, training, and experience in the relevant art. My qualifications are stated more fully in my curriculum vitae attached hereto as Exhibit C. I provide a brief summary of my qualifications below.

13. I earned a Bachelor of Technology (Honors) in Electronics & Electrical Communications Engineering from the Indian Institute of Technology (IIT) in 1984, and a Ph.D. in Electrical Engineering and Computer Sciences (EECS) from the University of California at Berkeley in 1989. I have published extensively, with about 100 technical publications and eight books in the areas of computing, signal processing and communications systems.

14. I am an Institute of Electrical and Electronics Engineers (“IEEE”) Fellow and, in 2006, I was awarded the 2006 Frederick Emmons Terman Medal by the American Society of Engineering Education (“ASEE”) and HP Corporation for my contributions to electrical engineering.

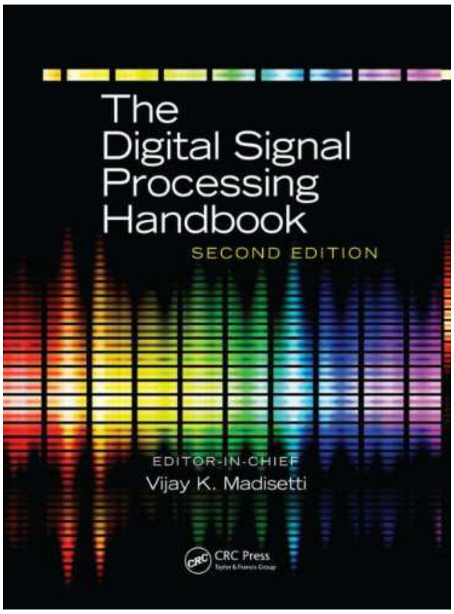
15. I am a Full Professor of Electrical/Computer Engineering at the Georgia Institute of Technology (“Georgia Tech”) since 1989. I lead several research and educational programs at Georgia Tech in the area of digital signal processing and computer engineering, including chip and circuit design.

16. I have authored, co-authored, or edited several books in the area of computer systems and distributed systems in the past twenty years, including:

- V. Madisetti, VLSI Digital Signal Processors, IEEE Press (1995).
- M. Romdhane, V. Madisetti, J. Hines, Quick-Turnaround ASIC Design in VHDL, Springer Verlag (1996).

- V. Madisett, D. Williams (Editors), The Digital Signal Processing Handbook (First Edition) (1998).
- V. Madisetti (Co-Editor), VHDL: A CD-ROM Interactive Tutorial: Electronics Systems Design Methodologies, IEEE Standards Press, (1997).
- V. Madisetti, A. Arpnikanondt, Platform-Centric Approach to System-on-Chip (SoC) Design (2001).
- V. Madisetti, The Digital Signal Processing Handbook – Second Edition (2009/2010).
- A.Bahga, V. Madisetti, Cloud Computing: A Hands-On Approach (2013).
- A. Bahga, V. Madisetti, Internet of Things: A Hands-On Approach (2014).

17. I have been involved in research and technology in the area of digital signal processing since the late 1980s, and I am the Editor-in-Chief the IEEE Press/CRC Press's 3-volume Digital Signal Processing Handbook (Editions 1 & 2) (1998, 2010).



18. Over the past three decades I studied, used, and designed image and video processing and wireless networking circuits for several applications, including digital and video cameras, mobile phones and networking products for leading commercial firms.

19. Prior to and during the timeframe of the patents-at-issue, some of the work in the area of digital image processing, video processing, networking technologies, and software engineering include:

- M. Romdhane, V. Madisetti, "All Digital Oversampled Front-End Sensors", IEEE Signal Processing Letters, Vol 3, Issue 2, 1996.
- A. Hezar, V. Madisetti, "Efficient Implementation of Two-Band PR-QMF Filterbanks", IEEE Signal Processing Letters, Vol 5, Issue 4, 1998.

- R. Tummala, V. Madisetti, System on Chip or System on Package”, IEEE Design & Test of Computers, Vol 16, Issue 2, 1999.
- V. Madisetti, “Electronic System, Platform, and Package Codesign”, IEEE Design & Test of Computers, Vol 23, Issue 3, 2006.

20. I have been active in the area signal processing systems, analysis of noise, and interference and mobile devices communications systems for several years, and some of my publications in this area include, “Adaptive Mobility Management in Wireless Networks, Electronics Letters, 1999, “Frequency Dependent Space-Interleaving of MIMO OFDM Systems” Proc. IEEE Radio and Wireless Conference (RAWCON ’03), 2003, “Embedded Alamouti Space Time Codes for High Rate and Low Decoding Complexity”, Proc. Of IEEE Asilomar Conf. on Signals, Systems and Computers, 2008; and “Asymmetric Golden Codes for Fast Decoding in Time Varying Channels”, Wireless Personal Communications (2011).

C. <u>Compensation</u>

21. I am being compensated by Google Inc. at the rate of $500 per hour for my work in this case, including time spent testifying. This rate is my standard hourly rate for engagements of this nature. I am also being reimbursed for reasonable fees and expenses, including hotel and travel expenses, incurred as a result of my work in this case. My compensation does not depend on the outcome

of the case and the fact that I am being compensated has not altered the opinions that I have or will give in this case.

II. UNDERSTANDING OF APPLICABLE LEGAL STANDARDS

22. My opinions are also informed by my understanding of the relevant law. I understand that the patentability analysis is conducted on a claim-by-claim and element-by-element basis, and that there are several possible reasons that a patent claim may be found to be unpatentable.

A. Interpreting Claims Before the Patent Office

23. I understand that *Inter Partes* Review is a proceeding before the United States Patent & Trademark Office for evaluating the validity of an issued patent claim. I understand that claims in an *Inter Partes* Review are given their broadest reasonable interpretation that is consistent with the patent's specification. I understand that a patent's "specification" includes all the figures, discussion, and claims within the patent document. I understand that the Patent Office will look to the specification to see if there is a definition for a claim term, and if not, will apply the broadest reasonable interpretation from the perspective of a Person Having Ordinary Skill In The Art (PHOSITA) at the time the invention was made.[1]

[1] I and the Petitions do not always use PHOSITA to refer to this hypothetical skilled artisan. The terms "person of ordinary skill," "ordinary artisan," and "skilled artisan" are sometimes used, and should be understood to synonyms of PHOSITA.

24. I understand that in deciding whether to institute *Inter Partes* Review,

25. "[a] claim in an unexpired patent shall be given its broadest reasonable construction in light of the specification of the patent in which it appears." 37 C.F.R. § 42.100(b). I understand that, unless the specification redefines a claim term or otherwise expressly narrows its scope, the broadest reasonable construction of a claim term should encompass the ordinary meaning of that claim term to a PHOSITA as of the filing date of the relevant patent, and that this ordinary meaning may be evidenced by contemporaneous dictionaries. I applied this broadest reasonable construction standard to my review of the claims of the patents-at-issue discussed below, including, without limitation, the claim terms which I specifically discuss below.

B. <u>Anticipation</u>

26. I understand that a single prior art reference, article, patent or publication "anticipates" a claim if each and every element of the claim is disclosed in that prior art reference. I further understand that, where a claim element is not explicitly disclosed in a prior art reference, the reference may nonetheless anticipate a claim if the missing claim element is necessarily present in the apparatus or a natural result of the method disclosed—i.e. the missing element is "inherent."

C. Obviousness

27. I understand that the prior art may render a patent claim "obvious." I understand that two or more prior art references (e.g., prior art articles, patents, or publications) that each disclose fewer than all elements of a patent claim may nevertheless be combined to render a patent claim obvious if the combination of the prior art collectively discloses all elements of the claim and one of ordinary skill in the art at the time would have been motivated to combine the prior art in such a way. I understand that this motivation to combine need not be explicit in any of the prior art, but may be inferred from the knowledge of one of ordinary skill in the art at the time the patent was filed. I also understand that one of ordinary skill in the art is not an automaton, but is a person having ordinary creativity. I further understand that one or more prior art references, articles, patents or publications that disclose fewer than all of the elements of a patent claim may render a patent claim obvious if including the missing element would have been obvious to one of skill in the art (e.g., the missing element represents only an insubstantial difference over the prior art or a reconfiguration of a known system).

28. I understand that the teaching of the prior art is viewed through the eyes of a person of ordinary skill in the art at the time claimed invention was made. To assess the level of ordinary skill in the art, I understand one can consider the types of problems encountered in the art, the prior solutions to those problems

found in the prior art references, the rapidity with which innovations are made, the sophistication of the technology, and the level of education of active workers in the field. My opinion as to what constitutes a relevant person of ordinary skill in the art is set forth below.

29. I understand that under an obviousness analysis, a patent for a claimed invention may not be obtained, notwithstanding that the claimed invention is not identically disclosed in a single piece of prior art, if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date (i.e., the date of the invention) of the claimed invention to a person having ordinary skill in the art in the relevant field.

30. I understand that a person of ordinary skill in the art provides a reference point from which the prior art and claimed invention should be viewed.

31. It is also my understanding that there are additional considerations that may be used as further guidance as to when the above factors will result in a finding that a claim is obvious, including the following:

- the claimed invention is simply a combination of prior art elements according to known methods to yield predictable results;
- the claimed invention is a simple substitution of one known element for another to obtain predictable results;

- the claimed invention uses known techniques to improve similar devices or methods in the same way;
- the claimed invention applies a known technique to a known device or method that is ready for improvement to yield predictable results;
- the claimed invention would have been "obvious to try" choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success;
- there is known work in one field of endeavor that may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations would have been predictable to one of ordinary skill in the art;
- there existed at the time of invention a known problem for which there was an obvious solution encompassed by the patent's claims; and
- there is some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention.

32. Finally, I understand that a claim may be deemed unpatentable for obviousness in light of a single prior art reference, without the need to combine references, if the elements of the claim that are not found in the reference can be supplied by the knowledge or common sense of one of ordinary skill in the relevant art.

III. MATERIAL RELIED ON IN FORMING OPINIONS

33. In forming my opinion, I have relied on the patent-at-issue's claims, disclosure, and file history; on the eight Petitions for *Inter Partes* Review referenced above and the exhibits cited there; on the other materials explicitly cited in this declaration; and my own experience, expertise, and knowledge of the person of ordinary skill in the art in the relevant timeframe.

IV. OVERVIEW OF PATENTS-AT-ISSUE

34. The patents-at-issue generally claims "devices" (or their use)—which are referred to as "Internet direct cameras" or "Internet direct devices"—that are nothing more than various combinations of well-known features of digital cameras and general mobile communications devices (such as cell phones and personal digital assistants that have camera or video capabilities).

A. <u>The Specifications of the Patents-at-Issue</u>

35. The specifications of the patents-at-issue describe the field of the alleged invention as an integrated Internet camera or system that is simple to install, operate, and maintain, and further that "seamlessly and automatically

transmits, receives, stores and/or archives still images, video and/or audio to and from a web site service/monitor center over the Internet using one or more integrated Internet cameras." Exhibit A, '524 patent, col. 1:10-17. The patents-at-issue are directed to the use of Internet-enabled cameras and devices, referred to as an "Internet direct camera" or an "Internet direct device," that automatically connects to a communication network on power up via a primary mode of connection and automatically switch to another mode of connection if the primary mode becomes unavailable.

36. Although the patents-at-issue contain *generally* the same description of their asserted invention, there are some differences among the various patents. The '172 patent, '600 patent, '197 patent, and '991 patent are based on continuation applications from the parent application that issued as the '524 patent and share a common specification. The '542 patent issued from a continuation-in-part application from the '991 patent application, and the '806 patent issued from a continuation of the '542 continuation-in-part application. Thus, the '542 and '806 patents do not share a common specification with the specifications of the other patents-in-suit.[2] For ease of reference, I will refer to the '524 patent's specification

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[2] For example, new matter added to the specification of the '542 and '806 patents that is not present in the specifications of the earlier applications is found in the section of the '542 patent entitled "Objects and Summary of the Invention") from

in this declaration, which is attached as **Exhibit A**. When I reference the new matter added to in the continuation-in-part application, I will refer to the '542 patent's specification, which is attached as **Exhibit B.** All of the patents-at-issue claim priority to provisional U.S. App. No. 60/702,470, filed on July 26, 2005 (the "Provisional," which is **Exhibit C** to this declaration). *See, e.g.*, '524 patent (cover).

37. The common portion of the specifications of the patents-at-issue describe the field of the alleged invention as an integrated Internet camera or system that is simple to install, operate, and maintain, and further that "seamlessly and automatically transmits, receives, stores and/or archives still images, video and/or audio to and from a web site service/monitor center over the Internet using one or more integrated Internet cameras." '524 patent, col. 1:10-17. As discussed herein, based on the teachings of the specifications of the patents-at-issue, I interpret the terms "Internet direct camera" ("IDC") and "Internet direct device" ("IDD") to include at least a camera (or device) that is capable of connecting to the Internet without the necessity of connecting to another device, such as a PC.

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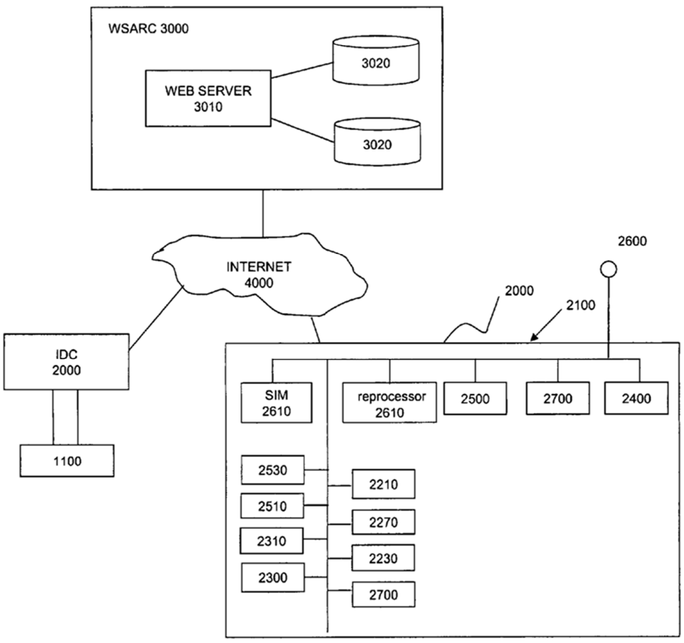
column 3, line 7, through column 4, line 31. *Compare* '524 patent, at "Objects and Summary of the Invention," col. 1:63–2:67, which omits the cited discussion in the '542 patent.

38. Figure 2 below is found in the specification of all patents-in-suit and purports to depict the claimed integrated internet camera system. '524 patent, col. 3:15-20. As depicted, an Internet direct camera ("IDC 2000) connects to a "website archive and review center" (WSARC 3000) via the Internet 4000. Id. The WSARC 3000 includes a web server 3010 and one or more databases 3020. Id. at col. 3:20-22. The IDC 2000 transmits still images, video, and audio (collectively, "data") over the Internet to the WSARC, where that data is stored or archived. *Id.* at col. 3:20-26.

Fig. 2



39. In the preferred embodiment, the Internet direct camera (an "IDC") connects to the network via a primary mode of connection but can switch to another mode of connection if the primary mode becomes unavailable:

> Preferably, the IDC **2000** connects to the Internet via a primary mode of communication and switches over the secondary mode of communication if the IDC **2000** detects a failure in the primary mode of communication. For example, if the IDC **2000** is programmed or setup to use Wi-Fi as a primary mode of communication, the IDC **2000** can switch to a cellular communication if the Wi-Fi communication is lost or unavailable.

‘524 patent, col. 3:30-37.

40. According to the specification, “[t]he IDC 2000 can connect to the Internet via, but not limited to, land line, DSL, cable, satellite, wireless network, cellular, Wi-Fi, Wi-Max and the like.” ‘524 patent, col. 3:27-29. Each of these are considered to be distinct “modes” of “connection” or “communication” to a “communication network” or the “Internet.” *Id.*, col. 3:27-37. The camera or device initially connects during power up to a “primary mode” and can switch to “another mode” if the primary mode becomes unavailable. *Id.*

B. Similarities And Differences Among The Issued Claims

41. There many several similarities among all of the challenged claims, but there are some differences that divide the challenged claims into different conceptual groups or sets for the purposes of my analysis.

42. As discussed below, every claim of the patents-at-issue require an Internet direct camera (IDC) or Internet direct device (IDD) that “automatically” connects “on power-up” using one of a “plurality of available modes of

[connection3], which is designated a primary mode of [connection]." "designated" "primary mode of connection." If the "primary mode" becomes "unavailable," every challenged claim requires that the IDC or IDD "automatically switches" to "another mode of connection."

43. These requirements were added to and relied upon by the applicant to distinguish the prior art that was before the Office during the prosecution of the application that became the issued '524 patent. The Examiner in that prosecution issued repeated rejections based upon the prior art. In traversing an obviousness-based rejection by the Examiner, the applicant argued:

> Further, paragraph [0065] in Lu, cited by the Examiner, merely describes that the terminal system searches the available network access in a predetermined order until it finds an available network access. Contrary to the Examiner's assertion, Lu does not teach or suggest that the terminal ***connected to a first network will automatically switch to another network when the first network becomes unavailable, as required in pending claims 1, 3-5, 7 and 9-29***.

[3] The challenged claims sometimes use the phrase "mode of communication" in place of "mode of connection," but I understand (and a person of ordinary skill in the art would have understood) these to be synonyms.

File Wrapper of U.S. Patent Application Serial No. 11/484,373, p. 170, June 3, 2009 Applicant's Response after Final Office Action, p. 9 (emphasis added).

44. Although all the claims require the recited connection to a primary mode of connection and then a switch to another mode should the primary mode become "unavailable," they differ in what they must connect to. The specifications of the patents-at-issue describe the IDC or IDD connecting to a WSARC in order to perform various storage, display or transmittal functions. Several of the issued claims, however, omit any mention of a WSARC and discuss instead connections between or among IDCs or IDDs without the use of (or need for) a WSARC.

45. This difference divides the challenged claims (and the Petitions) into two general categories:

46. The '524 patent, '172 patent, '197 patent, '806 patent, and half of the challenged claims of the '991 patent generally concern an "Internet Direct Camera" ("IDCs") or "Internet Direct Device" ("IDD") transmits and receives images (still or video) to or from a so-called "website review and archive center" (or "WSARC"). A WSARC is nothing more than a remote server with databases to store or manage images that is accessible via the "Internet" or a "communication network" through well-known wired, wireless, cellular, or other communication means. These "WSARC" claims are challenged in Petition Nos. 1, 2, 4, 5 and 8.

47. The ‘600 patent, the ‘542 patent, and the other half of the ‘991 patent generally concern an generally concern an “Internet Direct Device” (“IDD”) that transmits and receive images (still or video) to or from other “Internet Direct Device” via the Internet or a communications network. These challenged claims relate to photo sharing and/or videoconferencing across a plurality of devices with or without a WSARC. These “non-WSARC” claims are challenged in Petition Nos. 3, 6 and 7.

48. I address other, less significant differences among the challenged claims as appropriate below.

C. The Provisional Application’s Lack of Support For The Issued Claims

49. The patents-at-issue claim priority to a provisional application (the “Provisional”), which, as noted, is **Exhibit C** to this declaration. *See, e.g.*, ‘524 patent (cover). I have been asked to evaluate whether the subject matter of the challenged claims in the patents-at-issue is described in the Provisional such that a person of ordinary skill in the art would have recognized that subject matter in the Provisional.

50. I understand that to support the issued claims, the Provisional’s disclosure must convey with reasonable clarity to those skilled in the art that, as of its filing date, the applicant was in possession of the invention in the claims as issued. I understand that possession is determined by reading the Provisional and

determining, from the perspective of a person of ordinary skill in the art, whether the Provisional actually describes what was later claimed. I further understand that it is not enough that the subject matter be obvious in view of the Provisional's disclosures, but instead that the Provisional must actually or inherently disclose each claim element. I understand that in this context the word "inherently" means that the claim element must be necessarily present in the device, system or method described in the Provisional.

51. I have reviewed each challenged claim to the Provisional, and I have determined that each challenged claim contains at least two elements not described in the Provisional. Each challenged claim requires that at least its Internet direct camera or Internet direct device connect to the Internet and/or a communications network on power-up using one of a plurality of available modes of connection, which is designated as a "primary mode of connection." Each challenged claim also requires that its Internet direct camera or Internet direct device automatically switch to another available mode of connection when the primary mode of connection to said communications network is unavailable.

52. I have not been able to find either of these claim elements in the Provisional. It is further my opinion that the Provisional does not describe either of these elements either expressly or inherently such that a person of ordinary skill in the art would recognize that the applicant had possession of them. Rather, as to

both elements, the Provisional describes an "Internet Direct Camera (IDC)" that transmits images to a "Web Site Storage Center (WSSC)" on the Internet. File Wrapper of U.S. Provisional Application No. 60/702,470 (Ex. 1002, in each of IPR2017-02052 thru -02059), p. 3. It describes "[s]ix ways to transmit data to internet [sic]":

> a) Cable (with local wireless to PC or wired directly)
>
> b) T-Line (with local wireless to PC or wired directly)
>
> c) DSL (with local wireless to PC or wired directly)
>
> d) WiMax or Wi-Fi wireless direct to internet
>
> e) Satellite wireless transmission direct to internet
>
> f) Cell phone number direct to WSSC
>
> And any combo of above as primary with another as secondary backup

Id., pp. 3-4.

53. What I have not found in the Provisional, however, is any description of a device, system or method that automatically connects to the Internet or any other communication network "on power up" using any one of its disclosed ways of transmitting data, as claim 1 requires. The Provisional simply identifies ways in which its device can transmit data to the Internet. It does not describe how the device connects to any of the recited methods of transmission. It also does not state in any place when the connection to the recited method occurs.

54. The Provisional also fails to describe any apparatus, system or method for "automatically" switching to "another mode of communication" when the primary mode of communication is unavailable. The Provisional references only using a secondary "way" of transmission as a "backup," but does not describe a device that automatically switches to a backup. In the absence of a disclosure of automatic switching, the switch to a backup would have had to have been done by the user as part of a manual process.

55. Although I do not believe that the Provisional provides written description support for the challenged claims, none of my opinions in this declaration are affected if the Office disagrees.

D. Level Of Skill In The Art

56. I have evaluated the prior art and the challenged claims based upon the level of ordinary skill in the art as of the asserted invention date of the subject matter of the challenged claims. For the purposes of this declaration, I have assumed that the alleged invention date is the earliest asserted filing date of the challenged claims, which is the filing date of the Provisional (July 26, 2005). if the time of the alleged invention is assumed to be within one year (or even a little more) of the filing date of the Provisional July 26, 2005, including the date of the utility application filing (July 11, 2006).

57. As of the asserted invention date, one of ordinary skill in the art in the field with which the patents at issue pertains would have had at least a Bachelor's Degree in Electrical Engineering, Computer Science, or Computer Engineering, or equivalent experience, and 1-2 years of experience in the field of computer networking and/or telecommunications. Alternatively, an individual without a bachelor's degree, but with additional years of experience developing and deploying voice, video, and call processing applications would also be a person of ordinary skill in the art. My opinions expressed herein would not, however, be altered if a person of ordinary skill were deemed to have slightly more or less experience and/or education. My opinions also would not vary if the time of the alleged invention is assumed to be within one year (or even a little more) of the filing date of the Provisional July 26, 2005, including the date of the utility application filing (July 11, 2006).

58. I believe that I would qualify as a person of at least ordinary skill in the art, and that I have a sufficient level of knowledge, experience, and education to provide an expert opinion in the field of the patents-at-issue. By the 2004 timeframe, I have personally designed and implemented voice, VOIP, video and audio systems over local and wide area networks for over ten years. I have worked on the design and implementation of VOIP devices and products for voice and video for enterprise networks for commercial deployment and implemented

such functionality on commercial mobile devices, such as those deployed over cellular and local area networks.

59. My opinions in this declaration are based on the perspective of a person of ordinary skill in the art as of the alleged invention date of the patents-at-issue. All of my opinions are based upon my knowledge and understanding of the level of ordinary skill in the art as of the challenged claim's asserted invention date. This is true even if my testimony is stated in the present tense. Each of the statements below reflects my opinion based on my review of the prior art, the disclosures of the '524 patent, its file history, and the challenged claims.

E. Claim Construction

60. I understand that each term of an unexpired patent claim in *inter partes* review is given its "broadest reasonable construction in light of the specification of the patent in which it appears." 37 C.F.R. § 42.100(b). In reaching the opinions set forth in this declaration, I have applied the plain meaning that a person of ordinary skill in the art would have applied to the terms during the relevant period based upon their knowledge in the field and after review of relevant passages from the specifications of the patents-at-issue.

61. I may further explain the plain meaning of other terms of the patents-at-issue in the course of my discussions of the prior art below.

V. OVERVIEW OF THE STATE OF THE ART RELEVANT TO THE PATENTS-AT-ISSUE

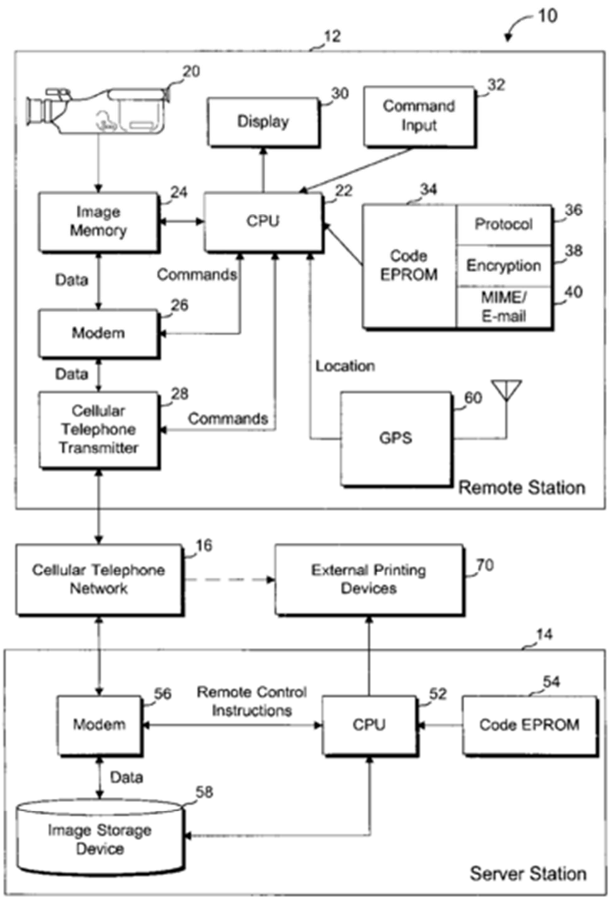
62. As I discuss in more detail below, the camera features described in the specifications of the patents-at-issue—such as storage, image compression, auto-zoom, motion sensors, video display, light indicators, and view finders—were well known features and functionality of digital cameras as of the filing date. Moreover, connecting a digital camera to the Internet was well known as of the filing date. Further, uploading digital images, video, and audio to a website for storage and management was well known as of the filing date. Well before the before the filing of any application for the patents-at-issue, it was also well known that digital cameras and cell phones integrating a digital camera were enabled to access the Internet to transfer, store, or archive images, video, or audio.

A. <u>Survey Of Publications And Patents In The Field</u>

63. For example, it was well-known in the mid-1990s that images were transferred from video and still image cameras over a wireless network to a server, as discussed in U.S. Patent No. 5,806,005 to Hull, et al., ("Hull"; Ex. D).[4]

[4] I refer to various patents or other publications in this background section to help illustrate the knowledge of a person of ordinary skill in the art. Each of these patents or other publications is available for review on the USPTO website or via third-party sources, such as Google.com/patents.

64. In Hull, a portable image transfer system include a digital camera that captures images and video in digital form and a cellular wireless transmitter controlled by an integrated CPU. The CPU transmits the images from the camera memory to a server over a wireless link after checking or “pinging” to see if the wireless link is available (*see* Hull, col 2:40-65). The server receives these messages and stores the images. The diagram of Hull (Figure 1) is shown below identifying the camera and the server. The server also transmits images back to the camera, so bidirectional upload and downloads are disclosed (*See* col 1:5-60).



65. In U.S. Patent 5,917,542 to Moghadam, et al. (the "Moghadam" Patent; Ex. E), filed on Feb 18, 1997 and issued on June 29, 1999, the inventors disclose a system for image capture via a camera and a fulfilment server, automatically, over a wireless link. If the link is not of sufficient quality, or it is interrupted during a transfer, the image is "backed up" in long term memory for future transmission, when conditions improve. The connection to the server is made automatically at "power-on" and images are transferred over the wireless link automatically to an account associated with the camera. *See* Moghadam, Figure 3 and col 3:18-68). The system also discloses "channel assessment signals" that determine if images can be transmitted based on channel conditions for wireless transfer.

U.S. Patent Jun. 29, 1999 Sheet 3 of 4 5,917,542

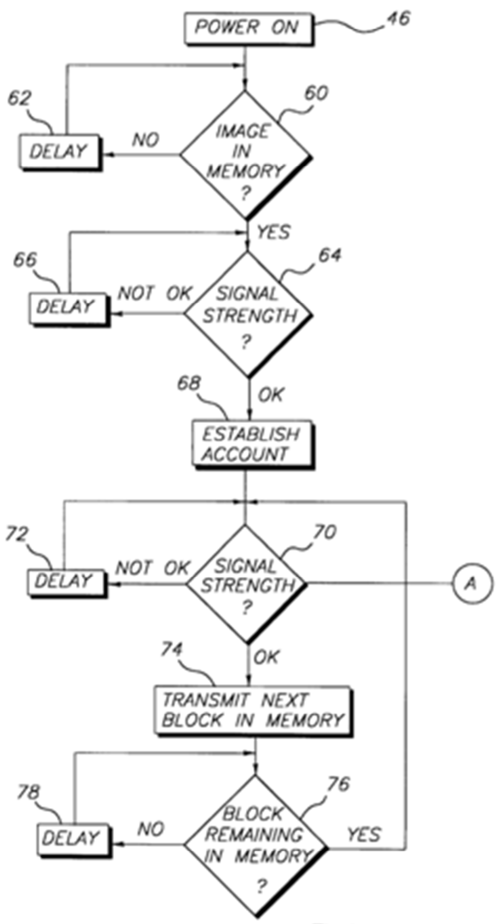


FIG. 3

66. In US Patent 6,980,232 to Suzuki (the “Suzuki” patent; Ex. F), which was filed on Feb 20, 2001, and issued on Dec 27, 2005, images are automatically uploaded onto a predetermined server on the network using a set of schedules.

67. In the paper “Photo Annotation on a Camera Phone”, dated April 24-29, 2004, (Ex. I) the authors describe a system that uses a digital camera with a light weight client application and server to store and download images and meta-

data that assists the user in annotation on the camera phone by providing guesses as to the content of the photos. The camera phone also included a built-in XHTML (Extensible Hypertext Markup Language) browser that allowed user interaction with the collaborative repository of annotated images. It was also recognized that network unpredictability was a problem and often the network failed to transmit the image and metadata to the server on a link that was very slow (See Page 1404). Also, the design of efficient user interfaces was also seen as important. The users of the camera phones would share their photos using Bluetooth and infrared capabilities directly with other users (See Page 1406).

68. In US Patent 7,936,391 to Ward, et al. (the "Ward" patent; Ex. G), which claims a priority date of Feb 20, 1997, the inventors disclose a digital camera that transmits images of a cellular network and a wireless LAN network. Therefore, as early as 1997 it was known to use multiple communication interfaces (to a cellular network and a Wireless LAN or WiFi network, or other "plurality of networks" –on the same camera phone alternatively. The images can be uploaded to servers on the network to accounts associated with the camera phone through a choice over multiple wireless interfaces. (*See* Ward at Figure 2, for instance).

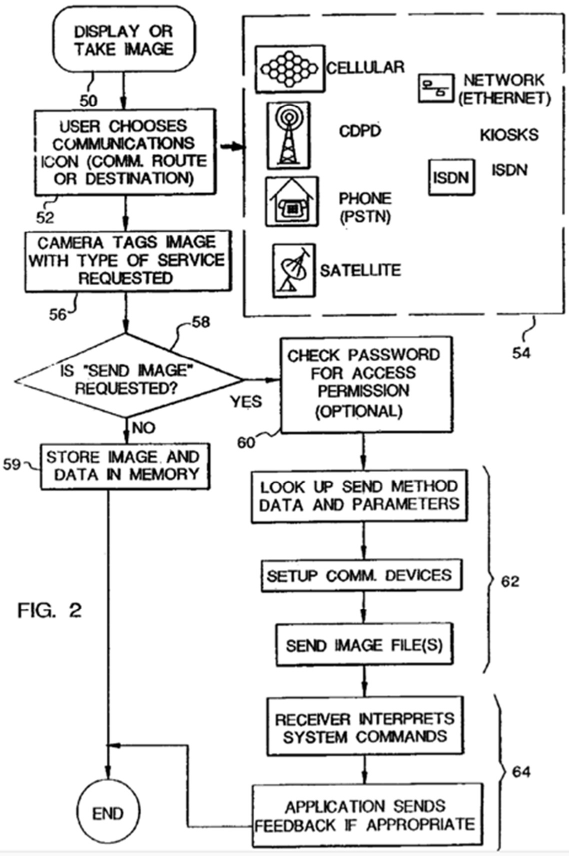


FIG. 2

Ward, Fig. 2.

69. In "Wireless Transfer of Images from a Digital Camera to the Internet via a Standard GSM Mobile Phone", by Perter M. Corcoran, et al, published August 2001 (Ex. A), the authors describe the infrastructure using the GSM cellular network between digital cameras and Internet Websites and servers. See Figure 1 (below):

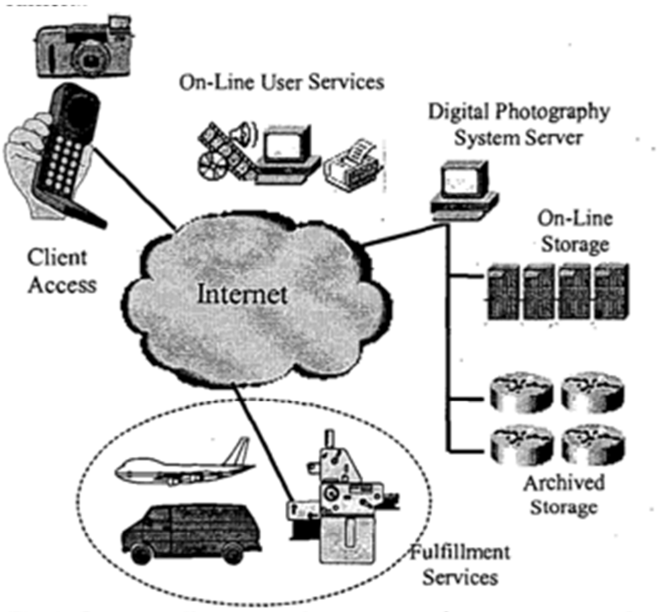


Fig 1: Diagram illustrating the various web services required by most users of an Internet PhotoCommunity. .

70. Two-way image transfer between the camera and the servers through a Web browser interface allows full functionality for picture editing and post processing. *See* Figure 3 (below):

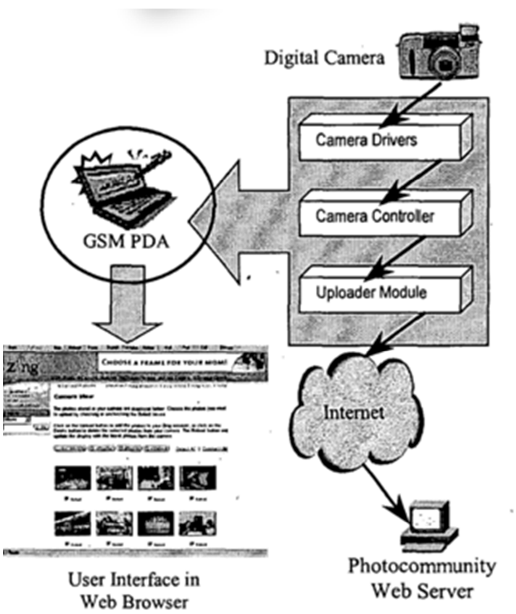


Fig 3: The component elements of a Home-PC based Direct-to-Web Interface for Digital Cameras.

71. Two-tier and three-tier architectures for the digital camera infrastructure is shown below in Figure 6 utilizing robust communication protocols.

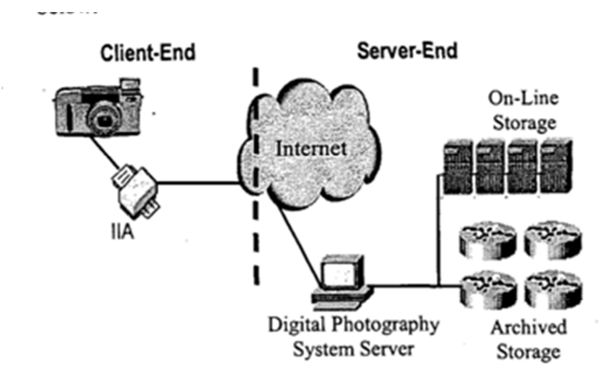


Fig 6(a): The Two-Tier Infrastructure.

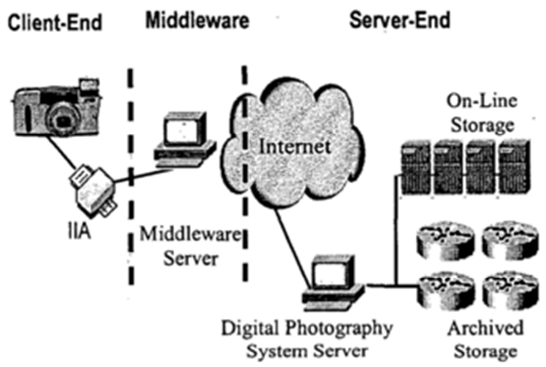


Fig 6(b): The Three-Tier Infrastructure.

72. In "Expanding the Digital Camera's Reach", by C. Narayanaswami and M. T. Raghunath, in IEEE Computer Magazine, December 2004 ("Narayanaswami" Ex. J or Ex. 1010, IPR2017-02052; Ex. 1013, IPR2017-02053; Ex. 1013, IPR2017-02056; Ex. 1016, IPR2017-02057; Ex. 1010, IPR2017-02059),

which I discuss in more detail below, the authors describe several features of the evolving digital cameras as follows (*See* Narayanaswami, page 66):

- Direction connection to network infrastructure
- Support for variety of content formats and supported Web browsers
- Support for direct user interaction using touch-screens
- Support for short range wireless networks to communication with wireless devices
- Connection to the internet to store and retrieve images from Web servers and repositories
- Quick search and retrieval of images (*See* Narayanaswami, Page 69).
- Support for wired, short-range *and* long-range wireless communication capabilities, and use of the short-range and long-range wireless communications simultaneously in certain applications (e.g., to establish “trust”, *See* Narayanaswami, Page 70).

73. Figures 4 and 5 from Narayanaswami disclose an architecture for the digital camera infrastructure as follows:

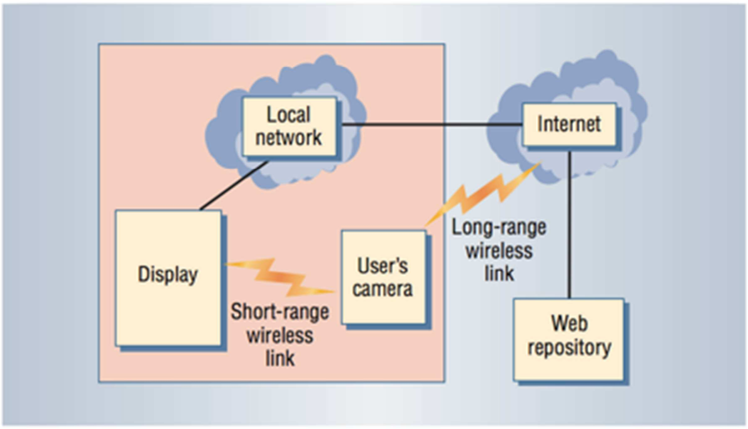


Figure 4. Image transfer via indirect symbiosis. When images are stored in a Web repository, if the bandwidth between the display and the Web server is greater than the direct link between the camera and display, letting the display fetch them directly can save the camera's battery power.

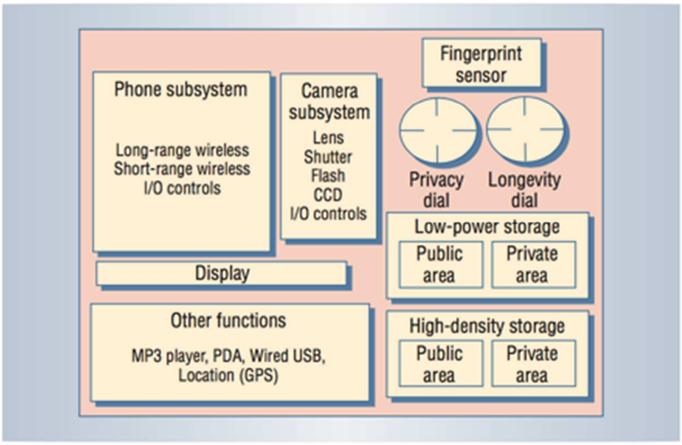


Figure 5. Hypothetical digital cell phone and camera components. Designed to function in different settings, this camera incorporates components such as a high-resolution imager, a phone with wide-area capability, and a location-tracking mechanism.

74. It was also well known that wireless and Internet-enabled devices could (and did) automatically switch between modes of connection in order to take advantage of more favorable connections or preserve communication if the initial network connection failed and/or became unavailable. For example, in their paper, "Flexible Network Support For Mobility," published in Proceedings of ACM/IEEE

MobiCom '98 (1998) (Ex. B), the authors disclose mobile devices supporting multiple active network interfaces (*see* Ex. B, pages 5 & 6). For example, they disclose that:

> … different networks that a user has access may offer different QoS guarantees. For instance, a mobile user may have simultaneous access to a GSM network that has low bandwidth but relatively low latency, as well as to a Metricom network that offers higher bandwidth but has higher and more variable latency. The mobile host might decide to use the GSM network for its low-bandwidth interactive flows, and the Metricom network for other flows that require high bandwidth but with a higher latency.

75. The paper also discloses that cost of accessing different networks may be a decisive factor in the interface selection phase. For example, users on the move may want to switch to "local" network access, whenever available, to reduce communication cost. Users may choose a cheaper and lower quality access network for personal communications, and a more expensive and better quality one for business communications. A user may also trust some networks more than others, and thus security and privacy may also play a role in selecting a connection mode among a plurality of modes.

76. The paper also discloses hand-offs for seamless transition from one active network to another simultaneously (*See* Ex. B, page 7). The paper also discloses that mobile devise will use 10 or 100 Mbits/s Ethernet in a suitably equipped office or home, but they use a slower wireless packet radio network elsewhere (*See* Ex. B, page 1).

77. This paper was hardly the only example of automatically switching between modes of connection that predates (or is contemporaneous with) the alleged invention date of the patents-at-issue. For example, in U.S. Patent Application US 2005/0197156A1, claiming a foreign priority date of Feb 10, 2004, and filed in the United States on Feb 9, 2005, entitled "Method of Selecting a Communication Network for a Mobile Communication Terminal on the Basis of Information on Wireless Network Access Points" ("Forquin"; Ex. H), the inventors disclose methods for selecting a communication network for a dual-mode communication device based on "Selection Criterion".

78. Forquin discloses using a wireless local area network instead of the GSM or UMTS network when the cellular coverage is unavailable (*see* Ex. H, ¶0006). It also discloses choosing the type of network that is most suited to the requirements of the dual-mode terminal (*See* Ex. H, ¶0008) based on certain characteristics, such as bit rate, radio frequency type, cost, etc. (*See* Ex. H, ¶0012).

79. Forquin also discloses that when switching from one network to another, the communication initially established for one communication network may be re-established on the other network (*see* Ex. H, ¶0018).

80. Forquin also discloses that the selection of the preferred mode of communications can be provided to the mobile telephone (identified in the patent as "UE") from the cellular network or be selected by the phone (*see* Ex. H, ¶¶0050-

0062, for instance), based on suitability. Forquin describes the use of both ordered and un-ordered lists of ranking (*see* Ex. H, ¶¶0049 – 0052).

81. Forquin further discloses automated switching from its parent cellular network to a local network and back if needed. (*See* ¶¶0059-0061). Switching can be dynamic as well based on instantaneous values of selection criterion (*see* Ex. H, ¶¶0052-0054).

82. Thus, at the time of the patents-at-issue earliest asserted invention, a person of ordinary skill in the art would have understood at least the following:

a. Digital cameras well known
b. Camera-enabled cell phones well known
c. Internet enabled cell phones and cameras, including cameras integrated into cell phones, were well known
d. Sharing photos, uploading and storing photos on Internet, well known.
e. Many ways to connect to the Internet to upload, store and retrieve data, including images, audio, and video.
f. WiFi and cellular connection to website-based repository or database for uploading, storing and retrieving digital images.
g. Auto-connection to a network a routine and trivial feature of cell phones, PDAs

h. Automatic switching from one network to another network routine.

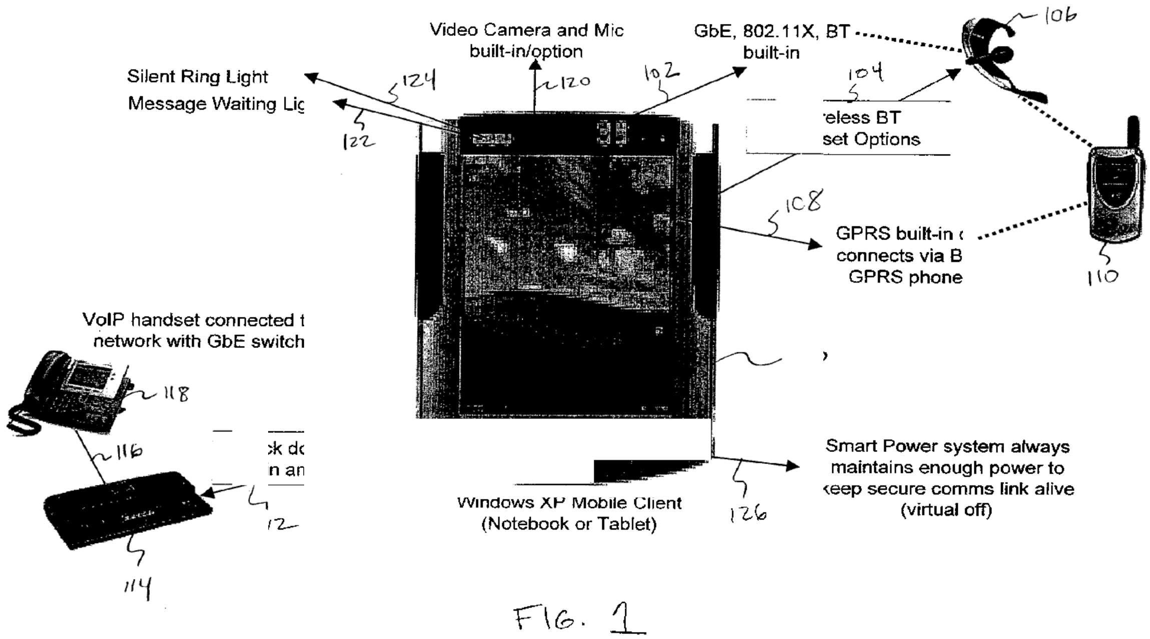
B. Certain Prior Art References At Issue In This Proceeding

83. In addition, the disclosures of the prior art references that form the grounds for my opinions of unpatentability of the identified claims of the ‘524 patent, I have provided an understanding of the state of the art prior to the priority date. I discuss some of these references below.

84. In discussing these references, I have chosen to cite certain teachings—both in the background section and as I discuss in detail the various prior art references that are the basis for the Petitions. My reference to a particular citation is not intended to be limiting, and I may reference additional points in the reference that support my opinions. For example, some of the Petitions may cite to additional or different portions of the prior art references, and I have reviewed and may rely on these citations or teachings in the course of offering opinions in this proceeding. In addition, although I have tried to be accurate in my citations, I reserve the right to correct an erroneous citation if I later learn of it.

85. **Nicholas.** U.S. Patent Application Publication No. 2004/0133668 to Nicholas, III (“Nicholas”), published on July 8, 2004. Nicholas discloses, among other things, an “end user device 100” defined as “any device capable of communicating data to or from a data communication network in accordance with

one or more wired and/or wireless communication protocols." Nicholas, ¶0019. Nicholas's end user device 100 includes an imaging system that can capture at least still and video images and audio: "Exemplary end user device 100 further comprises … an optional built-in video camera and microphone for enabling videoconferencing and the like." *Id.*, ¶¶0024, 0032, 0033; *see also id.*, Fig. 1 (120). *Id.*, ¶¶0024, 0032, 0033; *see also id.*, Fig. 1 (120). The data communication network includes an "Internet connection, including but not limited to cable modems, DSL, and ISP" as well as a variety of other wired and wireless networks. *Id.*; *see also id.*, ¶0020 & Fig. 1 (100). An exemplary depiction of Nicholas's end user device is below:



Id., Fig. 1.

86. Nicholas further describes how its end user device 100 can provide VoIP calling, video calls, and videoconferencing [*id.*, ¶¶0032, 0033, 0034], all of which are executed by the microprocessor [*id.*, ¶0037]. Nicholas also describes connecting to its primary mode of communication automatically on power up. *Id.*, ¶0046.

87. Nicholas's end user device "provides for seamless transitions between different data communication networks, thus permitting all network communication tasks to be performed in a seamless, uninterrupted manner regardless of the location of the device, the type of network connection being used, or the form of data communication being carried out." Nicholas, ¶0009.

88. Among other things, Nicholas discloses that its "end user device is provided that supports a connection to a plurality of data communication networks" that detects which data communication networks are available, "and selectively determines which of the plurality of data communication networks provides the most optimal communication channel." Nicholas, Abstract; *see also id*., ¶0008. The device determines which network "is optimal may be based on the type of data to be communicated (e.g., voice, video or computer data), the error rate associated with each available network, the number of anticipated 'hops' between the end user device and the remote network entity to which it needs to

communicate, the cost associated with establishing and maintaining a network link, the best path, and/or anticipated power consumption." Nicholas, ¶0008..

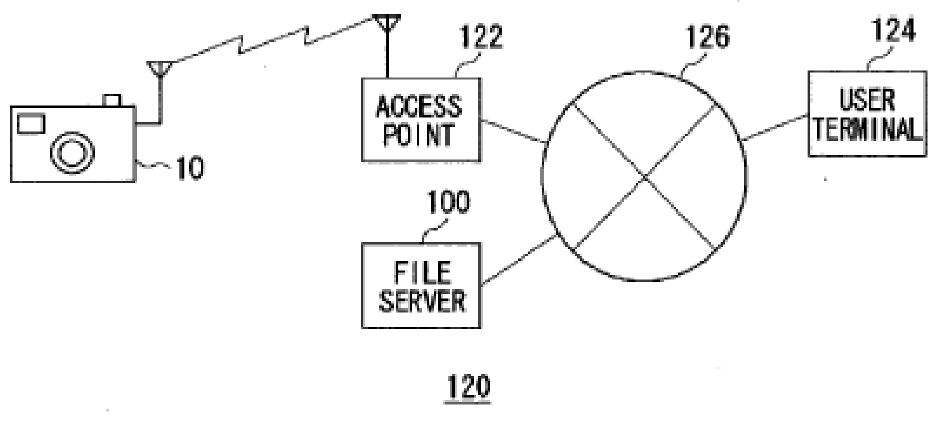
89. **Yamazaki.** Yamazaki describes "an image display apparatus and a camera that are provided with functions of communicating with a server through a network and transmitting and receiving image data to and from the server, and "an image communication system that distributes the image data by means of the image display apparatus, the camera and the server." Yamazaki, ¶0003. Yamazaki explains that the "camera 10 has access to the servers 52A, 52B, …52n through the network 50" and "[t]he servers [52A-n], have databases [53A-n], respectively, that store the image data. The image data recorded with the camera 10 is transmitted to the servers [52] and is recorded in the databases [53]." *Id.*, ¶¶0061-62. Yamazaki also discloses automatically transmitting an image captured by its electronic camera upon image capture, *i.e.*, when the picture is taken. *Id.*, ¶0025. Yamazaki further discloses that a user can "retrieve the image data recorded in the database 53A to reproduce the image on the image display 24 of the camera 10." *Id.*, ¶0063.

90. Yamazaki further discloses that, for ease of use, the owner of the device may elect to enter "and record the entered identification information as an owner's identification information in a memory such as a nonvolatile memory in the camera 10." *Id.*, ¶0066. Upon pre-setting the identification information, Yamazaki defaults to the previously-recorded information as the set information

and connects with its server. *Id.,* ¶¶0065, 0068, 0073. Moreover, "the camera 10 may also connect to the server 52 just after the setting of the user's identification information so as to evaluate the communicational condition." Id. ¶0072. A person of ordinary skill in the art would understand this passage to disclose automatic connection to a communications network and a file server on power-up.

91. **Inoue**. U.S. Patent Application Publication No. 2004/0109066 to Inoue, et al., published on June 10, 2004 ("Inoue"). . Inoue describes a digital camera for transmitting and receiving images that, when "powered on … automatically establishes a network connection with [a] file server" for the purposes of transmitting and receiving images over a communications network. Inoue, Abstract. Inoue's network connection can include a connection to the Internet (126). *See, e.g., id.,* ¶0060.

FIG.3



Inoue, Fig. 3.

92. Inoue describes a "processing block 16" that includes an "image processing unit 44," a "transmission processing unit 52," a "reproduction processing unit 48," memory units, and various other elements. Inoue, ¶0053 & Fig. 1. The transmission unit contains a "communication control unit 72" which controls an internal "option card 68" able to access various communication networks. *Id.*, ¶0049 ("The card slot 20 [in the camera] retains an option card 68 detachably"). "The communication control unit 72 exercises control necessary to communicate with the file server by using the option card 68 loaded in the card slot 20 if the option card 68 is a communication card." *Id.*, ¶¶0056, 0060 ("The digital camera 10 and the access point 122 communicate with each other over a wireless LAN"). Inoue teaches that its digital cameras (Internet direct devices) transmit images "upon obtainment of the image" to a server. *Id.*, ¶0018. "Upon obtainment of the image" includes image capture. *Id.*, ¶ 15 ("The 'image obtained by image pickup,' shall cover both an intact image just picked up and an image obtained through compression or the like after picked up."), ¶ 48 ("The image pickup block 12 shoots a subject under user instructions.").

93. Inoue describes its file server as managing the images of a plurality of digital cameras from a plurality of users in a user-specific folder structure. *Id.*, ¶0059. The folders comprise accounts associated each of Inoue's cameras on a file

server for managing images (e.g., what the patents-at-issue refer to as user accounts on a "WSARC"). Inoue also states that its digital camera can download images from the file server. Id., ¶¶0009-0013. Inoue further states that "[w]hen the digital camera is powered on, it automatically establishes a network connection with the file server in an activation process." Inoue, Abstract.

94. **Umeda**. U.S. Patent Application Publication No. 2002/0150228 to Umeda, et al., published on October 17, 2002 ("Umeda"). Umeda describes devices that connect to "mobile communication system … for roaming between different kinds of networks." Umeda, Abstract. Umeda's networks also can include the Internet. *Id.*, ¶0027. Umeda also describes various devices, including a "large-size TV set" and a "mobile phone," that utilize cameras for capturing video images for transmission to others as part of a videoconferencing system. *Id.*, ¶0097 & Fig. 10.

95. Umeda explains that its devices have the capability of connecting to one of a plurality of modes of connection, and of selecting a mode of connection based upon predetermined criteria. For example:

> Modifications in networks in use, such as those in a case where a communication path is changed to a network having a different transmission quality, terminal capability, or the like, may become the object to be inspected. An example of this case is one where a communication terminal which can utilize both of a cellular mobile communication system and a wireless LAN system is switched between these different networks. In the case where the communication terminal 200 is initially communicating in the cellular

> mobile communication system, whether the wireless LAN system, which is the other system, can be utilized or not is determined by measuring the reception level or the like in the NW detecting section 206. In the case where the wireless LAN system is more favorable for the user from the viewpoints of transmission quality, capability, and the like while communications are possible, switching (changing) is carried out between the systems (networks).

Umeda, ¶ 52.

96. **Kusaka**. U.S. Patent Application Publication No. 2004/0109063 to Kusaka, et al., published on June 10, 2004 ("Kusaka"). Kusaka describes "[a]n electronic camera 100" that "automatically transits captured image data and user identification to a gateway server 160 over a wireless portable telephone link 130." Kusaka, Abstract. Kusaka's "gateway server 160 manages image albums created on a per-user basis on multiple image servers on the Internet … and stores the image data received from the electronic camera 100 in an image album corresponding to the user identification information on the selected image server." *Id.*

97. Kusaka explains that its camera captures, processes, and sends/receives images to and from storage in "an image storage device such as an image server on the Internet[.]" *Id.*, ¶0003; *see also id.*, ¶¶0219-0221. Kusaka also describes its digital cameras as automatically transmitting image data captured by its camera upon image capture, *i.e.*, when the picture is taken. *Id.*, ¶¶0219, 0236. Kusaka further explains that its device automatically connects to its image server

by one of a several available networks or links, including via an "wireless portable telephone link 130" established by "wireless portable telephone circuit 72" integrated into the camera (*id.*, ¶¶0219, 0234, 0236 & Fig. 4); a "wireless LAN (Ethernet™)" that allows Internet communication (*id.*, ¶0534); and/or by connecting to portable telephone 120" using "a short-range communication link 110," which includes both short-range wireless and wired communication (*id.*, ¶0273). .

98. **Nair**. U.S. Patent Application Publication No. 2004/0127208 to Nair published on July 1, 2004 ("Nair"). Nair relates "generally to the field of wireless technology and, more particularly, to seamless routing between wireless networks." Nair, ¶0003. Its teachings apply to any wireless device with capability for communicating by wireless technology—*e.g.*, "wireless device 12 can be, for example, a wireless personal digital assistant (PDA), a cellular phone, or any other wireless-capable electronic device." *Id.*

99. Nair further explains that its technology allows wireless devices to have "uninterrupted and effective wireless access for the wireless device 12" by "automatically and seamlessly" handing off communications from a WLAN to a wireless wide area network (a "WWAN") when the WLAN connection is unavailable. Nair, ¶ 29; *see also id.*, Abstract, ¶¶0008, 0009, 0022, 0028, 0035-0040.

> In operation, as the wireless device 12 is moved between or among the effective ranges of various wireless networks (WLAN or WWAN), connectivity application 24 functions to change connections from one wireless network to another wireless network. In one aspect, the change of wireless connection can be automatic such that, for example, upon loss of connectivity from any one connection, the connectivity application 24 will automatically initiate a new connection and pass the respective IP address to operating system 20. Then, as applications 22 are subsequently refreshed using an IP connection, the applications 22 will automatically pick up the new IP address and start using the new address for wireless connectivity (e.g., according to the rules of core component 38). This may occur without any noticeable loss of connectivity to the user of the wireless device 12.

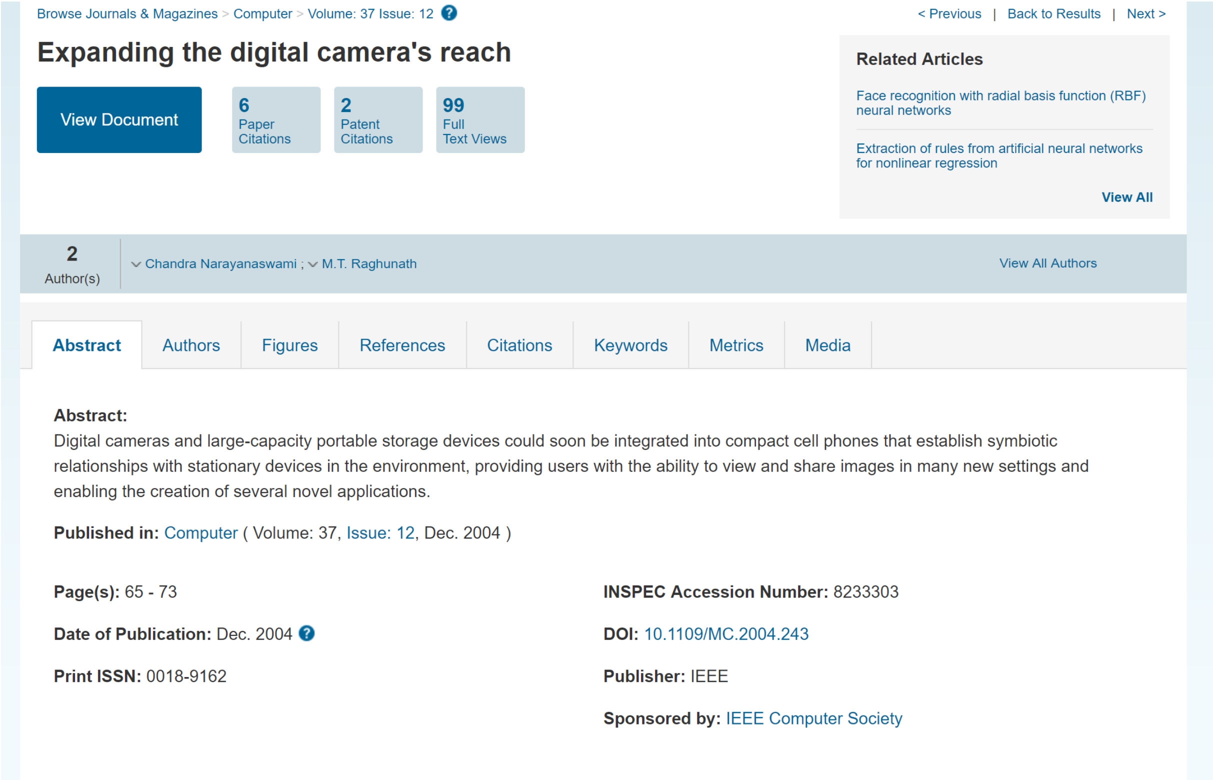
Id., ¶0039.

100. **Morris**. U.S. Patent Application Publication No. 2006/0143684 to Morris published on June 29, 2006 ("Morris"). Morris describes yet another Internet-enabled digital camera for automatically uploading and storing images. Morris, ¶¶0002-0003, 0020. Morris describes equipping its Internet-connected digital camera "with a standard web browser 158 and a client communication module 160 that enables the client device 152 to communicate with the server 154" to access, *inter alia*, images or video files. Morris, ¶0031.

101. **Khedouri**. U.S. Patent Application Publication No. 2004/0109063 to Khedouri, et al., published on Jan. 12, 2006 ("Khedouri"). Khedouri describes various devices for receiving video and or audio via the Internet over a variety of networks, including wireless networks. Khedouri describes several of its embodiments as using a touch screen as a user interface. "The user interface of a

preferred embodiment, if based on a touch-screen or similar input technique, is optimized to allow a user to input all selections without using a stylus, but rather by using a fingertip." Khedouri, ¶0043.

102. **Narayanaswami**. is a paper that appeared in the periodical, IEEE *Computer*, and was published by the Institute of Electrical and Electronics Engineers ("IEEE"). *Computer* is a well-known, widely published journal, and was widely available in the field at the time of the alleged invention. I am a subscriber to this publication. I had (and routinely have) access to it. I personally retrieved the Narayanaswami paper and I provided it to Petitioner's counsel. I have every reason to believe Narayanaswami was published in the December 2004 issue of *Computer*, and I have provided the records of this publication (as a screenshot, below) on the official IEEE Digital Library website, IEEE Xplore, that I personally used to download the referenced paper. I have used IEEE Xplore for more than a decade and have relied on it for accurate and timely dissemination of publicly available IEEE publications.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Abstract:
Digital cameras and large-capacity portable storage devices could soon be integrated into compact cell phones that establish symbiotic relationships with stationary devices in the environment, providing users with the ability to view and share images in many new settings and enabling the creation of several novel applications.

Published in: Computer (Volume: 37, Issue: 12, Dec. 2004)

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Publisher: IEEE

Sponsored by: IEEE Computer Society

103. As discussed above, Narayanaswami provides an overview of digital camera technology, including the architecture for a digital camera the connects to (and stores data on) the Internet. For the purposes of the opinions here, however, Narayanaswami also contains important confirmation of the marketplace trend to include digital cameras in cellular or mobile phones.

104. As Narayanaswami explains, "cell phones that integrate digital cameras have far outsold regular digital cameras" as of its publication date in December, 2004. Narayanaswami, p. 65. Narayanaswami explained several reasons why that is the case:

> "First, the cell phone's voice communication capability makes it the most ubiquitous portable device. Second, people enjoy the

> convenience of capturing high-resolution digital images using a device they already carry. Third, this integration relieves people from having to make a conscious decision to take a camera in anticipation of taking pictures. Some digital cameras even offer integrated Wi-Fi capabilities for direct image transfer."

Narayanaswami, p. 65.

105. As discussed below, Narayanaswami is consistent with my knowledge and experience as at least a person of ordinary skill in the art during the relevant time frame. As reflected in it and the other references cited herein, Internet-enabled digital cameras were not considered to be a stand-alone device, but were frequently (even typically) integrated as part of a mobile communications device, *e.g.*, a smartphone. Indeed, 2003, 2004 and 2005 saw the introduction of many smartphones that incorporated cameras and some form of Internet access, including the Palm Treo® 600, T-Mobile's Sidekick® and Sidekick 2®, the HTC Typhoon®, the Nokia® 6630, the Motorola® A1000, and many others. All of these phones integrated digital cameras and displays, including, in some cases (*e.g.*, the Motorola A1000) a touchscreen display.

VI. THE CHALLENGED CLAIMS IN THE PATENTS-AT-ISSUE THAT REQUIRE A "WSARC"

106. It is my opinion that the challenged claims of the patents-in-suit that require a "WSARC" are unpatentable under the standards that I understand govern an Inter *Partes* Review. The Examiner of the applications of the patents-in-suit did

not have before him the most relevant art to the subject matter of these challenged claims, including the majority of the references cited herein, that clearly teach and disclose the claimed functionality, which was well known at the time as an actual or obvious functionality of Internet-enable mobile devices, including digital cameras. The functionality of having a digital camera that automatically connects on power-up to upload images to a file server for later review and retrieval was well known in the art. Also well-known was the function of switching between available modes of connection to a communication network, such as the Internet, when a primary mode of connection became unavailable. A person of ordinary skill in the art would have found each of the challenged claims obvious, at a minimum.

A. Prior Art Combinations Relevant To My Opinions Regarding "WSARC" Claims

107. Before I address the specific patents and challenged claims in each Petition, I discuss some of the various prior art and prior art combinations that teach or render obvious each of the elements of the challenged claims. I also explain why a person of ordinary skill in the art would be motivated to combine each reference in the manner claimed. I may cite to or rely upon this discussion for each of the challenged claims that follow. While I have included precise discussion regarding certain specific combinations of art, those advantages which are apparent to the ordinary artisan may be applied equally to similar features

within my analysis. I discuss some additional combinations of art in my more detailed discussions of the challenged claims of the patents-at-issue. I may rely on my discussion in this section of the reasons a person of ordinary skill in the art would combine various functionalities in my later discussions of these other combinations.

1. Inoue and Nair

108. As discussed above, Inoue describes a digital camera that automatically establishes a primary connection to a network when the camera is powered-up for transmission of images to a server on the Internet and subsequent retrieval of images from the server for review on a display on the camera. Nair describes system applicable to any wireless device, including Inoue's camera, for automatically switching among networks when a primary network becomes unavailable in order to maintain a seamless connection to the communication network for data transmission. As discussed herein, a person of ordinary skill in the art would have been motivated to combine Inoue and Nair to achieve the advantages of seamlessly roaming among multiple networks when Inoue's primary network is unavailable.

109. A person of ordinary skill in the art would have recognized that Nair and Inoue are in the same field of art, and that Nair's technology is directly applicable to Inoue's teachings. This is, in fact, stated in Nair itself. Nair relates

"generally to the field of wireless technology and, more particularly, to seamless routing between wireless networks." Nair, ¶0003. Nair explains that its technology can be used with any wireless device with capability for communicating by wireless technology—*e.g.*, "wireless device 12 can be, for example, a wireless personal digital assistant (PDA), a cellular phone, or any other wireless-capable electronic device." *Id.* A person of ordinary skill in the art would have recognized that this includes digital cameras, including both stand-alone digital cameras and digital cameras integrated in cellular phones.

110. A person of ordinary skill in the art would have recognized that a Local Area Network, either wired (a "LAN") or wireless (a "WLAN"), can provide advantages over other networks, such as a cellular network (which is one version of a wireless Wide Area Network, or "WWAN").[5] For example, it was well known during the relevant time period that data transmissions over a cellular network were frequently metered, while data transmissions over a LAN or WLAN

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[5] I have adopted the nomenclature of the prior art references used herein for the convenience of the reader. By way of background, a person of ordinary skill in the art would have understood a LAN or WLAN to use the same (or similar) protocols—*i.e.*, the Internet Protocol or "IP" suit—but to be two different modes of connection (or communication). A person of ordinary skill in the art would also understand LANs and WLANs to be local networks, that is, to cover a particular geographic area. By contrast, a "WWAN" is a network that covers a much broader area, such as a cellular network.

frequently were not, and that LANs and WLANs usually provided greater transmission speeds (upload and download) than the cellular networks at the time. Both Inoue and Nair describe LANs and WLANs. Moreover, Nair itself explains that connecting and transmitting data over a wireless LAN (a "WLAN"), like that used in Inoue, can provides certain advantages over other available modes of connection including reduced cost and increased speed. Nair, ¶0029.

111. Nair further explains that its technology allows wireless devices to have "uninterrupted and effective wireless access for the wireless device 12" by "automatically and seamlessly" handing off communications from a WLAN to a wireless wide area network (a "WWAN") when the WLAN connection is unavailable. Nair, ¶0029; *see also id.*, Abstract, ¶¶0008-09, 0022, 0028, 0035-40.

> In one aspect, the change of wireless connection can be automatic such that, for example, upon loss of connectivity from any one connection, the connectivity application 24 will automatically initiate a new connection and pass the respective IP address to operating system 20. Then, as applications 22 are subsequently refreshed using an IP connection, the applications 22 will automatically pick up the new IP address and start using the new address for wireless connectivity (e.g., according to the rules of core component 38). This may occur without any noticeable loss of connectivity to the user of the wireless device 12.

Id., ¶0039.

112. A person of ordinary skill in the art would have understood that Nair's system of seamless and automatically switching between available networks (LANs, WLANs, and WWANs)—what the patents-at-issue refer to modes of connection or communication—would be directly applicable to, and usable in, Inoue's Internet-enabled digital camera. As discussed above, a person of ordinary skill in the art would already be familiar with the capability for Internet-enabled mobile devices to switch between available networks for a variety of reasons, including when one network becomes unavailable. As discussed above and in the prior art references themselves, it was well known that LANs and WLANs have advantages over other networks (e.g., a cellular network or WWAN), but had limited range. A person of ordinary skill in the art would have been motivated to combine this well-known automatic switching technology, like that disclosed in Nair, to Inoue's digital camera in order to take advantage of the benefits of a LAN or WLAN connection while also ensure seamless connectivity using a WWAN (e.g., a cellular network) when the camera or camera-equipped smartphone was out of range of the LAN or WLAN. In fact, Nair itself explains some of the advantages that would motivate a skilled artisan to modify Inoue's wireless camera to be able to seamlessly connect to a WWAN when a WLAN is unavailable. Nair, ¶¶0006-0009.

113. A person of ordinary skill in the art would also have recognized practical reasons that would motivate him or her to combine this “switching” functionality from Nair in Inoue’s digital camera. For example, digital cameras (including camera-equipped smartphones) were known to be mobile devices that frequently traverse across multiple networks, and will not always be within range of a LAN or WLAN. Users, such as travelers and photojournalists, would have been known to need to connect to Inoue’s fileserver even when out of range of a LAN or WLAN using a WWAN or other connection modes. A person of ordinary skill in the art would have further understood that users would have needed to access across multiple modes of connection to make their uploads reliable, secure and timely (particular for a photojournalist on a deadline).

114. There are also further reasons that would motivate the skilled artisan to adopt Nair’s automatic switching technology to Inoue’s digital camera. Making a function automated was known to be much easier on the user, who would not need to recall or enter network information, and ease-of-use was a known advantage in the marketplace. In the case of the enterprise market—*e.g.*, a media company that employs photojournalists—it also would have been known that it would be advantageous to centrally manage this switching process so that devices are automatically switched to a preferred network that may have a negotiated lower rate. A person of ordinary skill would also have understood that automatic

switching would make operation of the camera more convenient as well, in that the camera would be able to upload images from a variety of locations and would not need to manually switch networks.

2. Yamazaki and Nicholas.

115. As discussed above, Yamazaki discloses an Internet direct camera that automatically uploads images when they are captured to an image gallery associated with the camera on image server for storage, review, and retrieval (i.e., the claimed "website archive and retrieval center (WSARC)") via a primary mode of connection. Yamazaki also describes a system in which its device can automatically connect at power up; however, Yamazaki does not expressly discuss automatically switching to another mode of connection when the primary mode of connection is unavailable. Nicholas is in the same field of mobile communication devices as Yamazaki, and also was not before the Examiner. Nicholas supports implementing an automatic connection at power up as part of Yamazaki's camera and independently discloses the automatic switching element that is absent from Yamazaki.

116. A person of ordinary skill in the art would have recognized that Nicholas and Yamazaki are in the same field of art, and that Nicholas's technology is directly applicable to Yamazaki's teachings. For example, Nicholas concerns an end-user device with a display (e.g., a tablet, notebook computer, or personal

digital assistant) that allows for the transmission of images and audio via wired and wireless networks, including over the Internet. *See* Nicholas, Abstract & ¶¶0018-0026. Nicholas discloses that its "end user device is provided that supports a connection to a plurality of data communication networks" that detects which data communication networks are available, "and selectively determines which of the plurality of data communication networks provides the most optimal communication channel." Nicholas, Abstract; *see also id.*, ¶0008. The device determines which network "is optimal may be based on the type of data to be communicated (e.g., voice, video or computer data), the error rate associated with each available network, the number of anticipated 'hops' between the end user device and the remote network entity to which it needs to communicate, the cost associated with establishing and maintaining a network link, the best path, and/or anticipated power consumption." Nicholas, ¶0008.

117. In one embodiment, Nicholas describes connecting to its primary mode of communication automatically on power up. For example:

> The network detection function is preferably performed automatically by the end user device. For example, the network detection function may be performed automatically: (1) as part of the power-up sequence of the end user device to determine which network(s) are initially available to the end user device… Nicholas, ¶0046.

118. Nicholas explains that the available networks are detected, the end user device then "select[s] an available network for data communication based on one or more predefined criteria." Nicholas, ¶0049. The predefined criteria can include the type of data being transferred, the bit error rate, signal-to-noise ratio, the costs of connecting to the network (e.g., preferring to connect to networks that charge lower fees), and other criteria. Nicholas, ¶¶0050-0055. Moreover, Nicholas' end user device can perform network detection and selection at the same time. Nicholas, ¶0056.

119. A person of ordinary skill in the art would be motivated to combine Nicholas' system for automatic connection via a primary network on power-up with Yamazaki's camera in order to achieve the advantages described in both Yamazaki and Nicholas. For example, the ordinary artisan would have known that portable electronic cameras have limited user interfaces, and anything making it easier to connect to Yamazaki's image server would be an advantage. An ordinary artisan would have further known that Nicholas's automatic connection on power-up can simplify and reduce the time required to begin transferring images from a power-off state to the image server as disclosed by Yamazaki itself, namely, automatically transferring images from the camera to the WSARC (server) when an image is "captured" or when a network connection is available. Yamazaki, ¶¶0025, 0070.

120. This simplified startup sequence is itself a benefit, but can also allow the user to confidently maintain devices in the off-state to conserve power while ensuring prompt and automatic connectivity to the server on power-up when a photo-opportunity arises. These benefits are universal to various portable devices, and are particularly so for devices like cameras, which may be needed instantly to "capture the moment."

121. A person of skill in the art would have also recognized the benefits of automatically connecting to the most advantageous (primary) mode of connection available, whether for reasons of cost, speed, or reliability of network connection. This would be especially true of a portable electronic camera which, depending on its location, might not have all modes of connection available to it, or might have multiple viable connections available, some of which are more advantageous than others.

122. Nicholas also discloses switching to another available mode of connection when the primary mode of connection is unavailable. Nicholas's end user device "provides for seamless transitions between different data communication networks, thus permitting all network communication tasks to be performed in a seamless, uninterrupted manner regardless of the location of the device, the type of network connection being used, or the form of data communication being carried out." Nicholas, ¶0009. In one embodiment, Nicholas

describes that "the end user device may comprise a notebook or tablet PC with or without a docking interface" that can connect to a plurality of networks, including wired Ethernet, a wireless Local Area Network (WLAN) or a wireless Wide Area Network (WWAN). Nicholas, ¶0020. The end user device can be connected to a wired network at a particular location, with or without a docketing station. Nicholas, ¶¶0026, 0032.

123. A person of ordinary skill in the art at the time of invention of the Clemente patents would have appreciated the benefits of combining automatic switching in the mobile end-user devices of Nicholas with other mobile end-user devices, such as Yamazaki's camera. *See* Nicholas, ¶¶0029-34. It was a known problem at the time of the invention that uploading an image can take considerable time, during which the upload process can be interrupted due to loss of connection. This problem would be of particular concern to a portable electronic camera with differing modes of connection available to it based on its given location at the moment. In connection with Nicholas's switching feature, Nicholas also discloses a plurality of available modes of communication or connection, including at least wired connections, WLAN (e.g., Wi-Fi), and WWAN (e.g. cellular). *See* Nicholas, ¶0019.

124. A person of ordinary skill would have included Nicholas's switching between any of its landline, wireless, and cellular connections in modifying

Yamazaki to provide the full benefits of continuity of connection in seamless transition (Nicholas. Abstract), economy in selecting networks (Nicholas, ¶0053), transmission quality (Nicholas, ¶0056), and the recognized benefits of general versatility, signal strength, and/or performance.

3. Yamazaki and Nair.

125. As discussed above, Yamazaki discloses an Internet direct device (electronic camera). Nair discloses wireless devices, including cell phones, PDAs, "or any other wireless-capable suitable electronic device" [Nair, ¶0027] that connect to a primary network and then automatically switch to another network when the primary network is unavailable. Nair provides of an example of a wireless device that seamlessly switches among a local, high-speed low cost WLAN (e.g., Wi-Fi) to a WWAN (e.g., a cellular network) based on predetermined criteria. Nair's wireless device provides for transmission and receipt of at least captured audio transmissions over a communications network to another wireless device. A person of ordinary skill in the art would have combined Nair with Yamazaki to add Nair's automatic-connection and/or automatic switching capabilities to the Internet direct camera of Yamazaki.

126. Nair's wireless devices automatically connect to the communications network on power-up. As Nair explains, "[a]ccording to embodiments of the present invention, systems and methods provide uninterrupted and ubiquitous

wireless access, with seamless hand-off between different kinds of networks" [Nair, ¶0009], which is not possible unless the wireless device connects to the communication network via a mode of connection on power-up. Nair also describes a wireless local area network (WLAN) as a mode of connection with certain advantages over a cellular network—i.e., a "wireless wide area network (WWAN)"—as a mode of connection to a communications network. Nair, ¶0028.

127. Nair also explains that its wireless devices provide "uninterrupted and effective wireless access for the wireless device 12" by "automatically and seamlessly" handing off communications from the WLAN to the WWAN when the WLAN connection is not available. Nair, ¶0029; *see also id*., Abstract, ¶¶0022, 0028, 0035-0040. Nair's wireless device also automatically returns from a WWAN to a WLAN connection when WLAN become available.

128. In light of Nair's teachings regarding the advantages of a WLAN and the desirability of maintaining a consistent and seamless connection to the communications network, a person of ordinary skill in the art would have recognized that it would be desirable to connect to the WLAN on power-up, if it is available. *See* Nair, ¶0029 (describing one purpose of Nair's invention is to provide "uninterrupted and effective wireless access for the wireless device 12"). A WLAN is therefore a primary mode of connection for Nair's wireless device. *Id*.

A person of ordinary skill in the art would also have understood that Nair would seek to automatically connect to its WLAN on power-up if it is available.

129. A person of ordinary skill in the art would also have been motivated to combine Nair's automatic-switching features with Yamazaki to provide the full benefits of continuity of connection in seamless transition (Nair. Abstract, ¶¶0029, 0035), economy in selecting networks, transmission quality (Nair, ¶¶0052-0053), and the recognized benefits of general versatility, signal strength, and/or performance.

4. Yamazaki and Nicholas and Nair.

130. As discussed above, Yamazaki discloses an Internet direct device (electronic camera). Nicholas discloses an end-user device that provides for automatic switching between networks. Nair also discloses wireless devices configured for seamless automatic network switching. Nair, ¶0007. Further, at the time of invention, it was well known to incorporate more advanced communications functionality with sophisticated digital cameras, for example, in various mobile devices such as PDAs, cellphones, and the like. One of ordinary skill in the art at the time of invention of the challenged claims would have looked to Nair (which is analogous art to Nicholas) in considering wireless communications devices generally, and specifically in considering personal wireless devices including the portable cameras of Yamazaki. Nair, ¶0027.

131. Nair expressly teaches that its mobile communications functions are applicable to variety of mobile devices such as PDA's, cellular phones, "or any other wireless-capable suitable electronic device." Nair, ¶0027. Nair discloses that its wireless device "may run one or more applications that exchange data/information through wireless networks as the applications are run. Such an application can be, for example, a network browser that exchanges information with the distributed application known as the 'World Wide Web.'" Nair, ¶0027. Further, such exchanges of data can include "document sharing, accounting, word processing, application sharing, file transfer, remote control, browser, voice over Internet Protocol (IP), user authentication, address book, files and folders, accounting, database management, and the like." Nair, ¶0034.

132. A person of skill would have known that a web browser, like that disclosed in Nair, was an alternative option for providing image data transfer. Consequently, using web browser software with Yamazaki's camera would simply be the addition (or substitution) of known software for performing image transfer and retrieval, yielding merely predictable results.

133. The ordinary artisan also would have recognized that Nair itself suggests integration of various mobile communications features into various devices, including Inoue's camera, and not limited to Nair's automatic switching function. Therefore, a person of ordinary skill in the art would have known at the

time of invention that it would be advantageous to integrate Yamazaki's camera functions with higher lever communications functions, such as VOIP, to provide both the expressed advantages of voice calls and device integration, but also to achieve the apparent benefits of IP-based communications, such as, economy of cost and power conservation, among others.

5. Yamazaki and Inoue and Nair

134. As discussed above, Yamazaki discloses an Internet direct device (electronic camera). Inoue describes a digital camera that automatically establishes a primary connection to a network when the camera is powered-up for transmission of images to a server on the Internet and subsequent retrieval of images from the server for review on a display on the camera. Nair discloses wireless devices configured for seamless automatic network switching. Nair, ¶0007. Nair also discloses relevant features of communications, Input/Outputs, device functions, among others. *E.g.*, Nair, ¶¶0025-0026 (networks), ¶0027 (versatility across mobile devices), ¶0033 (touch screens, displays, microphone, speaker, internet browsing, email), ¶0034 (information exchange). Nair's disclosure of similar additional functions and features further evidences its suitability for combination with Yamazaki.

6. Kusaka and Nicholas

135. Kusaka describes "[a]n electronic camera 100" that "automatically transits captured image data and user identification to a gateway server 160 over a wireless portable telephone link 130." Kusaka, Abstract; *see also* ¶¶0003, 0219. For example, Kusaka explains that its camera captures, processes, and sends/receives images to and from storage in "an image storage device such as an image server on the Internet[.]" *Id.*, ¶0003; *see also id.*, ¶¶0219-0221. Kusaka also describes its digital cameras as automatically transmitting image data captured by its camera upon image capture, *i.e.*, when the picture is taken. *Id.*, ¶¶0219, 0236. Kusaka further explains that its device automatically connects to its image server by one of a several available networks or links, including via an "wireless portable telephone link 130" established by "wireless portable telephone circuit 72" integrated into the camera (*id.*, ¶¶0219, 0234, 0236 & Fig. 4); a "wireless LAN (Ethernet™)" that allows Internet communication (*id.*, ¶0534); and/or by connecting to portable telephone 120" using "a short-range communication link 110," which includes both short-range wireless and wired communication (*id.*, ¶0273).

136. I understand that Kusaka was before the Patent Office during the prosecution of the patents-at-issue, and was the basis for several obviousness objections during at least the prosecution of the '524 patent. During prosecution, I

understand that the Patent Office rejected various claims as unpatentable over Kusaka in combination with other references. File Wrapper of U.S. Patent Application Serial No. 11/484,373, pp. 98, 2009-06-22 Office Action, p. 4, *id.*, 2012-11-07 Office Action, p. 5 (Ex. 1003, for each of IPR2017-02052 to -02059). For example, the Examiner noted that Kusaka described an Internet direct camera that automatically uploads images upon capture to an Internet-based image file server on image server for storage, review and retrieval by a user. The Examiner found, however, that Kusaka did not disclose (a) automatically connecting to a website archive and review center (WSARC) using a primary mode of connection on power-up and (b) automatically switching to "another mode of communication" when the primary mode of communication is "unavailable."

137. As discussed above, Nicholas was not before the Examiner during the prosecution of any of the applications for the patents-at-issue and describes the very elements that the Examiner believed were missing from Kusaka. A person of ordinary skill in the art would have been motivated to combine Nicholas with Kusaka to teach these missing elements. A person of ordinary skill in the art would be motivated to combine Nicholas' system for automatic connection via a primary network on power-up with Kusaka's electronic camera in order to achieve the advantages described in Nicholas. For example, an ordinary artisan would have known that portable electronic cameras have limited user interfaces, and anything

making it easier to connect to Kusaka's image server would be an advantage. An ordinary artisan would have further known that Nicholas's automatic connection on power-up can simplify and reduce the time required to begin transferring images from a power-off state to the image server. This simplified startup sequence is itself a benefit, but can also allow the user to confidently maintain devices in the off-state to conserve power while ensuring prompt and automatic connectivity to the server on power-up when a photo-opportunity arises. These benefits are universal to various portable devices, and are particularly so for devices like cameras which may be needed instantly to "capture the moment."

138. A person of ordinary skill in the art also would have been motivated to include Nicholas's automatic switching technology to Kusaka's camera. Nicholas explains the benefits of continuity of connection in seamless transition (Nicholas, Abstract), economy in selecting networks (id., ¶0053), transmission quality (id. ¶0056), and the recognized benefits of general versatility, signal strength, and/or performance. A person of ordinary skill in the art would have appreciated that seamless connection to the communication network and file server would be beneficial for users of Kusaka's digital camera. Digital cameras were known to be mobile devices and were popularly included in cellular phones. As discussed above, cellular phones have access to cellular networks (WWANs) that provide ubiquitous coverage. A person of ordinary skill in the art would have been

motivated to include Nicholas's automatic switching capabilities in Kusaka in order to provide the benefits of connecting to the most beneficial network (of several alternatives) while maintaining a seamless connection to the server should that network become unavailable so as to continue to permit Kursaka's camera to automatically upload images to Kusaka's image server upon image capture.

7. Kusaka, Nicholas, and Nair

139. As discussed above, Kusaka describes "[a]n electronic camera 100" that "automatically transits captured image data and user identification to a gateway server 160 over a wireless portable telephone link 130." Kusaka, Abstract. Nicholas describes using its end user device to receive (*i.e.*, download) VoIP, video calls, and other data over IP networks, including audio and visual images. Kusaka, ¶¶0019, 0024, 0032-0034. In one embodiment, Nicholas's end user device can also record videos and provide "digital media networking." *Id.*, ¶ 0036. Nicholas also describes downloading live audio or visual images, such as during a VoIP call or a videocall or video conference. *Id.*, ¶¶0019, 0024, 0032-0034.

140. Although neither Kusaka or Nicholas specifically describe a web browser, as reflected in other prior art references that I discuss herein, the use of a web browser to download video, images or audio from the Internet was well known during the relevant period. Nair provides another example of a web-browser in a mobile device. Nair, ¶¶0027, 0034. Nair is in the same field of art as

Nicholas and Kusaka, and, like Nicholas, is directed to seamless connectivity across wired and wireless networks. *Id.*, ¶¶0022-0032. It describes its wireless devices as capable of providing various software applications to "support numerous services or functions such as, for example, document sharing, accounting, word processing, application sharing, file transfer, remote control, browser, voice over Internet Protocol (IP), user authentication, address book, files and folders, accounting, database management, and the like." *Id.*, ¶ 0034.

141. A person of skill in the art would have been motivated to combine Nair's teachings with Nicholas and/or Kusaka. Web browsers operate by transmitting and receiving data from the sites on the Internet, including still and video images, text, and audio. A person of ordinary skill in the art would have known that a web browser, like that used in Nair, was an alternative option for providing image data transfer, including videoconferencing function. Moreover, web browsers have certain advantages over alternative ways of performing the same functions. They are known to consumers, who are comfortable with them. They designed to negotiate firewalls and other security measures, allowing greater connectivity. Web browsers have also had a long period of development and are generally still supported, which means that they are less likely to have bugs than other software and they are unlikely to go quickly out of date. Given that Kusaka and Nicholas both describe transmitting, downloading and viewing images via an

Internet connection or IP, it would be natural and wholly expected and predictable for a person of ordinary skill in the art to have turned to a well-known web browser to perform that same functionality.

142. I now turn to the individual Petitions, including their discussions of the foregoing prior art references and other prior art references. As the various references and combinations overlap, the fact that I omit a particular disclosure or motivation to combine from one Petition while reference it in a different Petition (or above) should not be understood as an opinion that such disclosure or motivation to combine is irrelevant to that particular Petition. To the contrary, I may rely on the discussion of the prior art throughout all of the Petitions as background or support for my opinions in any of the Petitions.

B. Petition 1: Inter Partes Review Of Claims 1, 4, 5, And 14 Of The '524 Patent

1. Petition 1: Ground 1 – Inoue and Nair

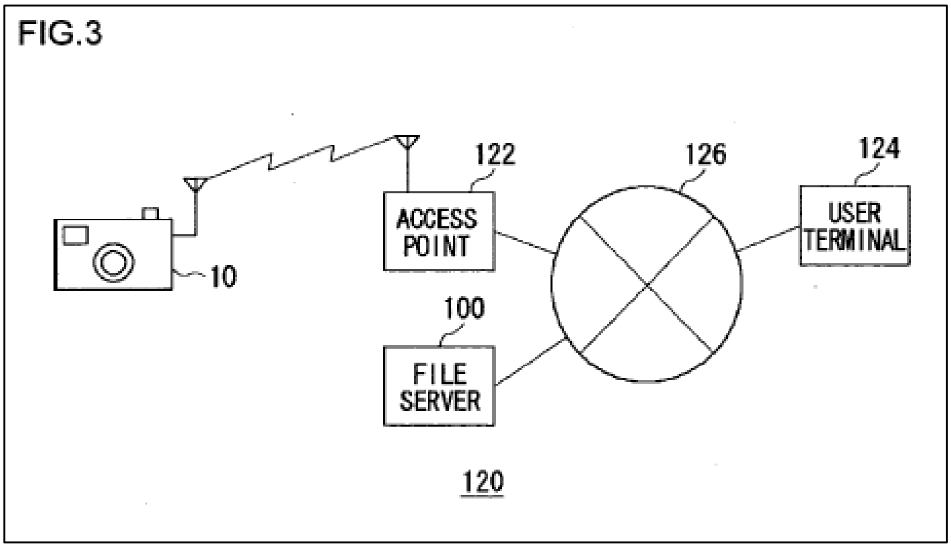
a) Claim 1

143. Each and every element of claim 1 of the '524 Patent is taught by the combination of Inoue and Nair, as set forth below. Claim 1 recites:

An integrated Internet camera system, comprising:

144. Inoue discloses this element at least by its disclosure of a camera in communication with a network, for example, the Internet. *See, e.g.*, Inoue, Abstract ("A digital camera and a user terminal including a file server are connected over a

network."); *see also id.*, ¶0059 ("FIG. 2 shows the configuration of a file server 100 which exchanges image data with the digital camera 10."), ¶0060 (Internet). Inoue is directed to Internet connected camera systems. *See id.*, Fig. 3 (reproduced below).



a website archive and review center (WSARC) for storing and managing images;

145. Inoue discloses a WSARC as recited in claim 1. Inoue teaches at least a server 100 including a reproduction processing unit 106 and a file management unit 108. Inoue, Fig. 2, ¶0059. "The 'file server' may be a network node of any architecture as long as it exchanges images with the digital camera." *Id.*, ¶0015. "[T]he file server can thus be used to store images into the file server and to acquire images from the file server for display on the digital camera, or as if it is a recording medium built in the digital camera." *Id.*, ¶0016. Inoue discloses that its WSARC (file server) can manage images at least by organizing, (de)compressing,

and reproducing the images on demand. *Id.*, ¶¶0034, 0059. Inoue's storage and management of images at least by file server 100 discloses this element.

an Internet direct camera (IDC) for capturing an image,

146. Inoue discloses an IDC as recited in claim 1. Inoue discloses a camera 10 including an image pickup block 12, processing block 16, and communications card 68. Inoue, Fig. 1, ¶¶0049, 0053, 0066. Inoue's image pickup block 12 includes a lens 26 forming images on a CCD 28 to obtain image data for use in the processing block. *Id.*, ¶¶0052-0053. Inoue's camera communicates with a network. *Id.*, Abstract ("A digital camera and a user terminal including a file server are connected over a network."), ¶¶0059-0060 (Internet). Accordingly, Inoue discloses an IDC for capturing an image.

automatically transmitting said image to an account associated with said IDC on said WSARC upon image capture and receiving stored image from said WSARC, and comprising a display for displaying said captured image and said received image; and

147. Inoue discloses that its IDC automatically transmits upon image capture. "When the digital camera shoots an image, this image is transmitted to the file server automatically upon completion of the encoding and compression of the image." Inoue, Abstract. "[T]he storing of images from the digital camera 10 to the file server 100, and the transmission of images from the file server 100 to the digital camera 10 are all performed automatically without a wait for explicit user

instructions." *Id.*, ¶0086. Inoue also discloses receiving stored image from its WSARC, and a display 22 for displaying captured and received images. *Id.*, Abstract ("[w]hen image reproduction is instructed from the digital camera, **the image is downloaded from the file server over the network and displayed on the digital camera**.") (emphasis added), ¶0062 ("[w]hen the user wishes to view an image on the digital camera 10, the necessary image is downloaded from the file server 100 to the digital camera 10 according to the reproduction instruction, and reproduced on the LCD 22 of the digital camera 10."), ¶¶0049, 0063, 0074-0075 (displays captured images). Accordingly, Inoue discloses these features.

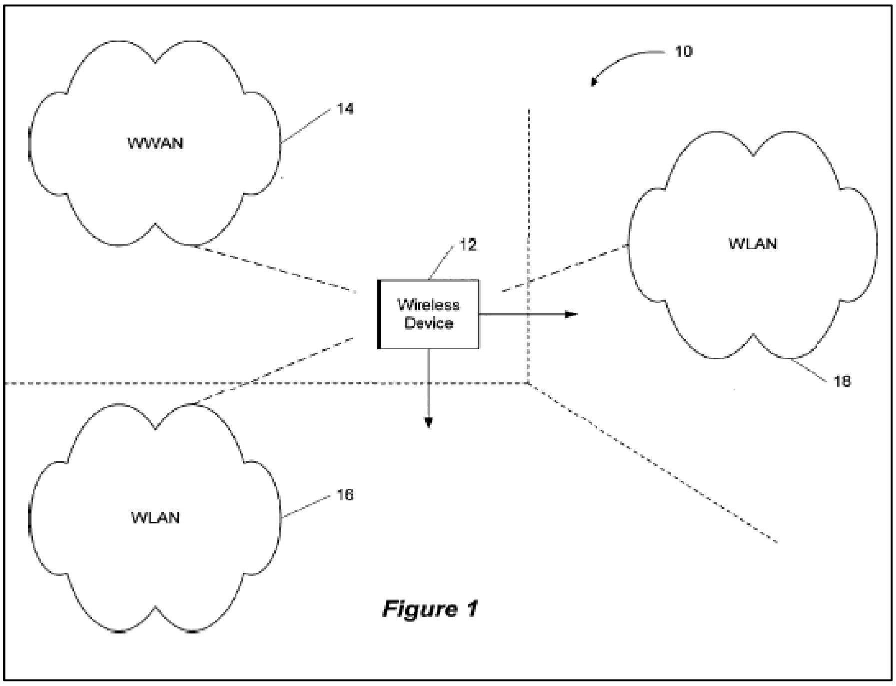
> *wherein said IDC automatically connects to said WSARC over an Internet connection on power-up using one of a plurality of available modes of connection, which is designated as a primary mode of communication, and*

148. Inoue discloses that "[w]hen the digital camera 10 is off, pressing the power button 38 is detected by the event detecting unit 50 as an activation request, which is followed by an activation process." Inoue, ¶0058. Further, Inoue states that "[w]hen the digital camera is powered on, it automatically establishes a network connection with the file server in an activation process." *Id.*, Abstract. Inoue teaches multiple modes of connection, including by a wireless access point 22 or by in an "ad-hoc mode." *Id.*, ¶¶0060-0061. Thus, Inoue teaches automatic connection on powering up its camera as recited in claim 1.

wherein said IDC automatically switches to another available mode of communication when said IDC detects that said primary mode of communication to said WSARC is unavailable.

149. Inoue describesa wireless LAN as a primary mode of connection to reach the Internet among a plurality of available modes and detecting connection failure, but does not explicitly disclose automatic switching to another mode of communication. Inoue, ¶¶0060, 0073.

150. Nair, however, teaches this feature for seamless connectivity throughout various locations. Nair relates “generally to the field of wireless technology and, more particularly, to seamless routing between wireless networks,” for example, between Wireless Local Area Networks (WLAN; e.g., Wi-Fi) and Wireless Wide Area Networks (WWAN; e.g., cellular). Nair, ¶0003, Fig. 3 (reproduced below).



151. Nair's teachings apply at least to various devices with capability for communicating by wireless technology—e.g., "wireless device 12 can be, for example, a wireless personal digital assistant (PDA), a cellular phone, or any other wireless-capable electronic device." *Id.*, ¶0003. Nair explains that connecting and transmitting data over a WLAN (Wi-Fi), like that used in Inoue, provides certain advantages over other available modes of connection. *Id.*, ¶0029. The ordinary artisan would therefore look to Nair in consider the issues of connectivity common to portable wireless devices, including Inoue's portable Internet-connected camera.

152. Nair further explains that its technology allows wireless devices to have "uninterrupted and effective wireless access for the wireless device 12" by "automatically and seamlessly" handing off communications from a WLAN to a

WWAN when the WLAN connection is unavailable. Nair, ¶0029; *see also id.*, Abstract, ¶¶0008-0009, 0022, 0028, 0035-0040.

> In operation, as the wireless device 12 is moved between or among the effective ranges of various wireless networks (WLAN or WWAN), connectivity application 24 functions to change connections from one wireless network to another wireless network. In one aspect, the change of wireless connection can be automatic such that, for example, upon loss of connectivity from any one connection, the connectivity application 24 will automatically initiate a new connection and pass the respective IP address to operating system 20. Then, as applications 22 are subsequently refreshed using an IP connection, the applications 22 will automatically pick up the new IP address and start using the new address for wireless connectivity (e.g., according to the rules of core component 38). This may occur without any noticeable loss of connectivity to the user of the wireless device 12.

Id., ¶0039.

153. A person of ordinary skill in the art would have applied Nair's automatic switching functionality to Inoue's digital camera. Nair explains some of the advantages that would motivate an ordinary artisan to modify Inoue's wireless camera to be able to seamlessly connect to a WWAN when a WLAN is unavailable, for example, user friendliness and speed of operation. Nair, ¶¶0006-09. A person of skill in the art would also have recognized additional advantages to

adding this functionality from Nair into Inoue's digital camera. For example, photographers (e.g., travelers and photojournalists) were known to be highly mobile and the ordinary artisan would have recognized that such seamless switching across multiple modes of connection would improve the reliability, security, and timeliness of image uploads while photographers travel throughout many shoot locations. In the case of the enterprise market—e.g., a media company that employs photojournalists—it also would have been known as advantageous to centrally manage this switching process so that devices are automatically switched to a preferred network that may operate at a negotiated lower fee-rate. A person of ordinary skill would have also understood that automatic switching would make operation of the camera more convenient to the user, at least because the camera could upload images from various locations without manually switching networks.

154. In summary, one of ordinary skill in the art at the time of (alleged) invention of the claim 1 of the '524 Patent would have modified Inoue's system such that its IDC automatically connected to another available mode of connection when it detected that the primary mode of communications was unavailable, as taught in Nair, to provide any of seamless connection, and/or enhanced reliability, security, timeliness of communications, convenience, performance, and/or economy.

b) Claim 4

155. Claim 4 depends from claim 1 and further recites:

wherein said IDC comprises an internal or rechargeable battery to power said IDC.

156. These additional elements would have been achieved by Inoue and Nair. Inoue mentions its operational power, and it was well known in the art at the time of Inoue that cameras and other portable end user devices typically use an internal or rechargeable battery as their power supply. *See, e.g.*, Inoue, ¶0064. Nair expressly acknowledges its use of personal electronic devices which routinely use batteries for portability. Nair, ¶0031. The ordinary artisan also would have known of rechargeable batteries, as well as that all batteries are rechargeable to at least some extent, even if certain specific batteries are designed for recharge. Moreover, the ordinary artisan would have been motivated to place a battery internally for protection from the elements, as well as to use a battery to power the device as fixed power supplies would be known to be unavailable when the camera is, for example, in a park.. Accordingly, it would have been obvious to use a rechargeable and/or internal battery to power a portable end user device, such as Inoue's camera. Inoue as modified by Nair, thus achieves the additional elements of claim 4.

c) Claim 5

157. Claim 5 depends from claims 1 and 4 and further recites:

The system of claim 4, wherein said IDC alerts said WSARC or a registered user associated with said IDC when the power of said internal or rechargeable battery is below a predetermined threshold.

158. Claim 5 incorporates the elements of claims 1 and 4, which, as I have discussed above, would have been obvious in view of Inoue and Nair. Claim 5 adds that the IDC alerts either the WSARC or a registered user associated with the IDC when the battery's power is below a predetermined threshold. As discussed above, it was well known in the art at the time of Inoue and Nair that cameras and other portable end user devices typically use internal and/or rechargeable batteries as their power supply. *See, e.g.*, Nair, ¶0031. Moreover, it was well known in the art at that time for portable end user devices, such as cameras, to have circuitry to monitor the status of their batteries, including whether the battery's power falls below a predetermined threshold, for example, to prevent unexpected power loss. . *See*, Lavelle, col. 12:39-54. One of ordinary skill in the art at the time of (alleged) invention of claim 5 would have further modified Inoue in view of Nair to alert a registered user when the power of the battery is below a predetermined threshold to prevent unexpected power failure. Accordingly, claim 5 would have been obvious over the teachings of Inoue and Nair.

d) Claim 14

Claim 14 depends from claim 1 and further recites:
wherein said plurality of available modes of connection is selected from a group consisting of: a land line, DSL, cable, satellite, wireless network, cellular, Wi-Fi, Wi-Max.

159. Inoue and Nair achieve the additional limitations of claim 14. As I have mentioned above, Inoue as modified by Nair includes a plurality of available modes of connection. For example, Nair, teaches at least "automatically and seamlessly" handing off communications from a WLAN (e.g., Wi-Fi) to a WWAN (e.g., cellular) when the WLAN connection is unavailable. Nair, ¶¶0008-0009, 0022, 0025 (cable, satellite, etc.), 0028-0029, 0035-0040, Abstract.

160. In combining Inoue and Nair, as discussed above regarding claim 1, the ordinary artisan would have included in Inoue at least the variety of Wi-Fi, wireless, and cellular connections taught by Nair to provide the full range of benefits including seamlessness, transmission quality, versatility, economy, signal strength, and/or performance discussed above regarding claim 1. *See*, Lavelle, col. 12:39-54. Consequently, Inoue as modified by Nair achieves each additional element of claim 14.

2. Petition 1: Ground 2 – Inoue, Nair, and Lavelle

161. As I discussed above regarding Ground 1 of Petition 1, dependent claims 4 and 5 of the '524 Patent are each achieved in view of Inoue and Nair.

These claims, however, can equally be found obvious in view of Inoue, Nair, and Lavelle.

162. Internally storing batteries in portable devices to protect them from the elements of the environment was well known at the time of Inoue and Nair. As the Examiner found during the prosecution of the '524 Patent, the use of a battery as a power source was disclosed in the analogous art of Lavelle. File Wrapper of U.S. Patent Application Serial No. 11/484,373, pp. 100-101 (2009-06-22 Non-Final Rejection at pp. 11-12). Lavelle teaches power management techniques in portable devices using rechargeable batteries. *Id.*; *see also* Lavelle, col. 1:43-44. Lavelle also teaches a power management system for wireless devices, including cameras (*see also id.*, col. 3:33-37), that sends a "warning" to the user "when the battery gets too low," i.e., when it falls below a predetermined level. File Wrapper of U.S. Patent Application Serial No. 11/484,373, pp. 100-101 (2009-06-22 Non-Final Rejection at pp. 11-12); Lavelle, col. 12:39-54. A person of ordinary skill in the art at the time of invention of the challenged claims would have been motivated to combine Lavelle's battery and warning system for wireless devices (including cameras) with Inoue as modified by Nair to provide a power management indication to the user. Such power indication is particularly beneficial to portable devices having limited power supply to reduce the risk of unexpected total power loss. Lavelle, col. 12:39-54. A person of ordinary skill in the art would have

recognized that this known technology would have particular applicability to Inoue's portable camera, which would frequently be used with battery power and whose users would be expected to need to know how much battery "life" is left. Thus, claims 4 and 5 would have been obvious in view of Inoue, Nair, and Lavelle.

3. Petition 1: Ground 3 – Inoue and Nicholas

a) Claim 1

163. As I have discussed above, Inoue discloses nearly all elements of claim 1. *See supra* Section VI(B)(1)(A). Inoue discloses identifying "a wireless LAN" as a primary mode of connection to reach the Internet among a plurality of available modes and detecting connection failure, but does not explicitly disclose automatic switching to another mode of communication. *Id.*; Inoue, ¶¶0060, 0073. Nicholas, however, teaches this feature for seamless connectivity when its devices move between various locations.

164. Nicholas is directed to systems including portable end-user devices 100 providing a variety of communications solutions for versatile connectivity. Nicholas' personal devices 100 communicate at least images and audio via wired and wireless networks, including over the Internet. *See* Nicholas, Abstract, ¶¶0018-0026. Nicholas' end user device 100 includes an imaging system that can capture images. "Exemplary end user device 100 further comprises … an optional built-in video camera and microphone for enabling videoconferencing and the like." *Id.*,

¶0024, *see also id.*, ¶0032-0033, Fig. 1 (120). "[The] end user device … supports a connection to a plurality of data communication networks ..." that detects which data communication networks are available "and selectively determines which of the plurality of data communication networks provides the most optimal communication channel." Nicholas, Abstract; *see also id.*, ¶0008.

165. Nicholas' device determines which network "is optimal … based on the type of data to be communicated (e.g., voice, video or computer data), the error rate associated with each available network, the number of anticipated 'hops' between the end user device and the remote network entity to which it needs to communicate, the cost associated with establishing and maintaining a network link, the best path, and/or anticipated power consumption." Nicholas, ¶0008. In one embodiment, Nicholas describes using a wired access point, which may or may not include a docking station, as a primary mode of communication. *Id.*, ¶¶0025-0026, Fig. 2. Nicholas explains that wired connections can have advantageous connectivity, cost, and transmission speeds as compared to other modes of communication (e.g., wireless).[6]

166. Nicholas discloses switching to another available mode of communication when its detects the primary mode of communication is

[6] Notably, however, Nicholas' 'primary' mode of communication is not limited to a wired docking station. *See*, *e.g.*, Nicholas, ¶¶ 0008, 0020.

unavailable. Nicholas's end user device 100 "provides for seamless transitions between different data communication networks, thus permitting all network communication tasks to be performed in a seamless, uninterrupted manner regardless of the location of the device, the type of network connection being used, or the form of data communication being carried out." Nicholas, ¶0009. When Nicholas's end user device is disconnected from its wired network (described as a LAN in the user's office), "the end user device continues to provide secure connections to the office network that are uninterrupted[.]" *Id.*, ¶0028. Nicholas explains that the device seamlessly switches to a wireless network, such as a WLAN that provides a mode of connection for the office campus to permit uninterrupted transmissions. *Id.*, ¶¶0029-0034.

167. Nicholas further describes seamless hand-offs of both video and voice transmissions between wireless LAN and wireless WAN networks, as well as a seamless switch to a wired secondary LAN in a user's home. Nicholas, ¶¶0020, 0033-0034. Any one of the wired LAN, wireless LAN, or wireless WAN networks can constitute a primary mode for the purposes of claim 1, and the various alternative networks can constitute "another mode of connection": WLAN in the case of the office LAN as the primary mode, WWAN in the case of WLAN as the primary mode, and home LAN in the case of WWAN as the primary mode. *Id.* Nicholas describes each aspect of this claim not expressly mentioned by Inoue.

168. Nicholas discloses its automatic switching to provide economy in selecting low cost networks (*see, e.g.*, Nicholas, ¶0053), continuity of connection in seamless transition (*id.*, Abstract), and transmission quality (*id.*, ¶0056). Moreover, the ordinary artisan would have understood such automatic switching to provide benefits of versatility, signal strength, and/or performance in networking by adapting to the loss of a preferred network. Further, a person of ordinary skill would have also understood that automatic switching would make operation of Inoue's camera more convenient to the user, at least because the camera could upload images from various locations without manually switching networks.

169. In summary, one of ordinary skill at the time of invention of claim 1 of the '524 Patent would have modified Inoue's device to automatically connects to its WSARC over an Internet connection on power-up using one of a plurality of available modes of connection, which is designated as a primary mode of communication, and to automatically switch to another available mode of communication when its device detects that its primary mode of communication to said WSARC is unavailable to achieve Nicholas' recognized advantages of economy, continuity of connection in seamless transition, transmission costs, and transmission quality, and/or the perceived benefits of versatility, ease and reliability of operation, power conservation, improved signal strength, and/or

improved performance in networking by adapting to the loss of a preferred network.

b) Claim 4

170. Claim 4 depends from claim 1 and further recites:

wherein said IDC comprises an internal or rechargeable battery to power said IDC.

171. This additional element is disclosed by Inoue and Nicholas. Inoue mentions its operational power, and it was well known in the art at the time of Inoue that cameras and other portable end user devices typically use an internal or rechargeable battery as their power supply. *See, e.g.*, Inoue, ¶0064. Nicholas expressly discloses the use of a battery which is routinely used for portable devices. Nicholas, ¶0055. The ordinary artisan also would have known of rechargeable batteries, as well as that all batteries are rechargeable to at least some extent, even if certain specific batteries are designed for recharge. Moreover, the ordinary artisan would have placed a battery internally for protection from the elements. An ordinary artisan would be motivated to use an internal or rechargeable battery to power the device as the camera is mobile and a fixed power supply will frequently be unavailable (for example, when the camera is outdoors in a park). Accordingly, it would be obvious to use a rechargeable and/or internal

battery to power a portable end user device, such as a camera. Inoue as modified by Nicholas, thus achieves the additional elements of claim 4.

c) Claim 5

172. Claim 5 depends from claims 1 and 4 and further recites:

The system of claim 4, wherein said IDC alerts said WSARC or a registered user associated with said IDC when the power of said internal or rechargeable battery is below a predetermined threshold.

173. Claim 5 incorporates the elements of claims 1 and 4, which, as I have discussed above, would have been obvious in view of Inoue and Nicholas. Claim 5 adds that the IDC alerts either the WSARC or a registered user associated with the IDC when the battery's power is below a predetermined threshold. As I have also discussed above, it was well known in the art at the time of Inoue and Nicholas that cameras and other portable end user devices typically use internal and/or rechargeable batteries as their power supply. *See* Nicholas, ¶0055 (disclosing the use of a battery). Moreover, it was well known in the art at that time for portable end user devices, such as cameras, to have circuitry to monitor the status of their batteries, including whether the battery's power falls below a predetermined threshold. *See*, Lavelle, col. 12:39-54.One of ordinary skill in the art at the time of (alleged) invention of claim 5 would have further modified Inoue in view of Nicholas to alert a registered user when the power of the battery is below a

predetermined threshold to prevent unexpected power failure. Accordingly, claim 5 would have been obvious over the teachings of Inoue and Nicholas.

d) Claim 14

174. Claim 14 depends from claim 1 and further recites:

> *wherein said plurality of available modes of connection is selected from a group consisting of: a land line, DSL, cable, satellite, wireless network, cellular, Wi-Fi, Wi-Max.*

175. Inoue and Nicholas achieve the additional limitations of claim 14. As mentioned above, Inoue as modified by Nicholas includes a plurality of available modes of connection. For example, Nicholas teaches at least wired network connections and wireless network connections WLAN (e.g., Wi-Fi), and WWAN (e.g., cellular). Nicholas, ¶0020.

176. In combining Inoue and Nicholas, as discussed above in regard to claim 1, the ordinary artisan would have included at least the variety of wired and wireless connections as taught by Nicholas to provide the full range of benefits including seamlessness, transmission quality, versatility, economy, signal strength, ease and convenience, and/or performance discussed above regarding claim 1. Consequently, Inoue as modified by Nicholas achieves each additional element of claim 14.

4. Petition 1: Ground 4 – Inoue, Nicholas, and Lavelle

177. As I have discussed above regarding Ground 3 of Petition 1, dependent claims 4 and 5 of the ‘524 Patent are each achieved in view of Inoue and Nicholas. These claims, however, can equally be found obvious in view of Inoue, Nicholas, and Lavelle.

178. As the Examiner found during the prosecution of the ‘524 Patent, the use of a battery as a power source was disclosed in the analogous art of Lavelle. File Wrapper of U.S. Patent Application Serial No. 11/484,373, pp. 100-101 (2009-06-22 Non-Final Rejection at pp. 11-12). Lavelle teaches power management techniques in portable devices using rechargeable batteries. *Id.*; *see also* Lavelle, col. 1:43-44. Lavelle also teaches a power management system for wireless devices, including cameras (*see also id.,* col. 3:33-37), that sends a “warning” to the user “when the battery gets too low,” i.e., when it falls below a predetermined level. File Wrapper of U.S. Patent Application Serial No. 11/484,373, pp. 100-101 (2009-06-22 Non-Final Rejection at pp. 11-12); Lavelle, col. 12:39-54. A person of ordinary skill in the art at the time of invention of the challenged claims would have combined Lavelle’s battery and warning system for wireless devices (including cameras) with Inoue as modified by Nicholas to provide a power management indication to the user. Such power indication is particularly beneficial to portable devices having limited power supply to reduce

the risk of unexpected total power loss. Lavelle, col. 12:39-54. Thus, claims 4 and 5 would have been obvious in view of Inoue, Nicholas, and Lavelle.

5. Petition 1: Ground 5 – Kusaka and Nicholas

a) **Claim** 1

179. Each and every element of claim 1 of the '524 Patent is taught by the combination of Kusaka and Nicholas, as discussed below. Claim 1 recites:

An integrated Internet camera system, comprising:

180. Kusaka discloses an integrated Internet camera system. Kusaka, ¶0219 ("transmitting image data from an electronic camera 100 to image servers 181 through 184 on the Internet 170."). Kusaka describes "[a]n electronic camera 100" that "automatically transits captured image data and user identification to a gateway server 160 over a wireless portable telephone link 130." *Id.*, Abstract. Kusaka's "gateway server 160 manages image albums created on a per-user basis on multiple image servers on the Internet … and stores the image data received from the electronic camera 100 in an image album corresponding to the user identification information on the selected image server." *Id.*

a website archive and review center (WSARC) for storing and managing images;

181. As the Office previously found, Kusaka discloses such a WSARC at least as Kusaka's servers. *See, e.g.*, Kusaka, ¶0219; File Wrapper of U.S. Application Serial No. 11/484,373, p. 93 (OA, p. 4). Kusaka explains that image

data is relayed to "an image storage device such as an image server on the Internet and stored there[.]" Kusaka, ¶0003; *see also id.*, ¶0220. The gateway server "appends image identification information … to the image file, camera identification information and user identification information from the electronic camera 100, selects an image server having an album with available capacity," and stores the captured image on the image server. *Id.* The images on the image server can later be managed, reviewed, or downloaded via the electronic camera. *Id.*, ¶0236. Kusaka teaches that the gateway server and images on the image server can also be managed, reviewed, or downloaded with a PC via the Internet. Kusaka, ¶0554. For example:

> The gateway server 160 can also be connected to from a user's personal computer 190 via the Internet 170, and the user can read and use image data from the virtual server 180 via the gateway server 160 on a personal computer 190, and can modify the settings of the gateway server 160.

Id. Accordingly, Kusaka discloses the WSARC.

an Internet direct camera (IDC) for capturing an image,

182. Kusaka's "electronic camera 100" constitutes an Internet direct camera for capturing an image. *See, e.g.*, Kusaka, ¶0224. Kusaka describes "[a]n electronic camera 100" that "automatically transmits captured image data and user identification to a gateway server 160 over a wireless portable telephone link 130."

Id., Abstract. "[I]mage data captured with an electronic device such as an electronic camera is transferred via an image relay apparatus such as a gateway server on the Internet and stored there[.]" *Id.*, ¶0003; *see also id.*, ¶¶0219, 0341. Notably, the Office previously found that Kusaka's use of a gateway server to transmit data to the image server did not make Kusaka's camera any less "direct" than the claimed Internet direct camera, a finding that was unopposed by the applicant. *Id.*, ¶0220. Kusaka's camera 100 conducts image capture to generate and stores image data. Kusaka, ¶0291.

automatically transmitting said image to an account associated with said IDC on said WSARC upon image capture and

183. Kusaka discloses its IDC as automatically transmitting an image to an account associated with said IDC on its WSARC upon image capture. *See, e.g.*, Kusaka, ¶0219 ("immediately after the image is captured."); File Wrapper of U.S. Application Serial No. 11/484,373, p. 93 (OA, p. 4). As noted above, Kusaka discloses an IDC (electronic camera) and an account on the WSARC (image server) that is associated with that IDC. *Id.*, ¶¶0003, 0219-0221, 0341. Kusaka also discloses automatically transmitting image data captured by its electronic camera upon image capture, i.e., when the picture is taken. *Id.*, ¶0219. "Using the wireless portable telephone function the electronic camera 100 transmits image data (an image file) generated by a capture operation to a gateway server 160 via a wireless

portable telephone link 130 immediately after the image is captured." *Id.* The gateway server relays the image file to the image server account (album). *Id.*, ¶0220. Accordingly, Kusaka teaches that its IDC (camera) includes this feature, including transmitting an image to an account on a WSARC associated with an IDC upon image capture.

> *receiving stored image from said WSARC, and comprising a display for displaying said captured image and said received image; and*

184. Kusaka's electronic camera includes a display suitable for viewing images. Kusaka, ¶¶0224, 0225. Kusaka also describes receiving previously captured and stored image data from its WSARC (image server) and displaying that received image data on the camera's display. *Id.*, ¶0236. As the Office previously found, Kusaka discloses that its IDC (camera) includes this feature. File Wrapper of U.S. Application Serial No. 11/484,373, p. 93 (OA, p. 4).

> *wherein said IDC automatically connects to said WSARC over an Internet connection on power-up using one of a plurality of available modes of connection, which is designated as a primary mode of communication, and*

185. Kusaka discloses that its IDC (electronic camera) can connect to the WSARC (image server) using one of a variety of possible modes of communication, including via an "wireless portable telephone link 130" established by "wireless portable telephone circuit 72" integrated into the camera

(Kusaka, ¶¶0219, 0234, 0236, 0341, Fig. 4); a "wireless LAN (Ethernet™)" that allows Internet communication (*id.*, ¶0534); and/or "a portable telephone 120" using "a short-range communication link 110," which includes "short-range wireless communication" as well as "short-range wired communication" (*id.*, ¶ 0273). Kusaka's connection to its WSARC (image server) constitutes a primary mode of communication. However, Kusaka does not explicitly disclose connecting on power-up using one of a plurality of available modes of communication.

186. However, Nicholas (which was not before the Examiner during the prosecution of the '524 Patent) discloses automatically connecting on power-up using a primary mode of communication from among a plurality of available modes of connection. As I have discussed above, Nicholas is directed to systems including portable end-user devices providing a variety of communications solutions for versatile connectivity. Nicholas' personal devices communicate at least images and audio via wired and wireless networks, including over the Internet. *See* Nicholas, Abstract, ¶¶0018-0026. Nicholas' end user device 100 includes an imaging system that can capture images. "Exemplary end user device 100 further comprises … an optional built-in video camera and microphone for enabling videoconferencing and the like." *Id.*, ¶¶0024; *see also id.*, 0032-0033, Fig. 1 (120). "[The] end user device … supports a connection to a plurality of data communication networks" that detects which data communication networks are

available “and selectively determines which of the plurality of data communication networks provides the most optimal communication channel.” *Id.*, Abstract; *see also id*., ¶0008. Nicholas’ device determines which network “is optimal may be based on the type of data to be communicated (e.g., voice, video or computer data), the error rate associated with each available network, the number of anticipated ‘hops’ between the end user device and the remote network entity to which it needs to communicate, the cost associated with establishing and maintaining a network link, the best path, and/or anticipated power consumption.” *Id.*, ¶0008. In one embodiment, Nicholas describes using a wired access point, which may or may not include a docking station, as a primary mode of communication. *Id.*, ¶¶0025, 0026, Fig. 2. Nicholas explains that wired connections can have advantageous connectivity, cost, and transmission speeds as compared to other modes of communication (*e.g.*, wireless).[7]

187. Nicholas teaches connecting to a primary mode of communication *automatically on power-up*:

> The network detection function is preferably performed automatically by the end user device. **For example, the network detection function may be performed automatically: (1) as part of the**

[7] Notably, however, Nicholas’ ‘primary’ mode of communication is not limited to a wired docking station. *See, e.g.*, Nicholas, ¶¶ 0008, 0020.

> **power-up sequence of the end user device to determine which network(s) are initially available to the end user device …**

Id., ¶0046 (emphasis added).

188. Nicholas explains that the available networks are detected, and the end user device "select[s] an available network for data communication based on one or more predefined criteria." Nicholas, ¶0049. Nicholas also mentions the advantage of using a particular network that has the most optimal characteristics for communicating data, including transmission cost, speed, and reliability. *Id.*, ¶0008. For example, Nicholas teaches that "the end user device may avoid connections via cellular networks or ISPs that charge access fees when there are network connections available at a lower cost." *Id.*, ¶0053. Nicholas describes its wired mode of connection as one that may be preferred over other connection modes for cost, power consumption, transmission quality, or other reasons. *Id.*, ¶¶0053-56; *see, e.g., id.*, ¶¶0008, 0020.

189. The ordinary artisan would have recognized that Nicholas' automatic-connection feature provides a variety of benefits such as versatility, ease and reliability of operation, power conservation, and/or reduced on-board component costs. For example, the ordinary artisan would have recognized that Nicholas' automatic connection on power-up can simplify and/or reduce the time required to initialize its device from a power-off state to begin capturing and transferring

images. This simplified and shortened start-up sequence is beneficial itself, but can also allow the user to more confidently store their device in a power-off state, conserving power while reducing the impacts of the startup process. Quick and easy start-up universally improves portable devices which typically include on-board power storage but, indeed, is particularly desirable for devices requiring sporadic use, such as digital cameras.

190. For example, users may sporadically “snap a shot” of an ongoing social event, followed by extended downtime before another scene arises at the same social event. Instant and easy startup can allow minimal impact in powering-off the camera during the downtime. Moreover, the ordinary artisan applying Nicholas’ automatic connection to Kusaka would have connected to the account of the WSARC (server) to instantly enable Kusaka’s principal function of remote image storage/management and to ensure reliability of the connection ahead of its need. *See, e.g.*, Kusaka, Abstract, ¶¶0002-0003 (Field of Invention). Moreover, automatic connection to its WSARC comports with Kusaka’s desire to reduce on-board storage costs without sacrificing availability, while reducing the user’s perception of delay. Accordingly, one of ordinary skill at the time of (alleged) invention of the claim 1 would have modified Kusaka to include automatic connection to its account on power-up based on Nicholas’ teachings, to improve

Kusaka's versatility, ease and reliability of operation, power conservation, on-board component costs, and/or reduce the user's perception of delay.

wherein said IDC automatically switches to another available mode of communication when said IDC detects that said primary mode of communication to said WSARC is unavailable.

191. As previously mentioned, Kusaka discloses that its IDC (electronic camera) can connect to the WSARC (image server) using one of a number of modes of communication, including via a "wireless portable telephone link 130" established by "wireless portable telephone circuit 72" integrated into the camera (Kusaka, ¶¶0219, 0234, 0236, Fig. 4); a "wireless LAN (Ethernet™)" that allows Internet communication (*id.*, ¶0534); and/or "a portable telephone 120" using "a short-range communication link 110," which includes "short-range wireless communication" as well as "short-range wired communication" (*id.*, ¶ 0273). However, Kusaka does not explicitly disclose that its electronic camera automatically switches to another available mode of communication when it detects that said primary mode of communication to said WSARC is unavailable.

192. Yet, Nicholas discloses switching to another available mode of communication when it detects the primary mode of communication is unavailable. Nicholas's end user device "provides for seamless transitions between different data communication networks, thus permitting all network communication tasks to be performed in a seamless, uninterrupted manner regardless of the location of the

device, the type of network connection being used, or the form of data communication being carried out." Nicholas, ¶0009. When Nicholas's end user device is disconnected from its wired network (described as a LAN in the user's office), "the end user device continues to provide secure connections to the office network that are uninterrupted[.]" *Id.*, ¶0028. Nicholas explains that the device seamlessly switches to a wireless network, such as a WLAN that provides a mode of connection for the office campus to permit uninterrupted transmissions. *Id.*, ¶¶0029-0034.

193. Nicholas further describes seamless hand-offs of both video and voice transmissions between wireless (W) LAN and wireless (W) WAN networks, as well as a seamless switch to a wired secondary LAN in a user's home. *Id.*, ¶¶0020, 0033-0034. Any one of the wired LAN, wireless (W) LAN, or wireless (W) WAN networks can constitute a primary mode for the purposes of claim 1, and the various alternative networks can constitute "another mode of connection": WLAN in the case of the office LAN as the primary mode, WWAN in the case of WLAN as the primary mode, and home LAN in the case of WWAN as the primary mode. *Id.* Nicholas describes each aspect of this claim that the Office believed to be missing from Kusaka.

194. Nicholas discloses its automatic switching to provide economy in selecting low cost networks (*see, e.g.*, Nicholas, ¶0053), continuity of connection

in seamless transition (*id.*, Abstract), and transmission quality (*id.*, ¶ 56). Moreover, the ordinary artisan would have understood such automatic switching to provide benefits of versatility, signal strength, and/or performance in networking by adapting to the loss of a preferred network.

195. In summary, one of ordinary skill at the time of invention of claim 1 of the ‘524 Patent would have modified Kusaka’s device to automatically connect to its WSARC over an Internet connection on power-up using one of a plurality of available modes of connection, which is designated as a primary mode of communication, and to automatically switch to another available mode of communication when its device detects that its primary mode of communication to said WSARC is unavailable to achieve Nicholas’ recognized advantages of economy, continuity of connection in seamless transition, transmission quality, and transmission quality, and/or the perceived benefits of versatility, ease and reliability of operation, power conservation, on-board component costs, reduction in the user’s perception of delay, improved signal strength, and/or improved performance in networking.

b) Claim 4

196. Claim 4 depends from claim 1 and further recites:

wherein said IDC comprises an internal or rechargeable battery to power said IDC.

197. This additional element is disclosed by Kusaka and Nicholas. Kusaka discloses a "power supply 263," and it was well known in the art at the time of Kusaka that cameras and other portable end user devices typically use an internal or rechargeable battery as their power supply. *See, e.g.*, Kusaka, ¶0298, Fig. 37. Nicholas expressly discloses the use of a battery which is routinely used for portable devices. Nicholas, ¶0055. The ordinary artisan would have been motivated to place a battery internally for protection from the elements.. Kusaka as modified by Nicholas, thus discloses each additional element of claim 4.

198. Moreover, it also would have been obvious to use a rechargeable battery to power a portable end user device, such as a camera. Batteries are the preferred method of powering such end user devices—particularly end user devices, like those in Kusaka and Nicholas, that are intended to be mobile at times. Moreover, internally storing such batteries in portable devices to protect them from the elements of the environment was well known at the time of Kusaka and Nicholas. Thus, claim 4 is obvious in view of Kusaka and Nicholas.

c) Claim 5

199. Claim 5 depends from claims 1 and 4 and further recites:

The system of claim 4, wherein said IDC alerts said WSARC or a registered user associated with said IDC when the power of said internal or rechargeable battery is below a predetermined threshold.

200. Claim 5 incorporates the elements of claims 1 and 4, which, as I have discussed above, would have been obvious in view of Kusaka and Nicholas. Claim 5 adds that the IDC alerts either the WSARC or a registered user associated with the IDC when the battery's power is below a predetermined threshold. As discussed above, Kusaka discloses a "power supply 263," and it was well known in the art at the time of Kusaka that cameras and other portable end user devices typically use an internal or rechargeable battery as their power supply. *See, e.g.*, Kusaka, ¶0298, Fig. 37. Nicholas also discloses the use of a battery. Nicholas, ¶ 0055. Moreover, it was well known in the art at that time for portable end user devices, such as cameras, to have circuitry to monitor the status of their batteries, including whether the battery's power falls below a predetermined threshold. . *See*, Lavelle, col. 12:39-54. One of ordinary skill in the art at the time of (alleged) invention of claim 5 would have further modified Kusaka in view of Nicholas to alert a registered user when the power of the battery is below a predetermined threshold to prevent unexpected power failure. Accordingly, claim 5 would have been obvious over the teachings of Kusaka and Nicholas.

d) Claim 14

201. Claim 14 depends from claim 1 and further recites:

wherein said plurality of available modes of connection is selected from a group consisting of: a land line, DSL, cable, satellite, wireless network, cellular, Wi-Fi, Wi-Max.

202. Kusaka and Nicholas achieve the additional limitations of claim 14. As I have mentioned above, Kusaka as modified by Nicholas includes a plurality of available modes of connection. For example, Nicholas, teaches at least wired network connections and wireless network connections WLAN (*e.g.,* Wi-Fi), and WWAN (*e.g.*, cellular). Nicholas, ¶0020.

203. In combining Kusaka and Nicholas, as I have discussed above in regard to claim 1, the ordinary artisan would have included at least the variety of wired and wireless connections as taught by Kusaka and Nicholas to provide the full range of benefits including seamlessness, transmission quality, versatility, economy, signal strength, and/or performance discussed above regarding claim 1. Consequently, Kusaka as modified by Nicholas achieves each additional element of claim 14.

6. Petition 1: Ground 6 – Kusaka, Nicholas, and Lavelle

204. As I discussed above regarding Ground 5 of Petition 1, dependent claims 4 and 5 of the '524 Patent are each achieved in view of Kusaka and

Nicholas. These claims, however, can equally be found obvious in view of Kusaka, Nicholas, and Lavelle.

205. As the Examiner found during the prosecution of the '524 Patent, the use of a battery as a power source was disclosed in the analogous art of Lavelle. File Wrapper of U.S. Patent Application Serial No. 11/484,373, pp. 100-101 (2009-06-22 Non-Final Rejection at pp. 11-12). Lavelle teaches power management techniques in portable devices using rechargeable batteries. *Id.*; *see also* Lavelle, col. 1:43-44. Lavelle also teaches a power management system for wireless devices, including cameras (*see also id.*, col. 3:33-37), that sends a "warning" to the user "when the battery gets too low," i.e., when it falls below a predetermined level. File Wrapper of U.S. Patent Application Serial No. 11/484,373, pp. 100-101 (2009-06-22 Non-Final Rejection at pp. 11-12); Lavelle, col. 12:39-54. A person of ordinary skill in the art at the time of invention of the challenged claims would have combined Lavelle's battery and warning system for wireless devices (including cameras) with Kusaka as modified by Nicholas to provide a power management indication to the user. Such power indication is particularly beneficial to portable devices having limited power supply to reduce the risk of unexpected total power loss. Lavelle, col. 12:39-54. Thus, claims 4 and 5 would have been obvious in view of Kusaka, Nicholas, and Lavelle.

7. Petition 1: Ground 7 – Yamazaki and Nicholas

a) Claim 1

206. Each and every element of claim 1 of the '524 Patent is achieved by the combination of Yamazaki and Nicholas, as I have set forth below. Claim 1 recites:

An integrated Internet camera system, comprising:

207. Yamazaki discloses an integrated Internet camera system. *See* Yamazaki, ¶0003. For example, Yamazaki discloses a digital camera 10 communicating images with server databases 52, 53 over a communication network 50. *See, e.g.*, Yamazaki, Fig. 4, ¶¶0061-0062. Yamazaki's communications network can include a computer network. *Id.*, ¶0061. Accordingly, Yamazaki discloses the claimed integrated Internet camera system.

a website archive and review center (WSARC) for storing and managing images;

208. Yamazaki discloses such a WSARC. Yamazaki explains that the "camera 10 has access to the servers [52A-n] through the network 50 such as a public telephone network or a special network." Yamazaki, ¶0061. "The servers [52A-n] have databases [53A-53n], respectively, that store the image data. The image data recorded with the camera 10 is transmitted to the servers [52A-n] and is recorded in the databases [53A-53n]." *Id.*, ¶0062. The servers can manage the "image data recorded in the database" by distributing them "to the camera 10 and

any other server." *Id*. Thus, the images on the servers can later be managed, reviewed, or downloaded via the electronic camera. *Id.*, ¶¶0062, 0094.

an Internet direct camera (IDC) for capturing an image,

209. Yamazaki's "image display apparatus and a camera" is an Internet direct camera for capturing an image. Yamazaki, ¶0003. Yamazaki describes "an image display apparatus and a camera that are provided with functions of communicating with a server through a network and transmitting and receiving image data to and from the server, and an image communication system that distributes the image data by means of the image display apparatus, the camera and the server." *Id.,* ¶0003. Yamazaki further discloses its camera to include "[a]n imaging part 12 [that] includes a taking lens and an imaging device such as a CCD arranged behind the taking lens." *Id*., ¶0048. This disclosure describes an Internet direct camera for capturing an image.

automatically transmitting said image to an account associated with said IDC on said WSARC upon image capture and

210. As noted above, Yamazaki discloses an IDC (electronic camera) and an account on the WSARC (image server) that is associated with that IDC. *Id*., ¶¶0003, 0048, 0061-0062. Yamazaki also discloses automatically transmitting an image captured by its electronic camera *upon image capture*, *i.e.*, when the picture is taken. *Id.*, ¶0025 ("[W]hen the one camera performs the image-recording, the recorded image data can be distributed automatically to the one or more of servers,

thus eliminating the necessity for extra printing."). Further, Yamazaki discloses that "when the record button 16 of the camera 10 is pressed and the image-recording is performed, the camera 10 selectively connects to one (e.g., the server 52A) of the servers [52A-52n] in accordance with the user's identification information **automatically**." *Id.*, ¶0067 (emphasis added). Accordingly, Yamazaki teaches this claim element.

> *receiving stored image from said WSARC, and comprising a display for displaying said captured image and said received image; and*

211. Yamazaki's electronic camera has a display suitable for viewing images. Yamazaki, ¶0063. "A person who uses the camera 10 (a user) makes a contract to use a certain server or arranges a home server at home (e.g., the server 52A). Then, the user can record the own image data in the database 53A through the server 52A and retrieve the image data recorded in the database 53A to reproduce the image on the image display 24 of the camera 10." *Id.*, ¶0063. Yamazaki's "server is designated in accordance with the entered identification information, and the communicating device connects the image display apparatus automatically to the designated server." *Id.*, ¶0011. Yamazaki discloses that its electronic camera "receives the image data from the connected server, and displays the image represented by the image data on the image display." *Id.* Accordingly, Yamakazi discloses this claim element.

wherein said IDC automatically connects to said WSARC over an Internet connection on power-up using one of a plurality of available modes of connection, which is designated as a primary mode of communication, and

212. Yamazaki discloses that its IDC (electronic camera) automatically connects to the WSARC (image server) on power-up. *See* Yamazaki, ¶¶0066, 0068 0072. Specifically, Yamazaki discloses that the owner of the camera may elect to enter "and record the entered identification information as an owner's identification information in a memory such as a nonvolatile memory in the camera 10." *Id.*, ¶0066. "[T]he camera 10 may also connect to the server 52 <u>*just after the setting of the user's identification information*</u> so as to evaluate the communicational condition." *Id.*, ¶0072 (emphasis added). Yamazaki explains that for ease of use, the identification information defaults to the previously-entered user's information. Thus, with previously-entered information, "[w]hen the power switch 19 of the camera 10 is turned on (S101), whether to enter the identification information of the user is determined (S102) . . . . [I]f no identification information is entered at S102, the previously-recorded owner's identification information is set as the user's identification information (S106). A server to which the camera 10 connects and a person who will be charged are determined in accordance with the set user's identification information." *Id.*, ¶0068. Accordingly, Yamazaki expressly

discloses automatic connection to a server on power-up based upon the set user's identification information.

213. Additionally, Nicholas discloses automatically connecting on power-up using a primary mode of communication. Like Yamazaki, Nicholas was not was not before the Office during prosecution of the '524 Patent. As I have previously discussed, Nicholas discloses that its "end user device is provided that supports a connection to a plurality of data communication networks" that detects which data communication networks are available "and selectively determines which of the plurality of data communication networks provides the most optimal communication channel." *See* Nicholas, Abstract; *see also id.*, ¶0008. Nicholas describes its end user device to connect to its primary mode of communication automatically on power-up. *Id.*, ¶0046. Nicholas further explains that as the available networks are detected, the end user device "select[s] an available network for data communication based on one or more predefined criteria." *Id.*, ¶0049. In selecting a network, Nicholas discloses connecting with the network to perform a test protocol (i.e., to determine bit error rate of the given network). *Id.*, ¶0056.

214. The ordinary artisan would have recognized the benefits of versatility, signal strength, power conservation, reduced on-board component costs, and/or performance resulting from Nicholas' automatic-connection feature. For example, the ordinary artisan would have recognized that Nicholas' automatic connection on

startup can simplify and/or reduce the time required to begin transferring images from a power-off state. This simplified startup sequence can allow the user to more confidently store personal devices in the off-state to conserve power while reducing the availability impact. Immediately, from power-off, devices can be initialized with automatic connection for communication. These benefits are universal to various portable devices, and are particularly useful for devices like cameras which may be needed instantly to "capture the moment." For example, users may sporadically "snap a shot" of an ongoing social event, followed by extended downtime before another scene arises at the same social event. Moreover, the ordinary artisan applying Nicholas' automatic connection to Yamazaki would have achieved automatic connection to the WSARC (server) at least because remote image storage/management is among the primary and dedicated functions of Yamazaki's camera device. *See, e.g.*, Yamazaki, Abstract, ¶¶0002-0003 (Field of Invention). Further, this would enable reduction in on-board storage costs without sacrificing their immediate availability.

> *wherein said IDC automatically switches to another available mode of communication when said IDC detects that said primary mode of communication to said WSARC is unavailable.*

215. Yamazaki does not disclose that its electronic camera "automatically switches to another available mode of communication when" it "detects that said primary mode of communication to said WSARC is unavailable." As I have

previously discussed, however, Nicholas discloses switching to another available mode of communication when the primary mode of communication is unavailable providing gains in continuity of connection, economy, resource conservation, and transmission quality, versatility, signal strength, and/or performance. The ordinary artisan would recognize that uploading an image can take considerable time, during which the upload process could be interrupted upon connection loss. The ordinary artisan would have recognized that incorporating mode switching into personal devices, such as cameras, can enable more continuous connections, allowing the cameras to complete transmissions over varying communication modes across different locations.

216. A person of ordinary skill in the art would have modified Yamazaki to automatically switch as taught by Nicholas for at least the reasons described in Nicholas. For example, Nicholas discloses that it is advantageous to use the particular network that has the most optimal characteristics for communicating data, including transmission cost, speed, and reliability. Nicholas, ¶¶0008, 0053. Nicholas teaches switching to provide seamlessness in transition (*id.*, Abstract), economy in selecting networks (*id.*, ¶0053), transmission quality (*id.* ¶0056), and the recognized benefits of general versatility, signal strength, and/or performance. Moreover, the ordinary artisan would have recognized the benefits of connection continuity, versatility, signal strength, power conservation, and/or performance

resultant from Nicholas' automatic-switching feature. Thus, a person of ordinary skill in the art at the time of invention of the challenged claims would have modified Yamazaki's camera to have Nicholas's automatic-switching to achieve the advantages of any of seamless and/or continuous connection, economical transmission, and enhanced speed, reliability, versatility, signal strength, power conservation, and/or performance. *Id.*

b) Claim 4

217. Claim 4 depends from claim 1 and further recites:

> *wherein said IDC comprises an internal or rechargeable battery to power said IDC.*

218. Claim 4 incorporates the elements of claim 1, which, as discussed above, is achieved by Yamazaki and Nicholas. Claim 4 further specifies that the IDC "comprises an internal or rechargeable battery to power said IDC." This additional element is disclosed by Yamazaki and Nicholas.

219. The electronic camera of Yamazaki discloses a "power switch 19," and it was well known in the art at the time of Yamazaki that cameras and other portable end user devices typically use an internal or rechargeable battery as their power supply. *See, e.g.,* Yamazaki, ¶0049, Fig. 1. Nicholas also discloses the use of a battery. *Id.*, ¶0055. Moreover, a person of skill in the art at the time of the invention would have been aware of rechargeable batteries, and that some batteries are specially designed for recharging. Thus, it would be obvious to use a

rechargeable battery to power a portable end user device, such as a camera. Batteries are the preferred method of powering such end user devices—particularly end user devices, like those in Yamazaki and Nicholas, that are intended to be mobile at times. Thus, claim 4 is obvious in view of Yamazaki and Nicholas.

c) Claim 5

220. Claim 5 depends from claims 1 and 4 and further recites:

> *wherein said IDC alerts said WSARC or a registered user associated with said IDC when the power of said internal or rechargeable battery is below a predetermined threshold.*

221. Claim 5 incorporates the elements of claims 1 and 4, which, as discussed above, would have been obvious in view of Yamazaki and Nicholas. Claim 5 adds that the IDC alerts either the WSARC or a registered user associated with the IDC when the battery's power is below a predetermined threshold. As discussed above, Yamazaki discloses a "power switch 19," and it was well known in the art at the time of Yamazaki that cameras and other portable end user devices typically use an internal or rechargeable battery as their power supply. *See, e.g.*, Yamazaki, ¶0049, Fig. 1. Further, Nicholas also discloses the use of a battery. Nicholas, ¶0055. Moreover, it was well known in the art at that time for portable end user devices, such as cameras, to have circuitry to monitor the status of their batteries, including whether the battery's power falls below a predetermined threshold. *See,* Lavelle, col. 12:39-54.One of ordinary skill in the art at the time of

(alleged) invention of claim 5 would have further modified Yamazaki in view of Nicholas to alert a registered user when the power of the battery is below a predetermined threshold to prevent unexpected power failure. Accordingly, claim 5 would have been obvious over the teachings of Yamazaki and Nicholas.

d) Claim 14

222. Claim 14 depends from claim 1 and further recites:

wherein said plurality of available modes of connection is selected from a group consisting of: a land line, DSL, cable, satellite, wireless network, cellular, Wi-Fi, Wi-Max.

223. Yamazaki and Nicholas achieve each additional limitation of claim 14. As I have mentioned above, Yamazaki as modified by Nicholas includes a plurality of available modes of connection. For example, Nicholas, teaches at least wired network connections and wireless network connections WLAN (*e.g.,* Wi-Fi), and WWAN (*e.g.,* cellular). Yamazaki, ¶0020.

224. In combining Yamazaki and Nicholas, as discussed above in regard to claim 1, the ordinary artisan would have included at least the variety of wired and wireless connections as taught by Yamazaki and Nicholas to provide the full range of benefits including seamlessness, transmission quality, versatility, economy, signal strength, and/or performance discussed above regarding claim 1. Consequently, Yamazaki as modified by Nicholas achieves each additional element of claim 14.

8. Petition 1: Ground 8 - Yamazaki, Nicholas, and Lavelle

225. As I discussed above regarding Ground 7 of Petition 1, dependent claims 4 and 5 of the '524 Patent are each achieved in view of Yamazaki and Nicholas. These claims, however, can equally be found obvious in view of Yamazaki, Nicholas, and Lavelle.

226. As the Examiner found during the prosecution of the '524 Patent, the use of a battery as a power source was disclosed in the analogous art of Lavelle. File Wrapper of U.S. Patent Application Serial No. 11/484,373, pp. 100-101 (2009-06-22 Non-Final Rejection at pp. 11-12). Lavelle teaches power management techniques in portable devices using rechargeable batteries. *Id.*; *see also* Lavelle, col. 1:43-44. Lavelle also teaches a power management system for wireless devices, including cameras (*see also id.,* col. 3:33-37), that sends a "warning" to the user "when the battery gets too low," i.e., when it falls below a predetermined level. File Wrapper of U.S. Patent Application Serial No. 11/484,373, pp. 100-101 (2009-06-22 Non-Final Rejection at pp. 11-12); Lavelle, col. 12:39-54. A person of ordinary skill in the art at the time of invention of the challenged claims would have combined Lavelle's battery and warning system for wireless devices (including cameras) with Inoue as modified by Nair to provide a power management indication to the user. Such power indication is particularly beneficial to portable devices having limited power supply to reduce the risk of

unexpected total power loss. Lavelle, col. 12:39-54. Thus, claims 4 and 5 would have been obvious in view of Yamazaki, Nicholas, and Lavelle.

C. Petition 2: *Inter Partes* Review Of Claims 1, 2, 4, 7-9, and 12-26 Of The '172 Patent

1. Petition 2: Ground 1 - Inoue and Nair

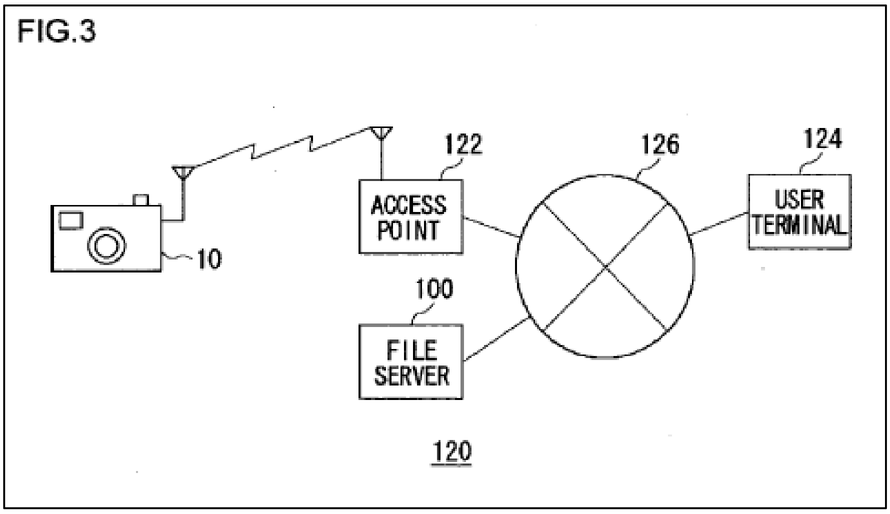
a) Claim 1

227. Inoue's mobile camera discloses all of the elements of claim 1, except the automatic switching function. Nair describes an automatic switching system that it states can be used with a variety of wireless devices, which include wireless digital cameras like those discussed in Inoue. As I have reviewed below, an ordinary artisan would have been motivated to combine Inoue to achieve the advantages of seamlessly roaming among multiple networks when Inoue's primary network is unavailable.

Claim 1 recites:

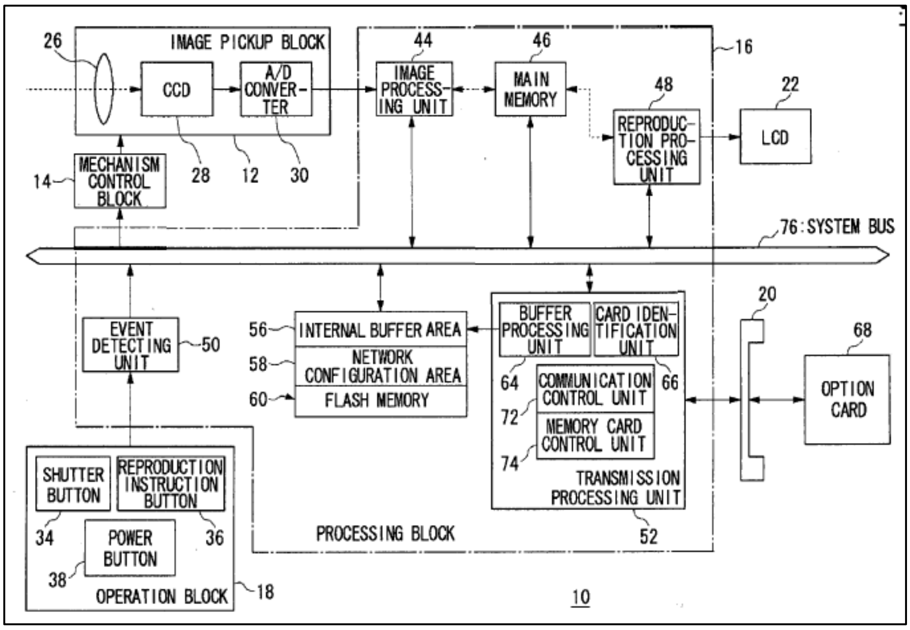
An Internet direct device comprising

228. Inoue describes a digital camera for transmitting and receiving images that, when "powered on … automatically establishes a network connection with [a] file server" for the purposes of transmitting and receiving images over a communications network. Inoue, Abstract. Inoue's network connection can include a connection to the Internet (126). *See, e.g., id.*, ¶0060, Fig. 3 (excerpted below):



an imaging system to capture a still or video image;

229. Inoue describes "a digital camera" with an "image pickup block" to capture images. Inoue, ¶0009; *see also id.*, ¶¶0002, 0010-0013, Fig. 1 (excerpted below; 12).



Inoue, Fig. 1.

> *and a microprocessor to transmit said captured still or video image to an account associated with the Internet direct device on a website archive and review center (WSARC) upon image capture, and receive still or video image from said WSARC;*

230. Inoue describes this element, including the claimed microprocessor. Inoue describes a processing block 16 that includes an image processing unit 44, a transmission processing unit 52, a reproduction processing unit 48, memory units, and various other elements. Inoue, ¶0053, Fig. 1. The transmission unit contains a communication control unit 72 which controls a communication card 68 (option card 68) able to access various communication networks. *Id.*, ¶0049 ("The card slot 20 [in the camera] retains an option card 68 detachably"). "The communication control unit 72 exercises control necessary to communicate with the file server…." *Id.*, ¶¶0056, 0060 ("The digital camera 10 and the access point 122 communicate with each other over a wireless LAN"). Inoue teaches that its digital cameras (Internet direct devices) transmit images "upon obtainment of the image" to a server. *Id.*, ¶0018. "Upon obtainment of the image" includes image capture. *Id.*, ¶0015 ("The 'image obtained by image pickup,' shall cover both an intact image just picked up and an image obtained through compression or the like after picked up."), ¶0048 ("The image pickup block 12 shoots a subject under user instructions.").

231. Inoue further explains that its microprocessor not only controls image capture and transmittal to the file server, but also operates to retrieve images from the file server. Inoue states:

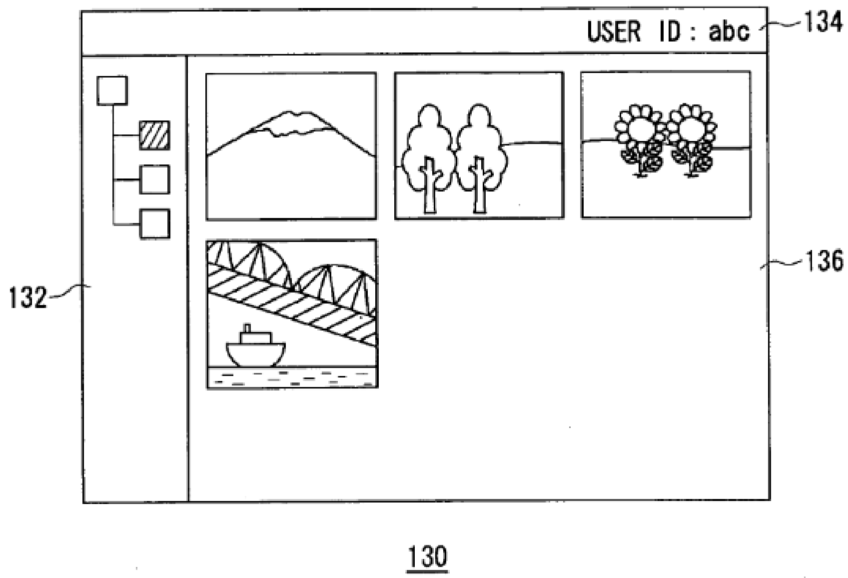
> For example, the processing block includes any one of the following configurations:
>
> (1) A detecting unit which detects an activation request for the digital camera, and a communication control unit which performs processing for establishing a network connection with a file server upon detection of the activation request;
>
> (2) A detecting unit which detects an image pickup request, and a communication control unit which performs processing for transmitting an image obtained by image pickup to a file server over a network upon obtainment of the image;
>
> (3) A detecting unit which detects an image reproduction request, and a communication control unit which performs processing for receiving an image to be reproduced from a file server over a network when the image reproduction request is detected; and
>
> (4) Any two or more of the configurations (1) to (3) in combination.

Inoue, ¶¶ 0009-0013.

232. Inoue further describes that its file server is configured with "user-specific folders … so that images are classified and stored in the folders" based upon the camera that captures and uploads the image. *Id.*, ¶0059. Inoue discloses that these folders are created for storing and retrieving images associated with a

particular digital camera and user. *Id.*, ¶0079-0082, Figs. 12, 13. Figure 13 depicts a file server structure with individual folders for different devices and users (*see also id.*, ¶¶0080-0082):

FIG.13



Id., Fig. 13. Inoue's folders comprise accounts associated each of the IDDs (Inoue's camera) on a WSARC (Inoue's file server). *Id.*

> *wherein the Internet direct device automatically connects to said WSARC over an Internet connection on power-up using one of a plurality of available modes of connection, which is designated as a primary mode of communication,*

233. Inoue explains that "[w]hen the digital camera is powered on, it automatically establishes a network connection with the file server in an activation process." Inoue, Abstract. "The power button 38 is one for switching on/off the

power of the entire digital camera 10. When the digital camera 10 is off, pressing the power button 38 is detected by event detecting unit 50 as an activation request, which is followed by an activation process." *Id.*, ¶0058. Inoue's digital camera "detects an activation request" and "establish[es] a network connection between the digital camera and a file server upon detection of the activation request." *Id.*, ¶0017; *see also id.*, ¶0066, Fig. 6. The communications network can be via any one of a plurality of modes of connection: "The 'network' may be either wireless or wired. Nor does it matter whether the network uses such facilities as an access point if on a wireless LAN in infrastructure mode, or is of so-called peer-to-peer as if in ad-hoc mode." *Id.*, ¶0015. The particular network that is selected for use is the primary mode for Inoue's camera to connect to a communication network, such as the Internet. *Id.*, ¶0060. In one embodiment, Inoue identifies a wireless LAN as the primary mode of communication to reach the Internet. *Id.* ¶0060, Fig. 3.

> *wherein the Internet direct device automatically switches to another available mode of communication when the Internet direct device detects that said primary mode of communication to said WSARC is unavailable.*

234. As I have noted, one of Inoue's embodiments identifies a wireless LAN as a primary mode of connection to reach the Internet among a plurality of available modes. Inoue, ¶0060. Inoue does not disclose that its digital cameras

automatically switch from a wireless LAN to another available mode of connection when the wireless LAN is unavailable. Nair, however, provides this teaching.

235. Nair relates "generally to the field of wireless technology and, more particularly, to seamless routing between wireless networks." Nair, ¶0003. Nair expressly acknowledges that it teachings apply to virtually any personal electronic device with capability for communicating by wireless technology—*e.g.*, "wireless device 12 can be, for example, a wireless personal digital assistant (PDA), a cellular phone, or any other wireless-capable electronic device." *Id.*, ¶0027. Nair explains that connecting and transmitting data over a wireless LAN (a "WLAN"), like that used in Inoue, provides certain advantages over other available modes of connection, for example, to increase throughput. *Id.*, ¶0028.

236. Nair further explains that its technology allows wireless devices to have "uninterrupted and effective wireless access for the wireless device 12" by "automatically and seamlessly" handing off communications from a WLAN to a wireless wide area network (a "WWAN") when the WLAN connection is unavailable. Nair, ¶0029; *see also id.*, Abstract, ¶¶0008-0009, 0022, 0028, 0035-0040.

> In operation, as the wireless device 12 is moved between or among the effective ranges of various wireless networks (WLAN or WWAN), connectivity application 24 functions to change connections from one wireless network to another wireless network. In one aspect,

> the change of wireless connection can be automatic such that, for example, upon loss of connectivity from any one connection, the connectivity application 24 will automatically initiate a new connection and pass the respective IP address to operating system 20 …. This may occur without any noticeable loss of connectivity to the user of the wireless device 12.

Id., ¶0039.

237. A person of ordinary skill in the art would have applied Nair's automatic switching functionality to Inoue's digital camera. Nair explains some of the advantages that would motivate an ordinary artisan to modify Inoue's wireless camera to be able to seamlessly connect to a WWAN when a WLAN is unavailable. Nair, ¶¶0006-09. A person of skill in the art would also have recognized additional advantages to combining this functionality from Nair into Inoue's digital camera. For example, photographers (*e.g.*, travelers, photojournalists, etc.) were known to be highly mobile and the ordinary artisan would have recognized that such seamless switching across multiple modes of connection would improve the reliability, security, and timeliness of image uploads while photographers travel outside of the reach of a LAN. In the case of the enterprise market—*e.g.*, a media company that employs photographers—it also would have been known as advantageous to centrally manage this switching process so that devices are automatically switched to a preferred network that may

operate at a negotiated lower fee-rate. A person of ordinary skill would have also understood that automatic switching would make operation of the camera more convenient to the user, at least because the camera could upload images from various locations without manually switching networks.

b) Claim 2

> *The Internet direct device of claim 1, further comprising a storage device for locally storing captured still or video image and said received still or video image.*

238. Inoue discloses such a storage device at least as buffer memory 56 on the IDD for locally storing captured and received still or video images. Inoue, ¶¶0025-30, 0063. Inoue discloses that "[t]he image saved to the buffer 56 is transferred to the file server 100 next time the communication with the file server 100 is enabled." *Id.*, ¶0063.

c) Claim 4

> *The Internet direct device of claim 1,wherein said plurality of available modes of connection is selected from a group consisting of: a land line, DSL, cable, satellite, wireless network, cellular, Wi-Fi, and Wi-Max.*

239. Nair explains that its wireless device 12 can use a variety of modes of communications in addition to WLAN (*e.g.*, Wi-Fi) and WWAN (*e.g.*, cellular). Nair, ¶0024. For example:

> Each wireless network 14, 16, 18 can be a communication network that supports wireless communication. … the networks may support a variety of communications, including, but not limited to, analog cellular system, digital cellular system…, and Enhanced Specialized Mobile Radio (ESMR). The wireless networks 14, 16, 18 may utilize or support various protocols. Exemplary protocols for WLANs **16,18** include IEEE 802.11, HomeRF, Bluetooth, HiperLAN and the like. Exemplary protocols for WWAN 14 include Time Division Multiple Access (TDMA, such as IS-136), Code Division Multiple Access (CDMA)….

Id., ¶0025. A person of ordinary skill would have combined this teaching in Nair with Inoue for the reasons I have discussed above.

d) Claim 7

> *The Internet direct device of claim 1, further comprising a SIM card associated with a registered user of said WSARC.*

240. Nair describes the use of a "wireless network card" for communication with, *inter alia*, a WWAN. Nair, ¶0032. Nair describes various cellular networks as exemplary WWANs. *Id.*, ¶0025. A person of ordinary skill in the art would understand the disclosed wireless network card to include a subscriber identity module card (SIM) card or equivalent, which is associated with a registered user of the wireless device. A person of ordinary skill would have combined this teaching in Nair with Inoue for the reasons I have discussed above. Additionally, as discussed below, a person of ordinary skill in the art would have

understood that Inoue's digital camera can be used in a cell phone, which contains a SIM card.

e) Claims 8 and 9

241. Claims 8 and 9 concern overlapping functionality and are addressed together.

> *8. The Internet direct device of claim 1, further comprising a web browser.*
>
> *9. The Internet direct device of claim 8, wherein said microprocessor is operable to download live or recorded audio or video images from a website using the web browser over said connection.*

242. Inoue does not expressly disclose a web browser for downloading live or recorded audio or video images. Nair, however, discloses such a browser. Nair, ¶0027 ("Such an application can be [] a network browser that exchanges information with the [] the 'World Wide Web.'"), ¶0034. Including a web browser application in Inoue's camera is nothing more than use of known software for its known downloading function, yielding merely predictable results. Among other things, web browsers have built-in capabilities to upload and retrieve images as well as to negotiate firewalls and other security systems. *Id.* The ordinary artisan would have recognized that a web browser is familiar to consumers and would provide ease of use as a universal interface. Moreover, the ordinary artisan would have used existing technology rather than develop new systems or technology that

may not have the same advantages and/or become out of date. *Id.* A person of ordinary skill in the art would have been motivated to include web browser in Inoue's camera as modified, to download from a website as recited therein, to provide security, ease and familiarity, and as application of a known solution to yield predictable results. *Id.*

f) Claim 12

The Internet direct device of claim 1, wherein said imaging system further comprises an image pickup, an optical module for forming an image on the image pickup, and an image capturing module for capturing digital still or video images from said image pickup.

243. Inoue discloses a digital camera that includes the claimed imaging system having at least an "image pickup block 12" (Inoue, ¶0052) and its control circuitry as the image pickup, a "lens" and its control circuitry which is used "for forming an image of a subject on the CCD" as the optical module (*id.*), and an "image processing unit 44" that "inputs the image data output from the image pickup block," as the image capturing module. *Id.*, ¶0052. Inoue explains interaction of its image pickup block 12 and processing block 16 to capture images. *Id.*, ¶0053.

g) Claim 13

The Internet direct device of claim 12, wherein said optical module comprises an auto-focus optical system.

244. Inoue discloses a mechanism control block 14 that exercises mechanical controls over the image pickup block 12, including zooming, focusing, and aperture setting. Inoue, ¶0049. A person of skill in the art would have understood that controlling "focusing" would include auto-focusing.

h) Claim 14

The Internet direct device of claim 1 is a portable camera or a cell phone with a camera.

245. Inoue describes a portable digital camera. Inoue, Abstract, ¶0002, *et seq.*; *id.*, ¶0061, Fig. 2. Additionally, Nair discloses a cell phone. Nair, ¶¶0027, 0034, 0040.

i) Claim 15

The Internet direct device of claim 1, further comprising a display for displaying said captured still or video image and said received still or video image.

246. Inoue describes a digital camera with a display 22 for displaying images. Inoue, Abstract, ¶¶ 0002, 0082. A person of ordinary skill in the art would have understood "images" to include still and video images. Inoue describes displaying downloaded and received images. *Id.*, ¶¶0053, 0062, 0074.

j) Claim 16

The Internet direct device of claim 15, wherein said display of the Internet direct device comprises a touch pad for entering a command, a text or labeling images.

247. Displays that comprise a touch pads (*e.g.*, a touch screen) were well known in the art as an input device for controlling a portable electronic device. Inoue does not expressly state that its end user devices incorporate a touch pad or screen, but Nair describes a "touch screen" as one such user interface that can be used on a mobile communication device. Nair, ¶0033.

248. The ordinary artisan would have known that using a touch screen as a user interface in place of another user interface (a keyboard, a roller, a stylus, etc.) is simply the substitution of one known input device for another to achieve no more than predictable results. Moreover, Inoue's device is intended to be portable and an ordinary artisan would have known that it would be advantageous to use a combined display/touch screen to reduce size requirements of portable devices. Further, the ordinary artisan would have understood digital camera user's may wish to pan, zoom, edit or focus images. Nair's touch screen would have been a preferred interface for performing these functions on a portable camera, having condensed and highly flexible input capabilities. Thus, a person of ordinary skill in the art would have been motivated to modify Inoue's display to have a touchscreen to reduce size requirements for portable devices, provide ease of controls, and otherwise as an application of known features for their predictable results.

k) Claim 17

The Internet direct device of claim 1, wherein said microprocessor is operable to connect the Internet direct device to other Internet direct devices over said connection.

249. Inoue itself discloses that its digital camera communicates with other digital cameras over a communications network. Inoue explains that its digital camera can receive images previously uploaded to the server by it or a different digital camera for visual display on the camera. "When image reproduction is instructed from the digital camera, the image is downloaded from the file server over the network and displayed on the digital camera." Inoue, Abstract; *see also id.*, ¶¶0012, 0019, 0074-0075. As discussed above, an ordinary artisan would have understood that, using the functionality already disclosed in Inoue, one digital camera could upload an image to the server and a different digital camera could access another camera's file folder and download the same image from the server, thus connecting one camera to a different camera for image transfer. *See id.*, ¶¶ 0080-0082, Fig. 13.

250. Additionally, it was well known prior to the alleged invention of the '172 Patent that digital cameras could be (and were) included in cell phones. *See* Narayanaswami, p. 65.[8] Indeed, as Narayanaswami reports "cell phones that

[8] Here, Narayanaswami demonstrates the state of the art, not as part of art combination. However, Narayanaswami is addressed together with Inoue and Nair

integrate digital cameras have far outsold regular digital cameras" as of December, 2004—prior to the earliest possible effective filing date of the challenged claims. Narayanaswami, p. 65. A person of ordinary skill in the art would have known at the time that it would be advantageous to include Inoue's digital camera in a cell phone, such as those described in Nair. As Narayanaswami explains from December 2004:

> First, the cell phone's voice communication capability makes it the most ubiquitous portable device. Second, people enjoy the convenience of capturing high-resolution digital images using a device they already carry. Third, this integration relieves people from having to make a conscious decision to take a camera in anticipation of taking pictures. Some digital cameras even offer integrated Wi-Fi capabilities for direct image transfer.

Narayanaswami, p. 65. Cell phones connect to other cell phones over a communication network. *Id.* Consequently, the ordinary artisan would have been motivated to combine Inoue and Nair to achieve all the functionality of claim 17.

l) Claim 18

> *The Internet direct device of claim 17 is operable to support voice over IP over said connection.*

251. As discussed in connection with dependent claim 17 (above), it was well known that digital cameras like those disclosed in Inoue could be (and were)

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as a combination below.

integrated with cell phones. *See* Narayanaswami, p. 65. Nair expressly discloses a cell phone that uses Voice over IP (VoIP). Nair, ¶0034. For the reasons discussed in connection with dependent claim 17, a person of ordinary skill in the art would have known to integrate Inoue's camera with a cell phone, such as that disclosed in Nair, supporting VoIP calling over the communication network at least as an application known of features for their predictable results.

m) Claim 19

The Internet direct device of claim 17, further comprising a display for displaying images received from said other Internet direct devices over said connection.

252. Inoue explains that its camera can receive images previously uploaded to the server by it or a different digital camera for visual display on the camera. Inoue, Abstract; *see also id.*, ¶¶0012, 0019, 0074-0075, 0080-82, Fig. 13.

n) Claim 20

The Internet direct device of claim 17, wherein said microprocessor is operable to receive from and transmit to other Internet direct devices still or video images over said connection.

253. As I have discussed above in connection with claims 17-20, it would have been known to provide for reception and transmittal of images to and from other digital direct devices, based on Inoue's teachings itself and/or combined with Nair. Each of Inoue and Nair disclose that their transmission and receipt functions

are under the control of a microprocessor. Inoue, ¶0053, Fig. 1; Nair, ¶¶0017, 0019. Accordingly, Inoue as modified by Nair achieves each feature of claim 20.

o) Claim 21

The Internet direct device of claim 20, wherein said microprocessor is operable to receive from and transmit to said other Internet direct devices audio over said connection.

254. As discussed in connection with claims 17 and 18, it was known it was well known that digital cameras could be (and were) integrated with cell phones. *See* Narayanaswami, p. 65. Nair discloses a cell phone that uses Voice over IP (VoIP). Inoue, ¶0034. A person of ordinary skill in the art would have been motivated to integrate Inoue's camera with a cell phone allowing audio communication among Internet direct devices included as at least VoIP at least as an application known of features for their predictable results.

p) Claim 22

The Internet direct device of claim 1, further comprising an image compression module for compressing said captured image.

255. Inoue itself further discloses that its "image processing unit 44 inputs the image data output from the image pickup block 12, and encodes and compresses the same according to a JPEG (Joint Photographic Experts Group) scheme or the like." Inoue, ¶0053. Accordingly, Inoue itself discloses each additional feature of claim 22.

q) Claim 23

256. Claim 23 is independent and, aside from a change in one of its claim elements, is identical in all relevant respects to claim 1. Claim 23 recites as follows with its differences from claim 1 shown in bold for comparison.

> *An Internet direct device comprising an imaging system to capture a still or video image;*
>
> *a microprocessor to transmit said captured still or video image* ***to another Internet direct device <u>or</u>*** *an account associated with the Internet direct device on a website archive and review center (WSARC) upon image capture, and receive still or video image* ***from said other Internet direct device <u>or</u>*** *said WSARC;*
>
> *and wherein the Internet direct device automatically connects . . .,*
>
> *and wherein the Internet direct device automatically switches . . ..*

257. The only difference between claim 23 and claim 1 is the option in claim 23 of transmitting/receiving with another Internet direct device <u>*or*</u> with a “website archive and review center.” As the option is stated in the alternative (“or”), it only broadens the scope of claim 23. As this broadening option is coextensive with the limitations of claim 1, it fails to distinguish the prior art combination of Inoue and Nair. Thus, claim 23 is unpatentable in light of Inoue and Nair for the same reasons I have stated above with regard to claim 1.

r) Claim 24

The Internet direct device of claim 23, wherein said microprocessor is operable to receive from and transmit to said other Internet direct devices audio over said connection.

258. As discussed above, it was well known that digital cameras like those disclosed in Inoue could be (and were) integrated with cell phones. *See* Narayanaswami, p. 65. Nair expressly discloses a cell phone that uses Voice over IP (VoIP). Nair, ¶0034. A person of ordinary skill in the art would have been motivated to integrate Inoue's camera with a cell phone allowing audio communication among Internet direct devices at least as an application of known features for their predictable results.

s) Claim 25

The Internet direct device of claim 23, further comprising a storage device for locally storing captured still or video image and said received still or video image.

259. Inoue discloses a storage device at least as buffer memory 56 on the IDD for locally storing captured and received still or video images. Inoue, ¶¶0025-30, 0063, 0075.

t) Claim 26

The Internet direct device of claim 23, further comprising a web browser; and wherein said microprocessor is operable to download *live or recorded audio or video images from a website using the web browser over said connection.*

260. As discussed above, Inoue does not expressly disclose a web browser for downloading live or recorded audio or video images—but Nair does. Nair, ¶0027 ("Such an application can be, for example, a network browser that exchanges information with the distributed application known as the 'World Wide Web.'"); *id.*, ¶0034. As discussed above, a person would be motivated to include a web browser application like that described as part of Nair's "wireless device" as part of Inoue's digital camera. Accordingly, Inoue modified by Nair achieves these additional features.

2. Petition 2: Ground 2 – Inoue, Nair, and Narayanaswami

261. As I discussed above regarding Ground 1 of Petition 2, dependent claims 7, 18-21, and 24 of the '172 Patent are each achieved in view of Inoue and Nair. These claims, however, can equally be found obvious in view of Inoue, Nair, and Narayanaswami. Nair describes mobile phones and Narayanaswami recognizes that digital cameras are in mobile phones and states the benefits of including a digital camera in a mobile phone. *See* Narayanaswami, p. 65. For the reasons discussed in Nair and Narayanaswami, and the further reasons discussed above, an ordinary artisan would have been motivated to integrate Inoue's camera with a mobile phone for the advantages indicated by Nair and Narayanaswami and apparent to the ordinary artisan.

3. Petition 2: Ground 3 – Kusaka and Nicholas

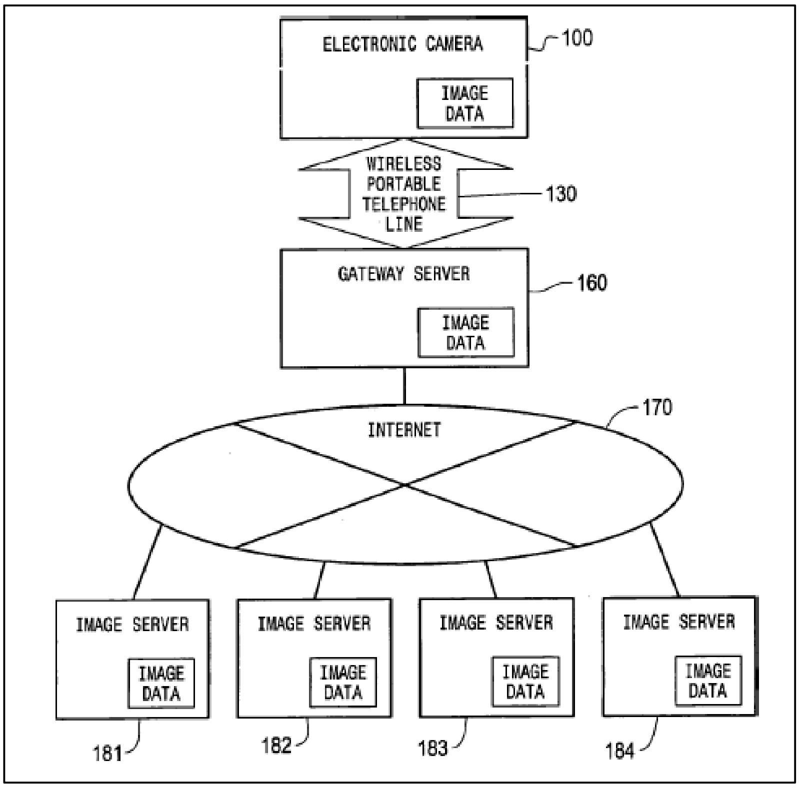
a) Claims 1 and 23

262. Kusaka as modified by Nicholas achieves every element of claims 1 and 23 of the '172 Patent.[9] Claims 1 and 23 each recite:

An Internet direct device, comprising:

263. Kusaka describes "[a]n electronic camera 100" that "automatically transits captured image data and user identification to a gateway server 160 over a wireless portable telephone link 130." Kusaka, Abstract; ¶0219.

[9] As I have discussed above, claim 23 differs from claim 1 only by including optional language "or" in its "microprocessor" element, which broadens claim 23 compared to claim 1. Because this broadening option does not change the patentability analysis, claims 1 and 23 are addressed together.



Id., Fig. 1.

an imaging system to capture a still or video image,

264. Kusaka describes its "electronic camera 100" to "automatically transmit[] captured image data and user identification to a gateway server 160 over a wireless portable telephone link 130." Kusaka, Abstract; *see also id.*, ¶¶0003, 0219.

a microprocessor to transmit said captured still or video image to [another Internet direct device or[10]] an account associated with the Internet direct device on a website archive and review center

[10] The bracketed material reflects the additional, non-limiting elements of claim 23 which do not affect the patentability analysis. *See supra*, n.9.

> *(WSARC) upon image capture, and receive still or video image from [said other Internet direct device or] said WSARC;*

265. Kusaka discloses the claimed microprocessor that communicates with a WSARC, at least by its communication with the image server. *See* Kusaka, ¶0234. Kusaka explains that its CPU 50 captures, processes, and sends/receives images to and from storage in "an image storage device such as an image server on the Internet[.]" Kusaka, ¶0003; *see also id*., ¶¶0219-0221. Kusaka discloses automatically transmitting image data captured by its camera upon image capture, i.e., when the picture is taken. *Id*., ¶¶0219, 0236. Accordingly, Kusaka discloses this claim element.

> *wherein the Internet direct device automatically connects to said WSARC over an Internet connection on power-up using one of a plurality of available modes of connection, which is designated as a primary mode of communication, and*

266. Kusaka discloses that its device automatically connects to its WSARC (image server) by one of a plurality of available modes of communication, including via an "wireless portable telephone link 130" established by "wireless portable telephone circuit 72" integrated into the camera (Kusaka, ¶¶0219, 0234, 0236, Fig. 4); a "wireless LAN (Ethernet™)" that allows Internet communication (*id.*, ¶0534); and/or by connecting to portable telephone 120" using "a short-range communication link 110," which includes "short-range wireless communication"

as well as "short-range wired communication," among other things. *Id.,* ¶0273. Kusaka does not explicitly disclose connecting to the WSARC on power-up.

267. Nicholas, however, fully discloses connecting over an Internet connection on power-up using a primary mode of communication. Nicholas was not of record during the '172 patent's prosecution. Nicholas describes an end user device that "supports a connection to a plurality of data communication networks," detects which networks are available, and "selects one of the one or more network(s) determined to be available for performing a data communication task." Nicholas, Abstract, ¶¶0008, 0049. The device may determine which network "is optimal… based on the type of data to be communicated (e.g., voice, video or computer data), the error rate associated with each available network, the number of anticipated 'hops' between the end user device and the remote network entity to which it needs to communicate, the cost associated with establishing and maintaining a network link, the best path, and/or anticipated power consumption." *Id.*, ¶0008. For example, Nicholas teaches that "the end user device may avoid connections via cellular networks or ISPs that charge access fees when there are network connections available at a lower cost." *Id.,* ¶0053. Nicholas describes a wired mode of connection as one that may be preferred over other connection modes for cost, power consumption, transmission quality, among other reasons. *Id.*, ¶¶0053-0056; *see, e.g., id.*, ¶¶0008, 0020.

268. Nicholas explains that the available networks are detected, then the end user device then "select[s] an available network for data communication based on one or more predefined criteria." Nicholas**,** ¶0049. Nicholas indicates that its device can construed to select a mode of connection as part of the network detection process. *Id.*, ¶0056. The connection through its primary mode of communication can also occur *automatically on power-up*.

> The network detection function is preferably performed automatically by the end user device. For example, the network detection function may be performed automatically: (1) **as part of the power-up sequence** of the end user device to determine which network(s) are initially available to the end user device…

Nicholas, ¶0046 (emphasis added); *see also id.*, ¶0049.

269. An ordinary artisan would have recognized the benefits of versatility, signal strength, power conservation, reduced on-board component costs, and performance resulting from Nicholas's automatic-connection feature. For example, the ordinary artisan would have known that portable electronic cameras have limited user interfaces, and it would be advantageous to automatically connect to Kusaka's server on power-up. An ordinary artisan would also would have been motivated to include Nicholas's automatic connection on power-up in order to reduce the time to begin transferring images so that images can be uploaded when they are "captured," rather than waiting for a connection. A person of skill in the art would have also recognized the benefits of automatically connecting to the

most advantageous (primary) mode of connection available, whether for reasons of cost, speed, or reliability of network connection. This would be especially true of a portable electronic camera which, depending on its location, might not have all modes of connection available to it, or might have multiple viable connections available, some of which are more advantageous than others.

wherein the Internet direct device automatically switches to another available mode of communication when the Internet direct device detects that said primary mode of communication to said WSARC is unavailable.

270. Kusaka does not disclose that its camera "automatically switches to another available mode of communication when [it] detects that said primary mode of communication to said WSARC is unavailable." Nicholas teaches this element and would be readily combined with Kusaka to achieve any of economy, continuity of connection, transmission quality, versatility, signal strength, and/or performance.

271. Nicholas's end user device "provides for seamless transitions between different data communication networks, thus permitting all network communication tasks to be performed in a seamless, uninterrupted manner regardless of the location of the device, the type of network connection being used, or the form of data communication being carried out." Nicholas, ¶0009. When Nicholas's end user device is disconnected from its wired network (*e.g.*, a LAN in

the user's office), "the end user device continues to provide secure connections to the office network that are uninterrupted[.]" *Id.*, ¶0028. Nicholas explains that the device seamlessly switches to a wireless network, such as a WLAN that provides a mode of connection for the office campus to permit uninterrupted transmissions. *Id.*, ¶¶0029-0034.

272. Nicholas further describes seamless hand-offs between WLAN and WWAN network, as well as a seamless switch to a wired secondary LAN in a user's home. *Id.*, ¶¶0033, 0034. Any one of the LAN, WLAN or WWAN networks can constitute a primary mode, and the various alternative networks constituting "another mode of connection": WLAN in the case of the office LAN as the primary mode, WWAN in the case of WLAN as the primary mode, and home LAN in the case of WWAN as the primary mode. *Id.*

273. The ordinary artisan would have understood Nicholas's automatic switching to provide continuity of connection in seamless transition (*id.* Abstract), transmission quality (*id.* ¶0056), general versatility, signal strength, and/or performance. One of ordinary skill at the time of invention would have modified Kusaka's device to automatically connect to its WSARC over an Internet connection on power-up using one of a plurality of available modes of connection, which is designated as a primary mode of communication, and to automatically

switch to another available mode of communication when its device detects that its primary mode of communication is unavailable.

b) Claim 2

further comprising a storage device for locally storing captured still or video image and said received still or video image.

274. Kusaka itself discloses a storage device at least one of its various storage mediums including buffer memory 59, memory card 77, frame memory 69,269 that are each capable of local storage of images. For example, Kusaka's buffer memory and frame memory store images and other information such as location information. Kusaka, ¶¶0234-0237.

c) Claim 4

wherein said plurality of available modes of connection is selected from a group consisting of: a land line, DSL, cable, satellite, wireless network, cellular, Wi-Fi, and Wi-Max.

275. Kusaka and Nicholas achieve the additional limitations of claim 4 to provide the full benefits of the combination as described above regarding claim 1. As mentioned above, Kusaka describes a plurality of available modes of communication including at least cellular and Wi-Fi. Kusaka, ¶¶0219, 0234, 0236, 0534, Fig. 4. Moreover, Nicholas, teaches this element including at least wired connections, WLAN (*e.g.,* Wi-Fi), and WWAN (*e.g.*, cellular). Nicholas, ¶0020. In combining Kusaka and Nicholas as discussed above, the ordinary artisan would

have included at least the variety of wired and wireless connections as taught by Kusaka and Nicholas to provide the full benefits that I have discussed above.

d) Claim 7

further comprising a SIM card associated with a registered user of said WSARC.

276. Kusaka itself discloses a User Identity Module (UIM) card 277 which can store personal information of the user. *E.g.*, Kusaka, ¶¶0298, 0431, Fig. 37. Personal information from Kusaka's UIM card 277 is used to register with its image servers for managing images. *Id.*, ¶0485. To the extent that Kusaka discloses this feature in one embodiment, the ordinary artisan would have been motivated to modify Kusaka's camera to itself include its UIM 277 as a predictable use of known elements and/or routine integration of parts. Kusaka, ¶0219.

e) Claim 12

wherein said imaging system further comprises an image pickup, an optical module for forming an image on the image pickup, and an image capturing module for capturing digital still or video images from said image pickup.

277. Kusaka itself discloses such an imaging system at least as its image capture system including elements 10 and 52-60. Kusaka discloses an image pickup at least as one or more of a CCD 55 and its control circuitry 56; an optical module at least as one or more a lens 10, a diaphragm 53, and their control circuitry 52,54 forming an image on the CCD 55; and an image capturing module

at least as one or more of a processor 57, converter 58, buffer 59, and control 60. Kusaka, ¶0379, Fig. 4.

f) Claim 13

wherein said optical module comprises an auto-focus optical system.

278. Kusaka discloses such an optical module as one or more a lens 10, a diaphragm 53, and their control circuitry 52,54 forming an image on the CCD 55. At least Kusaka's lens 10, diaphragm 53, and their control circuitry 52,54 comprise an auto-focus optical system. Kusaka, ¶0379.

g) Claim 14

The Internet direct device of claim 1 is a portable camera or a cell phone with a camera.

279. Kusaka itself discloses its device as at least as its camera 100 which is portable. *E.g.*, Kusaka, ¶0219, Fig. 2; *see also id.*, ¶¶0235 (GPS), 0583.

h) Claim 15

further comprising a display for displaying said captured still or video image and said received still or video image.

280. Kusaka itself discloses a display at least as screens 21,22 (Kusaka, Fig. 3) which can display captured and received images. *E.g., id.*, ¶¶0225, 0227, 0249, 0282.

i) Claim 16

wherein said display of the Internet direct device comprises a touch pad for entering a command, a text or labeling images.

281. Kusaka itself discloses such as touch pad at least as touch screen 66. *E.g.*, Kusaka, ¶0227. Kusaka's touch screen provides a user interface for entering commands. *See e.g., id.*, ¶¶0249 (scrolling, playback, etc.).

j) Claim 17

wherein said microprocessor is operable to connect the Internet direct device to other Internet direct devices over said connection.

282. Kusaka itself discloses its device to connect with other IDDs over its connection. For example, Kusaka describes that a single user can use multiple cameras/devices each accessing the same album on the image server. Kusaka, ¶0544. Moreover, Kusaka discloses direct communication between devices and using device common communications protocol (IP). *E.g., id.* ¶¶0573, 0626. Kusaka uses its CPU to conduct general operations, and the ordinary artisan would have understood that Kusaka's connection which other Internet direct devices to be the result of its CPU. Kusaka, ¶¶0229, 0234, 0263.

k) Claim 18

The Internet direct device of claim 17 is operable to support voice over IP over said connection.

283. Nicholas describes an end user device that functions as a cell phone and provides VoIP calling. Nicholas, ¶¶0020-0028, 0032-0034. As I have discussed above, it was well known to persons of ordinary skill in the art to

integrate a digital camera with a cell phone. *See* Narayanaswami, p. 65.[11] In fact, as of December 2004, "cell phones that integrate digital cameras have far outsold regular digital cameras." Narayanaswami, p. 65.

284. A person of ordinary skill in the art would have known at the time that it would be advantageous to integrate Kusaka's digital camera with Nicholas's end user device achieving VoIP at least as an application of known features to achieve mere predictable results. Moreover, a person of ordinary skill in the art would have been motivated to do so in light of the market trend of including digital cameras in cell phones. Consequently, a person of ordinary skill in the art would have been motivated to combine Kusaka and Nicholas to achieve the functionality of this additional element.

l) Claim 19

> *further comprising a display for displaying images received from said other Internet direct devices over said connection.*

285. Kusaka itself discloses a display at least as screen capable of displaying images. *See* Kusaka, Fig. 3(21,22); *see also e.g., id.*, ¶¶0225, 0227, 0249, 0282. Kusaka discloses an arrangement allowing multiple cameras/devices to connect by accessing the same album on the image server for storing, retrieving,

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[11] Narayanaswami is cited here to indicate the state of the art at the time of alleged invention.

and managing image data on the server. *Id.* ¶0544. Thus, one device connects and can view images from another device on its screens 21,22 over its connection. *E.g., id.*, ¶0245.

m) Claim 20

Claim 20 depends from claim 17 and recites:
wherein said microprocessor is operable to receive from and transmit to other Internet direct devices still or video images over said connection.

286. As I have previously discussed, Kusaka itself discloses its microprocessor transmitting and receiving images with other devices over its connection. *See* Kusaka, Fig. 3; *see also e.g., id.*, ¶¶0225, 0227, 0245, 0249, 0282.

n) Claim 22

further comprising an image compression module for compressing said captured image.

287. Kusaka discloses an image compression module as at least part of its capture control circuit 60 which "converts or compresses the digital data stored temporarily in the capture buffer memory 59 into a specific recording format (JPEG, etc.) to form the image data." Kusaka, ¶0234. Kusaka stores compressed image data in the memory card 77. *Id.*, ¶0291.

o) Claim 23

288. As I have explained in connection with independent claim 1, above, independent claim 23 is fully achieved by Kusaka and Nicholas.

p) Claim 24

The Internet direct device of claim 23, wherein said microprocessor is operable to receive from and transmit to said other Internet direct devices audio over said connection.

289. As discussed above, it was known it was well known that digital cameras like those disclosed in Kusaka could be (and were) integrated with cell phones. *See* Narayanaswami, p. 65. Nicholas describes an end user device that functions as a cell phone and provides VoIP calling. Nicholas, ¶¶0020-0028, 0032-0034. A person of ordinary skill in the art would have been motivated to integrate Kusaka's camera with cell phone allowing audio communication among Internet direct devices for the reasons I have discussed above.

q) Claim 25

The Internet direct device of claim 23, further comprising a storage device for locally storing captured still or video image and said received still or video image.

290. Kusaka itself discloses such a storage device at least one of its various storage mediums including buffer memory 59, memory card 77, frame memory 69,269 that are each capable of local storage of images. Kusaka, ¶¶0234-0237.

4. Petition 2: Ground 4 – Kusaka, Nicholas, Nair

a) Claim 8

further comprising a web browser.

291. Kusaka discloses browsing by scrolling through thumbnail images (*e.g.*, Kusaka, ¶0249), but does not expressly disclose a web browser. Moreover, Nicholas discloses using Internet Protocols and communications via the Internet (*e.g.*, Nicholas, ¶¶ 0012, 0060), but also does not expressly disclose a web browser. As I have discussed above, Nair expressly discloses a web browser for data exchange. Nair, ¶¶0027, 0034.

292. An ordinary artisan would have recognized that Nair's web browser was existing technology that could be used by Kusaka's camera to perform Kusaka's operation of uploading and downloading images from its web access and review archive. Using a web browser is the routine application of a standard technology able to negotiate firewalls and other security features. As discussed in detail above, a web browser has well-known advantages and, in addition, provides a platform that easily recognizable and operable by many customers. Accordingly, an ordinary artisan would have been motivated to include a web browser like that disclosed in Nair in Kusaka as modified by Nicholas to achieve this element.

b) Claims 9 and 26

Claim 9 depends from claim 8 and claim 1. Claim 9 recites:

The Internet direct device of claim 8, wherein said microprocessor is operable to download live or recorded audio or video images from a website using the web browser over said connection.

Claim 26 combines the text of claims 8 and 9 in a single dependent claim, which depends from claim 23:

> *The Internet direct device of claim 23, further comprising a web browser; and wherein said microprocessor is operable to download live or recorded audio or video images from a website using the web browser over said connection.*

As discussed above, an ordinary artisan would have been motivated to include Nair's web browser into the combination of Kusaka and Nicholas. A person of ordinary skill would have understood that Nair's web browser was operable to download live or recorded audio or video images from a website; indeed, that is a known function of all web browsers. Nair, ¶¶0027, 0034. Consequently, the combination of Kusaka, Nicholas and Nair achieve these additional elements.

5. Petition 2: Ground 5 – Kusaka, Nicholas, and Narayanaswami

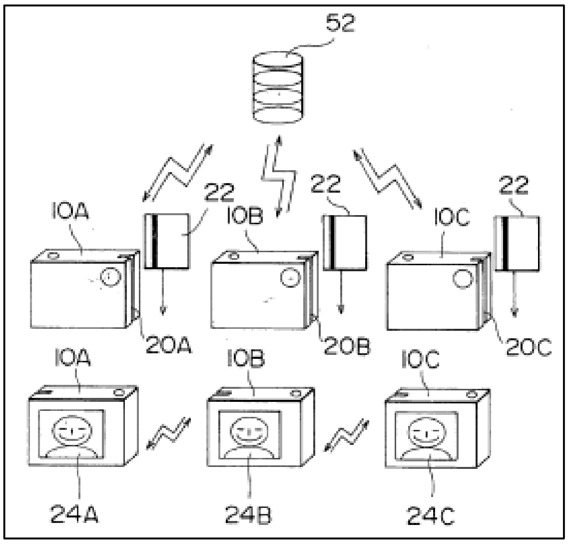
293. As I have discussed above regarding, the combination of Kusaka and Nicholas renders claims 7 and 18-24 unpatentable as obvious for the reasons discussed in Ground 3 of Petition 2. Additionally, these claims are obvious in view of Kusaka, Nicholas, and Naraswarmi. Nicholas describes a cell phone enabled device with VoIP capability and Kusaka describes a digital camera that can be used in a cell phone. Naraswarmi states that digital cameras are integrated into cell

phones. *See* Narayanaswami, p. 65. In fact, as of December 2004, "cell phones that integrate digital cameras have far outsold regular digital cameras." Narayanaswami, p. 65.

294. A person of ordinary skill in the art would have been motivated to follow the market trend that is reported in Naraswarmi to integrate Kusaka's digital camera with a cell phone having the functionality described in Nicholas. Inoue, Nicholas and Naraswarmi all explain why it would have been advantageous to integrate Kusaka's camera with a cell phone having Nicholas's functionality, and an ordinary artisan would have been motivated to make the combination for the reasons stated in those references as well as in Ground 3.

6. Petition 2: Ground 6 - Yamazaki And Nicholas

295. Also absent during prosecution, Yamazaki discloses a network camera 10 communicating images with a server and other cameras. *See*, Yamazaki, Fig. 7 (below), 2:15-23.



Yamazaki, Fig. 7.

296. Yamazaki discloses each element of independent claims 1 and 23, except does not teach automatically switching to another available mode of connection. However, Nicholas expressly teaches this feature and the benefits of its use. The ordinary artisan would have modified Yamazaki to perform automatic switching as taught by Nicholas to provide mobility and versatility, reliability of connection, to take advantage of greater signal strength, to promote power conservation and/or performance among other expressed and apparent advantages. As discussed herein, claims 1, 2, 4, 12-17, 19-20, 23 and 25 are unpatentable under 35 U.S.C. § 103(a) over Yamazaki modified by Nicholas.

a) Claims 1 and 23

297. For the reasons I have discussed above, independent claims 1 and 23 are again addressed together.

An integrated Internet device, comprising:

298. Yamazaki discloses a digital camera 10 communicating images with a server database 52,53 over a communication network 50. *E.g.*, Yamazaki, Fig. 4, 8:30-35. Yamazaki's communications network can include a computer network. *Id.*, 8:30-35. Accordingly, Yamazaki discloses an IDD.

an imaging system to capture a still or video image,

299. Yamazaki discloses such an imaging system at least as its camera. Yamazaki's device includes "[a]n imaging part 12 [that] includes a taking lens and an imaging device such as a CCD arranged behind the taking lens." Yamazaki, 2:25-27. "An image of the subject is formed on a light receiving surface of the CCD 30 through the taking lens of the imaging part 12, and the CCD 30 photoelectrically converts the image into an image signal ….[t]he image signal [is] stored in a detachable external storage medium." *Id.*, 8:13-16.

a microprocessor to transmit said captured still or video image to [another Internet direct device or[12]] an account associated with the

[12] The bracketed material reflects the additional, non-limiting elements of claim 23 which do not affect the patentability analysis. *See supra*, n.9.

Internet direct device on a website archive and review center (WSARC) upon image capture, and receive still or video image from [said other Internet direct device or] said WSARC;

300. Yamazaki discloses such a microprocessor at least as CPU 36 which controls the camera and communication with the server. Yamazaki, ¶0059. Yamazaki explains that the "camera 10 has access to the servers 52A, 52B, …52n through the network 50" and "[t]he servers [52A-n], have databases [53A-n], respectively, that store the image data. The image data recorded with the camera 10 is transmitted to the servers [52] and is recorded in the databases [53]." *Id.*, ¶¶0061-62. Yamazaki also discloses automatically transmitting an image captured by its electronic camera upon image capture, *i.e.*, when the picture is taken. *Id.*, ¶0025. Yamazaki further discloses that a user can "retrieve the image data recorded in the database 53A to reproduce the image on the image display 24 of the camera 10." *Id.*, ¶0063.

wherein said IDC automatically connects to said WSARC over an Internet connection on power-up using one of a plurality of available modes of connection, which is designated as a primary mode of communication, and

301. Yamazaki discloses that the owner of the camera may elect to enter "and record the entered identification information as an owner's identification information in a memory such as a nonvolatile memory in the camera 10."

Yamazaki, ¶¶0066, 0068. "[T]he camera 10 may also connect to the server 52 just after the setting of the user's identification information so as to evaluate the communicational condition." *Id.*, ¶0072. Yamazaki explains that for ease of use, the identification information defaults to the previously-entered user's information. Thus, with previously-entered information,

> [w]hen the power switch 19 of the camera 10 is turned on (S101), whether to enter the identification information of the user is determined (S102).... if no identification information is entered at S102, the previously-recorded owner's identification information is set as the user's identification information (S106). A server to which the camera 10 connects and a 55 person who will be charged are determined in accordance with the set user's identification information.

302. *Id.*, ¶0073. Yamazaki discloses automatic connection to its server on power-up as an automatic setting of its identification information.

303. Alternatively, this feature is achieved in view of Nicholas fully discloses this element. Like Yamazaki, Nicholas was not of record during the prosecution of the '172 Patent. As stated above with respect to Kusaka, a person of ordinary skill in the art would have modified Yamazaki to include automatic connection on power-up as taught by Nicholas to the extent it is not already present in Yamazaki. The ordinary artisan would have been motivated to combine

Nicholas's automatic connection with Yamazaki at least to facilitate the image storage/management feature of Yamazaki which is among Yamazaki's primary functions. *E.g.*, Yamazaki, Title, Abstract, ¶0002-03 (Field of Invention).

> *wherein said IDC automatically switches to another available mode of communication when said IDC detects that said primary mode of communication to said WSARC is unavailable.*

304. Yamazaki does not expressly disclose *automatically switch[ing]*. As discussed above, however, Nicholas discloses this element. For example, when Nicholas's end user device is disconnected from its wired network (described as a LAN in the user's office), "the end user device continues to provide secure connections to the office network that are uninterrupted[.]" Yamazaki, ¶0028. Nicholas explains that the device seamlessly switches to a wireless network, such as a WLAN to permit uninterrupted transmissions. *Id.*, ¶¶0029-34. Nicholas further describes seamless hand offs of both video and voice transmissions between WLAN and WWAN network, as well as a seamless switch to a wired secondary LAN in a user's home. *Id.*, ¶¶0033, 0034.

305. A person of ordinary skill would have appreciated the benefits of Nicholas's as applied to end user devices, such as cameras. *Id.*, ¶¶0029-34; *see also* One of ordinary skill in the art would also have been motivated to modify Yamazaki to perform automatic switching as taught by Nicholas to provide the

disclosed benefits of continuity of connection in seamless transition (*id.* Abstract), economy in selecting networks (*E.g.*, Nicholas, ¶0053), transmission quality (*id.* ¶0056), and the recognized benefits of general versatility, signal strength, and/or performance.

b) Claims 2 and 25[13]

306. Yamazaki itself discloses *a storage device for locally storing captured still or video image and said received still or video image* as recited in claim 2. Yamazaki discloses that its device includes memory 34 and removable storage, each of which can store captured and received images. Yamazaki, ¶0053 ("The image signal sent from the imaging part 12… is stored in the memory 34 (e.g., a flash memory built in the camera 10)…[or] may be stored in a detachable external storage medium such as a memory card."). Yamazaki expressly discloses retrieving images from the server and the ordinary artisan would understand this to include local storage for use. Yamazaki, ¶0063.

c) Claim 4

307. Yamazaki further discloses connecting through various connections such as computer networks, public telephones, or special networks as in claim 4. Yamazaki, ¶0061. As previously mentioned, Nicholas discloses switching between at least landline (wired, Ethernet), wireless (Wifi), and cellular connections. One of

[13] Claims 2 and 25 are the same except they depend from claims 1 and 23, respectfully. As they have already been recited several times, they are addressed together here for convenience.

ordinary skill would have included Nicholas's switching at least between any of its landline, wireless, and cellular connections in modifying Yamazaki to provide the full benefits of continuity of connection in seamless transition (Yamazaki, Abstract), economy in selecting networks (*E.g.*, *id.*, ¶0053), transmission quality (*id.* ¶0056), and the recognized benefits of general versatility, signal strength, and/or performance.

d) Claim 12

308. Yamazaki itself discloses its imaging system *further comprises an image pickup, an optical module for forming an image on the image pickup, and an image* capturing *module for capturing digital still or video images from said image pickup* as recited in claim 12. Yamazaki describes that "[a]n image of the subject is formed on a light receiving surface of the CCD 30 through the taking lens of the imaging part 12, and the CCD 30 photoelectrically converts the image into an image signal." Yamazaki, ¶0019. Yamazaki's includes at least the light receiving surface (sensor) of the CCD 30 as an image pickup, at least the imaging part as the optical module, and at least an CCD as the image capture module. *Id.*; Yamazaki discloses control of these components by its CPU 36 which may also constitute portions of these respective features. Yamazaki, ¶0059.

e) Claim 13

309. Yamazaki discloses the *optical module* and the rest of claim 13 as its imaging part and its control circuitry forming an image on the CCD. Further, Yamazaki explicitly discloses its imaging part 12 and control thereof to provide automated focus and zoom operation. Yamazaki, ¶¶0048, 0055.

f) Claim 14

310. Yamazaki itself discloses a *portable camera*. *E.g.*, Yamazaki, Abstract, Figs. 1&2. Moreover the ordinary artisan would recognize Yamazaki's disclosure of digital cameras and PDA's to pertain to portable devices generally.

g) Claim 15

311. Yamazaki itself discloses a *display* that displays captured and received images. *See* Yamazaki, ¶¶0051, 0063, Fig. 2.

h) Claim 16

312. Yamasaki itself discloses a *touch pad* as a touch panel 26 to provide user interface for entering at least commands. *E.g.*, Yamazaki, ¶0051.

i) Claim 17

313. Yamazaki itself discloses its device *to connect with other Internet direct devices over its connection*. For example, Yamazaki discloses using the same identification information on multiple devices creating the same connection to the server to simultaneously exchange information. Yamazaki, ¶¶0085. Moreover, Yamazaki describes a master-slave arrangement to conserve resources

and/or cost by direct communication between the devices (cameras). *E.g., id.*, ¶¶0086-89. Yamazaki discloses its operations to be generally controlled by its CPU 36 and the ordinary artisan would understand Yamazaki's device connections to include an operation of its CPU. *E.g.*, Yamazaki, ¶0059.

j) Claim 19

314. As previously mentioned, Yamazaki itself discloses a *display* as image display 24 capable of displaying images. Yamazaki, ¶¶0059, 0063. Yamazaki expressly describes displaying retrieved images communicated to multiple devices through the server (*id.*, ¶0085), and directly between the devices (*id.*, ¶0086-89).

k) Claim 20

315. Yamazaki itself discloses its *microprocessor* transmitting and receiving images with other devices over its connection. *E.g.*, Yamazaki, ¶¶0059, 0085-89. Moreover, Yamazaki discloses that in its master-slave arrangement, the master device can be changed according to the needs of the user. *Id.*, ¶0089.

7. Petition 2: Ground 7 - Yamazaki and Nair

316. As reviewed above, Yamazaki discloses all the elements of independent claims 1 and 23 except for automatically switching. However, Nair discloses this element. Nair, ¶0007. As discussed below, One of ordinary skill in the art would have looked to Nair in considering wireless communications devices generally, and specifically in considering personal wireless devices including the

portable cameras of Yamazaki. Yamazaki, ¶0027. As discussed herein, claims 1, 2, 4, 8-9, 12-21, and 23-26 are achieved by Yamazaki in view of Nair.

a) Claims 1 and 23

317. As reviewed above, Yamazaki discloses all the elements of claims 1 and 23, except for automatically switching. However, Nair discloses automatically switching. Nair, ¶0039. Nair further teaches that switching "can be automatic such that, for example, **upon loss of connectivity from any one connection**, the connectivity application 24 will automatically initiate a new connection and pass the respective IP address to operating system 20." *Id.* (emphasis added). Nair expressly indicates that its seamless connectivity arrangements are applicable to a wide-range of personal electronic devices. *Id.*, ¶0027.

318. One of ordinary skill in the art at the time of invention of the challenged claims would have modified Yamazaki to include automatic switching as taught by Nair to provide the seamlessness in networking, time savings, and user-friendliness that Nair recognizes, and to provide the range, mobility, signal strength, and/or performance apparent to the ordinary artisan.

b) Dependent Claims 2, 12-17, 19, 20, and 25

319. Yamazaki itself discloses all features of claims 2, 12-17, 19, 20 and 25 for at least the same reasons as stated above regarding those claims. Nair also discloses relevant features of communications, Input/Outputs, device functions,

among others. *E.g.*, Nair, ¶¶0025-26 (networks), ¶0027 (versatility across mobile devices), ¶0033 (touch screens, displays, microphone, speaker, internet browsing, email), ¶0034 (information exchange). Nair's disclosure of similar additional functions and features further evidences its suitability for combination with Yamazaki with respect to those claim elements that may be omitted from Yamazaki.

c) Dependent Claim 4

320. Yamazaki further discloses that its device may connect using various connections such as computer networks, public telephones, or special networks. Yamazaki, ¶0061. As previously mentioned, Nair discloses its switching between at least Wi-fi (WLAN) and cellular (WWAN) connections. *E.g.*, Yamazaki, ¶0025. As discussed in Ground 1, an ordinary artisan would have been motivated to include Nair's switching at least between any of its wireless and cellular connections in Yamazaki in order to provide Nair's described benefits of continuity of connection in seamless transition, general mobility and versatility, signal strength, and/or performance.

d) Dependent Claims 8, 9, and 26

321. Yamazaki does not disclose a web browser (claim 8) or a web browser operable to download live or recorded audio or video from a website (claims 9 and 26). As discussed above, however, Nair discloses a web browser that an ordinary

artisan would understand includes the claimed downloading functionality. Nair, ¶¶0027, 0034. For the reasons discussed above, an ordinary artisan would have been motivated to include a web browser in Yamazaki's digital camera at least to provide ease and recognized interface and as application of known features for their predictable results.

e) Dependent Claims 18, 21 and 24

322. Yamazaki does not disclose its device being *operable to support voice over IP* as recited in claim 18 or operable to send and receive *audio* as recited in claims 21 and 24. However, Nair explicitly cellular phones and discloses voice over IP (VOIP) as part of its device capability. As discussed above, integrating digital cameras with fully-mobile functionality, including with the full functionality of mobile phones, was well known in the art at the time of invention and would readily have been achieved based at least on Nair's disclosure. Narayanaswami, p. 65.

323. Moreover, Yamazaki's portable digital camera includes initial mobile communication functionality of cameras. Yamazaki, Abstract, Fig. 7. Nair expressly teaches that its mobile communications functions are applicable to variety of mobile devices such as PDA's, cellular phones, "or any other wireless-capable suitable electronic device." Yamazaki, ¶0027. The ordinary artisan would have recognized that Nair itself suggests integration of various mobile

communications features into many personal devices, including Yamazaki's camera, and not limited to Nair's automatic switching function. Moreover, Narayanaswami evidences that the integration of cameras and mobile phones was known and provided substantial benefit to the product and consumer. Narayanaswami, p. 65. Therefore, a person of ordinary skill in the art would have known at the time of invention that it would be advantageous to integrate Yamazaki's digital camera with Nair's cell phone.

8. Petition 2: Ground 8 - Yamazaki, Nair, and Narayanaswami

324. Claims 7, 18-21 and 24 are also achieved by Yamazaki modified by Nair and Narayanaswami (Narayanaswami, p. 65).[14] As discussed above, an ordinary artisan would have known that cell phones contain digital cameras and would have been motivated to integrate Yamazaki's digital camera with Nair's cell phone, as taught by Narayanaswami. Moreover, incorporation of VOIP functions as taught by Nair likewise achieves connection with other devices as recited by claim 17 from which claim 18 depends. Including a digital camera in a cell phone, like Nair's cell phone, achieves all of the functionality of these dependent claims as discussed above in connection with Ground 2 above.

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[14] Yamazaki modified by Nair achieves each element of claims 18, 21, and 24, but these claims are also obvious with the further addition of Narayanaswami.

9. Petition 2: Ground 9 – Yamazaki, Nair, and Inoue

325. Yamazaki as modified by Nair does not expressly discloses a *compression module for* compressing *said capture image* as recited in claim 22. However, compression module providing compression of images in mobile devices, and particularly digital cameras was well known at the time of invention to reduce transfer time and burden. Moreover, Inoue discloses such a compression module at least as its image processing unit 44 which "inputs the image data output from the image pickup block 12, and encodes and compresses the same according to a JPEG (Joint Photographic Experts Group) scheme or the like." Yamazaki, ¶0053. One of ordinary skill in the art would have recognized the use of image compression to provide at least reduction in transfer time and burden. Accordingly, one of ordinary skill in the art at the time of invention of claim 22 would have further modified Yamazaki to include a compression module for compressing the captured image as taught by Inoue to transfer time and burden, and as an application of a known feature for its predictable use.

D. Petition 4: *Inter Partes* Review Of Claims 1-4 And 7-19 Of The '197 Patent

326. I understand that this Petition 4 contains the following grounds to challenge claims 1, 2, 3, 4, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, and 19 of the '197 patent. I have reviewed this Petition, and the following analysis substantially mirrors the analysis in this Petition 4.

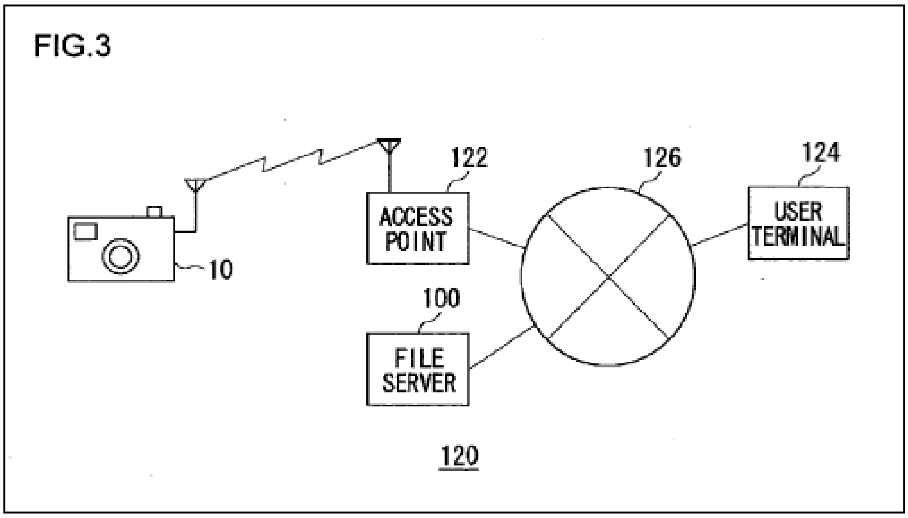
Ground	Challenged Claims	Statutory Ground and Prior Art
1	1, 2, 3, 4, 7, 8, 9 10, 11, 12, 13, 14, 15, 16, 17, 18, 19	Obviousness under 35 U.S.C. § 103(a) over Inoue and Nair
2	9, 15	Obviousness under 35 U.S.C. § 103(a) over Inoue, Nair and Narayanaswami
3	1, 2, 3, 4, 7, 8, 9 10, 11, 12, 16, 17, 19	Obviousness under 35 U.S.C. § 103(a) over Yamazaki and Nicholas
4	13, 14, 15, 18	Obviousness under 35 U.S.C. § 103(a) over Yamazaki, Nicholas and Nair
5	1, 2, 3, 4, 7, 8, 9 10, 11, 12, 16, 17, 19	Obviousness under 35 U.S.C. § 103(a) over Kusaka and Nicholas
6	13, 14, 15, 18	Obviousness under 35 U.S.C. § 103(a) over Kusaka, Nicholas and Nair

1. Petition 4: Ground 1 - Inoue and Nair

a) Claim 1

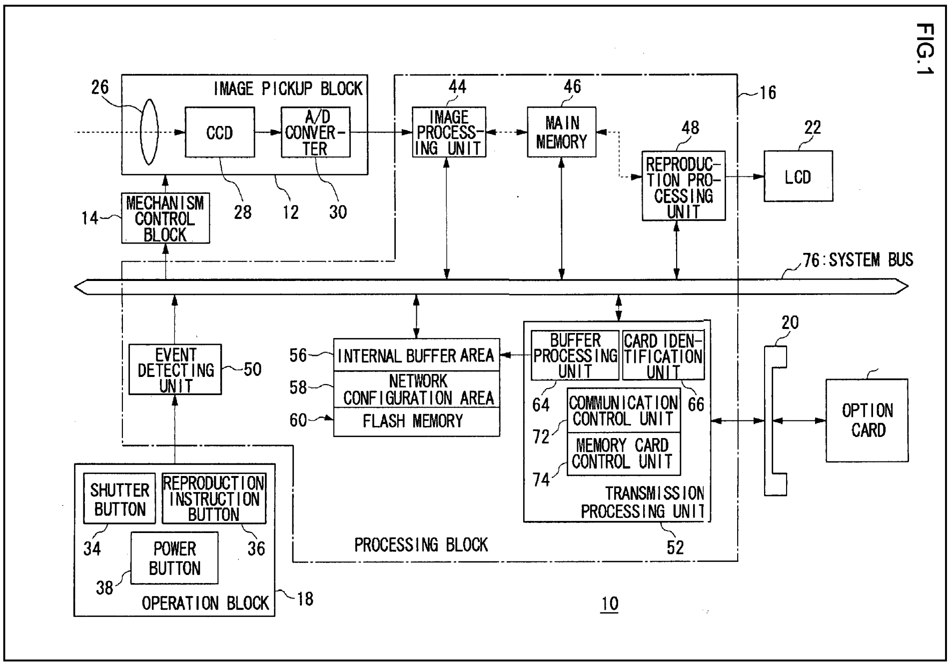
An Internet direct device comprising:

327. Inoue describes a digital camera for transmitting and receiving images that, when "powered on … automatically establishes a network connection with [a] file server" for the purposes of transmitting and receiving images over a communications network. Inoue, Abstract. Inoue's network connection can include a connection to the Internet as indicated by numeral 126. *See, e.g.*, Inoue, ¶0060 & Fig. 3:



an imaging system to capture still or video images;

Inoue describes "a digital camera" with an "image pickup block" to capture images. Inoue, ¶0009; *see also id.*, ¶¶02, 10-13 & Fig. 1(12, upper left):



328. Inoue's discloses of image capture includes capture of still or video images as understood by the ordinary artisan.

a microprocessor to transmit said captured still or video images to an account associated with the Internet direct device on a website archive and review (WSARC) upon image capture, and receive still or video images from said WSARC over a communications network;

329. Inoue describes the claimed microprocessor element. Inoue describes a processing block 16 that includes an image processing unit 44, a transmission processing unit 52, a reproduction processing unit 48, memory units, and various other elements. Inoue, ¶0053 & Fig. 1. The transmission unit contains a communication control unit 72 which controls an internal option card 68 (communication card 68) able to access various communication networks. *Id.*, ¶0049 ("The card slot 20 [in the camera] retains an option card 68 detachably"). "The communication control unit 72 exercises control necessary to communicate with the file server…." *Id.*, ¶¶0056, 0060 ("The digital camera 10 and the access point 122 communicate with each other over a wireless LAN").

330. Inoue teaches that its digital cameras (IDDs) transmit images "upon obtainment of the image" to a server. Id., ¶0018. As understood by the ordinary artisan, the phrase "upon obtainment of the image" includes on image capture. Id., ¶0015 ("The 'image obtained by image pickup,' shall cover both an intact image just picked up and an image obtained through compression or the like after picked up."), ¶0048 ("The image pickup block 12 shoots a subject under user instructions.").

331. Inoue further explains that its microprocessor not only controls image capture and transmittal to the file server, but also operates to retrieve images from the file server. Inoue states, in paragraphs 0009-0013:

> One of the aspects of the present invention relates to a digital camera, which comprises … a processing block which applies processing to an image. For example, the processing block includes any one of the following configurations:
> (1) A detecting unit which detects an activation request for the digital camera, and a communication control unit which performs processing for establishing a network connection with a file server upon detection of the activation request;
> (2) A detecting unit which detects an image pickup request, and a communication control unit which performs processing for transmitting an image obtained by image pickup to a file server over a network upon obtainment of the image;
> (3) A detecting unit which detects an image reproduction request, and a communication control unit which performs processing for receiving an image to be reproduced from a file server over a network when the image reproduction request is detected; and
> (4) Any two or more of the configurations (1) to (3) in combination.

332. Inoue further describes that its file server is configured with "user-specific folders … so that images are classified and stored in the folders" based upon the camera that captures and uploads the image. *Id.*, ¶0059. Inoue discloses that these folders are created for storing and retrieving images associated with a particular digital camera and user. *Id.*, ¶0079-0080 & Fig. 12. The ordinary artisan would have understood these folders to constitute accounts associated with each of

the IDDs (Inoue's camera) at least through association with their users on a WSARC (Inoue's file server). *Id.*

> *and wherein the Internet direct device automatically connects to said communications network on power-up using one of a plurality of available modes of connection, which is designated as a primary mode of connection;*

333. Inoue explains that "[w]hen the digital camera is powered on, it automatically establishes a network connection with the file server in an activation process." Inoue, Abstract. "The power button 38 is one for switching on/off the power of the entire digital camera 10. When the digital camera 10 is off, pressing the power button 38 is detected by event detecting unit 50 as an activation request, which is followed by an activation process." *Id.*, ¶0058. Inoue's camera "detects an activation request" and "establish[es] a network connection between the digital camera and a file server upon detection of the activation request." *Id.*, ¶0017; *see also id.*, ¶0066 & Fig. 6. The communications network can be via any one of a plurality of modes of connection: "The 'network' may be either wireless or wired. Nor does it matter whether the network uses such facilities as an access point if on a wireless LAN in infrastructure mode, or is of so-called peer-to-peer as if in ad-hoc mode." *Id.*, ¶0015. The particular network that is selected for use is the "primary mode of connection" for Inoue's camera for connection to a communication network, such as the Internet. *Id.*, ¶0060. In one embodiment,

Inoue identifies "a wireless LAN" as the primary mode of communication to reach the Internet. *Id.* ¶0060 & Fig. 3.

> *and wherein the Internet direct device automatically switches to another available mode of connection when the Internet direct device detects that said primary mode of connection to said communications network is unavailable.*

334. One of Inoue's embodiments identifies "a wireless LAN" as a primary mode of connection to reach the Internet among a plurality of available modes. Inoue, ¶0060. Inoue does not expressly disclose that its digital cameras automatically switch from a wireless LAN to another available mode of connection when the wireless LAN is unavailable. Nair, however, provides this teaching.

335. Nair relates "generally to the field of wireless technology and, more particularly, to seamless routing between wireless networks." Nair, ¶0003. Its teachings apply to any wireless device with capability for communicating by wireless technology—*e.g.*, "wireless device 12 can be, for example, a wireless personal digital assistant (PDA), a cellular phone, or any other wireless-capable electronic device." *Id.* Nair explains that connecting and transmitting data over a wireless LAN (a "WLAN"), like that used in Inoue, provides certain advantages over other available modes of connection. *Id.*, ¶0029.

336. Nair further explains that its technology allows wireless devices to have uninterrupted and effective wireless access for the wireless device 12 by "automatically and seamlessly" handing off communications from a WLAN to a

wireless wide area network (a "WWAN") when the WLAN connection is unavailable. Inoue, ¶0029; *see also id.*, Abstract, ¶¶0008-09, 0022, 0028, 0035-0040.

> In operation, as the wireless device 12 is moved between or among the effective ranges of various wireless networks (WLAN or WWAN), connectivity application 24 functions to change connections from one wireless network to another wireless network. In one aspect, the change of wireless connection can be automatic such that, for example, upon loss of connectivity from any one connection, the connectivity application 24 will automatically initiate a new connection and pass the respective IP address to operating system 20…. This may occur without any noticeable loss of connectivity to the user of the wireless device 12.

Id., ¶0039.

337. A person of ordinary skill in the art would have applied these teachings from Nair to Inoue's digital camera. Nair explains some of the advantages that would motivate a skilled artisan to modify Inoue's wireless camera to be able to seamlessly connect to a WWAN when a WLAN is unavailable. Nair, ¶¶0006-0009. The ordinary artisan would also have recognized additional advantages to combining this functionality from Nair to Inoue's digital camera. It was known that there were photographers (*e.g.*, travelers and photojournalists) who are mobile and need access across multiple modes of connection to make their uploads reliable, secure and timely. In the case of the enterprise market—*e.g.*, a media company that employs photojournalists—it also would have been known

that it would be advantageous to centrally manage this switching process so that devices are automatically switched to a preferred network that may have a negotiated lower rate. The ordinary artisan would also have understood that automatic switching would make operation of the camera more convenient to the user, in that the camera would be able to upload images from a variety of locations and would not need to manually switch networks.

b) **Claim** 2

> *The Internet direct device of claim 1, wherein said plurality of available modes of connection is selected from a group consisting of: a land line, DSL, cable, satellite, wireless network, cellular, Wi-Fi, and Wi-Max.*

338. Nair itself explains that its wireless device 12 can use a variety of modes of communications in addition to WLAN (*e.g.*, Wi-Fi) and WWAN (*e.g.*, cellular). Nair, ¶0024. For example:

> Each wireless network 14, 16, 18 can be a communication network that supports wireless communication. Each network supports at least one wireless link or device connection. As such, the networks may support a variety of communications, including, but not limited to, analog cellular system, digital cellular system,… and Enhanced Specialized Mobile Radio (ESMR). The wireless networks 14, 16, 18 may utilize or support various protocols. Exemplary protocols for WLANs **16,18** include IEEE 802.11, HomeRF, Bluetooth, HiperLAN and the like. Exemplary protocols for WWAN 14 include Time Division Multiple Access (TDMA, such as IS-136), Code Division Multiple Access (CDMA),… Global System for Mobile communications

> (GSM), … and Integrated Digital Enhanced Network (iDEN) Packet Data.

Id., ¶0025. The ordinary artisan would have combined Nair with Inoue for the reasons discussed above.

c) Claim 3

> *The Internet direct device of claim 1, further comprising a storage device for locally storing captured still or video images and said received still or video images.*

339. Inoue itself discloses a storage device as at least buffer memory 56 on its camera (Internet direct device) for locally storing captured and received still or video images. Inoue, ¶¶0025-30, 0063. Inoue teaches that its buffer memory 56 fully performs such storage, even despite the possibility of other storage. *Id.*

d) Claim 4

> *The Internet direct device of claim 3, wherein the storage device stores the captured still or video images when the connection to said communications network is unavailable, and wherein the microprocessor transmits the stored still or video images to said WSARC when the connection to said communications network is re-established.*

340. Inoue itself discloses that "[t]he image saved to the buffer 56 is transferred to the file server 100 next time the communication with the file server 100 is enabled." Inoue, ¶0063. Inoue's discloses of storage within its buffer 56

including storage during unavailability of the connection to the WSARC and transmission when connection is re-established.

e) Claim 7

The Internet direct device of claim 1, wherein the microprocessor of the Internet direct device communicates with other Internet direct devices over said communications network.

341. Inoue itself discloses that its digital camera communicates with other digital cameras over a communications network. Inoue explains that its digital camera can receive images previously uploaded to the server by it or a different digital camera for visual display on the camera. "When image reproduction is instructed from the digital camera, the image is downloaded from the file server over the network and displayed on the digital camera." Inoue, Abstract; *see also id.*, ¶¶0012, 0019, 0074-0075. A skilled artisan would have understood that, using the functionality already disclosed in Inoue, one digital camera could upload an image to the server and a different digital camera could download the same image from the server, thus connecting one camera to a different camera for image transfer over the communications network.

a) Claim 8

The Internet direct device of claim 7, wherein said microprocessor transmits and receives still or video images to and from said other Internet direct devices over said communications network.

342. As I have discussed above, Inoue both discloses a microprocessor (e.g., Inoue, ¶0053, Fig. 1) that transmits and receives images from a file server (e.g., Inoue, ¶¶ 0009-0013). Also, the folder structure in Inoue's file server allows images transmitted to one camera's folder to be received on another camera over the communication network. *Id.*; *see also id.*, ¶0080-0082, Fig. 13.

343. Moreover, It was well known prior to the alleged invention of the '197 Patent that digital cameras could be (and were) included in cell phones. *See*, Narayanaswami, *et al.*, "Expanding the Digital Camera's Reach," *Computer*, Vol. 37, Issue 12 (IEEE Dec. 2004), p. 65 ("Narayanaswami").[15] In fact, as of December 2004, "cell phones that integrate digital cameras have far outsold regular digital cameras." *Id.*

344. As noted above, Inoue discloses a digital camera. Inoue, ¶0009; *see also id.*, ¶¶0002, 0010-0013. Nair discloses a cell phone that permits the transmission and receipt of audio from other cell phones, *i.e.*, other Internet direct devices. Nair, ¶¶0027, 0034, 0040. The ordinary artisan would have known at the time that it would be advantageous to include Inoue's digital camera in a cell phone, such as those described in Nair. As Narayanaswami explained:

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[15] Narayanaswami is cited to indicate state of the art and the background knowledge that a person of ordinary skill in the art would have had while reading Inoue and Nair.

> First, the cell phone's voice communication capability makes it the most ubiquitous portable device. Second, people enjoy the convenience of capturing high-resolution digital images using a device they already carry. Third, this integration relieves people from having to make a conscious decision to take a camera in anticipation of taking pictures. Some digital cameras even offer integrated Wi-Fi capabilities for direct image transfer.

Narayanaswami, p. 65. Consequently, the ordinary artisan would have combined Inoue and Nair achieving all of the functionality of claim 8.

b) Claim 9

The Internet direct device of claim 8, wherein said microprocessor transmits and receives audio to and from said other Internet direct devices over said communications network.

345. Inoue disclose an image capture system under the control of a microprocessor. *E.g*, Inoue, ¶0053, Fig. 1. An ordinary artisan would have understood "images" to include video images, which would have been accompanied by audio. Consequently, it would have been known to an ordinary artisan that image transfer capability would include audio. Inoue, ¶¶0080-0082, Fig. 13.

346. It was well known that digital cameras like those disclosed in Inoue could be (and were) included in cell phones. *See* Narayanaswami, p. 65. Nair discloses a cell phone that permits the transmission and receipt of audio from other cell phones, *i.e.*, other Internet direct devices. Nair, ¶¶0027, 0034, 0040. "[C]ell

phones that integrate digital cameras have far outsold regular digital cameras" by the time of the alleged invention. Narayanaswami, p. 65. A person of ordinary skill in the art would have been motivated to include Inoue's camera in a cell phone, such as those described in Nair for the reasons described in Narayanaswami, a prior art reference:

> "First, the cell phone's voice communication capability makes it the most ubiquitous portable device. Second, people enjoy the convenience of capturing high-resolution digital images using a device they already carry. Third, this integration relieves people from having to make a conscious decision to take a camera in anticipation of taking pictures. Some digital cameras even offer integrated Wi-Fi capabilities for direct image transfer."

Narayanswami, p. 65; Consequently, an ordinary artisan would have combined Inoue and Nair to achieve all of the functionality of claim 9

347. For the reasons I have discussed in connection with dependent claim 8, the ordinary artisan would have known to include Inoue's digital camera in a cell phone, such as Nair's cell phone, allowing the Internet direct device to transmit and receive audio from other Internet direct devices.

c) Claim 10

The Internet direct device of claim 1 is a portable camera, a personal digital assistant or a cell phone.

348. As discussed above, Inoue itself discloses a portable digital camera. Inoue, Abstract. Furthermore, Nair discloses a cell phone. Nair, ¶¶0027, 0034, 0040.

d) Claim 11

The Internet direct device of claim 1, further comprising a display for displaying still or video images.

349. Inoue itself describes a digital camera with a display for displaying images. Inoue, Abstract, ¶¶0002, 0082. The ordinary artisan would have understood Inoue's "images" to include still and video images. Digital cameras were well known to have both still and video capabilities at the relevant time of alleged invention.

e) Claim 12

The Internet direct device of claim 11, wherein said display of the Internet direct device comprises a touch pad for entering texts.

350. Displays that comprise a touch pads (*e.g.*, a touch screen) were well known in the art as an input device for controlling a portable electronic device. Inoue does not expressly state that its end user devices incorporate a touch pad or screen, but Nair describes a "touch screen" as one such user interface that can be

used on a mobile communication device. Inoue, ¶0033. The ordinary artisan would have appreciated that Nair's touch screen could perform the same role as played by other user interfaces and would be motivated to make the combination.

f) Claim 13

The Internet direct device of claim 1 is operable to access the Internet using a web browser over said communications network.

351. Nair discloses that its wireless device "may run one or more applications that exchange data/information through wireless networks as the applications are run. Such an application can be, for example, a network browser that exchanges information with the distributed application known as the 'World Wide Web.'" Inoue, ¶0027.

352. Including a web browser application, like that described as part of Nair's "wireless device," as part of Inoue's digital camera would simply be the addition or substitution of known software for performing known downloading function yielding nothing more than predictable results. In addition, a person of ordinary skill in the art would have been motivated to make the combination for the reasons discussed above. Among other things, web browsers are well known to include built-in capabilities to upload and retrieve images as well as to negotiate firewalls and other security systems. *Id.* The ordinary artisan would have been motivated to use this existing technology rather than develop new systems or technology that may not have the same advantages and/or become out of date.

g) Claim 14

The Internet direct device of claim 13, wherein said microprocessor is operable to download live or recorded audio or video images from a website over said communications network.

353. As I have discussed above, Nair's web browser "exchange[s] data/information through the wireless networks." Nair, ¶0027. Such exchanges of data can include "document sharing, accounting, word processing, application sharing, file transfer, remote control, browser, voice over Internet Protocol (IP), user authentication, address book, files and folders, accounting, database management, and the like." *Id*. ¶0034. For the reasons discussed immediately above, the ordinary artisan would have understood that web browsers were well-known means for downloading images or video from a network, yielding merely predictable results.

h) Claim 15

The Internet direct device of claim 13 is operable support voice over IP over said communications network.

354. As discussed above, Nair's web browser "exchange[s] data/information through the wireless networks," including through the use of "voice over Internet Protocol (IP)." Nair, ¶¶0027, 0034. Nair expressly teaches that its mobile communications functions are applicable to variety of mobile devices such as PDA's, cellular phones, "or any other wireless-capable suitable electronic

device." *Id*. ¶0027. The ordinary artisan would have recognized that Nair itself suggests integration of various mobile communications features into various devices, including Inoue's camera, and not limited to Nair's automatic switching function. Therefore, the ordinary artisan would have known at the time of invention that it would be advantageous to integrate Inoue's digital camera functions with higher lever communications functions, such as Voice over Internet Protocol ("VoIP"), to provide both the expressed advantages of voice calls and device integration, but also to achieve the apparent benefits of IP-based communications, such as, economy of cost and power conservation, among others.

i) Claim 16

The Internet direct device of claim 1, wherein said imaging system further comprises an image pickup, an optical component for forming an image on the image pickup, and an image capturing component for capturing digital still or video images from the image pickup.

355. Inoue itself discloses a digital camera that has an "image pickup block 12" (Inoue, ¶0052), a lens which is used for forming an image of a subject on the CCD (*id*.), and an image processing unit 44 that inputs the image data output from the image pickup block. *Id*. ¶0053. At least the lens, CCD, and image processing unit, and their associated controls, constitute the image pickup, optical component, and image capturing component, respectively.

j) Claim 17

The Internet direct device of claim 16, wherein said optical component comprises an auto-focus optical system.

356. Inoue itself discloses a "mechanism control block 14" that "exercises mechanical controls over the image pickup block 12, including zooming, focusing, and aperture setting." Inoue, ¶0049. The ordinary artisan would have understood that controlling "focusing" by means of the mechanism control block 14 would include such an auto-focus optical system.

k) Claim 18

The Internet direct device of claim 1 is a web-enabled portable device.

357. As I have previously discussed, Nair's device incorporating a web browser is a web-enabled portable device at least as a portable device capable of communicating with the web.

l) Claim 19

The Internet direct device of claim 1, further comprising an image compression component for compressing said captured still or video images.

358. Inoue itself discloses that its "image processing unit 44 inputs the image data output from the image pickup block 12, and encodes and compresses the same according to a JPEG (Joint Photographic Experts Group) scheme or the

like." Inoue, ¶0053. Moreover, the ordinary artisan would have recognized JPEG format as indicating a compression module.

2. Petition 4: Ground 2 - Inoue, Nair, and Narayanaswami

359. As I discussed above regarding Ground 1 of Petition 4, dependent claims 9 and 15 of the '197 Patent are each achieved in view of Inoue and Nair. These claims, however, can equally be found obvious in view of Inoue, Nair, and Narayanaswami. Nair describes mobile phones and Narayanaswami recognizes that digital cameras are in mobile phones and states the benefits of including a digital camera in a mobile phone. *See* Narayanaswami, p. 65. For the reasons discussed in Nair and Narayanaswami, and the further reasons discussed above, an ordinary artisan would have been motivated to integrate Inoue's camera with a mobile phone for the advantages indicated and made apparent by Nair and Narayanaswami.

3. Petition 4: Ground 3 - Yamazaki and Nicholas

a) Claim 1

An Internet direct device comprising:

360. Yamazaki describes "an image display apparatus and a camera that are provided with functions of communicating with a server through a network and transmitting and receiving image data to and from the server, and an image communication system that distributes the image data by means of the image display apparatus, the camera and the server." *Id.*, ¶0003. Yamazaki, thus, meets

this claim term as least by its description of a method for transmitting and receiving still or video images by an IDD associated with a user over a communications network. *Id.*

an imaging system to capture still or video images;

361. Yamazaki's "image display apparatus and a camera" is an Internet direct camera/device for capturing an image. Yamazaki, ¶0003. Yamazaki further discusses an imaging part 12 that "includes a taking lens and an imaging device such as a CCD arranged behind the taking lens." *Id.*, ¶0048. This disclosure describes an Internet direct device including an imaging system that captures still or video images.

a microprocessor to transmit said captured still or video images to an account associated with the Internet direct device on a website archive and review (WSARC) upon image capture, and receive still or video images from said WSARC over a communications network;

362. Yamazaki discloses the claimed microprocessor as CPU 36, which controls communication with the server. Yamazaki, Fig. 3, item 36, ¶0059. The ordinary artisan would have recognized that reference to a CPU, as a Central Processing Unit, equates with a microprocessor, which is merely a small CPU for purposes of portable devices such as Yamazaki's camera. Yamazaki explains that the "camera 10 has access to the servers 52A, 52B, …52n through the network 50" and "[t]he servers [52A-n], have databases [53A-n], respectively, that store the

image data. The image data recorded with the camera 10 is transmitted to the servers [52] and is recorded in the databases [53].” *Id.*, ¶¶0061-62. Yamazaki also discloses automatically transmitting an image captured by its electronic camera upon image capture, *i.e.*, when the picture is taken. *Id.*, ¶0025. Yamazaki further discloses that a user can “retrieve the image data recorded in the database 53A to reproduce the image on the image display 24 of the camera 10.” *Id*., ¶0063. For at least these reasons, Yamakazi discloses this claim element.

> *and wherein the Internet direct device automatically connects to said communications network on power-up using one of a plurality of available modes of connection, which is designated as a primary mode of connection;*

363. Yamazaki discloses that its camera automatically connects to a communications network on power-up. Yamazaki discloses an “image communication system comprising: at least one server provided with a storage device storing image data; a network capable of connecting to the server; [and] an image display apparatus communicating with the server through the network....” Yamazaki, ¶0027. Yamazaki’s camera connects to a server through one of a plurality of networks “such as a public telephone network or a special network.” *Id*., ¶0027.

364. Yamazaki further discloses that, for ease of use, the owner of the device may elect to enter “and record the entered identification information as an

owner's identification information in a memory such as a nonvolatile memory in the camera 10." Yamazaki, ¶0066. Upon pre-setting the identification information, Yamazaki defaults to the previously-recorded information as the set information and connects with its server. *Id.*, ¶¶0065, 0068, 0073. Moreover, "the camera 10 may also connect to the server 52 just after the setting of the user's identification information so as to evaluate the communicational condition." *Id.*, ¶0072. A person of ordinary skill in the art would understand this passage to disclose automatic connection to a communications network on power-up using a primary mode of connection.

365. Nicholas fully discloses connecting on power up using a primary mode of communication. Like Yamazaki, Nicholas was not before the Examiner during the prosecution of the '197 Patent. Nicholas concerns an end-user device with a display (*e.g.*, a tablet, notebook computer, or personal digital assistant) that allows for the transmission of images and audio via wired and wireless networks, including over the Internet. *See* Nicholas, Abstract & ¶¶0018-0026. Nicholas discloses that its "end user device is provided that supports a connection to a plurality of data communication networks," that detects which data communication networks are available, "and selectively determines which of the plurality of data communication networks provides the most optimal communication channel." *Id.*, Abstract; *see also id.*, ¶0008. The device determines which network "is optimal

may be based on the type of data to be communicated (e.g., voice, video or computer data), the error rate associated with each available network, the number of anticipated 'hops' between the end user device and the remote network entity to which it needs to communicate, the cost associated with establishing and maintaining a network link, the best path, and/or anticipated power consumption." Nicholas, ¶0008.

366. In one embodiment, Nicholas describes connecting to its primary mode of communication automatically on power up. For example:

> The network detection function is preferably performed automatically by the end user device. For example, the network detection function may be performed automatically: (1) as part of the power-up sequence of the end user device to determine which network(s) are initially available to the end user device.

Id., ¶0046.

367. Nicholas explains that the available networks are detected, the end user device then "select[s] an available network for data communication based on one or more predefined criteria." Nicholas**,** ¶0049. The predefined criteria can include the type of data being transferred, the bit error rate, signal-to-noise ratio, the costs of connecting to the network (e.g., preferring to connect to networks that charge lower fees), and other criteria. *Id.*, ¶¶0050-0055. Moreover, Nicholas' end

user device can perform network detection and selection at the same time. *Id*., ¶0056.

368. The ordinary artisan would be motivated to combine Nicholas' system for automatic connection via a primary network on power-up with Yamazaki's camera in order to achieve the advantages described in both Yamazaki and Nicholas. For example, the ordinary artisan would have known that portable electronic cameras have limited user interfaces, and anything making it easier to connect to Yamazaki's image server would be an advantage. *Id.* An ordinary artisan would have further known that Nicholas's automatic connection on power-up can simplify and reduce the time required to begin transferring images from a power-off state to the image server as disclosed by Yamazaki itself, namely, automatically transferring images from the camera to the WSARC (server) when an image is "captured" or when a network connection is available. *E.g*., Nicholas, ¶¶0025, 0070.

369. This simplified startup sequence is itself a benefit, but can also allow the user to confidently maintain devices in the off-state to conserve power while ensuring prompt and automatic connectivity to the server on power-up when a photo-opportunity arises. The ordinary artisan would have understood these benefits are universal to various portable devices, and are particularly so for devices like cameras, which may be needed instantly to "capture the moment."

370. A person of skill in the art would have also recognized the benefits of automatically connecting to the most advantageous (primary) mode of connection available, whether for reasons of cost, speed, or reliability of network connection. *Id*. This would be especially true of a portable electronic camera which, depending on its location, might not have all modes of connection available to it, or might have multiple viable connections available, some of which are more advantageous than others. *Id*.

And wherein the Internet direct device automatically switches to another available mode of connection when the Internet direct device detects that said primary mode of connection to said communications network is unavailable.

371. Yamazaki does not explicitly disclose that its camera engages in "automatically switch[ing]." Nicholas, however, discloses switching to another available mode of connection when the primary mode of connection is unavailable. Nicholas's end-user device "provides for seamless transitions between different data communication networks, thus permitting all network communication tasks to be performed in a seamless, uninterrupted manner regardless of the location of the device, the type of network connection being used, or the form of data communication being carried out." Yamazaki, ¶0009. In one embodiment, Nicholas describes that "the end user device may comprise a notebook or tablet PC with or without a docking interface" that can connect to a plurality of networks,

including wired Ethernet, a wireless Local Area Network (WLAN) or a wireless Wide Area Network (WWAN). *Id.*, ¶0020. The end user device can be connected to a wired network at a particular location, with or without a docketing station. *Id*., ¶¶0026, 0032

372. When Nicholas's end user device is disconnected from its wired network (described as a LAN in the user's office), "the end user device continues to provide secure connections to the office network that are uninterrupted[.]" *Id.*, ¶0028. Nicholas explains that the device seamless switches to a wireless network, such as a WLAN that provides a mode of connection for the office campus to permit uninterrupted transmissions. *Id.*, ¶¶0029-0034. Nicholas explains that,

> Usage modes of an end-user device … maybe [sic] divided into the following categories of operation:
>
> desk-bound at a primary office location, mobile while roaming within a campus network, mobile while roaming outside of the campus network, in a meeting room (secondary location), or at a home (secondary location).
>
> While desk-bound at a primary office location, an end user device … provides a connection to a LAN/WLAN; may be docked or undocked; provides continuous network connection while transitioning from a wired to wireless connection, or vice versa[.]

Yamazaki, ¶¶0030-0032.

373. Nicholas states that while desk-bound at a primary office location, its end user device provides a range of functionality, including the "enabling of video and voice calls." *Id.*, ¶0032. Nicholas describes a set-up in which its end user device is connected to a LAN (wired connection) at the primary office location and "seamlessly transitions from a LAN connection to a WLAN connection" when in "mobile mode." *Id.*, ¶0033. In this example, the wired connection at Nicholas primary office location is the primary mode of connection to the communications network. *Id.* As Nicholas explains, the wired connection can be detected and connected as the primary mode of connection based on preexisting criteria on power up. *Id.*, ¶¶0049-0056. Nicholas then describes a user entering a mobile mode in which the end user device is disconnected from the primary, wired connection, rendering the primary mode of connection unavailable. *Id.*, ¶0033. Nicholas explains that its end user device seamlessly switches its video calling capability from the primary mode of connection to wireless network (WLAN), which is another mode of connection—when the end user device is disconnected from the wired network. *Id*.

374. Nicholas describes other situations where its end-user device can switch modes of connection to a communications network. For example, Nicholas describes an embodiment where WLAN is available on a "campus." Nicholas, ¶0033. Nicholas' end user device may connect to the WLAN on power-up

according to predetermined criteria, and designate it as the primary mode of connection. *Id.*, ¶¶0049-0056. When a user leaves the campus, Nicholas describes seamless switching to a "WWAN connection" (a wireless wide area network), which is another mode of connection to the communications network. *Id.*, ¶0034. Nicholas also describes connection to additional networks, such as "[i]n a secondary location such as a home," where the device would switch its mode of connection to a "home LAN or WLAN." *Id.*, ¶0036.

375. A person of ordinary skill in the art at the time of invention of the challenged claims would have appreciated the benefits of combining automatic switching in the mobile end-user devices of Nicholas with other mobile end-user devices, such as Yamazaki's camera. *Id.*, ¶¶0029-34. It was a known problem at the time of the invention that uploading an image can take considerable time, during which the upload process can be interrupted due to loss of connection. This problem would be of particular concern to a portable electronic camera with differing modes of connection available to it based on its given location at the moment. One of ordinary skill in the art would have modified Yamazaki with Nicholas to provide the disclosed benefits of continuity of connection in seamless transition (*id.*, Abstract), economy in selecting networks (*e.g.*, Nicholas, ¶0053), transmission quality (*id.*, ¶0056), and the recognized benefits of general versatility,

signal strength, and/or performance. For at least these reasons, Yamazaki in view of Nicholas achieves the invention as recited in claim 1.

b) Claim 2

> *The Internet direct device of claim 1, wherein said plurality of available modes of connection is selected from a group consisting of: a land line, DSL, cable, satellite, wireless network, cellular, Wi-Fi, and Wi-Max.*

376. Yamazaki as modified by Nicholas teaches this element. Nicholas describes "[a]n end user device is provided that supports a connection to a plurality of data communication networks" that detects which data communication networks are available, "and selectively determines which of the plurality of data communication networks provides the most optimal communication channel." Nicholas, Abstract; *see also id.*, ¶0008. The plurality of available modes of communication includes at least wired connections, WLAN (*e.g.*, Wi-Fi), and WWAN (*e.g.*, cellular). *Id.*, ¶0020. For example:

> Wired and wireless networks supported by an end user device in accordance with embodiments of the present invention may include: (1) cellular networks…(2) public packet-radio networks… (3) Inter net connections, including but not limited to cable modem, DSL, and ISP; (4) Dial-up connections, including … ISDN, PPP, and PSTN (POTS); (5) private packet networks… (6) satellite networks… and

> (7) LAN connections, including but not limited to Ethernet, Token Ring and Wireless LAN.

Id., ¶ 0019.

377. Thus, the plurality of available modes of connection for the end user device includes mode of connection consisting of a land line, a DSL, cable, satellite, wireless network, cellular, Wi-Fi, and Wi-Max. A person of ordinary skill would have included Nicholas's switching between any of its landline, wireless, and cellular connections in modifying Yamazaki as reviewed above regarding claim 1, to provide the full benefits of continuity of connection in seamless transition (*id.*, Abstract), economy in selecting networks (*e.g.*, Nicholas, ¶0053), transmission quality (*id.*, ¶0056), and the recognized benefits of general versatility, signal strength, and/or performance.

c) Claim 3

> *The Internet direct device of claim 1, further comprising a storage device for locally storing captured still or video images and said received still or video images.*

378. Yamazaki itself discloses that its Internet direct camera has a storage device in the form of "a memory 34." Yamazaki, ¶0052, 0059 & Fig. 3. Yamazaki discloses that images can be stored locally in the IDD: "[i]f there is enough storage capacity (more than a predetermined level), the image data is temporarily stored in the memory 34 (S118)." *Id.* ¶0070. Further, the ordinary artisan would have

recognized that, in order to display a received image on Yamazaki's electronic camera, the image data can be stored, even if temporarily, on the device. Thus Yamazaki discloses each element of claim 3.

d) Claim 4

> *The Internet direct device of claim 3, wherein the storage device stores the captured still or video images when the connection to said communications network is unavailable, and wherein the microprocessor transmits the stored still or video images to said WSARC when the connection to said communications network is re-established.*

379. Yamazaki itself discloses that its storage device stores the captured images when connection is unavailable, and transmits them on re-connection. "[I]f the communicational condition [between the camera and the server] is determined as being unsatisfactory at S112, the capacity of the memory 34 built in the camera 10 is evaluated (S116). If there is enough storage capacity (more than a predetermined level), the image data is temporarily stored in the memory 34 (S118). Then, the image data transmission to the server 52 is postponed until it is determined that the communicational condition becomes satisfactory (S120)." *Id*. ¶0070. "When the communicational condition becomes satisfactory, the image data stored in the memory 34 is transmitted to the server 52." *Id*. Yamazaki's microprocessor (CPU 36) performs this local image storing and transmitting. Yamazaki, ¶0059.

380. Yamazaki further discloses the use of its microprocessor (CPU 36) in communicating images. *See* Yamazaki, ¶0052 & Fig. 3. Yamazaki discloses using the same identification information on multiple devices creating the same connection to the server to simultaneously exchange information. *Id.*, ¶¶0082-0083. Moreover, Yamazaki describes a master-slave arrangement to conserve resources and/or cost by direct communication between the devices (cameras). *Id.*, ¶¶0084-0085. Yamazaki discloses its operations to be generally controlled by its CPU 36 and the ordinary artisan would understand Yamazaki's device connections to include an operation of its CPU. *E.g.*, *id.*, ¶0059.

381. This element is also disclosed by Nicholas. Nicholas's end user device 100 (an Internet direct device) also discloses a microprocessor: "As shown in FIG. 3, the example end user devices includes a processor 302 for executing software routines in accordance with embodiments of the present invention." Nicholas, ¶0037 & Fig. 3. The microprocessor controls a plurality of "communication interfaces 324a-324n" that "permit data, including but not limited to voice, video and/or computer data, to be transferred between the end user device 100 and external devices[.]" *Id.*, ¶0041; *see also id.*, ¶¶0024, 0032-0033; *see also id.*, Fig. 1 (120). Nicholas further describes how its end user device 100 can provide VoIP calling, video calls, and videoconferencing [*id.*, ¶¶0032, 0033, 0034], all of which are executed by the microprocessor [*id.*, ¶0037]. Such VoIP calling, among other

forms of communication, occurs to and from other Internet direct devices, including but not limited to other end user devices. *Id.*, ¶¶0032, 0033, 0034. Thus, each additional element of claim 7 is disclosed by both Yamazaki and Nicholas.

e) Claim 8

The Internet direct device of claim 7, wherein said microprocessor transmits and receives still or video images to and from said other Internet direct devices over said communications network.

382. As I have discussed above, Yamazaki discloses that its microprocessor communicates to transmit and receive images with other devices over a communications network. Moreover, Yamazaki discloses that in its master-slave arrangement permits direct communication between devices. Each device can perform master operations as the designated master can be changed according to the needs of the user. Yamazaki, ¶0088-0089. For at least these reasons, Yamazaki alone discloses each additional features of this claim.

383. Nicholas also transmits video images to another end user device over the communications network. As I discussed above, Nicholas's end user device 100 (an Internet direct device) includes a microprocessor that communicates with other Internet direct devices over a communications network. The "end user device 100" in Nicholas transmits and receives images over a communication network since it is "capable of communicating data to or from a data communication network in accordance with one or more wired and/or wireless communication

protocols." Nicholas, ¶0019. The video images are transmitted upon capture, including as part of a VoIP calling, video calls, and videoconferencing. *Id.*, ¶¶0032, 0033, 0034. A person of ordinary skill in the art would have combined Nicholas with Yamazaki for the reasons stated above. Thus, Yamazaki and Nicholas achieve each additional element of claim 8.

f) Claim 9

> *The Internet direct device of claim 8, wherein said microprocessor transmits and receives audio to and from said other Internet direct devices over said communications network.*

384. Nicholas transmits and receives audio as part of its VoIP, videocalling and videoconferencing aspects. Nicholas's microprocessor controls a plurality of "communication interfaces 324a-324n" that "permit data, including but not limited to voice, video and/or computer data, to be transferred between the end user device 100 and external devices[.]" Nicholas, ¶0041; *see also id.*, ¶¶0024, 0032, 0033; *see also id.*, Fig. 1 (120). Nicholas further describes how its end user device 100 can provide VoIP calling, video calls, and videoconferencing [*id.*, ¶¶0032, 0033, 0034], all of which are executed by the microprocessor [*id.*, ¶0037].

g) Claim 10

The Internet direct device of claim 1 is a portable camera, a personal digital assistant or a cell phone.

385. Yamazaki itself discloses that its device is a portable camera. Yamazaki, ¶0003. Additionally, Nicholas also discloses that its device is portable and includes a camera. *See* Nicholas, ¶0024 & Fig 1 ("Video camera/mic built in option 120"). Thus, Yamazaki and Nicholas achieve each additional element of claim 10.

h) Claim 11

The Internet direct device of claim 1, further comprising a display for displaying still or video images.

386. Yamazaki itself discloses an "image display apparatus and a camera." Yamazaki, ¶0003; Yamazaki's camera "receives the image data from the connected server, and displays the image represented by the image data on the image display." *Id.*, ¶0011. Thus, Yamazaki and Nicholas achieve each additional element of claim 11.

i) Claim 12

The Internet direct device of claim 11, wherein said display of the Internet direct device comprises a touch pad for entering texts.

387. Yamazaki itself discloses a touch pad as a touch panel 26. *E.g.*, Yamazaki, ¶0051. Yamazaki discloses its touch panel 26 to provide user interface

for entering commands. *See id.* Accordingly, Yamazaki itself discloses each additional element of claim 12.

j) Claim *16*

The Internet direct device of claim 1, wherein said imaging system further comprises an image pickup, an optical component for forming an image on the image pickup, and an image capturing component for capturing digital still or video images from the image pickup.

388. Yamazaki describes that "[a]n image of the subject is formed on a light receiving surface of the CCD 30 through the taking lens of the imaging part 12, and the CCD 30 photoelectrically converts the image into an image signal." Yamazaki, ¶0053. Yamazaki's discloses the light receiving surface (sensor) of the CCD 30 as an image pickup, the imaging part as the optical module, and a CCD as the image capture module. *Id.* Yamazaki discloses control of these components by its CPU 36 which may also constitute portions of these respective features. *Id.*, ¶0059. Accordingly, Yamazaki discloses each additional element of this claim.

k) Claim 17

The Internet direct device of claim 16, wherein said optical component comprises an auto-focus optical system.

389. Yamazaki explicitly discloses its imaging part 12 and control thereof to provide automated focus and zoom operation. Yamazaki, ¶¶0048, 0055, 0059. Accordingly, Yamazaki discloses this additional element.

l) Claim 19

The Internet direct device of claim 1, further comprising an image compression component for compressing said captured still or video images.

390. Yamazaki itself discloses that its camera can operate in connection with other devices in a master/slave mode. Yamazaki, ¶0016-0017 (a camera that is "designated in the master mode is capable of manipulating the images such as switching, enlarging, and reducing" the captured images). Yamazaki discloses that "[i]f a command to enlarge or reduce the reproduced image is entered into the master camera, the images displayed on all the cameras are enlarged or reduced." *Id*. ¶0088. Thus, Yamakai discloses reducing (or compressing) images.

391. Further, one of ordinary skill in the art would recognize that, when transmitting images from an Internet direct device (such as Yamazaki's Internet direct camera) to a server over a communications network, it would be desirable to reduce or compress the images to facilitate their transmission.. Such image compression technology was well known at the time of the alleged invention of the '197 Patent. Accordingly, this limitation is taught and/or achieved in light of the disclosure of Yamazaki.

4. Petition 4: Ground 4 - Yamazaki, Nicholas, and Nair

a) Claim 13

The Internet direct device of claim 1 is operable to access the Internet using a web browser over said communications network.

392. As I have discussed above, Nair discloses that its wireless device "may run one or more applications that exchange data/information through wireless networks as the applications are run. Such an application can be, for example, a network browser that exchanges information with the distributed application known as the 'World Wide Web.'" Nair, ¶0027. A person of skill would have known that a web browser, like that disclosed in Nair, was an alternative option for providing image data transfer. Consequently, using web browser software with Yamazaki's camera would simply be the addition (or substitution) of known software for performing image transfer and retrieval, achieving merely predictable results.

b) Claim 14

The Internet direct device of claim 13, wherein said microprocessor is operable to download live or recorded audio or video images from a website over said communications network.

393. As I have discussed, above, Nair's web browser "exchange[s] data/information through the wireless networks." Nair, ¶0027. Such exchanges of data can include "document sharing, accounting, word processing, application sharing, file transfer, remote control, browser, voice over Internet Protocol (IP),

user authentication, address book, files and folders, accounting, database management, and the like." *Id*. ¶0034. For the reasons discussed immediately above, a person of skill would have understood that web browsers were well-known means for downloading images or video from a network, yielding merely predictable results.

c) Claim 15

The Internet direct device of claim 13 is operable support [sic] voice over IP over said communications network.

394. As I discussed immediately above, Nair's web browser "exchange[s] data/information through the wireless networks," including through the use of "voice over Internet Protocol (IP)." Nair, ¶¶0027, 0034. Nair expressly teaches that its mobile communications functions are applicable to variety of mobile devices such as PDA's, cellular phones, "or any other wireless-capable suitable electronic device." *Id*. ¶0027. The ordinary artisan would have recognized that Nair itself suggests integration of various mobile communications features into various devices, including Inoue's camera, and not limited to Nair's automatic switching function. Therefore, a person of ordinary skill in the art would have known at the time of invention that it would be advantageous to integrate Yamazaki's camera functions with higher lever communications functions, such as VoIP, to provide both the expressed advantages of voice calls and device integration, but also to

achieve the apparent benefits of IP-based communications, such as, economy of cost and power conservation, among others.

d) Claim 18

The Internet direct device of claim 1 is a web-enabled portable device.

395. As I discussed above in Section _, Nair's device incorporating a web browser is a "web-enabled portable device," at least as a portable device capable of communicating with the web.

5. Petition 4: Ground 5 - Kusaka and Nicholas

a) Claim 1

An Internet direct device comprising:

396. Kusaka discloses this element based at least on its description of "[a]n electronic camera 100" that "automatically transits captured image data and user identification to a gateway server 160 over a wireless portable telephone link 130." Kusaka, Abstract.

an imaging system to capture still or video images;

397. Kusaka's "electronic camera 100" includes an imaging system for capturing an image. File Wrapper of U.S. Application Serial No. 11/484,373, 2009-06-22 Office Action, p. 4; File Wrapper of U.S. Application Serial No. 13/415,346, 2012-11-07 Office Action, p.5. Kusaka describes "[a]n electronic camera 100" that "automatically transmits captured image data and user

identification to a gateway server 160 over a wireless portable telephone link 130." Kusaka, Abstract; *see also* ¶¶0003, 0219.

> *a microprocessor to transmit said captured still or video images to an account associated with the Internet direct device on a website archive and review (WSARC) upon image capture, and receive still or video images from said WSARC over a communications network;*

398. Kusaka discloses the claimed microprocessor that communicates with a WSARC, at least by its communication with the image server. *See* Kusaka, ¶0234. Kusaka explains that its CPU 50 captures, processes, and sends/receives images to and from storage in "an image storage device such as an image server on the Internet[.]" Kusaka, ¶0003; *see also id.*, ¶¶0219-0221. Kusaka discloses automatically transmitting image data captured by its camera upon image capture, *i.e.*, when the picture is taken. *Id.*, ¶¶0219, 0236. Accordingly, Kusaka discloses this claim element.

> *and wherein the Internet direct device automatically connects to said communications network on power-up using one of a plurality of available modes of connection, which is designated as a primary mode of connection;*

399. Kusaka discloses that its device automatically connects to its WSARC (image server) by one of a plurality of available modes of communication, including via an "wireless portable telephone link 130" established by "wireless portable telephone circuit 72" integrated into the camera (Kusaka, ¶¶0219, 0234,

0236 & Fig. 4); a “wireless LAN (Ethernet™)” that allows Internet communication (*Id.,* ¶ 0534); and/or by connecting to portable telephone 120” using “a short-range communication link 110,” which includes both short-range wireless and wired communication. *Id.,* ¶0273. Kusaka does not explicitly disclose connecting to the WSARC on power-up.

400. As I discussed above, however, Nicholas, fully discloses connecting to a remote server on power-up using a primary mode of connection. Notably, Nicholas was not before the Examiner during the prosecution of the ‘373 Application or the ‘197 Patent.

401. A person of ordinary skill in the art would have been motivated to combine Nicholas’ system for automatic connection via a primary network on power-up with Kusaka’s electronic camera in order to achieve the advantages described in Nicholas. For example, the ordinary artisan would have known that portable electronic cameras have limited user interfaces, and anything making it easier to connect to Kusaka’s image server would be an advantage. Id. An ordinary artisan would have further known that Nicholas’s automatic connection on power-up can simplify and reduce the time required to begin transferring images from a power-off state to the image server. This simplified startup sequence is itself a benefit, but can also allow the user to confidently maintain devices in the off-state to conserve power while ensuring prompt and automatic connectivity to the server

on power-up when a photo-opportunity arises. These benefits are universal to various portable devices, and are particularly so for devices like cameras which may be needed instantly to "capture the moment."

402. A person of ordinary skill in the art would have also been motivated to combine Nicholas's connection via a primary network with Kusaka's connection through one of a plurality of available networks to achieve the benefits of Nicholas. A person of skill in the art would have recognized that it would be beneficial to automatically connect to the most advantageous mode of connection available, whether for reasons of cost, speed, or reliability of network connection. This would be especially true of a mobile electronic camera which, depending on its location, might not have all modes of connection available to it.

> *and wherein the Internet direct device automatically switches to another available mode of connection when the Internet direct device detects that said primary mode of connection to said communications network is unavailable.*

403. As I have previously discussed, Kusaka discloses that its device (camera) can connect to the WSARC (image server) over a plurality of available modes of communication, including via an "wireless portable telephone link 130" established by "wireless portable telephone circuit 72" integrated into the camera (Kusaka, ¶¶0219, 0234, 0236 & Fig. 4); a "wireless LAN (Ethernet™)" that allows Internet communication (*Id.*, ¶0534); and/or by connecting to portable telephone

120” using “a short-range communication link 110,” which includes both short-range wireless and wired communication. *Id.*, ¶0273. However, Kusaka does not explicitly disclose that its electronic camera “automatically switches to another available mode of communication when [it] detects that said primary mode of communication to said WSARC is unavailable.” *Consider* File Wrapper of U.S. Application Serial No. 11/484,373, 2009-06-22 Office Action, p. 5. As I have discussed above, however, Nicholas teaches this element.

404. A person of ordinary skill in the art at the time of invention of the challenged claims would have appreciated the benefits of combining automatic switching in the mobile end-user devices of Nicholas with other mobile end-user devices, such as Kusaka’s electronic cameras. *Id.*, ¶¶0029-34. One of ordinary skill in the art would have modified Kusaka with Nicholas to provide the disclosed benefits of continuity of connection in seamless transition (Nicholas, Abstract), economy in selecting networks (*E.g., id.*, ¶0053), transmission quality (*id.* ¶0056), and the recognized benefits of general versatility, signal strength, and/or performance. For at least these reasons, Kusaka in view of Nicholas achieves the invention as recited in claim 1.

b) Claim 2

The Internet direct device of claim 1, wherein said plurality of available modes of connection is selected from a group consisting of:

> *a land line, DSL, cable, satellite, wireless network, cellular, Wi-Fi, and Wi-Max.*

405. Kusaka describes a plurality of available modes of communication including at least cellular and Wi-Fi. (Kusaka, ¶¶0219, 0234, 0236 & Fig. 4) and a "wireless LAN (Ethernet™)" that allows Internet communication, *i.e.*, Wi-Fi (*Id.*, ¶0534). Moreover, Nicholas teaches this element including at least wired connections, WLAN (*e.g.*, Wi-Fi), and WWAN (*e.g.*, cellular). *Id.*, ¶0020, which would have been combined with Kusaka for the reasons discussed above. In combining Kusaka and Nicholas as discussed above regarding claim 1, the ordinary artisan would have included at least the variety of wired and wireless connections as taught by both Kusaka and Nicholas for the same reasons discussed above regarding claim 1. Consequently, Kusaka as modified by Nicholas fully achieve these additional elements.

c) Claim 3

> *The Internet direct device of claim 1, further comprising a storage device for locally storing captured still or video images and said received still or video images.*

406. Kusaka itself discloses such a storage device in its various storage mediums including buffer memory 59, memory card 77, frame memory 69,269 that are each capable of local storage of images. For example, Kusaka's buffer memory and frame memory store images for periods. Kusaka, ¶¶0234, 0236.

Kusaka's memory card 77 can store images files together with other information such as location information as needed. *Id.*, ¶¶0235, 0237. Accordingly, Kusaka discloses these additional elements.

d) Claim 4

The Internet direct device of claim 3, wherein the storage device stores the captured still or video images when the connection to said communications network is unavailable, and wherein the microprocessor transmits the stored still or video images to said WSARC when the connection to said communications network is re-established.

407. Kusaka itself discloses that: "[i]f communication with the gateway server 160 is not possible, the image file is temporarily stored in the memory card 77 and the subroutine returns in S309." Kusaka, ¶0247. Kusaka further discloses that: "[i]f communication with the gateway server 160 is possible, the image file, camera identification information, user identification information and a transmission request are transmitted to the gateway server 160 using the wireless portable telephone circuit 72 in S307." *Id*. Kusaka thus discloses these additional elements.

e) Claim 7

The Internet direct device of claim 1, wherein the microprocessor of the Internet direct device communicates with other Internet direct devices over said communications network.

408. Kusaka itself discloses its device to connect with other Internet direct devices over its connection. For example, Kusaka describes that a single user can use multiple cameras/devices each accessing the same album on the image server. Kusaka, ¶0544. Kusaka's user-based arrangement allows the different devices to connect for storing, retrieving, and managing image data on the server. *Id.* Moreover, Kusaka discloses direct communication between devices and using device common communications protocol (IP). *E.g., id.* ¶¶0573, 0626. Kusaka discloses its CPU 50,250 to conduct general operations and the ordinary artisan would understand Kusaka's connection which other Internet direct devices to be the operable result of its CPU 50, 250. Kusaka, ¶¶0229, 0234, 0263. Accordingly, Kusaka itself discloses all additional elements of claim 7.

f) Claim 8

The Internet direct device of claim 7, wherein said microprocessor transmits and receives still or video images to and from said other Internet direct devices over said communications network.

409. Kusaka itself discloses its microprocessor transmitting and receiving images with other devices over its connection. *See* Kusaka, Fig. 3; *see also e.g., id.*, ¶¶0225, 0227, 0249, 0282. Kusaka discloses a user-based arrangement

allowing multiple cameras/devices to connect by access the same album on the image server for storing, retrieving, and managing image data on the server. *Id.* ¶0544. Thus, one device connects and can transmit and receive images to and from another device through the server over its connection. *E.g., id.,* ¶0245. Accordingly, Kusaka itself discloses these additional elements.

410. Nicholas also transmits video images to another end user device over the communications network. As I have discussed above, Nicholas's end user device 100 (an Internet direct device) includes a microprocessor that communicates with other Internet direct devices over a communications network. The "end user device 100" in Nicholas transmits and receives images over a communication network since it is "capable of communicating data to or from a data communication network in accordance with one or more wired and/or wireless communication protocols." Nicholas, ¶0019. The video images are transmitted upon capture, including as part of a VoIP calling, video calls, and videoconferencing. *Id.*, ¶¶0032, 0033, 0034. Thus, Kusaka and Nicholas each disclose these additional elements.

g) Claim 9

The Internet direct device of claim 8, wherein said microprocessor transmits and receives audio to and from said other Internet direct devices over said communications network.

411. Nicholas transmits and receives audio as part of its VoIP, videocalling and videoconferencing aspects. Nicholas' microprocessor controls a plurality of "communication interfaces 324a-324n" that "permit data, including but not limited to voice, video and/or computer data, to be transferred between the end user device 100 and external devices[.]" Nicholas, ¶0041; *see also id.*, ¶¶0024, 0032, 0033; *see also id.*, Fig. 1 (120). Nicholas further describes how its end user device 100 can provide VoIP calling, video calls, and videoconferencing [*id.*, ¶¶0032, 0033, 0034], all of which are executed by the microprocessor [*id.*, ¶0037]. For the reasons discussed above, a person of skill in the art would have combined Nicholas with Kusaka.

h) Claim 10

The Internet direct device of claim 1 is a portable camera, a personal digital assistant or a cell phone.

412. Kusaka itself discloses that its device is a portable camera. Kusaka, Abstract, ¶¶0219, 0235, Fig. 2. Nicholas also discloses that its device is portable and includes a camera. *See* Nicholas, ¶0024 & Fig 1 ("Video camera/mic built in option 120"). Thus, each of Kusaka and Nicholas discloses each additional element of claim 10.

i) Claim 11

The Internet direct device of claim 1, further comprising a display for displaying still or video images.

413. Kusaka's electronic camera has a display suitable for viewing images. Kusaka, ¶¶0224, 0225. Nicholas states that its device "forwards graphics, text, and other data from the communication infrastructure 304 or from a frame buffer (not shown) for display to a user on a display unit 322" (Nicholas, ¶0040), such as in connection with its video conferencing and video calling capability (*id.*, ¶¶0008, 0024 & Fig 1). Thus, Kusaka and Nicholas disclose each additional element of this claim.

j) Claim 12

The Internet direct device of claim 11, wherein said display of the Internet direct device comprises a touch pad for entering texts.

414. Kusaka discloses a touch pad as a touch screen 66. See, *e.g.*, Kusaka, ¶0227. Kusaka discloses its touch screen 66 on its screens 21, 22 to provide user interface for entering commands. *See, e.g., id.*, ¶¶0249 (scrolling, playback, etc.). Accordingly, Kusaka discloses each additional element of this claim.

k) Claim 16

The Internet direct device of claim 1, wherein said imaging system further comprises an image pickup, an optical component for forming an image on the image pickup, and an image capturing component for capturing digital still or video images from the image pickup.

415. Kusaka itself discloses such elements, as its image capture system including elements 10 and 52-60. Kusaka discloses an image pickup as one or more of a CCD 55 and its control circuitry 56; an optical module as one or more a lens 10, a diaphragm 53, and their control circuitry 52,54 forming an image on the CCD 55; and an image capturing module as one or more of a processor 57, converter 58, buffer 59, and control 60. Kusaka, ¶0379, Fig. 4. Accordingly, Kusaka discloses these additional elements.

l) Claim 17

The Internet direct device of claim 16, wherein said optical component comprises an auto-focus optical system.

416. Kusaka itself discloses the optical module as one or more a lens 10, a diaphragm 53, and their control circuitry 52,54 forming an image on the CCD 55. Kusaka's lens 10, diaphragm 53, and their control circuitry 52,54 comprise an auto-focus optical system. Kusaka, ¶0379. Accordingly Kusaka discloses these additional elements.

m) Claim 19

The Internet direct device of claim 1, further comprising an image compression component for compressing said captured still or video images.

417. Kusaka itself discloses an image compression module as part of its capture control circuit 60 which "converts or compresses the digital data stored

temporarily in the capture buffer memory 59 into a specific recording format (JPEG, etc.) to form the image data." Kusaka, ¶0234. Kusaka stores compressed image data in the memory card 77. *Id.*, ¶0291. Accordingly, Kusaka discloses these additional elements.

n) Claim 21

> *The Internet direct device of claim 20, wherein said microprocessor is operable to receive from and transmit to said other Internet direct devices audio over said connection.*

418. As I have discussed in several places, it was a well-known trend to incorporate digital cameras in cellular devices, *see* Narayanaswami, p. 65, and persons of skill in the art would have been motivated to make the combination for several reasons. Nicholas' microprocessor controls a plurality of "communication interfaces 324a-324n" that "permit data, including but not limited to voice, video and/or computer data, to be transferred between the end user device 100 and external devices[.]" Nicholas, ¶0041; *see also id.*, ¶¶0024, 0032, 0033; *see also id.*, Fig. 1 (120). Nicholas further describes how its end user device 100 can provide VoIP calling, video calls, and videoconferencing [*id.*, ¶¶0032, 0033, 0034], all of which are executed by the microprocessor [*id.*, ¶0037]. A person of ordinary skill in the art would have been motivated to combine Kasaka's camera with Nicholas's camera-enabled communication device in light of known consumer desires and marketplace trends. *See* Narayanaswami, p. 65.

6. Petition 4: Ground 6 –Kusaka, Nicholas, and Nair

a) Claims 13 and 14

419. Dependent claim 13 of the '197 Patent incorporates the elements of claim 1 and adds the further requirement of a "web browser." Dependent claim 14 depends from claim 13 and further requires the step of a microprocessor "operable to download live or recorded audio or video images from a website[.]" Specifically, these claims recite the following:

> *13. The Internet direct device of claim 1 is operable to access the Internet using a web browser over said communications network.*
>
> *14. The Internet direct device of claim 13, wherein said microprocessor is operable to download live or recorded audio or video images from a website over said communications network.*

420. Nicholas describes using its end user device to receive (*i.e.*, download) VoIP, video calls, and other data over IP networks, including audio and visual images. Nicholas, ¶¶0019, 0024, 0032-0034. In one embodiment, Nicholas's end user device can also record videos and provide "digital media networking." *Id.*, ¶0036. Nicholas also describes downloading live audio or visual images, such as during a VoIP call or a videocall or video conference. *Id.*, ¶¶0019, 0024, 0032-0034. These functions are performed by "software routines" that are executed by one or more microprocessors. *Id.*, ¶ 0037. Nicholas does not expressly state that the software routines include use of web browser software.

421. Multiple prior art cameras describe using a web browser to download images or audio from the Internet. Kusaka concerns a digital camera that, like Nicholas's end user device, can record videos. Like Nicholas's end user device, Kusaka's mobile electronic camera also has a display suitable for viewing images. Kusaka, ¶¶0224, 0225. Kusaka describes interfacing with images or videos on a website, receiving previously captured and stored image data from an image server, and displaying that received image data on the camera's display. *Id.*, ¶0236. Similarly, as I discussed above, Nair discloses a web browser. Nair, ¶0027.

422. A web browser, like that disclosed in Nair, was a well-known means of downloading images or video from a network. A person of ordinary skill in the art would have known that a web browser, like that used in Nair, was an alternative option for providing image data transfer, including videoconferencing function. Consequently, using web browser software with Kusaka's camera would simply be the addition (or substitution) of known software for performing image transfer and retrieval, achieving no more than mere predictable results.

b) Claim 15

The Internet direct device of claim 13 is operable support [sic] voice over IP over said communications network.

423. As I discussed above, Nicholas also transmits and receives audio as part of its VoIP, videocalling and videoconferencing aspects. Nicholas discloses that its device can provide VoIP calling, video calls, and videoconferencing

[Nicholas**,** ¶¶0032, 0033, 0034], all of which are executed by the microprocessor [*id.*, ¶0037]. Nair likewise discloses VoIP. *See* Nair, ¶¶9927, 0034. Nicholas and Nair thus each independently disclose this additional element.

c) Claim 18

The Internet direct device of claim 1 is a web-enabled portable device.

424. As I discussed above, Nair's device incorporates a web browser which renders Kusaka's device a "web-enabled portable device," at least as a portable device capable of communicating with the web.

E. Petition 5: *Inter Partes* Review Of Claims 1, 2, 3, 10, 11, 12, 13, 14, And 21 Of The '991 Patent

425. I understand that this Petition 5 contains the following grounds to challenge claims 1, 2, 3, 10, 11, 12, 13, 14, and 21 of the '991 Patent. I have reviewed this Petition, and the following analysis substantially mirrors the analysis in the Petition 5.

Ground	Challenged Claims	Statutory Ground and Prior Art
1	1, 2, 3, 10, 11, 12, 13, 14, 21	Obviousness under 35 U.S.C. § 103(a) over Inoue and Nair
2	1, 2, 3, 12, 13, 14 and 21	Obviousness under 35 U.S.C. § 103(a) over Yamazaki and Nicholas
3	1, 2, 3, 12, 13, 14 and 21	Obviousness under 35 U.S.C. § 103(a) over Yamazaki and Nair

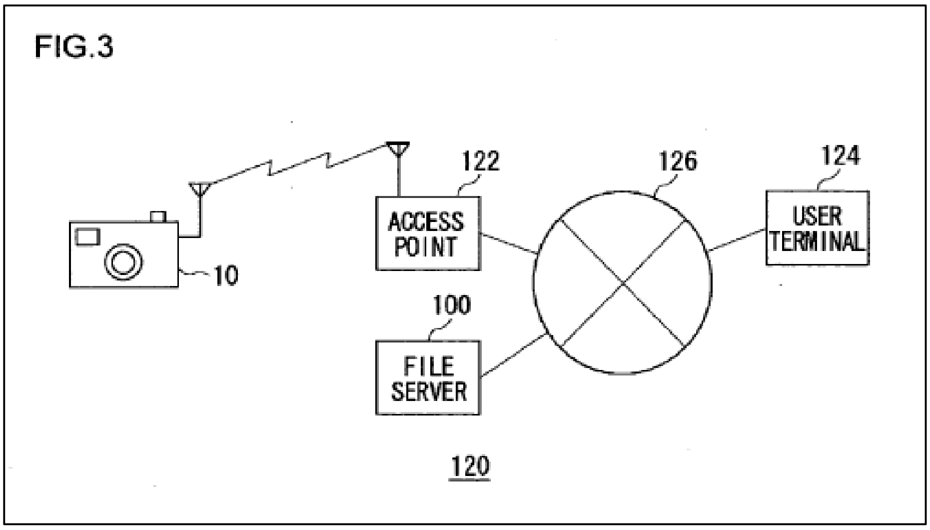
4	10 and 11	Obviousness under 35 U.S.C. § 103(a) over Yamazaki, Nicholas and Nair
5	1, 2, 3, 12, 13, 14 and 21	Obviousness under 35 U.S.C. § 103(a) over Kusaka and Nicholas
6	10 and 11	Obviousness under 35 U.S.C. § 103(a) over Kusaka, Nicholas, and Nair

1. Petition 5: Ground 1 - Inoue and Nair

a) Claim 1

A method for transmitting and receiving still or video images by an Internet direct device associated with a user over a communications network, comprising the steps of:

426. Inoue describes a digital camera for transmitting and receiving images that, when "powered on … automatically establishes a network connection with [a] file server" for the purposes of transmitting and receiving images over a communications network. Inoue, Abstract. Inoue's network connection can include a connection to the Internet (126). *See, e.g., id.*, ¶0060 & Fig. 3:



Id., Fig. 3.

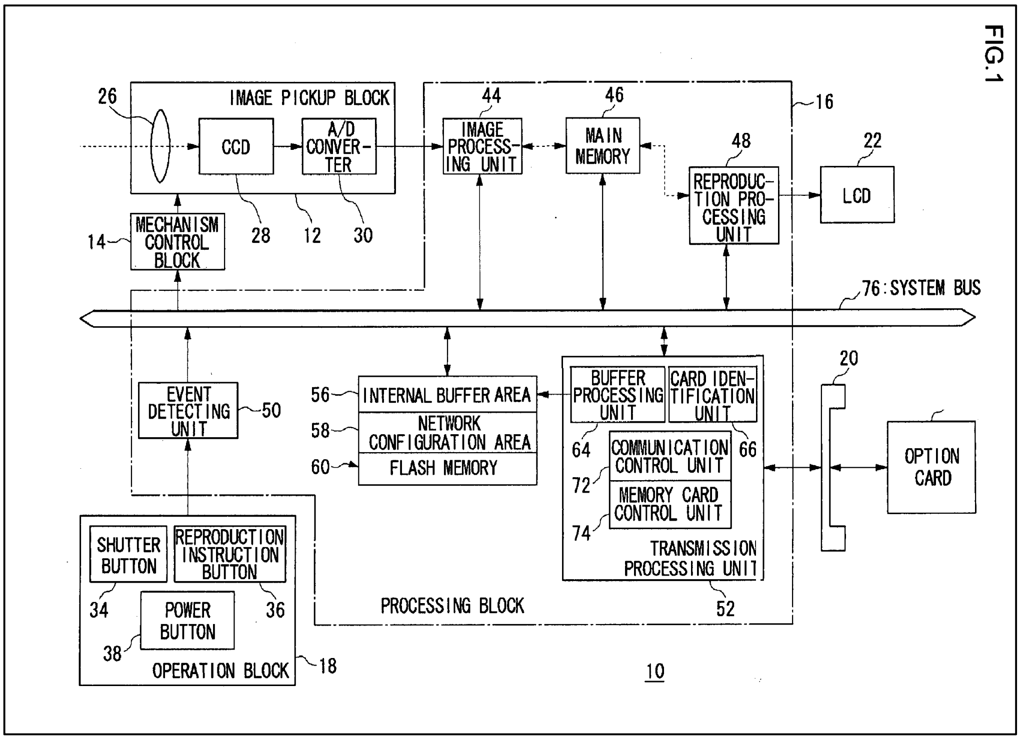
automatically connecting the Internet direct device to said communications network on power-up using one of a plurality of available modes of connection, which is designated as a primary mode of connection;

427. Inoue explains that "[w]hen the digital camera is powered on, it automatically establishes a network connection with the file server in an activation process." Inoue, Abstract. "The power button 38 is one for switching on/off the power of the entire digital camera 10. When the digital camera 10 is off, pressing the power button 38 is detected by event detecting unit 50 as an activation request, which is followed by an activation process." *Id.*, ¶0058. Inoue's digital camera "detects an activation request" and "establish[es] a network connection between the digital camera and a file server upon detection of the activation request." *Id.*, ¶0017; *see also id.*, ¶0066 & Fig. 6. The communications network can be via any

one of a plurality of modes of connection: "The 'network' may be either wireless or wired. Nor does it matter whether the network uses such facilities as an access point if on a wireless LAN in infrastructure mode, or is of so-called peer-to-peer as if in ad-hoc mode." Inoue, ¶0015. The particular network that is selected for use is the "primary mode of connection" for Inoue's camera for connection to a "communication network," such as the Internet. *Id.*, ¶0060. In one embodiment, Inoue identifies "a wireless LAN" as the primary mode of communication to reach the Internet. *Id.* ¶0060 & Fig. 3.

capturing still or video images by an image capture system of the Internet direct device;

428. Inoue describes "a digital camera" with an "image pickup block" to capture images. Inoue, ¶0009; *see also id.*, ¶¶0002, 0010-0013 & Fig. 1(12).



Id., Fig. 1 (12, upper left).

> *transmitting the captured still or video images to an account associated with the Internet direct device on a website archive and review (WSARC) upon image capture by a microprocessor of the Internet direct device, receiving still or video images from said WSARC over the communications network by the Internet direct device; and*

429. Inoue describes this element, including the claimed microprocessor. Inoue describes a processing block 16 that includes an image processing unit 44, a transmission processing unit 52, a reproduction processing unit 48, memory units, and various other elements. Inoue, ¶0053 & Fig. 1. The transmission unit contains a "communication control unit 72" which controls an internal "option card 68"

able to access various communication networks. *Id.*, ¶0049 ("The card slot 20 [in the camera] retains an option card 68 detachably"). "The communication control unit 72 exercises control necessary to communicate with the file server…." *Id.*, ¶¶0056, 0060 ("The digital camera 10 and the access point 122 communicate with each other over a wireless LAN"). Inoue teaches that its digital cameras (IDDs) transmit images "upon obtainment of the image" to a server. *Id.*, ¶0018. "Upon obtainment of the image" includes image capture. *Id.*, ¶0015 ("The 'image obtained by image pickup,' shall cover both an intact image just picked up and an image obtained through compression or the like after picked up."), ¶0048 ("The image pickup block 12 shoots a subject under user instructions.").

430. Inoue further explains that its microprocessor not only controls image capture and transmittal to the file server, but also operates to retrieve images from the file server. Inoue states:

> One of the aspects of the present invention relates to a digital camera, which comprises … a processing block which applies processing to an image. For example, the processing block includes any one of the following configurations:
> (1) A detecting unit which detects an activation request for the digital camera, and a communication control unit which performs processing for establishing a network connection with a file server upon detection of the activation request;

> (2) A detecting unit which detects an image pickup request, and a communication control unit which performs processing for transmitting an image obtained by image pickup to a file server over a network upon obtainment of the image;
>
> (3) A detecting unit which detects an image reproduction request, and a communication control unit which performs processing for receiving an image to be reproduced from a file server over a network when the image reproduction request is detected; and
>
> (4) Any two or more of the configurations (1) to (3) in combination.

Inoue, ¶¶0009-0013.

431. Inoue further describes that its file server is configured with "user-specific folders … so that images are classified and stored in the folders" based upon the camera that captures and uploads the image. *Id.*, ¶0059. Inoue discloses that these folders are created for storing and retrieving images associated with a particular digital camera and user. *Id.*, ¶¶0079-0080 & Fig. 12. The folders comprise accounts associated each of the IDDs (Inoue's camera) on a WSARC (Inoue's file server). *Id.*

> *automatically switching to another available mode of connection by the microprocessor when the Internet direct device detects that said primary mode of connection to the communications network is unavailable.*

432. As I have noted, one of Inoue's embodiments identifies "a wireless LAN" as a primary mode of connection to reach the Internet among a plurality of

available modes. Inoue, ¶0060. Inoue does not disclose that its digital cameras automatically switch from a wireless LAN to another available mode of connection when the wireless LAN is unavailable. Nair, however, provides this teaching.

433. Nair relates "generally to the field of wireless technology and, more particularly, to seamless routing between wireless networks." Nair, ¶0003. Its teachings apply to any wireless device with capability for communicating by wireless technology—*e.g.*, "wireless device 12 can be, for example, a wireless personal digital assistant (PDA), a cellular phone, or any other wireless-capable electronic device." *Id.* Nair explains that connecting and transmitting data over a wireless LAN (a "WLAN"), like that used in Inoue, provides certain advantages over other available modes of connection. *Id.*, ¶0029.

434. Nair further explains that its technology allows wireless devices to have "uninterrupted and effective wireless access for the wireless device 12" by "automatically and seamlessly" handing off communications from a WLAN to a wireless wide area network (a "WWAN") when the WLAN connection is unavailable. Nair, ¶0029; *see also id.*, Abstract, ¶¶0008, 0009, 0022, 0028, 0035-0040.

435. In operation, as the wireless device 12 is moved between or among the effective ranges of various wireless networks (WLAN or WWAN), connectivity application 24 functions to change connections from one wireless

network to another wireless network. In one aspect, the change of wireless connection can be automatic such that, for example, upon loss of connectivity from any one connection, the connectivity application 24 will automatically initiate a new connection and pass the respective IP address to operating system 20…. This may occur without any noticeable loss of connectivity to the user of the wireless device 12. *Id.*, ¶0039.

436. A person of ordinary skill in the art would have applied these teachings from Nair to Inoue's digital camera. Nair explains some of the advantages that would motivate a skilled artisan to modify Inoue's wireless camera to be able to seamlessly connect to a WWAN when a WLAN is unavailable. Nair, ¶¶0006-0009; A person of skill in the art would also have recognized additional advantages to combining this functionality from Nair to Inoue's digital camera. It was known that there were photographers (*e.g.*, travelers and photojournalists) who are mobile and need access across multiple modes of connection to make their uploads reliable, secure and timely. In the case of the enterprise market—*e.g.*, a media company that employs photojournalists—it also would have been known that it would be advantageous to centrally manage this switching process so that devices are automatically switched to a preferred network that may have a negotiated lower rate. A person of ordinary skill would also have understood that automatic switching would make operation of the camera more convenient to the

user, in that the camera would be able to upload images from a variety of locations and would not need to manually switch networks.

b) Claim 2

> *The method of claim 1, wherein the step of automatically switching comprises the step of switching to one of the following available modes of connection: a land line, DSL, cable, satellite, wireless network, cellular, Wi-Fi, and Wi-Max.*

437. Nair explains that its wireless device 12 can use a variety of modes of communications in addition to WLAN (*e.g.*, Wi-Fi) and WWAN (*e.g.*, cellular). Nair, ¶0024. For example:

> Each wireless network 14, 16, 18 can be a communication network that supports wireless communication. Each network supports at least one wireless link or device connection. As such, the networks may support a variety of communications, including, but not limited to, analog cellular system, digital cellular system,… and Enhanced Specialized Mobile Radio (ESMR). The wireless networks 14, 16, 18 may utilize or support various protocols. Exemplary protocols for WLANs **16,18** include IEEE 802.11, HomeRF, Bluetooth, HiperLAN and the like. Exemplary protocols for WWAN 14 include Time Division Multiple Access (TDMA, such as IS-136), Code Division Multiple Access (CDMA),… Global System for Mobile communications (GSM),… and Integrated Digital Enhanced Network (iDEN) Packet Data.

Id., ¶0025. A person of ordinary skill would have combined Nair with Inoue for the reasons discussed above.

c) Claim 3

The method of claim 1, further comprising the steps of locally storing the captured still or video images in a storage device of the Internet direct device by the microprocessor when the connection to said communications network is unavailable, and transmitting the stored still or video images to said WSARC by the microprocessor when the connection to said communications network is re-established.

438. Inoue itself discloses a storage device (buffer memory 56) on the IDD for locally storing captured and received still or video images. Inoue, ¶¶0025-30, 0063. Inoue further discloses that "[t]he image saved to the buffer 56 is transferred to the file server 100 next time the communication with the file server 100 is enabled." *Id*. ¶0063.

d) Claim 10

The method of claim 1, further comprising the step of accessing the Internet using a web browser of the Internet direct device over said communications network.

439. Nair discloses that its wireless device "may run one or more applications that exchange data/information through wireless networks as the applications are run. Such an application can be, for example, a network browser

that exchanges information with the distributed application known as the 'World Wide Web.'" Nair, ¶0027.

440. Including a web browser application like that described as part of Nair's "wireless device" as part of Inoue's digital camera would simply be the addition (or substitution) of known software for performing a known downloading function yielding merely predictable results. In addition, a person of ordinary skill in the art would have been motivated to make the combination for the reasons discussed above. Among other things, web browsers have built in capabilities to upload and retrieve images as well as to negotiate firewalls and other security systems. A person of ordinary skill in the art would have been motivated to use this existing technology rather than develop new systems or technology that may not have the same advantages and/or become out of date.

e) Claim 11

The method of claim 10, further comprising the step of downloading live or recorded audio or video images from a website by the microprocessor of the Internet direct device over said communications network.

441. As I have previously discussed, Nair's web browser "exchange[s] data/information through the wireless networks." Nair, ¶0027. Such exchanges of data can include "document sharing, accounting, word processing, application sharing, file transfer, remote control, browser, voice over Internet Protocol (IP),

user authentication, address book, files and folders, accounting, database management, and the like." *Id*. ¶0034. For the reasons discussed immediately above, a person of skill would have understood that web browsers were well-known means for downloading images or video from a network, yielding merely predictable results.

f) Claim 12

The method of claim 1, further comprising the step of compressing the captured still or video images.

442. Inoue itself discloses that its "image processing unit 44 inputs the image data output from the image pickup block 12, and encodes and compresses the same according to a JPEG (Joint Photographic Experts Group) scheme or the like." Inoue, ¶0053. Moreover, the ordinary artisan would have understood that producing JPEG format implies an image compression module.

g) Claim 13

A non-transitory storage medium comprising:

443. Inoue discloses a main memory and a flash memory as part of its processing block 16. Inoue, ¶0053. Nair explains that the "wireless device 12 can be any suitable electronic device such as, for example, a portable personal computer (PC), wireless PDA or cellular phone, having a data processing facility supported by memory (either internal or external) and being wireless network

capable." Nair, ¶0031; *see also id.*, ¶0020 (noting that the storage medium can be "non-volatile memory, such as read-only memory (ROM)").

> *a program for transmitting and receiving still or video images over a communications network when executed by an Internet direct device associated with a user to cause the Internet direct device to:*

444. A skilled artisan would understand that both Inoue and Nair are electronic devices that are programmed to perform their transmitting and receiving functions. Inoue describes the use of various programs to transmit and receive at least still images over a communications networks. Inoue, ¶¶0053-0061, 0074-0075; *see also id.*, ¶¶0010-0012. Nair also describes using a computer program to perform its functions. Nair, ¶0018 ("For purposes of this discussion, an application, process, method, routine, or sub-routine is generally considered to be a sequence of computer-executed steps leading to a desired result[,]" *i.e.*, a computer program).

445. With respect to the remainder of Claim 13, as I have noted above, Inoue in combination with Nair teaches the following elements of Claim 1 (which are also the remaining elements in Claim 13); namely, causing an "Internet direct device" to:

> *(a) automatically connect to said communications network on power-up using one of a plurality of available modes of connection, which is designated as a primary mode of connection;*
>
> *(b) capture still or video images by an image capture system of the Internet direct device;*

(c) transmit said captured still or video images to an account associated with the Internet direct device on a website archive and review (WSARC) upon image capture by a microprocessor of the Internet direct device;

(d) receive still or video images from said WSARC over the communications network, and

(e) automatically switch to another available mode of connection by the microprocessor when the Internet direct device detects that said primary mode of connection to the communications network is unavailable.

446. Thus, Inoue in combination with Nair discloses each and every element of Claim 13.

h) Claim 14

The storage medium of claim 13, the program when executed causes the Internet direct device to locally store the captured still or video images in a storage device when the connection to said communications network is unavailable, and transmits the stored still or video images to said WSARC when the connection to said communications network is re-established.

447. As I have previously discussed, Inoue itself discloses a storage device (buffer memory 56) on the IDD for locally storing captured and received still or video images, and discloses that "[t]he image saved to the buffer 56 is transferred

to the file server 100 next time the communication with the file server 100 is enabled.” Inoue, ¶¶0025-30, 0063.

i) Claim 21

The storage medium of claim 13, the program when executed causes the Internet direct device to compress the captured still or video images.

448. As I have discussed above, Inoue itself discloses that its “image processing unit 44 inputs the image data output from the image pickup block 12, and encodes and compresses the same according to a JPEG (Joint Photographic Experts Group) scheme or the like.” Inoue, ¶0053. Moreover, the ordinary artisan would have understood generating JPEG format to imply an image compression module.

2. Petition 5: Ground 2 - Yamazaki and Nicholas

a) Claim 1

A method for transmitting and receiving still or video images by an Internet direct device associated with a user over a communications network, comprising the steps of:

449. Yamazaki describes “an image display apparatus and a camera that are provided with functions of communicating with a server through a network and transmitting and receiving image data to and from the server, and an image communication system that distributes the image data by means of the image display apparatus, the camera and the server.” Yamazaki, ¶0003. Yamazaki thus

describes a method for transmitting and receiving still or video images by an integrated Internet camera system associated with a user over a communications network. *Id.*

> *automatically connecting the Internet direct device to said communications network on power-up using one of a plurality of available modes of connection, which is designated as a primary mode of connection;*

450. Yamazaki discloses that its IDD (electronic camera) automatically connects to communications network on power-up. Yamazaki discloses an "image communication system comprising: at least one server provided with a storage device storing image data; a network capable of connecting to the server; [and] an image display apparatus communicating with the server through the network...." Yamazaki, ¶0027. Yamazaki further discloses that the owner of the device may elect to enter "and record the entered identification information as an owner's identification information in a memory such as a nonvolatile memory in the camera 10." *Id*. ¶0066. Upon pre-setting the identification information, Yamazaki defaults to the previously-recorded information as the set information and connects with its server. *Id.*, ¶¶0065, 0068, 0073. Moreover, "the camera 10 may also connect to the server 52 just after the setting of the user's identification information so as to evaluate the communicational condition." *Id*. ¶0072. A person of ordinary skill in the art would understand this passage to disclose automatic

connection to a communications network on power-up using a primary mode of connection.

451. Further, Nicholas fully discloses connecting on power up using a primary mode of communication. Like Yamazaki, Nicholas was not before the Examiner during the prosecution of the '991 Patent, and thus was not available to apply in combination with Yamazaki in evaluating the patentability of claim 1 of the '991 Patent.

452. Nicholas concerns an end-user device with a display (*e.g.*, a tablet, notebook computer, or personal digital assistant) that allows for the transmission of images and audio via wired and wireless networks, including over the Internet. *See* Nicholas, Abstract & ¶¶0018-0026. Nicholas discloses that its "end user device is provided that supports a connection to a plurality of data communication networks" that detects which data communication networks are available, "and selectively determines which of the plurality of data communication networks provides the most optimal communication channel." *Id.*, Abstract; *see also id.*, ¶0008. The device determines which network "is optimal may be based on the type of data to be communicated (e.g., voice, video or computer data), the error rate associated with each available network, the number of anticipated 'hops' between the end user device and the remote network entity to which it needs to

communicate, the cost associated with establishing and maintaining a network link, the best path, and/or anticipated power consumption." Nicholas, ¶0008.

453. In one embodiment, Nicholas describes using a wired access point, which may or may not include a docking station, as its primary mode of communication. *Id.* ¶¶0025, 0026 & Fig. 2. Nicholas explains that wired connections can have advantageous connectivity, cost, and transmission speeds as compared to other modes of communication (*e.g.*, wireless). Nicholas also describes connecting to its primary mode of communication automatically on power up. For example:

> The network detection function is preferably performed automatically by the end user device. For example, the network detection function may be performed automatically: (1) as part of the power-up sequence of the end user device to determine which network(s) are initially available to the end user device …

Id., ¶0046.

454. Nicholas explains that when one or more available networks are detected, the end user device "select[s] an available network for data communication based on one or more predefined criteria." Nicholas, ¶0049. The predefined criteria can include the type of data being transferred, the bit error rate, signal-to-noise ratio, the costs of connecting to the network (e.g., preferring to

connect to networks that charge lower fees), and other criteria. *Id*., ¶¶0050-0055. Moreover, Nicholas' end user device can perform network detection and selection at the same time. *Id*., ¶0056.

455. Nicholas also describes selecting a primary network based at least in part upon the location of the device and the needs of the user, including a wired LAN at a primary desk site on an office campus, a WLAN on the office campus when the end user device is moved, a WWAN for use when the WLAN is unavailable, and a WLAN or LAN at a secondary location, which can be a home. *Id.*, ¶¶0031-0036. Thus, Nicholas describes automatic connection over an Internet connection on power-up using one of a plurality of available modes of connection, which is designated as a primary mode of communication.

456. The ordinary artisan would be motivated to combine Nicholas' system for automatic connection via a primary network on power-up with Yamazaki's camera in order to achieve the advantages described in both Yamazaki and Nicholas. For example, the ordinary artisan would have known that portable electronic cameras have limited user interfaces, and anything making it easier to connect to Yamazaki's image server would be an advantage. An ordinary artisan would have further known that Nicholas's automatic connection on power-up can simplify and reduce the time required to begin transferring images from a power-off state to the image server as disclosed by Yamazaki itself, namely, automatically

transferring images from the camera to the WSARC (server) when an image is "captured" or when a network connection is available. *E.g.*, Yamazaki, ¶¶0025, 0070.

457. This simplified startup sequence is itself a benefit, but can also allow the user to confidently maintain devices in the off-state to conserve power while ensuring prompt and automatic connectivity to the server on power-up when a photo-opportunity arises. These benefits are universal to various portable devices, and are particularly so for devices like cameras, which may be needed instantly to "capture the moment."

458. A person of skill in the art would have also recognized the benefits of automatically connecting to the most advantageous (primary) mode of connection available, whether for reasons of cost, speed, or reliability of network connection. This would be especially true of a portable electronic camera which, depending on its location, might not have all modes of connection available to it, or might have multiple viable connections available, some of which are more advantageous than others.

capturing still or video images by an image capture system of the Internet direct device;

459. Yamazaki's "image display apparatus and a camera" is an Internet direct camera / device for capturing an image. Yamazaki, ¶0003. Yamazaki further

discusses "[a]n imaging part 12" that "includes a taking lens and an imaging device such as a CCD arranged behind the taking lens." *Id.*, ¶0048. This disclosure describes an Internet direct device including an imaging system that captures still or video images.

> *transmitting the captured still or video images to an account associated with the Internet direct device on a website archive and review (WSARC) upon image capture by a microprocessor of the Internet direct device, receiving still or video images from said WSARC over the communications network by the Internet direct device; and*

460. Yamazaki discloses the claimed microprocessor as CPU 36, which controls communication with the server. Yamazaki, Fig. 3, item 36, ¶0059. Yamazaki explains that the "camera 10 has access to the servers 52A, 52B, …52n through the network 50" and "[t]he servers [52A-n], have databases [53A-n], respectively, that store the image data. The image data recorded with the camera 10 is transmitted to the servers [52] and is recorded in the databases [53]." *Id.*, ¶¶0061-62. Yamazaki also discloses automatically transmitting an image captured by its electronic camera upon image capture, *i.e.*, when the picture is taken. *Id.*, ¶0025. Yamazaki further discloses that a user can "retrieve the image data recorded in the database 53A to reproduce the image on the image display 24 of the camera 10." *Id.*, ¶0063. Accordingly, Yamakazi discloses this claim element.

automatically switching to another available mode of connection by the microprocessor when the Internet direct device detects that said primary mode of connection to the communications network is unavailable.

461. Yamazaki does not disclose that its camera engages in "automatically switch[ing]." Nicholas, however, discloses switching to another available mode of connection when the primary mode of connection is unavailable. Nicholas's end user device "provides for seamless transitions between different data communication networks, thus permitting all network communication tasks to be performed in a seamless, uninterrupted manner regardless of the location of the device, the type of network connection being used, or the form of data communication being carried out." Nicholas, ¶0009. In one embodiment, Nicholas describes that "the end user device may comprise a notebook or tablet PC with or without a docking interface" that can connect to a plurality of networks, including wired Ethernet, a wireless Local Area Network (WLAN) or a wireless Wide Area Network (WWAN). *Id*., ¶0020. The end user device can be connected to a wired network at a particular location, with or without a docketing station. *Id*., ¶¶0026, 0032

462. When Nicholas's end user device is disconnected from its wired network (described as a LAN in the user's office), "the end user device continues to provide secure connections to the office network that are uninterrupted[.]" *Id.*,

¶0028. Nicholas explains that the device seamless switches to a wireless network, such as a WLAN that provides a mode of connection for the office campus to permit uninterrupted transmissions. *Id.*, ¶¶0029-0034. Nicholas explains that,

> Usage modes of an end-user device … maybe [sic] divided into the following categories of operation:
>
> desk-bound at a primary office location, mobile while roaming within a campus network, mobile while roaming outside of the campus network, in a meeting room (secondary location), or at a home (secondary location).
>
> While desk-bound at a primary office location, an end user device … provides a connection to a LAN/WLAN; may be docked or undocked; provides continuous network connection while transitioning from a wired to wireless connection, or vice versa[.]

Nicholas, ¶¶0030, 0031, 0032.

463. Nicholas states that while desk-bound at a primary office location, its end user device provides a range of functionality, including the "enabling of video and voice calls." *Id.*, ¶0032. Nicholas describes a set-up in which its end user device is connected to a LAN (wired connection) at the primary office location and "seamlessly transitions from a LAN connection to a WLAN connection" when in "mobile mode." *Id.*, ¶0033. In this example, the wired connection at Nicholas primary office location is the primary mode of connection to the communications network. *Id.* As Nicholas explains, the wired connection can be detected and

connected as the primary mode of connection based on preexisting criteria on power up. Nicholas, ¶¶0049-0056. Nicholas then describes a user entering a mobile mode in which the end user device is disconnected from the primary, wired connection, rendering the primary mode of connection unavailable. *Id.*, ¶0033. Nicholas explains that its end user device seamlessly switches its video calling capability from the primary mode of connection to wireless network (WLAN), which is another mode of connection—when the end user device is disconnected from the wired network. *Id.*

464. Nicholas describes other situations where its end-user device can switch modes of connection to a communications network. For example, Nicholas describes an embodiment where WLAN is available on a "campus." Nicholas, ¶0033. When Nicholas' end user device may connect to the WLAN on power up according to predetermined criteria, and designate it as the primary mode of connection. *Id.*, ¶¶0049-0056. When a user leaves the campus, Nicholas describes seamless switching voice and video calling to a "WWAN connection" (a wireless wide area network), which is another mode of connection to the communications network. *Id.*, ¶0034. Nicholas also describes connection to additional networks, such as "[i]n a secondary location such as a home," where the device would switch its mode of connection to a "home LAN or WLAN." *Id.*, ¶0036.

465. A person of ordinary skill in the art at the time of invention of the challenged claims would have appreciated the benefits of combining automatic switching in the mobile end-user devices of Nicholas with other mobile end-user devices, such as Yamazaki's camera. Nicholas, ¶¶0029-34. It was a known problem at the time of the invention that uploading an image can take considerable time, during which the upload process can be interrupted due to loss of connection. This problem would be of particular concern to a portable electronic camera with differing modes of connection available to it based on its given location at the moment. One of ordinary skill in the art would have modified Yamazaki with Nicholas to provide the disclosed benefits of continuity of connection in seamless transition (Nicholas, Abstract), economy in selecting networks (*E.g.*, *id.*, ¶0053), transmission quality (*id.* ¶0056), and the recognized benefits of general versatility, signal strength, and/or performance. For at least these reasons, Yamazaki in view of Nicholas achieves the invention as recited in claim 1.

b) Claim 2

The method of claim 1, wherein the step of automatically switching comprises the step of switching to one of the following available modes of connection: a land line, DSL, cable, satellite, wireless network, cellular, Wi-Fi, and Wi-Max.

466. Yamazaki as modified by Nicholas teaches this element. Nicholas describes "[a]n end user device is provided that supports a connection to a plurality

of data communication networks" that detects which data communication networks are available, "and selectively determines which of the plurality of data communication networks provides the most optimal communication channel." Nicholas, Abstract; *see also id.*, ¶0008. The plurality of available modes of communication includes at least wired connections, WLAN (*e.g.*, Wi-Fi), and WWAN (*e.g.*, cellular). *Id.*, ¶0020. For example:

> Wired and wireless networks supported by an end user device in accordance with embodiments of the present invention may include: (1) cellular networks… (2) public packet-radio networks... (3) Inter net connections, including but not limited to cable modem, DSL, and ISP; (4) Dial-up connections, including … ISDN, PPP, and PSTN (POTS); (5) private packet networks… (6) satellite networks…; and (7) LAN connections, including but not limited to Ethernet, Token Ring and Wireless LAN.

Id., ¶0019.

467. Thus, the plurality of available modes of connection for the end user device includes mode of connection consisting of a land line, a DSL, cable, satellite, wireless network, cellular, Wi-Fi, and Wi-Max. The ordinary artisan would have included Nicholas's switching between any of its landline, wireless, and cellular connections in modifying Yamazaki as reviewed above regarding claim 1, to provide the full benefits of continuity of connection in seamless transition (Nicholas, Abstract), economy in selecting networks (*E.g.*, *id.* ¶0053),

transmission quality (*id.* ¶0056), and the recognized benefits of general versatility, signal strength, and/or performance.

c) Claim 3

> *The method of claim 1, further comprising the steps of locally storing the captured still or video images in a storage device of the Internet direct device by the microprocessor when the connection to said communications network is unavailable, and transmitting the stored still or video images to said WSARC by the microprocessor when the connection to said communications network is re-established.*

468. Yamazaki itself discloses that its Internet direct camera has a storage device in the form of "a memory 34," Yamazaki, ¶0052, 0059 & Fig. 3. Yamazaki discloses that images can be stored locally in the IDD: "[i]f there is enough storage capacity (more than a predetermined level), the image data is temporarily stored in the memory 34 (S118)." *Id.*, ¶0070. Further, a person of ordinary skill in the art would recognize that, in order to display a received image on Yamazaki's electronic camera, the image data can be stored (at least temporarily) on the IDD.

469. Yamazaki also discloses that its storage device stores the captured images when connection is unavailable, and transmits them on re-connection. "[I]f the communicational condition [between the camera and the server] is determined as being unsatisfactory at S112, the capacity of the memory 34 built in the camera 10 is evaluated (S116). If there is enough storage capacity (more than a predetermined level), the image data is temporarily stored in the memory 34

(S118). Then, the image data transmission to the server 52 is postponed until it is determined that the communicational condition becomes satisfactory (S120)." *Id*. ¶0070. "When the communicational condition becomes satisfactory, the image data stored in the memory 34 is transmitted to the server 52." *Id*. Yamazaki's microprocessor (CPU 36) performs this local image storing and transmitting. Yamazaki, ¶0059.

d) Claim 12

> *The method of claim 1, further comprising the step of compressing the captured still or video images.*

470. Yamazaki itself discloses that its camera can operate in connection with other devices in a master/slave mode. Yamazaki, ¶0016 (a camera that is "designated in the master mode is capable of manipulating the images such as switching, enlarging, and reducing" the captured images). Yamazaki discloses that "[i]f a command to enlarge or reduce the reproduced image is entered into the master camera, the images displayed on all the cameras are enlarged or reduced." *Id*. ¶0088. Thus, Yamazaki discloses reducing (or compressing) images.

471. Further, one of ordinary skill in the art would recognize that, when transmitting images from an Internet direct device (such as Yamazaki's Internet direct camera) to a server over a communications network, it would be desirable to reduce or compress the images to facilitate their transmission. Such image compression technology was well known at the time of the alleged invention of the

'991 Patent. Accordingly, this limitation is taught or achieved in light of the disclosures of Yamazaki.

e) Claim 13

A non-transitory storage medium comprising

472. Yamazaki's Internet direct device, comprising among other things "an imaging circuit 32, a memory 34, a central processing unit (CPU) 36, the image display or the LCD 24, a communication interface 38, a user operation interface 40, an identification information entering interface 42, and an external storage medium interface 44," *id*. ¶0052. At least the memory 34 describes a non-transitory storage medium.

a program for transmitting and receiving still or video images over a communications network when executed by an Internet direct device associated with a user to cause the Internet direct device to:

473. The ordinary artisan would understand that both Yamazaki and Nicholas are electronic devices that are programmed to perform their transmitting and receiving functions. One of ordinary skill in the art would recognize that Yamazaki's Internet direct device, comprising among other things "an imaging circuit 32, a memory 34, a central processing unit (CPU) 36, the image display or the LCD 24, a communication interface 38, a user operation interface 40, an identification information entering interface 42, and an external storage medium interface 44," Yamazaki, ¶0052, operates by way of a "non-transitory storage

medium comprising a program." Yamazaki's CPU, for example, could not perform its functions without a non-transitory storage medium comprising a program.

474. With respect to the remainder of Claim 13, as noted above, Yamazaki in combination with Nicholas teaches at least the following elements of Claim 1 (which are also claimed in Claim 13); namely, causing an "Internet direct device" to:

> *(a) automatically connect to said communications network on power-up using one of a plurality of available modes of connection, which is designated as a primary mode of connection;*
>
> *(b) capture still or video images by an image capture system of the Internet direct device;*
>
> *(c) transmit said captured still or video images to an account associated with the Internet direct device on a website archive and review (WSARC) upon image capture by a microprocessor of the Internet direct device;*
>
> *(d) receive still or video images from said WSARC over the communications network, and*
>
> *(e) automatically switch to another available mode of connection by the microprocessor when the Internet direct device detects that said primary mode of connection to the communications network is unavailable.*

475. Thus, Yamazaki in combination with Nicholas discloses each and every element of Claim 13.

f) Claim 14

The storage medium of claim 13, the program when executed causes the Internet direct device to locally store the captured still or video images in a storage device when the connection to said communications network is unavailable, and transmits the stored still or video images to said WSARC when the connection to said communications network is re-established.

476. As I have previously discussed, these steps are disclosed by Yamazaki. *See* Yamazaki, ¶¶0052, 0059, 0070 & Fig. 3.

g) Claim 21

The storage medium of claim 13, the program when executed causes the Internet direct device to compress the captured still or video images.

477. As I have previously discussed, this step is disclosed by Yamazaki. *See* Yamazaki, ¶¶0016, 0088.

3. Petition 5: Ground 3 - Yamazaki and Nair

a) Claim 1

478. As I have noted above, Yamazaki teaches at least the following elements of Claim 1; namely:

(a) A method of transmitting and receiving still or video images by an Internet direct device associated with a user over a communications network;

(b) capturing still or video images by an image capture system of the Internet direct device;

(c) transmitting said captured still or video images to an account associated with the Internet direct device on a website archive and review (WSARC) upon image capture by a microprocessor of the Internet direct device;

(d) receiving still or video images from said WSARC over the communications network by the Internet direct device;

479. As I have also previously discussed, Yamazaki also teaches *automatically connecting to said communications network on power-up using one of a plurality of available modes of connection, which is designated as a primary mode of connection. See* Yamazaki, ¶¶0027, 0065-66, 0068, 0073. Yet, Yamazaki does not explicitly disclose *automatically connecting the Internet direct device to said communications network on power-up using one of a plurality of available modes of connection, which is designated as a primary mode of connection.* Nair resolves this feature.

480. Like Yamazaki, Nair was not before the Examiner during prosecution. Nair discloses wireless devices, including cell phones, PDAs, "or any other wireless-capable suitable electronic device" [*id.*, ¶0027] that connect to a primary network and then automatically switch to another network when the primary network is unavailable. Nair provides of an example of a wireless device that seamlessly switches among a local, high-speed low cost WLAN (*e.g.*, Wi-Fi) to a WWAN (*e.g.*, a cellular network) based on predetermined criteria. Nair's wireless device provides for transmission and receipt of at least captured audio

transmissions over a communications network to another wireless device. A person of ordinary skill in the art would have combined Nair with Yamazaki to add Nair’s automatic switching capabilities to Yamazaki achieving the limitations of claim 1.

481. Nair’s wireless devices automatically connect to the communications network on power-up. As Nair explains, “[a]ccording to embodiments of the present invention, systems and methods provide uninterrupted and ubiquitous wireless access, with seamless hand-off between different kinds of networks” [Nair, ¶0009], which is not possible unless the wireless device connects to the communication network via a mode of connection on power-up.

482. Nair describes a wireless local area network (WLAN) as a mode of connection with certain advantages over a cellular network—*i.e.*, a “wireless wide area network (WWAN)”—as a mode of connection to a communications network. Nair, ¶0028. Nair explains:

> In general, WLANs provide higher throughput rates (e.g., from 11 Mbps to 54 Mbps and higher), but are not conducive to use in higher mobility applications (e.g., such as when a user is in a car). WWANs can be used in high mobility applications, but do not provide as much throughput as WLANs. Thus, to increase throughput rates for the user of the wireless device 12, it is desirable to connect to a WLAN when one is available and connection to it is possible, while connecting to a WWAN when a WLAN connection is not available or possible.

Id., ¶0028.

483. In light of *Nair's* teachings regarding the advantages of a WLAN and the desirability of maintaining a consistent and seamless connection to the communications network, a person of ordinary skill in the art would have recognized that it would be desirable to connect to the WLAN on power-up, if it is available. S*ee* Nair, ¶0029 (describing one purpose of Nair's invention is to provide "uninterrupted and effective wireless access for the wireless device 12"). A WLAN is therefore a primary mode of connection for Nair's wireless device. *Id.* A person of ordinary skill in the art would also have understood that Nair would seek to automatically connect to its WLAN on power-up if it is available, as discussed above.

> *automatically switch to another available mode of connection by the microprocessor when the Internet direct device detects that said primary mode of connection to the communications network is unavailable.*

484. Yamazaki does not teach this element, but it is disclosed by Nair. Nair explains that its wireless devices provide "uninterrupted and effective wireless access for the wireless device 12" by "automatically and seamlessly" handing off communications from the WLAN to the WWAN when the WLAN connection is not available. Nair, ¶0029; *see also id.*, Abstract, ¶¶0022, 0028, 0035-0040. Nair's wireless device also automatically returns from a WWAN to a WLAN connection when WLAN become available. *Id.* As Nair explains:

> In operation, as the wireless device 12 is moved between or among the effective ranges of various wireless networks (WLAN or WWAN), connectivity application 24 functions to change connections from one wireless network to another wireless network. In one aspect, the change of wireless connection can be automatic such that, for example, upon loss of connectivity from any one connection, the connectivity application 24 will automatically initiate a new connection and pass the respective IP address to operating system 20…. This may occur without any noticeable loss of connectivity to the user of the wireless device 12.

Nair, ¶0039.

485. A person of ordinary skill in the art would also have been motivated to combine Nair's automatic-switching features with Yamazaki to provide the full benefits of continuity of connection in seamless transition (Nair, Abstract, ¶¶0029, 0035), economy in selecting networks, transmission quality (*id*., ¶¶0052-0053), and the recognized benefits of general versatility, signal strength, and/or performance.

b) Claim 2

> *The method of claim 1, wherein the step of automatically switching comprises the step of switching to one of the following available modes of connection: a land line, DSL, cable, satellite, wireless network, cellular, Wi-Fi, and Wi-Max.*

486. Nair explains that its wireless device 12 can use a variety of modes of communications [Nair, ¶0024], including those recited in claim 2. For example:

> Each wireless network 14, 16, 18 can be a communication network that supports wireless communication. Each network supports at least one wireless link or device connection. As such, the networks may support a variety of communications, including, but not limited to, analog cellular system, digital cellular system,… and Enhanced Specialized Mobile Radio (ESMR). The wireless networks 14, 16, 18 may utilize or support various protocols. Exemplary protocols for WLANs **16,18** include IEEE 802.11, HomeRF, Bluetooth, HiperLAN and the like. Exemplary protocols for WWAN 14 include Time Division Multiple Access (TDMA, such as IS-136), Code Division Multiple Access (CDMA),… Global System for Mobile communications (GSM),… and Integrated Digital Enhanced Network (iDEN) Packet Data.

Id., ¶ 0025.

487. A person of ordinarily skill in the art would have combined Nair with Yamazaki for the reasons stated above to achieve the full benefits of the "automatic-switching" features of the '991 Patent.

c) Claim 3

> *The method of claim 1, further comprising the steps of locally storing the captured still or video images in a storage device of the Internet direct device by the microprocessor when the connection to said communications network is unavailable, and transmitting the stored*

still or video images to said WSARC by the microprocessor when the connection to said communications network is re-established.

488. As I have previously discussed, Yamazaki itself discloses the additional elements of Claim 3. Yamazaki, ¶0052, 0059 & Fig. 3.

d) Claim 12

The method of claim 1, further comprising the step of compressing the captured still or video images.

489. As I have previously discussed, Yamazaki itself discloses the additional elements of Claim 12. *See* Yamazaki, ¶0053.

e) Claim 13

A non-transitory storage medium comprising a program for transmitting and receiving still or video images over a communications network when executed by an Internet direct device associated with a user to cause the Internet direct device to:

490. As I have discussed above, this element is disclosed by Yamazaki. Yamazaki, ¶0003. The ordinary artisan would understand that both Yamazaki and Nair are electronic devices that are programmed to perform their transmitting and receiving functions. One of ordinary skill in the art would recognize that Yamazaki’s Internet direct device, comprising among other things “an imaging circuit 32, a memory 34, a central processing unit (CPU) 36, the image display or the LCD 24, a communication interface 38, a user operation interface 40, an

identification information entering interface 42, and an external storage medium interface 44," Yamazaki, ¶0052, operates by way of a "non-transitory storage medium comprising a program." Yamazaki's CPU, for example, could not perform its functions without a non-transitory storage medium comprising a program.

491. With respect to the remainder of Claim 13, as noted above, Yamazaki in combination with Nair teaches at least the following elements of Claim 1 (which are also claimed in Claim 13); namely, causing an "Internet direct device" to:

> *(a) automatically connect to said communications network on power-up using one of a plurality of available modes of connection, which is designated as a primary mode of connection;*
> *(b) capture still or video images by an image capture system of the Internet direct device;*
> *(c) transmit said captured still or video images to an account associated with the Internet direct device on a website archive and review (WSARC) upon image capture by a microprocessor of the Internet direct device;*
> *(d) receive still or video images from said WSARC over the communications network, and*
> *(e) automatically switch to another available mode of connection by the microprocessor when the Internet direct device detects that said primary mode of connection to the communications network is unavailable.*

492. Thus, Yamazaki in combination with Nair, discloses each and every element of Claim 13.

f) Claim 14

> *The storage medium of claim 13, the program when executed causes the Internet direct device to locally store the captured still or video images in a storage device when the connection to said*

communications network is unavailable, and transmits the stored still or video images to said WSARC when the connection to said communications network is re-established.

493. As I have previously discussed, Yamazaki itself discloses each additional element of claim 14. *See* Yamazaki, ¶¶0052, 0059, 0070 & Fig. 3.

g) Claim 21

The storage medium of claim 13, the program when executed causes the Internet direct device to compress the captured still or video images.

494. As I have previously discussed, Yamazaki itself discloses each additional element of claim 21. *See* Yamazaki, ¶¶0016, 0088.

4. Petition 5: Ground 4 - Yamazaki, Nicholas, and Nair

a) Claim 10

The method of claim 1, further comprising the step of accessing the Internet using a web browser of the Internet direct device over said communications network.

495. As I have previously discussed, Nair discloses that its wireless device "may run one or more applications that exchange data/information through wireless networks as the applications are run. Such an application can be, for example, a network browser that exchanges information with the distributed application known as the 'World Wide Web.'" Nair, ¶0027. A person of skill would have known that a web browser, like that disclosed in Nair, was an

alternative option for providing image data transfer. Consequently, using web browser software with Yamazaki's camera would simply be the addition (or substitution) of known software for performing image transfer and retrieval, yielding merely predictable results.

b) Claim 11

The method of claim 10, further comprising the step of downloading live or recorded audio or video images from a website by the microprocessor of the Internet direct device over said communications network.

496. As I have previously discussed, Nair's web browser "exchange[s] data/information through the wireless networks." Nair, ¶0027. Such exchanges of data can include "document sharing, accounting, word processing, application sharing, file transfer, remote control, browser, voice over Internet Protocol (IP), user authentication, address book, files and folders, accounting, database management, and the like." *Id*. ¶0034. For the reasons discussed immediately above, a person of skill would have understood that web browsers were well-known means for downloading images or video from a network, yielding merely predictable results.

5. Petition 5: Ground 5 - Kusaka and Nicholas

a) Claim 1

A method for transmitting and receiving still or video images by an Internet direct device associated with a user over a communications network, comprising the steps of:

497. Kusaka describes "[a]n electronic camera 100" that "automatically transits captured image data and user identification to a gateway server 160 over a wireless portable telephone link 130." Kusaka, Abstract.

automatically connecting the Internet direct device to said communications network on power-up using one of a plurality of available modes of connection, which is designated as a primary mode of connection;

498. Kusaka discloses that its IDD (electronic camera) can connect to the WSARC (image server) over a plurality of available modes of communication, including via an "wireless portable telephone link 130" established by "wireless portable telephone circuit 72" integrated into the camera. Kusaka, ¶¶0219, 0234, 0236 & Fig. 4); a "wireless LAN (Ethernet™)" (*Id.*, ¶0534); and/or by connecting to portable telephone 120" using "a short-range communication link 110," which includes both short-range wireless and wired communication (*id.*, ¶0273).

499. Kusaka does not explicitly disclose connecting to the communications network on power-up using the recited "primary mode of connection." As I have

previously discussed in, however, Nicholas, fully discloses connecting over an Internet connection on power-up using a primary mode of connection.

500. A person or ordinary skill in the art would have recognized the benefits of versatility, signal strength, power conservation, and/or performance resultant from Nicholas' automatic-connection feature. For example, the ordinary artisan would have known that portable electronic cameras have limited user interfaces, and anything making it easier to connect to Kusaka's image server would be an advantage. An ordinary artisan would have further known that Nicholas's automatic connection on power-up can simplify and reduce the time required to begin transferring images from a power-off state to the image server. This simplified startup sequence is itself a benefit, but can also allow the user to confidently maintain devices in the off-state to conserve power while ensuring prompt and automatic connectivity to the server on power-up when a photo-opportunity arises. These benefits are universal to various portable devices, and are particularly so for devices like cameras which may be needed instantly to "capture the moment."

501. A person of ordinary skill in the art would have also been motivated to combine Nicholas's connection via a primary network with Kusaka's connection through one of a plurality of available networks to achieve the benefits of Nicholas. A person of skill in the art would have recognized that it would be

beneficial to automatically connect to the most advantageous mode of connection available, whether for reasons of cost, speed, or reliability of network connection. This would be especially true of a mobile electronic camera which, depending on its location, might not have all modes of connection available to it.

> *capturing still or video images by an image capture system of the Internet direct device;*

502. Kusaka's "electronic camera 100" is an Internet direct camera for capturing an image. Kusaka, Abstract, ¶¶0003, ¶0219.

> *transmitting the captured still or video images to an account associated with the Internet direct device on a website archive and review (WSARC) upon image capture by a microprocessor of the Internet direct device;*

503. Kusaka discloses such a website archive and review center for storing and managing images. Kusaka explains that image data is relayed to "an image storage device such as an image server on the Internet and stored there[.]" Kusaka, ¶0003; *see also id.*, ¶0220. The gateway server "appends image identification information … to the image file, camera identification information and user identification information from the electronic camera 100, selects an image server having an album with available capacity," and stores the captured image on the image server. *Id.*, ¶0220; *see also id.*, ¶0221. The images on the image server can later be managed, reviewed, or downloaded via the electronic camera. *Id.*, ¶0236.

504. Kusaka also discloses automatically transmitting an image to an account associated with said IDD on said WSARC upon image capture. Kusaka discloses an account on the WSARC (image server) that is associated with that IDD. Kusaka, ¶¶0003, 0219, 0220-0221. Kusaka also discloses automatically transmitting image data captured by its electronic camera upon image capture, *i.e.*, when the picture is taken. *Id.*, ¶0219. "Using the wireless portable telephone function the electronic camera 100 transmits image data (an image file) generated by a capture operation to a gateway server 160 via a wireless portable telephone link 130 immediately after the image is captured." *Id.* Kusaka discloses performing these functions via a microprocessor (CPU 50) on the IDD. Kusaka, ¶0234.

receiving still or video images from said WSARC over the communications network by the Internet direct device; and

505. Kusaka's electronic camera has a display suitable for viewing images. Kusaka, ¶¶0224, 0225. Kusaka also describes receiving previously captured and stored image data from a WSARC (image server) and displaying that received image data on the camera's display. *Id.*, ¶0236.

Automatically switching to another available mode of connection by the microprocessor when the Internet direct device detects that said primary mode of connection to the communications network is unavailable.

506. Kusaka discloses that its camera can connect to the WSARC (image server) over a plurality of available modes of communication, including via an "wireless portable telephone link 130" established by "wireless portable telephone circuit 72" integrated into the camera (Kusaka, ¶¶0219, 0234, 0236 & Fig. 4); a "wireless LAN (Ethernet™)" (*Id.*, ¶ 0534); and/or by connecting to portable telephone 120" using "a short-range communication link 110," which includes both wireless and wired connection. (*id.*, ¶ 0273). However, Kusaka does not explicitly disclose that its electronic camera "automatically switches to another available mode of communication when" it "detects that said primary mode of communication to said WSARC is unavailable."

507. As I have previously discussed, however, Nicholas discloses switching to another available mode of communication when the primary mode of communication is unavailable.

508. A person of ordinary skill in the art would be motivated to combine Nicholas' system for automatic switching via a primary network with Kusaka's electronic camera in order to achieve the advantages described in Nicholas. *Id.* As Nicholas describes, it is advantageous to use the particular network that has the most optimal characteristics for communicating data, including transmission cost, speed, and reliability. Nicholas, ¶0008. For example, Nicholas teaches that "the end user device may avoid connections via cellular networks or ISPs that charge

access fees when there are network connections available at a lower cost." *Id.*, ¶0053. Nicholas describes its wired mode of communication as one such communication mode that may be preferred over other communication modes for cost or other reasons. *Id.*; *see, e.g., id.*, ¶¶0008, 0020. Moreover, the ordinary artisan would have recognized the benefits of versatility, signal strength, power conservation, and/or performance resultant from Nicholas' automatic-switching feature.

b) Claim 2

> *The method of claim 1, wherein the step of automatically switching comprises the step of switching to one of the following available modes of connection: a land line, DSL, cable, satellite, wireless network, cellular, Wi-Fi, and Wi-Max.*

509. Kusaka describes a plurality of available modes of communication including at least cellular and Wi-Fi. For example, Kusaka describes available modes of communication as including both a "wireless portable telephone circuit 72" integrated into the camera, *i.e.*, a cellular network (Kusaka, ¶¶0219, 0234, 0236 & Fig. 4) and a "wireless LAN (Ethernet™)" that allows Internet communication, *i.e.*, Wi-Fi (*Id.*, ¶0534).

510. As I have previously discussed, this element is also taught by Nicholas, which would have been combined with Kusaka for the reasons discussed

above. Consequently, Kusaka and Nicholas each fully disclose the additional element of claim 2.

c) Claim 3

The method of claim 1, further comprising the steps of locally storing the captured still or video images in a storage device of the Internet direct device by the microprocessor when the connection to said communications network is unavailable, and transmitting the stored still or video images to said WSARC by the microprocessor when the connection to said communications network is re-established.

511. Kusaka itself discloses that: [i]f communication with the gateway server 160 is not possible, the image file is temporarily stored in the memory card 77 and the subroutine returns in S309." Kusaka, ¶0247. Kusaka further discloses that: "[i]f communication with the gateway server 160 is possible, the image file, camera identification information, user identification information and a transmission request are transmitted to the gateway server 160 using the wireless portable telephone circuit 72 in S307." *Id*. Kusaka thus discloses these additional elements.

d) Claim 12

The method of claim 1, further comprising the step of compressing the captured still or video images.

512. Kusaka itself discloses that: "[t]he capture control circuit 60 converts or compresses the digital data stored temporarily in the capture buffer memory 59

into a specific recording format (JPEG, etc.) to form the image data." Kusaka, ¶0234.

e) Claim 13

A non-transitory storage medium comprising:

513. Kusaka discloses "EEPROM 68 (electrically erasable programmable ROM)" which "is a non-volatile memory that stores settings information, etc. required for the operation of the electronic camera 100." Kusaka, ¶0230.

a program for transmitting and receiving still or video images over a communications network when executed by an Internet direct device associated with a user to cause the Internet direct device to:

514. Kusaka discloses that: "[t]he CPU 50 controls the various units according to a control program stored in ROM 67 (read-only memory). The EEPROM 68 (electrically erasable programmable ROM) is a non-volatile memory that stores settings information, etc. required for the operation of the electronic camera 100." *Id.*, ¶0230. As I have previously discussed, Kusaka's CPU 50 sends a "capture instruction" to the "capture control circuit" causing "the subject image to be picked up by the CCD 55 via the CCD drive circuit." *Id*. ¶0234. "Next, the CPU 50 connects to the gateway server 160" and "transmits the aforementioned image file" to the "gateway server 160" (image server). *Id*. Thus, Kusaka discloses the program elements of claim 13.

515. With respect to the remainder of Claim 13, as noted above, Kusaka in combination with Nicholas teaches the following elements of claim 1 (which are also claimed in claim 13); namely, causing an "Internet direct device" to:

> *(a) automatically connect to said communications network on power-up using one of a plurality of available modes of connection, which is designated as a primary mode of connection;*
> *(b) capture still or video images by an image capture system of the Internet direct device;*
> *(c) transmit said captured still or video images to an account associated with the Internet direct device on a website archive and review (WSARC) upon image capture by a microprocessor of the Internet direct device;*
> *(d) receive still or video images from said WSARC over the communications network , and*
> *(e) automatically switch to another available mode of connection by the microprocessor when the Internet direct device detects that said primary mode of connection to the communications network is unavailable.*

516. Thus, Kusaka in combination with Nicholas, discloses each and every element of claim 13.

f) Claim 14

> *The storage medium of claim 13, the program when executed causes the Internet direct device to locally store the captured still or video images in a storage device when the connection to said communications network is unavailable, and transmits the stored still or video images to said WSARC when the connection to said communications network is re-established.*

517. As I have previously discussed regarding claim 3, Kusaka discloses these additional elements.

g) Claim 21

The storage medium of claim 13, the program when executed causes the Internet direct device to compress the captured still or video images.

518. As I have previously discussed regarding claim 12, Kusaka discloses these additional elements.

6. Petition 5: Ground 6 – Kusaka, Nicholas and Nair

519. Dependent claim 10 of the '991 Patent incorporates the elements of claim 1 and adds the further requirement of a "web browser." Dependent claim 11 of the '991 Patent depends from claim 10 and further requires the step of "downloading live or recorded audio or video images from a website[.]":

10. The method of claim 1, further comprising the step of accessing the Internet using a web browser of the Internet direct device over said communications network.

11. The method of claim 10, further comprising the step of downloading live or recorded audio or video images from a website by the microprocessor of the Internet direct device over said communications network.

520. Nicholas describes using its end user device to receive (*i.e.*, download) VoIP, video calls, and other data over IP networks, including audio and visual images. Nicholas, ¶¶0019, 0024, 0032-0034. In one embodiment, Nicholas's end user device can also record videos and provide "digital media networking." *Id.*,

¶ 0036. Nicholas also describes downloading live audio or visual images, such as during a VoIP call or a videocall or video conference. *Id.*, ¶¶0019, 0024, 0032-0034. These functions are performed by "software routines" that are executed by one or more microprocessors. *Id.*, ¶0037. Nicholas does not expressly state that the software routines include use of web browser software.

521. Multiple prior art cameras describe using a web browser to download images or audio from the Internet. Kusaka concerns a digital camera that, like Nicholas's end user device, can record videos. Like Nicholas's end user device, Kusaka's mobile electronic camera also has a display suitable for viewing images. Nicholas, ¶¶0224, 0225. Kusaka describes interfacing with images or videos on a website, receiving previously captured and stored image data from an image server, and displaying that received image data on the camera's display. Kusaka, ¶0236. Similarly, as discussed above, Nair discloses a web browser. Nair, ¶0027.

522. A web browser, like that disclosed in Nair, was a well-known means of downloading images or video from a network. A person of ordinary skill in the art would have known that a web browser, like that used in Nair, was an alternative option for providing image data transfer, including videoconferencing function. Consequently, using web browser software with Kusaka's camera would simply be the addition (or substitution) of known software for performing image transfer and retrieval, achieving merely predictable results.

F. **Petition 8: *Inter Partes* Review Of Claims 1, 2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13 and 16 of the '806 Patent**

523. I understand that this Petition 8 contains the following grounds to challenge claims 1, 2, 3, 10, 11, 12, 13, and 16 of the '806 Patent. I have reviewed this Petition, and the following analysis substantially mirrors the analysis in this Petition 8.

Ground	Challenged Claims	Statutory Ground and Prior Art
1	1, 2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 16	Obviousness under 35 U.S.C. § 103(a) over Inoue and Nair
2	8	Obviousness under 35 U.S.C. § 103(a) over Inoue, Nair and Narayanaswami
3	1, 2, 3, 6, 7, 8, 9, 10, 11, 12, 16	Obviousness under 35 U.S.C. § 103(a) over Yamazaki and Nicholas
4	5, 8, 13,	Obviousness under 35 U.S.C. § 103(a) over Yamazaki, Nicholas and Nair
5	1, 2, 3, 6, 7, 8, 9, 10, 11, 12, 16	Obviousness under 35 U.S.C. § 103(a) over Kusaka and Nicholas
6	5, 13	Obviousness under 35 U.S.C. § 103(a) over Kusaka, Nicholas and Nair

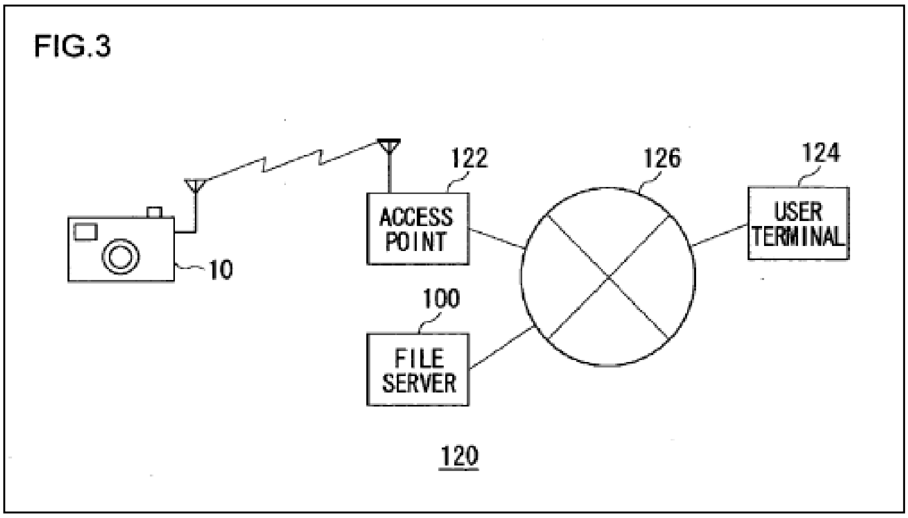
1. Petition 8: Ground 1 - Inoue and Nair

a) Claim 1

An Internet direct device comprising:

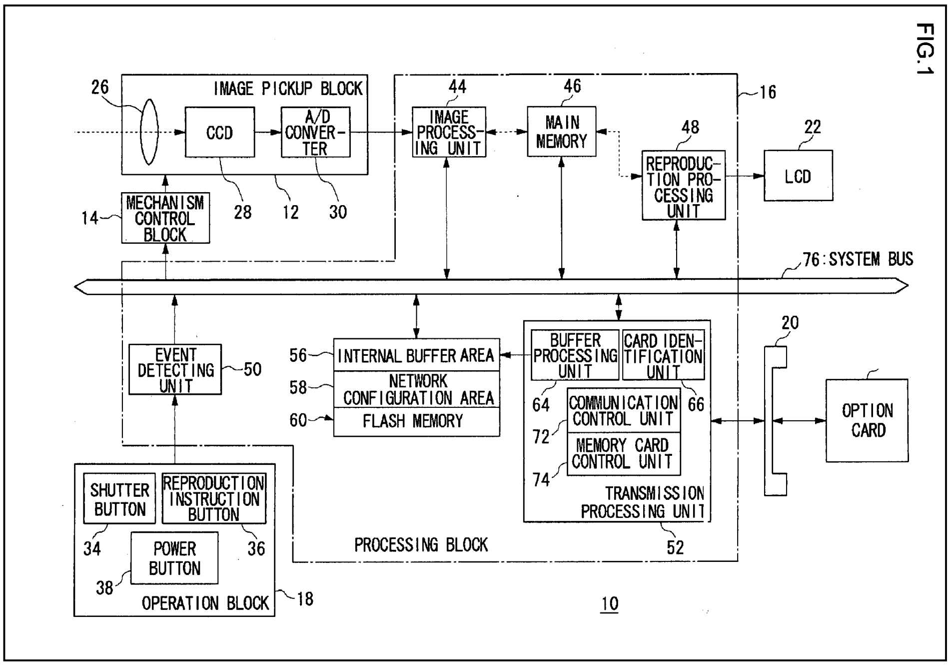
524. Inoue describes a digital camera for transmitting and receiving images that, when "powered on … automatically establishes a network connection with [a]

file server" for the purposes of transmitting and receiving images over a communications network. Inoue, Abstract. Inoue's network connection can include a connection to the Internet as indicated by numeral 126. *See, e.g.,* Inoue, ¶0060 & Fig. 3:



an imaging system to capture at least one of audio, still images and video images;

Inoue describes "a digital camera" with an "image pickup block" to capture images. Inoue, ¶0009; *see also id.*, ¶¶02, 10-13 & Fig. 1(12, upper left):



525. Inoue's discloses of image capture includes capture of still or video images as understood by the ordinary artisan.

> *a microprocessor to transmit at least one of the captured audio, the captured still images and the captured video images to an account associated with the Internet direct device on a website archive and review center (WSARC) upon image capture;*

526. Inoue describes the claimed microprocessor element. Inoue describes a processing block 16 that includes an image processing unit 44, a transmission processing unit 52, a reproduction processing unit 48, memory units, and various other elements. Inoue, ¶0053 & Fig. 1. The transmission unit contains a communication control unit 72 which controls an internal option card 68 (communication card 68) able to access various communication networks. *Id.*, ¶0049 ("The card slot 20 [in the camera] retains an option card 68 detachably").

"The communication control unit 72 exercises control necessary to communicate with the file server…." *Id.*, ¶¶0056, 0060 ("The digital camera 10 and the access point 122 communicate with each other over a wireless LAN").

527. Inoue teaches that its digital cameras (IDDs) transmit images "upon obtainment of the image" to a server. Id., ¶0018. As understood by the ordinary artisan, the phrase "upon obtainment of the image" includes on image capture. Id., ¶0015 ("The 'image obtained by image pickup,' shall cover both an intact image just picked up and an image obtained through compression or the like after picked up."), ¶0048 ("The image pickup block 12 shoots a subject under user instructions."). Inoue explains that its microprocessor not only controls image capture and transmittal to the file server, but also operates to retrieve images from the file server. Inoue, ¶¶0050-51.

528. Inoue further describes that its file server is configured with "user-specific folders … so that images are classified and stored in the folders" based upon the camera that captures and uploads the image. *Id.*, ¶0059. Inoue discloses that these folders are created for storing and retrieving images associated with a particular digital camera and user. *Id.*, ¶0079-0080 & Fig. 12. The ordinary artisan would have understood these folders to constitute accounts associated with each of the IDDs (Inoue's camera) at least through association with their users on a WSARC (Inoue's file server). *Id.*

529. Additionally, it was well known prior to the '806 patent's earliest effective filing date that digital cameras could be (and were) included in cell phones. *See* Narayanaswami, *et al.*, "Expanding the Digital Camera's Reach," *Computer*, Vol. 37, Issue 12 (IEEE Dec. 2004), p. 65 ("Narayanaswami").[16] In fact, as of December 2004, "cell phones that integrate digital cameras have far outsold regular digital cameras." *Id.*

530. Inoue discloses a digital camera. Inoue, ¶0009; *see also id.*, ¶¶0002, 0010-0013. Nair discloses a cell phone that permits the transmission and receipt of audio from other cell phones, *i.e.*, other Internet direct devices. Nair, ¶¶0027, 0034, 0040.

531. A person of ordinary skill in the art would have known at the time that it would be advantageous to include Inoue's digital camera in a cell phone, such as those described in Nair. As Narayanaswami explained:

> First, the cell phone's voice communication capability makes it the most ubiquitous portable device. Second, people enjoy the convenience of capturing high-resolution digital images using a device they already carry. Third, this integration relieves people from having to make a conscious decision to take a camera in anticipation

[16] Narayanaswami is cited to indicate state of the art and the background knowledge of a person of ordinary skill in the art at the time of invention.

> of taking pictures. Some digital cameras even offer integrated Wi-Fi capabilities for direct image transfer.

Narayanaswami, p. 65. A person of ordinary skill in the art would have known to include Inoue's digital camera in a cell phone such as that disclosed in Nair, allowing the IDD to transmit audio to other IDDs.

> *and wherein the Internet direct device automatically connects to a communications network on power-up using one of a plurality of available modes of communications network, which is designated as a primary mode of communication;*

532. Inoue explains that "[w]hen the digital camera is powered on, it automatically establishes a network connection with the file server in an activation process." Inoue, Abstract. "The power button 38 is one for switching on/off the power of the entire digital camera 10. When the digital camera 10 is off, pressing the power button 38 is detected by event detecting unit 50 as an activation request, which is followed by an activation process." *Id.*, ¶0058. Inoue's camera "detects an activation request" and "establish[es] a network connection between the digital camera and a file server upon detection of the activation request." *Id.*, ¶0017; *see also id.*, ¶0066 & Fig. 6. The communications network can be via any one of a plurality of modes of connection: "The 'network' may be either wireless or wired. Nor does it matter whether the network uses such facilities as an access point if on a wireless LAN in infrastructure mode, or is of so-called peer-to-peer as if in ad-

hoc mode." *Id.*, ¶0015. The particular network that is selected for use is the "primary mode of connection" for Inoue's camera for connection to a communication network, such as the Internet. *Id.*, ¶0060. In one embodiment, Inoue identifies "a wireless LAN" as the primary mode of communication to reach the Internet. *Id.* ¶0060 & Fig. 3.

> *and wherein the Internet direct device automatically switches to another available mode of communication when the primary mode of communication to the communications network is unavailable.*

533. One of Inoue's embodiments identifies "a wireless LAN" as a primary mode of connection to reach the Internet among a plurality of available modes. Inoue, ¶0060. Inoue does not expressly disclose that its digital cameras automatically switch from a wireless LAN to another available mode of connection when the wireless LAN is unavailable. Nair, however, provides this teaching.

534. Nair relates "generally to the field of wireless technology and, more particularly, to seamless routing between wireless networks." Nair, ¶0003. Its teachings apply to any wireless device with capability for communicating by wireless technology—*e.g.*, "wireless device 12 can be, for example, a wireless personal digital assistant (PDA), a cellular phone, or any other wireless-capable electronic device." *Id.* Nair explains that connecting and transmitting data over a wireless LAN (a "WLAN"), like that used in Inoue, provides certain advantages over other available modes of connection. *Id.*, ¶0029.

535. Nair further explains that its technology allows wireless devices to have uninterrupted and effective wireless access for the wireless device 12 by "automatically and seamlessly" handing off communications from a WLAN to a wireless wide area network (a "WWAN") when the WLAN connection is unavailable. Inoue, ¶0029; *see also id.*, Abstract, ¶¶0008-09, 0022, 0028, 0035-0040.

> In operation, as the wireless device 12 is moved between or among the effective ranges of various wireless networks (WLAN or WWAN), connectivity application 24 functions to change connections from one wireless network to another wireless network. In one aspect, the change of wireless connection can be automatic such that, for example, upon loss of connectivity from any one connection, the connectivity application 24 will automatically initiate a new connection and pass the respective IP address to operating system 20…. This may occur without any noticeable loss of connectivity to the user of the wireless device 12.

Id., ¶0039.

536. A person of ordinary skill in the art would have applied these teachings from Nair to Inoue's digital camera. Nair explains some of the advantages that would motivate a skilled artisan to modify Inoue's wireless camera to be able to seamlessly connect to a WWAN when a WLAN is unavailable. Nair, ¶¶0006-0009. The ordinary artisan would also have recognized additional advantages to combining this functionality from Nair to Inoue's digital camera. It was known that there were photographers (*e.g.*, travelers and photojournalists) who

are mobile and need access across multiple modes of connection to make their uploads reliable, secure and timely. In the case of the enterprise market—*e.g.*, a media company that employs photojournalists—it also would have been known that it would be advantageous to centrally manage this switching process so that devices are automatically switched to a preferred network that may have a negotiated lower rate. The ordinary artisan would also have understood that automatic switching would make operation of the camera more convenient to the user, in that the camera would be able to upload images from a variety of locations and would not need to manually switch networks.

b) Claim 2

> *The Internet direct device of claim 1, further comprising a storage device to locally store at least one of the captured audio, the captured still images and the captured video images when the connection to the communications network is unavailable; and wherein the microprocessor transmits the stored audio, the stored still images and the stored video images to the WSARC when the Internet direct device re-establishes connection to the communications network.*

537. Inoue itself discloses a storage device at least as buffer memory 56 on the IDD for locally storing captured and received still or video images. Inoue, ¶¶0025-30, 0063. Inoue also discloses that "[t]he image saved to the buffer 56 is transferred to the file server 100 next time the communication with the file server 100 is enabled." Inoue, ¶0063.

c) Claim 3

The Internet direct device of claim 1, wherein said plurality of available modes of communications network is selected from a group consisting of: a land line, DSL, cable, satellite, wireless network, cellular, Wi-Fi, and Wi-Max.

538. Nair explains that its wireless device 12 can use a variety of modes of communications in addition to WLAN (e.g., Wi-Fi) and WWAN (e.g., cellular). Nair, ¶¶0024-0025. A person of ordinary skill would have combined Nair with Inoue for the reasons I have discussed above.

d) Claim 5

The Internet direct device of claim 1, further comprising a web browser; and the microprocessor is configured to download live or recorded audio or video images from a website using the web browser the [sic] said communications network.

539. Nair discloses that its wireless device "may run one or more applications that exchange data/information through wireless networks as the applications are run. Such an application can be, for example, a network browser that exchanges information with the distributed application known as the 'World Wide Web.'" Nair, ¶0027. Nair discloses that such exchanges of "data/information" can include "document sharing, accounting, word processing, application sharing, file transfer, remote control, browser, voice over Internet

Protocol (IP), user authentication, address book, files and folders, accounting, database management, and the like." Id., ¶0034.

540. Including a web browser application like that described as part of Nair's "wireless device" as part of Inoue's digital camera would simply be the addition (or substitution) of a known software for performing a known downloading function yielding merely predictable results. Among other things, web browsers have built in capabilities to upload and retrieve images as well as to negotiate firewalls and other security systems. A person of skill also would have understood that web browsers were well-known means for downloading images or video from a network, achieving only predictable results.

e) Claim 6

> *The Internet direct device of claim 1, wherein the imaging system further comprises an image pickup; an optical module to form an image on the image pickup and comprises an auto-focus optical system; and an image capturing module to capture audio, and digital still and video images from the image pickup.*

541. Inoue itself discloses a digital camera that has an "image pickup block 12" (Inoue, ¶0052), a "lens" which is used "for forming an image of a subject on the CCD" (*id*.), and an "image processing unit 44" that "inputs the image data output from the image pickup block." *Id*. ¶0053. Inoue also discloses a "mechanism control block 14" that "exercises mechanical controls over the image

pickup block 12, including zooming, focusing, and aperture setting." *Id.*, ¶0049. A person of skill in the art would have understood that controlling "focusing" would include auto-focusing.

f) Claim 7

The Internet direct device of claim 1 is a portable camera, a security camera, a cell phone with a camera, a tablet with a camera or a laptop with a camera.

542. As discussed above, Inoue itself discloses a portable digital camera. Inoue, Abstract. Additionally, Nair discloses a cell phone. Nair, ¶¶0027, 0034, 0040.

g) Claim 8

The Internet direct device of claim 1 is configured to support voice over IP over the communications network.

543. As I have discussed above, Nair's web browser "exchange[s] data/information through the wireless networks," including through the use of "voice over Internet Protocol (IP)." Nair, ¶¶0027, 0034. The ordinary artisan would have recognized that Nair itself suggests integration of various mobile communications features into various devices, including Inoue's camera. Therefore, a person of ordinary skill in the art would have known at the time of invention that it would be advantageous to integrate Inoue's digital camera functions with higher lever communications functions, such as VoIP, to provide

both the expressed advantages of voice calls and device integration, but also to achieve the benefits of IP-based communications such as economy of cost and power conservation, among others.

h) Claim 9

> *The Internet direct device of claim 1, wherein the microprocessor is configured to transmit to and receive from other Internet direct devices at least one of audio, still images and video images over the communications network.*

544. Inoue itself discloses that its digital camera communicates with other digital cameras over a communications network. Inoue explains that its digital camera can receive images previously uploaded to the server by it or a different digital camera for visual display on the camera. "When image reproduction is instructed from the digital camera, the image is downloaded from the file server over the network and displayed on the digital camera." Inoue, Abstract; *see also id.*, ¶¶0012, 0019, 0074-0075. "The reproduction processing unit 48 decompresses the image and reproduces it on the LCD 22[.]" *Id.*, ¶0075. Additionally, as I discussed above, it was well known that digital cameras could be (and were) included in cell phones, thereby providing audio transmission. *See* Narayanaswami, p. 65.

545. The ordinary artisan would have understood that, using the functionality already disclosed in Inoue, one device could upload an image or

audio file to the server and a different device could download the same image or audio file from the server, thus connecting one device to a different device for image or audio transfer.

i) Claim 10

A method for transmitting at least one of audio, still images and video images by an Internet direct device associated with a user over a communications network, comprising the steps of:

546. Inoue discloses a digital camera and describes a "transmission processing unit 52." Inoue, ¶0053 & Fig. 1. Inoue also teaches that its digital cameras (Internet direct devices) transmit images to a server (WSARC) associated with a user. *Id.*, ¶0018. Additionally, Nair discloses a cell phone that permits the transmission and receipt of audio from other cell phones, *i.e.*, other Internet direct devices. Nair, ¶¶0027, 0034, 0040.

547. The remainder of Claim 10 merely recites each of the elements of claim 1, but in method form. As I discussed above regarding claim 1, each of these elements and methods are disclosed by Inoue in view of Nair. Specifically:

(a) automatically connecting the Internet direct device to the communications network on power-up using one of a plurality of available modes of connection, which is designated as a primary mode of connection;

(b) capturing at least one of audio, still images and video images by an image capture system of the Internet direct device;

(c) transmitting at least one of the captured audio, the captured still images and the captured video images to an account associated with the Internet direct device on a website archive and review (WSARC) upon capture by a microprocessor of the Internet direct device;

(d) and automatically switching to another available mode of connection by the microprocessor when the primary mode of connection to the communications network is unavailable.

548. Thus, Inoue in combination with Nair discloses every element of claim 10.

j) Claim 11

The method of claim 10, wherein the step of automatically switching comprises the step of switching to one of the following available modes of connection: a land line, DSL, cable, satellite, wireless network, cellular, Wi-Fi, and Wi-Max.

549. As I discussed above, Nair explains that its wireless device 12 switches between a variety of modes of communications in addition to WLAN (*e.g.*, Wi-Fi) and WWAN (*e.g.*, cellular). Nair, ¶¶0024-0025. A person of ordinary skill would have combined Nair with Inoue for the reasons discussed above.

k) Claim 12

The method of claim 10, further comprising the steps of locally storing at least one of the captured audio, the captured still images and the captured video images in a storage device of the Internet direct device by the microprocessor when the connection to the communications *network is unavailable, and transmitting the stored audio, the stored still images and the stored video images to the WSARC by the microprocessor when the connection to the communications network is re-established.*

550. As I discussed above, Inoue itself discloses a storage device at least as buffer memory 56 on the IDD for locally storing captured and received still or video images. Inoue, ¶¶0025-30, 0063. Inoue also discloses that "[t]he image saved to the buffer 56 is transferred to the file server 100 next time the communication with the file server 100 is enabled." *Id.*, ¶0063.

l) Claim 13

The method of claim 10, further comprising the step of accessing the Internet using a web browser of the Internet direct device over the communications network.

551. As I discussed above, Nair discloses a web browser on its Internet direct device that accesses the Internet over the communications network. Nair, ¶0027. Including a web browser application like that described as part of Nair's "wireless device" as part of Inoue's digital camera would simply be the addition (or substitution) of a known software for performing a known downloading function yielding merely predictable results.

m) Claim 16

A non-transitory storage medium comprising:

552. Inoue discloses a main memory and a flash memory as part of its processing block 16. Inoue, ¶0053. Nair explains that the “wireless device 12” is “supported by memory (either internal or external).” Nair, ¶0031; *see also id.*, ¶0020 (noting that the storage medium can be “non-volatile memory, such as read-only memory (ROM)”).

a program for transmitting at least one of audio, still images and video images over a communications network when executed by an Internet direct device associated with a user to cause the Internet direct device to:

553. A skilled artisan would understand that both Inoue and Nair are electronic devices that are programmed to perform their transmitting and receiving functions. Inoue describes the use of various programs to transmit and receive at least still images over a communications networks. Inoue, ¶¶0053-0061, 0074-0075; *see also id.*, ¶¶0010-0012. Nair also describes using a computer program to perform its functions. Nair, ¶0018.

554. With respect to the remainder of Claim 16, as noted above, Inoue in combination with Nair teaches the following elements of Claim 1 (which are also

the remaining elements in Claim 16); namely, causing an "Internet direct device" to:

> *(a) automatically connect to the communications network on power-up using one of a plurality of available modes of connection, which is designated as a primary mode of connection;*
> *(b) capture at least one of audio, still images and video images by an image capture system of the Internet direct device;*
> *(c) transmit at least one of the captured audio, the captured still images and the captured video images to an account associated with the Internet direct device on a website archive and review (WSARC) upon capture by a microprocessor of the Internet direct device; and*
> *(d) automatically switch to another available mode of connection by the microprocessor when the primary mode of connection to the communications network is unavailable.*

555. Thus, Inoue in combination with Nair discloses each and every element of Claim 16.

2. Petition 8: Ground 2 - Inoue, Nair, and Narayanaswami

556. As I discussed above regarding Ground 1of Petition 8, above, dependent claim 8 is obvious in view of Inoue and Nair. This claim, however, can equally be found obvious in view of Inoue, Nair and Narayanaswami. As discussed above, Nair describes mobile phones and Narayanaswami recognizes that digital cameras are in mobile phones and states the benefits of including a digital camera in a mobile phone. *See* Narayanaswami, p. 65. For the reasons discussed in Nair

and Narayanaswami, an ordinary artisan would have been motivated to combine Inoue's camera in a mobile phone for the reasons disclosed by Nair and Narayanaswami and those discussed above.

3. Petition 8: Ground 3 - Yamazaki and Nicholas

An Internet direct device comprising:

557. Yamazaki describes "an image display apparatus and a camera that are provided with functions of communicating with a server through a network and transmitting and receiving image data to and from the server, and "an image communication system that distributes the image data by means of the image display apparatus, the camera and the server." Yamazaki, ¶0003.

an imaging system to capture at least one of audio, still images and video images; and

558. Yamazaki's "image display apparatus and a camera" is an Internet direct camera/device for capturing an image. Yamazaki, ¶0003. Yamazaki further discusses "[a]n imaging part 12" that "includes a taking lens and an imaging device such as a CCD arranged behind the taking lens." *Id.*, ¶0048. This disclosure describes an IDD including an imaging system that captures still or video images.

a microprocessor to transmit at least one of the captured audio, the captured still images and the captured video images to an account associated with the Internet direct device on a website archive and review center (WSARC) upon capture;

559. Yamazaki discloses the claimed microprocessor as CPU 36, which controls communication with the server. Yamazaki, Fig. 3, item 36, ¶0059. Yamazaki explains that the "camera 10 has access to the servers 52A, 52B, …52n through the network 50" and "[t]he servers [52A-n], have databases [53A-n], respectively, that store the image data. The image data recorded with the camera 10 is transmitted to the servers [52] and is recorded in the databases [53]." *Id.*, ¶¶0061-62. Yamazaki also discloses automatically transmitting an image captured by its electronic camera upon image capture, *i.e.*, when the picture is taken. *Id.*, ¶0025.

560. Additionally, Nicholas transmits and receives audio as part of its VoIP, videocalling and videoconferencing aspects. Nicholas's microprocessor controls a plurality of "communication interfaces 324a-324n" that "permit data, including but not limited to voice, video and/or computer data, to be transferred between the end user device 100 and external devices[.]" Nicholas, ¶0041; *see also id.*, ¶¶0024, 0032, 0033; *see also id.*, Fig. 1 (120). Nicholas further describes how its end user device 100 can provide VoIP calling, video calls, and videoconferencing [*id.*, ¶¶0032, 0033, 0034], all of which are executed by the microprocessor [*id.*, ¶0037].

561. A person of skill in the art would have been motivated to combine Nicholas's transmission of audio as part of its VoIP, videocalling and

videoconferencing aspects with Yamazaki's digital camera. As I discussed above, integrating digital cameras with fully-mobile functionality, including with the full functionality of mobile phones, was well known in the art at the time of invention and would readily have been achieved based at least on Nicholas's disclosure. This is made explicit by Narayanaswami. *See* Narayanaswami, p. 65. In fact, as of December 2004, "cell phones that integrate digital cameras have far outsold regular digital cameras." *Id.* Thus, integration between camera and phone functionality was known with the art.

> *and wherein the Internet direct device automatically connects to a communications network on power-up using one of a plurality of available modes of communications network, which is designated as a primary mode of communication,*

562. Yamazaki discloses that its camera automatically connects to a communications network on power-up. Yamazaki discloses an "image communication system comprising: at least one server provided with a storage device storing image data; a network capable of connecting to the server; [and] an image display apparatus communicating with the server through the network...." Yamazaki, ¶0027. Yamazaki's camera connects to a server through one of a plurality of networks "such as a public telephone network or a special network." *Id*. ¶0027.

563. Yamazaki further discloses that, for ease of use, the owner of the device may elect to enter "and record the entered identification information as an owner's identification information in a memory such as a nonvolatile memory in the camera 10." *Id.*, ¶0066. Upon pre-setting the identification information, Yamazaki defaults to the previously-recorded information as the set information and connects with its server. *Id.*, ¶¶0065, 0068, 0073. Moreover, "the camera 10 may also connect to the server 52 just after the setting of the user's identification information so as to evaluate the communicational condition." *Id*. ¶0072. A person of ordinary skill in the art would understand this passage to disclose automatic connection to a communications network on power-up using a primary mode of connection.

564. Additionally, Nicholas fully discloses connecting on power-up using a primary mode of communication. Like Yamazaki, Nicholas was not before the Examiner during the prosecution of the '806 Patent, and thus was not available to apply in combination with Yamazaki in evaluating the patentability of claim 1 of the '806 Patent.

565. Nicholas concerns an end-user device with a display (*e.g.*, a tablet, notebook computer, or personal digital assistant) that allows for the transmission of images and audio via wired and wireless networks, including over the Internet. *See* Nicholas, Abstract & ¶¶0018-0026. Nicholas discloses that its "end user device is

provided that supports a connection to a plurality of data communication networks" that detects which data communication networks are available, "and selectively determines which of the plurality of data communication networks provides the most optimal communication channel." *Id.*, Abstract; *see also id.*, ¶0008. The device determines which network "is optimal may be based on the type of data to be communicated (e.g., voice, video or computer data), the error rate associated with each available network, the number of anticipated 'hops' between the end user device and the remote network entity to which it needs to communicate, the cost associated with establishing and maintaining a network link, the best path, and/or anticipated power consumption." Nicholas, ¶0008.

566. In one embodiment, Nicholas describes connecting to its primary mode of communication *automatically on power-up*. For example:

> The network detection function is preferably performed automatically by the end user device. For example, the network detection function may be performed automatically: (1) as part of the power-up sequence of the end user device to determine which network(s) are initially available to the end user device…

Id., ¶0046.

567. Nicholas explains that the available networks are detected, the end user device then "select[s] an available network for data communication based on

one or more predefined criteria." Nicholas**,** ¶0049-0055. Moreover, Nicholas' end user device can perform network detection and selection at the same time. *Id*., ¶0056.

568. A person of ordinary skill in the art would be motivated to combine Nicholas' system for automatic connection via a primary network on power-up with Yamazaki's camera in order to achieve the advantages described in both Yamazaki and Nicholas. For example, the ordinary artisan would have known that portable electronic cameras have limited user interfaces, and anything making it easier to connect to Yamazaki's image server would be an advantage. An ordinary artisan would have further known that Nicholas's automatic connection on power-up can simplify and reduce the time required to begin transferring images from a power-off state to the image server as disclosed by Yamazaki itself, namely, automatically transferring images from the camera to the WSARC (server) when an image is "captured" or when a network connection is available. *E.g*., Yamazaki, ¶¶0025, 0070.

569. This simplified startup sequence is itself a benefit, but can also allow the user to confidently maintain devices in the off-state to conserve power while ensuring prompt and automatic connectivity to the server on power-up when a photo-opportunity arises. These benefits are universal to various portable devices,

and are particularly so for devices like cameras, which may be needed instantly to "capture the moment."

570. A person of skill in the art would have also recognized the benefits of automatically connecting to the most advantageous (primary) mode of connection available, whether for reasons of cost, speed, or reliability of network connection. This would be especially true of a portable electronic camera which, depending on its location, might not have all modes of connection available to it, or might have multiple viable connections available, some of which are more advantageous than others.

and wherein the Internet direct device automatically switches to another available mode of communication when the primary mode of communication to the communications network is unavailable

571. Yamazaki does not disclose that its camera engages in "automatically switch[ing]. Nicholas, however, discloses switching to another available mode of connection when the primary mode of connection is unavailable. Nicholas' end user device "provides for seamless transitions between different data communication networks, thus permitting all network communication tasks to be performed in a seamless, uninterrupted manner regardless of the location of the device, the type of network connection being used, or the form of data communication being carried out." Nicholas, ¶0009. Nicholas describes that its

device can connect to a plurality of networks, including wired Ethernet, a wireless Local Area Network (WLAN) or a wireless Wide Area Network (WWAN). *Id.*, ¶0020.

572. When Nicholas’s end user device is disconnected from its wired network (described as a LAN in the user’s office), “the end user device continues to provide secure connections to the office network that are uninterrupted[.]” *Id.*, ¶0028. Nicholas explains that the device seamless switches to a wireless network, such as a WLAN that provides a mode of connection for the office campus to permit uninterrupted transmissions. *Id.*, ¶¶0029-0034. Nicholas explains that,

> Usage modes of an end-user device … maybe [sic] divided into the following categories of operation:
>
> desk-bound at a primary office location, mobile while roaming within a campus network, mobile while roaming outside of the campus network, in a meeting room (secondary location), or at a home (secondary location).
>
> While desk-bound at a primary office location, an end user device … provides a connection to a LAN/WLAN; may be docked or undocked; provides continuous network connection while transitioning from a wired to wireless connection, or vice versa[.]

Id., ¶¶0030-0032.

573. Nicholas explains that its end user device seamlessly switches its video calling capability from the primary mode of connection to wireless network

(WLAN), which is another mode of connection—when the end user device is disconnected from the wired network. *Id*; *see also id*., ¶¶¶0033-0034, ¶¶0049-0056.

574. A person of ordinary skill in the art at the time of invention of the challenged claims would have appreciated the benefits of combining automatic switching in the mobile end-user devices of Nicholas with other mobile end-user devices, such as Yamazaki's camera. *Id*., ¶¶0029-34. It was a known problem at the time of the invention that uploading an image can take considerable time, during which the upload process can be interrupted due to loss of connection. This problem would be of particular concern to a portable electronic camera with differing modes of connection available to it based on its given location at the moment. One of ordinary skill in the art would have modified Yamazaki with Nicholas to provide the disclosed benefits of continuity of connection in seamless transition (Nair, Abstract), economy in selecting networks (*E.g., id.,* ¶0053), transmission quality (*Id.* ¶0056), and the recognized benefits of general versatility, signal strength, and/or performance. For at least these reasons, Yamazaki in view of Nicholas achieves the invention as recited in claim 1.

a) Claim 2

The Internet direct device of claim 1, further comprising a storage device to locally store at least one of the captured audio, the captured still images and the captured video images when the connection to the *communications network is unavailable; and wherein the microprocessor transmits the stored audio, the stored still images and the stored video images to the WSARC when the Internet direct device re-establishes connection to the communications network.*

575. Yamazaki itself discloses that its Internet direct camera has a storage device in the form of "a memory 34," Yamazaki, ¶0052, 0059 & Fig. 3. Yamazaki discloses that images can be stored locally in the IDD: "[i]f there is enough storage capacity (more than a predetermined level), the image data is temporarily stored in the memory 34 (S118)." *Id*. ¶0070.

576. Yamazaki also discloses that its storage device stores the captured images when connection is unavailable, and transmits them on re-connection. "[I]f the communicational condition [between the camera and the server] is determined as being unsatisfactory at S112, the capacity of the memory 34 built in the camera 10 is evaluated (S116). If there is enough storage capacity (more than a predetermined level), the image data is temporarily stored in the memory 34 (S118). Then, the image data transmission to the server 52 is postponed until it is determined that the communicational condition becomes satisfactory (S120)." *Id*. ¶0070. "When the communicational condition becomes satisfactory, the image data stored in the memory 34 is transmitted to the server 52." *Id.*

b) Claim 3

The Internet direct device of claim 1, wherein said plurality of available modes of communications network is selected from a group consisting of: a land line, DSL, cable, satellite, wireless network, cellular, Wi-Fi, and Wi-Max.

577. Yamazaki as modified by Nicholas teaches this element. Nicholas describes "[a]n end user device is provided that supports a connection to a plurality of data communication networks" Nicholas, Abstract; *see also id.*, ¶0008. The plurality of available modes of communication includes at least wired connections, WLAN (*e.g.,* Wi-Fi), WWAN (*e.g.,* cellular), land lines, cable, satellite, and Wi-Max. *Id.*, ¶0019-0020. A person of ordinary skill would have included Nicholas's switching between any of its landline, wireless, and cellular connections in modifying Yamazaki as reviewed above regarding claim 1, to provide the full benefits of continuity of connection in seamless transition (Nair, Abstract), economy in selecting networks (*E.g., id.*, ¶0053), transmission quality (*Id.* ¶0056), and the recognized benefits of general versatility, signal strength, and/or performance.

c) Claim 6

The Internet direct device of claim 1, wherein the imaging system further comprises an image pickup; an optical module to form an image on the image pickup and comprises an auto-focus optical

> *system; and an image capturing module to capture audio, and digital still and video images from the image pickup.*

578. Yamazaki itself describes that "[a]n image of the subject is formed on a light receiving surface of the CCD 30 through the taking lens of the imaging part 12, and the CCD 30 photoelectrically converts the image into an image signal." Yamazaki, ¶0053. Yamazaki's discloses the light receiving surface (sensor) of the CCD 30 as an image pickup, the imaging part as the optical module, and a CCD as the image capture module. *Id*. Yamazaki also discloses its imaging part 12 and control thereof to provide automated focus and zoom operation. Yamazaki, ¶¶0048, 0055, 0059.

d) Claim 7

> *The Internet direct device of claim 1 is a portable camera, a security camera, a cell phone with a camera, a tablet with a camera or a laptop with a camera.*

579. Yamazaki itself discloses that its device is a portable camera. Yamazaki, ¶0003. Additionally, Nicholas also discloses that its device is portable and includes a camera. *See* Nicholas, ¶24 & Fig 1 ("Video camera/mic built in option 120"). As discussed above, a person of skill in the art would have been motivated to combine Nicholas's transmission of audio as part of its VoIP, videocalling and videoconferencing aspects with Yamazaki's digital camera.

Integrating digital cameras with fully-mobile functionality, including with the full functionality of mobile phones, was well known in the art at the time of invention and would readily have been achieved based at least on Nicholas's disclosure. *See* Narayanaswami, p. 65.

e) Claim 8

The Internet direct device of claim 1 is configured to support voice over IP over the communications network.

580. Nicholas discloses that its device is portable and includes a camera. *See* Nicholas, ¶24 & Fig 1 ("Video camera/mic built in option 120"). Nicholas further describes how its end user device 100 can provide VoIP calling, video calls, and videoconferencing. *Id.*, ¶¶0032, 0033, 0034. Such VoIP calling, among other forms of communication, occur to and from other Internet direct devices. *Id.*, ¶¶0032, 0033, 0034. As discussed above, a person of skill in the art would have been motivated to combine Nicholas's transmission of audio as part of its VoIP, videocalling and videoconferencing aspects with Yamazaki's digital camera.

f) Claim 9

The Internet direct device of claim 1, wherein the microprocessor is configured to transmit to and receive from other Internet direct devices at least one of audio, still images and video images over the communications network.

581. Yamazaki itself discloses the use of its microprocessor (CPU 36) in communicating images. *See* Yamazaki, ¶¶0052, 0059 & Fig. 3. Yamazaki further discloses that a user can "retrieve the image data recorded in the database 53A to reproduce the image on the image display 24 of the camera 10." *Id*., ¶0063. Yamazaki also discloses using the same identification information on multiple devices creating the same connection to the server to simultaneously exchange information. Yamazaki, ¶¶0082-0083. Moreover, Yamazaki describes a master-slave arrangement to conserve resources and/or cost by direct communication between the devices (cameras). *Id.*, ¶¶0084-0085.

582. Additionally, Nicholas discloses that its end user device also discloses "a processor 302 for executing software routines in accordance with embodiments of the present invention." Nicholas, ¶0037 & Fig. 3. The microprocessor controls a plurality of "communication interfaces 324a-324n" that "permit data, including but not limited to voice, video and/or computer data, to be transferred between the end user device 100 and external devices[.]" A person of ordinary skill in the art would have combined Nicholas with Yamazaki for the reasons stated above. Thus, whether alone or in combination, Yamazaki and Nicholas each disclose this additional element.

g) Claim 10

A method for transmitting at least one of audio, still images and video images by an Internet direct device associated with a user over a communications network, comprising the steps of:

583. Yamazaki explains that its camera 10 has access to the image servers and that the "data recorded with the camera 10 is transmitted to the servers [52] and is recorded in the databases [53]." Yamazaki, ¶¶0061-62. Additionally, Nicholas transmits and receives audio as part of its VoIP, videocalling and videoconferencing aspects. Nicholas, ¶0041; *see also id.*, ¶¶0024, 0032, 0033.

584. The remainder of Claim 10 merely recites each of the elements of claim 1, but in method form. As I have discussed above, each of these elements and methods are disclosed by Yamazaki in view of Nicholas. Specifically:

(a) automatically connecting the Internet direct device to the communications network on power-up using one of a plurality of available modes of connection, which is designated as a primary mode of connection;
(b) capturing at least one of audio, still images and video images by an image capture system of the Internet direct device;
(c) transmitting at least one of the captured audio, the captured still images and the captured video images to an account associated with the Internet direct device on a website archive and review (WSARC) upon capture by a microprocessor of the Internet direct device;
(e) and automatically switching to another available mode of connection by the microprocessor when the primary mode of connection to the communications network is unavailable.

585. Thus, Yamazaki in combination with Nicholas discloses every element of Claim 10.

h) Claim 11

The method of claim 10, wherein the step of automatically switching comprises the step of switching to one of the following available modes of connection: a land line, DSL, cable, satellite, wireless network, cellular, Wi-Fi, and Wi-Max.

586. As I have discussed above, Yamazaki as modified by Nicholas teaches this element. Nicholas describes an end user device that automatically switches among a plurality of networks. Nicholas, Abstract; *see also id.*, ¶0008. The plurality of available modes of communication includes at least wired connections, WLAN (*e.g.*, Wi-Fi), and WWAN (*e.g.*, cellular). *Id.*, ¶¶0019-0020.

i) Claim 12

The method of claim 10, further comprising the steps of locally storing at least one the captured audio, the captured still images and the captured video images in a storage device of the Internet direct device by the microprocessor when the connection to the communications network is unavailable, and transmitting the stored audio, the stored still images and the stored video images to the WSARC by the microprocessor when the connection to the communications network is re-established.

587. As I have discussed above, Yamazaki itself discloses that its Internet direct camera has a storage device in the form of "a memory 34," Yamazaki, ¶0052, 0059 & Fig. 3. Yamazaki discloses that images can be stored locally in the IDD: "[i]f there is enough storage capacity (more than a predetermined level), the image data is temporarily stored in the memory 34 (S118)." *Id.*, ¶0070. Yamazaki also discloses that its storage device stores the captured images when connection is unavailable, and transmits them to the WSARC on re-connection. *Id.*, ¶0070.

j) Claim 16

A non-transitory storage medium comprising:

588. Yamazaki's camera comprises among other things "an imaging circuit 32, a memory 34, a central processing unit (CPU) 36,… and an external storage medium interface 44," Yamazaki, ¶0052. At least the memory 34 describes a non-transitory storage medium.

> *a program for transmitting at least one of audio, still images and video images over a communications network when executed by an Internet direct device associated with a user to cause the Internet direct device to:*

589. The ordinary artisan would understand that both Yamazaki and Nicholas are electronic devices that are programmed to perform their transmitting and receiving functions. One of ordinary skill in the art would recognize that

Yamazaki's Internet direct device, comprising among other things "an imaging circuit 32, a memory 34, a central processing unit (CPU) 36, the image display or the LCD 24, a communication interface 38, a user operation interface 40, an identification information entering interface 42, and an external storage medium interface 44," Yamazaki, ¶0052, operates by way of a "non-transitory storage medium comprising a program." Yamazaki's CPU, for example, could not perform its functions without a non-transitory storage medium comprising a program.

590. With respect to the remainder of Claim 16, as noted above, Yamazaki in combination with Nicholas teaches the following elements of Claim 1 (which are also the remaining elements in Claim 16); namely, causing an "Internet direct device" to:

> *(a) automatically connect to the communications network on power-up using one of a plurality of available modes of connection, which is designated as a primary mode of connection;*
> *(b) capture at least one of audio, still images and video images by an image capture system of the Internet direct device;*
> *(c) transmit at least one of the captured audio, the captured still images and the captured video images to an account associated with the Internet direct device on a website archive and review (WSARC) upon capture by a microprocessor of the Internet direct device; and*
> *(d) automatically switch to another available mode of connection by the microprocessor when the primary mode of connection to the communications network is unavailable.*

591. Thus, Yamazaki in combination with Nicholas discloses each and every element of Claim 16.

4. Petition 8: Ground 4 - Yamazaki, Nicholas, and Nair

a) Claim 5

The Internet direct device of claim 1 further comprising a web browser; and the microprocessor is configured to download live or recorded audio or video images from a website using the web browser the said communications network.

592. As I have discussed above, Nair's web browser "exchange[s] data/information through the wireless networks." Nair, ¶0027. Such exchanges of data can include "document sharing, accounting, word processing, application sharing, file transfer, remote control, browser, voice over Internet Protocol (IP), user authentication, address book, files and folders, accounting, database management, and the like." *Id*. ¶0034. For the reasons discussed above, a person of skill would have understood that web browsers were well-known means for downloading images or video from a network, yielding merely predictable results.

b) Claim 8

The Internet direct device of claim 1 is configured to support voice over IP over the communications network.

593. As I have discussed above, Yamazaki in view of Nicholas discloses that a device that supports voice over IP. Nair's web browser also "exchange[s] data/information through the wireless networks," including through the use of "voice over Internet Protocol (IP)." Nair, ¶¶0027, 0034. Nair expressly teaches that

its mobile communications functions are applicable to variety of mobile devices such as PDA's, cellular phones, "or any other wireless-capable suitable electronic device." *Id*. ¶0027.

594. The ordinary artisan would have recognized that Nair itself suggests integration of various mobile communications features into various devices, including Inoue's camera. Therefore, a person of ordinary skill in the art would have known at the time of invention that it would be advantageous to integrate Yamazaki's camera functions with higher lever communications functions, such as VoIP, to provide both the expressed advantages of voice calls and device integration, but also to achieve the apparent benefits of IP-based communications, such as, economy of cost and power conservation, among others.

c) Claim 13

> *The method of claim 10, further comprising the step of accessing the Internet using a web browser of the Internet direct device over the communications network.*

595. Claim 13 depends from claim 10 which, as I have discussed above, is obvious in view of Yamazaki and Nair. Nair discloses a web browser on its Internet direct device that accesses the Internet over the communications network. Nair, ¶0027. Including a web browser application like that described as part of Nair's "wireless device" as part of Yamazaki's digital camera would simply be the

addition (or substitution) of a known software for performing a known downloading function yielding merely predictable results.

5. Petition 8: Ground 5 - Kusaka and Nicholas

a) Claim 1

An Internet direct device comprising:

596. Kusaka describes "[a]n electronic camera 100" that "automatically transits captured image data and user identification to a gateway server 160 over a wireless portable telephone link 130." Kusaka, Abstract.

an imaging system to capture at least one of audio, still images and video images; and

597. Kusaka's "electronic camera 100" is an Internet direct camera for capturing an image. File Wrapper of U.S. Application Serial No. 11/484,373, 2009-06-22 Office Action, p. 4. Kusaka describes "[a]n electronic camera 100" that "automatically transmits captured image data and user identification to a gateway server 160 over a wireless portable telephone link 130." Kusaka, Abstract; *see also* ¶¶0003, 0219.

a microprocessor to transmit at least one of the captured audio, the captured still images and the captured video images to an account associated with the Internet direct device on a website archive and review center (WSARC) upon image capture;

598. Kusaka discloses the claimed microprocessor that communicates with a WSARC, at least by its communication with the image server. *See* Kusaka, ¶0234. Kusaka explains that its CPU 50 captures, processes, and sends/receives images to and from storage in "an image storage device such as an image server on the Internet[.]" *Id.*, ¶0003; *see also id.*, ¶¶0219-0221. Kusaka discloses automatically transmitting image data captured by its camera upon image capture, *i.e.*, when the picture is taken. *Id.*, ¶¶0219, 0236.

> *and wherein the Internet direct device automatically connects to a communications network on power-up using one of a plurality of available modes of communications network, which is designated as a primary mode of communication;*

599. Kusaka discloses that its device automatically connects to its WSARC (image server) by one of a plurality of available modes of communication, including via an "wireless portable telephone link 130" established by "wireless portable telephone circuit 72" integrated into the camera (Kusaka, ¶¶0219, 0234, 0236 & Fig. 4); a "wireless LAN (Ethernet™)" that allows Internet communication (*Id.*, ¶ 0534); and/or by connecting to portable telephone 120" using "a short-range communication link 110," which includes both short-range wireless and wired communication. *Id.*, ¶0273. Kusaka does not explicitly disclose connecting to the WSARC on power-up.

600. As I have discussed above, however, Nicholas, fully discloses connecting to a remote server on power-up using a primary mode of connection.

601. A person of ordinary skill in the art would be motivated to combine Nicholas' system for automatic connection via a primary network on power-up with Kusaka's electronic camera in order to achieve the advantages described in Nicholas. For example, the ordinary artisan would have known that portable electronic cameras have limited user interfaces, and anything making it easier to connect to Kusaka's image server would be an advantage. An ordinary artisan would have further known that Nicholas's automatic connection on power-up can simplify and reduce the time required to begin transferring images from a power-off state to the image server. This simplified startup sequence is itself a benefit, but can also allow the user to confidently maintain devices in the off-state to conserve power while ensuring prompt and automatic connectivity to the server on power-up when a photo-opportunity arises. These benefits are universal to various portable devices, and are particularly so for devices like cameras which may be needed instantly to "capture the moment."

602. A person of ordinary skill in the art would have also been motivated to combine Nicholas's connection via a primary network with Kusaka's connection through one of a plurality of available networks to achieve the benefits of Nicholas. A person of skill in the art would have recognized that it would be

beneficial to automatically connect to the most advantageous mode of connection available, whether for reasons of cost, speed, or reliability of network connection. This would be especially true of a mobile electronic camera which, depending on its location, might not have all modes of connection available to it.

> *and wherein the Internet direct device automatically switches to another available mode of communication when the primary mode of communication to the communications network is unavailable.*

603. As previously discussed, Kusaka discloses that its device (camera) can connect to the WSARC (image server) over a plurality of available modes of communication, including via an "wireless portable telephone link 130" established by "wireless portable telephone circuit 72" integrated into the camera (Kusaka, ¶¶0219, 0234, 0236 & Fig. 4); a "wireless LAN (Ethernet™)" that allows Internet communication (*Id.*, ¶0534); and/or by connecting to portable telephone 120" using "a short-range communication link 110," which includes both short-range wireless and wired communication. *Id.*, ¶0273. However, Kusaka does not explicitly disclose that its electronic camera engages in "automatically switch[ing]." As I have discussed above, however, Nicholas teaches this element.

604. A person of ordinary skill in the art at the time of invention of the challenged claims would have appreciated the benefits of combining automatic switching in the mobile end-user devices of Nicholas with other mobile end-user

devices, such as Kusaka's cameras. *Id.*, ¶¶0029-34. One of ordinary skill in the art would have modified Kusaka with Nicholas to provide the disclosed benefits of continuity of connection in seamless transition (Nicholas, Abstract), economy in selecting networks (*E.g., id.*, ¶0053), transmission quality (*Id.* ¶0056), and the recognized benefits of general versatility, signal strength, and/or performance. For at least these reasons, Kusaka in view of Nicholas achieves the invention as recited in claim 1.

b) Claim *2*

> *The Internet direct device of claim 1, further comprising a storage device to locally store at least one of the captured audio, the captured still images and the captured video images when the connection to the communications network is unavailable; and wherein the microprocessor transmits the stored audio, the stored still images and the stored video images to the WSARC when the Internet direct device re-establishes connection to the communications network.*

605. Kusaka itself discloses such a storage device in its various storage mediums including buffer memory 59, memory card 77, frame memory 69,269 that are each capable of local storage of images. Kusaka, ¶¶0234-0237. Kusaka also discloses that: [i]f communication with the gateway server 160 is not possible, the image file is temporarily stored in the memory card 77 and the subroutine returns in S309." Kusaka, ¶0247. Kusaka further discloses that: "[i]f

communication with the gateway server 160 is possible, the image file, camera identification information, user identification information and a transmission request are transmitted to the gateway server 160 using the wireless portable telephone circuit 72 in S307." *Id.*

c) Claim 3

> *The Internet direct device of claim 1, wherein said plurality of available modes of communications network is selected from a group consisting of: a land line, DSL, cable, satellite, wireless network, cellular, Wi-Fi, and Wi-Max.*

606. Kusaka describes a plurality of available modes of communication including at least cellular and Wi-Fi. (Kusaka, ¶¶0219, 0234, 0236 & Fig. 4) and a "wireless LAN (Ethernet™)" that allows Internet communication, *i.e.*, Wi-Fi (*Id.*, ¶0534). Moreover, Nicholas teaches this element including at least wired connections, WLAN (*e.g.*, Wi-Fi), and WWAN (*e.g.*, cellular). *Id.*, ¶0020, which would have been combined with Kusaka for the reasons discussed above.

d) Claim 6

> *The Internet direct device of claim 1, wherein the imaging system further comprises an image pickup; an optical module to form an image on the image pickup and comprises an auto-focus optical system; and an image capturing module to capture audio, and digital still and video images from the image pickup.*

607. Kusaka itself discloses such elements, as its image capture system including elements 10 and 52-60. Kusaka discloses an image pickup as one or more of a CCD 55 and its control circuitry 56; an optical module as one or more a lens 10, a diaphragm 53, and their control circuitry 52,54 forming an image on the CCD 55; and an image capturing module as one or more of a processor 57, converter 58, buffer 59, and control 60. Kusaka, ¶0379, Fig. 4. Kusaka's lens 10, diaphragm 53, and their control circuitry 52,54 comprise an auto-focus optical system. Kusaka, ¶0379.

e) Claim 7

The Internet direct device of claim 1 is a portable camera, a security camera, a cell phone with a camera, a tablet with a camera or a laptop with a camera.

608. Kusaka itself discloses that its device is a portable camera. Kusaka, Abstract, ¶¶0219, 0235, Fig. 2. Nicholas also discloses that its device is portable and includes a camera. *See* Nicholas, ¶0024 & Fig 1 ("Video camera/mic built in option 120").

f) Claim 8

The Internet direct device of claim 1 is configured to support voice over IP over the communications network.

609. Nicholas discloses that its device is portable and includes a camera. *See* Nicholas, ¶0024 & Fig 1 ("Video camera/mic built in option 120"). Nicholas

further describes how its end user device 100 can provide VoIP calling, video calls, and videoconferencing *Id.*, ¶¶0032, 0033, 0034.

610. As I have discussed above, a person of skill in the art would have been motivated to combine Nicholas's transmission of audio as part of its VoIP, videocalling and videoconferencing aspects with Yamazaki's digital camera.

g) Claim 9

The Internet direct device of claim 1, wherein the microprocessor is configured to transmit to and receive from other Internet direct devices at least one of audio, still images and video images over the communications network.

611. Kusaka itself discloses its microprocessor transmitting and receiving images with other devices over its connection. *See* Kusaka, Fig. 3; *see also e.g., id.*, ¶¶0225, 0227, 0249, 0282. Kusaka discloses a user-based arrangement allowing multiple cameras/devices to connect by access the same album on the image server for storing, retrieving, and managing image data on the server. *Id.* ¶0544. Thus, one device connects and can transmit and receive images to and from another device through the server over its connection. *E.g., id.*, ¶0245.

612. Nicholas also discloses that it transmits and receives audio as part of its VoIP, videocalling and videoconferencing aspects (Nicholas, ¶0041; *see also id.*, ¶¶0024, 0032, 0033; *see also id.*, Fig. 1 (120), all of which are executed by the microprocessor (*id.*, ¶0037).

h) Claim 10

A method for transmitting at least one of audio, still images and video images by an Internet direct device associated with a user over a communications network, comprising the steps of:

613. This method is fully disclosed by Kusaka and Nicholas as I have discussed above. For example, Kusaka discloses an electronic camera where its CPU 50 captures, processes, and sends/receives images to and from storage in "an image storage device such as an image server on the Internet[.]" Kusaka, ¶0003; *see also id.*, ¶¶0219-0221. Additionally, Nicholas transmits and receives audio as part of its VoIP, videocalling and videoconferencing aspects. Nicholas, ¶0041; *see also id.*, ¶¶0024, 0032, 0033.

614. The remainder of Claim 10 merely recites each of the elements of claim 1, but in method form. As I have discussed above, each of these elements and methods are disclosed by Kusaka in view of Nicholas. Specifically:

(a) automatically connecting the Internet direct device to the communications network on power-up using one of a plurality of available modes of connection, which is designated as a primary mode of connection;
(b) capturing at least one of audio, still images and video images by an image capture system of the Internet direct device;
(c) transmitting at least one of the captured audio, the captured still images and the captured video images to an account associated with the Internet direct device on a website archive and review (WSARC) upon capture by a microprocessor of the Internet direct device;

(e) and automatically switching to another available mode of connection by the microprocessor when the primary mode of connection to the communications network is unavailable.

615. Thus, Kusaka in combination with Nicholas discloses every element of Claim 10.

i) Claim 11

The method of claim 10, wherein the step of automatically switching comprises the step of switching to one of the following available modes of connection: a land line, DSL, cable, satellite, wireless network, cellular, Wi-Fi, and Wi-Max.

616. As I have discussed above, Kusaka as modified by Nicholas teaches this element. Nicholas describes switching between a plurality of modes of connection. Nicholas, Abstract; *see also id.*, ¶0008. The plurality of available modes of communication includes at least wired connections, WLAN (*e.g.*, Wi-Fi), and WWAN (*e.g.*, cellular). *Id.*, ¶0020.

j) Claim 12

The method of claim 10, further comprising the steps of locally storing at least one the captured audio, the captured still images and the captured video images in a storage device of the Internet direct device by the microprocessor when the connection to the communications network is unavailable, and transmitting the stored audio, the stored still images and the stored video images to the WSARC by the *microprocessor when the connection to the communications network is re-established*

617. As I have previously discussed, Kusaka itself discloses various storage mediums including buffer memory 59, memory card 77, frame memory 69,269 that are each capable of local storage of images. Kusaka, ¶¶0234-0237. Kusaka also discloses that if communication with the gateway server is not possible, the image file is temporarily stored in the memory card 77 and, if communication with the gateway server is possible, the image file is transmitted to the server. *Id*. ¶0247.

k) Claim 16

A non-transitory storage medium comprising:

618. Kusaka discloses various storage mediums including buffer memory 59, memory card 77, frame memory 69. At least frame memory 69 describes a non-transitory storage medium.

a program for transmitting at least one of audio, still images and video images over a communications network when executed by an Internet direct device associated with a user to cause the Internet direct device to:

619. A skilled artisan would understand that both Kusaka and Nicholas are electronic devices that are programmed to perform their transmitting and receiving

functions. One of ordinary skill in the art would recognize that Kusaka's Internet direct device, comprising among other things its CPU 50 that captures, processes, and sends/receives images to and from storage in an image storage server on the Internet (Kusaka, ¶0003; see also id., ¶¶0219-0221) operates by way of a "non-transitory storage medium comprising a program." Kusaka's CPU, for example, could not perform its functions without a non-transitory storage medium comprising a program.

620. With respect to the remainder of Claim 16, as noted above, Kusaka in combination with Nicholas teaches the following elements of Claim 1 (which are also the remaining elements in Claim 16); namely, causing an "Internet direct device" to:

> *(a) automatically connect to the communications network on power-up using one of a plurality of available modes of connection, which is designated as a primary mode of connection;*
> *(b) capture at least one of audio, still images and video images by an image capture system of the Internet direct device;*
> *(c) transmit at least one of the captured audio, the captured still images and the captured video images to an account associated with the Internet direct device on a website archive and review (WSARC) upon capture by a microprocessor of the Internet direct device; and*
> *(d) automatically switch to another available mode of connection by the microprocessor when the primary mode of connection to the communications network is unavailable.*

621. Thus, Kusaka in combination with Nicholas discloses each and every element of Claim 16.

6. Petition 8: Ground 6 – Kusaka, Nicholas, And Nair

a) Claims 5 and 13

622. Dependent claim 5 incorporates the elements of claim 1; dependent claim 13 incorporates the elements of claim 10. Each adds the further requirement of a "web browser." Dependent claim 5 further requires the step of a microprocessor "configured to download live or recorded audio or video images from a website using the web browser…." Specifically, these claims recite the following:

> *5. The Internet direct device of claim 1 further comprising a web browser; and the microprocessor is configured to download live or recorded audio or video images from a website using the web browser the said communications network.*
>
> *13. The method of claim 10, further comprising the step of accessing the Internet using a web browser of the Internet direct device over the communications network.*

623. As discussed above, both claims 1 and 10 are obvious in view of Kusaka and Nicholas. Nicholas describes using its end user device to receive (*i.e.*, download) VoIP, video calls, and other data over IP networks, including audio and visual images. Nicholas, ¶¶0019, 0024, 0032-0034. In one embodiment, Nicholas's end user device can also record videos and provide "digital media networking." *Id.*, ¶0036. Nicholas also describes downloading live audio or visual images, such as

during a VoIP call or a videocall or video conference. *Id.*, ¶¶0019, 0024, 0032-0034. These functions are performed by "software routines" that are executed by one or more microprocessors. *Id.*, ¶ 0037. Nicholas does not expressly state that the software routines include use of web browser software.

624. Multiple prior art cameras describe using a web browser to download images or audio from the Internet. Kusaka concerns a digital camera that, like Nicholas's end user device, can record videos. Like Nicholas's end user device, Kusaka's mobile electronic camera also has a display suitable for viewing images. Kusaka, ¶¶0224, 0225. Kusaka describes interfacing with images or videos on a website, receiving previously captured and stored image data from an image server, and displaying that received image data on the camera's display. *Id.*, ¶0236. Similarly, as I have previously discussed, Nair discloses a web browser. Nair, ¶0027.

625. A web browser, like that disclosed in Nair, was a well-known means of downloading images or video from a network. A person of ordinary skill in the art would have known that a web browser, like that used in Nair, was an alternative option for providing image data transfer, including videoconferencing function. Consequently, using web browser software with Kusaka's camera would simply be the addition or substitution of known software for performing image transfer and retrieval, yielding no more than predictable results.

VII. THE CHALLENGED CLAIMS IN THE PATENTS-AT-ISSUE THAT DO NOT REQUIRE A "WSARC"

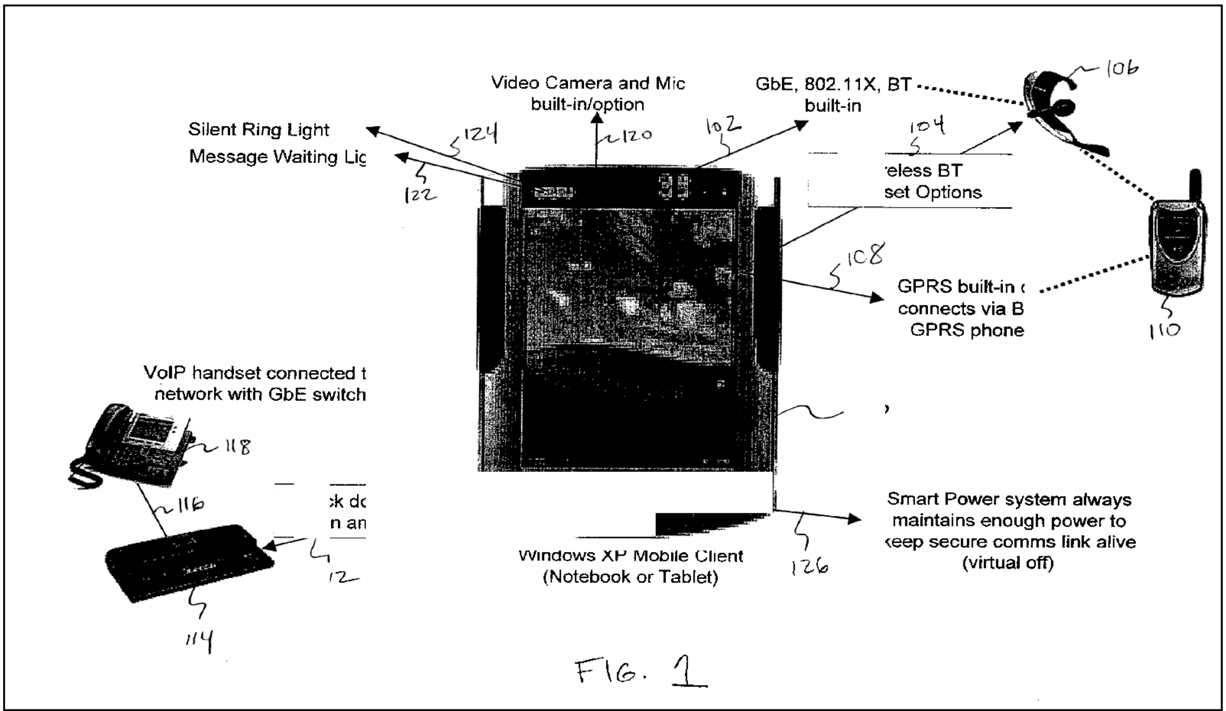
A. Prior Art Combinations Relevant To My Opinions Regarding The "Non-WSARC" Claims

626. As I did with the "WSARC" challenged claims, before I address the specific patents and challenged claims in each "non-WSARC" Petition, I set forth some of the various prior art and prior art combinations that teach or render obvious each of the elements of the challenged claims. I also explain why a person of ordinary skill in the art would be motivated to combine these exemplary references in the manner claimed. I may cite to or rely upon this discussion for each of the challenged claims that follow. While I have included precise discussion regarding certain specific combinations of art, those advantages which are apparent to the ordinary artisan may be applied equally to similar features within my analysis. I also discuss some additional combinations of art in my more detailed discussions of the challenged claims of the patents-at-issue. I may rely on my discussion in this section of the reasons a person of ordinary skill in the art would combine various functionalities in my later discussions of these other combinations.

1. Nicholas

627. As I discuss in detail below when I address the specific grounds for the *Inter Partes* Reviews, Nicholas describes nearly all of the elements of the non-WSARC claims.

628. Nicholas describes an "end user device 100" which is "any device capable of communicating data to or from a data communication network in accordance with one or more wired and/or wireless communication protocols." Nicholas, ¶0019. The device can include a camera and microphone, among other things. *Id.*, ¶¶0024, 0032-0033; *see also id.*, Fig. 1 (120). The data communication network includes an "Internet connection, including but not limited to cable modems, DSL, and ISP" as well as a variety of other wired and wireless networks. *Id.*; *see also id.*, ¶0020, Fig. 1 (100).



629. Nicholas's "end user device is provided that supports a connection to a plurality of data communication networks" that detects which data communication networks are available, "and selectively determines which of the plurality of data communication networks provides the most optimal communication channel." Nicholas, Abstract; *see also id.*, ¶0008. Nicholas discloses a plurality of available wired and wireless networks, including cellular networks, public packet-radio networks, cable modem, DLS, ISP, dial-up connections, private packet networks, satellite networks and LAN connections (including Ethernet, Token Ring, and Wireless LAN). *Id.*, ¶0019. Nicholas connects to a communication network (*e.g.* the Internet) via a mode of connection

on power up, and seamlessly switches to another available connection mode if the primary mode becomes unavailable. *Id.*, ¶¶ 0030-0036, 0046, 0055-0056.

630. As I discuss below, Nicholas describes every element of most of the challenged claims of the ‘600 patent and all of the challenged non-WSARC claims of the ‘991 and ‘542 patent.

2. Nicholas and Nair

631. As I discuss above, Nair’s wireless devices “provide uninterrupted and ubiquitous wireless access, with seamless hand-off between different kinds of networks” [Nair, ¶0009], which is not possible unless the wireless device connects to the communication network via a mode of connection on power-up. Nair also describes a wireless local area network (WLAN) as a mode of connection with certain advantages over a cellular network—i.e., a “wireless wide area network (WWAN)”—as a mode of connection to a communications network. Nair, ¶0028. A person of ordinary skill in the art would have recognized Nicholas and Nair as in the same field of art and directed to solving the same problems.

632. Given the similarities in their disclosures, Nair and Nicholas overlap in their teachings to a substantial extent. However, Nair adds two elements of that are relevant to my opinions. First, Nair describes a “touch screen” as a user interface that can be used on a mobile communication device: “The functionality of the user interface 34 can be performed by one or more suitable input devices

(e.g., keypad, touch screen, input port, pointing device, microphone, and/or other device that can accept user input information)[.]" Nair, ¶0033.

633. Touch screens were well known in the art at the time as a user input device, but Nicholas does not explicitly state that its device includes a touch screen. However, an ordinary artisan would have known that a touch screen could be added to Nicholas, and would be motivated to do so. An ordinary artisan would have known that using a touch screen as a user interface in place of another user interface (a keyboard, a roller, a stylus, etc.) is simply the substitution of one known input device for another to achieve no more than predictable results. Moreover, Nicholas's device is intended to be portable and an ordinary artisan would have known that it would be advantageous to decrease the size. As Nicholas already has a screen, an ordinary artisan would have known that it would be advantageous to modify Nicholas's existing screen to be a touch screen and a user interface in place of a separate interface in order to decrease the size of the portable device.

634. Moreover, a person of ordinary skill in the art also would have understood that a video conferencing device may wish to pan, zoom or focus the image; it would have been known that a touch screen would have been advantageous as an interface for a video conferencing device.

635. Second, Nair describes using a web browser to upload and download data. Nair, ¶0027. Web browsers were ubiquitous in the field at the time, but Nicholas does not expressly mention that its end user device has a browser. Nonetheless, a person of ordinary skill in the art would have known to include a web browser in Nicholas, and would have been motivated to do so. A person of ordinary skill in the art would have known that a web browser was an option for downloading or transferring images and video over a communications network. Including web browser software like that described as part of Nair's "wireless device" in Nicholas's end user device would simply be the addition (or substitution) of a known software for performing a known downloading function yielding merely predictable results. Browsers were commonly known to have built-in capability to download and view video, and thus it would have been known to be advantageous to utilize standardized technology for this function instead of creating custom technology, which may become out of date.

636. Additionally, it was well known to skilled artisans that, due to firewalls or other security restrictions, videoconferencing (*e.g.*, "downloading … live video") it would have been advantageous to provide videoconferencing using a web browser. A skilled artisan also would have known that a browser would support Nicholas' email capability by extending it to multimedia attachments. Nicholas, ¶0046.

3. Inoue and Nair

637. A person of ordinary skill in the art also would have combined the teachings of Inoue and Nair (or Nair and Inoue, as the case may be) to arrive at the complete teachings of all of the challenged non-WSARC claims. As discussed above, Inoue describes an Internet-enabled camera. Nair describes an automatic switching system that it states can be used with a variety of wireless devices, which include wireless digital cameras like those discussed in Inoue. Nair, Abstract, ¶¶ 0003, 00029. For example, Nair explains that:

> In operation, as the wireless device 12 is moved between or among the effective ranges of various wireless networks (WLAN or WWAN), connectivity application 24 functions to change connections from one wireless network to another wireless network. In one aspect, the change of wireless connection can be automatic such that, for example, upon loss of connectivity from any one connection, the connectivity application 24 will automatically initiate a new connection and pass the respective IP address to operating system 20. Then, as applications 22 are subsequently refreshed using an IP connection, the applications 22 will automatically pick up the new IP address and start using the new address for wireless connectivity (e.g., according to the rules of core component 38). This may occur without any noticeable loss of connectivity to the user of the wireless device 12.

Id., ¶0039.

638. A person of ordinary skill in the art would have applied these teachings from Nair to Inoue's digital camera. Nair explains some of the advantages that would motivate a skilled artisan to modify Inoue's wireless camera to seamlessly switch to a WWAN when a WLAN is unavailable. Nair, ¶¶0006-0009; I agree that network seamlessness and related attributes described in Nair are important motivations to have combined Nair's functionality with Inoue's digital camer. A person of skill in the art would also have recognized additional advantages of combining this functionality from Nair to Inoue's digital camera. It was known that photographers (*e.g.*, travelers and photojournalists) who are mobile and need access across multiple modes of connection to make their uploads reliable, secure, and timely. In the case of the enterprise market—*e.g.*, a media company that employs photojournalists—it also would have been known that it would be advantageous to centrally manage this switching process so that devices are automatically switched to a preferred network that may have a negotiated lower rate.

639. A person of ordinary skill would also have understood that automatic switching would make operation of the camera more convenient to the user, in that the camera would be able to upload images from a variety of locations and would not need to manually switch networks. Making an electronic device easier to use

and more reliable to operate is import because it was known in the field that consumers value both attributes.

640. Thus, an ordinary artisan would have been motivated to combine Nair with Inoue to achieve the advantages of seamlessly roaming among multiple networks when Inoue's primary network is unavailable.

4. Inoue, Nair, and Narayanaswami

641. It was well known during the relevant period that digital camera technology was directly applicable to cell phone technology, because, as discussed above, digital cameras of increasing functionality were incorporated into cell phones. As I also mention above, Narayanaswami reports on this trend. Narayanaswami, p. 65. I fully agree with Narayanaswami's findings. Moreover, a person of ordinary skill in the art would have been motivated to include the digital camera taught by Inoue/Nair in in a cell phone. As Narayanaswami explains, stand-alone digital cameras were losing market share to camera-equipped smart phones. An ordinary artisan would have been motivated by this trend to include digital camera technology in cellular phone, including the Inoue/Nair camera.

5. Inoue and Umeda

642. A person of ordinary skill in the art also would have combined the teachings of Inoue and Umeda (or Umeda and Inoue, as the case may be) to arrive at the complete teachings of all of the challenged non-WSARC claims. As

discussed above, Inoue describes a digital camera that automatically establishes a primary connection to a network when the camera is turned on for transmission of images to a server and other digital cameras via the Internet. Umeda describes devices, methods and systems that allow seamless roaming over multiple networks in order to transmit images, including video images, via the Internet. Umeda describes switching from one mode of connection to another mode of connection when the first mode is unavailable.

643. A person of ordinary skill in the art would have been motivated to combine Inoue with Umeda to arrive at the alleged invention in the challenged claims. As discussed below, a seamless network connection is important in Umeda's system not only to permit ongoing videoconferences to continue across multiple modes of connection, but also to ensure that the device is always able to receive an incoming request for a videoconference. That is only possible if Umeda's system is connected to the communication network on power up. Inoue explains a system for connecting to a WLAN on power up. Thus, a person of ordinary skill in the art would have understood that it could be advantageous to apply Inoue to automatically connect on power-up.

6. Nair and Umeda

644. A person of ordinary skill in the art also would have included Umeda's videoconferencing capability with Nair's seamless connection across

networks. The teachings of Nair and Umeda substantially overlap, are in the same field, and are directed to solving largely the same problems. Umeda explains that cell phones can have videoconferencing capability, and Nair describes that its system applies to a cellular phone. A person of ordinary skill in the art would have understood from Umeda that Nair's cell phones can include the capability to videoconference, including (as discussed above) via Nair's disclosed web-browser. An ordiary artisan would have been motivated to add Umeda's videoconferencing feature to Nair's wireless device in order to provide competitive technology to Umeda's device and to serve the known marketplace demand for videoconferencing functionality. Moreover, Nair expressly discloses "a network browser that exchanges information with the distributed application known as the 'World Wide Web.'" *Id.*, ¶0027. Browsers were known at the time to have built-in capability to download and view video, as well as to provide videoconferencing functionality. A skilled artisan would further understand that existing, off-the-shelf videoconferencing technology could be run Nair's web browser to meet a known customer demand.

7. Nicholas and Kusaka or Inoue/Umeda and Kusaka

645. Kusaka is also in the same field of art as Nicholas, Inoue and Umeda. Kusaka describes an Internet camera capable of recording video that includes a touch screen to enter data and manipulate images. *See* Kusaka, ¶0227. "A so-called

touch screen 66, equipped with a function of outputting contact position information corresponding to the position indicated by a finger touch operation is arranged over the left LCD 21 and the right LCD 22, which can be used for selection of image data and options displayed on the screen." *Id.*; *see also* Fig. 33. Again, a person of ordinary skill in the art would have appreciated that a touch screen, such as the touch screen described in Kusaka, could perform the same selection role as played by other user interfaces. A person of ordinary skill in the art also would have been motivated to combine a touch screen, like that in Kusaka, for the reasons discussed above in connection with Nair.

646. Like Nair, Kusaka describes interfacing with images or videos on a website, receiving previously captured and stored image data from an image server, and displaying that received image data on the camera's display. Kusaka, ¶0236. As discussed above, a web browser was a well-known means of downloading images or video from a network. A person of ordinary skill in the art also would have been motivated to combine web browser with the claimed functionality, like that in Kusaka, for the reasons discussed above in connection with Nair.

8. Nicholas and Khedouri or Inoue/Umeda and Khedouri

647. Khedouri describes various devices for receiving video and or audio via the Internet over a variety of networks, including wireless networks. Khedouri

describes several of its embodiments using a touch screen as a user interface. "The user interface of a preferred embodiment, if based on a touch-screen or similar input technique, is optimized to allow a user to input all selections without using a stylus, but rather by using a fingertip." Khedouri, ¶0043. A person of ordinary skill in the art would have been motivated to include a touchscreen, like those used in Khedouri, to provide user input selections in the devices of Nicholas, Inoue and Umeda for the reasons discussed above.

9. Nicholas and Morris or Inoue/Umeda and Morris

648. Morris also describes equipping its Internet-connected digital camera "with a standard web browser 158 and a client communication module 160 that enables the client device 152 to communicate with the server 154" to access, *inter alia*, images or video files. Morris, ¶0031. As using a web browser to download images or videos from a website was a well-known means of downloading images or video from a network, a person of ordinary skill in the art would have been motivated to include a web browser, like that used in Morris, as an alternative option for providing image data transfer, including videoconferencing function, for the reasons stated above.

649. It is also my opinion that the challenged "non-WSARC" claims of the patents-in-suit are unpatentable under the standards that I understand govern an Inter *Partes* Review. Once again, the Examiner of the applications of the patents-

in-suit did not have before him the most relevant art to the subject matter of these challenged claims, including the majority of the references cited herein, that clearly teach and disclose the claimed functionality, which was well known at the time as an actual or obvious functionality of Internet-enable mobile devices, including digital cameras. The functionality of having a digital camera or other communication device (*e.g.*, a videoconferencing unit or video calling or –conferencing cell phone) that automatically connects on power-up in order to receive incoming video calls was well known in the art. Also well-known was the function of switching between available modes of connection to a communication network, such as the Internet, when a primary mode of connection became unavailable—including but not limited to in order to avoid dropping an ongoing video call or –conference in the event that the primary mode of connection becomes unavailable. A person of ordinary skill in the art would have found each of the challenged claims obvious, at a minimum.

650. .I now turn to the individual Petitions, including their discussions of the foregoing prior art references and other prior art references. As the various references and combinations overlap, the fact that I omit a particular disclosure or motivation to combine from one Petition while reference it in a different Petition (or above) should not be understood as an opinion that such disclosure or motivation to combine is irrelevant to that particular Petition. To the contrary, I

may rely on the discussion of the prior art throughout all of the Petitions as background or support for my opinions in any of the Petitions.

B. Petition 3: *Inter Partes* Review Of Claims 1, 2, 3, 4, 5, 8, 9, 10, 12 And 13 Of The '600 Patent

651. I understand that Petition 3 contains the following grounds to challenge claims 1, 2, 3, 4, 5, 8, 9, 10, 12 and 13 of the '600 patent. I have reviewed the Petition, and the following analysis substantially mirrors the analysis in the Petition 3.

Ground	Challenged Claims	Statutory Ground and Prior Art
Ground 1	1, 2, 3, 4, 5, 8 and 9	Anticipation under 35 U.S.C. § 102(b) or (e) by Nicholas
Ground 2	10, 12, 13	Obviousness under 35 U.S.C. § 103(a) in view of Nicholas and Nair
Ground 3	10, 12, 13	Obviousness under 35 U.S.C. § 103(a) in view of Nicholas and Kusaka
Ground 4	10	Obviousness under 35 U.S.C. § 103(a) in view of Nicholas and Khedouri
Ground 5	12 and 13	Obviousness under 35 U.S.C. § 103(a) in view of Nicholas and Morris
Ground 6	1, 2, 3, 4, 5, 8, 9, 10, 12 and 13	Obviousness under 35 U.S.C. § 103(a) in view of Inoue and Nair
Ground 7	2	Obviousness under 35 U.S.C. § 103(a) in view of Inoue, Nair and Narayanswami
Ground 8	1, 2, 3, 4, 5, 8 and 9	Obviousness under 35 U.S.C. § 103(a) in view of Inoue and Umeda

Ground 9	10, 12 and 13	Obviousness under 35 U.S.C. § 103(a) in view of Inuoe, Umeda and Kusaka
Ground 10	10	Obviousness under 35 U.S.C. § 103(a) in view of Inuoe, Umeda and Khedouri
Ground 11	12 and 13	Obviousness under 35 U.S.C. § 103(a) in view of Inuoe, Umeda and Morris

1. Petition 3: Ground 1 – Nicholas

a) Claim 1

An Internet direct device comprising

652. Nicholas discloses an “end user device 100” that is capable of communicating data to or from a data communication network in accordance with one or more wired and/or wireless communication protocols.” Nicholas, ¶0019. The device can include a camera and microphone, among other things. *Id.*, ¶¶0024, 0032, 0033; *see also id.*, Fig. 1 (120). The data communication network includes an “Internet connection, including but not limited to cable modems, DSL, and ISP” as well as a variety of other wired and wireless networks. *Id.*; *see also id.*, ¶0020 & Fig. 1 (100). Nicholas’s end user device 100 includes a microprocessor: “As shown in FIG. 3, the example end user devices includes a processor 302 for executing software routines in accordance with embodiments of the present invention.” Nicholas, ¶0037 & Fig. 3. The microprocessor controls a plurality of “communication interfaces 324a-324n” that “permit data, including but not limited to voice, video and/or computer data, to be transferred between the end user device

100 and external devices[.]" *Id.*, ¶0041; *see also id.*, ¶¶0024, 0032, 0033 & Fig. 1 (120). Nicholas further describes how its end user device 100 can provide VoIP calling, video calls, and videoconferencing [*id.*, ¶¶0032, 0033, 0034], all of which are executed by the microprocessor [*id.*, ¶0037].

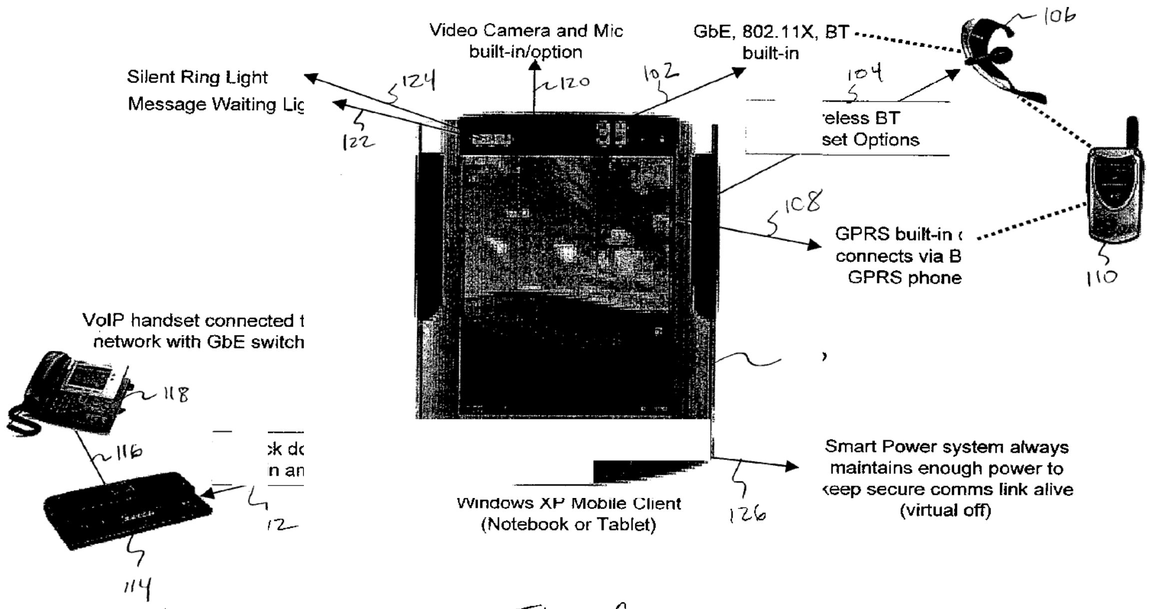


FIG. 1

Id., Fig. 1.

an imaging system to capture still or video images;

653. "Exemplary end user device 100 further comprises … an optional built-in video camera and microphone for enabling videoconferencing and the like." Nicholas, ¶¶0024, 0032, 0033; *see also id.*, Fig. 1 (120).

a microprocessor to transmit said captured still or video images to another Internet direct device upon image capture, and receive still or

> *video images from said other Internet direct device over a communications network;*

654. The "end user device 100" is "capable of communicating data to or from a data communication network in accordance with one or more wired and/or wireless communication protocols." Nicholas, ¶0019. At least video images are transmitted under the control of the microprocessor upon image capture order, and video images are received from another Internet direct device, in order to implement the described video-calling and videoconferencing system. *Id.*, ¶¶0032, 0033, 0034, 0037, 0041.

> *and wherein the Internet direct device automatically connects to said communications network on power-up using one of a plurality of available modes of connection, which is designated as a primary mode of connection,*

655. Nicholas discloses that its "end user device is provided that supports a connection to a plurality of data communication networks" that detects which data communication networks are available, "and selectively determines which of the plurality of data communication networks provides the most optimal communication channel." Nicholas, Abstract; *see also id.*, ¶0008. Nicholas discloses a plurality of available wired and wireless networks, including cellular networks, public packet-radio networks, cable modem, DLS, ISP, dial-up

connections, private packet networks, satellite networks and LAN connections (including Ethernet, Token Ring, and Wireless LAN). *Id.*, ¶0019.

656. In one embodiment, Nicholas describes using a wired access point, which may or may not include a docking station, at "primary and secondary stationary locations." *Id.* ¶0025. "As shown in FIG. 2, when docked at a primary stationary location, such as at an office desk, the end user device … operates as a communications base station." *Id.*, ¶0026 & Fig. 2. Nicholas' primary mode of communication is not limited to a wired docking station, however. *See, e.g.*, *id.*, ¶¶0008, 0020; *see also* discussion *infra*. For example, Nicholas states that its device can also be connected via a wired or wireless access point without a docking station while at a primary location in an office. *Id.*, ¶0032.

657. Nicholas states that while at a primary office location, its end user device provides a range of functionality, including the "enabling of video and voice calls." *Id.*, ¶0032. Nicholas also describes connecting to its primary mode of communication automatically on power up. For example:

> The network detection function is preferably performed automatically by the end user device. For example, the network detection function may be performed automatically: (1) as part of the power-up sequence of the end user device to determine which network(s) are initially available to the end user device …

Id., ¶0046.

658. Nicholas explains that when one or more available networks are detected, the end user device "select[s] an available network for data communication based on one or more predefined criteria." *Id.*, ¶0049. The predefined criteria can include the type of data being transferred, the bit error rate, signal-to-noise ratio, the costs of connecting to the network (*e.g.*, preferring to connect to networks that charge lower fees), and other criteria. *Id.*, ¶¶*0*050-0055; *see also id.*, ¶ 8. Nicholas explains that its end user device can select the appropriate network for connection as part of the detection process on power up of the device. *Id.*, ¶0056 ("[t]here may be identity between network detection functions and the collection of information necessary to perform network selection"). The selection of a primary mode of connection can be based at least in part upon the location of the device and the needs of the user. In one embodiment, the primary mode can be a wired LAN with or without a docking station at the aforementioned primary desk site on an office campus. *Id.*, ¶¶0031-0032.[17]

and wherein the Internet direct device automatically switches to another available mode of connection when the Internet direct device detects that said primary mode of connection to said communications network is unavailable.

[17] As discussed below, the primary mode of connection in Nicholas can also be other locations, such as a wireless LAN on an office campus or other locations. Nicholas, ¶¶0006, 0033-0034.

659. Nicholas's end user device "provides for seamless transitions between different data communication networks, thus permitting all network communication tasks to be performed in a seamless, uninterrupted manner regardless of the location of the device, the type of network connection being used, or the form of data communication being carried out." Nicholas, ¶0009. As noted, in one embodiment, Nicholas describes that "the end user device may comprise a notebook or tablet PC with or without a docking interface," *id.*, ¶0020, and can be connected to the communications network via a wired LAN at a primary office location, *see id.*, ¶¶0026 & 0032.

660. When Nicholas's end user device is disconnected from its wired LAN, "such as roaming in an office," the wired network is no longer available yet "the end user device continues to provide secure connections to the office network that are uninterrupted[.]" *Id.*, ¶0028. This connection can be made by automatically switching to a wireless network, including a WLAN or WWAN, to permit uninterrupted transmissions. *Id.*, ¶¶0029-0034. In fact, Nicholas explains that its end user device "seamlessly transitions from a LAN connection to a WLAN connection" when in "mobile mode." *Id.*, ¶0033.

661. Nicholas describes additional situations where its end-user device can switch modes of connection to a communications network. For example, as noted, Nicholas describes an embodiment where WLAN is available on a "campus."

Nicholas, ¶0033. Nicholas' end user device may connect to the WLAN on power up according to predetermined criteria, and can designate the WLAN as the primary mode of connection. *Id.*, ¶¶0032, 0049-0056. When a user leaves the campus, Nicholas describes seamless switching of voice and video calling to a "WWAN connection" (a wireless wide area network), which is another mode of connection to the communications network. *Id.*, ¶0034. Nicholas also describes connection to additional networks, such as "[i]n a secondary location such as a home," where the device would switch its mode of connection to a "home LAN or WLAN." *Id.*, ¶0036. In these scenarios, either the campus LAN or WLAN may constitute the primary mode of connection, and the home LAN or WLAN would constitute another mode of connection.

b) '600 Patent, Claim 2

> *The Internet direct device of claim 1, wherein said microprocessor receives from and transmits to said other Internet direct devices audio over said communications network.*

662. Nicholas discloses that its end user device receives and transmits audio to and from other Internet direct devices over a communications network. "As shown in FIG. 3, the example end user devices includes a processor 302 for executing software routines in accordance with embodiments of the present invention." Nicholas, ¶0037 & Fig. 3. The microprocessor controls a plurality of "communication interfaces 324a-324n" that "permit data, including but not limited

to voice, video and/or computer data, to be transferred between the end user device 100 and external devices[.]" *Id.*, ¶0041; *see also id.*, ¶¶0024, 0032, 0033; *see also id.*, Fig. 1 (120). Nicholas further describes how its end user device 100 can provide VoIP calling, video calls, and videoconferencing with other Internet direct devices [*id.*, ¶¶0032, 0033, 0034], all of which are executed by the microprocessor [*id.*, ¶0037].

c) '600 Patent, Claim 3

The Internet direct device of claim 1, wherein the microprocessor connects the Internet direct device to other Internet direct devices over said communications network.

663. Nicholas discloses that its end user device "detects which data communication networks are available and determines which of the plurality of data communication networks provides the most optimal channel" in order to connect to other Internet direct devices over a communications network. Nicholas, Abstract. Nicholas explains that the end user device contains a microprocessor that controls a plurality of "communication interfaces 324a-324n," which "permit data, including but not limited to voice, video and/or computer data, to be transferred between the end user device 100 and external devices" over a communications network. *Id.*, ¶0041; *see also id.*, ¶¶0024, 0032, 0033; *see also id.*, Fig. 1 (120). This includes placing and receiving VoIP calls, video calls, and videoconferences to and from other end user devices over a communication network [*id.*, ¶¶0022,

0026, 0027, 0032, 0033, 0034], all of which are executed by the microprocessor [*id.*, ¶0037].

d) ‘600 Patent, Claim 4

The Internet direct device of claim 1, wherein said plurality of available modes of communication is selected from a group consisting of: a land line, a DSL, cable, satellite, wireless network, cellular, Wi-Fi and Wi-Max.

664. Nicholas explains that “the end user device may comprise a notebook or tablet PC with or without a docking interface” that can connect to a plurality of networks, including wired Ethernet, a wireless Local Area Network (WLAN) or a wireless Wide Area Network (WWAN). *Id.*, ¶0019, 0020.

e) ‘600 Patent, Claim 5

The Internet direct device of claim 1, wherein said microprocessor transmits and receives audio to and from other Internet direct devices over said communications network.

665. Nicholas discloses that its microprocessor controls a plurality of “communication interfaces 324a-n” that “permit data, including but not limited to voice, video and/or computer data, to be transferred between the end user device 100 and external devices” over a communications network. Nicholas, ¶0041; *see also id.*, ¶¶0024, 0032, 0033; *see also id.*, Fig. 1 (120) & Fig. 2. Nicholas further describes how its end user device 100 can provide VoIP calling, video calls, and

videoconferencing [*id.*, ¶¶0032, 0033, 0034], all of which are executed by the microprocessor [*id.*, ¶0037].

f) '600 Patent, Claim 8

The Internet direct device of claim 1 is a portable camera or a cell phone with a camera.

666. Nicholas discloses at least that its end user device is portable, includes a camera, and has cellular capability. *See* Nicholas, ¶¶0019, 0024 & Fig 1 ("Video camera/mic built in option 120"). Nicholas's end user device is thus both a portable camera and a cell phone with a camera.

g) '600 Patent, Claim 9

The Internet direct device of claim 1, further comprising a display for displaying still or video images.

667. The end user device has a display. Nicholas, ¶0040 & Fig. 3 (322). Nicholas states that its device "forwards graphics, text, and other data from the communication infrastructure 304 or from a frame buffer (not shown) for display to a user on a display unit 322" (*id.*, ¶0040), such as in connection with its video conferencing and video calling capability (*id.*, ¶¶0008, 0024 & Fig 1).

2. Petition 3: Ground 2 - Nicholas and Nair

a) Claim 10

The Internet direct device of claim 9, wherein said display of the Internet direct device comprises a touch pad for entering texts.

668. As discussed above, touch screens were well known in the art as an input device for controlling a portable electronic device. Nicholas does not expressly state that its end user devices incorporate a touch pad or screen, but Nair describes a "touch screen" as one such user interface that can be used on a mobile communication device: "The functionality of the user interface 34 can be performed by one or more suitable input devices (e.g., keypad, touch screen, input port, pointing device, microphone, and/or other device that can accept user input information)[.]" Nair, ¶0033. For the reasons discussed above, a skilled artisan would have been motivated to use a touch screen as a user interface in place of another user interface (a keyboard, a roller, a stylus, etc.) is simply the substitution of one known input device for another to achieve no more than predictable results.

b) Claim 12 and 13

12. The Internet direct device of claim 1, further comprising a web browser.

13. The Internet direct device of claim 12, wherein said microprocessor is operable to download live or recorded audio or video images from a website using the web browser over said communications network.

669. Nicholas describes using its end user device to receive (*i.e.*, download) VoIP, video calls, and other data over IP networks, including audio and visual images. Nicholas, ¶¶0019, 0024, 0032-0034. In one embodiment, Nicholas's end user device can also record videos and provide "digital media networking." *Id.*, ¶0036. Nicholas also describes downloading live audio or visual images, such as during a VoIP call or a videocall or video conference. *Id.*, ¶¶0019, 0024, 0032-0034. These functions are performed by "software routines" that are executed by one or more microprocessors. *Id.*, ¶0037. Nicholas does not expressly state that the software routines executed by the microprocessor(s) include a web browser, however. Nair, however, describes a web browser to download information from the Internet, including (but not limited to) audio or visual images. Nair, ¶¶0027, 0034. For the reasons discussed above, a skilled artisan would have been motivated to combine Nicholas and Nair to teach these claim elements.

3. Petition 3: Ground 3, Nicholas and Kusaka

670. As noted above, dependent claim 10 recites that its "display … comprises a touch pad for entering texts." Kusaka describes an Internet camera capable of recording video that includes a touch screen to enter data and manipulate images. *See* Kusaka, ¶0227. "A so-called touch screen 66, equipped with a function of outputting contact position information corresponding to the position indicated by a finger touch operation is arranged over the left LCD 21 and

the right LCD 22, which can be used for selection of image data and options displayed on the screen." *Id.*; *see also* Fig. 33. For the reasons discussed above, a skilled artisan would have been motivated to combine Nicholas and Kusaka to teach these claim elements.

671. As also noted above, Claims 12 and 13 depend from claim 1 and add the requirement of a web browser to download live or recorded audio or video images from a website. Like Nicholas's end user device, Kusaka's mobile electronic camera also has a display suitable for viewing images. Kusaka, ¶¶0224, 0225. Kusaka describes interfacing with images or videos on a website, receiving previously captured and stored image data from an image server, and displaying that received image data on the camera's display. Kusaka, ¶0236. As discussed above, a web browser was a well-known means of downloading images or video from a network. For the reasons discussed above, a skilled artisan would have been motivated to combine Nicholas and Kusaka to teach these claim elements.

4. Petition 3: Ground 4 – Nicholas and Khedouri

672. Khedouri also discloses a touch screen as used in claim 10 in analogous art. "The user interface of a preferred embodiment, if based on a touch-screen or similar input technique, is optimized to allow a user to input all selections without using a stylus, but rather by using a fingertip." Khedouri, ¶0043. For the

reasons discussed above, a skilled artisan would have been motivated to combine Nicholas and Khedouri to teach claim 10.

5. Petition 3: Ground 5 –Nicholas and Morris

673. Morris also describes equipping its Internet-connected digital camera "with a standard web browser 158 and a client communication module 160 that enables the client device 152 to communicate with the server 154" to access, *inter* alia, images or video files. Morris, ¶0031. As using a web browser to download images or videos from a website was a well-known means of downloading images or video from a network. For the reasons discussed above, a skilled artisan would have been motivated to combine Nicholas and Khedouri to teach claims 12 and 13.

6. Petition 3: Ground 6 –Inoue and Nair

674. For the reasons discussed above, a person of ordinary skill in the art would have been motivated to combine the teachings of Inoue and Nair to practice all of the elements of claims 1, 2, 3, 4, 5, 8, 9, 10, 12 and 13 of the '600 patent.

a) Claim 1

An Internet direct device comprising

675. Inoue describes a digital camera for transmitting and receiving images that, when "powered on … automatically establishes a network connection with [a] file server" for the purposes of transmitting and receiving images over a communications network. Inoue, Abstract. Inoue's network connection can include a connection to the Internet (126). *See, e.g.,* Inoue, ¶0060; Fig. 3.

an imaging system to capture still or video images;

676. Inoue describes "a digital camera" with an "image pickup block" to capture images. *Id.*, ¶0009; *see also id.*, ¶¶0002, 0010-0013 & Fig. 1(12).

a microprocessor to transmit said captured still or video images to another Internet direct device upon image capture, and receive still or video images from said other Internet direct device over a communications network;

677. Inoue describes a "processing block 16" that includes an "image processing unit 44," a "transmission processing unit 52," a "reproduction processing unit 48," memory units, and various other elements. Inoue, ¶0053 & Fig. 1. The transmission unit contains a "communication control unit 72" which controls an internal "option card 68" able to access various communication networks. *Id.*, ¶0049 ("The card slot 20 [in the camera] retains an option card 68 detachably"). "The communication control unit 72 exercises control necessary to communicate with the file server by using the option card 68 loaded in the card slot 20 if the option card 68 is a communication card." *Id.*, ¶¶0056, 0060 ("The digital camera 10 and the access point 122 communicate with each other over a wireless LAN"). Inoue teaches that its digital cameras (Internet direct devices) transmit images "upon obtainment of the image" to a server. *Id.*, ¶0018. "Upon obtainment of the image" includes image capture. *Id.*, ¶ 15 ("The 'image obtained by image pickup,' shall cover both an intact image just picked up and an image obtained

through compression or the like after picked up.”), ¶ 48 (“The image pickup block 12 shoots a subject under user instructions.”).

678. Inoue further describes that its microprocessor controls image capture to the server, as well as receipt of images from the service; thus, Inoue’s cameras have the capability to transmit an image to another digital camera by having a first camera upload the image and a second camera download the same image. Inoue explains:

> One of the aspects of the present invention relates to a digital camera, which comprises … a processing block which applies processing to an image. For example, the processing block includes any one of the following configurations:
>
> (1) A detecting unit which detects an activation request for the digital camera, and a communication control unit which performs processing for establishing a network connection with a file server upon detection of the activation request;
>
> (2) A detecting unit which detects an image pickup request, and a communication control unit which performs processing for transmitting an image obtained by image pickup to a file server over a network upon obtainment of the image;
>
> (3) A detecting unit which detects an image reproduction request, and a communication control unit which performs processing for receiving an image to be reproduced from a file server over a network when the image reproduction request is detected; and

(4) Any two or more of the configurations (1) to (3) in combination.

Inoue, ¶¶0009-0013.

679. Inoue describes its file server as managing the images of a plurality of digital cameras from a plurality of users. *Id.*, ¶0059. A person of ordinary skill in the art would have understood that one of Inoue's digital cameras can transmit images to a server, and another of Inoue's digital cameras could retrieve those images from a server. Such functionality is already in Inoue's digital cameras. Inoue, ¶¶0010-0013; *see also id.*, ¶¶0059-0061.

680. A person of ordinary skill in the art would also be motivated to operate Inoue's system in this method in view of Nair. Nair relates "generally to the field of wireless technology and, more particularly, to seamless routing between wireless networks." Nair, ¶0003. Nair describes two-way communication among devices. *Id.* As discussed above, a person of ordinary skill in the art would be motivated to combine Inoue with Nair.

and wherein the Internet direct device automatically connects to said communications network on power-up using one of a plurality of available modes of connection, which is designated as a primary mode of connection,

681. Inoue explains that "[w]hen the digital camera is powered on, it automatically establishes a network connection with the file server in an activation process." Inoue, Abstract. "The power button 38 is one for switching on/off the

power of the entire digital camera 10. When the digital camera 10 is off, pressing the power button 38 is detected by event detecting unit 50 as an activation request, which is followed by an activation process." *Id.*, ¶0058. Inoue's digital camera "detects an activation request" and "establish[es] a network connection between the digital camera and a file server upon detection of the activation request." *Id.*, ¶0017; *see also id.*, ¶0066 & Fig. 6. The connection to the communications network can be via any one of a plurality of modes of connection: "The 'network' may be either wireless or wired. Nor does it matter whether the network uses such facilities as an access point if on a wireless LAN in infrastructure mode, or is of so-called peer-to-peer as if in ad-hoc mode." *Id.*, ¶0015. The particular network that is selected for use is the "primary mode of connection" for Inoue's camera for connection to a "communication network," such as the Internet. *Id.*, ¶0060. In one embodiment, Inoue identifies "a wireless LAN" as the primary mode of communication to reach the Internet. *Id.* ¶0060 & Fig. 3.

> *and wherein the Internet direct device automatically switches to another available mode of connection when the Internet direct device detects that said primary mode of connection to said communications network is unavailable.*

682. As noted, one of Inoue's embodiments identify "a wireless LAN" as a primary mode of connection to reach the Internet among a plurality of available modes. Inoue, ¶0060. Inoue does not disclose that its digital cameras automatically

switch from a wireless LAN to another available mode of connection when the wireless LAN is unavailable. Nair, however, provides this teaching.

683. Nair relates "generally to the field of wireless technology and, more particularly, to seamless routing between wireless networks." Nair, ¶0003. Its teachings apply to any wireless device with capability for communicating by wireless technology—*e.g.*, "wireless device 12 can be, for example, a wireless personal digital assistant (PDA), a cellular phone, or any other wireless-capable electronic device." *Id.* Nair explains that connecting and transmitting data over a wireless LAN (a "WLAN"), like that used in Inoue, provides certain advantages over other available modes of connection. *Id.*, ¶0029. Nair further explains that its technology allows wireless devices to have "uninterrupted and effective wireless access for the wireless device 12" by "automatically and seamlessly" handing off communications from a WLAN to a wireless wide area network (a "WWAN") when the WLAN connection is unavailable. Nair, ¶ 29; *see also id.*, Abstract, ¶¶0008, 0009, 0022, 0028, 0035-0040. For the reasons discussed above, a person of ordinary skill in the art would have combined Inoue with Nair to practice this claim element.

b) '600 Patent, Claim 2

The Internet direct device of claim 1, wherein said microprocessor receives from and transmits to said other Internet direct devices audio over said communications network.

684. As noted above, it was well known that digital cameras could be (and were) included in cell phones. As of at least December 2004, "cell phones that integrate digital cameras have far outsold regular digital cameras." Narayanaswami, p. 1. As noted above, Inoue discloses a digital camera. Inoue, ¶0009; *see also id.*, ¶¶0002, 0010-0013. Nair discloses a cell phone that permits the transmission and receipt of audio from other cell phones, *i.e.*, other Internet direct devices. Nair, ¶¶0027, 0034, 0040. For the reasons discussed above, a person of ordinary skill in the art would have known at the time that it would be advantageous to include Inoue's digital camera in a cell phone, such as those described in Nair.

c) '600 Patent, Claim 3

The Internet direct device of claim 1, wherein the microprocessor connects the Internet direct device to other Internet direct devices over said communications network.

685. Inoue's digital camera communicates with other digital cameras over a communications network. Inoue explains that its digital camera can receive images previously uploaded to the server by it or a different digital camera for visual display on the camera. "When image reproduction is instructed from the

digital camera, the image is downloaded from the file server over the network and displayed on the digital camera." Inoue, Abstract; *see also id.*, ¶¶0012, 0019, 0074-0075. "The reproduction processing unit 48 decompresses the image and reproduces it on the LCD 22[.]" *Id.*, ¶0075. As discussed above, a skilled artisan would have understood that, using the functionality already disclosed in Inoue, one digital camera could upload an image to the server and a different digital camera could download the same image from the server, thus connecting one camera to a different camera for image transfer.

686. Moreover, Inoue discloses a digital camera and it was well known to persons of ordinary skill in the art to include a digital camera in a cell phone. Nair discloses a cell phone that permits the transmission and receipt of audio from other cell phones, *i.e.*, other Internet direct devices. Nair, ¶¶0027, 0034, 0040. A person of ordinary skill in the art would have known to include Inoue's digital camera in a cell phone, such as the cell phones discussed in Nair for the reasons discussed above.

d) '600 Patent, Claim 4

The Internet direct device of claim 1, wherein said plurality of available modes of communication is selected from a group consisting of: a land line, a DSL, cable, satellite, wireless network, cellular, Wi-Fi and Wi-Max.

687. Nair explains that its wireless device 12 can use a variety of modes of communications in addition to WLAN (*e.g.*, Wi-Fi) and WWAN (*e.g.*, cellular). Nair, ¶0024. For example:

> Each wireless network 14, 16, 18 can be a communication network that supports wireless communication. Each network supports at least one wireless link or device connection. As such, the networks may support a variety of communications, including, but not limited to, analog cellular system, digital cellular system, Personal Communication System (PCS), Cellular Digital Packet Data (CDPD), ARDIS, RAM Mobile Data, Metricom Ricochet, paging, and Enhanced Specialized Mobile Radio (ESMR). The wireless networks 14, 16, 18 may utilize or support various protocols. Exemplary protocols for WLANs **16,18** include IEEE 802.11, HomeRF, Bluetooth, HiperLAN and the like. Exemplary protocols for WWAN 14 include Time Division Multiple Access (TDMA, such as IS-136), Code Division Multiple Access (CDMA), lxRTT, General Packet Radio Service (GPRS), Enhanced Data rates for GSM Evolution (EDGE), Global System for Mobile communications (GSM), Universal Mobile Telecommunications System (UMTS), and Integrated Digital Enhanced Network (iDEN) Packet Data.

Id., ¶0025.

e) '600 Patent, Claim 5

The Internet direct device of claim 1, wherein said microprocessor transmits and receives audio to and from other Internet direct devices over said communications network.

688. It was well known prior to the '600 patent's earliest effective filing date that digital cameras like those disclosed in Inoue could be (and were) included in cell phones. *See* Narayanaswami, p. 65. Nair discloses a cell phone. Nair. As discussed above, a person of ordinary skill in the art would have known to include Inoue's digital camera in a cell phone such as that disclosed in Nair, allowing the Internet direct device to transmit and receive audio from other Internet direct devices.

f) '600 Patent, Claim 8

The Internet direct device of claim 1 is a portable camera or a cell phone with a camera.

689. Inoue describes a portable digital camera. Inoue, Abstract, ¶0002, *et seq*.

g) '600 Patent, Claim 9

The Internet direct device of claim 1, further comprising a display for displaying video images.

690. Inoue describes a digital camera with a display for displaying images. Inoue, Abstract, ¶¶0002, 0082. A person of ordinary skill in the art would have understood "images" to include video images.

h) ‘600 Patent, Claim 10

The Internet direct device of claim 9, wherein said display of the Internet direct device comprises a touch pad for entering texts.

691. As discussed above, displays that comprise a touch pads (*e.g.*, a touch screen) were well known in the art as an input device for controlling a portable electronic device. Inoue does not expressly state that its end user devices incorporate a touch pad or screen, but Nair describes a “touch screen” as one such user interface that can be used on a mobile communication device. Nair, ¶0033. For the reasons discussed above, a person of ordinary skill in the art would have appreciated that a touch screen such as the touch screen described in Nair could perform the same role as played by other user interfaces and would be motivated to make the combination.

i) Claims 12 and 13

12. The Internet direct device of claim 1, further comprising a web browser.

13. The Internet direct device of claim 12, wherein said microprocessor is operable to download live or recorded audio or video images from a website using the web browser over said communications network.

692. Inoue does not mention that one could use a web browser for downloading live or recorded audio or video images, but this capability was well known to persons of ordinary skill in the art at the time and Nair discloses a web

browser. Nair, ¶0027 (“Such an application can be, for example, a network browser that exchanges information with the distributed application known as the ‘World Wide Web.’”) & ¶0034. As discussed above, a person of ordinary skill in the art would have been motivated to make the combination for the reasons discussed above.

7. Petition 3: Ground 7 –Inoue, Nair and Narayanaswami

693. For the reasons discussed above, a person of ordinary skill in the art would have been motivated to follow the market trend that is reported in Narayanaswami and include Inoue’s digital camera in a cell phone with the functionality described in Nair.

8. Petition 3: Ground 8 –Umeda and Inoue

a) ‘600 Patent, Claim 1

An Internet direct device comprising

694. Umeda describes devices that connect to “mobile communication system … for roaming between different kinds of networks.” Umeda, Abstract. Umeda’s networks also can include the Internet. *Id.*, ¶0027. Inoue describes a digital camera that, when “powered on … automatically establishes a network connection with [a] file server” for the purposes of transmitting images over a communications network. Inoue, Abstract. Inoue’s camera can connect to the Internet via a LAN. *Id.*, ¶0060.

an imaging system to capture still or video images;

695. Both Umeda and Inoue disclose an imaging system to capture still or video images. Umeda discloses a digital camera that captures video images. *See* Umeda, ¶0038 (distinctly include both video and digital cameras). Umeda describes various devices, including a "large-size TV set" and a "mobile phone," that utilize cameras for capturing video images for transmission to others as part of a videoconferencing system. *Id.*, ¶0097 & Fig. 10. Inoue describes "a digital camera" with an "image pickup block" to capture image data. Inoue, ¶0009; *see also id.*, ¶¶0002, 0010-0013. A person of ordinary skill in the art would understand that digital cameras like those disclosed in Inoue can capture both still and video images, and thus the term "images" in Inoue would have been understood to include both still and video images.

a microprocessor to transmit said captured still or video images to another Internet direct device upon image capture, and receive still or video images from said other Internet direct device over a communications network;

696. Umeda describes its Internet direct devices as including a "communication terminal 200" that includes "a control section 202, an antenna section 204, a network detecting section 206, network communication sections 208, and a terminal interface section 210." Umeda, ¶0036 & Fig. 3. "The control section 202 controls the whole communications terminal 200 in a centralized manner." *Id.* "Control section 202" controls the antenna and "carries out

communications with at least one network NW100[.]" *Id.*; *see also id.*, Fig. 1. Among the communications that are transmitted and received at the direction of control section 202 are images as part of a videoconference with other Internet direct devices. *Id.*, ¶¶0096-0099 & Fig. 10. A person of ordinary skill in the art would have understood Umeda to disclose at least one processor to perform these functions.

> *and wherein the Internet direct device automatically connects to said communications network on power-up using one of a plurality of available modes of connection, which is designated as a primary mode of connection,*

697. Umeda describes connecting to a communications network using one of a plurality of modes of connection that is determined to be preferred. Umeda explains that its devices have the capability of connecting to one of a plurality of modes of connection, and of selecting a mode of connection based upon predetermined criteria. For example:

> Modifications in networks in use, such as those in a case where a communication path is changed to a network having a different transmission quality, terminal capability, or the like, may become the object to be inspected. An example of this case is one where a communication terminal which can utilize both of a cellular mobile communication system and a wireless LAN system is switched between these different networks. In the case where the communication terminal 200 is initially communicating in the cellular

> mobile communication system, whether the wireless LAN system, which is the other system, can be utilized or not is determined by measuring the reception level or the like in the NW detecting section 206. In the case where the wireless LAN system is more favorable for the user from the viewpoints of transmission quality, capability, and the like while communications are possible, switching (changing) is carried out between the systems (networks).

Umeda, ¶ 52.

698. Umeda does not, however, expressly describe automatically connecting to a primary mode of communication on power up. Inoue, however, contains this disclosure. Inoue, Abstract, ¶¶0017, 0058, 0066 & Fig. 6. As discussed above, a person of ordinary skill in the art would have been motivated to combine Inoue's teaching of automatic connection at power up with Umeda's videoconferencing system.

> *and wherein the Internet direct device automatically switches to another available mode of connection when the Internet direct device detects that said primary mode of connection to said communications network is unavailable.*

699. Umeda discloses automatic switching to another available network. Umeda discloses such switching at least when the Internet direct device detects that the primary mode of connection to the communications network lacks "capability," which a person of ordinary skill in the art would understand includes when the network is unavailable. Umeda, ¶0052. For example, Umeda describes

automatically switching to and from a wireless LAN and a cellular network depending upon network availability:

> Modifications in networks in use, such as those in a case where a communication path is changed to a network having a different transmission quality, terminal capability, or the like, may become the object to be inspected. An example of this case is one where a communication terminal which can utilize both of a cellular mobile communication system and a wireless LAN system is switched between these different networks. In the case where the communication terminal 200 is initially communicating in the cellular mobile communication system, whether the wireless LAN system, which is the other system, can be utilized or not is determined by measuring the reception level or the like in the NW detecting section 206. In the case where the wireless LAN system is more favorable for the user from the viewpoints of transmission quality, capability, and the like while communications are possible, switching (changing) is carried out between the systems (networks).

Umeda, ¶ 52.

700. Umeda also teaches switching from a primary mode of connection to the communication network to another available mode of connection in its discussion of a mobile user who begins a videoconference in a stationary location (*e.g.*, a conference room) and then continues the videoconference by switching to a mobile phone with a camera and display. *See id.*, ¶¶0096 - 0099 & Fig. 10. For example:

> It is assumed that a video conference is held by use of a large-size TV set with a party in another office connected with a VPN by way of a wireless LAN (network NW1). Here, if one of parties of the video conference goes outdoor with a mobile phone, the network NW1 is notified of the change in terminal, whereby the communication network is automatically changed from the wireless LAN (network NW1) to a mobile communication network (another network NW2), whereas contents are converted from high-definition visual information for the large-size TV set to a high-compression visual information for a mobile terminal.

Id., ¶¶0097.

b) ‘600 Patent, Claim 2

> *The Internet direct device of claim 1, wherein said microprocessor receives from and transmits to said other Internet direct devices audio over said communications network.*

701. Umeda discloses that its Internet direct devices can receive and transmit audio from other Internet direct devices over the communication network in, *e.g.*, its videoconferencing function. Umeda, ¶¶0052, 0096 - 0099 & Fig. 10. Umeda further discloses that these transmissions are operated by its “control section,” which a person of ordinary skill in the art would understand to include at least one microprocessor. *Id.*, ¶¶0027, 0028.

c) '600 Patent, Claim 3

The Internet direct device of claim 1, wherein the microprocessor connects the Internet direct device to other Internet direct devices over said communications network.

702. Umeda discloses that the connection of its described Internet direct devices to other Internet direct devices (*e.g.*, videoconferencing televisions and mobile phones) is under the control of its processor. Umeda, ¶0036 & Fig. 3.

d) '600 Patent, Claim 4

The Internet direct device of claim 1, wherein said plurality of available modes of communication is selected from a group consisting of: a land line, a DSL, cable, satellite, wireless network, cellular, Wi-Fi and Wi-Max.

703. Umeda discloses wired, wireless and a cellular network as among its available modes of communication. Umeda, ¶0032, 0050, 0052, 0096-0099. Inoue states that its network can be either "wired" (a land line) or "wireless," *e.g.*, Wi-Fi as in a LAN. Inoue, ¶¶0015, 0060.

e) '600 Patent, Claim 5

The Internet direct device of claim 1, wherein said microprocessor transmits and receives audio to and from other Internet direct devices over said communications network.

704. Umeda discloses that its Internet direct devices can receive and transmit audio from other Internet direct devices over the communication network

in, *e.g.*, its videoconferencing function. Umeda, ¶¶0052, 0096 - 0099 & Fig. 10. Umeda further discloses that these transmissions are operated by its "control section," which a person of ordinary skill in the art would understand to include at least one microprocessor. *Id.*, ¶¶0027, 0028.

f) '600 Patent, Claim 8

The Internet direct device of claim 1 is a portable camera or a cell phone with a camera.

705. Inoue describes a portable digital camera. Inoue, Abstract, ¶0002. Umeda describes a cell phone with a digital camera for videoconferencing. Umeda, ¶¶0096-0099.

g) '600 Patent, Claim 9

The Internet direct device of claim 1, further comprising a display for displaying video images.

706. Inoue describes a portable camera with a display for displaying images. Inoue, Abstract, ¶¶0002, 0082. Umeda also describes various displays, including "displays which make it possible to input/output images" and displays on cell phones. Umeda, ¶¶0038, 0096-0099.

9. Petition 3: Ground 9 – Inoue, Umeda and Kusaka

707. Claim 10 adds a touch screen interface. As discussed above, Kusaka describes an Internet camera capable of recording video that can use a touch screen to choose or manipulate images. *See* Kusaka, ¶0227; *see also* Fig. 33. For the

reasons discussed above, a person of ordinary skill in the art would have been motivated to add a touch screen such as the touch screen described in Kusaka to Umeda's videoconferencing system.

708. Claims 12 and 13 add the requirement of a web browser to download images, including video. Inoue and Umeda do not expressly discuss using a web browser to perform these functions, however, as recited in dependent claims 12 and 13. Kusaka describes interfacing with images or videos on a website, receiving previously captured and stored image data from an image server, and displaying that received image data on the camera's display. Kusaka, ¶0236. For the reasons discussed above, a person of ordinary skill in the art would have been motivated to add a web browser to Umeda's videoconferencing system.

10. Petition 3: Ground 10 – Inoue, Umeda And Khedouri

709. As discussed above, Khedouri also discloses the use of a touch screen in analogous art. Khedouri, ¶0043. For the reasons discussed above, a person of ordinary skill in the art would have been motivated to add a touch screen to Umeda's videoconferencing system.

11. Petition 3: Ground 11 – Inoue, Umeda And Morris

710. As noted above, Morris describes equipping its Internet-connected digital camera "with a standard web browser 158 and a client communication module 160 that enables the client device 152 to communicate with the server 154"

to access, *inter alia*, video files. Morris, ¶0031. For the reasons discussed above, a person of ordinary skill in the art would have been motivated to add a web browser to Umeda’s videoconferencing system.

C. Petition 6: *Inter Partes* Review Of Claims 22, 23, 25, 27, 28, 29, 32, 33, 35, 36, 37, And 38 Of The ‘991 Patent

711. I understand that Petition 6 contains the following grounds to challenge claims 22, 23, 25, 27, 28, 29, 32, 33, 35, 36, 37, and 38 of the ‘991 patent. I have reviewed the Petition, and the following analysis substantially mirrors the analysis in the Petition 6.

Ground	**Challenged Claims**	**Statutory Ground and Prior Art**
Ground 1	22, 23, 25, 27, 28, 29, 32, 33, 35, 36, 37, and 38	Anticipation under 35 U.S.C. § 102(b) in view of Nicholas
Ground 2	22, 23, 25, 27, 28, 29, 32, 33, 35, 36, 37, and 38	Obviousness under 35 U.S.C. § 103(a) in view of Inoue and Nair
Ground 3	25, 27, 28, 35, 36 and 37	Obviousness under 35 U.S.C. § 103(a) in view of Inoue, Nair and Narayanswami
Ground 4	22, 23, 25, 27, 28, 29, 32, 33, 35, 36, 37, and 38	Obviousness under 35 U.S.C. § 103(a) in view of Umeda and Inoue

1. Petition 6: Ground 1 – Nicholas

a) Claim 22

22. A method for transmitting and receiving still or video images by an Internet direct device associated with a user over a communications network, comprising the steps of:

712. Nicholas discloses an Internet direct device, specifically, an "end user device 100" which is "any device capable of communicating data to or from a data communication network in accordance with one or more wired and/or wireless communication protocols." Nicholas, ¶0019. The data communication network includes, among others, an "Internet connection, including but not limited to cable modems, DSL, and ISP" as well as a variety of other wired and wireless networks. *Id.*; *see also id.* at ¶0020 & Fig. 1 (100). "Exemplary end user device 100 further comprises … an optional built-in video camera and microphone for enabling videoconferencing and the like." *Id.*, ¶¶0024, 0032, 0033; *see also id.,* Fig. 1 (120). The end user device is associated with a user and practices a method of transmitting and receiving audio or video images by, *e.g.*, enabling videocalling and videoconferencing. *Id.*, ¶¶0032-0034; *see also id.*, ¶0020 & Fig. 1 (100).

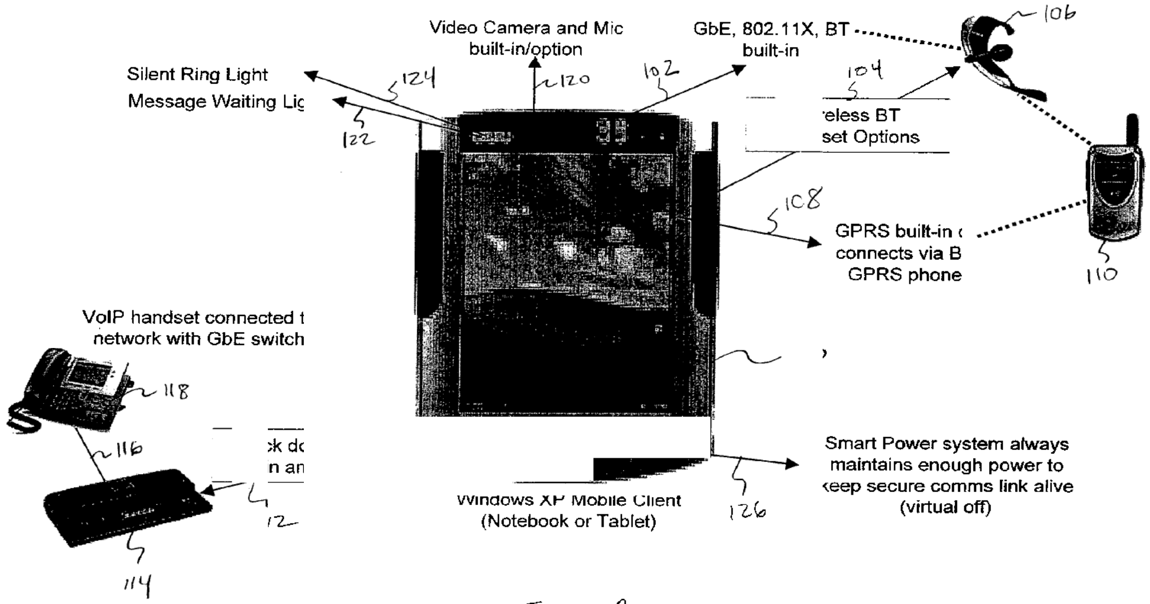


FIG. 1

Id., Fig. 1.

> *automatically connecting the Internet direct device to said communications network on power-up using one of a plurality of available modes of connection, which is designated as a primary mode of connection;*

713. Nicholas discloses automatically connecting its end user device to a communications network on power-up using one of a plurality of available modes of connection, which is designated a primary mode of connection. Nicholas states that an "end user device is provided that supports a connection to a plurality of data communication networks." Nicholas, Abstract; *see also id.*, ¶0008. The end user device detects which data communication networks are available "and selectively determines which of the plurality of data communication networks provides the

most optimal communication channel." *Id.* The end user device then connects to the selected network. *Id.*

714. Nicholas further states that "the end user device may comprise a notebook or tablet PC with or without a docking interface" that can connect to a plurality of networks, including wired Ethernet, a wireless Local Area Network (WLAN) or a wireless Wide Area Network (WWAN). *Id.*, ¶0020. In one embodiment, the end user device detects the available networks and selects the network to connect to "as part of a power-up sequence." *Id.*, ¶¶0046, 0056 ("[t]here may be an identity between network detection functions and the collection of information necessary to perform network selection."). Nicholas explains:

> The network detection function is preferably performed automatically by the end user device. For example, the network detection function may be performed automatically: (1) as part of the power-up sequence of the end user device to determine which network(s) are initially available to the end user device …

Id.

715. Which available network is selected as the primary network can be based on "one or more predefined criteria." Nicholas, ¶0049. The predefined criteria can include the type of data being transferred, the bit error rate, signal-to-noise ratio, the costs of connecting to the network (*e.g.*, preferring to connect to networks that charge lower fees), and other reasons. *Id.*, ¶¶0050-0055. Nicholas

also describes selecting a primary network based at least in part upon the location of the device and the user. *Id.*, ¶¶0030-0032. For example, in one embodiment, the end user device is "desk-bound at a primary office location[.]" *Id.*, ¶0030. "While desk-bound at a primary office location, an end user device … provides a connection to a LAN/WLAN," which is the primary mode of connection. *Id.*, 0032. Nicholas states that while desk-bound at a primary office location, its end user device provides a range of functionality, including the "enabling of video and voice calls." *Id.* The connection may use a docking station, but it does not require a docking station in order to connect to either the wired or wireless LAN. *Id.* In this example, either the wired or wireless connection at Nicholas's primary office location can be the primary mode of connection. *Id.*

capturing still or video images by an image capture system of the Internet direct device;

716. Nicholas's end user device includes an imaging system that can capture at least video images: "Exemplary end user device 100 further comprises … an optional built-in video camera and microphone for enabling videoconferencing and the like." Nicholas, ¶¶0024; *see also id.*, ¶¶0032, 0033 & Fig. 1 (120). The end user device's camera and microphone capture at least video images as part of a video call or conference. *Id.*

transmitting the captured still or video images to another Internet direct device over said communications network upon image capture by a microprocessor of the Internet direct device;

717. Nicholas describes using a microprocessor in the end user device to control its various functions, including transmitting at least video images to another end user device over the communications network upon image capture, *e.g.*, in a video call or conference. "As shown in FIG. 3, the example end user devices includes a processor 302 for executing software routines in accordance with embodiments of the present invention." Nicholas, ¶0037 & Fig. 3. The microprocessor controls a plurality of "communication interfaces 324a-324n" that "permit data, including but not limited to voice, video and/or computer data, to be transferred between the end user device 100 and external devices[.]" *Id.*, ¶0041; *see also id.*, ¶¶0024, 0032, 0033; *see also id.*, Fig. 1 (120). Consequently, Nicholas's end user device is "capable of communicating data to or from a data communication network in accordance with one or more wired and/or wireless communication protocols," which is a communication network. *Id.*, ¶0019.

718. Nicholas further describes how its end user device transmits and receives video images over the communication network in order to provide for VoIP calling, video calls, and videoconferencing. *Id.*, ¶¶0032-0034. The video images must be transmitted and received upon capture in order to provide the

described video-calling and –conferencing applications. *Id.* All of these functions are executed by the microprocessor. *id.*, ¶0037.

> *receiving still or video images from said other Internet direct device over said communications network by the Internet direct device; and*

719. Nicholas' end user device also receives video images from other Internet direct devices.[18] Nicholas describes how its end user device can provide VoIP calling, video calls, and videoconferencing, which all include the receipt of video images from another device. Nicholas, ¶¶0032-0034; *see also id.*, Fig. 1, ¶0019.

> *automatically switching to another available mode of connection by the microprocessor when the Internet direct device detects that said primary mode of connection to the communications network is unavailable.*

720. Nicholas's end user device "provides for seamless transitions between different data communication networks, thus permitting all network communication tasks to be performed in a seamless, uninterrupted manner regardless of the location of the device, the type of network connection being used, or the form of data communication being carried out." Nicholas, ¶0009. As noted above, Nicholas describes that the end user device can connect to a plurality of

[18] Nicholas describes this function as being executed by a microprocessor in the end user device.

available modes of connection, including wired LAN (*e.g.*, Ethernet), a wireless Local Area Network (WLAN) or a wireless Wide Area Network (WWAN). *Id.*, ¶0020. The end user device selects which connection to use based on predetermined criteria. The mode of connection selected by the end user device is the primary mode of connection. *Id.*

721. In one embodiment, Nicholas states that its end user device connects to the primary mode of connection while desk-bound at a primary office location where it provides a range of functionality, including the "enabling of video and voice calls." *Id.*, 0032. The primary mode of connection can be a wired LAN. *Id.* The end user device, however, can be disconnected from its wired, primary mode of connection network, "such as roaming in an office," at which time the primary mode of connection is unavailable. *Id.*, ¶0028; *see also id.*, ¶0032. In this circumstance, the end user device "provides continuous network connection while transitioning from a wired to wireless connection," *e.g.*, a WLAN. *Id.*, ¶0032. Nicholas explains as follows:

> While desk-bound at a primary office location, an end user device … provides a connection to a LAN/WLAN; may be docked or undocked; provides continuous network connection while transitioning from a wired to wireless connection, or vise versa[.]

Id., ¶0032; *see also id.*, ¶¶0030-0031.

722. In this example, when the end user device is disconnected from the wired connection the primary mode of connection unavailable and the device automatically switches to a wireless LAN (WLAN), which is another available mode of connection. *Id.*, ¶0033.

723. Nicholas describes other situations in which its end-user device switch from primary to other modes of connection to a communications network. For example, Nicholas describes an embodiment where WLAN is available on a "campus." Nicholas, ¶0033. When Nicholas' end user device connects to the WLAN on power-up according to predetermined criteria, it is a primary mode of connection. *Id.*, ¶¶49-56. When a user leaves the campus, the WLAN becomes unavailable and Nicholas describes automatically switching to a "WWAN connection" (a wireless wide area network), which is another mode of connection to the communications network that was previously available but not used. *Id.*, ¶0034. Nicholas also describes connection to additional networks, such as at a "secondary location" in "a home," where the device would switch its modes of connection to a secondary mode of connection (*e.g.*, a home WLAN). *Id.*, ¶¶0035, 0036. In this scenario, either the campus WLAN or WWAN may constitute the primary mode of connection, and the home WLAN would constitute another mode of connection.

b) Claim 23

> *23. The method of claim 22, wherein the step of automatically switching comprises the step of switching to one of the following available modes of connection: a land line, DSL, cable, satellite, wireless network, cellular, Wi-Fi, and Wi-Max.*

724. Nicholas explains that "the end user device may comprise a notebook or tablet PC with or without a docking interface" that can connect to a plurality of networks, including wired Ethernet, a wireless Local Area Network (WLAN) or a wireless Wide Area Network (WWAN). Nicholas, ¶0020. For example:

> Wired and wireless networks supported by an end user device in accordance with embodiments of the present invention may include: (1) cellular networks, including but not limited to AMPS and N-AMPS, CDMA, TDMA, GSM, iDEN, PCS 1900, PCD, and PHS; (2) public packet-radio networks, including but not limited to CDPD and CS-CDPD, DataTAC 4000, DataTAC 5000, Modacom, DataTAC 6000, DataTAC/IP, GPRS (GSM), Mobitex, Mobitex/IP, and PDC-P; (3) Inter net connections, including but not limited to cable modem, DSL, and ISP; (4) Dial-up connections, including but not limited to DIkL/TCP, ISDN, PPP, and PSTN (POTS); (5) private packet networks, including but not limited to Dat- aradio and Motorola Private Data TAC; (6) satellite networks, including but not limited to Norcom; and (7) LAN connections, including but not limited to Ethernet, Token Ring and Wireless LAN.

Id., ¶0019.

c) Claim 25

25. The method of claim 22, further comprising the step of transmitting and receiving audio to and from said other Internet direct devices by the microprocessor of the Internet direct device associated with the user over said communications network.

725. Nicholas transmits and receives audio as part of its VoIP, videocalling and videoconferencing aspects. Nicholas's microprocessor controls a plurality of "communication interfaces 324a-324n" that "permit data, including but not limited to voice, video and/or computer data, to be transferred between the end user device 100 and external devices[.]" Nicholas, ¶0041; *see also id.*, ¶¶0024, 0032, 0033; *see also id.*, Fig. 1 (120). Nicholas further describes how its end user device can provide VoIP calling, video calls, and videoconferencing [*id.*, ¶¶0032-0034], all of which are executed by the microprocessor [*id.*, ¶0037].

d) Claim 27

27. The method of claim 22, further comprising the step of communicating with other Internet direct devices by the Internet direct device associated with the user over said communications network.

726. Nicholas describes how its end user device can provide VoIP calling, video calls, and videoconferencing to communicate with other Internet direct devices, including but not limited to other end user devices. Nicholas, ¶¶0032-0034 & Fig. 1.

e) Claim 28

28. The method of claim 22, further comprising the step of communicate with other Internet direct devices via voice over IP by the Internet direct device associated with the user.

727. Nicholas describes how its end user device can provide VoIP (voice over IP) calling to and from other Internet direct devices, including but not limited to other end user devices. Nicholas, ¶¶0032-0034.

f) Claim 29

29. The method of claim 22, further comprising the steps of displaying the still or video images on a display of the Internet direct device, and receiving texts from the user by the Internet direct device.

728. Nicholas describes how its end user device can provide video calls and videoconferencing with other Internet direct devices, which include at least video images. Nicholas, ¶¶0032-0034. Nicholas also explains that its end user device can send and receive text messages. *Id.*, ¶0024 ("Exemplary end user device 100 further comprises: … a message waiting light 122 that provides a visual indication to an end user that they have received a voice and/or **text message**") (emphasis added); *id.,* ¶0040 ("The end user device 300 further includes a **display interface** 320 that forwards graphics, **text**, and other data from the communication infrastructure 304 or from a frame buffer (not shown) for display to a user on a display unit 322.") (emphasis added).

g) Claim 32

32. A non-transitory storage medium comprising

729. Nicholas discloses such a non-transitory storage medium. Nicholas discloses "a main memory 306, such as a random access memory (RAM), and a secondary memory 308. The secondary memory 308 may include, for example, a hard disk drive 310 and/or a removable storage drive 312, which may comprise a floppy disk drive, a magnetic tape drive, an optical disk drive, or the like." Nicholas, ¶0038 & Fig. 2. At least the hard disk drives and the removable storage drive describe non-transitory storage mediums.

a program for transmitting and receiving still or video images over a communications network when executed by an Internet direct device associated with a user to cause the Internet direct device to:

730. Nicholas states that its VoIP, videocalling, and videoconferencing functions are performed by computer programs residing in its nontransitory storage medium and executed by its processor. As Nicholas explains:

> …. Computer programs (also called computer control logic) maybe stored in main memory **306** and/or secondary memory **308**, as well as in a memory internal to processor **302** (not shown in FIG. 3). … In an embodiment, such computer programs, when executed, enable the end user device **300** to perform the features of the present invention as discussed herein. In particular, the computer programs, when executed, enable the processor **302** to perform features of the present

> invention. Accordingly, such computer programs represent controllers of the end user device **300**.

Nicholas, ¶0043, *see also id.*, ¶¶0041-0044.

731. "The communication interfaces 324 a-324n" executed by Nicholas's computer programs "permit data, including but not limited to voice, video, and/or computer data to be transferred between the end user device 300 and external devices via a plurality of data communication networks." *Id.*, ¶0041. These programs are executed by the processor and cause the end user device associated with a user to transmit and receive video images over a communications network. *See id.*, ¶0037; *see also id.*, Abstract, ¶¶0032-0036. As discussed above, the transmission and receipt can occur on image capture as part of a video call or conference. *Id.*, ¶0030-0036.

> *automatically connect the Internet direct device to said communications network on power-up using one of a plurality of available modes of connection, which is designated as a primary mode of connection;*

732. The disclosed computer programs cause Nicholas's end user device to perform this element. Nicholas discloses that its "end user device is provided that supports a connection to a plurality of data communication networks," detects which data communication networks are available, "and selectively determines which of the plurality of data communication networks provides the most optimal

communication channel." Nicholas, Abstract; *see* also *id*., ¶0008. The device's determination of which network to use can be based on various predetermined criteria. *Id*., ¶0008. Nicholas also discloses a plurality of available wired and wireless networks, including cellular networks, public packet-radio networks, cable modem, DLS, ISP, dial-up connections, private packet networks, satellite networks and various LAN connections. *Id.*, ¶0019. As discussed above, the primary mode of connection can be detected, selected and connected on power-up by Nicholas's computer programs. *Id.*, ¶¶0046, ¶0056.

733. Nicholas also describes selecting a primary network based at least in part upon the location of the device and the needs of the user, including a wired LAN at a primary desk site on an office campus, a WLAN on the office campus when the end user device is moved, a WWAN for use when the WLAN is unavailable, and a WLAN or LAN at a secondary location, which can be a home. *Id.*, ¶¶0031-0036. In one embodiment, Nicholas describes using a wired access point as its primary mode of communication. *Id.* ¶¶0025, 0026 & Fig. 2. The wired connection can be used by the end user device for videoconferencing while at a "primary office" location. *Id.*, ¶0032.[19]

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[19] As noted, Nicholas' primary mode of communication is not limited to a wired connection. *See, e.g., id.*, ¶¶0008, 0020.

capture still or video images by an image capture system of the Internet direct device;

734. Nicholas's end user device is programmed to operate an image capture system that can capture at least video images: "Exemplary end user device 100 further comprises … an optional built-in video camera and microphone for enabling videoconferencing and the like." Nicholas, ¶¶0024, 0032, 0033; *see also id.*, Fig. 1 (120). The camera captures at least video images as part of the end user device's video calling and conferencing functions. *Id.*

transmit the captured still or video images to another Internet direct device over said communications network upon image capture by a microprocessor of the Internet direct device;

735. As noted above, Nicholas' end user device includes a microprocessor to execute its VoIP, videocalling and videoconferencing programs. Nicholas, ¶0037 & Fig. 3. The microprocessor controls a plurality of "communication interfaces 324a-324n" to transmit "voice, video and/or computer data … between the end user device 100 and external devices[.]" *Id.*, ¶0041; *see also id.*, ¶¶0024, 0032, 0033; *see also id.*, Fig. 1 (120). Nicholas further describes how its end user device can provide VoIP calling, video calls, and videoconferencing [*id.*, ¶¶0032-0034], all of which are executed by the microprocessor [*id.*, ¶0037]. The audio or video images are transmitted upon capture as part of the end user device's video calling and conferencing functions. Nicholas, ¶¶0032-0034.

receive still or video images from said other Internet direct device over said communications network by the Internet direct device; and

736. Nicholas further explains how its end user device is programmed to receive video images from other Internet direct devices (such as other end user devices) over the communications network. Nicholas describes video calls and videoconferencing [Nicholas, ¶¶0032-0034], all of which involve receipt of video, which are executed by the microprocessor [*id.*, ¶0037]. As part of these functions, the end user device in Nicholas is "capable of communicating data to or from a data communication network in accordance with one or more wired and/or wireless communication protocols." *Id.*, ¶0019. The video images are received upon capture as part of a video call or conference and displayed on Nicholas's device. *Id.*, ¶¶0032-0034; *see also id.*, Fig. 3(322).

automatically switch to another available mode of connection by the microprocessor when the Internet direct device detects that said primary mode of connection to the communications network is unavailable.

737. As discussed above, Nicholas discloses computer programming running on the end user device's microprocessor that causes the device to automatically switch to another available mode of communication when the primary mode of communication is unavailable. Nicholas's end user device "provides for seamless transitions between different data communication networks,

thus permitting all network communication tasks to be performed in a seamless, uninterrupted manner regardless of the location of the device, the type of network connection being used, or the form of data communication being carried out." Nicholas, ¶0009.

738. In one embodiment, Nicholas describes that "the end user device may comprise a notebook or tablet PC with or without a docking interface" that can connect to a plurality of networks, including wired Ethernet, a wireless Local Area Network (WLAN) or a wireless Wide Area Network (WWAN). *Id.*, ¶0020. The end user device can be connected to a wired network at a particular location, with or without a docketing station. *Id.*, ¶¶0026, 0032. When Nicholas's end user device is disconnected from its wired network "such as roaming in an office"—*i.e.*, when the wired network is not connected and therefore unavailable—"the end user device continues to provide secure connections to the office network that are uninterrupted[.]" *Id.*, ¶0028. This connection can be made via a wireless network, including a WLAN or WWAN, to permit uninterrupted transmissions. *Id.*, ¶¶0029-0034.

739. Nicholas describes other situations where its end-user device can switch modes of connection to a communications network. For example, Nicholas describes an embodiment where WLAN is available on a "campus." Nicholas, ¶0033. When Nicholas' end user device may connect to the WLAN on power-up

according to predetermined criteria, and designate it as the primary mode of connection. *Id.*, ¶¶49-56. When a user leaves the campus, Nicholas describes seamless switching voice and video calling to a "WWAN connection" (a wireless wide area network), which is another mode of connection to the communications network. *Id.*, ¶0034. Nicholas also describes connection to additional networks, such as "[i]n a secondary location such as a home," where the device would switch its mode of connection to a "home LAN or WLAN." *Id.*, ¶0036. In this scenario, either the campus LAN or WLAN may constitute the primary mode of connection, and the home LAN or WLAN would constitute another mode of connection.

h) Claim 33

> *33. The storage medium of claim 32, the program when executed causes the Internet direct device to automatically switch to one of the following available modes of connection: a land line, DSL, cable, satellite, wireless network, cellular, Wi-Fi, and Wi-Max.*

740. Nicholas explains that "the end user device may comprise a notebook or tablet PC with or without a docking interface" that can be programmed to connect to a plurality of networks, including at least a wired Ethernet, a wireless Local Area Network (WLAN) or a wireless Wide Area Network (WWAN). Nicholas, ¶¶0019, 0020. Thus, the end user device has a plurality of modes of communication selected from the modes recited in claim 33.

i) Claim 35

35. The storage medium of claim 32, the program when executed causes the Internet direct device to transmit and receive audio to and from said other Internet direct devices over said communications network.

741. Nicholas's end user device is programmed to transmit and receive audio as part of its VoIP, videocalling and videoconferencing aspects. Nicholas's microprocessor executes programming that controls a plurality of "communication interfaces 324a-324n" to "permit data, including but not limited to voice, video and/or computer data, to be transferred between the end user device 100 and external devices[.]" *Id.*, ¶0041; *see also id.*, ¶¶0024, 0032, 0033; *see also id.*, Fig. 1 (120). Nicholas further describes how its device can provide VoIP calling, video calls, and videoconferencing [*id.*, ¶¶0032-0034], all of which are executed by programs running on the microprocessor [*id.*, ¶0037].

j) Claim 36

36. The storage medium of claim 32, the program when executed causes the Internet direct device to communicate with other Internet direct devices over said communications network.

742. Nicholas describes how its end user device can be programmed to provide VoIP calling, video calls, and videoconferencing to communicate with other Internet direct devices, including but not limited to other end user devices. *Id.*, ¶¶0032-0034.

k) Claim 37

37. The storage medium of claim 32, the program when executed causes the Internet direct device to communicate with other Internet direct devices via voice over IP by the Internet direct device associated with the user.

743. Nicholas describes how its end user device has programming that provides VoIP calling, among other forms of communication, to and from other Internet direct devices, including but not limited to other end user devices. *Id.*, ¶¶0032-0034.

l) Claim 38

38. The storage medium of claim 32, the program when executed causes the Internet direct device to display the still or video images on a display and receive texts from the user.

744. Nicholas describes how its end user device has programming that can provide video calls and videoconferencing with other Internet direct devices, which include at least video images. *Id.*, ¶¶0032-0034. Nicholas also explains that its end user device can send and receive text messages. *Id.*, ¶0024 ("Exemplary end user device 100 further comprises: … a visual indication to an end user that they have received a voice and/or text message"); *id.*, ¶0040 ("The end user device 300 further includes a display interface 320 that forwards graphics, **text**, and other data

from the communication infrastructure 304 or from a frame buffer (not shown) for display to a user on a display unit 322.") (emphasis added).

2. Petition 6: Ground 2: Inoue And Nair

a) Claim 22

> *22. A method for transmitting and receiving still or video images by an Internet direct device associated with a user over a communications network, comprising the steps of:*

745. Inoue describes a digital camera practing a method of transmitting and receiving images that, when "powered on … automatically establishes a network connection with [a] file server" for the purposes of transmitting and receiving images over a communications network. Inoue, Abstract. Inoue's camera can connect to the Internet via a LAN or WLAN. *See, e.g.*, Inoue, ¶0060.

> *automatically connecting the Internet direct device to said communications network on power-up using one of a plurality of available modes of connection, which is designated as a primary mode of connection;*

746. Inoue states that "[w]hen the digital camera is powered on, it automatically establishes a network connection with the file server in an activation process." Inoue, Abstract. "The power button 38 is one for switching on/off the power of the entire digital camera 10. When the digital camera 10 is off, pressing the power button 38 is detected by event detecting unit 50 as an activation request, which is followed by an activation process." *Id.*, ¶0058. Inoue's camera "detects an

activation request" and "establish[es] a network connection between the digital camera and a file server upon detection of the activation request." *Id.*, ¶0017; *see also id.*, ¶0066 & Fig. 6. The connection to the communications network can be via any one of a plurality of modes of connection: "The 'network' may be either wireless or wired. Nor does it matter whether the network uses such facilities as an access point if on a wireless LAN in infrastructure mode, or is of so-called peer-to-peer as if in ad-hoc mode." *Id.*, ¶0015.

747. The particular network that is preselected for use is the "primary mode of connection" for Inoue's camera (Internet direct device) to a "communication network," such as the Internet. *Id.*, ¶0060. In one embodiment, Inoue identifies "a wireless LAN" as the primary mode of communication to reach the Internet.

capturing still or video images by an image capture system of the Internet direct device;

748. Inoue expressly describes "a digital camera" with an "image pickup block" to capture image data, including at least still images. Inoue, ¶0009; *see also id.*, ¶¶0002, 0010-0013.

transmitting the captured still or video images to another Internet direct device over said communications network upon image capture by a microprocessor of the Internet direct device;

749. Inoue describes a "processing block 16" that includes an "image processing unit 44," a "transmission processing unit 52," a "reproduction processing unit 48," memory units, and various other elements. Inoue, ¶0053 & Fig. 1. The transmission unit contains a "communication control unit 72" which controls an internal "option card 68" able to access various communication networks. *Id.*, ¶0049 ("The card slot 20 [in the camera] retains an option card 68 detachably"). "The communication control unit 72 exercises control necessary to communicate with the file server by using the option card 68 loaded in the card slot 20 if the option card 68 is a communication card." *Id.*, ¶¶0056, 0060 ("The digital camera 10 and the access point 122 communicate with each other over a wireless LAN"). Inoue teaches that its digital camera transmits images "upon obtainment of the image" by the image pickup to a server. *Id.*, ¶0018. "Upon obtainment of the image" includes image capture. *Id.*, ¶15 ("The 'image obtained by image pickup,' shall cover both an intact image just picked up and an image obtained through compression or the like after picked up."); *id.*, ¶0048 ("The image pickup block 12 shoots a subject under user instructions.").

750. Inoue further describes that its digital cameras can both transmit and receive images from the server; thus, its cameras have the capability to transmit an image to another digital camera by having a first camera upload the image and a second camera download the same image. Inoue explains:

> One of the aspects of the present invention relates to a digital camera, which comprises … a processing block which applies processing to an image. For example, the processing block includes any one of the following configurations:
>
> (1) A detecting unit which detects an activation request for the digital camera, and a communication control unit which performs processing for establishing a network connection with a file server upon detection of the activation request;
>
> (2) A detecting unit which detects an image pickup request, and a communication control unit which performs processing for transmitting an image obtained by image pickup to a file server over a network upon obtainment of the image;
>
> (3) A detecting unit which detects an image reproduction request, and a communication control unit which performs processing for receiving an image to be reproduced from a file server over a network when the image reproduction request is detected; and
>
> (4) Any two or more of the configurations (1) to (3) in combination.

Inoue, ¶¶0009-0013.

751. Inoue describes its file server as managing the images of a plurality of digital cameras from a plurality of users. *Id.*, ¶0059. A person of ordinary skill in the art would have understood that one of Inoue's digital cameras can transmit images to a server, and another of Inoue's digital cameras could retrieve those

images from a server. In fact, such functionality is already part of in each of Inoue's digital cameras. Inoue, ¶¶0010-0013; see also id., ¶¶0059-0061.

752. Nair supports using the functionality described in Inoue to allow transmission and receipt of image data among two or more of its devices. Nair relates "generally to the field of wireless technology and, more particularly, to seamless routing between wireless networks." Nair, ¶0003. Its teachings apply to any wireless device with capability for communicating by wireless technology—e.g., "wireless device 12 can be, for example, a wireless personal digital assistant (PDA), a cellular phone, or any other wireless-capable electronic device." Id. Nair describes two-way communication among devices. Id. A skilled artisan would have recognized that it would be advantageous to use the functionality already described in Inoue to permit one digital camera to transmit an image to the file server, and a different digital camera to receive the image. For example, it was well known at the time that photographers need to share images with other photographers, such as in the cases of a photojournalists working together on a remote assignment or of friends traveling together. A person of ordinary skill in the art would have understood to apply the teachings already in Inoue to allow the sharing of images to occur among digital cameras, including upon image capture (*e.g.*, in real time).

receiving still or video images from said other Internet direct device over said communications network by the Internet direct device; and

753. Inoue also explains that its digital camera that can receive images previously uploaded to the server by it or a different digital camera for visual display on the camera. "When image reproduction is instructed from the digital camera, the image is downloaded from the file server over the network and displayed on the digital camera." Inoue, Abstract; *see also id.*, ¶¶0012, 0019, 0074-0075. "The reproduction processing unit 48 decompresses the image and reproduces it on the LCD 22[.]" *Id.*, ¶0075. As discussed above, a skilled artisan would understand Inoue's digital cameras to be capable of practicing a method of receiving still or video images from another digital camera.

automatically switching to another available mode of connection by the microprocessor when the Internet direct device detects that said primary mode of connection to the communications network is unavailable.

754. The particular network that is preselected for use is the "primary mode of connection" for Inoue's camera (Internet direct device) for connection to a "communication network," such as the Internet. Inoue, ¶0058. In one embodiment, Inoue identifies "a wireless LAN" as the primary mode of communication to reach the Internet. *Id.*, ¶0060. Inoue, however, does not disclose that its digital cameras

automatically switch from a WLAN to another available mode of connection when the WLAN is unavailable.

755. Nair teaches automatic switching to another available mode of connection. Nair relates "generally to the field of wireless technology and, more particularly, to seamless routing between wireless networks." Nair, ¶0003. Nair describes its technology as applicable to any wireless device with capability for communicating by wireless technology—*e.g.*, "wireless device 12 can be, for example, a wireless personal digital assistant (PDA), a cellular phone, or any other wireless-capable electronic device." *Id.* As noted, Inoue's digital camera is a wireless-capable electronic device that also uses a WLAN. Nair, ¶0060.

756. Nair explains that its technology allows wireless devices to have "uninterrupted and effective wireless access for the wireless device 12" by "automatically and seamlessly" handing off communications from a WLAN to a wireless wide area network (a "WWAN") when the WLAN connection is unavailable. Nair, ¶0029; *see also id.*, Abstract, ¶¶0008, 0009, 0022, 0028, 0035-0040. As Nair states:

> In operation, as the wireless device 12 is moved between or among the effective ranges of various wireless networks (WLAN or WWAN), connectivity application 24 functions to change connections from one wireless network to another wireless network. In one aspect, the change of wireless connection can be automatic such that, for

> example, upon loss of connectivity from any one connection, the connectivity application 24 will automatically initiate a new connection and pass the respective IP address to operating system 20. Then, as applications 22 are subsequently refreshed using an IP connection, the applications 22 will automatically pick up the new IP address and start using the new address for wireless connectivity (e.g., according to the rules of core component 38). This may occur without any noticeable loss of connectivity to the user of the wireless device 12.

Nair, ¶0039. As discussed above, a person of ordinary skill in the art would have applied these teachings from Nair to Inoue's digital camera.

b) Claim 23

> *23. The method of claim 22, wherein the step of automatically switching comprises the step of switching to one of the following available modes of connection: a land line, DSL, cable, satellite, wireless network, cellular, Wi-Fi, and Wi-Max.*

757. Nair explains that its wireless device 12 can use a variety of modes of communications in addition to WLAN (*e.g.*, Wi-Fi) and WWAN (*e.g.*, cellular). Nair, ¶0024. For example:

> Each wireless networks 14, 16, 18 can be a communication network that supports wireless communication. Each network supports at least one wireless link or device connection. As such, the networks may support a variety of communications, including, but not limited to, analog cellular system, digital cellular system, Personal

> Communication System (PCS), Cellular Digital Packet Data (CDPD), ARDIS, RAM Mobile Data, Metricom Ricochet, paging, and Enhanced Specialized Mobile Radio (ESMR). The wireless networks 14, 16, 18 may utilize or support various protocols. Exemplary protocols for WLANs **16,18** include IEEE 802.11, HomeRF, Bluetooth, HiperLAN and the like. Exemplary protocols for WWAN 14 include Time Division Multiple Access (TDMA, such as IS-136), Code Division Multiple Access (CDMA), lxRTT, General Packet Radio Service (GPRS), Enhanced Data rates for GSM Evolution (EDGE), Global System for Mobile communications (GSM), Universal Mobile Telecommunications System (UMTS), and Integrated Digital Enhanced Network (iDEN) Packet Data.

Id., ¶0025.

758. In fact, a person of ordinary skill in the art would have known that a plurality of modes of communication could have included each the referenced modes, and would have been aware of all of the modes of connection in this claim as potential alternatives. The recited networks were well-known modes of connecting to a communication network, such as the Internet.

c) Claim 25

> *25. The method of claim 22, further comprising the step of transmitting and receiving audio to and from said other Internet direct devices by the microprocessor of the Internet direct device associated with the user over said communications network.*

759. It was well known prior to the '991 patent's earliest effective filing date that digital cameras could be (and were) included in cell phones. See Narayanaswami, p. 65. As of December 2004, "cell phones that integrate digital cameras have far outsold regular digital cameras." Id.

760. As noted above, Inoue discloses a digital camera. Inoue, ¶0009; see also id., ¶¶0002, 0010-0013. Nair discloses a cell phone that permits the transmission and receipt of audio from other cell phones, *i.e.*, other Internet direct devices. Nair, ¶¶0027, 0034, 0040. For the reasons discussed above, a person of ordinary skill in the art would have been motivated to include Inoue's digital camera in a cell phone, such as those described in Nair. As Narayanaswami, which would have been available at the time of alleged invention, explained:

> First, the cell phone's voice communication capability makes it the most ubiquitous portable device. Second, people enjoy the convenience of capturing high-resolution digital images using a device they already carry. Third, this integration relieves people from having to make a conscious decision to take a camera in anticipation of taking pictures. Some digital cameras even offer integrated Wi-Fi capabilities for direct image transfer.

Narayanaswami, p. 65.

d) Claim 27

27. The method of claim 22, further comprising the step of communicating with other Internet direct devices by the Internet *direct device associated with the user over said communications network.*

761. Inoue's digital camera communicates with other digital cameras over a communications network. Inoue explains that its digital camera can receive images previously uploaded to the server by it or a different digital camera for visual display on the camera. "When image reproduction is instructed from the digital camera, the image is downloaded from the file server over the network and displayed on the digital camera." Inoue, Abstract; *see also id.*, ¶¶0012, 0019, 0074-0075. "The reproduction processing unit 48 decompresses the image and reproduces it on the LCD 22[.]" *Id.*, ¶0075.

762. Moreover, Inoue discloses a digital camera and it was well known to persons of ordinary skill in the art to include a digital camera in a cell phone. Nair discloses a cell phone that permits the transmission and receipt of audio from other cell phones, *i.e.*, other Internet direct devices. Nair, ¶¶0027, 0034, 0040. For the reasons discussed above, a person of ordinary skill in the art would have been motivated to include Inoue's digital camera in a cell phone, such as the cell phones discussed in Nair.

e) Claim 28

28. The method of claim 22, further comprising the step of communicate [sic] with other Internet direct devices via voice over IP by the Internet direct device associated with the user.

763. As discussed above, it was well known in the art that Inoue's digital camera could be included in a cell phone, such as the cell phones disclosed in Nair. Nair describes using "voice over Internet Protocol (IP)" as a means for its cell phone to communicate with other cell phones. Nair, ¶0034. A person of ordinary skill in the art would have been motivated to include Inoue's digital camera in a cell phone, such as the cell phones discussed in Nair. As disclosed in Nair, it was known at the time that VoIP was a communication method used by cellular phones and a person of ordinary skill in the art would have included VoIP to provide an addition, lower cost method of making and receiving telephone calls.

f) Claim 29

29. The method of claim 22, further comprising the steps of displaying the still or video images on a display of the Internet direct device, and receiving texts from the user by the Internet direct device.

764. Inoue displays at least still images on a display: "When image reproduction is instructed from the digital camera, the image is downloaded from the file server over the network and displayed on the digital camera." Inoue, Abstract; *see also id.*, ¶¶0012, 0019, 0074-0075. "The reproduction processing unit 48 decompresses the image and reproduces it on the LCD 22[.]" *Id.,* ¶0075. For the reasons discussed above, it was well known to include digital cameras like that disclosed by Inoue in a cell phone. A person of ordinary skill in the art would also have understood at the time that the capability to receive text messages (*e.g.*, via

SMS) is a part of the disclosure of a cell phone. Indeed, cellular phones typically send and receive text messages. For the reasons discussed above, a person of ordinary skill in the art would have been motivated to include Inoue's digital camera in a cell phone, such as the cell phones discussed in Nair.

g) Claim 32

32. A non-transitory storage medium comprising

765. This element is fully disclosed by both Inoue and Nair. Inoue discloses a main memory and a flash memory as part of its processing block 16. Inoue, ¶0053. Nair explains that the "wireless device 12 can be any suitable electronic device such as, for example, a portable personal computer (PC), wireless PDA or cellular phone, having a data processing facility supported by memory (either internal or external) and being wireless network capable." Nair, ¶0031; *see also id.*, ¶0020 (noting that the storage medium can be "non-volatile memory, such as read-only memory (ROM)").

a program for transmitting and receiving still or video images over a communications network when executed by an Internet direct device associated with a user to cause the Internet direct device to:

766. A skilled artisan would understand that both Inoue and Nair are electronic devices that are programmed to perform their transmitting and receiving functions. Inoue describes the use of various programs to transmit and receive at least still images over a communications networks. Inoue, ¶¶0053-0061, 0074-

0075; *see also id.*, ¶¶0010-0012. Nair also describes using a computer program to perform its functions. Nair, ¶0018 ("For purposes of this discussion, an application, process, method, routine, or sub-routine is generally considered to be a sequence of computer-executed steps leading to a desired result[,]" *i.e.*, a computer program).

> *automatically connect the Internet direct device to said communications network on power-up using one of a plurality of available modes of connection, which is designated as a primary mode of connection;*

767. As discussed above, Inoue's camera (Internet direct device) contains programming to "detect[] an activation request" and "establish[] a network connection between the digital camera and a file server upon detection of the activation request." Inoue, ¶0017; *see also id.*, ¶0066 & Fig. 6; *see also id.*, ¶0058. The connection to the communications network can be via any one of a plurality of modes of connection: "The 'network' may be either wireless or wired. Nor does it matter whether the network uses such facilities as an access point if on a wireless LAN in infrastructure mode, or is of so-called peer-to-peer as if in ad-hoc mode." *Id.*, ¶0015. In one embodiment, the primary mode of connection to the communications network is "a wireless LAN" and the communications network can be the Internet. *Id.*, ¶0060.

> *capture still or video images by an image capture system of the Internet direct device;*

768. Inoue describes "a digital camera" with an "image pickup block" with programming to capture image data, including capturing at least still images.Inoue, ¶0009; *see also id.*, ¶¶0002, 0010-0013.

> *transmit the captured still or video images to another Internet direct device over said communications network upon image capture by a microprocessor of the Internet direct device;*

769. Inoue teaches that its digital cameras (Internet direct devices) are programmed to transmit images "upon obtainment of the image" by the image pickup to a server. Inoue, ¶0018. As discussed above, "[u]pon obtainment of the image" includes image capture. *Id.*, ¶15. As further discussed above, a person of skill in the art would have understood that the cameras can be programmed to transmit the images to a server, and that the server can be programmed to permit images to be received by another digital camera simply by applying the teachings in Inoue. Thus, Inoue's digital camera can transmit still images to another Internet direct device over a communication network upon image capture.

770. Moreover, Nair describes two-way communication among devices. Nair, ¶0003. A person of ordinary skill in the art would have recognized that it would be advantageous to use the functionality already described in Inoue to permit one digital camera to transmit an image to the file server, and a different digital camera to receive the image. For example, it was well known at the time that photographers need to share images with other photographers, such as in the

cases of a photojournalists working together on a remote assignment or of friends traveling together. A skilled artisan would have understood to apply the teachings already in Inoue to allow the sharing of images to occur among digital cameras, including upon image capture (*e.g.*, in real time).

receive still or video images from said other Internet direct device over said communications network by the Internet direct device; and

771. As discussed above, Inoue also discloses that its digital camera can be programmed to receive images previously uploaded to the server by it or a different digital camera for visual display on the camera. *See* Inoue, Abstract; *see also* id., ¶¶0012, 0019, 0074-0075. "The reproduction processing unit 48 decompresses the image and reproduces it on the LCD 22" of the digital camera. *Id.*, ¶0075. A person of ordinary skill in the art would have understood that this programming allows Inoue's digital camera to receive at least still images that had been uploaded to the server by other digital cameras. As discussed above, a skilled artisan would have understood that Inoue's digital camera can transmit still images to the server upon image capture and another Internet direct device can receive them, including in real time. Moreover, for the reasons discussed above a skilled artisan would be motivated to combine Inoue with Nair's teachings regarding two-way communication for the reasons set forth above.

automatically switch to another available mode of connection by the microprocessor when the Internet direct device detects that said *primary mode of connection to the communications network is unavailable.*

772. As discussed above, in one embodiment the “primary mode of connection” for Inoue’s digital camera’s connection to a communication network is “a wireless LAN” to reach the Internet. Inoue, ¶0060. Inoue does not disclose that its digital cameras is programmed to automatically switch to another available mode of connection when the primary mode of connection is unavailable, As discussed above, Nair provides this teaching and a skilled artisan would have been motivated to combine Nair with Inoue. Nair relates “generally to the field of wireless technology and, more particularly, to seamless routing between wireless networks.” Nair, ¶0003. Nair explains that its technology allows wireless devices to have “uninterrupted and effective wireless access for the wireless device 12” by “automatically and seamlessly” handing off communications from a WLAN to a wireless wide area network (a “WWAN”) when the WLAN connection is unavailable. Inoue, ¶29; *see also id.*, Abstract, ¶¶0008, 0009, 0022, 0028-0028, 0035-0040.

773. Nair further explains that its technology allows wireless devices to have “uninterrupted and effective wireless access for the wireless device 12” by “automatically and seamlessly” handing off communications from a WLAN to a wireless wide area network (a “WWAN”) when the WLAN connection is

unavailable. Inoue, ¶29; *see also id.*, Abstract, ¶¶0008, 0009, 0022, 0028, 0035-0040.

774. A skilled artisan would have applied these teachings from Nair to Inoue's digital camera. Nair explains some of the advantages that would motivate a skilled artisan to modify Inoue's wireless camera to be able to seamlessly connect to a WWAN when a WLAN is unavailable. Nair, ¶¶0006-0009. For the reasons discussed above, a person of ordinary skill in the art would also have recognized additional advantages to combining this functionality from Nair to Inoue's digital camera.

h) Claim 33

33. The storage medium of claim 32, the program when executed causes the Internet direct device to automatically switch to one of the following available modes of connection: a land line, DSL, cable, satellite, wireless network, cellular, Wi-Fi, and Wi-Max.

775. As discussed above, Nair discloses that another mode of connection to a communication network includes WLAN (*e.g.*, Wi-Fi), WWAN (*e.g.*, cellular) and a wide variety of other modes of communication to the communication network. Nair, ¶¶0024-0025. A skilled artisan would have applied the programming in Nair, as discussed above, to implement Nair's automatic switching functionality as a modification of the programming in Inoue's digital

camera. A person of ordinary skill in the art also would have known that a plurality of modes of communication could have included each the referenced modes.

i) Claim 35

35. The storage medium of claim 32, the program when executed causes the Internet direct device to transmit and receive audio to and from said other Internet direct devices over said communications network.

776. As discussed above, it was well known prior to the '991 patent's earliest effective filing date that digital cameras could be (and were) included in cell phones. *See* Narayanaswami. Inoue discloses a digital camera. Inoue, ¶0009; *see also id.*, ¶¶0002, 0010-0013. Nair discloses a cell phone that permits the transmission and receipt of audio from other cell phones, *i.e.*, other Internet direct devices. Nair, ¶¶0027, 0034, 0040. For the reasons discussed above, a person of ordinary skill in the art would have known based on at least Narasayanswami that it would be advantageous to include Inoue's digital camera could be used in a cell phone, such as those described in Nair.

j) Claim 36

36. The storage medium of claim 32, the program when executed causes the Internet direct device to communicate with other Internet direct devices over said communications network.

777. As discussed above, Inoue's digital camera communicates with other digital cameras over a communications network and can download images from a

server that have been uploaded by other digital cameras. Inoue, Abstract; *see also id.*, ¶¶0012, 0019, 0074-0075.

778. Moreover, as discussed above it was well known to persons of ordinary skill in the art to include a digital camera in a cell phone. Nair discloses a cell phone that communicates other cell phones, *i.e.*, other Internet direct devices. Nair, ¶¶0027, 0034, 0040. A person of ordinary skill in the art would have known to include Inoue's digital camera in a cell phone, like those discussed in Nair.

k) **Claim** 37

37. The storage medium of claim 32, the program when executed causes the Internet direct device to communicate with other Internet direct devices via voice over IP by the Internet direct device associated with the user.

779. As discussed above, it was well known in the art that Inoue's digital camera could be included in a cell phone, such as the cell phones disclosed in Nair. Nair describes programming a cell phone to use "voice over Internet Protocol (IP)" as a means to communicate with other phones. Nair, ¶0034. As discussed above, a person of ordinary skill in the art would have been motivated to include Inoue's digital camera in a cell phone, such as the cell phones discussed in Nair. As disclosed in Nair, it was known at the time that VoIP was a communication method used by cellular phones and a person of ordinary skill in the art would have

included VoIP to provide an addition, lower cost method of making and receiving telephone calls.

l) Claim 38

38. The storage medium of claim 32, the program when executed causes the Internet direct device to display the still or video images on a display and receive texts from the user.

780. Inoue displays at least still images on a display: "When image reproduction is instructed from the digital camera, the image is downloaded from the file server over the network and displayed on the digital camera." Inoue, Abstract; *see also id.*, ¶¶0012, 0019, 0074-0075. "The reproduction processing unit 48 decompresses the image and reproduces it on the LCD 22[.]" *Id.*, ¶0075. For the reasons discussed above, it was well known to include digital cameras like that disclosed by Inoue in a cell phone. A person of ordinary skill in the art would have understood at the time that the capability to receive text messages (*e.g.*, via SMS) is a part of, and inherently disclosed in, the disclosure of a cell phone.

3. Petition 6: Ground 3 –Inoue, Nair and Narayanaswami

781. As discussed above, Nair describes mobile phones and Narayanaswami recognizes that digital cameras are in mobile phones and states the benefits of including a digital camera in a mobile phone. *See* Narayanaswami, ¶0013, p. 65. For the reasons discussed in Nair and Narayanaswami, and the

further reasons discussed above, an ordinary artisan would have been motivated to combine Inoue's camera in a mobile phone in the manner disclosed in Nair and Narayanaswami. Inoue, Nair and Narayanaswami all explain why it would have been advantageous to include Inoue's camera in a cell phone with Nair's functionality, and a skilled artisan would have been motivated to make the combination for the reasons stated in those references as well as in Ground 2, above.

4. Petition 6: Ground 4: Umeda and Inoue

a) Claim 22

22. A method for transmitting and receiving still or video images by an Internet direct device associated with a user over a communications network, comprising the steps of:

782. Umeda describes a "mobile communication system … for roaming between different kinds of networks." Umeda, Abstract. Umeda's describes the Internet as a communications network. *Id.*, ¶0027. Umeda also describes transmitting and receiving audio and/or video images as part of a video call or videoconference. *See Id.*, ¶0038 (describing both video and digital cameras). Umeda further describes various devices, including a "large-size TV set" and a "mobile phone," that utilize cameras for capturing image data for transmission to others as part of a videoconferencing system. *Id.*, ¶¶0094-0099.

> *automatically connecting the Internet direct device to said communications network on power-up using one of a plurality of available modes of connection, which is designated as a primary mode of connection;*

783. For the reasons discussed above, a person of ordinary skill in the art would have been motivated to combine Inoue and Umeda and Inoue to achieve this claim element. Umeda explains that its devices have the capability of connecting to one of a plurality of modes of connection, and of selecting a mode of connection based upon predetermined criteria. For example:

> In the case where the communication terminal 200 is initially communicating in the cellular mobile communication system, whether the wireless LAN system, which is the other system, can be utilized or not is determined by measuring the reception level or the like in the NW detecting section 206. In the case where the wireless LAN system is more favorable for the user from the viewpoints of transmission quality, capability, and the like while communications are possible, switching (changing) is carried out between the systems (networks).

Umeda, ¶52.

784. Umeda does not expressly describe automatically connecting to a primary mode of communication on power up. Inoue, however, contains this disclosure and would have been combined with Umeda to practice this entire claim element. Inoue also describes a plurality of available network connections [Inoue, ¶0015], and states that "[w]hen the digital camera is powered on, it automatically

establishes a network connection with the file server in an activation process" [Inoue, Abstract]; *see also id.*, ¶¶0017, 0058, 0066 & Fig. 6.

785. As discussed above, a person of ordinary skill in the art would have been motivated to combine Inoue's teaching of automatic connection at power up with Umeda's videoconferencing system. Umeda describes its technology as providing a seamless network connection [Umeda, ¶0052] and, in order to have a seamless connection the device must be connected to the network at power up. Indeed, in order for Umeda's devices to receive a request for a videoconference, it must always be on. A skilled artisan would have included Inoue's teaching of connecting at power-up to Umeda to ensure, among other things, that the network connection was seamless in order to permit Umeda's device to receive incoming requests for video conferences.

capturing still or video images by an image capture system of the Internet direct device;

786. Umeda discloses an imaging system that includes a digital camera, with a focus in several examples on video images. *See* Umeda, ¶0038 (describing both video and digital cameras). Umeda also describes various devices, including a "large-size TV set" and a "mobile phone," that utilize cameras for capturing image data for transmission to others as part of a videoconferencing system. *Id.*, ¶0097 & Fig. 10. Transmissions during a videoconference occur on image capture. Umeda

describes how these devices and cameras can also capture audio as part of a “video conference system.” *Id.*, ¶¶0094-0099.

transmitting the captured still or video images to another Internet direct device over said communications network upon image capture by a microprocessor of the Internet direct device;

787. Umeda describes its Internet direct devices as including a “communication terminal 200” that includes “a control section 202, an antenna section 204, a network detecting section 206, network communication sections 208, and a terminal interface section 210.” Umeda, ¶0036 & Fig. 3. “The control section 202 controls the whole communications terminal 200 in a centralized manner” [*id.*] and would be understood by a person of ordinary skill in the art to include at least one microprocessor. “Control section 202” controls the antenna and “carries out communications with at least one network NW100[.]” Umeda, ¶0036; *see also id.*, Fig. 1. Among the communications that are transmitted and received at the direction of control section 202 are images as part of a videoconference with other Internet direct devices. *Id.*, ¶¶0096-0099 & Fig. 10. Umeda’s Figure 10 depicts multiple Internet direct devices (*e.g.*, mobile phones, televisions) transmitting and receiving images between each other over a communication network. *Id.*, Fig. 10.

receiving still or video images from said other Internet direct device over said communications network by the Internet direct device; and

788. Umeda describes this method step as being practiced by its devices and systems. Among the communications that are transmitted and received at the direction of control section 202 are images as part of a videoconference with other Internet direct devices. Umeda, ¶¶0096-0099 & Fig. 10. Umeda's Figure 10 depicts multiple Internet direct devices (*e.g.*, mobile phones, televisions) transmitting and receiving images between each other over a communication network. *Id.*, Fig. 10.

automatically switching to another available mode of connection by the microprocessor when the Internet direct device detects that said primary mode of connection to the communications network is unavailable.

789. Umeda discloses automatic switching to another available network when the primary network is unavailable. Umeda explains that such switching can occur at least when the Internet direct device detects that the primary mode of connection to the communications network lacks "capability" [Umeda, ¶52], which includes when the network is unavailable. A person of ordinary skill in the art would have understood that an "incapable" network includes networks that are unavailable, such as when one moves out of range (as in the case of a WLAN) or when one disconnects a wired connection (as in the case of a wired LAN). In the case that a mode of connection is unavailable, Umeda teaching switching to another available mode of connection, *e.g.*, a cellular network. Umeda, ¶52. In a related discussion, Umeda further teaches switching from a primary mode of

connection to the communication network to another available mode of connection in its discussion of a mobile user who begins a videoconference in a stationary location (*e.g.*, a conference room) and then continues the videoconference by switching to a mobile phone connected via a cellular network with a camera and display. *See id.*, ¶¶0096-0099 & Fig. 10.

b) Claim 23

23. The method of claim 22, wherein the step of automatically switching comprises the step of switching to one of the following available modes of connection: a land line, DSL, cable, satellite, wireless network, cellular, Wi-Fi, and Wi-Max.

790. Umeda also discloses wired, wireless and a cellular network as among its available modes of communication. ¶009, ¶0032, 0050, 0052, 0096-0099. As discussed above, a person of ordinary skill in the art would have known that a plurality of modes of communication could have included each the referenced modes.

c) Claim 25

25. The method of claim 22, further comprising the step of transmitting and receiving audio to and from said other Internet direct devices by the microprocessor of the Internet direct device associated with the user over said communications network.

791. Umeda discloses an imaging system that includes a digital camera, with a focus in several examples on video images. *See* Umeda, ¶0038 (describing

both video and digital cameras). Umeda also describes various devices, including a "large-size TV set" and a "mobile phone," that utilize cameras for capturing image data for transmission to others as part of a videoconferencing system. *Id.*, ¶0097 & Fig. 10. Umeda describes how these devices and cameras can also capture audio as part of a "video conference system." *Id.*, ¶¶0094-0099.

d) Claim 27

> *27. The method of claim 22, further comprising the step of communicating with other Internet direct devices by the Internet direct device associated with the user over said communications network.*

792. Umeda discloses an imaging system that includes a digital camera for communicating video images and audio with other Internet direct devices. *See* Umeda, ¶0038 (describing both video and digital cameras). Umeda also describes various devices, including a "large-size TV set" and a "mobile phone," that utilize cameras for capturing image data for communication with others as part of a videoconferencing system. ¶009, ¶0097 & Fig. 10; *see also id.*, ¶¶0094-0099.

e) Claim 28

> *28. The method of claim 22, further comprising the step of communicate with other Internet direct devices via voice over IP by the Internet direct device associated with the user.*

793. Although Umeda does not use the term "voice over IP," it discloses the use of a packet network and packet routing for communicating among Internet

direct devices. Umeda, ¶¶0027, 0031. A person of ordinary skill in the art would have recognized these disclosures to refer to communicating with other devices via VoIP.

f) Claim 29

> *29. The method of claim 22, further comprising the steps of displaying the still or video images on a display of the Internet direct device, and receiving texts from the user by the Internet direct device.*

794. Umeda describes receiving both displaying video images and receiving texts from a user by the Internet direct device. In one embodiment, Umeda's device switches between providing audio, video, and or text information depending upon the capabilities of the device or network, or based on the user's environment. *See, e.g.,* Umeda, ¶¶0053 ("Also, changes in provided contents, such as those in the case where contents including moving images and sounds are switched to contents including still images and texts, can become the object to be inspected."), 58 (the "terminal responds to a change from contents consisting of text information alone to contents including visual information, the apparatus, functions, and the like can be switched in a form conforming to a condition required for contents."), 0062-0068 & Fig. 7.

g) Claim 32

32. A non-transitory storage medium comprising

795. Umeda describes a "control section 302" and "a storage section 316" in an information terminal. Umeda, ¶0038 & Fig. 4. "The control section 302 has an internal memory for storing control programs such as an OS (Operating system), programs defining various processing procedures and the like, and required data; and carries out various information processing operations according to these programs and the like." *Id.*, ¶0038. "The storage section 316" in the information terminal also "is storage means such as memory devices like RAM and ROM, fixed disk devices such as hard disks, flexible disks, and optical disks; and stores various tables, files, databases, and the like for use in various processing operations." *Id.*, ¶0038.

a program for transmitting and receiving still or video images over a communications network when executed by an Internet direct device associated with a user to cause the Internet direct device to:

796. Umeda states that its "control section 302 has an internal memory for storing control programs such as an OS (Operating system), programs defining various processing procedures and the like, and required data; and carries out various information processing operations according to these programs and the like." Umeda, ¶0038. The programming in "control section 202" controls the antenna and "carries out communications with at least one network NW100[.]" *Id.*;

see also id., Fig. 1. Among the communications that are transmitted and received at the direction of control section 202 are images as part of a videoconference with other Internet direct devices. *Id.*, ¶¶0052, 0096-0099 & Fig. 10. Umeda's Figure 10 depicts multiple Internet direct devices (*e.g.*, mobile phones, televisions) transmitting and receiving images between each other over a communication network. *Id.*, Fig. 10.

> *automatically connect the Internet direct device to said communications network on power-up using one of a plurality of available modes of connection, which is designated as a primary mode of connection;*

797. The combination of Umeda and Inoue render this claim element obvious. As discussed above, Umeda describes cellular phones and other devices that connect to one of a plurality of modes of connection, including as part of a videoconference. *See, e.g.,* Umeda, Abstract, ¶¶0052, 0097 & Figs. 1& 10. Umeda does not, however, expressly describe automatically connecting to an available mode of communication on power-up, which is then designated as a primary mode of connection.

798. As discussed above, however, Inoue contains this disclosure and would have been combined with Umeda by a skilled artisan. Inoue describes a plurality of available network connections [Inoue, ¶0015], and states that "[w]hen the digital camera is powered on, it automatically establishes a network connection

with the file server in an activation process." Inoue, Abstract. Inoue's camera (Internet direct device) "detects an activation request" and "establish[es] a network connection between the digital camera and a file server upon detection of the activation request." *Id.*, ¶0017; *see also id.*, ¶¶0058, 0066 & Fig. 6. As discussed above, person of ordinary skill in the art would have been motivated to combine Inoue's teaching of automatic connection at power up with Umeda's videoconferencing system for the reasons discussed above.

capture still or video images by an image capture system of the Internet direct device;

799. Umeda's programming includes operation of an imaging system that includes a digital camera for capturing at least video images. *See* Umeda, ¶0038. Umeda also describes various devices, including a "large-size TV set" and a "mobile phone," that utilize cameras for capturing image data for transmission to others as part of a videoconferencing system. *Id.*, ¶0097 & Fig. 10. These cameras and microphones are an image capture system. Umeda further describes how these devices and cameras can also capture audio as part of a "video conference system." *Id.*, ¶¶0094 – 0099.

transmit the captured still or video images to another Internet direct device over said communications network upon image capture by a microprocessor of the Internet direct device;

800. Umeda describes this claim element. Umeda describes its Internet direct devices as including a "control section 202 [that] controls the whole communications terminal 200 in a centralized manner." ¶009, ¶0036 & Fig. 3. As I have discussed above, the control section runs programming that operates the device. Among the communications that are transmitted and received at the direction of control section 202 are images as part of a videoconference with other Internet direct devices. *Id.*, ¶¶0096-0099 & Fig. 10. Umeda's Figure 10 depicts multiple Internet direct devices (*e.g.*, mobile phones, televisions) transmitting and receiving images between each other over a communication network. *Id.*, Fig. 10. Transmissions during a videoconference occur on image capture.

receive still or video images from said other Internet direct device over said communications network by the Internet direct device; and

801. Umeda describes that the programming of its devices also causes them to receive audio and/or video images from other Internet direct devices over the communications network. "Control section 202" controls the antenna and "carries out communications with at least one network NW100[.]" Umeda, ¶0036; *see also id.*, Fig. 1. Among the communications that are transmitted and received at the direction of control section 202 are images as part of a videoconference with other Internet direct devices. *Id.*, ¶¶0096-0099 & Fig. 10. Umeda's Figure 10 depicts

multiple Internet direct devices (*e.g.*, mobile phones, televisions) transmitting and receiving images between each other over a communication network. *Id.*, Fig. 10.

> *automatically switch to another available mode of connection by the microprocessor when the Internet direct device detects that said primary mode of connection to the communications network is unavailable.*

802. As discussed above, Umeda explains that automatic switching can occur at least when the Internet direct device detects that the primary mode of connection to the communications network lacks "capability," which includes when the network is unavailable. Umeda, ¶52. In another discussion, Umeda teaches switching from a primary mode of connection to the communication network to another available mode of connection in its discussion of a mobile user who begins a videoconference in a stationary location (*e.g.*, a conference room) and then continues the videoconference by switching to a mobile phone connected via a cellular network with a camera and display. *See* Umeda, ¶¶0096-0099 & Fig. 10.

h) Claim 33

> *33. The storage medium of claim 32, the program when executed causes the Internet direct device to automatically switch to one of the following available modes of connection: a land line, DSL, cable, satellite, wireless network, cellular, Wi-Fi, and Wi-Max.*

803. Umeda also discloses wired, wireless and a cellular network as among its available modes of communication. Umeda, ¶0032, 0050, 0052, 0096-0099. As discussed above, a person of ordinary skill in the art would have known that a plurality of modes of communication could have included each the referenced modes.

i) Claim 35

35. The storage medium of claim 32, the program when executed causes the Internet direct device to transmit and receive audio to and from said other Internet direct devices over said communications network.

804. Umeda discloses that its devices transmit and receive audio, both as part of a videoconferencing function and as a cell phone. *See* Umeda, ¶¶0052, 0094-0099.

j) Claim 36

36. The storage medium of claim 32, the program when executed causes the Internet direct device to communicate with other Internet direct devices over said communications network.

805. Umeda discloses a programmed imaging system that permits communication with other Internet direct devices, including during a cellular call and a videoconference. Umeda, ¶0097 & Fig. 10; *see also id.*, ¶¶0094-0099.

k) Claim 37

37. The storage medium of claim 32, the program when executed causes the Internet direct device to communicate with other Internet direct devices via voice over IP by the Internet direct device associated with the user.

806. Although Umeda does not use the term "voice over IP," as noted above, it discloses the use of a packet network and packet routing for communicating among Internet direct devices. Umeda, ¶¶0027, 0031. A person of ordinary skill in the art would understand these disclosures to refer to communicating with other Internet direct devices via VoIP.

l) Claim 38

38. The storage medium of claim 32, the program when executed causes the Internet direct device to display the still or video images on a display and receive texts from the user.

807. As discussed above, Umeda describes displaying both video images and text messages on the screen in its device. *See, e.g.,* Umeda, ¶¶0053, 0058, 0062-0068, 0094-0099, & Figs. 7 & 10.

D. <u>Petition 7: Inter Partes Review Of Claims 1, 2, 10, 11, 19 And 20 Of The '542 Patent</u>

808. I understand that Petition 7 contains the following grounds to challenge claims 1, 2, 10, 11, 19 and 20 of the '542 patent. I have reviewed the

Petition, and the following analysis substantially mirrors the analysis in the Petition 7.

Ground	Challenged Claims	Statutory Ground and Prior Art
Ground 1	1, 2, 10, 11, 19 and 20	Anticipation under 35 U.S.C. § 102(b) by Nicholas
Ground 2	1, 2, 10, 11, 19 and 20	Obviousness under 35 U.S.C. § 103(a) by Nair in view of Umeda
Ground 3	1, 2, 10, 11, 19 and 20	Obviousness under 35 U.S.C. § 103(a) in view of Inoue and Umeda

1. Petition 7: Ground 1 – Nicholas

a) Claim 1

An Internet direct device comprising

809. Nicholas discloses an "end user device 100" defined as "any device capable of communicating data to or from a data communication network in accordance with one or more wired and/or wireless communication protocols." Nicholas, ¶0019. The device can include a camera and microphone, among other things. *Id.*, ¶¶0024, 0032-0033; *see also id.*, Fig. 1(120). The data communication network includes an "Internet connection, including but not limited to cable modems, DSL, and ISP" as well as a variety of other wired and wireless networks. *Id.*; *see also id.*, ¶0020 & Fig. 1(100).

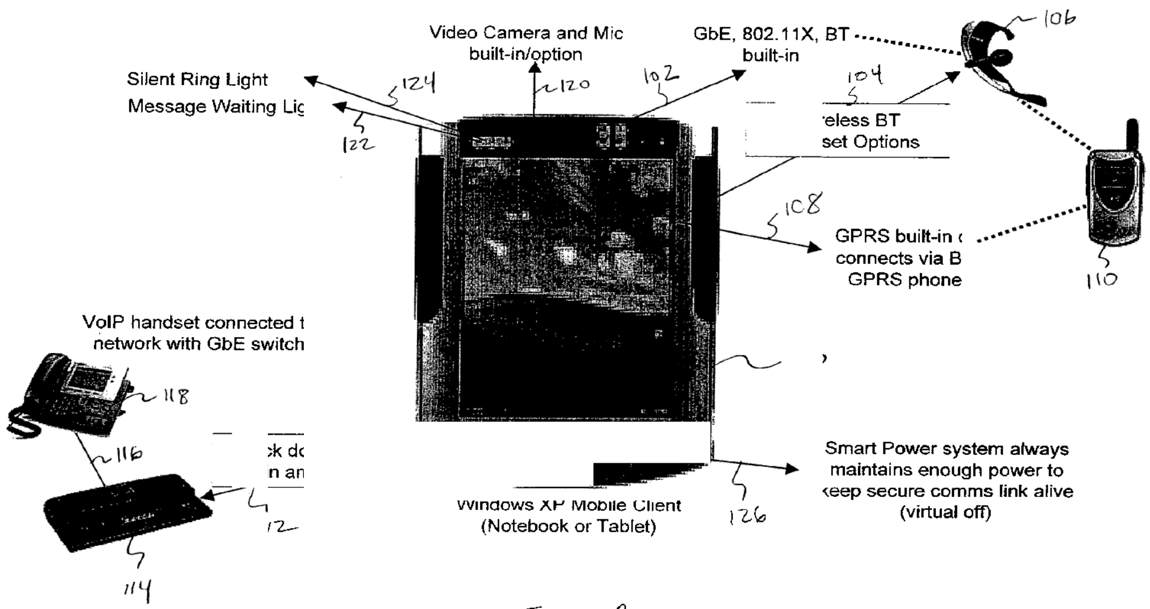

FIG. 1

Id., Fig. 1.

an imaging system to capture audio or video images

810. Nicholas's end user device 100 includes an imaging system that can capture at least video images: "Exemplary end user device 100 further comprises … an optional built-in video camera and microphone for enabling videoconferencing and the like." Nicholas, ¶¶0024, 0032-0033; *see also id.*, Fig. 1(120). Nicholas also discloses using VoIP, which can capture at least audio. *See, e.g., id.*, ¶¶0032-0034.

a microprocessor to transmit the captured audio or video images to another Internet direct device upon image capture, and receive audio or video images from the other Internet direct device over a communications network;

811. Nicholas's end user device 100 includes a microprocessor: "As shown in FIG. 3, the example end user devices includes a processor 302 for executing software routines in accordance with embodiments of the present invention." Nicholas, ¶0037 & Fig. 3. The microprocessor controls a plurality of "communication interfaces 324a-324n" that "permit data, including but not limited to voice, video and/or computer data, to be transferred between the end user device 100 and external devices[.]" *Id.*, ¶0041; *see also id.*, ¶¶0024, 0032-0033 & Fig. 1(120). Nicholas further describes how its end user device 100 can provide VoIP calling, video calls, and videoconferencing [*id.*, ¶¶0032-0034], all of which are executed by the microprocessor [*id.*, ¶0037]. The "end user device 100" is "capable of communicating data to or from a data communication network in accordance with one or more wired and/or wireless communication protocols." Nicholas, ¶0019. Audio and video images are transmitted under the control of the microprocessor upon image capture order, and audio and video images are received from another Internet direct device, in order to implement the described video-calling and videoconferncing system. *Id.*, ¶¶0032-0034, 0037, 0041.

and wherein the Internet direct device automatically connects to the communications network on power-up using one of a plurality of available modes of connection, which is designated as a primary mode of connection,

812. Nicholas discloses that its "end user device is provided that supports a connection to a plurality of data communication networks" that detects which data communication networks are available, "and selectively determines which of the plurality of data communication networks provides the most optimal communication channel." Nicholas, Abstract; *see also id.*, ¶0008. Nicholas discloses a plurality of available wired and wireless networks, including cellular networks, public packet-radio networks, cable modem, DLS, ISP, dial-up connections, private packet networks, satellite networks and LAN connections (including Ethernet, Token Ring, and Wireless LAN). *Id.*, ¶0019.

813. In one embodiment, Nicholas describes using a wired access point, which may or may not include a docking station, at "primary and secondary stationary locations." *Id.* ¶0025. "As shown in FIG. 2, when docked at a primary stationary location, such as at an office desk, the end user device … operates as a communications base station." *Id.*, ¶0026 & Fig. 2. Nicholas' primary mode of communication is not limited to a wired docking station, however. *See, e.g., id.*, ¶¶0008, 0020; *see also* discussion *infra*. For example, Nicholas states that its device can also be connected via a wired or wireless access point without a docking station while at a primary location in an office. *Id.*, ¶0032.

814. Nicholas states that while at a primary office location, its end user device provides a range of functionality, including the "enabling of video and

voice calls." *Id.*, ¶0032. Nicholas also describes connecting to its primary mode of communication automatically on power up. For example:

> The network detection function is preferably performed automatically by the end user device. For example, the network detection function may be performed automatically: (1) as part of the power-up sequence of the end user device to determine which network(s) are initially available to the end user device …

Nicholas, ¶0046.

815. Nicholas explains that when one or more available networks are detected, the end user device "select[s] an available network for data communication based on one or more predefined criteria." *Id.*, ¶0049. The predefined criteria can include the type of data being transferred, the bit error rate, signal-to-noise ratio, the costs of connecting to the network (*e.g.*, preferring to connect to networks that charge lower fees), and other criteria. *Id.*, ¶¶0050-0055; *see also id.*, ¶8. Nicholas explains that its end user device can select the appropriate network for connection as part of the detection process on power up of the device. *Id.*, ¶0056 ("[t]here may be identity between network detection functions and the collection of information necessary to perform network selection"). The selection of a primary mode of connection can be based at least in part upon the location of the device and the needs of the user. In one embodiment, the primary mode can be

a wired LAN with or without a docking station at the aforementioned primary desk site on an office campus. *Id.*, ¶¶0031-0032.[20]

and wherein the Internet direct device automatically switches to another available mode of connection when the Internet direct device detects that the primary mode of connection to the communications network is unavailable.

816. Nicholas's end user device "provides for seamless transitions between different data communication networks, thus permitting all network communication tasks to be performed in a seamless, uninterrupted manner regardless of the location of the device, the type of network connection being used, or the form of data communication being carried out." Nicholas, ¶0009. As noted, in one embodiment, Nicholas describes that "the end user device may comprise a notebook or tablet PC with or without a docking interface," *id.*, ¶0020, and can be connected to the communications network via a wired LAN at a primary office location, *see id.*, ¶¶0026 & 0032.

817. When Nicholas's end user device is disconnected from its wired LAN, "such as roaming in an office," the wired network is no longer available yet "the end user device continues to provide secure connections to the office network that

[20] As discussed below, the primary mode of connection in Nicholas can also be other locations, such as a wireless LAN on an office campus or other locations. Nicholas, ¶¶0033-0034.

are uninterrupted[.]" *Id.,* ¶0028. This connection can be made by automatically switching to a wireless network, including a WLAN or WWAN, to permit uninterrupted transmissions. *Id.,* ¶¶0029-0034. In fact, Nicholas explains that its end user device "seamlessly transitions from a LAN connection to a WLAN connection" when in "mobile mode." *Id.*, ¶0033.

818. Nicholas describes additional situations where its end-user device can switch modes of connection to a communications network. For example, as noted, Nicholas describes an embodiment where WLAN is available on a "campus." ¶006, ¶0033. Nicholas' end user device may connect to the WLAN on power up according to predetermined criteria, and can designate the WLAN as the primary mode of connection. *Id.,* ¶¶0032, 0049-0056. When a user leaves the campus, Nicholas describes seamless switching of voice and video calling to a "WWAN connection" (a wireless wide area network), which is another mode of connection to the communications network. *Id.,* ¶0034. Nicholas also describes connection to additional networks, such as "[i]n a secondary location such as a home," where the device would switch its mode of connection to a "home LAN or WLAN." *Id.*, ¶0036. In these scenarios, either the campus LAN or WLAN may constitute the primary mode of connection, and the home LAN or WLAN would constitute another mode of connection.

b) Claim 2

> *2. The Internet direct device of claim 1, wherein the plurality of available modes of connection is selected from a group consisting of: a land line, DSL, cable, satellite, wireless network, cellular, Wi-Fi, and Wi-Max.*

819. Nicholas explains that "the end user device may comprise a notebook or tablet PC with or without a docking interface" that can connect to a plurality of networks, including wired Ethernet, a wireless Local Area Network (WLAN) or a wireless Wide Area Network (WWAN). Nicholas, ¶0020. For example:

> Wired and wireless networks supported by an end user device in accordance with embodiments of the present invention may include: (1) cellular networks, including but not limited to AMPS and N-AMPS, CDMA, TDMA, GSM, iDEN, PCS 1900, PCD, and PHS; (2) public packet-radio networks, including but not limited to CDPD and CS-CDPD, DataTAC 4000, DataTAC 5000, Modacom, DataTAC 6000, DataTAC/IP, GPRS (GSM), Mobitex, Mobitex/IP, and PDC-P; (3) Inter net connections, including but not limited to cable modem, DSL, and ISP; (4) Dial-up connections, including but not limited to DIkL/TCP, ISDN, PPP, and PSTN (POTS); (5) private packet networks, including but not limited to Dat- aradio and Motorola Private Data TAC; (6) satellite networks, including but not limited to Norcom; and (7) LAN connections, including but not limited to Ethernet, Token Ring and Wireless LAN.

Nicholas, ¶0019.

c) Claim 10

10. A method for transmitting and receiving audio or video images by an Internet direct device associated with a user over a communications network, comprising the steps of:

820. Nonetheless, Nicholas discloses it. Nicholas discloses an Internet direct device, specifically, an "end user device 100" which is "any device capable of communicating data to or from a data communication network in accordance with one or more wired and/or wireless communication protocols." Nicholas, ¶0019. The data communication network includes, among others, an "Internet connection, including but not limited to cable modems, DSL, and ISP" as well as a variety of other wired and wireless networks. *Id.*; *see also id.* at ¶0020 & Fig. 1(100). "Exemplary end user device 100 further comprises … an optional built-in video camera and microphone for enabling videoconferencing and the like." *Id.*, ¶¶0024, 0032-0033; *see also id.*, Fig. 1(120). The end user device is associated with a user and practices a method of transmitting and receiving audio or video images by, *e.g.*, enabling VoIP, video calling and videoconferencing. *Id.*, ¶¶0032-0034; *see also id.*, ¶0020 & Fig. 1(100).

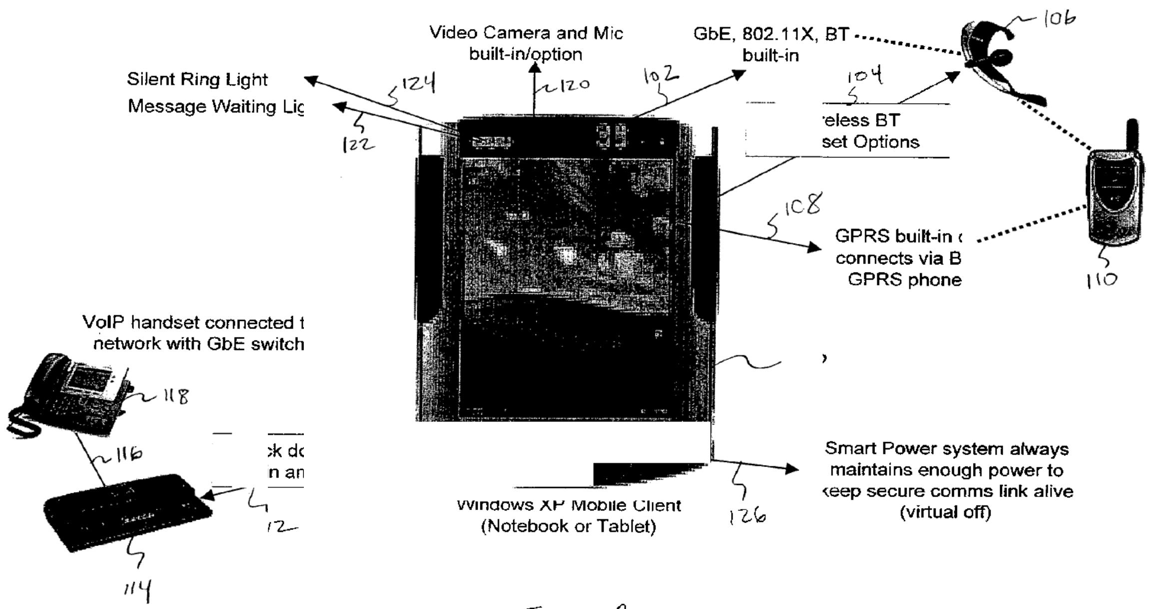

FIG. 1

Id., Fig. 1.

> *automatically connecting the Internet direct device to the communications network on power-up using one of a plurality of available modes of connection, which is designated as a primary mode of connection;*

821. Nicholas discloses automatically connecting its end user device to a communications network on power-up using one of a plurality of available modes of connection, which is designated a primary mode of connection. Nicholas states that an "end user device is provided that supports a connection to a plurality of data communication networks." Nicholas, Abstract; *see also id.*, ¶0008. The end user device detects which data communication networks are available "and selectively determines which of the plurality of data communication networks provides the

most optimal communication channel." *Id.* The end user device then connects to the selected network. *Id.*

822. Nicholas further states that "the end user device may comprise a notebook or tablet PC with or without a docking interface" that can connect to a plurality of networks, including wired Ethernet, a wireless Local Area Network (WLAN) or a wireless Wide Area Network (WWAN). *Id.*, ¶0020. In one embodiment, the end user device detects the available networks and selects the network to connect to "as part of a power-up sequence." *Id.*, ¶¶0046, 0056 ("[t]here may be an identity between network detection functions and the collection of information necessary to perform network selection."). Nicholas explains:

> The network detection function is preferably performed automatically by the end user device. For example, the network detection function may be performed automatically: (1) as part of the power-up sequence of the end user device to determine which network(s) are initially available to the end user device …

Id.

823. Which available network is selected as the primary network can be based on "one or more predefined criteria." *Id.*, ¶0049. The predefined criteria can include the type of data being transferred, the bit error rate, signal-to-noise ratio, the costs of connecting to the network (*e.g.*, preferring to connect to networks that charge lower fees), and other reasons. *Id.*, ¶¶0050-0055. Nicholas also describes

selecting a primary network based at least in part upon the location of the device and the user, *e.g.*, whethe. *Id.*, ¶¶0030-0032. For example, in one embodiment, the end user device is "desk-bound at a primary office location[.]" *Id.*, ¶0030. "While desk-bound at a primary office location, an end user device … provides a connection to a LAN/WLAN," which is the primary mode of connection. *Id.*, 0032. Nicholas states that while desk-bound at a primary office location, its end user device provides a range of functionality, including the "enabling of video and voice calls." *Id*. The connection may use a docking station, but it does not require a docking station to connection to either the wired or wireless LAN. *Id.* In this example, either the wired or wireless connection at Nicholas's primary office location is the primary mode of connection to the communications network. *Id.*

capturing audio or video images by an image capture system of the Internet direct device;

824. Nicholas's end user device includes an imaging system that can capture at audio and video images: "Exemplary end user device 100 further comprises … an optional built-in video camera and microphone for enabling videoconferencing and the like." Nicholas, ¶¶0024; *see also id.*, ¶¶0032-0033 & Fig. 1(120). The end user device's camera and microphone capture audio video images as part of a video call or conferencing session, and the end user device can capture at least audio as part of a VoIP call. *Id.*

transmitting the captured audio or video images to another Internet direct device over the communications network upon image capture by a microprocessor of the Internet direct device;

825. Nicholas describes using a microprocessor in the end user device to control its various functions, including transmitting audio and video images to another end user device over the communications network upon image capture, *e.g.*, in a video call or conference. "As shown in FIG. 3, the example end user devices includes a processor 302 for executing software routines in accordance with embodiments of the present invention." Nicholas, ¶0037 & Fig. 3. The microprocessor controls a plurality of "communication interfaces 324a-324n" that "permit data, including but not limited to voice, video and/or computer data, to be transferred between the end user device 100 and external devices[.]" *Id.*, ¶0041; *see also id.*, ¶¶0024, 0032-0033; *see also id.*, Fig. 1(120). Consequently, Nicholas's end user device is "capable of communicating data to or from a data communication network in accordance with one or more wired and/or wireless communication protocols," which is a communication network. *Id.*, ¶0019.

826. Nicholas further describes how its end user device transmits and receives audio and video images over the communication network in order to provide for VoIP calling, video calls, and videoconferencing. *Id.*, ¶¶0032-0034. The audio and video images must be transmitted and received upon capture in

order to provide the described video-calling and –conferencing applications. *Id.* All of these functions are executed by the microprocessor. *Id.*, ¶0037.

receiving audio or video images from the other Internet direct device over the communications network by the Internet direct device; and

827. Nicholas' end user device also receives audio or video images in accordance with this claim limitation.[21] Nicholas describes how its end user device 100 can provide VoIP calling, video calls, and videoconferencing, all of which include the receipt of audio and/or video images from another end user device. Nicholas, ¶¶0032-0034; *see also id.*, Fig. 1. The "end user device 100" also transmits and receives images over a communication network since it is "capable of communicating data to or from a data communication network in accordance with one or more wired and/or wireless communication protocols." *Id.*, ¶0019.

automatically switching to another available mode of connection by the microprocessor when the Internet direct device detects that the primary mode of connection to the communications network is unavailable.

828. Nicholas's end user device "provides for seamless transitions between different data communication networks, thus permitting all network communication tasks to be performed in a seamless, uninterrupted manner

[21] Nicholas describes this function as being executed by a microprocessor in the end user device.

regardless of the location of the device, the type of network connection being used, or the form of data communication being carried out." Nicholas, ¶0009. As noted above, Nicholas describes that "the end user device may comprise a notebook or tablet PC with or without a docking interface" that can connect to a plurality of networks, including wired LAN (*e.g.*, Ethernet), a wireless Local Area Network (WLAN) or a wireless Wide Area Network (WWAN). *Id.*, ¶0020. The end user device selects which network connection to use based on predetermined criteria on power-up. The mode of connection selected by the end user device on power-up is the primary mode of connection. *Id.*

829. In one embodiment, Nicholas states that its end user device connects to the primary mode of connection while desk-bound at a primary office location where it provides a range of functionality, including the "enabling of video and voice calls." *Id.*, 0032. The primary mode of connection can be a wired LAN. *Id.* The end user device, however, can be disconnected from its wired, primary mode of connection network, "such as roaming in an office," at which time the primary mode of connection is unavailable. *Id.*, ¶0028; *see also id.*, ¶0032. In this circumstance, the end user device "provides continuous network connection while transitioning from a wired to wireless connection," *e.g.*, a WLAN. *Id.*, ¶0032. Nicholas explains as follows:

> While desk-bound at a primary office location, an end user device … provides a connection to a LAN/WLAN; may be docked or undocked; provides continuous network connection while transitioning from a wired to wireless connection, or vise versa[.]

Id., ¶¶0032; *see also id.*, ¶¶0030-0032.

830. In this example, the end user device is disconnected from the wired connection and the primary mode of connection unavailable, the device automatically switches its video calling capability to a wireless LAN (WLAN), which is another mode of connection. *Id.*, ¶0033.

831. Nicholas describes other situations in which its end-user device can switch from primary to other modes of connection to a communications network. For example, Nicholas describes an embodiment where WLAN is available on a "campus." Nicholas, ¶0033. When Nicholas' end user device may connect to the WLAN on power-up according to predetermined criteria, it is a primary mode of connection. *Id.*, ¶¶49-56. When a user leaves the campus, the WLAN becomes unavailable and Nicholas describes automatically switching voice and video calling to a "WWAN connection" (a wireless wide area network), which is another mode of connection to the communications network that was previously available but not used. *Id.*, ¶0034. Nicholas also describes connection to additional networks, such as at a "secondary location" in a meeting room or "a home," where the device would switch its modes of connection to a secondary mode of connection (*e.g.*, a

connection site in the meeting room or a home LAN or WLAN. *Id.*, ¶¶0035, 0036. In these latter scenarios, either the LAN, WLAN or WWAN may constitute the primary mode of connection, and the meeting room or home LAN or WLAN would constitute another mode of connection.

d) Claim 11

11. The method of claim 10, wherein the step of automatically switching comprises the step of switching to one of the following available modes of connection: a land line, DSL, cable, satellite, wireless network, cellular, Wi-Fi, and Wi-Max.

832. Nicholas explains that "the end user device may comprise a notebook or tablet PC with or without a docking interface" that can connect to a plurality of networks, including wired Ethernet, a wireless Local Area Network (WLAN) or a wireless Wide Area Network (WWAN). *Id.*, ¶0020; *see also id.*, ¶0019.

e) Claim 19

Claim 19 recites as follows:

A non-transitory storage medium comprising:

833. Nicholas discloses such a non-transitory storage medium. Nicholas discloses "a main memory 306, such as a random access memory (RAM), and a secondary memory 308. The secondary memory 308 may include, for example, a hard disk drive 310 and/or a removable storage drive 312, which may comprise a floppy disk drive, a magnetic tape drive, an optical disk drive, or the like."

Nicholas, ¶0038 & Fig. 2. At least the hard disk drives and the removable storage drive disclose non-transitory storage mediums.

a program for transmitting and receiving audio or video images over a communications network when executed by an Internet direct device associated with a user to cause the Internet direct device to:

834. Nicholas states that its VoIP, videocalling, and videoconferencing functions are performed by computer programs residing in its non-transitory storage medium and executed by its processor. As Nicholas explains:

> Computer programs (also called computer control logic) maybe stored in main memory **306** and/or secondary memory **308**, as well as in a memory internal to processor **302** (not shown in FIG. 3). … In an embodiment, such computer programs, when executed, enable the end user device **300** to perform the features of the present invention as discussed herein. In particular, the computer programs, when executed, enable the processor **302** to perform features of the present invention. Accordingly, such computer programs represent controllers of the end user device **300**.

Nicholas, ¶0043; *see also id.*, ¶¶0041-0044.

835. "The communication interfaces 324a-324n" executed by Nicholas's computer programs running on its processor "permit data, including but not limited to voice, video, and/or computer data to be transferred between the end user device 300 and external devices via a plurality of data communication networks." *Id.*, ¶0041. These programs cause the end user device associated with a user to

transmit and receive audio or video images over a communications network when executed by a processor in the end user device. *See id.,* ¶0037; *see also id.*, Abstract, ¶¶0032-0036. As discussed above, the transmission and receipt can occur on image capture as part of a video call or conference. *Id.*, ¶0030-0036.

> *automatically connect the Internet direct device to the communications network on power-up using one of a plurality of available modes of connection, which is designated as a primary mode of connection;*

836. The disclosed computer programs cause Nicholas's end user device to perform this element when executed by the processor. Nicholas discloses that its "end user device is provided that supports a connection to a plurality of data communication networks," detects which data communication networks are available, "and selectively determines which of the plurality of data communication networks provides the most optimal communication channel." Nicholas, Abstract; *see also id.*, ¶0008. The device's determination of which network "is optimal may be based on the type of data to be communicated (e.g., voice, video or computer data), the error rate associated with each available network, the number of anticipated 'hops' between the end user device and the remote network entity to which it needs to communicate, the cost associated with establishing and maintaining a network link, the best path, and/or anticipated power consumption." *Id*., ¶0008. Nicholas also discloses a plurality of available

wired and wireless networks. *Id.,* ¶0019. The network that is selected for connection on power-up by the program based on the predetermined criteria is designated as the primary mode of connection.

837. In one embodiment, Nicholas describes using a wired access point, which may include a docking station, as its primary mode of communication. *Id.* ¶¶0025, 0026 & Fig. 2. The wired connection can be used by the end user device for videoconferencing while at a "primary office" location. *Id.*, ¶0032. Nicholas explains that wired connections can have advantageous connectivity, cost, and transmission speeds as compared to other modes of communication (*e.g.*, wireless).[22] Nicholas also describes connecting to its primary mode of communication automatically on power-up. For example:

> The network detection function is preferably performed automatically by the end user device. For example, the network detection function may be performed automatically: (1) as part of the power-up sequence of the end user device to determine which network(s) are initially available to the end user device …

Id., ¶0046.

838. As noted above, Nicholas' end user device can perform network detection, selection and connection at the same time: "[t]here may be identity

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[22] Nicholas' primary mode of communication is not limited to a wired docking station. *See, e.g., id.*, ¶¶0008, 0020.

between network detection functions and the collection of information necessary to perform network selection." *Id.*, ¶0056. Nicholas also describes selecting a primary network based at least in part upon the location of the device and the needs of the user, including a LAN or WLAN at a primary desk site in an office, a WLAN on the office campus, a WWAN for use when the WLAN is unavailable, and a WLAN or LAN at a secondary location, which can be a home. *Id.*, ¶¶0031-0036.

> *capture audio or video images by an* image *capture system of the Internet direct device;*

839. Nicholas's end user device 100 (an Internet direct device) is programmed to operate an image capture system that can capture at least video images: "Exemplary end user device 100 further comprises … an optional built-in video camera and microphone for enabling videoconferencing and the like." Nicholas, ¶¶0024, 0032-0033; *see also id.*, Fig. 1(120). The camera and microphone capture audio and/or video images at least as part of the end user device's video calling and conferencing functions. *Id.*

> *transmit the captured audio or video images to another Internet direct device over the communications network upon image capture by a microprocessor of the Internet direct device;*

840. As noted, Nicholas's end user device 100 (an Internet direct device) includes a microprocessor to execute its VoIP, videocalling and videoconferencing programs: "As shown in FIG. 3, the example end user devices includes a processor

302 for executing software routines in accordance with embodiments of the present invention." Nicholas, ¶0037 & Fig. 3. The microprocessor controls a plurality of "communication interfaces 324a-324n" that "permit data, including but not limited to voice, video and/or computer data, to be transferred between the end user device 100 and external devices[.]" *Id.*, ¶0041; *see also id.*, ¶¶0024, 0032-0033; *see also id.*, Fig. 1(120). Nicholas further describes how its end user device 100 can provide VoIP calling, video calls, and videoconferencing [*id.*, ¶¶0032-0034], all of which are executed by the microprocessor [*id.*, ¶0037]. The "end user device 100" in Nicholas is "capable of communicating data to or from a data communication network in accordance with one or more wired and/or wireless communication protocols." *Id.*, ¶0019. The audio or video images are transmitted upon capture as part of the end user device's video calling and conferencing functions. *Id.*, ¶¶0032-0034.

receive audio or video images from the other Internet direct device over the communications network by the Internet direct device; and

841. Nicholas further explains how its end user device can be programmed to receive audio or video images from other Internet direct devices (such as other end user devices) over the communications network. Nicholas describes video calls and videoconferencing [Nicholas, ¶¶0032-0034], all of which involve receipt of video, which are executed by the microprocessor [*id.*, ¶0037]. As part of these

functions, the "end user device 100" in Nicholas is "capable of communicating data to or from a data communication network in accordance with one or more wired and/or wireless communication protocols." *Id.*, ¶0019. The video images are received upon capture as part of a video call or conference and displayed on Nicholas's end user device. *Id.*, ¶¶0032-0034; *see also id.*, Fig. 3 (322) (the "display" operated by programs running on the microprocessor).

> *automatically switch to another available mode of connection by the microprocessor when the Internet direct device detects that the primary mode of connection to the communications network is unavailable.*

842. Nicholas discloses this element as well. As discussed above, Nicholas discloses computer programming running on the end user device's microprocessor that causes the device to automatically switch to another available mode of communication when the primary mode of communication is unavailable. Nicholas's end user device "provides for seamless transitions between different data communication networks, thus permitting all network communication tasks to be performed in a seamless, uninterrupted manner regardless of the location of the device, the type of network connection being used, or the form of data communication being carried out." Nicholas, ¶0009. In one embodiment, Nicholas describes that "the end user device may comprise a notebook or tablet PC with or without a docking interface" that can connect to a plurality of networks, including

wired Ethernet, a wireless Local Area Network (WLAN) or a wireless Wide Area Network (WWAN). *Id.*, ¶0020. The end user device can be connected to a wired network at a particular location, with or without a docketing station. *Id.*, ¶¶0026, 0032.

843. When Nicholas's end user device is disconnected from its wired network "such as roaming in an office"—*i.e.*, when the wired network is not connected and therefore unavailable—"the end user device continues to provide secure connections to the office network that are uninterrupted[.]" *Id.*, ¶0028. This connection can be made via a wireless network, including a WLAN or WWAN, to permit uninterrupted transmissions. *Id.*, ¶¶0029-0034.

844. In one embodiment, Nicholas states that while desk-bound a primary office location, its end user device provides a range of functionality, including the "enabling of video and voice calls." *Id.*, 0032. Nicholas describes a set-up in which its end user device is connected to a LAN (wired connection) at the primary office location and "seamlessly transitions from a LAN connection to a WLAN connection" when in "mobile mode." *Id.*, ¶0033. In this example, the wired connection at Nicholas primary office location is the primary mode of connection to the communications network. *Id.*

845. Nicholas then describes a user entering a mobile mode in which the end user device is disconnected from the primary, wired connection, rendering the

primary mode of connection unavailable. *Id.,* ¶0033. Nicholas explains that its end user device seamlessly switches its video calling capability from the primary mode of connection to a WLAN, which is another mode of connection, when the end user device is disconnected from the wired network. *Id*.

846. Nicholas describes other situations where its end-user device can switch modes of connection to a communications network. For example, Nicholas describes an embodiment where WLAN is available on a "campus." ¶006, ¶0033. When Nicholas' end user device may connect to the WLAN on power-up according to predetermined criteria, and designate it as the primary mode of connection. *Id.*, ¶¶49-56. When a user leaves the campus, Nicholas describes seamless switching voice and video calling to a "WWAN connection" (a wireless wide area network), which is another mode of connection to the communications network. *Id.*, ¶0034. Nicholas also describes connection to additional networks, such as "[i]n a secondary location such as a home," where the device would switch its mode of connection to a "home LAN or WLAN." *Id.,* ¶0036. In this scenario, either the campus LAN or WLAN may constitute the primary mode of connection, and the home LAN or WLAN would constitute another mode of connection.

f) Claim 20

20. The storage medium of claim 19, the program when executed causes the Internet direct device to automatically switch to one of the *following available modes of connection: a land line, DSL, cable, satellite, wireless network, cellular, Wi-Fi, and Wi-Max.*

847. Nicholas explains that "the end user device may comprise a notebook or tablet PC with or without a docking interface" that can be programmed to connect to a plurality of networks, including at least a wired Ethernet, a wireless Local Area Network (WLAN) or a wireless Wide Area Network (WWAN). Id., ¶¶0019, 0020.

2. Petition 7: Ground 2 – Nair And Umeda

a) Claim 1

An Internet direct device comprising

848. Nair's "wireless device 12 can be an electronic device with capability for communicating by wireless technology. Thus, wireless device 12 can be, for example, a laptop or desktop computer, a wireless personal digital assistant (PDA), a cellular phone, or any other wireless-capable, suitable electronic device." Nair, ¶0027. The wireless device can provide Voice over IP (VoIP) [*id.*, ¶0034], including via the Internet [*id.*, ¶¶0034, 0040]. The wireless device can also run applications, "for example, a network browser that exchanges information with the distributed application known as the 'World Wide Web.'" *Id.*, ¶0027.

an imaging system to capture audio or video images

849. Nair describes a wireless device with a user interface that can display images. Nair, ¶0033. The system of Nair's wireless devices also provides mobile

phone, cellular and VoIP capability to capture at least audio. *Id.*, ¶¶0025, 0027, 0031, 0034. In the same field of art, Umeda discloses a communications system that adds a video-calling feature. *See* Umeda, ¶¶0008, 0038 (describing both video and digital cameras), 0094-0099 (describing a videoconferencing system) & Fig. 10. Umeda also describes transmitting and receiving audio and/or video images as part of a video call or videoconference, including using a wireless device such as a mobile phone. Umeda, ¶0097.

850. As discussed above, a person of ordinary skill in the art would have understood that Umeda's video imaging system could be added to Nair's wireless device to provide for video calling or videoconferencing, and would have been motivated to combine the same. Umeda discloses the use of cell phones for videoconferencing [Umeda, ¶¶0094-0099], and Nair discloses that its system is used with cell phones [Nair, ¶¶0025, 0027, 0031, 0034].

a microprocessor to transmit the captured audio or video images to another Internet direct device upon image capture, and receive audio or video images from the other Internet direct device over a communications network;

851. Nair describes its devices and system are performed by "conventional computer components," including a "central processing unit (CPU), processor, server, or other suitable processing device associated with a general purpose or specialized computer system[.]" Nair, ¶0017. Nair further states that its wireless

device "may operate under the control of a suitable operating system (OS) 20**,** such as, for example, MS-DOS, MAC OS, WINDOWS NT, WINDOWS 95, WINDOWS CE, OS/2, UNIX, LINUX, LIN-DOWS, XENIX, PALM OS, and the like" [*Id.*, ¶0034] and a "core 38" [*id.*, ¶0038], which a person of skill in the art would understand discloses a microprocessor. "*Id.*, ¶0034. "[W]ireless device 12 can be, for example, a laptop or desktop computer, a wireless personal digital assistant (PDA), a cellular phone, or any other wireless-capable, suitable electronic device." *Id.*, ¶0027.

852. Nair's microprocessor operates its system of transmitting and receiving at audio images from other Internet direct devices over a communications network upon image capture, including via cellular and VoIP technology. *Id.*, ¶¶0025, 0027, 0031, 0034. As noted, Umeda discloses image capture in the same field of art. *See* ¶009, ¶¶0008, 0038, 94-99 & Fig. 10. As discussed above, A person of ordinary skill in the art would have understood that Umeda's video imaging system could be added to Nair's wireless device, which transmits audio upon image capture.

> *and wherein the Internet direct device automatically connects to the communications network on power-up using one of a plurality of available modes of connection, which is designated as a primary mode of connection,*

853. Nair's wireless devices include devices capable of voice communications, *e.g.*, mobile phones. Nair, ¶0027. A mobile phone must be connected to a communication network to perform its function. *Id.*, ¶0024. A person of ordinary skill in the art would understand a cell phone to automatically connect to the communications network on power-up, including in order to receive incoming calls. As Nair explains, "[a]ccording to embodiments of the present invention, systems and methods provide uninterrupted and ubiquitous wireless access, with seamless hand-off between different kinds of networks" [Nair, ¶0009], which is not possible unless the wireless device connects to the communication network via a mode of connection on power-up.

854. Nair further describes a wireless local area network (WLAN) as a mode of connection with certain advantages over a cellular network—*i.e.*, a "wireless wide area network (WWAN)"—as a mode of connection to a communications network. Nair, ¶0028. Nair explains:

> In general, WLANs provide higher throughput rates (e.g., from 11 Mbps to 54 Mbps and higher), but are not conducive to use in higher mobility applications (e.g., such as when a user is in a car). WWANs can be used in high mobility applications, but do not provide as much throughput as WLANs. Thus, to increase throughput rates for the user of the wireless device 12, it is desirable to connect to a WLAN when one is available and connection to it is possible, while connecting to a WWAN when a WLAN connection is not available or possible.

Nair. ¶0028.

855. In light of Nair's teachings regarding the advantages of a WLAN and the desirability of maintaining a consistent and seamless connection to the communications network, a person of ordinary skill in the art would have recognized that it would be desirable to connect to the WLAN on power-up, if it is available. *See also* Nair, ¶0029 (describing one purpose of Nair's invention is to provide "uninterrupted and effective wireless access for the wireless device 12"). A WLAN is therefore a primary mode of connection for Nair's wireless device. *Id.* A person of ordinary skill in the art would also have understood that Nair would seek to automatically connect to its WLAN on power-up if it is available.

> *and wherein the Internet direct device automatically switches to another available mode of connection when the Internet direct device detects that the primary mode of connection to the communications network is unavailable.*

856. Nair explains that its wireless devices provide "uninterrupted and effective wireless access for the wireless device 12" by "automatically and seamlessly" handing off communications from the WLAN to the WWAN when the WLAN connection is not available. Nair, ¶29; *see also id.*, Abstract, ¶¶0022, 0028, 0035-0040. Nair's wireless device also automatically returns from a WWAN to a WLAN connection when WLAN become available. *Id.* As Nair explains:

> In operation, as the wireless device 12 is moved between or among the effective ranges of various wireless networks (WLAN or WWAN), connectivity application 24 functions to change connections from one wireless network to another wireless network. In one aspect, the change of wireless connection can be automatic such that, for example, upon loss of connectivity from any one connection, the connectivity application 24 will automatically initiate a new connection and pass the respective IP address to operating system 20. Then, as applications 22 are subsequently refreshed using an IP connection, the applications 22 will automatically pick up the new IP address and start using the new address for wireless connectivity (e.g., according to the rules of core component 38). This may occur without any noticeable loss of connectivity to the user of the wireless device 12.

Nair, ¶0039.

b) Claim 2

> *2. The Internet direct device of claim 1, wherein the plurality of available modes of connection is selected from a group consisting of: a land line, DSL, cable, satellite, wireless network, cellular, Wi-Fi, and Wi-Max.*

857. Nair explains that its wireless device 12 can use a variety of modes of communications [Nair, ¶0024], including those recited in claim 2. For example:

> Each wireless networks14, 16, 18 can be a communication network that supports wireless communication. Each network supports at least one wireless link or device connection. As such, the networks may

> support a variety of communications, including, but not limited to, analog cellular system, digital cellular system, Personal Communication System (PCS), Cellular Digital Packet Data (CDPD), ARDIS, RAM Mobile Data, Metricom Ricochet, paging, and Enhanced Specialized Mobile Radio (ESMR). The wireless networks 14, 16, 18 may utilize or support various protocols. Exemplary protocols for WLANs **16,18** include IEEE 802.11, HomeRF, Bluetooth, HiperLAN and the like. Exemplary protocols for WWAN 14 include Time Division Multiple Access (TDMA, such as IS-136), Code Division Multiple Access (CDMA), lxRTT, General Packet Radio Service (GPRS), Enhanced Data rates for GSM Evolution (EDGE), Global System for Mobile communications (GSM), Universal Mobile Telecommunications System (UMTS), and Integrated Digital Enhanced Network (iDEN) Packet Data.

Id., ¶0025. A person of ordinary skill in the art would have known that a plurality of modes of communication could have included each the referenced modes.

c) Claim 10

> *10. A method for transmitting and receiving audio or video images by an Internet direct device associated with a user over a communications network, comprising the steps of:*

858. Nair's wireless device uses at least a method transmitting and receiving audio or video images by an Internet direct device associated with a user over a communications network, *e.g.*, in connection with a mobile phone using

various WLAN and WWAN networks to transmit and receive audio in the form of a phone call. Nair, ¶¶0027, 0034, 0040.

> *automatically connecting the Internet direct device to the communications network on power-up using one of a plurality of available modes of connection, which is designated as a primary mode of connection;*

859. Nair's wireless devices include devices capable of voice communications, *e.g.*, mobile phones. Nair, ¶0027. As noted above, a mobile phone must be connected to a communication network to perform its function. *Id.*, ¶0024. A person of ordinary skill in the art would understand a cell phone to automatically connect to the communications network on power-up, including in order to receive incoming calls. In fact, "[a]ccording to embodiments of the present invention, systems and methods provide uninterrupted and ubiquitous wireless access, with seamless hand-off between different kinds of networks" [Nair, ¶0009], which is not possible unless the wireless device connects via a mode of connection on power-up.

860. Nair describes a wireless local area network (WLAN) as a mode of connection with certain advantages over a cellular network—*i.e.*, a "wireless wide area network (WWAN)"—as a mode of connection to a communications network. Nair, ¶0028. In light of Nair's teachings regarding the advantages of a WLAN and the desirability of maintaining a consistent and seamless connection to the

communications network, a person of ordinary skill in the art would have recognized that it would be desirable to connect to the WLAN on power-up, if it is available. *See also* Nair, ¶0029 (describing one purpose of Nair's invention is to provide "uninterrupted and effective wireless access for the wireless device 12"). A WLAN is therefore a primary mode of connection for Nair's wireless device. *Id.* A person of ordinary skill in the art would also have understood that Nair would seek to automatically connect to its WLAN on power-up if it is available.

capturing audio or video images by an image capture system of the Internet direct device;

861. Nair also states that its wireless device provides mobile phone, cellular and VoIP functions and captures at least audio. Nair, ¶¶0025, 0027, 0031, 0034. Nair's user interface can also display visual images. *Id.*, ¶0033. In the same field of art, Umeda discloses a communications system that adds a video-calling feature. *See* Umeda, ¶¶0008, 0038 (describing both video and digital cameras), 0094-0099 (describing a videoconferencing system) & Fig. 10. Umeda also describes transmitting and receiving audio and/or video images as part of a video call or videoconference. *Id*. Umeda also describes various devices, including a "large-size TV set" and a "mobile phone," that utilize cameras for capturing image data for transmission to others as part of a videoconferencing system. ¶009, ¶0097. As discussed above, a skilled artisan would have been motivated to add Umeda's

video conferencing capability to Nair's wireless device to provide for an image capture system, including as an application running on Nair's web browser.

transmitting the captured audio or video images to another Internet direct device over the communications network upon image capture by a microprocessor of the Internet direct device;

862. Nair's "wireless device 12 can be, for example, a laptop or desktop computer, a wireless personal digital assistant (PDA), a cellular phone, or any other wireless-capable, suitable electronic device." Nair, ¶0027. The services provided by the wireless device include transmitting at least audio from other Internet direct devices over a communications network upon capture of the audio image, including via cellular and VoIP technology. *Id.*, ¶¶0025, 0027, 0031, 0034.

863. As noted above, Umeda discloses image capture in the same field of art. *See* Umeda, ¶¶0008, 0038, 94-99 & Fig. 10. For the reasons discussed above, a skilled artisan would have been motivated to add Umeda's video imaging system to Nair's wireless device.

receiving audio or video images from the other Internet direct device over the communications network by the Internet direct device; and

864. Nair's "wireless device 12 can be, for example, a laptop or desktop computer, a wireless personal digital assistant (PDA), a cellular phone, or any other wireless-capable, suitable electronic device." Nair, ¶0027. The system of the wireless device includes receiving at least audio images from other Internet direct

devices over a communications network upon image capture, including via cellular and VoIP technology. *Id.*, ¶¶0025, 0027, 0031, 0034.

> *automatically switching to another available mode of connection by the microprocessor when the Internet direct device detects that the primary mode of connection to the communications network is unavailable.*

865. Nair explains that its wireless devices provide “uninterrupted and effective wireless access for the wireless device 12” by “automatically and seamlessly” handing off communications from the WLAN to the WWAN when the WLAN connection is not available. Nair, ¶29; *see also id.*, Abstract, ¶¶0022, 0028, 0035-0040. Nair’s wireless device also automatically returns from a WWAN to a WLAN connection when WLAN become available. *Id.* As Nair explains:

> In operation, as the wireless device 12 is moved between or among the effective ranges of various wireless networks (WLAN or WWAN), connectivity application 24 functions to change connections from one wireless network to another wireless network. In one aspect, the change of wireless connection can be automatic such that, for example, upon loss of connectivity from any one connection, the connectivity application 24 will automatically initiate a new connection and pass the respective IP address to operating system 20. Then, as applications 22 are subsequently refreshed using an IP connection, the applications 22 will automatically pick up the new IP address and start using the new address for wireless connectivity (e.g., according to the rules of core component 38). This may occur without

> any noticeable loss of connectivity to the user of the wireless device 12.

Nair, ¶0039.

d) Claim 11

> *11. The method of claim 10, wherein the step of automatically switching comprises the step of switching to one of the following available modes of connection: a land line, DSL, cable, satellite, wireless network, cellular, Wi-Fi, and Wi-Max.*

866. As I discuss above, Nair explains that its wireless device 12 can use a variety of modes of communications [Nair, ¶0024], including those recited in claim 11. *Id.*, ¶0025.

e) Claim 19

> *A non-transitory storage medium comprising:*

867. Nair discloses such a non-transitory storage medium. Nair, ¶0031; *see also id.*, ¶0020 (noting that the storage medium can be "non-volatile memory, such as read-only memory (ROM)").

> *a program for transmitting and receiving audio or video images over a communications network when executed by an Internet direct device associated with a user to cause the Internet direct device to:*

868. "[W]ireless device 12" is described as "a laptop or desktop computer, a wireless personal digital assistant (PDA), a cellular phone, or any other wireless-capable, suitable electronic device." Nair, ¶0027. The services provided by the

wireless device include transmitting and receiving at least audio from other Internet direct devices over a communications network upon capture of the audio image, including via cellular and VoIP technology. *Id.*, ¶¶0025, 0027, 0031, 0034. Nair further teaches that all of its functions are executed by computer programs running on its microprocessor. "For purposes of this discussion, an application, process, method, routine, or sub-routine is generally considered to be a sequence of computer-executed steps leading to a desired result[,]" *i.e.*, a computer program. Nair, ¶0018.

automatically connect the Internet direct device to the communications network on power-up using one of a plurality of available modes of connection, which is designated as a primary mode of connection;

869. Nair's wireless devices include a cell phone. Nair, ¶0027. A cell phone is programed to connect to a variety of cellular networks. *Id.*, ¶0024. A person of ordinary skill in the art would understand a cell phone to automatically connect to the communications network via a cellular network on power-up. In fact, "[a]ccording to embodiments of the present invention, systems and methods provide uninterrupted and ubiquitous wireless access, with seamless hand-off between different kinds of networks" [Nair, ¶0009], which is not possible unless the wireless device connects via a mode of connection on power-up.

870. As noted above, Nair describes a wireless local area network (WLAN) as a mode of connection with certain advantages over a cellular network—*i.e.*, a "wireless wide area network (WWAN)"—as a mode of connection to a communications network. Nair, ¶0028. In light of Nair's teachings regarding the advantages of a WLAN and the desirability of maintaining a consistent and seamless connection to the communications network, a person of ordinary skill in the art would have recognized that it would be desirable to connect to the WLAN on power-up, if it is available. *See also* Nair, ¶0029 (describing one purpose of Nair's invention is to provide "uninterrupted and effective wireless access for the wireless device 12"). A WLAN is therefore a primary mode of connection for Nair's wireless device. *Id.* As discussed above person of ordinary skill in the art would also have understood that Nair would seek to automatically connect to its WLAN on power-up if it is available.

capture audio or video images by an image *capture system of the Internet direct device;*

871. Nair describes a wireless device that is programmed to provide mobile phone, cellular and VoIP capability to capture at least audio images upon capture. Nair, ¶¶0025, 0027, 0031, 0034. Nair's user interface can also display images. *Id.*, ¶0033. As noted above, Umeda discloses a communications system that adds a video-calling feature in the same field of art. *See* Nair, ¶¶0008, 0038 (describing

both video and digital cameras), 0094-0099 (describing a videoconferencing system) & Fig. 10. Umeda also describes transmitting and receiving audio and/or video images as part of a video call or videoconference on a mobile phone. *Id.*, ¶0097. As discussed above, a person of ordinary skill in the art would have motivated to add Umeda’s video imaging system to Nair’s mobile phone to provide for an image capture system.

transmit the captured audio or video images to another Internet direct device over the communications network upon image capture by a microprocessor of the Internet direct device;

872. Nair’s program causes this step to occur. The services provided by Nair’s wireless device include transmitting at least audio from other Internet direct devices over a communications network upon capture of the audio image, including via cellular and VoIP technology. Nair, ¶¶0025, 0027, 0031, 0034.

873. As noted, Umeda discloses image capture in the same field of art. See Umeda, ¶¶0008, 0038, 94-99 & Fig. 10. For the reasons discussed above, a skilled artisan would have been motivated to add Umeda’s video imaging system to Nair’s wireless device, which transmits audio upon image capture.

automatically switch to another available mode of connection by the microprocessor when the Internet direct device detects that the primary mode of connection to the communications network is unavailable.

874. Nair's program causes this step to occur. Nair explains that its wireless devices provide "uninterrupted and effective wireless access for the wireless device 12" by "automatically and seamlessly" handing off communications from the WLAN to the WWAN when the WLAN connection is not available. Nair, ¶29; *see also id.*, Abstract, ¶¶0022, 0028, 0035-0040. Nair's wireless device also automatically returns from a WWAN to a WLAN connection when WLAN become available. *Id.*, ¶0039.

f) Claim 20

20. The storage medium of claim 19, the program when executed causes the Internet direct device to automatically switch to one of the following available modes of connection: a land line, DSL, cable, satellite, wireless network, cellular, Wi-Fi, and Wi-Max.

875. Nair's program causes this step to occur. Nair explains that its wireless device 12 can use a variety of modes of communications [Nair, ¶0024], including those recited in claim 20. *Id.*, ¶0025.

3. Petition 7: Ground 3 - Umeda and Inoue

a) Claim 1

An Internet direct device comprising

876. Umeda describes a "mobile communication system … for roaming between different kinds of networks." Umeda, Abstract. Umeda's networks also can include the Internet. *Id.*, ¶0027. Inoue describes a digital camera that, when

"powered on … automatically establishes a network connection with [a] file server" for the purposes of transmitting images over a communications network. Inoue, Abstract. Inoue's camera can connect to the Internet via a LAN. *Id.*, ¶0060.

an imaging system to capture audio or video images;

877. Umeda describes transmitting and receiving audio and/or video images using an imaging system as part of a video call or videoconference. Umeda, ¶¶0008, 0038 (describing both video and digital cameras), and 0094-0097. Umeda further describes various devices, including a "large-size TV set" and a "mobile phone," that utilize cameras for capturing image data for transmission to others as part of a videoconferencing system. *Id.*, ¶0097 & Fig. 10. Umeda describes how these devices and cameras can also capture audio as part of a "video conference system." *Id.*, ¶¶0094 – 0099.

a microprocessor to transmit the captured audio or video images to another Internet direct device upon image capture, and receive audio or video images from the other Internet direct device over a communications network

878. Umeda describes its Internet direct devices as including a "communication terminal 200" that includes "a control section 202, an antenna section 204, a network detecting section 206, network communication sections 208, and a terminal interface section 210." Umeda, ¶0036 & Fig. 3. "The control section 202 controls the whole communications terminal 200 in a centralized

manner" and would be understood by a person of ordinary skill in the art to include at least one microprocessor. "Control section 202" controls the antenna and "carries out communications with at least one network NW100[.]" Umeda, ¶0036; *see also id.*, Fig. 1. Among the communications that are transmitted and received at the direction of control section 202 are images as part of a videoconference with other Internet direct devices. *Id.*, ¶¶0096-0099 & Fig. 10. Transmissions during a videoconference occur on image capture. Umeda's Figure 10 depicts multiple Internet direct devices (*e.g.*, mobile phones, televisions) transmitting and receiving images between each other over a communication network. *Id.*, Fig. 10.

> *and wherein the Internet direct device automatically connects to the communications network on power-up using one of a plurality of available modes of connection, which is designated as a primary mode of connection*

879. The combination of Umeda and Inoue render this claim element obvious. Umeda describes its cellular phones and other devices as containing a camera and display for transmitting and receiving images, including as part of a videoconference. Umeda, ¶¶0008, 0038, 0094-0099 & fig. 10. Umeda also explains that certain available networks may be more advantageous for particular types of communications, such as video calls or videoconferencing. For example:

> An example of this case is one where a communication terminal which can utilize both of a cellular mobile communication system and

> a wireless LAN system is switched between these different networks. In the case where the communication terminal 200 is initially communicating in the cellular mobile communication system, whether the wireless LAN system, which is the other system, can be utilized or not is determined by measuring the reception level or the like in the NW detecting section 206. In the case where the wireless LAN system is more favorable for the user from the viewpoints of transmission quality, capability, and the like while communications are possible, switching (changing) is carried out between the systems (networks).

Id., ¶52.

880. Umeda does not, however, expressly describe automatically connecting to an available mode of communication on power-up, which is then designated as a primary mode of connection. Inoue, however, states that "[w]hen the digital camera is powered on, it automatically establishes a network connection with the file server in an activation process." Inoue, Abstract. "The power button 38 is one for switching on/off the power of the entire digital camera 10. When the digital camera 10 is off, pressing the power button 38 is detected by event detecting unit 50 as an activation request, which is followed by an activation process." *Id.*, ¶0058. Inoue's camera "detects an activation request" and "establish[es] a network connection between the digital camera and a file server upon detection of the activation request." *Id.*, ¶0017; *see also id.*, ¶0066 & Fig. 6. The connection to the communications network can be via any one of a plurality of

modes of connection: "The 'network' may be either wireless or wired. Nor does it matter whether the network uses such facilities as an access point if on a wireless LAN in infrastructure mode, or is of so-called peer-to-peer as if in ad-hoc mode." *Id.*, ¶0015. The particular network that is selected for use is the "primary mode of connection" for Inoue's camera (Internet direct device) for connection to a "communication network," such as the Internet. *Id.*, ¶0060. In one embodiment, Inoue identifies "a wireless LAN" as the primary mode of communication to reach the Internet. *Id.*

881. As discussed above, A person of ordinary skill in the art would have added Inoue's auto-connection program to Umeda programming. Umeda indicates that it is advantageous to maintain a "seamless network" connection. *Id.*, Abstract. A seamless network connection is important in Umeda's system not only to permit ongoing videoconferences to continue across multiple modes of connection, but also to ensure that the device is always able to receive an incoming request for a videoconference. That is only possible if Umeda's system is connected to the communication network on power up—and via the primary (and preferred) mode of connection, a WLAN, if it is available. A person of ordinary skill in the art would therefore have be motivated to apply Inoue's teaching of automatically connecting to a designated, preferred network (in this example, a WLAN) when the device is powered-up to Umeda.

> *and wherein the Internet direct device automatically switches to another available mode of connection when the Internet direct device detects that the primary mode of connection to the communications network is unavailable.*

882. As discussed above, Umeda discloses automatic switching to another available network when the primary network is unavailable. Umeda explains that such switching can occur at least when the Internet direct device detects that the primary mode of connection to the communications network lacks "capability," which includes when the network is unavailable. Umeda, ¶52. In the case that a mode of connection is unavailable, Umeda teaching switching to another available mode of connection, *e.g.*, a cellular network. Umeda, ¶52. In a related discussion, Umeda further teaches switching from a primary mode of connection to the communication network to another available mode of connection in its discussion of a mobile user who begins a videoconference in a stationary location (*e.g.*, a conference room) and then continues the videoconference by switching to a mobile phone connected via a cellular network with a camera and display. *See* Umeda, ¶¶0096 - 0099 & Fig. 10. For example:

> It is assumed that a video conference is held by use of a large-size TV set with a party in another office connected with a VPN by way of a wireless LAN (network NW1). Here, if one of parties of the video conference goes outdoor with a mobile phone, the network NW1 is notified of the change in terminal, whereby the communication

> network is automatically changed from the wireless LAN (network NW1) to a mobile communication network (another network NW2), whereas contents are converted from high-definition visual information for the large-size TV set to a high-compression visual information for a mobile terminal.

Id., ¶¶0097.

b) Claim 2

> *The Internet direct device of claim 1, wherein the plurality of available modes of connection is selected from a group consisting of: a land line, DSL, cable, satellite, wireless network, cellular, Wi-Fi, and Wi-Max.*

883. Both Inoue and Umeda disclose this element. Inoue states that its network can be either "wired" (a land line) or "wireless," *e.g.*, Wi-Fi as in a LAN. Inoue, ¶¶0015, 0060. Umeda also discloses wired, wireless and a cellular network as among its available modes of communication. Umeda, ¶0032, 0050, 0052, 0096-0099. A person of ordinary skill in the art would have known that a plurality of modes of communication could have included each the referenced modes.

c) Claim 10

> *A method for transmitting and receiving audio or video images by an Internet direct device associated with a user over a communications network, comprising the steps of:*

884. Umeda describes a "mobile communication system … for roaming between different kinds of networks." Umeda, Abstract. Umeda also describes

transmitting and receiving audio and/or video images as part of a video call or videoconference. *See Id.*, ¶0038 (describing both video and digital cameras). Inoue also describes a digital camera for transmitting and receiving images. Inoue, Abstract. Inoue's camera can connect to the Internet via a LAN. *Id.*, ¶0060.

> *automatically connecting the Internet direct device to the communications network on power-up using one of a plurality of available modes of connection, which is designated as a primary mode of connection;*

885. The combination of Umeda and Inoue render this claim element obvious. Umeda explains that its devices have the capability of connecting to one of a plurality of modes of connection, and of selecting a mode of connection based upon predetermined criteria. For example:

> In the case where the communication terminal 200 is initially communicating in the cellular mobile communication system, whether the wireless LAN system, which is the other system, can be utilized or not is determined by measuring the reception level or the like in the NW detecting section 206. In the case where the wireless LAN system is more favorable for the user from the viewpoints of transmission quality, capability, and the like while communications are possible, switching (changing) is carried out between the systems (networks).

Umeda, ¶52.

886. Umeda does not, however, expressly describe automatically connecting to a primary mode of communication on power up. Inoue, however,

contains this disclosure and would have been combined with Umeda by a person of ordinary skill in the art to practice this entire claim element. Inoue also describes a plurality of available network connections [Inoue, ¶0015], and states that "[w]hen the digital camera is powered on, it automatically establishes a network connection with the file server in an activation process." Inoue, Abstract. "The power button 38 is one for switching on/off the power of the entire digital camera 10. When the digital camera 10 is off, pressing the power button 38 is detected by event detecting unit 50 as an activation request, which is followed by an activation process." *Id.,* ¶0058. Inoue's camera (Internet direct device) "detects an activation request" and "establish[es] a network connection between the digital camera and a file server upon detection of the activation request." *Id.,* ¶0017; *see also id.*, ¶0066 & Fig. 6.

887. As discussed above, a person of ordinary skill in the art would have been motivated to combine Inoue's teaching of automatic connection at power up with Umeda's videoconferencing system. Umeda describes its technology as providing a seamless network connection [Umeda, ¶0052] and, in order to have a seamless connection the device must be connected to the network at power up. Indeed, in order for Umeda's devices to receive a request for a videoconference, it must always be on. A skilled artisan would have included Inoue's teaching of connecting at power-up to Umeda to ensure, among other things, that the network

connection was seamless in order to permit Umeda's device to receive incoming requests for video conferences.

> *capturing audio or video images by an image capture system of the Internet direct device;*

888. Umeda discloses an imaging system that includes a digital camera, with a focus in several examples on video images. *See* Umeda, ¶0038 (describing both video and digital cameras). Umeda also describes various devices, including a "large-size TV set" and a "mobile phone," that utilize cameras for capturing image data for transmission to others as part of a videoconferencing system. Umeda, ¶0097 & Fig. 10. Transmissions during a videoconference occur on image capture. Umeda describes how these devices and cameras can also capture audio as part of a "video conference system." Umeda, ¶¶0094 – 0099.

> *transmitting the captured audio or video images to another Internet direct device over the communications network upon image capture by a microprocessor of the Internet direct device;*

889. Umeda describes its Internet direct devices as including a "communication terminal 200" that includes "a control section 202, an antenna section 204, a network detecting section 206, network communication sections 208, and a terminal interface section 210." Umeda, ¶0036 & Fig. 3. "The control section 202 controls the whole communications terminal 200 in a centralized manner" and would be understood by a person of ordinary skill in the art to include

at least one microprocessor. *Id.* "Control section 202" controls the antenna and "carries out communications with at least one network NW100[.]"Umeda, ¶0036; *see also id.*, Fig. 1. Among the communications that are transmitted and received at the direction of control section 202 are images as part of a videoconference with other Internet direct devices. *Id.*, ¶¶0096-0099 & Fig. 10. Umeda's Figure 10 depicts multiple Internet direct devices (*e.g.*, mobile phones, televisions) transmitting and receiving images between each other over a communication network. *Id.*, Fig. 10.

> *receiving audio or video images from the other Internet direct device over the communications network by the Internet direct device; and*

890. Umeda describes this method step as being practiced by its devices and systems. Among the communications that are transmitted and received at the direction of control section 202 are images as part of a videoconference with other Internet direct devices. Umeda, ¶¶0096-0099 & Fig. 10. Umeda's Figure 10 depicts multiple Internet direct devices (*e.g.*, mobile phones, televisions) transmitting and receiving images between each other over a communication network. *Id.*, Fig. 10.

> *automatically switching to another available mode of connection by the microprocessor when the Internet direct device detects that the primary mode of connection to the communications network is unavailable.*

891. Umeda discloses automatic switching to another available network when the primary network is unavailable. Umeda explains that such switching can occur at least when the Internet direct device detects that the primary mode of connection to the communications network lacks "capability," which includes when the network is unavailable. Umeda, ¶52. A person of ordinary skill in the art would have understood that an "incapable" network includes networks that are unavailable, such as when one moves out of range (as in the case of a wireless LAN) or when one disconnects a wired connection (as in the case of a wired LAN). In the case that a mode of connection becomes unavailable, Umeda teaching switching to another available mode of connection, *e.g.*, a cellular network. Umeda, ¶52. In a related discussion, Umeda further teaches switching from a primary mode of connection to the communication network to another available mode of connection in its discussion of a mobile user who begins a videoconference in a stationary location (*e.g.*, a conference room) and then continues the videoconference by switching to a mobile phone connected via a cellular network with a camera and display. *See* Umeda, ¶¶0096 - 0099 & Fig. 10.

d) Claim 11

> *The method of claim 10, wherein the step of automatically switching comprises the step of switching to one of the following available modes of connection: a land line, DSL, cable, satellite, wireless network, cellular, Wi-Fi, and Wi-Max.*

892. Umeda also discloses wired, wireless and a cellular network as among its available modes of communication. Umeda, ¶0032, 0050, 0052, 0096-0099. In fact, a person of ordinary skill in the art would have known that a plurality of modes of communication could have included each the referenced modes.

e) Claim 19

A non-transitory storage medium comprising

893. Umeda describes a "control section 302" and "a storage section 316" in an information terminal. Umeda, ¶0038 & Fig. 4. "The control section 302 has an internal memory for storing control programs such as an OS (Operating system), programs defining various processing procedures and the like, and required data; and carries out various information processing operations according to these programs and the like." *Id.*, ¶0038. "The storage section 316" in the information terminal also "is storage means such as memory devices like RAM and ROM, fixed disk devices such as hard disks, flexible disks, and optical disks; and stores various tables, files, databases, and the like for use in various processing operations." *Id.*, ¶0038.

a program for transmitting and receiving audio or video images over a communications network when executed by an Internet direct device associated with a user to cause the Internet direct device to:

894. Umeda states that its "control section 302 has an internal memory for storing control programs such as an OS (Operating system), programs defining

various processing procedures and the like, and required data; and carries out various information processing operations according to these programs and the like.” Umeda, ¶0038. The programming in “control section 202” controls the antenna and “carries out communications with at least one network NW100[.]” *Id.*; *see also id.*, Fig. 1. Among the communications that are transmitted and received at the direction of control section 202 are images as part of a videoconference with other Internet direct devices. *Id.*, ¶¶0052, 0096-0099 & Fig. 10. Umeda’s Figure 10 depicts multiple Internet direct devices (*e.g.*, mobile phones, televisions) transmitting and receiving images between each other over a communication network. *Id.*, Fig. 10.

> *automatically connect the Internet direct device to the communications network on power-up using one of a plurality of available modes of connection, which is designated as a primary mode of connection;*

895. The combination of Umeda and Inoue render this claim element obvious. As discussed above, Umeda describes cellular phones and other devices that connect to one of a plurality of modes of connection, including as part of a videoconference. *See, e.g.,* Umeda, Abstract, ¶¶0052, 0097 & Figs. 1& 10. Umeda does not, however, expressly describe automatically connecting to an available mode of communication on power-up, which is then designated as a primary mode of connection.

896. As discussed above, however, Inoue contains this disclosure and would have been combined with Umeda by a skilled artisan. Inoue describes a plurality of available network connections [Inoue, ¶0015], and states that "[w]hen the digital camera is powered on, it automatically establishes a network connection with the file server in an activation process." Inoue, Abstract. Inoue's camera (Internet direct device) "detects an activation request" and "establish[es] a network connection between the digital camera and a file server upon detection of the activation request." *Id.*, ¶0017; *see also id.*, ¶¶0058, 0066 & Fig. 6. As discussed above, a person of ordinary skill in the art would have been motivated to combine Inoue's teaching of automatic connection at power up with Umeda's videoconferencing system for the reasons discussed above. Among other things, in order for Umeda's devices to receive a request for a videoconference, it must always be on; a skilled artisan would have been motivated to include Inoue's connection on power-up functionality in Umeda to ensure that Umeda's videoconferencing devices were capable of receiving incoming calls.

capture audio or video images by an image capture system of the Internet direct device;

897. Umeda's programming includes operation of an imaging system that includes a digital camera for capturing at least video images. *See* ¶009, ¶0038. Umeda also describes various devices, including a "large-size TV set" and a

"mobile phone," that utilize cameras for capturing image data for transmission to others as part of a videoconferencing system. Umeda, ¶0097 & Fig. 10. These cameras and microphones are an image capture system Umeda further describes how these devices and cameras can also capture audio as part of a "video conference system." *Id.*, ¶¶0094 – 0099.

> *transmit the captured audio or video images to another Internet direct device over the communications network upon image capture by a microprocessor of the Internet direct device;*

898. Umeda describes this claim element. Umeda describes its Internet direct devices as including a "control section 202 [that] controls the whole communications terminal 200 in a centralized manner." Umeda, ¶0036 & Fig. 3. As discussed above, the control section runs programming that operates the device. Among the communications that are transmitted and received at the direction of control section 202 are images as part of a videoconference with other Internet direct devices. *Id.*, ¶¶0096-0099 & Fig. 10. Umeda's Figure 10 depicts multiple Internet direct devices (*e.g.*, mobile phones, televisions) transmitting and receiving images between each other over a communication network. *Id.*, Fig. 10. Transmissions during a videoconference occur on image capture.

receive audio or video images from the other Internet direct device over the communications network by the Internet direct device; and

899. Umeda describes that the programming of its devices also causes them to receive audio and/or video images from other Internet direct devices over the communications network. “Control section 202” controls the antenna and “carries out communications with at least one network NW100[.]” *Id.*, ¶0036; *see also id.*, Fig. 1. Among the communications that are transmitted and received at the direction of control section 202 are images as part of a videoconference with other Internet direct devices. *Id.*, ¶¶0096-0099 & Fig. 10. Umeda’s Figure 10 depicts multiple Internet direct devices (*e.g.*, mobile phones, televisions) transmitting and receiving images between each other over a communication network. *Id.*, Fig. 10.

automatically switch to another available mode of connection by the microprocessor when the Internet direct device detects that the primary mode of connection to the communications network is unavailable.

900. As discussed above, Umeda explains that automatic switching can occur at least when the Internet direct device detects that the primary mode of connection to the communications network lacks “capability,” which includes when the network is unavailable. Umeda, ¶0052. In another discussion, Umeda teaches switching from a primary mode of connection to the communication network to another available mode of connection in its discussion of a mobile user

who begins a videoconference in a stationary location (*e.g.*, a conference room) and then continues the videoconference by switching to a mobile phone connected via a cellular network with a camera and display. *See* Umeda, ¶¶0096 - 0099 & Fig. 10.

f) Claim 20

> *The storage medium of claim 19, the program when executed causes the Internet direct device to automatically switch to one of the following available modes of connection: a land line, DSL, cable, satellite, wireless network, cellular, Wi-Fi, and Wi-Max.*

901. Umeda also discloses wired, wireless and a cellular network as among its available modes of communication. Umeda, ¶¶0032, 0050, 0052, 0096-0099. As discussed above, a person of ordinary skill in the art would have known that a plurality of modes of communication could have included each the referenced modes.

VIII. CONCLUSION

902. I reserve the right to supplement my opinions in the future to respond to any arguments that Patent Owner or its expert(s) may raise and to take into account new information as it becomes available to me. I hereby attest that all statements made of my own knowledge are true and that all statements made on information and belief are believed to be true. I have been warned that warned that willful false statements and the like are punishable by fine or imprisonment, or both (18 U.S.C. 1001) and may jeopardize this petition.

Signed and sworn under the pain and penalty of perjury, this 7th day of September 2017.

9/7/17

Vijay K. Madisetti, Ph.D.

EXHIBIT A

Corcoran, P., *et al.*, *Wireless Transfer of Images from a Digital Camera to the Internet via a Standard GSM Mobile Phone,* IEEE Transactions on Consumer Electronics, Vol. 47, No. 3 (August 2001)

WIRELESS TRANSFER OF IMAGES FROM A DIGITAL CAMERA TO THE INTERNET VIA A STANDARD GSM MOBILE PHONE

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Abstract

In this paper we describe an infrastructure based on an existing, commercially available, GSM mobile phone for achieving connectivity between digital cameras and an Internet Website. Pictures are loaded from a standard digital camera, or compact flash card, by an embedded appliance, which establishes the Internet connection and controls the transfer of pictures from the camera to a remote website. Detailed descriptions are given of this picture transfer appliance and of a typical website infrastructure to store and manage the pictures and provide end-user services.

1. Introduction

Today's digital cameras are increasingly sophisticated and are rapidly superseding conventional photography. However a digital camera does not offer consumers the ease of use and service available from conventional photography today. In particular it is difficult and expensive for consumers to obtain prints of their digital images. In addition, they must rely on their home PC for long-term storage of such images. In short the digital photography solutions available today are inadequate for the needs of many consumers.

In this paper we describe how providing wireless Internet connectivity can extend the range of services available to consumers using digital cameras. We examine how today's consumer uses digital images and describe how wireless connectivity solutions can be provided in today's marketplace by extending the functionality of a commercially available GSM mobile phone using an inexpensive embedded appliance.

Mobile data networks will soon begin the transition to 3rd generation technology - commonly known as G3. However, in the current marketplace it is likely that the capital investment for G3 infrastructure will be difficult to raise for another few years. This is likely to delay the development of G3 by 1-2 years. Thus it becomes important for network operators to investigate new data services over existing networks.

In this paper we describe our experiences in implementing just such a data service - the transfer of digital pictures from a standard digital camera or compact flash memory card to a remote Internet site using existing GSM networks and mobile phones. Once the pictures are transferred onto the website the end-user can access a broad range of added-value services for their pictures [1].

2. Elements of a Mobile Photography Service

We now describe the component parts of a fully integrated mobile digital photography service. Note that all these components exists today and that the service proposed in this paper can be implemented with today's technology and existing mobile infrastructure.

2.1 Digital Picture Sources

The first component is, naturally enough, a source of digital pictures. In most instances this will be a digital camera, although many users of the service may prefer the simpler option to use compact flash (CF) memory cards to store and manage the pictures.

Digital cameras are now quite ubiquitous. The more recent models all feature USB connectivity as the primary means of moving the pictures and other content such as audio and video clips from the camera. Older models use RS-232 although this can be quite slow if the digital images are larger than a 50k JPEG - typically 640x480 VGA size. However we note that it may not be desirable to send larger pictures over a wireless GSM network as even recent enhancements to existing networks can rarely achieve 38kB throughput. Further some mobile phones provide data connectivity at RS-232 compatible data rates but we have not yet seen a mobile phone to offer USB connectivity or data rates. Thus for the pilot study described in this paper we have confined our connectivity support of current digital cameras to access over RS-232.

As many users now make use of CF cards to store and transport their "rolls" of digital pictures it was also felt important to provide support for the direct upload of digital images from such portable media. Most digital cameras now rely entirely on a CF card to store the final images and models exist with up to 256 MB of storage.

2.2 GSM Phone & Data Infrastructure

Until recently it was possible, although slow and expensive, to obtain data services using a GSM mobile

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phone. With the advent of G3 services many users were happy to postpone the transition to mobile services until G3 roll-out occurred. For similar reasons GSM service operators did not invest time or effort in trying to upgrade or improve existing data services. It is widely anticipated that as next generation G3 services come on stream Internet services will initially be offered at 115k baud rates. This is expected to rise to 384k baud within 12 months of initial deployment. Ultimately, it is expected that some next generation GSM services will support wireless 2-Megabit connectivity to the Internet. These new wireless services will undoubtedly be one of the key driving forces of Internet Photography over the next 2-3 years.

As it is now becoming widely accepted that G3 roll-out has been postponed due to the prohibitive costs and uncertain market for services there is a renewed demand for faster data services based on existing network infrastructure.

One alternative is GPRS with planned availability for many existing networks by early 2002. In the meantime there are other approaches - one handset manufacturer has released mobile phones with 3-speed modems. These are capable of providing 3 GSM channels with a resulting throughput of 3 x 14.4 kB if the service operator does not implement error correction or 3 x 9.6 kB if error correction is implemented. Thus theoretical data rates of 43.2 kB or 28.8 kB are possible using existing mobile networks available, and in widespread usage, on a day-to-day basis.

For the pilot study described in this paper we used a 3-speed modem to provide mobile internet access. We expect that the same technology could be readily adapted to work with GPRS and G3 data services when they become widely available.

2.3 Embedded Picture Transfer Appliance

The core connectivity between the digital camera and mobile phone is provided by an embedded picture transfer appliance (EmPicTA). This device incorporates an RS-232 port to connect directly to a conventional digital camera and a compact flash slot to allow pictures to be read directly from digital media. The connection to the mobile phone is achieved via a proprietary data cable.

The appliance runs an embedded form of DOS. A full TCP/IP stack is implemented in software. In addition a generic interface is provided to a broad range of digital cameras via a modular set of device drivers. An additional, unique, feature of this appliance is that it may be reprogrammed from the Web. As the main functionality of the appliance requires it to connect to the Internet it searches, by default, for a home web page. Upon accessing this page the appliance determines if its firmware is up to date. If not, it will load a new firmware mask into its flash memory. This feature allows, for example, additional camera drivers to be easily added to the appliance in a manner transparent to the user.

Internet connectivity is achieved by establishing a PPP link via the mobile phone network. The unit is designed to connect to any standard ISP.

2.4 Website Services for Digital Photography

To support the client appliance it is important that a flexible server-side infrastructure exists to provide the end user with a range of exciting and interesting new services, focused around the network-enabled digital camera.

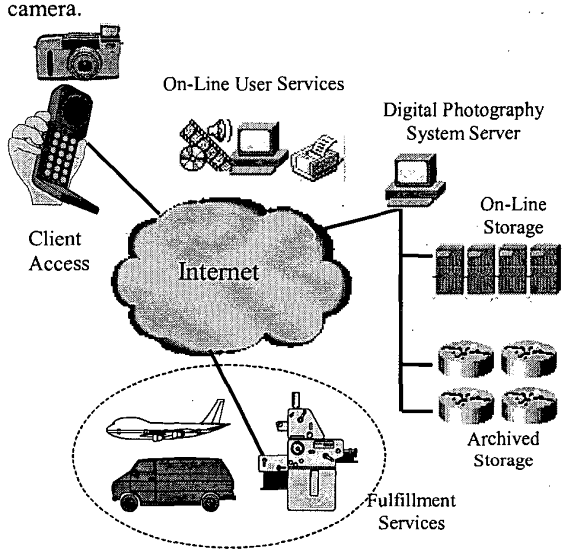


Fig 1: Diagram illustrating the various web services required by most users of an Internet PhotoCommunity. .

The key services that will initially be required in order to promote the success of digital photography on a mass-market scale are:

(i) picture fulfillment services
(ii) on-line picture storage
(iii) archival picture storage
(iv) added-value on-line services

In an experimental laboratory set up these services can be adequately provided by a conventional PC-based web server with a large hard disk to provide on-line storage and a tape drive to provide archival storage facilities. Added value services can be programmed using one of the high-level scripting languages that are popular for web development.

Note that a key aspect of this client-server architecture for digital photography is that practically all of the client configuration information can be maintained on the server-side. This, in turn, reduces maintenance issues and facilitates upgrading of services and the infrastructure as a whole.

In **Fig 2** we show how the user can access the pictures on a remote website. Some of this functionality could also be made available from the mobile phone through a WAP or iMode service.

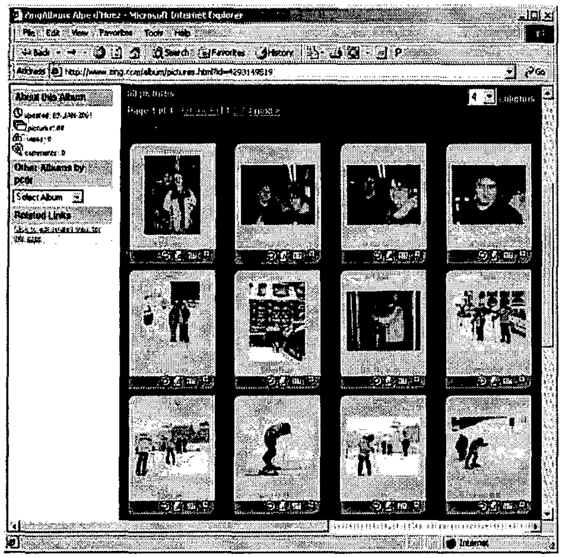


Fig 2(a) *Picture access using a standard Web Browser.*

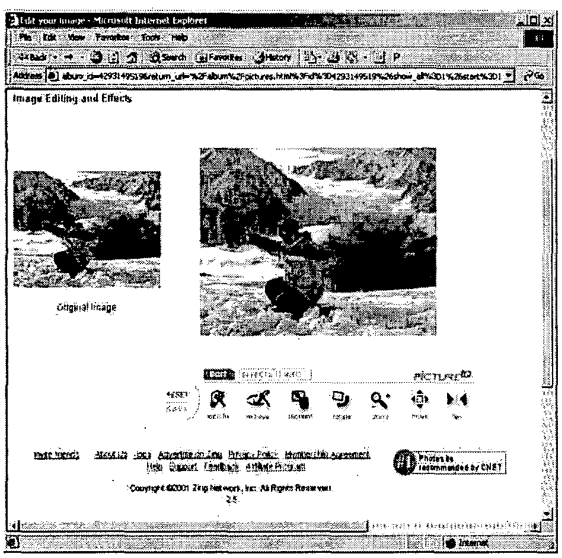


Fig 2(b) *Picture editing and post-processing tools are available via the Web interface.*

3. Implementing the Service

In this section we give some details of our experimental implementation of an internet-enabled digital photography system. Some descriptions of the system services and overall system infrastructure have already been given, so here we will focuss on practical implementation issues.

3.1 An Initial Approach

As a first step towards investigating the practicality of building a service solution for GSM we undertook a project to demonstrate Direct-to-Web services using the existing GSM infrastructure. For this technology demonstration we decided to use a standard and very well known GSM PDA. This device combines a mobile phone with a full alphanumeric keyboard and a reasonably sized grayscale LCD. It has an RS-232 port and can establish an Internet connection over the GSM network to allow the user to receive e-mail or to browse the Web.

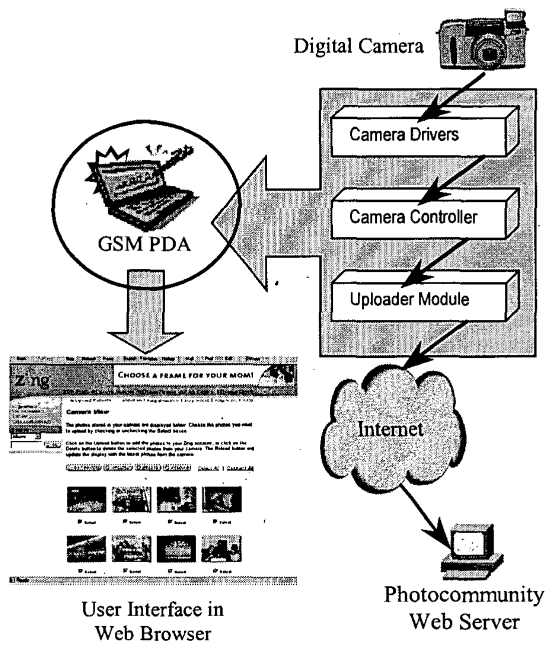


Fig 3: *The component elements of a Home-PC based Direct-to-Web Interface for Digital Cameras.*

This GSM PDA runs a windowing OS known as GEOS. This is an older OS, originating on simple x86 systems, but it provides adequate multi-tasking functionality to allow us to implement a Direct-to-Web solution for a standard digital camera.

This service solution is, naturally enough, somewhat cruder than its big-brother equivalent which runs on a standard Pentium-based PC. For example, only filenames are displayed when the user has to select the pictures for uploading to the Web. It is just not practical to provide a thumbnail view to the end user. Further the data transfer rate is limited to 9600 baud over the GSM connection which limits the practicality utility of this demonstration. However the key point is that it is possible to port the multi-camera Web solution which runs on today's Pentium PC to run on a much less powerful PDA platform.

Fig 3 illustrates the PDA solution. On the RHS of the diagram we see that software drivers implemented on the PDA connect with the digital camera. The driver software inter-operates with a camera controller daemon which, in turn, inter-operates with a third software module which controls the upload of pictures/data to a back-end server. The complex operations involved in obtaining pictures from the camera and uploading them to the back-end server are transparent to the end-user who sees a single, unified interface presented in a web browser - the LHS of the diagram.

More recently we have completed an initial port of our picture upload technology onto the EPOC operating system. This will form the core OS to be adopted by next-generation mobile appliances. Already many next-generation mobile PDA's and "smart" phones use EPOC as their OS. It provides a more advanced windowing environment than GEOS and is capable of handling mouse or stylus input from a touch-screen. Thus it is feasibly to retain many aspects of the user interface and the features of the desktop PC application, but operating on a much smaller mobile appliance.

3.2 The EmPicTA Prototype

Following our implementation of a PDA-centric port it was decided to investigate the feasibility of providing a dedicated appliance, the EmPicTA, to work with a conventional mobile phone. Clearly the user interface would be much simpler and the concept was initially to use the phone solely as a "picture uploading" conduit; additional services would be provided via a Web browser or WAP services independently of the picture upload process.

3.2.1 EmPicTA Hardware

Here we give an overview description of our actual IIA client hardware. As was mentioned earlier, this hardware is limited to RS-232 camera connectivity and to analog-modem Internet connectivity. The Internet connectivity is achieved either over a PPP link or via a direct, non-IP link to a middleware server, which provides an internet relay service.

The layout of the hardware is illustrated in ***fig 4*** below. The system has both RAM and flash memory. The flash has a boot area, which can be dynamically reprogrammed, and a disk area, which appears like a DOS compatible disk to the operating system.

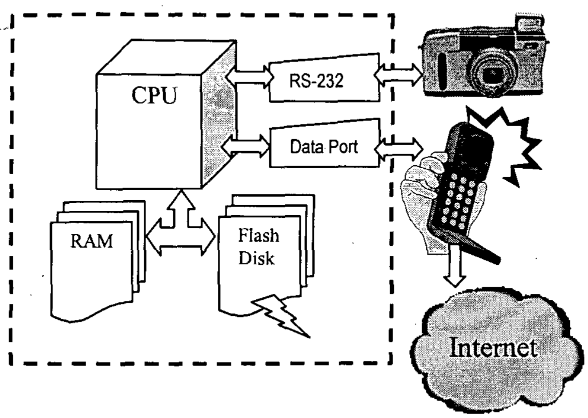


Fig 4: *Block diagram of the Embedded Picture Transfer Appliance (EmPicTA). An Internet connection is established over the data port connection of the mobile phone.*

3.2.2 EmPicTA Client-End Software

The EmPicTA client runs an embedded OS that is compatible with DOS. Depending on the client-server architecture the IIA client may run either a TCP/IP stack and PPP or it may run a more lightweight non-IP data transfer program.

From our experiences there is significant overhead in implementing a full TCP/IP stack on the client. Furthermore as TCP/IP does not, in its present form, guarantee any quality of service (QOS) it is conceivable that picture download over a slow link will be both time-consuming and costly for the consumer. If a lightweight non-IP transfer program is used then practically all the limited modem bandwidth can be devoted to transferring picture data. This offers a 30-40% performance improvement over the best case for TCP/IP.

The client also runs an embedded camera protocol module with establishes a connection with the camera and downloads the "digital film" from the camera. The EmPicTA can be easily reprogrammed with a wide range of camera protocols, or these may be loaded dynamically from the internet-photography server.

3.2.3 The Internet Infrastructure

Mention was already made of the difference between the EmPicTA client-server model and more conventional client-server models. The EmPicTA client is, in a sense, a micro-server and this introduces some complications that are unique to the EmPicTA client-server model. Furthermore the EmPicTA client will suffer from bandwidth limitations when used with a GSM phone. This limits the data throughput to the main system server.

To best understand these issues it is useful to study the protocol stack shown in ***fig 5*** below. The key point is that, for a modem-based version of the EmPicTA client hardware there are PPP protocol layers in addition to the standard TCP/IP protocol layer. The PPP guarantees robust communications, but when large block of digital data, such as digital pictures are transmitted through such a protocol stack there is a significant overhead. In our best-case studies between 30% and 40% of the transmission bandwidth is lost to such protocol overheads. Note that there is less overhead in an Ethernet based stack.

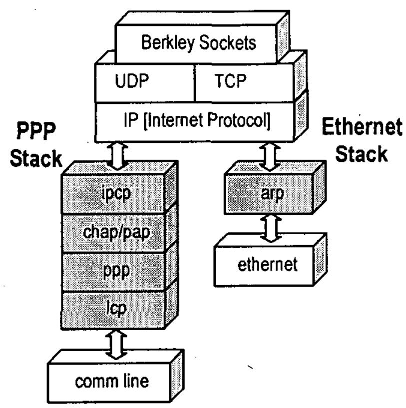


Fig 5: *Protocol Stacks for EmPicTA Client.*

This form of EmPicTA client has a complete TCP/IP solution integrated into the basic appliance hardware. Thus the EmPicTA client connects a digital camera directly to the Internet over the modem/PPP link and digital pictures are sent directly to the main system server over this TCP/IP link. We call this a two-tier client server solution and the main system infrastructure is illustrated in ***fig 6(a)*** below.

There are a number of key drawbacks to this two-tier architecture. Apart from the protocol overhead we must also consider that if the EmPicTA client does not succeed in making a direct, fast connection to the remote system server then there will be additional delays over the Internet connection. This will increase the online time required by the client and if a link proves unreliable then pictures can easily be lost in transit from EmPicTA client to the main server.

A more complex three-tier system architecture [2] overcomes these difficulties and provides a more reliable infrastructure. It also requires less complicated client software on the appliance and allows faster data transfer from the EmPicTA appliance to the Internet. This alternative systems architecture is illustrated in ***fig 6(b)*** below.

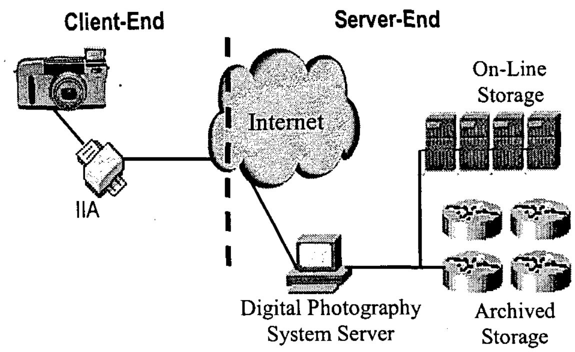


Fig 6(a): *The Two-Tier Infrastructure.*

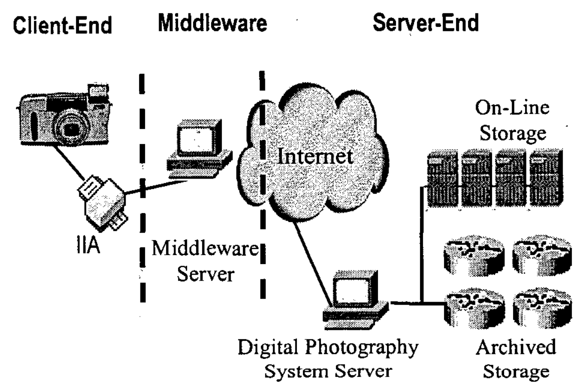


Fig 6(b): *The Three-Tier Infrastructure.*

This 3-tier architecture has the additional benefit that the middle-tier, or proxy server can forward the images to different photocommunity websites allowing the end-user greater flexibility in their choice of services. It also overcomes the integration issues which often arise in dealing with server-side modifications to large, mission-critical, websites.

4. Conclusions

The main purpose of this paper has been to demonstrate that a workable mobile photography service can be offered to consumers with today's technology infrastructure. Recent improvements in data services over GSM have made it possible to offer reasonable upload rates for digital pictures. Services such as WAP and iMode now offer the possibility to access and manipulate uploaded pictures directly from a mobile phone.

However there are still many barriers to the broad adoption of such services. Our experimental service requires a dedicated upload appliance - the EmPicTA - to access a digital camera and establish a connection with the Internet. Until such functionality is integrated directly into a mobile phone unit it will be necessary for an end-user to purchase such a dedicated peripheral. Further, as the current length of time to upload a standard 16 MB compact flash card of pictures is of the order of several hours such a service will be very expensive to use unless mobile operators market it in an imaginative manner. One approach we have proposed is to make the picture upload service available at night time when mobile networks carry very little traffic and a user could be offered a bulk billing rate. An additional problem is that mobile phone batteries will generally only sustain a 2 hour talk-time when fully charged. To overcome both problems we have proposed developing a combined battery-charger and picture/data upload unit.

Fig 7 shows an artists impression of a production version of such a picture-upload and battery-charging cradle for a mobile phone. We believe that such a connectivity appliance, as described in this paper provide a practical, market-focussed, bridge between the Internet and digital cameras and mobile phones available in today's market. This illustrates that wireless digital photography is a service, which could be made available to consumers today and that it is no longer a dream of tomorrow.

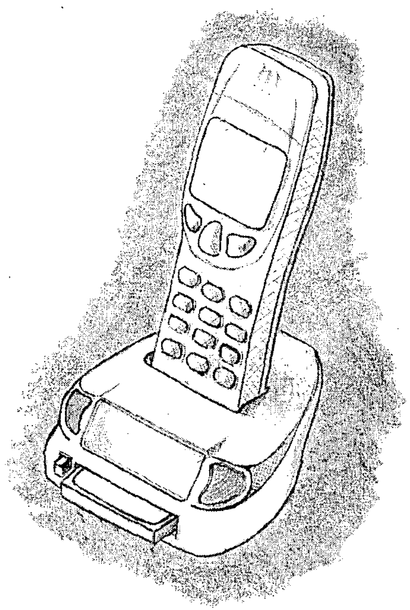


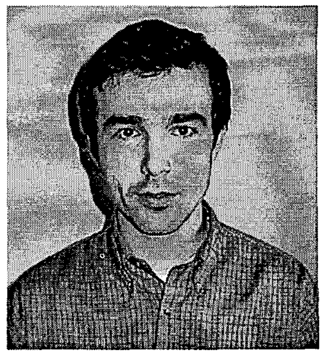
Fig 7: *Artist's concept sketch of a combined battery-charger and photo-upload appliance*

References

[1] Corcoran P.M., and Steinberg, E., "Internet Connectivity Solutions for Digital Photography", *IEEE Transactions on Consumer Electronics, Vol. 46 No. 3 p.494-498, Aug. 2000.*

[2] Corcoran, P.M., Bigioi, P., Steinberg, E. and Prilutsky, Y., "Internet Enabled Digital Photography", *IEEE Transactions on Consumer Electronics,* Vol. 45, No. 3, 1999, pp. 577-584, Nov 1999.

Biographies



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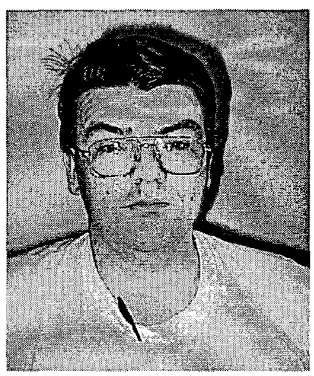

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EXHIBIT B

Zhao, X., *et al.*, *Flexible Network Support for Mobility*, Proceedings of ACM/IEEE MobiCom ’98 (1998)

Flexible Network Support for Mobility

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Abstract

Fueled by the large number of powerful light-weight portable computers, the expanding availability of wireless networks, and the popularity of the Internet, there is an increasing demand to connect portable computers to the Internet at any time and in any place. However, the dynamic nature of such connectivity requires more flexible network support than has typically been available for stationary workstations.

This paper introduces the following two mechanisms, in the context of Mobile IP [24], to ensure a mobile host's convenient and efficient communication with other hosts in a changing environment. One mechanism supports multiple packet delivery methods (such as regular IP or Mobile IP) and adaptively selects the most appropriate one to use according to the characteristics of each traffic flow. The other mechanism enables a mobile host to make use of multiple active network interfaces simultaneously and to control the selection of the most desirable network interfaces for both outgoing and incoming packets for different traffic flows. We demonstrate the usefulness of these two network layer mechanisms and describe how they are implemented.

1 Introduction

Light-weight portable computers, the spread of wireless networks and services, and the popularity of the Internet combine to make mobile computing an attractive goal. With these technologies, users should be able to connect to the Internet at any time and in any place, to read email, query databases, retrieve information from the web, or entertain themselves.

However, due to the dynamic nature of a mobile host's connectivity, providing network support for a mobile host can be a much more complex task than for its stationary counterparts.

For a mobile host, there is the need to provide it with a unique unchanging address, despite the fact that as a mobile host switches from one communication medium to another or from one network segment to another, the IP address it uses will have to change accordingly. The address must change because IP [27] assumes that a host's IP address uniquely identifies the segment of the network through which a host is attached to the Internet. Unfortunately, changing the address will break ongoing network conversations between a mobile host and other hosts, because connection-oriented protocols such as TCP [28] use the IP addresses of both ends of a connection to identify the connection. Therefore, Mobile IP [24], or another similar mechanism that allows a host to be addressed by a single address, is needed to accommodate host mobility within the Internet.

While Mobile IP is useful and is the context for our work, there is more than one way to use it. A mobile host demands the flexibility to use Mobile IP in a variety of ways due to the dynamic environment in which the host may be operating. The work presented in this paper is mainly motivated by the following observations on the unique characteristics of a mobile host:

- Duality: The mobile host has two roles as both a host virtually connected to its home network and as a normal host on the network it is visiting. This duality brings along increased complexity as well as opportunities for optimization. For example, whenever possible, the mobile host can act as a normal host on the network visited, since, as we will see, this is more efficient.

- Dynamically changing point of attachment: We connect a portable to our office network while at work, to the network of a wireless Internet access service provider while on the road, or to another network at home or elsewhere.

  Different networks may have different policies for dealing with packets from mobile hosts. Depending on where a mobile host is currently operating and with whom it is communicating, the mobile host may need to use different packet delivery methods that are both safe and efficient in this dynamically changing environment.

- Multiple network interfaces: To achieve connectivity in any place at any time, mobile hosts will likely require more than one type of network device. For example, our mobile hosts use 10 or 100 Mbit/s Ethernet when in a suitably equipped office or home, but they use a slower wireless packet radio network elsewhere.

  There is no single network device that can provide the desired quality of service (QoS) all the time. There is always a trade-off among coverage, performance, and price. There are even times when multiple network devices need to be used at the same time (such as a

*Work performed while the author was visiting the MosquitoNet Mobile and Wireless Computing Group at Stanford University.

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satellite connection for downlink and a modem connection for uplink from a mobile host). Making use of these active network interfaces simultaneously for different flows of traffic is a challenge.

A mobile host should be able to communicate both conveniently and efficiently with other hosts as it moves from place to place. While there are ways to satisfy one goal or the other, satisfying both at once is a challenge. For example, we can treat a mobile host as a host virtually connected to its home network by always tunneling packets between the mobile host and its home agent. Although convenient, this is obviously not efficient. Achieving efficiency as well requires a mobile host to have more flexibility than has been provided by previously existing mechanisms.

This paper addresses the following two issues in providing the flexibility desirable for a mobile host. First is the need at the network routing layer to support multiple packet delivery methods (such as whether to use regular IP or Mobile IP). We have developed a general-purpose mechanism at the network layer, the Mobile Policy Table, that supports multiple packet delivery methods simultaneously and adaptively selects the most appropriate method according to the characteristics of each traffic flow. Second is the need to make use of multiple network interfaces simultaneously and to control the interface selection of both outgoing and incoming packets for different traffic flows. This is achieved by extending the base Mobile IP protocol to control the choice of interfaces to use for incoming traffic to a mobile host. We also amend the routing table lookup to enable the use of multiple network interfaces for outgoing traffic flows from a mobile host. The result is a system that uses Mobile IP in a way that provides more flexibility to mobile hosts.

The rest of the paper is organized as follows: In section 2, we give a brief description of Mobile IP, the context in which our work is done. In section 3, we illustrate scenarios for the use of multiple packet delivery methods for different flows of traffic. In section 4, we detail the general-purpose mechanism that supports this use of multiple packet delivery methods. In section 5, we describe the use of multiple active network interfaces simultaneously. In section 6, we report the implementation status of the system and present the results of system performance measurements obtained from our experiments. In section 7, we list related work. In section 8, we consider the applicability and potential of our work with IPv6. Finally, we present conclusions together with some future and continuing work in section 9.

2 Background: Mobile IP

Mobile IP [24] is a mechanism for maintaining transparent network connectivity to mobile hosts. Mobile IP allows a mobile host to be addressed by the IP address it uses in its home network (home IP address), regardless of the network to which it is currently physically attached.

Figure 1 illustrates the operation of basic Mobile IP. Hosts communicating with the mobile host (correspondent hosts) may continue to use its home IP address and do not need to know where it is actually located. Packets sent to the mobile host's home IP address are intercepted in the home network by a stationary host (the home agent), encapsulated in a new IP packet, and forwarded (tunneled [23]) to the mobile host's current point of attachment (care-of address). At the destination, the packet is decapsulated, revealing the original packet sent by the correspondent host.

The mobile host sends packets directly to the correspondent host in the reverse direction. However, it uses its home IP address as the source address in these packets, regardless of its current location, to make it appear to the correspondent host that these packets originated in the mobile host's home network. The mobile host thus maintains its home identity even when visiting other networks. Since the paths to and from the mobile host form a triangle between the correspondent host, the home network and the mobile host, the paths are called a triangular route.

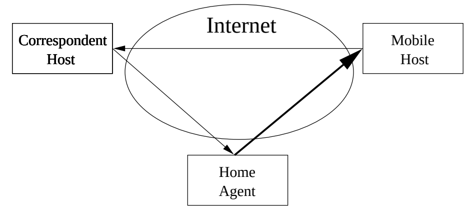

Figure 1: Basic Mobile IP protocol. Packets from the correspondent host to the mobile host are always sent to the mobile host's home network first, and then forwarded by the home agent to the mobile host's current point of attachment. Packets originating from the mobile host are sent directly to the correspondent host, thus forming a triangular route. The thick line indicates the original packet is encapsulated in another IP packet when forwarded, and is therefore of a larger size.

The Mobile IP specification allows for two types of attachment for a mobile host visiting a "foreign" network (a network other than the mobile host's home network). For the first type of attachment, the mobile host can connect to the foreign network through a "foreign agent" by registering the foreign agent's IP address with its home agent. The home agent then tunnels packets to the foreign agent, which decapsulates them and sends them to the mobile host via link-level mechanisms.

Although our implementation supports the use of foreign agents, our work is more focused on the second type of attachment, which provides a mobile host with its own "co-located" care-of address in the foreign network. In this scenario, the mobile host receives an IP address to use while it visits the network, via DHCP [7] or some other protocol or policy. It registers this address with its home agent, which then tunnels packets directly to the mobile host at this address. The disadvantage of this scenario is that the mobile host has to be able to decapsulate the packets itself and more IP addresses are needed. The advantage is that the mobile host also becomes more directly responsible for the addressing and routing decisions for the packets it sends out, and it therefore has more control over such decisions.

While Mobile IP has laid the groundwork for Internet mobility, there are still many challenges to tackle, as seen from on-going efforts in this area. These efforts include route optimization [14], firewall traversal [21], and "bi-directional tunneling" (or "reverse-tunneling") [20] to allow packets to cross security-conscious boundary routers. This last problem, as described in section 3.2, is one of our motivations for making it possible for mobile hosts to choose dynamically between different packet addressing and routing options. We believe that these efforts make evident the inherent need for mobile hosts to use different techniques under different circumstances.

3 Supporting Multiple Packet Delivery Methods

The first flexibility need that we have identified for a mobile host is to avoid the undue cost of always using a single packet delivery method. By avoiding a single method of delivery, the mobile host only pays for the extra cost of mobility support or security perimeter traversal when it is truly needed.

We illustrate some of the situations for which we have found such flexibility to be beneficial in practice. While these are the examples we have implemented so far, the mechanism we propose here can be extended to support other delivery methods when other choices become desirable.

3.1 Providing Transparent Mobility Support Only When Necessary

The transparent mobility support of Mobile IP is important for long-lived connection-oriented traffic or for traffic initiated by correspondent hosts. However, this transparent mobility support does not come without cost. In the absence of route optimization for Mobile IP, packets destined to a mobile host are delivered to its home network and then forwarded to the mobile host's current care-of address in the network it is visiting. If a mobile host is far away from home but relatively close to its correspondent host, the path traversed by these packets is significantly longer than the path traveled if the mobile host and the correspondent host can talk to each other directly. The extra path length not only increases latency, but also generates extra load on the Internet. It even increases load on the home agent, potentially contributing to a communication bottleneck if the home agent is serving many mobile hosts simultaneously.

It would be ideal to use Mobile IP route optimization [14]. However, since Mobile IP route optimization requires extra support on correspondent hosts in addition to support on the mobile host and its home agent, it requires widespread changes throughout the Internet, which is unrealistic for the near future.

Fortunately, there are certain types of traffic for which a mobile host may not require Mobile IP support. For example, most web browsing traffic does not require this support. Web connections are usually short-lived [1], so it is unlikely that a mobile host will change addresses in the midst of a connection. Even if it does, the user can simply press reload, and the web transfer will be retried. Also, it is the mobile host that initiates the web transfers most of the time, so it is usually not necessary for the server (the correspondent host) to recognize the mobile host across different connections if the mobile host changes addresses.

3.2 Supporting Bi-directional Tunnels and Triangle Routes

When communication requires transparent mobility, there still remains a choice of packet delivery methods. An important example is communication that must traverse security-conscious boundary routers.

As a result of IP address spoofing attacks, and in accordance with the IAB [8] and CERT [4] advisory, more routers are filtering on the source address (ingress filtering) and will drop a packet whose address is not "topologically correct" (whose originating network cannot be the one identified by the source address). In the presence of such routers, the triangle route as specified in the basic Mobile IP protocol will fail. Figure 2 illustrates an example of this problem.

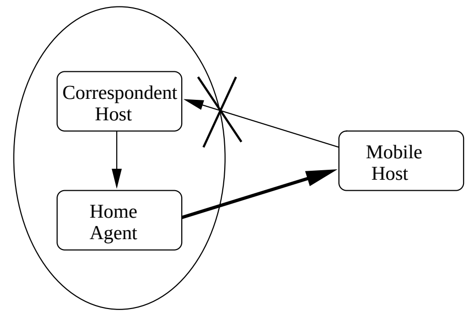

Figure 2: This figure illustrates the problem with source IP address filtering when a security-conscious boundary router is in the mobile host's home domain. When the mobile host sends packets directly to the correspondent host in its home domain with the source IP address of the packets set to the mobile host's home IP address, these packets will be dropped by the boundary router, because they arrive from outside of the institution and yet claim to originate from within.

As another example, if the boundary router is in the domain visited by the mobile host, it may drop packets that are received from inside but claim to originate from outside; these packets look as if they are "transit traffic", and not all networks will carry transit traffic.

To address the above problems, we should tunnel packets sent by the mobile host through its home agent to its correspondent hosts, in much the same way packets sent to the mobile host are tunneled. This is called "bi-directional tunneling" [20]. Figure 3 illustrates the solution.

This bi-directional tunneling addresses the problem related with ingress filtering routers, but again, this comes with increased cost. If a mobile host visits a network far away from home and tries to talk to a correspondent host in a nearby network, packets originating from the mobile host will now have to travel all the way home and then back to the correspondent host, increasing the length of this reverse path.

However, not all the packets need to be sent this way. It is unnecessary to force all traffic through a bi-directional tunnel just because some ingress filtering routers would drop traffic sent to specific destinations. Such tunneling may be unnecessary for a large part of the traffic for which the topologically incorrect source IP address in packet headers is not a problem.

Fortunately, we can avoid unnecessary bi-directional tunneling by supporting both the triangle route and the bi-directional tunnel simultaneously through appropriate entries in the Mobile Policy Table. This choice usually depends upon the destination network, and only certain destinations will require the overhead of the bi-directional tunnel. We insert entries matching these destinations into the Mobile Policy Table, and all packets with a matching destination address will be sent encapsulated through the home agent, unless a more specific entry (by port number perhaps) indicates otherwise.

Nonetheless, there are scenarios when the default behav-

[1] One exception is the current web push technology which uses long-lived transport connections, but it has been proposed that ultimately connectionless multicast should be used. Another exception is HTTP 1.1 [9], which can potentially use persistent transport connections. Even so, it is possible for the user simply to reload the page when the mobile host has moved.

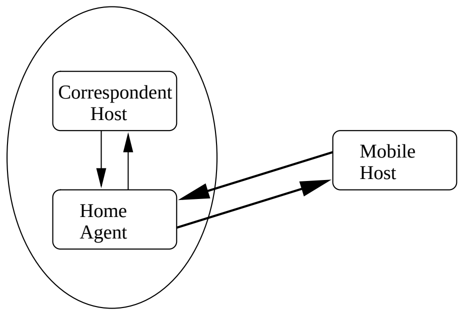

Figure 3: To address the problem caused by source IP address filtering on security-conscious boundary routers, the mobile host sends packets by tunneling along the reverse path as well. Since the encapsulated packets in the tunnel from the mobile host to its home agent use the mobile host's care-of address as their source IP address (which is topologically correct), these packets will no longer be dropped by the security-conscious boundary routers.

ior should be to use bi-directional tunneling. If the host is visiting a network that drops transit traffic, the default entry for the Mobile Policy Table will specify bi-directional tunneling, and only more specialized entries will turn it off for other traffic to destinations within the local domain.

3.3 Joining Multicast Groups in Different Ways

The final packet delivery mechanism we have experimented with is to allow a mobile host to choose to join multicast groups either remotely (through its home network), using its home IP address, or locally, using its care-of address in the foreign network [31]. This flexibility is necessary because multicast traffic is often limited to a particular site by scoping [6, 1]. Also, there are advantages and disadvantages to either choice even if scoping is not an issue.

- Joining locally: In this respect the mobile host is no different from any normal host on the same subnet. The advantage is that the delivery of multicast traffic to the mobile host is more efficient. The disadvantages are that it requires the existence of a multicast-capable router in the foreign network, and those mobile hosts actively participating in the multicast session will lose their identity within the group when they move to another network.

- Joining through the home network: All multicast traffic has to be tunneled bi-directionally between the mobile host and its home agent. The advantages of this choice are that it does not require multicast support on the foreign network, and the mobile host will retain its membership as it moves around. The disadvantage is that the route is less efficient. Although there are optimizations that allow a single copy of multiple packets to be tunneled to a foreign agent serving multiple mobile hosts [10], the home agent still has to tunnel a copy of a multicast packet to each foreign network that has one of its mobile hosts visiting.

We can choose either option for different multicast groups. To join a multicast group locally, we add an entry in the Mobile Policy Table instructing traffic destined to certain multicast addresses to use conventional IP support. To join a multicast group remotely, we add an entry in the Mobile Policy Table to use bi-directional tunneling for traffic destined to these multicast groups. The mobile host also needs to notify its home agent, in a registration packet, to forward multicast traffic to it.

4 A General-purpose Mechanism for Flexible Routing

In this section, we describe the mechanism used to achieve the flexibility features described in the previous section. This general-purpose mechanism is centered around the idea of introducing a Mobile Policy Table in the routing layer of the network software stack. The IP route lookup routine `ip_rt_route` is augmented to take the Mobile Policy Table into consideration together with the normal routing table in determining how a packet should be sent.

4.1 Support in the Network Layer

We choose the network layer to add our support for multiple packet delivery methods due to its unique position in the network software stack. By modifying the layer through which packets converge and then diverge, we avoid a proliferation of modifications. Relatively fewer changes need to be made in the kernel network software, and both the upper layer protocol modules (such as TCP or UDP) and lower layer drivers for different network devices remain unchanged.

We further identify the route lookup routine as a natural place to add such support. Along with normal route selection, the enhanced route lookup also makes decisions for choosing among multiple ways to deliver packets, as necessitated by the changing environment of a mobile host.

4.2 The Mobile Policy Table

The Mobile Policy Table specifies how the packets should be sent and received for each traffic flow matching certain characteristics. The routing and addressing policy decisions currently supported in the Mobile Policy Table are:

- whether to use transparent mobility support (Mobile IP) or regular IP;

- whether to use triangular routing or bi-directional tunneling, if using Mobile IP.

These policies are specified through two types of entries: "per-socket" entries and "generic" entries, with per-socket entries taking precedence. While the Mobile Policy Table only contains generic entries. a per-socket entry kept within the socket data structure allows any application to override the general rules. Without a per-socket entry, traffic is subject only to generic entries in the policy table, which specify the delivery policy for all traffic matching the given characteristics.

For generic entries, the Mobile Policy Table lookup currently determines which policy entry to use based on two traffic characteristics: the correspondent address and port number (for TCP and UDP). The correspondent address is useful, because we often want to treat flows to different destinations differently. The port number is useful as well, because there are many reserved port numbers that indicate the nature of the traffic, such as TCP port 23 for telnet, or port 80 for HTTP traffic. While these are the characteristics currently taken into consideration, we can extend the technique to include other characteristics in the future.

Dest	Netmask	PortNum	Mobility	Tunneling
a.b.0.0	255.255.0.0	0	Yes	Yes
0.0.0.0	0.0.0.0	80	No	N/A
0.0.0.0	0.0.0.0	0	Yes	No

Table 1: A sample mobile policy table. This mobile policy table specifies that all traffic destined back to the mobile host's home domain should use bi-directional tunneling, to satisfy the boundary routers at its home institution (first row); all traffic to port 80 (web traffic) should avoid using transparent mobility support (second row); and the remaining traffic should by default use Mobile IP with a regular triangular route (third row). The second entry applies to all traffic with a destination port number of 80, even for destinations matching the first entry, since port number specification takes precedence.

Table 1 shows, as an example, the Mobile Policy Table currently used on our mobile hosts when visiting places outside of their home domain. The Mobile Policy Table lookup operation always chooses the most specifically matched entries, i.e. those with more restricted netmask and/or port number specifications, over more general ones.

4.3 How it Works

The difference between the augmented route lookup and the regular route lookup routine is that traffic characteristics (such as the port number of the socket) other than the destination IP address also have to be taken into consideration.

Figure 4 illustrates the use of the Mobile Policy Table and routing table within the Linux kernel. The modification to the kernel is mainly limited to the route lookup function. For backward compatibility, the normal routing table remains intact. During a route lookup, extra arguments such as the source IP address to use (if it has already been chosen), and other characteristics of the traffic flow (currently only the TCP or UDP port number) are used in addition to the correspondent host's address for deciding how the packet should be sent.

An important extra argument passed into the new route lookup function is the source IP address in use for the particular packet. The new route lookup function uses the source IP address to determine if the packet is subject to policy decisions in the Mobile Policy Table. If the source IP address has already been set to the IP address associated with one of the physical network interfaces, this indicates that no mobility decision should be made for the packet. Packets may have their source address set either after they are looped back by the virtual interface (described below), since a mobility decision has already been made by that time, or by certain applications. An example of such an application is the mobile host daemon handling registration and deregistration with the home agent that wishes to force a packet through a particular real interface using regular IP. In these cases, only the normal routing table is consulted based upon the destination address, and the resulting route entry is returned. For the rest of the packets, the Mobile Policy Table needs to be consulted to choose among multiple packet delivery methods.

The virtual interface ("*vif*") handles packets that need to be encapsulated and tunneled. It provides the illusion that the mobile host is still in its home network. Packets sent through *vif* are encapsulated and then looped back to the IP layer (as shown by the wide bi-directional arc in the figure) for delivery to the home agent. This time, however, the source IP address of the encapsulating packet has already been chosen, so it will now be sent through one of the physical interfaces. Accordingly, packets being tunneled to the mobile host by its home agent are also looped by the IPIP module to *vif*, so that they appear to have arrived from an interface connected to its home network.

To maintain reasonable processing overhead, policy table entries are cached in a manner similar to routing table entries. If the characteristics of the traffic match a cached entry, the software uses the cached entry to speed up the process of policy lookup. Otherwise, a new policy table lookup will be carried out. Whenever the mobile policy table is modified, the cached entries are flushed.

We believe this is a general-purpose mechanism, because it can be easily extended to take other traffic characteristics into consideration and to add more policy decisions if it becomes desirable to do so. For instance, if particular correspondent hosts have the ability to decapsulate packets themselves, we could note this information in the Mobile Policy Table for those destinations, and the mobile host could send encapsulated packets directly to these hosts, bypassing the home agent yet still providing the robustness of a bi-directional tunnel.

4.4 Dynamic Adaptation of Mobile Policy Table

The Mobile Policy Table entries can be dynamically adjusted. We currently support adaptively selecting between the safest packet delivery method (i.e. bi-directional tunneling) and a more efficient packet delivery method (i.e. triangular routing).

The adaptation applies only to those entries that are currently cached. That is, we only change those entries that are in use.

If a flow uses reverse tunneling, a separate process will probe (with exponential back off) the destination by sending ICMP echo requests using triangular routing. If a reply is successfully received, the Mobile Policy Table entry for this flow will be changed from bi-directional tunneling to use the more efficient triangular routing. For a flow using triangular routing, the Mobile Policy Table entry will be changed back to use bi-directional tunneling if the current more aggressive policy does not seem to work for the flow. We detect this by checking whether any packet has been received from the destination associated with the Mobile Policy Table entry during the period that this cached entry has been used in the route lookup a certain number of times (for example, five).

5 Supporting Multiple Active Network Interfaces

The use of multiple active network interfaces is different on mobile hosts than on typical stationary machines. Stationary hosts with multiple active network interfaces are usually routers, forwarding packets with different destination addresses through different network interfaces. On a mobile host, these network devices instead represent different ways this single mobile host can communicate with the outside world. For example, we may want to use two different interfaces (one for telnet and another for file downloading) for communication with the same host.

The ability to use multiple interfaces in the way described above is not supported by the operating systems we

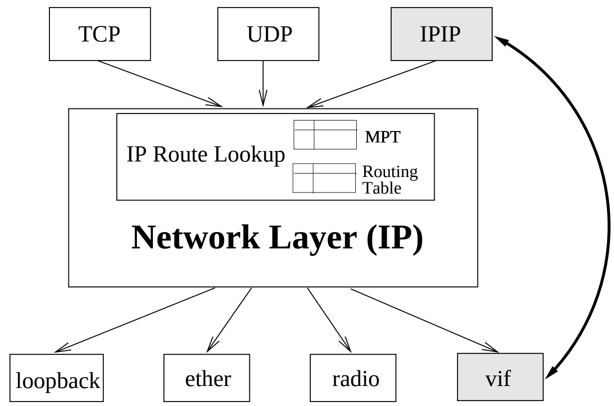

Figure 4: This figure shows where the Mobile Policy Table (MPT) fits into the link, network, and transport layers of our protocol stack. The MPT resides in the middle (network) layer, consulted by the IP route lookup function in conjunction with the normal routing table to determine how packets should be sent. The bottom (link) layer shows the device interfaces, with *vif* being a virtual interface that handles encapsulation and tunneling of packets. The top (transport) layer shows TCP and UDP, along with an IP-within-IP processing module. The solid arrows depict the passing of data packets down the layers. The shaded boxes indicate that the IPIP and *vif* modules have overlapping functionalities. The bold bi-directional arc shows the need to pass packets between the two modules.

are aware of, except for Linux. The standard Linux distribution includes our contribution that enables each socket to choose among different simultaneously active network interfaces for outgoing traffic. As a result, the routing decisions in operating systems without this feature are determined by destination addresses alone, without taking other traffic flow characteristics into consideration. For example, these operating systems assume there is only one default route for traffic that does not match with any particular destination specification in the routing table.

By supporting the use of multiple active network interfaces, we can make use of them simultaneously for different flows of traffic that are not necessarily distinguishable by their destination addresses alone.

5.1 Motivation for Multiple Interfaces

Specifically, we find the support for the use of multiple active interfaces useful for the following reasons:

1. Smoother hand-offs: With the ability to use multiple active network interfaces simultaneously, a mobile host can probe the usability of these interfaces beyond its directly connected subnet at the same time and register with its home agent without switching from the interface currently in use. The current network interface can still remain in use until the new interface has successfully registered the new care-of address with the home agent.

2. Quality of service (QoS): The different networks to which a user has access may offer different QoS guarantees. For example, a mobile user may have simultaneous access to a GSM network [29] that has low bandwidth but relatively low latency, as well as to a Metricom network [19] that offers higher bandwidth but has higher and more variable latency. The mobile host might decide to use the GSM network for its low-bandwidth interactive flows, such as its voice or telnet traffic, which require low latency for user satisfaction, but to use the Metricom network for its bulk data transfer flows, such as ftp traffic, which require high bandwidth but do not demand as low a latency. The combination of these different types of networks can virtually deliver a single network that provides a larger range of QoS to mobile users.

3. Link asymmetry: Some networks only provide unidirectional connectivity. This is the case for many satellite systems, which usually provide downlinks only. In these systems, connectivity in the reverse direction is provided via a different means, such as a SLIP or PPP dialup line, a cellular modem, or a CDPD [3] modem. Being able to specify the incoming and outgoing interfaces explicitly in a natural manner is a useful feature.

4. Cost and billing: The cost of accessing different networks may be a decisive factor in the interface selection phase. For example, users on the move may want to switch to "local" network access, whenever available, to reduce the communication cost. They might also select different interfaces according to who is going to pay the bill. For example, they might choose a cheaper and lower quality access network for personal communications and a more expensive and better quality one for business communications.

5. Privacy and security: Privacy and security may also be of considerable importance in interface selection. Users may trust some networks more than others and prefer to use them for confidential and important communications. They might also want, for privacy reasons, to choose different networks for business and personal communications.

The following sections explain how to support this feature for packet transmission and reception.

5.2 Supporting Multiple Interfaces in Transmission

For a mobile host to send packets using multiple active network interfaces at the same time, we have devised the following two techniques. The first is to make use of the metric field in the existing routing table entry so that multiple routes through different interfaces can be associated with a certain destination specification. Usually the normal default route has a metric of one. Routes through other interfaces with metrics greater than one can coexist with the normal default route in the routing table. A route lookup that does not specify a particular interface will thus find the normal default route, since the lookup always chooses the matching route with the smallest metric.

The second technique we provide is a "bind-to-device" socket option that applications can call to associate a specific device with a certain socket. The route lookup routine has been modified so that when a device selection is specified, only those route entries associated with the particular device will be considered. Therefore, different applications running simultaneously can each choose different network interfaces to use for sending packets.

5.3 Supporting Multiple Interfaces in Reception

5.3.1 Overview of the scheme

A mobile host with multiple interfaces running standard Mobile IP cannot receive different flows of packets on different interfaces simultaneously. With Mobile IP, a mobile host sends location updates that indicate its current (care-of address, home address) bindings to its home agent and possibly to its correspondent hosts. As a result, all packets addressed to a mobile host are sent over the same interface or possibly multicast over multiple interfaces if the "S" (simultaneous binding) flag is set in the registration.

We have extended Mobile IP to allow a mobile host to use different interfaces to receive different flows. In our work, we define a flow as a triplet (the mobile host's home IP address, the correspondent host's IP address, the port number on the correspondent host). We do not include the port number on the mobile host in the flow definition for two reasons. The first is that we believe most of the communications between a correspondent host and a mobile host are initiated by the mobile host itself, and the source port is generally not meaningful in distinguishing a flow since it is usually selected randomly. The second is efficiency: by limiting the number of fields defining a flow, we limit the processing cost.

In our framework, a mobile host may choose to receive the packets belonging to a given flow on any of its interfaces by sending a Flow-to-Interface binding to its home agent. This Flow-to-Interface binding specifies the mobile host's care-of address(es) that the home agent should use to forward packets belonging to the flow.

Upon reception of a Flow-to-Interface binding, a home agent updates its extended binding list. The extended binding list contains entries that associate a particular flow specification with a mobile host's care-of address. Thereafter, when the home agent receives a packet addressed to a mobile host it is serving, it searches in its extended binding list for an entry matching the corresponding fields of the packet and forwards the packet to the associated care-of address. If no entry is found, the packet is forwarded to the mobile host's default care-of address.

Figure 5 illustrates the routing of datagrams to and from a mobile host away from home, once the mobile host has registered some Flow-to-Interface bindings with its home agent.

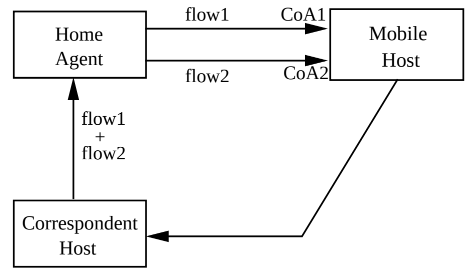

Figure 5: Supporting Multiple Incoming Interfaces. Packets belonging to any flows addressed to the mobile host arrive on the home network via standard IP routing. Packets are intercepted by the home agent and are tunneled to the care-of address selected based on the packets' destination address, source address and source port. Packets of flow1 are tunneled to CoA1; Packets of flows2 are tunneled to CoA2. Packets sent by the mobile host are delivered to their destinations via standard IP routing.

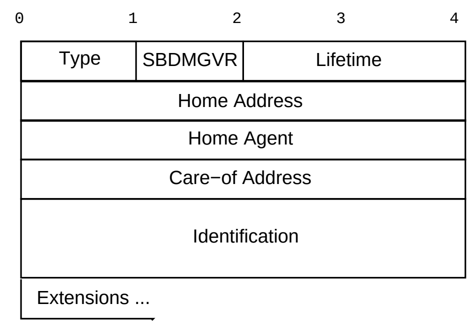

Figure 6: Mobile IP Registration Request. A registration request is used by a mobile host to create on its home agent a mobility binding from the static IP address at its home network, i.e. home address, to its current care-of address. A general extension mechanism is defined to carry additional information, such as the new extensions introduced in this paper.

The Flow-to-Interface bindings are registered to the home agent via two new extensions of the Mobile IP registration messages. The following section reviews briefly the Mobile IP registration procedure and details the new extensions we have devised.

5.3.2 The Mobile IP Flow-to-Interface Binding Extensions

The Mobile IP Registration Procedure

A mobile host and its home agent exchange Mobile IP registration request and reply messages so that the mobile host can notify the home agent of its current point-of attachment to the Internet. Upon receiving a registration request message, the home agent creates or modifies its mobility binding, associating the mobile host's home address with its current care-of address for the specified lifetime.

The Mobile IP registration request uses UDP packets, as shown in Figure 6. The fixed portion of the registration request is followed by one or more extensions, a general mechanism to allow optional information and protocol extensibility. We use this general mechanism to extend the Mobile IP protocol so that different flows to a mobile host can be associated with different network interfaces on that host.

The Flow-to-Interface Binding Extension

A mobile host may ask a home agent to register one or several Flow-to-Interface bindings by appending to a registration request one or more Flow-to-Interface extensions, each defining a Flow-to-Interface binding to be registered.

The Flow-to-Interface binding extension format is shown in Figure 7.

The Flow-to-Interface Binding Update Extension

A mobile host may ask a home agent to replace a care-of address for its Flow-to-Interface bindings by appending to a registration request an Flow-to-Interface binding update extension. The care-of address specified in the fixed-length part of the registration request must then indicate the care-of address to be replaced. The care-of address specified in the update binding extension must indicate the new care-of address.

This extension is useful when a mobile host changes the point of attachment of one of its interfaces and gets a new care-of address for this interface. This extension is for convenience, since it obviates the need for the mobile host to deregister all Flow-to-Interface bindings pointing to the previous care-of address and reregister them with the new care-of address.

The binding update extension format is detailed in Figure 8.

Some Compatibility Issues

We want to ensure that unmodified mobile hosts are able to use our enhanced home agent, and that our enhanced mobile hosts work properly with unmodified home agents. The first scenario is not an issue, since the enhanced home agent can process both regular registration messages as well as those with our new extensions. However, we have to make a design choice for the second scenario.

According to the Mobile IP specification [24], when an extension numbered within the range 0 through 127 is encountered but not recognized, the message containing that extension must be silently discarded. When an extension numbered in the range 128 through 255 is encountered but not recognized, only that particular extension is ignored, but the rest of the extensions and the message must still be processed. We choose the types for our new extensions within the range 128 to 255, since it is undesirable to have registration packets silently discarded, causing the system to wait for timeouts instead.

When a mobile host sends a Flow-to-Interface binding registration to a home agent that does not support Flow-to-Interface bindings, the packets will still be processed. This is safe, since the registration message is a normal registration message excluding the Flow-to-Interface binding extension. However, to distinguish these unsuspecting home agents from the enhanced home agents, we make the enhanced home agents use different return codes in reply to registration requests with Flow-to-Interface extensions. If the registration is accepted, the home agent returns code 2

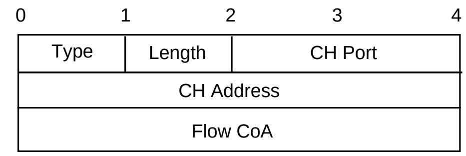

Figure 7: Flow-to-Interface binding extension. The CH (correspondent host) Address and the CH Port fields in this extension together with the mobile host's home address define the flow associated with the care-of address specified in the Flow CoA field.

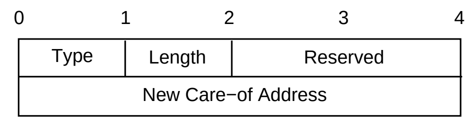

Figure 8: Flow-to-Interface binding update extension. The New Care-of Address field specifies the new care-of address that replaces the one specified in the fixed-length part of the registration message.

instead of 0. Return code 3 (instead of 1) will be used if the registration is accepted and simultaneous mobility binding is granted. Therefore, if a mobile host sends out registration requests with Flow-to-Interface binding extensions but gets return code 0 or 1 in reply, it should stop sending Flow-to-Interface binding extensions to its home agent, since continuing to send them will just waste bandwidth.

6 Implementation Status and Experiments

6.1 Implementation Status

In our Mobile IP implementation [2], some core functions of Mobile IP are in the kernel, such as packet encapsulation and forwarding. Other functions, such as the transmission and reception of registration messages, are implemented in a user space daemon.

We have implemented the support for multiple packet delivery methods within the Linux kernel (currently version 2.0.33). A mobile host can choose the use of either Mobile IP or regular IP and the use of either bi-directional tunneling or triangular routing for different flows of traffic all at the same time.

We have also implemented support for multiple active interfaces under Linux. We provide mobility-aware applications with the flexibility to choose incoming and outgoing interfaces. Two new socket options are used to bind flows to given interfaces:

- SO_BINDTODEVICE: [2] This option is used by an application to bind the outgoing flows of a socket to an interface.
- SO_BIND_FLOWTODEVICE: This option is used by an application to bind the incoming flows of a socket to a given interface.

[2]SO_BIND_OUTFLOW_TO_INTERFACE would be more appropriate, and the next socket option should be named accordingly as well. Unfortunately, SO_BINDTODEVICE is already in the standard Linux distribution for historical reasons.

Experiment	Cached (μs)	Not cached (μs)
Regular route lookup	18.5 (0.8)	100.1 (0.9)
Route lookup w/ MPT	23.5 (0.7)	116.5 (1.2)

Table 2: This experiment measures both the time needed for the regular route lookup and the time spent to do the modified route lookup with Mobile Policy Table (MPT) consultation in microseconds. Each measurement is repeated 10 times. The numbers in parentheses are the standard deviations. We tested cases for both a cache hit and a cache miss when looking up routes.

6.2 Experiments with Multiple Packet Delivery Methods

We measure both the time spent in doing regular route lookup and the time spent in doing route lookup with a Mobile Policy Table lookup on a mobile host. We then examine the difference to determine the added latency in making policy decisions according to the Mobile Policy Table.

The results are shown in Table 2. The overhead of consulting the Mobile Policy Table in route lookups is small, less than 20 μs even when the entries are not currently in cache. It is less than one percent of the round-trip time between two hosts on the same Ethernet segment (typically around 2ms).

6.3 Experiments with Multiple Active Interfaces

The main possible source of overhead for supporting multiple interfaces is the flow demultiplexing processing on the home agent, which may affect both the latency and the throughput. The goal of the experiments described in this section is to evaluate the latency cost of this demultiplexing, i.e. the extra time it takes for a home agent to forward a packet addressed to a mobile host.

For these experiments, the mobile host connects to a foreign network on one of our department's Ethernets, and registers its current care-of address with its home agent. The correspondent host sends *ping* (ICMP echo request) packets to the mobile host. We measure the flow binding demultiplexing time at the home agent by monitoring the code using the Linux `do_gettimeofday` kernel function. We consider two cases: when the home agent has no Flow-to-Interface bindings, regular Mobile IP is used, but when the home agents contains Flow-to-Interface bindings, it must search the list of bindings before forwarding a packet to the mobile host.

The setup of our test environment is illustrated in Figure 9. We collect the data by repeating the above test 10 times as the number of bindings in the home agent's list increases from 0 to 60. Table 3 displays the results.

These results for the flow binding demultiplexing cost may seem large compared to the demultiplexing time incurred with regular Mobile IP on the home agent (2.1 microseconds), but they are a small additional factor when compared to the round-trip time between the mobile host and the correspondent host, which is approximately 5400 microseconds in our experiments. The flow binding demultiplexing cost varies from 2.3 microseconds for one binding to 9.2 microseconds for 60 bindings.

Note that the cost per flow binding decreases as the number of flow bindings in the list increases, with the result converging to about 0.12 microseconds. This result is explained by the structure of the flow binding lookup function. This

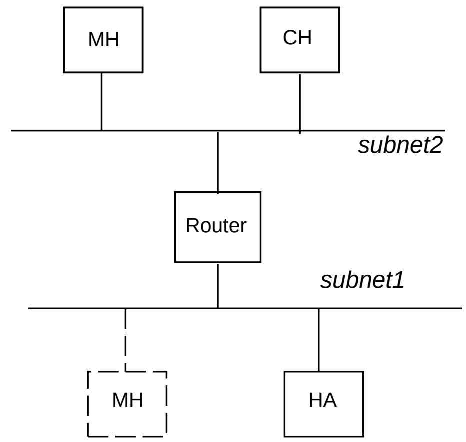

Figure 9: Test Environment Setup. The mobile host, whose home network is subnet1, visits subnet2 of the departmental network. The Mobile Host (MH) is a Gateway2000 (486DX2-40 processor) and the Home Agent (HA) is a Toshiba Tecra (Pentium 133MHz). The Correspondent Host (CH), which is on subnet2, is a 90MHz Pentium. All machines are running Linux.

function is composed of two parts. The first part takes a fixed amount of time to locate an entry for the mobile host in the mobility binding table on the home agent by hashing on the mobile host's home IP address. The second part searches into a list for a flow binding corresponding to the incoming packet. When the number of bindings in the list is small, the cost of the first part is large relatively and increases the average demultiplexing time. On the other hand, when the number of bindings in the list is large, the cost of the first becomes negligible and the average cost converges to the real demultiplexing cost.

7 Related Work

There are a number of projects focusing on providing flexibility support for mobile hosts at different layers of the network software stack.

Work at Oregon Graduate Institute and Portland State University [12] addresses the flexibility need of a mobile host in the face of physical media changes, mainly dealing with IP reconfiguration issues. The focus is on a model that determines the set of available network devices and dynamically reconfigures a mobile system in response to changes in the link-layer environment.

The CMU Monarch project [13] aims at enabling mobile hosts to communicate with each other and with stationary or wired hosts transparently and adaptively, making the most efficient use of the best network connectivity available to the mobile host at any time. It has an overall goal similar to ours, although the project currently does not support multiple packet delivery mechanisms. Monarch also focuses on ad hoc networking, which we currently do not support.

The CMU Odyssey project [22] extends the Unix system call interface to support the flexibility through application-aware adaptation. Odyssey exposes resources to applications by allowing them to specify a bound of tolerance for a resource. When the behavior of the resource moves outside the tolerance window, the application is informed via

Flow Bindings	Demultiplexing Time (μs)	Cost (μs)
0	2.1 (0.30)	N/A
1	2.3 (0.45)	0.2 (0.20)
2	2.7 (0.30)	0.6 (0.30)
10	3.9 (0.30)	1.8 (0.18)
20	4.7 (0.46)	2.6 (0.13)
30	5.3 (0.46)	3.2 (0.11)
40	6.7 (0.64)	4.6 (0.12)
60	9.2 (0.40)	7.1 (0.12)

Table 3: Flow Binding Demultiplexing Cost. The Demultiplexing Time column displays the demultiplexing time of a packet at the home agent as a function of the number of flow bindings in the list (the numbers in parentheses are the standard deviation). The Cost column displays the cost of the flow binding demultiplexing as a function of the number of flow bindings in the list (the numbers in parentheses are the cost per flow binding).

an up-call.

Making simultaneous use of multiple interfaces is also an important goal of the work by David Maltz and Pravin Bhagwat [17]. Their approach provides transport layer mobility by splitting each TCP session between a mobile host and a server into two separate TCP connections at the proxy, through which all packets between the mobile host and the server will travel. It allows a mobile host to change its point of attachment to the Internet by rebinding the mobile-proxy connection while keeping the proxy-server connection unchanged. It can control which network interfaces are used for different kinds of data leaving to and from the mobile host. However, their work differs from ours in that it does not use Mobile IP and it selects the interface by explicitly picking the corresponding IP addresses to use on a per session basis, while with our enhancement to Mobile IP, we can select different interfaces to use for different flows even if the mobile host always assumes its static home address.

Also at the network layer, the BARWAN project [15] at UC Berkeley aims at building mobile information systems upon heterogeneous wireless overlay networks to support services allowing mobile applications to operate across a wide range of networks. Their current focus is on providing low latency hand-offs among multiple network devices.

The use of a Mobile Policy Table is similar to the Security Policy Database (SPD) in IPsec [16], which needs to be consulted in processing all traffic. While the Mobile Policy Table is used to direct the addressing and routing decisions in sending packets, the SPD deals with the security aspects of traffic control. Another difference is that the Mobile Policy Table is only in effect for outgoing traffic. It affects the incoming traffic through the selection of source IP address for the outgoing traffic and/or through coordination with the home agent. The SPD is in effect for both inbound and outbound traffic all the time.

Our previous work on Internet mobility [5] enumerates a variety of ways for sending and receiving packets on a mobile host, based on factors such as the characteristics the protocol should optimize, the permissiveness of the network over which the packet travels and the level of mobile awareness of the host with which the mobile host corresponds. This paper builds upon this previous work by providing an adaptive mechanism for simultaneous use of multiple packet delivery methods and by extending this with support for the simultaneous use of multiple active interfaces.

In summary, our approach focuses more on the network layer by providing increased support for a mobile host to control how it sends and receives packets. Our work differs from other work in the combination of the following features:

1. Mobile IP is an integral part of our system. We address the issue of how Mobile IP can be used most efficiently and flexibly on mobile hosts.

2. Our system provides support for multiple packet delivery methods.

3. Our system makes use of multiple active interfaces simultaneously.

8 IPv6 Considerations

With IPv6 [11], a mobile host will always be able to obtain a co-located care-of address in the network it is visiting. However, the fact that a mobile host will always have both a home role (acting as a host still connected to its home network) and a local role (acting as a normal host in the visited network) simultaneously will still be an issue. An example is in multicast scoping. A mobile host needs to assume its home role if it wants to join the multicast group scoped within its home domain, while it needs to assume its local role to join the multicast group scoped within the visited domain.

Because of the duality of the roles a mobile host can assume, there is always the need for a mobile host to select different packet delivery methods for different traffic flows.

With regard to multiple interface management under IPv6, we have the following observations:

1. In Mobile IPv6 [26], route optimization is provided. As a result, the correspondent hosts can send packets directly to the mobile host without going through the home agent. Therefore, the Flow-to-Interface binding extensions need to be sent to the correspondent hosts as well.

2. The IPv6 *flow label* field can be very useful for providing multiple interface support. The flow label is a field of the IPv6 header which is set by the source of the packet and used by routers to identify flows. This flow label field could be used, in our proposal, by the home agent to demultiplex packets and forward them on the appropriate interface. This avoids degrading performance, since it is no longer necessary to look into the transport layer header of the packets for the port number.

3. IPv6 provides a *priority* (class) field that is used by routers to provide different services to different types of packets. This field can potentially be used in our proposal by the home agent in determining the most appropriate interfaces through which to forward packets addressed to a mobile host in the absence of Flow-to-Interface binding registrations.

9 Conclusions and Future Work

A mobile host using Mobile IP needs to have more flexibility in the way packets are delivered to and from it. This is due to the dynamic environment in which a mobile host may operate.

It is desirable to choose different packet delivery methods according to the characteristics of different traffic flows. A mobile host is unique in that it needs to act both as a host still virtually connected to its home network and as a normal host in the network it is visiting. Therefore, one method will not suit all purposes. For this reason, we have devised a general-purpose mechanism at the network routing layer that supports the choices of multiple packet delivery methods. This is achieved by coupling the consultation of the Mobile Policy Table with the regular routing table lookup.

It is also desirable for a mobile host to be able to make use of multiple active network interfaces simultaneously for different flows of traffic. For this, we have added two new socket options and have extended the Mobile IP protocol with new registration extensions so that a mobile host has more control over which interface to use to send and receive packets.

Our experiments show that with reasonable overhead we can address the flexibility needs of a mobile host by maintaining a balance between the convenience and efficiency needs of packet delivery.

As for future work, we plan to draw upon results from other projects such as the CMU Odyssey project [22] and provide mobility-aware applications with an API to specify their QoS requirements instead of requiring them to bind flows explicitly to specific interfaces. A kernel module will be responsible for automatically selecting the most suitable interface to use for each flow according to the QoS specified. This module will have two functions. First, it must periodically probe the different interfaces to identify their characteristics. Second, it must match the requested QoS to the interface's characteristics so that the most suitable interface can be selected. We are also looking into the possibility of merging interface selection into the Mobile Policy Table.

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References

[1] A. Acharya, A. Bakre, and B. Badrinath. IP Multicast Extensions for Mobile Internetworking. In *Proceedings of the IEEE INFOCOM'96*, 1996.

[2] Mary Baker, Xinhua Zhao, Stuart Cheshire, and Jonathan Stone. Supporting Mobility in MosquitoNet. In *Proceedings of the Annual USENIX Technical Conference*, 1996.

[3] CDPD93. Cellular Digital Packet Data System Specification Release 1.0. 1993.

[4] Computer Emergency Response Team (CERT). IP Spoofing Attacks and Hijacked Terminal Connections. In *CA-95:01*, 1995.

[5] Stuart Cheshire and Mary Baker. Internet Mobility 4x4. In *Proceedings of SIGCOMM*, 1996.

[6] S. Deering and D. Cheriton. Multicast Routing in Datagram Internetworks and Extended LANs. *ACM Transactions on Computer Systems, Vol. 8, No.2, pp. 85-110*, 1990.

[7] R. Droms. Dynamic Host Configuration Protocol. In *RFC 2131*, 1993.

[8] P. Ferguson and D. Senie. Network Ingress Filtering: Defeating Denial of Service Attacks which Employ IP Source Address Spoofing. In *RFC 2267*, 1998.

[9] R. Fielding, J. Gettys, J. Mogul, H. Frystyk, and T. Berners-Lee. Hypertext Transfer Protocol – HTTP/1.1. In *RFC 2068*, 1997.

[10] Tim G. Harrison, Carey L. Williamson, Wayne L. Mackrell, and Richard B. Bunt. Mobile Multicast (MoM) Protocol: Multicast Support for Mobile Hosts. In *Proceedings of the Third Annual ACM/IEEE International Conference on Mobile Computing and Networking*, 1997.

[11] Christian Huitema. *IPv6: The New Internet Protocol*. Prentice Hall, 1997.

[12] Jon Inouye, Jim Binkley, and Jonathan Walpole. Dynamic Network Reconfiguration Support for Mobile Computers. In *Proceedings of the Third Annual ACM/IEEE International Conference on Mobile Computing and Networking*, 1997.

[13] David B. Johnson and David A. Maltz. Protocols for Adaptive Wireless and Mobile Networking. *IEEE Personal Communications, 3(1):34-42*, 1995.

[14] David B. Johnson and Charles Perkins. Route Optimization in Mobile IP. In *Internet Draft (work in progress)*, 1998.

[15] R. H. Katz and E. A. Brewer. The Case for Wireless Overlay Networks. In *Proceedings of the SPIE Conference on Multimedia and Networking*, 1996.

[16] Stephen Kent and Randall Atkinson. Security Architecture for the Internet Protocol. In *Internet Draft (work in progress)*, 1998.

[17] David A. Maltz and Pravin Bhagwat. MSOCKS: An Architecture for Transport Layer Mobility. In *Proceedings of the IEEE INFOCOM'98*, 1998.

[18] Marshall Kirk McKusick. *The Design and Implementation of the 4.4BSD Operating System*. Addison-Wesley, 1996.

[19] Metricom. The Ricochet Wireless Network Overview. http://www.ricochet.net/ricochet/, 1997.

[20] G. Montenegro. Reverse Tunneling for Mobile IP. In *RFC 2344*, 1998.

[21] G. Montenegro and V. Gupta. Sun's SKIP Firewall Traversal for Mobile IP. In *RFC 2356*, 1998.

[22] B. Noble, M. Satyanarayanan, D. Narayanan, J. E. Tilton, J. Flinn, and K. Walker. Agile Application-Aware Adaptation for Mobility. In *Proceedings of the 16th ACM Symposium on Operating System Principles*, 1997.

[23] C. Perkins. IP Encapsulation within IP. In *RFC 2003*, 1996.

[24] C. Perkins. IP Mobility Support. In *RFC 2002*, 1996.

[25] Charles E. Perkins and Tangirala Jagannadh. DHCP for Mobile Networking with TCP/IP. In *IEEE ISCC'95*, 1995.

[26] Charles E. Perkins and David B. Johnson. Mobility Support in IPv6. In *Proceedings of the Second Annual ACM/IEEE International Conference on Mobile Computing and Networking*, 1996.

[27] J. Postel. Internet Protocol. In *STD 5, RFC 791*, 1981.

[28] DARPA Internet Program. Transmission Control Protocol. In *RFC 793*, 1981.

[29] Siegmund H. Redl, Matthias K. Weber, and Malcolm W. Oliphant. *An Introduction to GSM*. Artech House, 1995.

[30] Lucent Technologies. WaveLAN Support. http://www.wavelan.com/support/index.html, 1998.

[31] Xinhua Zhao and Mary G. Baker. Flexible Connectivity Management for Mobile Hosts. Technical Report CSL-TR-97-735, Stanford University, 1997.

EXHIBIT C

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Areas of Technical Interest – Wireless & Mobile Communications, Computer Engineering, Circuit Design (Analog/Digital), Software Engineering, Digital Signal Processing, Wireline & Wireless Computer Networks, Software Systems**,** Control Systems, Cloud Computing.

Startup Companies:

Director, **VP Technologies, Inc**. (1995-): A startup commercialized through Georgia Tech's Advanced Technology Development Corporation (ATDC) focusing on digital software and hardware design services for military market. http://www.vptinc.com

Director, **Soft Networks, LLC** (2001-2007): A startup commercialized through Georgia Tech support focusing on software development tools and compilers for Cellular/WiFi/VOIP/telecommunication products. http://www.soft-networks.com

Director, **Elastic Video Inc.** (2007- 2009): A startup commercialized through Georgia Tech's VentureLab (http://venturelab.gatech.edu) development image and video processing software for wireless & IP networking.

Litigation Experience (2011-2016) With Testimony

Case Name: HTC v. IPCOM –
Case No: 1:2008-cv-01897 (District of Columbia)
Expert for IPCOM.
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Case Name: Apple v. Kodak
Case No. **ITC 337-TA-717 (ITC)**
Expert for Kodak
(Digital Image Processing & UI: 2008-2011)
Testified at trial

Case Name: Harkabi v. Sandisk,
Case No: 1:08-cv-08203-WHP
Expert for Harkabi
(Digital Rights Management for Flash Devices: 2010-2012)
Testified at trial

Case Name: Yangaroo Inc. v. Destiny Media Technologies, Inc.
Case No: 09-C-0462
Expert for Yangaroo.
(Digital Rights Management Streaming: 2010-2011)
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Case Name: Motorola v. Microsoft,
Case No: **ITC 337-TA-752**
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Testified at trial

Case Name: Motorola v. Apple,
Case No: **ITC 337-TA-745**
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Testified at trial

Case Name: Innovative Sonic Ltd. vs. RIM
Case No: 3:11-cv-00706-K-BF
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Testified at trial

Case Name: Interdigital v. ZTE et al (JDA)
Case No: ITC 337-TA-800
Expert for JDA
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Testified at trial

Case Name: Kodak v. Apple, HTC
Case No: ITC 337-TA-831
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Case Name: Calypso v. T-Mobile
Case No: 2:08-CV-441-JRG-RSP
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Case Name: TracBeam v. AT&T
Case No: 6:11-cv-00096-LED
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Testified by deposition

Case Name: BT v. Cox/Comcast
Case No: 10-658 (SLR) Delaware
Expert for Cox and Comcast
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Testified by deposition

Case Name: Ericsson v. Samsung
Case No: 337-TA-862 (ITC)
Expert for Ericsson
(RF Receivers, EDGE Standards: 2012- 2013)
Testified at trial

Case Name: IPR – ContentGuard v. ZTE
Expert for ZTE
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Testified by deposition

Case Name: Emblaze v. Apple
Case No: 5:11-cv-01079-PSG

Expert for Emblaze
(Digital Video/Audio Streaming: 2012-2014)
Testified at trial

Case Name: Emblaze v. Microsoft
Case No: 3:12-cv-05422-JST
Expert for Emblaze
(Digital Video/Audio Streaming: 2012 - Present)
Ongoing

Case Name: MMI v. RIM
Case No: 2:10-cv-00113-TJW-CE
Expert for MMI
(Area: Mobile Devices/User Interfaces: 2012- 2013)
Testified by deposition

Case Name: Wi-LAN v. Apple
Case No: 13-cv-0790 DMS
Expert for Wi-LAN
(Area: 4G/3G Wireless Communications: 2013 – 2015)

Testified by Deposition

Case Name: Sentius LLC v. Microsoft
Case No: 5:13-cv-00825-PSG
Expert for Sentius
(Area: Enterprise Software Systems: 2014-2015)

Testified by deposition

Case Name: Medius Eagle Harbor v. Ford
Case No: 3:1-cv-05503-BHS
Expert for Medius Tech
(Area: Automotive Multimedia Systems: 2014-)

Testified at Trial

Genband US LLC v. Metaswitch Networks
No 2:14-cv-33 (ED Texas Marshall)
Expert for Metaswitch Networks
Technology: Voice & Data Over IP Networks (2014-2015)

Submitted declarations & deposition

Enterprise - Systems Technologies S.a.r.l v. Samsung Electronics Co. Ltd
Case No: 6:14-cv-555-MHS and ITC Inv. No. 337-TA-925

Expert for Samsung
Technology: Android Operating System (2014-2015)

Testified by deposition

Ericsson Inc. v. Apple Inc.
Case No: 2:15-cv-287 (ED Texas) and ITC-337-952/953
Expert for Ericsson
Technology: 4G Wireless Systems (2015 – present)

Testified by deposition & Trial

Intellectual Ventures LLC v. Motorola Mobility LLC (Google)
Case No: 13-cv-61358-RST (SD Florida)
Expert for Google
Technology: Wireless Systems (2013- present)

Testified by deposition (IPR)

Intellectual Ventures LLC v. Nikon Corp
C.A No. 11-1025-SLR (Delaware)
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Technology: Wireless Systems (WiFi) (2014-2015)

Submitted declarations

Masimo v. Mindray Biomedical Electronics Co. / Philips
Case No: SACV-12-02206 CJC (JPRx) C. D. California
8:12-cv-02206-CJC-JPR
Expert for Masimo
Technology: Pulse Oximetry (2014 – 2016)

Submitted reports, testified by deposition

Samsung v. Nvidia
Case No: 3:14-cv-757-REP ED Virginia
Expert for Samsung
Technology: Microprocessors & Memories (2014 – 2016)

Submitted reports & Deposition & Trial

Chrimar v. HP/Cisco/Alcatel
Case No: 4:13-cv-1300-JSW
Expert for Chrimar
Technology: Power over Ethernet (2015-present)

Submitted reports & Deposition & Trial

Chamberlain v. Ryobi/TTI
Case No: 1:16-cv-06097
Expert for Ryobi
Technology: Wireless/IoT/Barrier Movement (2016 – present)

Submitted reports & deposition & trial testimony

IOEngine v. IMC/Imation
Case No: cv-14-1572-GMS
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Submitted reports & deposition & trial testimony

Additional matters include declarations supporting IPRs at the PTAB for Google (US Patent 8,601,154), On Semiconductor (US Patent 6,212,079), Ubisoft (US Patent 5,490,216), Sony (US Patent 6,101,534), Kia, (US Patent 5,530,431) Fortinet (US patent 6,195,587), and ZTE (US Patent 7,523,072).

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Books

1. **VLSI Digital Signal Processors**
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2. **Quick-Turnaround ASIC Design in VHDL**
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3. **The Digital Signal Processing Handbook (First Edition)**
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4. **VHDL: Electronics Systems Design Methodologies**.
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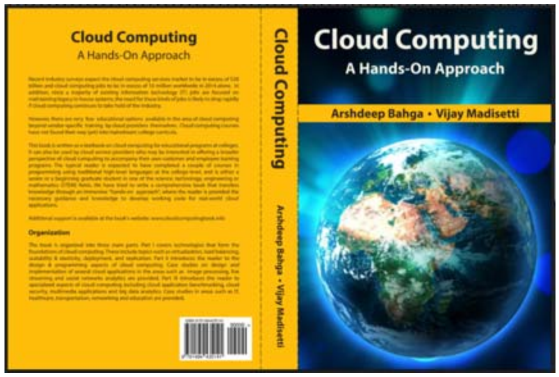
5. **Platform-Centric Approach to System-on-Chip (SoC) Design.**
   Madisetti, V. K., Arpnikanondt, A.
   Springer, Boston: MA, Springer, 2004, 280 pp.

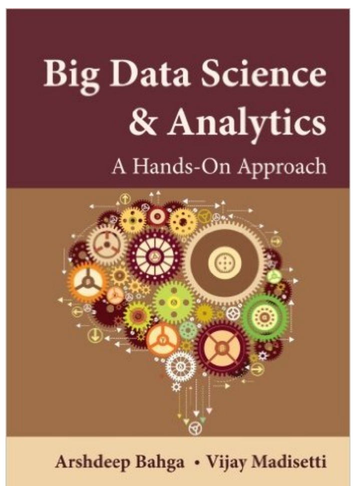
6. **The Digital Signal Processing Handbook – Second Edition.**
   Madisetti, V. K. (2009)
   CRC Press, Boca Raton, Fla.

7. **Cloud Computing: A Hands-On Approach**
   A Bahga, V. Madisetti (2013)
   Amazon CreateSpace Publishing, 2013, 454 pp.

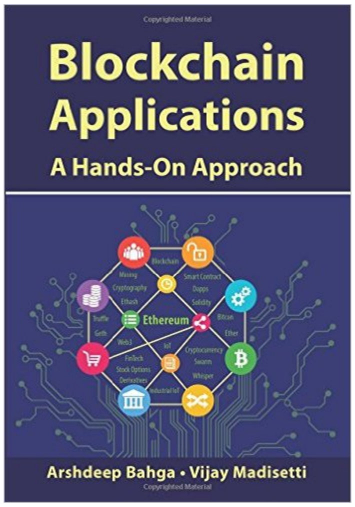
8. **Internet of Things: A Hands-On Approach**
   A Bahga, V. Madisetti (2014)
   Amazon CreateSpace Publishing, 2014, 450 pp.



9. **Big Data Science & Analytics: A Hands-On Approach**
   A Bahga, V. Madisetti (2016)
   Amazon CreateSpace Publishing, 2016, 542 pp.



10. **Blockchain Applications: A Hands-On Approach**
A Bahga, V. Madisetti (2017)
Amazon CreateSpace Publishing, 2017, 380 pp.



Edited Books & Collection of Papers

1. **Advances in Parallel & Distributed Simulation**
   Madisetti, V.K.;Nicol, D., Fujimoto, R. (Editors)
   San Diego, CA: SCS Press, 1991, 200 pp.

2. **Modeling, Analysis, Simulation of Computer & Telecommunications Systems**
   Madisetti, V., Gelenbe, E., Walrand, J. W. (Editors)
   Los Alamitos: CA, IEEE Computer Society Press, 1994, 425 pp.

3. **Modeling & Simulations on Microcomputers**
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Editorship of Journals & Transactions

1. **IEEE Design & Test of Computers**
   Special Issue: Reengineering Digital Systems
   April – June 1999 (Vol 16, No 2)
   Madisetti, V.K (Editor)
   Los Alamitos: CA, IEEE Computer Society Press, 1999.

2. **IEEE Design & Test of Computers**
   Special Issue: Rapid Prototyping of Digital Systems
   Fall 1996 (Vol 13, No 3)

Madisetti, V., Richards, M. (Editors)
Los Alamitos: CA, IEEE Computer Society Press, 1994, 425 pp.

3. **IEEE Transactions on Circuits & Systems II**
   Associate Editor: 1993-1995.

4. **International Journal in Computer Simulation**
   Associate Editor: 1990-1993

5. **International Journal in VLSI Signal Processing**
   Editorial Board: 1995 - Present

Refereed Journal Publications

1. **Trends in the Electronic Control of Mine Hoists**
   Madisetti, V. and Ramlu, M.,
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2. **Multilevel range/NEXT performance in digital subscriber loops**
   Brand, G.; Madisetti, V.; Messerschmitt, D.G.;
   Communications, Speech and Vision, IEE Proceedings I [see also IEE Proceedings-Communications] ,Volume: 136 , Issue: 2 , April 1989
   Pages:169 – 174

3. **Seismic migration algorithms on parallel computers**
   Madisetti, V.K.; Messerschmitt, D.G.;
   Signal Processing, IEEE Transactions on [see also Acoustics, Speech, and Signal Processing, IEEE Transactions on] ,Volume: 39 , Issue: 7 , July 1991
   Pages:1642 – 1654

4. **Asynchronous algorithms for the parallel simulation of event-driven dynamical systems**
   Madisetti, V.K.; Walrand, J.C.; Messerschmitt, D.G.:
   ACM Transactions on Modeling and Computer Simulation, v 1, n 3, July 1991, Pages: 244-74

5. **Synchronization mechanisms for distributed event-driven computation**

Madisetti, V.K.; Hardaker, D.:
ACM Transactions on Modeling and Computer Simulation, v 2, n 1, Jan. 1992, Pages: 12-51

6. **Efficient VLSI Architectures for the Arithmetic Fourier Transform (AFT)**
   Kelley, B.T.; Madisetti, V.K.;
   Signal Processing, IEEE Transactions on [see also Acoustics, Speech, and Signal Processing, IEEE Transactions on] ,Volume: 41 , Issue: 1 , January 1993
   Pages:365-378

7. **The fast discrete Radon transform. I. Theory**
   Kelley, B.T.; Madisetti, V.K.;
   Image Processing, IEEE Transactions on ,Volume: 2 , Issue: 3 , July 1993
   Pages:382 – 400

8. **The Georgia Tech digital signal multiprocessor**
   Barnwell, T.P., III; Madisetti, V.K.; McGrath, S.J.A.;
   Signal Processing, IEEE Transactions on [see also Acoustics, Speech, and Signal Processing, IEEE Transactions on] ,Volume: 41 , Issue: 7 , July 1993
   Pages:2471 – 2487

9. **The MIMDIX Environment for Parallel Simulation**
   Madisetti, V.K.; Hardaker, D.; Fujimoto, R.M.:
   Journal of Parallel and Distributed Computing, v18, no. 4, August 1993, Pages: 473-83.

10. **LMSGEN: a prototyping environment for programmable adaptive digital filters in VLSI**
    Romdhane, M.S.B.; Madisetti, V.K.;
    Chapter in VLSI Signal Processing, VII, 1994.,
    Pages:33 – 42

11. **Fixed-point co-design in DSP**
    Egolf, T.W.; Famorzadeh, S.; Madisetti, V.K.;
    Chapter in VLSI Signal Processing, VII, 1994.,
    Pages:113 - 126

12. **A fast spotlight-mode synthetic aperture radar imaging system**
    Madisetti, V.K.;
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    Pages:873 – 876

13. Rapid prototyping on the Georgia Tech digital signal multiprocessor
Curtis, B.A.; Madisetti, V.K.;
Signal Processing, IEEE Transactions on [see also Acoustics, Speech, and Signal Processing, IEEE Transactions on] ,Volume: 42 , Issue: 3 , March 1994
Pages:649 – 662

14.Low-power signaling in asymmetric noisy channels via spectral shaping
Sipitca, M.; Madisetti, V.K.;
Signal Processing Letters, IEEE, Volume: 1 , Issue: 8 , Aug 1994
Pages:117 – 118

15. A quantitative methodology for rapid prototyping and high-level synthesis of signal processing algorithms
Madisetti, V.K.; Curtis, B.A.;
Signal Processing, IEEE Transactions on [see also Acoustics, Speech, and Signal Processing, IEEE Transactions on] ,Volume: 42 , Issue: 11 , Nov. 1994
Pages:3188 – 3208

16. Computer Simulation of Application-Specific Signal Processing Systems
Casinovi, G.; Madisetti, V.K.;
International Journal in Computer Simulation, Vol. 4, No. 4, Nov 1994.

17. System partitioning of MCMs for low power
Khan, S.A.; Madisetti, V.K.;
Design & Test of Computers, IEEE ,Volume: 12 , Issue: 1 , Spring 1995
Pages:41 – 52

18. Error correcting run-length limited codes for magnetic recording
Jaejin Lee; Madisetti, V.K.;
Magnetics, IEEE Transactions on ,Volume: 31 , Issue: 6 , Nov. 1995
Pages:3084 – 3086

19. Virtual prototyping of embedded microcontroller-based DSP systems
Madisetti, V.K.; Egolf, T.W.;
Micro, IEEE ,Volume: 15 , Issue: 5 , Oct. 1995
Pages:9 – 21

20. Constrained multitrack RLL codes for the storage channel
Lee, J.; Madisetti, V.K.;
Magnetics, IEEE Transactions on ,Volume: 31 , Issue: 3 , May 1995
Pages:2355 – 2364

21. Rapid digital system prototyping: current practice, future challenges
Madisetti, V.K.;
Design & Test of Computers, IEEE ,Volume: 13 , Issue: 3 , Fall 1996
Pages:12 – 22

22. Conceptual prototyping of scalable embedded DSP systems
Dung, L.-R.; Madisetti, V.K.;
Design & Test of Computers, IEEE ,Volume: 13 , Issue: 3 , Fall 1996
Pages:54 – 65

23. Advances in rapid prototyping of digital systems
Madisetti, V.K.; Richards, M.A.;
Design & Test of Computers, IEEE ,Volume: 13 , Issue: 3 , Fall 1996
Pages:9

24. Combined modulation and error correction codes for storage channels
Jaejin Lee; Madisetti, V.K.;
Magnetics, IEEE Transactions on ,Volume: 32 , Issue: 2 , March 1996
Pages:509 – 514

25. Model-based architectural design and verification of scalable embedded DSP systems-a RASSP approach
Dung, L.-R.; Madisetti, V.K.; Hines, J.W.;
Chapter in VLSI Signal Processing, IX, 1996.
Pages:147 – 156

26. Low-power digital filter implementations using ternary coefficients
Hezar, R.; Madisetti, V.K.;
Chapter in VLSI Signal Processing, IX, 1996.,
Pages:179 – 188

27. All-digital oversampled front-end sensors
Romdhane, M.S.B.; Madisetti, V.K.;
Signal Processing Letters, IEEE, Volume: 3 , Issue: 2 , Feb. 1996
Pages:38 – 39

28. Modeling COTS components in VHDL
Calhoun, S., Reese, R; Egolf, T., Madisetti, V.K.;
Journal of VLSI Signal Processing, Volume: 14 , Issue: 2 , Nov 1996
Pages: 24 – 31

29. VHDL-Based Rapid Systems Prototyping

Egolf, T.; Madisetti, V.K.;
Journal of VLSI Signal Processing, Volume: 14 , Issue: 2 , Nov 1996
Pages: 40-52

30. Interface design for core-based systems
Madisetti, V.K.; Lan Shen;
Design & Test of Computers, IEEE ,Volume: 14 , Issue: 4 , Oct.-Dec. 1997
Pages:42 - 51

31. Incorporating cost modeling in embedded-system design
Debardelaben, J.A.; Madisetti, V.K.; Gadient, A.J.;
Design & Test of Computers, IEEE ,Volume: 14 , Issue: 3 , July-Sept. 1997
Pages:24 – 35

32. On homomorphic deconvolution of bandpass signals
Marenco, A.L.; Madisetti, V.K.;
Signal Processing, IEEE Transactions on [see also Acoustics, Speech, and Signal Processing, IEEE Transactions on] ,Volume: 45 , Issue: 10 , Oct. 1997
Pages:2499 – 2514

33. A case study in the development of multi-media educational material: the VHDL interactive tutorial
Gadient, A.J.; Stinson, J.A., Jr.; Taylor, T.C.; Aylor, J.H.; Klenke, R.H.; Salinas, M.H.; Madisetti, V.K.; Egolf, T.; Famorzadeh, S.; Karns, L.N.; Carter, H.W.;
Education, IEEE Transactions on ,Volume: 40 , Issue: 4 , Nov. 1997
Pages:17 pp.

34. Adaptive mobility management in wireless networks
Jeongwook Kim; Madisetti, V.K.;
Electronics Letters ,Volume: 34 , Issue: 15 , 23 July 1998
Pages:1453 – 1455

35. Efficient implementation of two-band PR-QMF filterbanks
Hezar, R.; Madisetti, V.K.;
Signal Processing Letters, IEEE ,Volume: 5 , Issue: 4 , April 1998
Pages:92 – 94

36. On fast algorithms for computing the inverse modified discrete cosine transform
Yun-Hui Fan; Madisetti, V.K.; Mersereau, R.M.;
Signal Processing Letters, IEEE ,Volume: 6 , Issue: 3 , March 1999
Pages:61 – 64

37. System on chip or system on package?
Tummala, R.R.; Madisetti, V.K.;
Design & Test of Computers, IEEE ,Volume: 16 , Issue: 2 , April-June 1999
Pages:48 – 56

38. Reengineering legacy embedded systems
Madisetti, V.K.; Jung, Y.-K.; Khan, M.H.; Kim, J.; Finnessy, T.;
Design & Test of Computers, IEEE ,Volume: 16 , Issue: 2 , April-June 1999
Pages:38 – 47

39. Reengineering digital systems
Madisetti, V.K.;
Design & Test of Computers, IEEE ,Volume: 16 , Issue: 2 , April-June 1999
Pages:15 – 16

40. Parameter optimization of robust low-bit-rate video coders
Sangyoun Lee; Madisetti, V.K.;
Circuits and Systems for Video Technology, IEEE Transactions on, Volume: 9
Issue: 6 , Sept. 1999
Pages:849 – 855

41. Closed-form for infinite sum in bandlimited CDMA
Jatunov, L.A.; Madisetti, V.K.;
Communications Letters, IEEE ,Volume: 8 , Issue: 3 , March 2004
Pages:138 – 140

42. A new protocol to enhance path reliability and load balancing in mobile ad hoc networks
Argyriou, A.; Madisetti, V.K.;
Journal of Ad Hoc Networks, Elsevier Press, 2004

43. Closed-form analysis of CDMA systems using Nyquist pulse
Jatunov, L.A.; Madisetti, V. K.;
Communications Letters, IEEE (Under Revision), 2005.

44. Systematic Design of End-to-End Wireless Mobility Management Prototocols,
Argyriou, A.; Madisetti, V. K.;
ACM/Springer Wireless Networks (WINET), Accepted 2005.

45. A Novel End-to-End Approach for Video Streaming Over the Internet,
Argyriou, A.; Madisetti, V. K.;
Kluwer Telecommunications Systems, Vol. 28, No. 2, Pages 133-150, Jan 2005. *Special Issue on Multimedia Streaming.*

46. An Analytical Framework of RD Optimized Video Streaming with TCP,

Argyriou, A.; Madisetti, V. K.;
IEEE Transactions on Multimedia, Submitted for review in March 2005.

47. **Modeling the Effect of Handoffs on Transport Protocol Performance,**
Argyriou, A.; Madisetti, V. K.;
IEEE Transactions on Mobile Computing, Submitted for review in March 2005

48. **Throughput Models for Transport Protocols with CBR and VBR Traffic Workloads",**
Argyriou, A.; Madisetti, V. K.;
ACM Transactions on Multimedia Computing, Communications & Applications, Submitted for review in April 2005.

49. **"Electronic System, Platform & Package Codesign",**
Madisetti, V. K.
IEEE Design & Test of Computers, Volume 23, Issue 3, June 2006. pages 220-233.

50. **"The Design of an End-to-End Handoff Management Protocol",**
A. Argyriou, Madisetti, V. K.
Wireless Networks, Springer, May 2006.

51. **"A Soft-Handoff Transport Protocol for Media Flows in Heterogeneous Mobile Networks ",**
A. Argyriou, Madisetti, V. K.
Computer Networks, Vol 50, Issue 11, Pages 1860-1871, August 2006.

52. **"Computationally Efficient SNR Estimation for Bandlimited WCDMA Systems"**
L. Jatunov, Madisetti, V. K.
IEEE Transactions on Wireless Communications, Volume 5, Issue 13, December 2006, Pages 3480-3491.

53. **"Space-Time Codes for Wireless & Mobile Applications",**
M. Sinnokrot, Madisetti, V.K.
DSP Handbook, Second Edition, 2009 (to be published)

54. A. Bahga, V. Madisetti, "**Rapid Prototyping of Advanced Cloud-Based Systems**", *IEEE Computer*, vol. 46, no. 11, Nov 2013, pp 76-83, 2013

55. A. Bahga, V. Madisetti, "**Cloud-Based Information Integration & Informatics Framework for Healthcare Application**s", *IEEE Computer*, February 2015.

56. A. Bahga, V. Madisetti, "**A Cloud-based Approach for Interoperable EHRs**", *IEEE Journal of Biomedical and Health Informatics*, vol. 17, no. 5, Sep 2013, pp. 894-906, 2013
57. A. Bahga, V. Madisetti, "**Cloud-Based Information Technology Framework for Data Driven Intelligent Transportation Systems**", *Journal of Transportation Technologies*, vol.3 no.2, April 2013

58. A. Bahga, V. Madisetti, **"Performance Evaluation Approach for Multi-tier Cloud Applications"**, *Journal of Software Engineering and Applications*, vol. 6, no. 2, pp. 74-83, Mar 2013.
59. Yusuf, A., V. Madisetti, **"Configuration for Predicting Travel Time Using Wavelet Packets and Support Vector Regression**", ***Journal of Transportation Technologies***, vol 3, no. 3, June 2013.
60. A. Bahga, V. Madisetti, **"Analyzing Massive Machine Maintenance Data in a Computing Cloud"**, *IEEE Transactions on Parallel and Distributed Systems*, vol. 23, no. 10, pp. 1831 - 1843, 2012.
61. N. Radia. Y. Zhang, M. Tatimapula, V. Madisetti, **"Next Generation Applications on Cellular Networks: Trends, Challenges, and Solutions**," *Proceedings of the IEEE*, Vol 100, Issue 4, pp. 841-854, 2012.
62. A. Bahga, V. Madisetti, "**Rapid Prototyping of Advanced Cloud-Based Systems**", *IEEE Computer*, vol. 46, no. 11, Nov 2013, pp 76-83, 2013
63. A. Bahga, V. Madisetti, "**A Cloud-based Approach for Interoperable EHRs**", *IEEE Journal of Biomedical and Health Informatics*, vol. 17, no. 5, Sep 2013, pp. 894-906, 2013
64. A. Bahga, V. Madisetti, "**Cloud-Based Information Integration & Informatics Framework for Healthcare Application**s", *IEEE Computer*, February 2015.

Peer Reviewed Conference Publications

1. **Dynamically-reduced complexity implementation of echo cancelers**
   Madisetti, V.; Messerschmitt, D.; Nordstrom, N.;
   Acoustics, Speech, and Signal Processing, IEEE International Conference on ICASSP '86. ,Volume: 11 , Apr 1986

2. **Seismic migration algorithms using the FFT approach on the NCUBE multiprocessor**
   Madisetti, V.K.; Messerschmitt, D.G.;
   Acoustics, Speech, and Signal Processing, 1988. ICASSP-88., 1988 International Conference on , 11-14 April 1988

3. **Seismic migration algorithms on multiprocessors**
   Madisetti, V.K.; Messerschmitt, D.G.;

Acoustics, Speech, and Signal Processing, 1988. ICASSP-88., 1988 International Conference on , 11-14 April 1988
Pages:2124 - 2127 vol.4

4. **WOLF: A rollback algorithm for optimistic distributed simulation systems**
   Madisetti, V.; Walrand, J.; Messerschmitt, D.;
   Simulation Conference Proceedings, 1988 Winter , December 12-14, 1988
   Pages:296 – 305

5. **Efficient distributed simulation**
   Madisetti, V.; Walrand, J.; Messerschmitt, D.;
   Simulation Symposium, 1989. The 22nd Annual , March 28-31, 1989
   Pages:5 - 6

6. **High speed migration of multidimensional seismic data**
   Kelley, B.; Madisetti, V.;
   Acoustics, Speech, and Signal Processing, 1991. ICASSP-91., 1991 International Conference on , 14-17 April 1991
   Pages:1117 - 1120 vol.2

7. **Performance of a fast analog VLSI implementation of the DFT**
   Buchanan, B.; Madisetti, V.; Brooke, M.;
   Circuits and Systems, 1992., Proceedings of the 35th Midwest Symposium on , 9-12 Aug. 1992
   Pages:1353 - 1356 vol.2

8. **Task scheduling in the Georgia Tech digital signal multiprocessor**
   Curtis, B.A.; Madisetti, V.K.;
   Acoustics, Speech, and Signal Processing, 1992. ICASSP-92., 1992 IEEE International Conference on ,Volume: 5 , 23-26 March 1992
   Pages:589 - 592 vol.5

9. **The fast discrete Radon transform**
   Kelley, B.T.; Madisetti, V.K.;
   Acoustics, Speech, and Signal Processing, 1992. ICASSP-92., 1992 IEEE International Conference on ,Volume: 3 , 23-26 March 1992
   Pages:409 - 412 vol.3

10. **Yield-based system partitioning strategies for MCM and ASEM design**
    Khan, S.; Madisetti, V.;
    Multi-Chip Module Conference, 1994. MCMC-94, Proceedings., 1994 IEEE,15-17 March 1994
    Pages:144 – 149

11. Multitrack RLL codes for the storage channel with immunity to intertrack interference
Lee, J.; Madisetti, V.K.;
Global Telecommunications Conference, 1994. GLOBECOM '94. 'Communications: The Global Bridge'., IEEE,Volume: 3 , 28 Nov.-2 Dec. 1994
Pages:1477 - 1481 vol.3

12. A parallel mapping of backpropagation algorithm for mesh signal processor
Khan, S.A.; Madisetti, V.K.;
Neural Networks for Signal Processing [1995] V. Proceedings of the 1995 IEEE Workshop , 31 Aug.-2 Sept. 1995
Pages:561 – 570

13. Virtual prototyping of embedded DSP systems
Madisetti, V.K.; Egolf, T.; Famorzadeh, S.; Dung, L.-R.;
Acoustics, Speech, and Signal Processing, 1995. ICASSP-95., 1995 International Conference on ,Volume: 4 , 9-12 May 1995
Pages:2711 - 2714 vol.4

14. Assessing and improving current practice in the design of application-specific signal processors
Shaw, G.A.; Anderson, J.C.; Madisetti, V.K.;
Acoustics, Speech, and Signal Processing, 1995. ICASSP-95., 1995 International Conference on ,Volume: 4 , 9-12 May 1995
Pages:2707 - 2710 vol.4

15. Introduction to ARPA's RASSP initiative and education/facilitation program
Corley, J.H.; Madisetti, V.K.; Richards, M.A.;
Acoustics, Speech, and Signal Processing, 1995. ICASSP-95., 1995 International Conference on ,Volume: 4 , 9-12 May 1995
Pages:2695 - 2698 vol.4

16. DSP design education at Georgia Tech
Madisetti, V.K.; McClellan, J.H.; Barnwell, T.P., III;
Acoustics, Speech, and Signal Processing, 1995. ICASSP-95., 1995 International Conference on ,Volume: 5 , 9-12 May 1995
Pages:2869 - 2872 vol.5

17. Rapid prototyping of DSP systems via system interface module generation
Famorzadeh, S.; Madisetti, V.K.;
Acoustics, Speech, and Signal Processing, 1996. ICASSP-96. Conference Proceedings., 1996 IEEE International Conference on ,Volume: 2 , 7-10 May

1996
Pages:1256 - 1259 vol. 2

18. Rapid prototyping of DSP chip-sets via functional reuse
Romdhane, M.S.B.; Madisetti, V.K.;
Acoustics, Speech, and Signal Processing, 1996. ICASSP-96. Conference Proceedings., 1996 IEEE International Conference on ,Volume: 2 , 7-10 May 1996
Pages:1236 - 1239 vol. 2

19. A constructive deconvolution procedure of bandpass signals by homomorphic analysis
Marenco, A.L.; Madisetti, V.K.;
Geoscience and Remote Sensing Symposium, 1996. IGARSS '96. 'Remote Sensing for a Sustainable Future.', International ,Volume: 3 , 27-31 May 1996
Pages:1592 - 1596 vol.3

20. BEEHIVE: an adaptive, distributed, embedded signal processing environment
Famorzadeh, S.; Madisetti, V.; Egolf, T.; Nguyen, T.;
Acoustics, Speech, and Signal Processing, 1997. ICASSP-97., 1997 IEEE International Conference on ,Volume: 1 , 21-24 April 1997
Pages:663 - 666 vol.1

21. Target detection from coregistered visual-thermal-range images
Perez-Jacome, J.E.; Madisetti, V.K.;
Acoustics, Speech, and Signal Processing, 1997. ICASSP-97., 1997 IEEE International Conference on ,Volume: 4 , 21-24 April 1997
Pages:2741 - 2744 vol.4

22. Variable block size adaptive lapped transform-based image coding
Klausutis, T.J.; Madisetti, V.K.;
Image Processing, 1997. Proceedings., International Conference on ,Volume: 3 , 26-29 Oct. 1997
Pages:686 - 689 vol.3

23. A Rate 8/10 (0, 6) MTR Code And Its Encoder/decoder
Jaejin Lee; Madisetti, V.K.;
Magnetics Conference, 1997. Digests of INTERMAG '97., 1997 IEEE International , 1-4 April 1997
Pages:BS-15 - BS-15

24. VHDL models supporting a system-level design process: a RASSP approach
DeBardelaben, J.A.; Madisetti, V.K.; Gadient, A.J.;

VHDL International Users' Forum, 1997. Proceedings , 19-22 Oct. 1997
Pages:183 – 188

25. A performance modeling framework applied to real time infrared search and track processing
Pauer, E.K.; Pettigrew, M.N.; Myers, C.S.; Madisetti, V.K.;
VHDL International Users' Forum, 1997. Proceedings , 19-22 Oct. 1997
Pages:33 – 42

26. System design and re-engineering through virtual prototyping: a temporal model-based approach
Khan, M.H.; Madisetti, V.K.;
Signals, Systems & Computers, 1998. Conference Record of the Thirty-Second Asilomar Conference on ,Volume: 2 , 1-4 Nov. 1998
Pages:1720 - 1724 vol.2

27. A debugger RTOS for embedded systems
Akgul, T.; Kuacharoen, P.; Mooney, V.J.; Madisetti, V.K.;
Euromicro Conference, 2001. Proceedings. 27th , 4-6 Sept. 2001
Pages:264 - 269

28. Adaptability, extensibility and flexibility in real-time operating systems
Kuacharoen, P.; Akgul, T.; Mooney, V.J.; Madisetti, V.K.;
Digital Systems, Design, 2001. Proceedings. Euromicro Symposium on , 4-6 Sept. 2001
Pages:400 – 405

29. Effect of handoff delay on the system performance of TDMA cellular systems
Turkboylari, M.; Madisetti, V.K.;
Mobile and Wireless Communications Network, 2002. 4th International Workshop on , 9-11 Sept. 2002
Pages:411 – 415

30. Enforcing interdependencies and executing transactions atomically over autonomous mobile data stores using SyD link technology
Prasad, S.K.; Bourgeois, A.G.; Dogdu, E.; Sunderraman, R.; Yi Pan; Navathe, S.; Madisetti, V.;
Distributed Computing Systems Workshops, 2003. Proceedings. 23rd International Conference on , 19-22 May 2003
Pages:803 – 809

31. Performance evaluation and optimization of SCTP in wireless ad-hoc networks
Argyriou, A.; Madisetti, V.;
Local Computer Networks, 2003. LCN '03. Proceedings. 28th Annual IEEE

International Conference on , 20-24 Oct. 2003
Pages:317 - 318

32. Implementation of a calendar application based on SyD coordination links
Prasad, S.K.; Bourgeois, A.G.; Dogdu, E.; Sunderraman, R.; Yi Pan; Navathe, S.; Madisetti, V.;
Parallel and Distributed Processing Symposium, 2003. Proceedings. International , 22-26 April 2003
Pages:8 pp.

33. Bandwidth aggregation with SCTP
Argyriou, A.; Madisetti, V.;
Global Telecommunications Conference, 2003. GLOBECOM '03. IEEE Volume: 7 , 1-5 Dec. 2003
Pages:3716 - 3721 vol.7

34. Software streaming via block streaming
Kuacharoen, P.; Mooney, V.J.; Madisetti, V.K.;
Design, Automation and Test in Europe Conference and Exhibition, 2003 , 2003
Pages:912 – 917

35. Frequency-dependent space-interleaving for MIMO OFDM systems
Mohajerani, P.; Madisetti, V.K.;
Radio and Wireless Conference, 2003. RAWCON '03. Proceedings , Aug. 10-13, 2003
Pages:79 - 82

36. A media streaming protocol for heterogeneous wireless networks
Argyriou, A.; Madisetti, V.;
Computer Communications, 2003. CCW 2003. Proceedings. 2003 IEEE 18th Annual Workshop on , 20-21 Oct. 2003
Pages:30 – 33

37. Realizing load-balancing in ad-hoc networks with a transport layer protocol
Argyriou, A.; Madisetti, V.;
Wireless Communications and Networking Conference, 2004. WCNC. 2004 IEEE ,Volume: 3 , 21-25 March 2004
Pages:1897 - 1902 Vol.3

38.Streaming H.264/AVC video over the Internet
Argyriou, A.; Madisetti, V.;
Consumer Communications and Networking Conference, 2004. CCNC 2004.

First IEEE , 5-8 Jan. 2004
Pages:169 – 174

Other Publications

1. **A Transport Layer Technology for Improving the QoS of Networked Multimedia Applications <draft-madisetti-arguriou-qos-sctp-00.txt).**
   Madisetti, V., Argyriou, A.
   IETF Internet-Draft, Jul 25, 2002.

2. **Voice & Video over Mobile IP Networks <draft-madisetti-argyriou-voice-video-mip-00.txt>**
   Madisetti, V., Argyriou, A.
   IETF Internet-Draft, Nov 20, 2002.

3. **Enhancements to ECRTP with Applications to Robust Header Compression for Wireless Applications**. **<draft-madisetti-rao-suresh-rohc-00.txt>**
   Madisetti, V.; Rao, S., Suresh, N.
   IETF Internet-Draft, June 30, 2003.

Ph.D. Students Graduated

1. **Brian T. Kelley, 1992**
   VLSI Computing Architectures for High Speed Signal Processing
   Member of Technical Staff, Motorola.

   Winner of Dr. Thurgood Marshall Dissertation Fellowship Award

2. **Bryce A. Curtis, 1992**
   Special Instruction Set Multiple Chip Computer for DSP
   Member of Technical Staff, IBM

3. **Jaejin Lee, 1994**
   Robust Multitrack Codes for the Magnetic Channel
   Professor, Yonsei University, Korea

4. **Mohamed S. Ben Romdhane, 1995**
   Design Synthesis of Application-Specific IC for DSP
   Director of IP, Rockwell.

5. **Shoab A. Khan, 1995**
   Logic and Algorithm Partitioning on MCMs
   Professor, National University of Science & Technology, Pakistan

6. **Lan-Rong Dung, 1997**
   VHDL-based Conceptual Prototyping of Embedded DSP Architectures
   Professor, National Chaio Tung University, Taiwan.

   Winner of VHDL International Best PhD Thesis Award, 1997

7. **Thomas W. Egolf, 1997**
   Virtual Prototyping of Embedded DSP Systems
   Distinguished Member of Technical Staff, Agere

8. **Alvaro Marenco, 1997**
   On Homomorphic Deconvolution of Bandpass Signals
   Professor, Texas A&M University.

   Winner of GIT ECE Outstanding Teaching Assistant Award

9. **Shahram Famorzadeh, 1997**
   BEEHIVE: A Distributed Environment for Adaptive Signal Processing
   Member of Technical Staff, Rockwell.

10. **Timothy J. Klausutis, 1997**
    Adaptive Lapped Transforms with Applications to Image Coding.
    US Air Force/Univ. of Florida.

11. **Lan Shen, 1998**
    Temporal Design of Core-Based Systems
    Member of Technical Staff, IBM

12. **James DeBardelaben, 1998**
    Optimization Based Approach to Cost Effective DSP Design
    Research Scientist, Johns Hopkins University

    Georgia Tech ECE Faculty Award

13. **Sangyoun Lee, 1999**
    Design of Robust Video Signal Processors
    Professor, Yonsei University

    US Army Sensors Lab Research Excellence Award, 1999

14. Rahmi Hezar, 2000
Oversampled Digital Filters
Member of Technical Staff, Texas Instruments

15. Yong-kyu Jung, 2001
Model-Based Processor Synthesis
Professor, Texas A&M University

16. Mustafa Turkboylari, 2002
Handoff Algorithms for Wireless Applications
Member of Technical Staff, Texas Instruments

17. Yun-Hui Fan, 2002
A Stereo Audio Coder with Nearly Constant Signal to Noise Ratio
Post-Doctoral Research Associate, Northeastern University

18. Subrato K. De, 2002
Design of a Retargetable Compiler for DSP
Member of Technical Staff, Qualcomm

US Army Sensors Lab Research Excellence Award, 1999

19. Chonlameth Aripnikanondt, 2004
System-on-Chip Design with UML
Professor, King Mongkut's University, Thailand.

US Army Sensors Lab Research Excellence Award, 1999

20. Loran Jatunov, 2004
Performance Analysis of 3G CDMA Systems
Senior Research Scientist, Soft Networks, LLC.

21. Antonios Argyriou, 2005, Serving in Hellenic Army.

22. Pilho Kim, 2009, Scientist, VP Technologies, Inc.

23. M. Sinnokrot, 2009, Staff Engineer, Qualcomm.

Awards & Honors

1. **Jagasdis Bose National Science Talent Fellowship**, Indian Institute of Technology, Kharagpur, 1980-1984.
2. **General Proficiency Prize**, Indian Institute of Technology, Kharagpur, 1984.
3. **Demetri Angelakos Outstanding Graduate Student Award**, Univ. of California, Berkeley, 1989

4. **Ira Kay IEEE/ACM Best Paper Award** for Best Paper presented at IEEE Annual Simulation Symposium, 1989

5. **IBM Faculty Development Award** 1990

6. **Technical Program Chair**, IEEE Workshop on Parallel and Distributed Simulation. 1990.

7. **Technical Program Chair**, IEEE MASCOTS'94

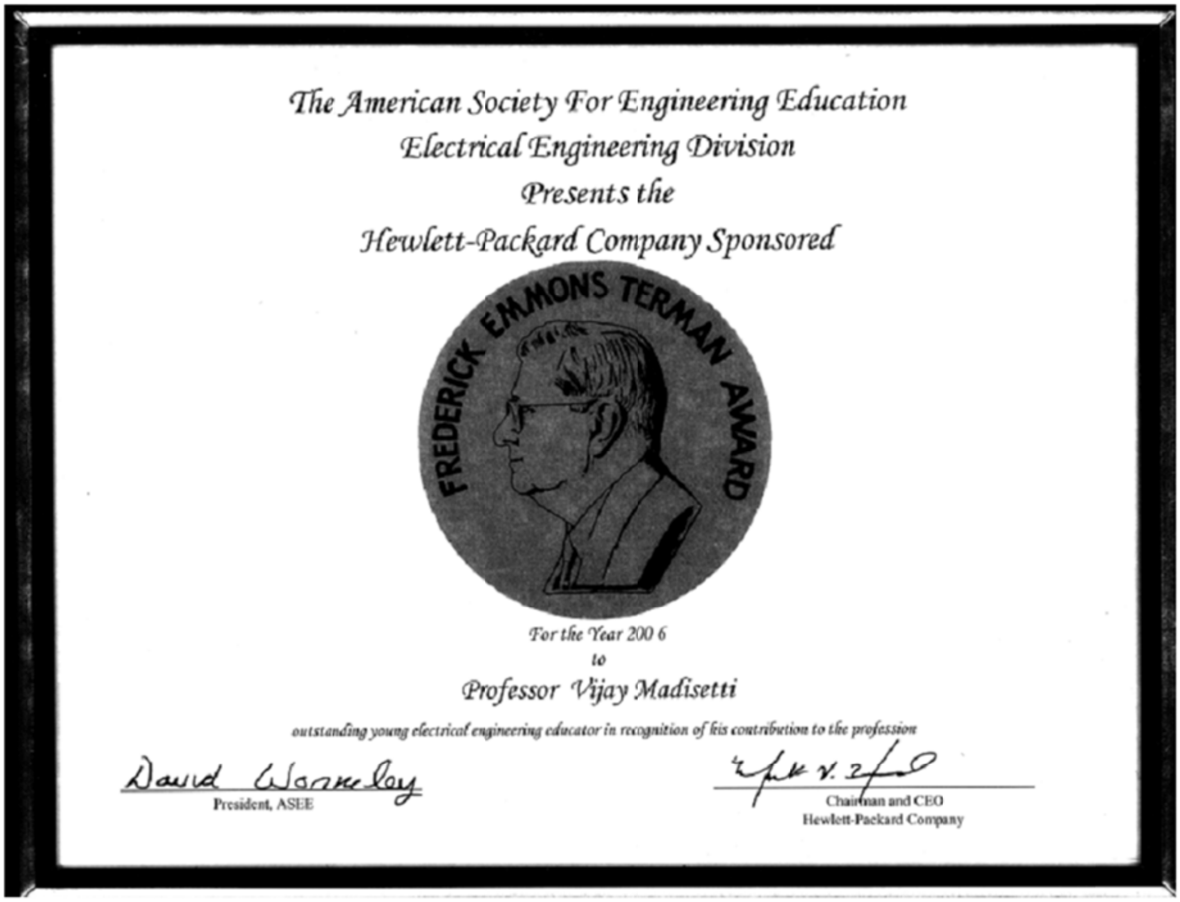
8. **NSF RI Award**, 1990

9. **VHDL International Best PhD Dissertation Advisor Award**, 1997

10. **Georgia Tech Outstanding Doctoral Dissertation Advisor Award**, 2001.

11. **ASEE 2006 Frederick Emmons Terman Medal, 2006.**

12. **Fellow of IEEE**



Intellectual Property Disclosures (Georgia Tech)

Patent	Date	Description
2843	2004	Method and Apparatus for Improving the Performance of Wireless LANs
2825	2003	Method and Apparatus for Optimal Partitioning and Ordering of Antennas for Layered Space-Time Block Codes in MIMO Communications Systems
2815	2003	How to Rapidly Develop a SyD Application
GSU-023	2003	Rapid Development of SyD Applications
2810	2003	System on Mobile Devices Middleware Design
2718	2003	A Transport Layer Algorithm for Improved Anycast Communication
2717	2003	A Novel Transport Layer Load-Balancing Algorithm
2716	2003	A Transport Layer QoS Algorithm
2715	2003	A Novel Transport Layer Algorithm for MPLS Performance
2659	2002	A New Algorithm and Technology for Implementing Mobile IP with Applications to Voice and Video over Mobile IP
2656	2002	Debugging with Instruction-Level Reverse Execution
2655	2002	Embedded Software Streaming

2539		System of Databases: An Enabling Technology for Programming
2517	2002	A Dynamic Instantiated Real-Time Operating System Debugger
2516	2002	A Dynamic Real-Time Operating System
GSU-009	2001	System of Databases: Architecture,, Global Queries, Triggers and Constraints
2480	2001	Mobile Fleet Application based on SyD Technology
2479	2001	System of Databases: A model with coordination links and a calendar application
1893	1999	Beehive
1726	1995	Very High Scale Integrated Circuit Hardware Description Language Models (VHDL Models)
1401	1995	Self-Compensation Receiver (SCR)

EXHIBIT D

U.S. Patent 5,806,005

US005806005A

United States Patent [19]

Hull et al.

[11] **Patent Number: 5,806,005**

[45] **Date of Patent: Sep. 8, 1998**

[54] **WIRELESS IMAGE TRANSFER FROM A DIGITAL STILL VIDEO CAMERA TO A NETWORKED COMPUTER**

[75] Inventors: **Jonathan J. Hull**, Cupertino; **John F. Cullen**, Redwood City, both of Calif.

[73] Assignees: **Ricoh Company, Ltd.**, Tokyo, Japan; **Ricoh Corporation**, Menlo Park, Calif.

[21] Appl. No.: **644,349**

[22] Filed: **May 10, 1996**

[51] **Int. Cl.**[6] **H04M 11/00**

[52] **U.S. Cl.** **455/566**; 348/17

[58] **Field of Search** 379/59; 348/12, 348/13, 14, 15, 17, 222, 552; 455/33.1, 408, 566, 418, 419

[56] **References Cited**

U.S. PATENT DOCUMENTS

5,220,420	6/1993	Hoarty et al.	358/86
5,485,504	1/1996	Ohnsorge	455/566
5,491,507	2/1996	Umezawa et al.	455/566
5,546,445	8/1996	Dennison et a l.	455/408
5,550,646	8/1996	Hassan et a l.	348/18
5,557,320	9/1996	Krebs	348/12
5,579,239	11/1996	Freeman et al.	348/14
5,598,536	1/1997	Slaughter, III et al.	379/93.02
5,606,365	2/1997	Maurinus et al.	348/222

OTHER PUBLICATIONS

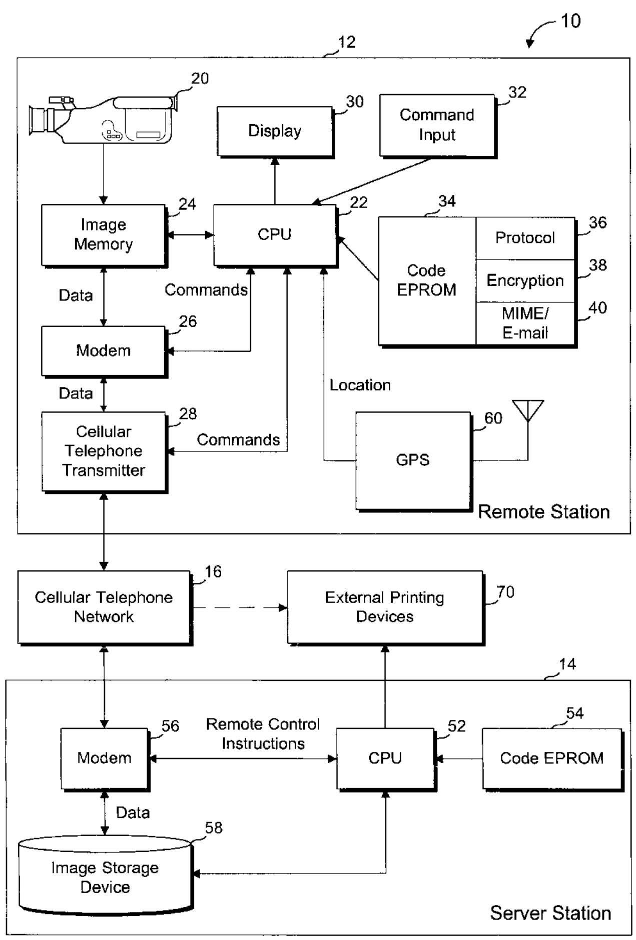
C3D™ Product Brochure, with attached article, P. Mowforth, A. Ayoub, J. Jin, K. Moss, T. Niblett, P. Siebert, C. Urquhart and D. Wray, "3D Imaging System for Clinical Applications," *Medical Electronics,* Dec. 1995, pp. 59–63.

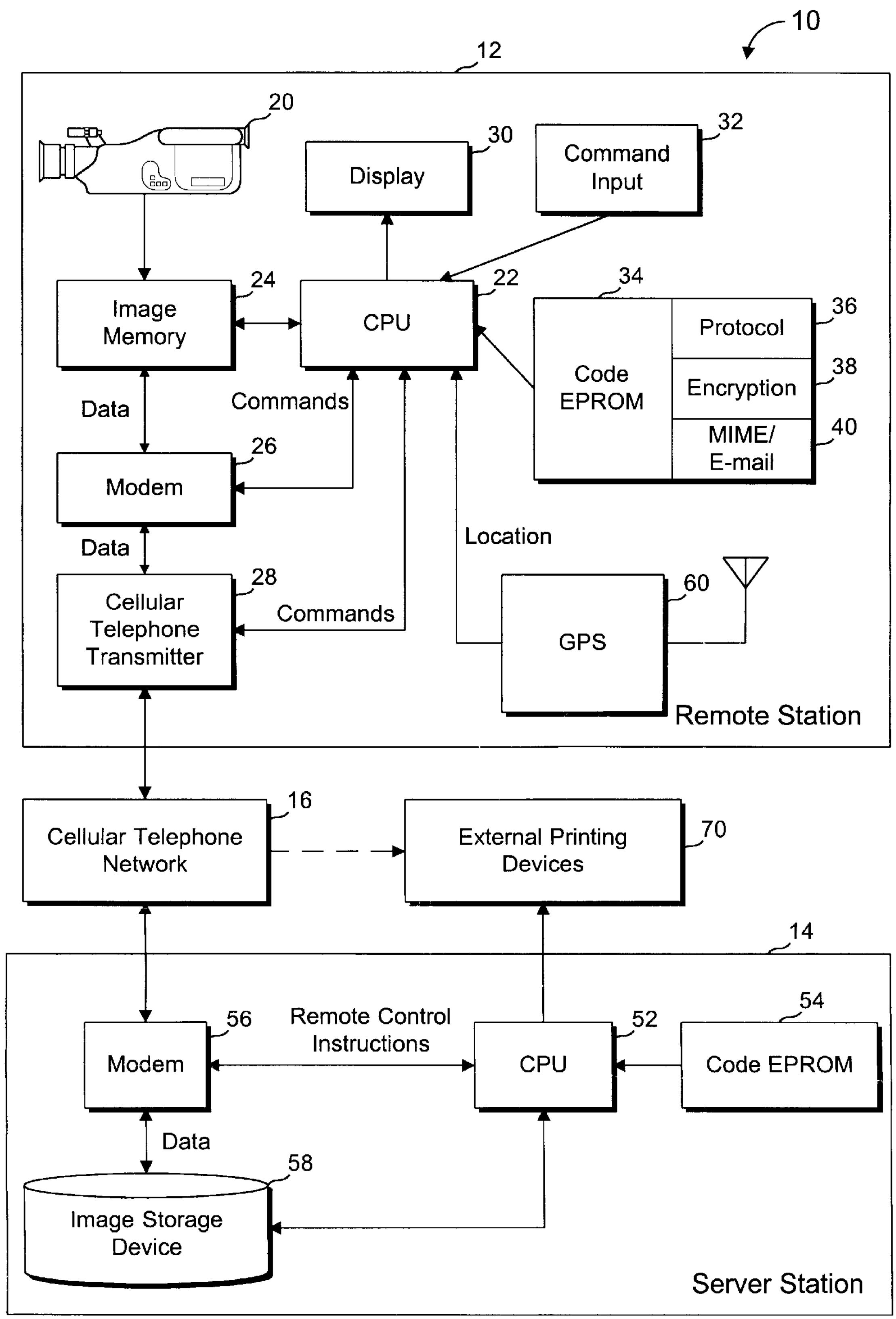
Primary Examiner—Dwayne Bost
Assistant Examiner—Myran K. Wyche
Attorney, Agent, or Firm—Philip H. Albert; Townsend and Towsend and Crew LLP

[57] **ABSTRACT**

A portable image transfer system includes a digital still camera which captures images in digital form and stores the images in a camera memory, a cellular telephone transmitter, and a central processing unit (CPU). The CPU controls the camera memory to cause it to output data representing an image and the CPU controls the cellular telephone transmitter to cause a cellular telephone to transmit the data received from the camera memory. A receiving station is coupled to the cellular telephone transmitter by a cellular network to receive image data and store the images.

13 Claims, 1 Drawing Sheet

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12
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Display
32
Command Input
Image Memory
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CPU
22
34
Code EPROM
Protocol
36
Encryption
38
MIME/ E-mail
40
Data
Commands
Modem
26
Data
Location
Cellular Telephone Transmitter
28
Commands
GPS
60
Remote Station
Cellular Telephone Network
16
External Printing Devices
70
14
Modem
56
Remote Control Instructions
CPU
52
Code EPROM
54
Data
58
Image Storage Device
Server Station

Fig. 1

WIRELESS IMAGE TRANSFER FROM A DIGITAL STILL VIDEO CAMERA TO A NETWORKED COMPUTER

BACKGROUND OF THE INVENTION

The present invention relates to the field of digital still video cameras (DSVC's). More specifically, one embodiment of the present invention provides for improved storage of images generated by a DSVC. A portable DSVC is convenient for taking pictures at various locations because of the camera's size and weight. Unfortunately, as users have come to expect small weights and compact sizes for consumer electronics, DSVC's have tended to be limited in the number of images which could be stored. One solution to the problem is to add additional memory modules, but this is an expensive solution given that the memory modules must be miniaturized so as not to adversely affect the portability of the DSVC.

What is needed is a DSVC with a large image storage capacity where the image storage is not unduly expensive and does not unreasonably impact the size of the portable camera.

SUMMARY OF THE INVENTION

An improved portable image capture system is provided by virtue of the present invention. In one embodiment, a central processing unit (CPU), a modem and a cellular telephone transmitter are coupled to an image memory of a DSVC. The CPU is also coupled to a display and a command input device, which might be a voice activated device or a touch screen device integrated with the display. The CPU executes programs as needed to download images through the cellular telephone transmitter to a server station according to a protocol optimized for the connection available. Where the connection is a direct cellular telephone line, data is sent through the cellular telephone transmitter to cellular telephone system and it is received by a modem at the server station. A CPU at the server station directs the file to be stored in a data storage device, which is typically a large-capacity, inexpensive device such as a hard drive.

In variations of the present invention, the server station might perform complex analysis of the received images in order to instruct the DSVC to obtain additional images which the server station determines are needed for the analyses. The analyses include image resolution enhancement, stereoscopic matching, photocopying, and the like, as well as subjective evaluation of camera angle and image compression. In a specific implementation, the server station transmits images back to the remote station for viewing or forwarding to a local facsimile device or digital camera.

A further understanding of the nature and advantages of the inventions herein may be realized by reference to the remaining portion of the specification and the attached drawing.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a block diagram of a remote station according to the present invention coupled to a server station via a cellular telephone system.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIG. **1**, a image transfer system **10** is shown with a remote station **12** coupled to a server station **14** via a cellular telephone system **16**. Remote station **12** includes a digital camera made up of a capture device **20** and an image memory **24**. Image memory **24** is a memory configured to hold a small number of images captured by capture device **20**. In some embodiments, capture device **20** and image memory **24** are provided by a conventional digital still video camera, such as the Ricoh RDC-1 still video camera supplied by Ricoh Company, Ltd. of Tokyo Japan. Whether an existing DSVC is used or the camera is integrated, a CPU **22** is coupled to image memory **24**, a modem **26** and a cellular telephone transmitter **28**. The coupling between the various elements is such that CPU **22** can control image memory **24** to transfer data representing an image from image memory **24** to modem **26**, which converts the image data into a signal suitable for transmission over a telephone line. Modem **26** is coupled to provide that signal to cellular telephone transmitter **28**, which transmits the signal through cellular system **16** to modem **56** of server station **14**.

Remote station **12** also includes a display **30** and a command input device **32** for interacting with the user of remote station **12** and accepting commands. The programs executed by CPU **22** are stored in a code EPROM **34** which respond to the commands sent by a user using input command device **32**. Command input device **32** might be a voice activated device or a touch screen integrated with display **30**. Code EPROM **34** includes code necessary to perform certain processing functions on an image before it is transmitted, such as a protocol packetizing program **36**, an encryption module **38** and an e-mail handler **40**.

Server station **14** is shown comprising modem **56** which is controlled by a CPU **52** which executes code stored in its own code EPROM **54**. The programs stored in code EPROM **54** are instructions for CPU **52** to transfer data received by modem **56** into data storage device **58** while processing the received image to handle the requirements of the protocols used to send the image.

In one example of the operation of image transfer system **10**, CPU **22** executes a program with instructions to periodically read an image from image memory **24** and mark the image as being read, allowing image memory **24** to be overwritten by subsequent images. As each image is read, the image data is encrypted and formatted as an electronic mail message. Where cellular system **16** is not a direct modem link, but a SLIP/PPP connection using TCP/IP, additional protocol packaging is performed on the image for transmission. When the images are received at server station **14**, they are decrypted and unpackaged, then stored in data storage **58**. If desired, some or all of the images in data storage **58** can be made available over the Internet. If a TCP/IP connection is used, CPU **20** might also execute a routine stored in code EPROM **34** to "ping" a destination before sending an image. The ping process sends a dummy message through a channel to determine whether or not the destination, such as server station **14**, is available, ready and willing to receive data. If an affirmative response to the ping is received by remote station **12**, only then does CPU **22** transmit the image package. If location information is to be included with each image, a Global Positioning System (GPS) receiver **60** can be coupled to CPU **22**, such as a PCMCIA-compatible GPS receiver manufactured by Trimble Navigation of Sunnyvale, Calif.

Many uses of the present invention are contemplated, some of which are mentioned here, others of which are apparent after reading the disclosure. One use is the collection of vacation photos. Since the remote station is extremely portable, it is convenient for a vacationer to pack the remote station and carry it on their travels. When the capture of an image is desired, the vacationer activates remote station **12** using command input device **32**, captures the image and, if image memory **24** is full, transmits images back to server station **14**. This allows the vacationer to take as many pictures as desired without worrying about running out of film or image memory capacity, or needing to carry around sufficient memory to hold all the images from an entire trip.

Another application in television reporting. A field reporter could use the remote station to capture images at the scene of a news event and have those images transmitted to a server station controlled by the television studio, thus allowing up-to-the-minute news photos without requiring expensive and bulky equipment such as is now required in a news van.

In a typical operation, display **30** indicates the amount of free space remaining in image memory **24**. When the user decides to free up additional memory by transmitting images already stored in image memory **24**, the user initiates a command sequence using command input device **32**. This begins the process of CPU **22** dialing a cellular number for server station **14** or otherwise setting up the link between remote station **12** and server station **14**. CPU **22** then packages an image as required by the protocols, encryption or mailing procedures and directs the package as needed and flags the images in image memory **24** as being sent. One method for labeling images as being sent is to include a binary flag for each block of image memory **24** available for images. As an image is captured by capture device **20**, the flag is set to indicate that the block is in use. As an image is transmitted by CPU **22**, the flag is reset to indicate that the block is again available for image storage.

One application in which the present invention finds a use is in-field stereo image capture. With in-field stereo image capture, a camera is on location capturing an image and the server is processing the images. One problem with developing high quality stereo reconstructions is accuracy in image areas where the scene geometry changes quickly, i.e., sharp edges. The need for increased accuracy can be accommodated by capturing more images where needed to increase accuracy. Unfortunately, in the prior art, a photographer would either have to return from a site to process the images to determine if any more images are needed, often necessitating a second trip to the site, or have take the image processing computers to the site. With the present invention, images can be captured and sent to the server for processing with the server interactively responding with requests for the additional images. Thus, the server would process the captured images to determine if a good stereo image can be created. If portions of the stereo image are unacceptable, the server can signal, via the digital still video camera, the photographer to capture additional images.

Face recognition is a similar example. The capture device and the server could cooperate to interactively perform stereo matching, with the server requesting additional captures to improve face recognition. This would overcome the need for subjects to have stereo photographs stored in a laboratory.

Another use of the present invention is to obtain photocopies in locations, such as libraries, where it is not convenient to bring the item to be copied to a photocopy machine. At photocopier resolutions, a single uncompressed page image might require about 15 megabits of memory (1 bit/pixel ×400 dpi×8.5"×11"=1496 mbit). In order to reduce the memory requirements, the image can be compressed at the DSVC, but this requires considerable computation power at the DSVC. With the present invention, a low resolution image (e.g., 100 dpi) can be captured and sent to the server station. The server station then analyzes the low resolution image and identifies all white or black areas of the image as well as boundaries of the areas. To convert to a higher resolution image, the server represents each low resolution pixel with sixteen high resolution pixels. Where the image is all black or all white the high resolution pixels are correctly colored, while the blocks of sixteen high resolution pixels near an edge might not all be one color. To refine these areas, the server station sends image capture instructions to the DSVC instructing it to capture additional information from the edge areas.

Once the image is created at the server station with the desired high resolution, it can be sent to an printer or facsimile machine, typically one located near the user of the DSVC. A user of the DSVC desiring a photocopy could then indicate, using command input **32**, the telephone number of a nearby facsimile machine. The DSVC would then obtain a low resolution image of the page of which a hard copy is desired, and send a low resolution image to server station **14**. Server station **14** then determines the areas of the image for which additional information is needed. Server station **14** communicates the locations of those areas on the image and the DSVC recaptures those areas of the image. The increased resolution required for the high resolution image can be obtained by using a higher resolution lens on the DSVC, or simply capturing multiple images at low resolution and averaging. The resulting image can be compressed by server station **14** if the printing device is a facsimile machine, so that server station **14** need only transmit a compressed facsimile file. Alternatively, server station **14** can retransmit the compressed file to remote station **12**, which would then dial the facsimile machine directly through cellular telephone network **16**.

In FIG. **1**, CPU **52** is shown connected to external printing devices **70**, which could be facsimile machines, printers, or digital copiers. Other variations include the external printing devices **70** coupled to cellular telephone network **16**, especially in the case of the external printing device being a facsimile machine. External printing device **70** might also be coupled directly to remote station **12**. If the size and weight of remote station **12** is not too constrained, a printer might be included thereon. If desired, remote station **12** can be configured to display the captured image on display **30** or in a viewfinder of camera **20**.

Yet another application is stereoscopic matching. Suppose remote station **12** is carried by a geologist who is backpacking to a remote region and desires to capture three-dimensional (3D) images of a landscape. Stereoscopic images are formed from two images of one scene taken at slight offset of each other. In many stereoscopic systems, the precise relative position of the camera between the two images is needed. However, it is now possible to perform stereographic "matching" (alignment of the two images to create the 3D effect) without alignment information. One such system is the C3D technology sold by The Turing Institute of Glasgow, Scotland. Combining that system with the present invention, the geologist could upload the dual images and have a C3D system at the server station immediately evaluate the images to determine if a lock on a 3D image can be made. If not, the server station sends a message to the geologist to reposition the camera and recapture an image, thus avoiding a second trip to the site for image capture.

The above description is illustrative and not restrictive. Many variations of the invention will become apparent to those skilled in the art upon review of this disclosure. For example, the server station **14** can be either a stationary system or a semi-portable system, so long as it need not be as portable as remote station **12**. Also, the remote station **12** might be controlled from server station **14** by allowing remote station **12** to receive command messages from server station **14** over cellular system **16**. The scope of the invention should, therefore, be determined not with reference to the above description, but instead should be determined with reference to the appended claims along with their full scope of equivalents.

What is claimed is:

1. A portable image transfer system comprising:

a digital still camera, at a remote station, which captures images in digital form and stores the images in a camera memory;

a cellular telephone transmitter;

a central processing unit (CPU) coupled to the camera memory and the cellular telephone transmitter, wherein the CPU controls the camera memory to cause it to output data representing an image and the CPU controls the cellular telephone transmitter to cause a cellular telephone to transmit the data output from the camera memory;

a receiving station coupled to the cellular telephone transmitter by a cellular network to receive image data;

means, at the receiving station, for image processing;

means for resetting the camera memory to be reused for subsequent images once an image is transmitted to the receiving station;

a return link for sending commands from the receiving station to the CPU, wherein the commands are directions for obtaining further images as needed by the means for image processing; and

an image storage device coupled to the receiving station to store images received by the receiving station.

2. The apparatus of claim **1**, wherein the CPU interfaces to a camera memory of an existing digital still camera.

3. The apparatus of claim **1**, wherein the cellular telephone transmitter comprises:

a standard cellular telephone; and

a cellular modem.

4. The apparatus of claim **1**, further comprising means for packaging images as electronic mail messages prior to transmission by the cellular telephone transmitter.

5. The apparatus of claim **1**, further comprising means for handling a serial line interface protocol connection between the cellular telephone transmitter and the receiving station.

6. The apparatus of claim **1**, further comprising means for encrypting image data prior to transmission by the cellular telephone transmitter.

7. The apparatus of claim **1**, further comprising a means for causing the digital still camera to capture images on a periodic basis, wherein the CPU is progammed to periodically transmit an image to free the camera memory for accepting subsequent images.

8. The apparatus of claim **1**, further comprising means for determining a location of the portable image transfer system and means for including a location indication with each image.

9. The apparatus of claim **1**, wherein the commands represent user directions to be displayed at the remote station directing the user to capture additional images as needed by the means for image processing.

10. The apparatus of claim **1**, wherein the commands are directions directed at the remote station directing the digital still camera or CPU to capture additional image data as needed by the means for image processing.

11. The apparatus of claim **1**, further comprising a remote printing device for printing images processed by the receiving station.

12. The apparatus of claim **11**, wherein the remote printing device is one of a facsimile machine, a digital copier or a printer.

13. The apparatus of claim **8**, further comprising means, within the receiving station, for using the location indication as a variable when processing said each image.

* * * * *

EXHIBIT E

U.S. Patent 5,917,542

US005917542A

United States Patent [19]

Moghadam et al.

[11] Patent Number: 5,917,542

[45] Date of Patent: Jun. 29, 1999

[54] **SYSTEM AND METHOD FOR DIGITAL IMAGE CAPTURE AND TRANSMISSION**

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[73] Assignee: **Eastman Kodak Company**, Rochester, N.Y.

[21] Appl. No.: **08/801,537**

[22] Filed: **Feb. 18, 1997**

[51] **Int. Cl.**[6] **H04N 5/225**

[52] **U.S. Cl.** **348/207**; 348/231

[58] **Field of Search** 348/211, 522, 348/187, 192, 193, 207, 233, 231, 67.1, 67.7; 455/226.1, 226.4; 358/906, 909.1; 386/117, 46; 396/311, 57, 106, 108

[56] **References Cited**

U.S. PATENT DOCUMENTS

4,097,893	6/1978	Camras	358/906
4,884,132	11/1989	Morris et al. .	
5,086,345	2/1992	Nakane et al.	358/906
5,134,708	7/1992	Marui et al.	455/67.7
5,296,884	3/1994	Honda et al.	369/311
5,418,565	5/1995	Smith	348/233
5,426,511	6/1995	Nagatomo .	
5,446,553	8/1995	Grube .	
5,537,414	7/1996	Takiyasu et al. .	
5,631,701	5/1997	Miyake	348/222
5,666,159	9/1997	Parulski et al.	348/723

FOREIGN PATENT DOCUMENTS

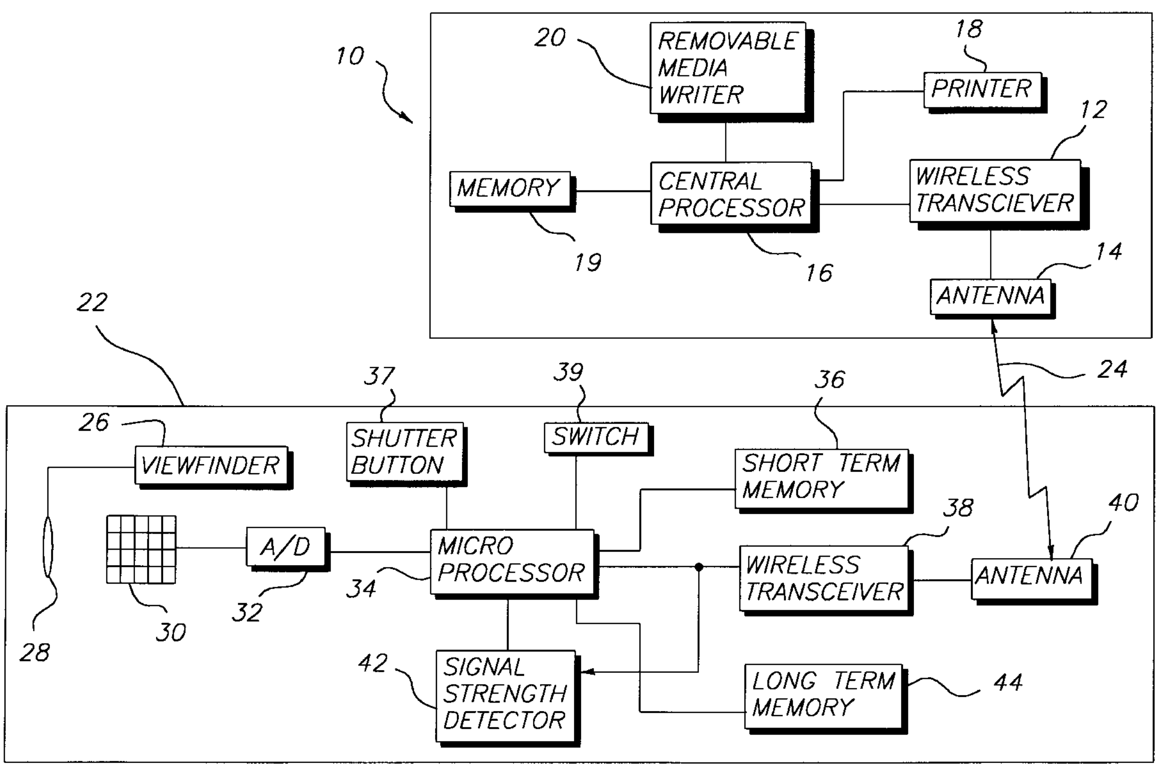
5167529	7/1993	Japan	455/67.7

Primary Examiner—Wendy Garber
Assistant Examiner—Aung S. Moe
Attorney, Agent, or Firm—Thomas H. Close

[57] **ABSTRACT**

A system method for digital image capture and transmission includes an image fulfillment server, having a transceiver for sending and receiving channel assessment signals and receiving a digital image file and a memory for storing the received digital image file. The system also includes a digital camera having an electronic image sensor for sensing an image and producing a digital image; a short term memory for storing digital images produced by the image sensor in digital image files; a transceiver for communicating with and transmitting the digital image files to the image fulfillment server; a signal strength detector for monitoring the registration signal from the fulfillment server and producing a transmit enable signal; a long term memory for storing the digital image files; the transmit enable signal for disabling transmission of the digital image data when the channel assessment signal indicates that successful transmission of the digital image data is not possible; and a timer for transferring the digital image file from the short term memory to the long term memory after a predetermined period of time.

6 Claims, 4 Drawing Sheets



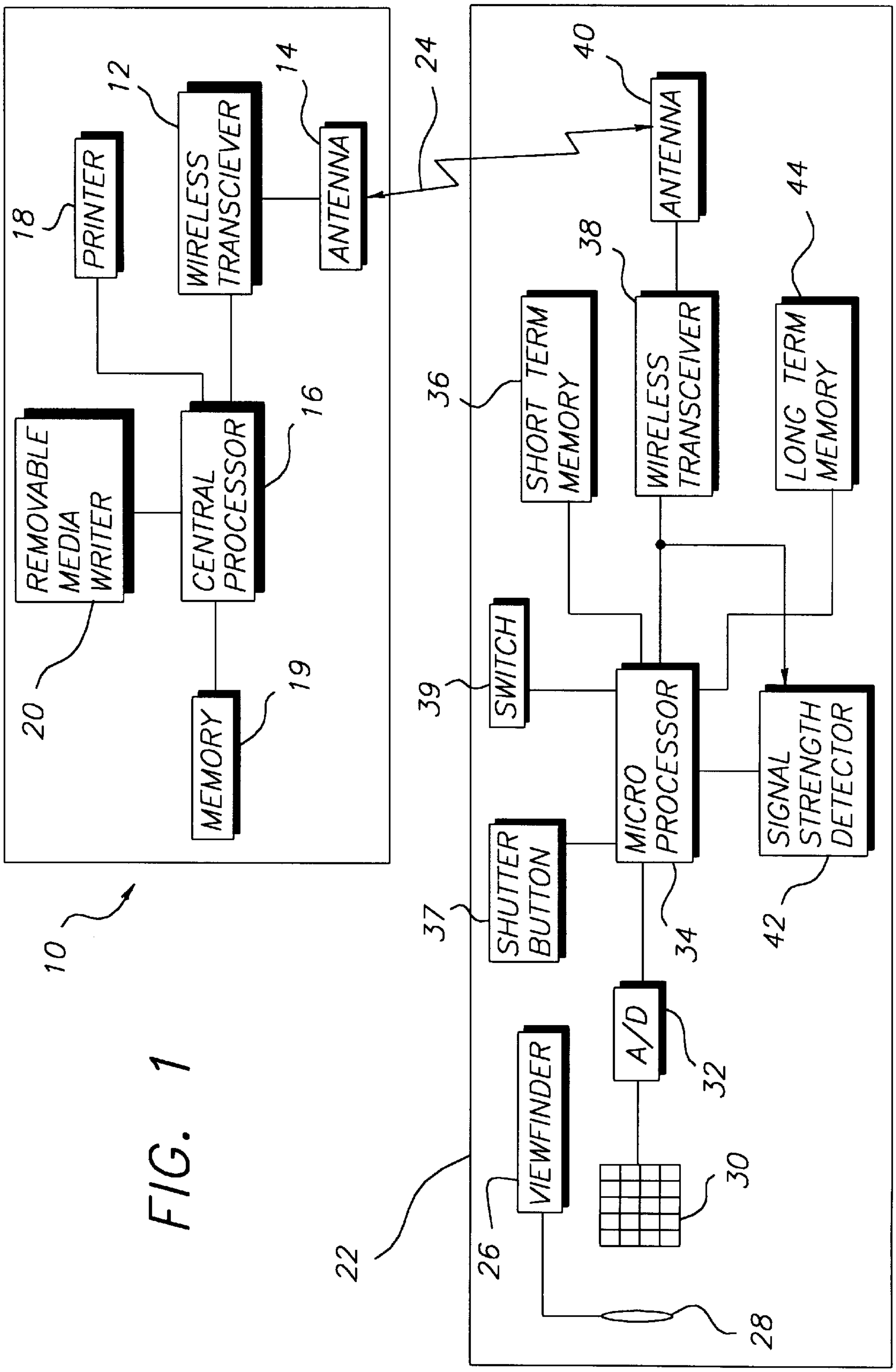

PRINTER
WIRELESS TRANSCIEVER
ANTENNA
REMOVABLE MEDIA WRITER
CENTRAL PROCESSOR
MEMORY
ANTENNA
SHORT TERM MEMORY
WIRELESS TRANSCEIVER
LONG TERM MEMORY
SWITCH
MICRO PROCESSOR
SIGNAL STRENGTH DETECTOR
SHUTTER BUTTON
A/D
VIEWFINDER
10
12
14
16
18
19
20
22
24
26
28
30
32
34
36
37
38
39
40
42
44

FIG. 1

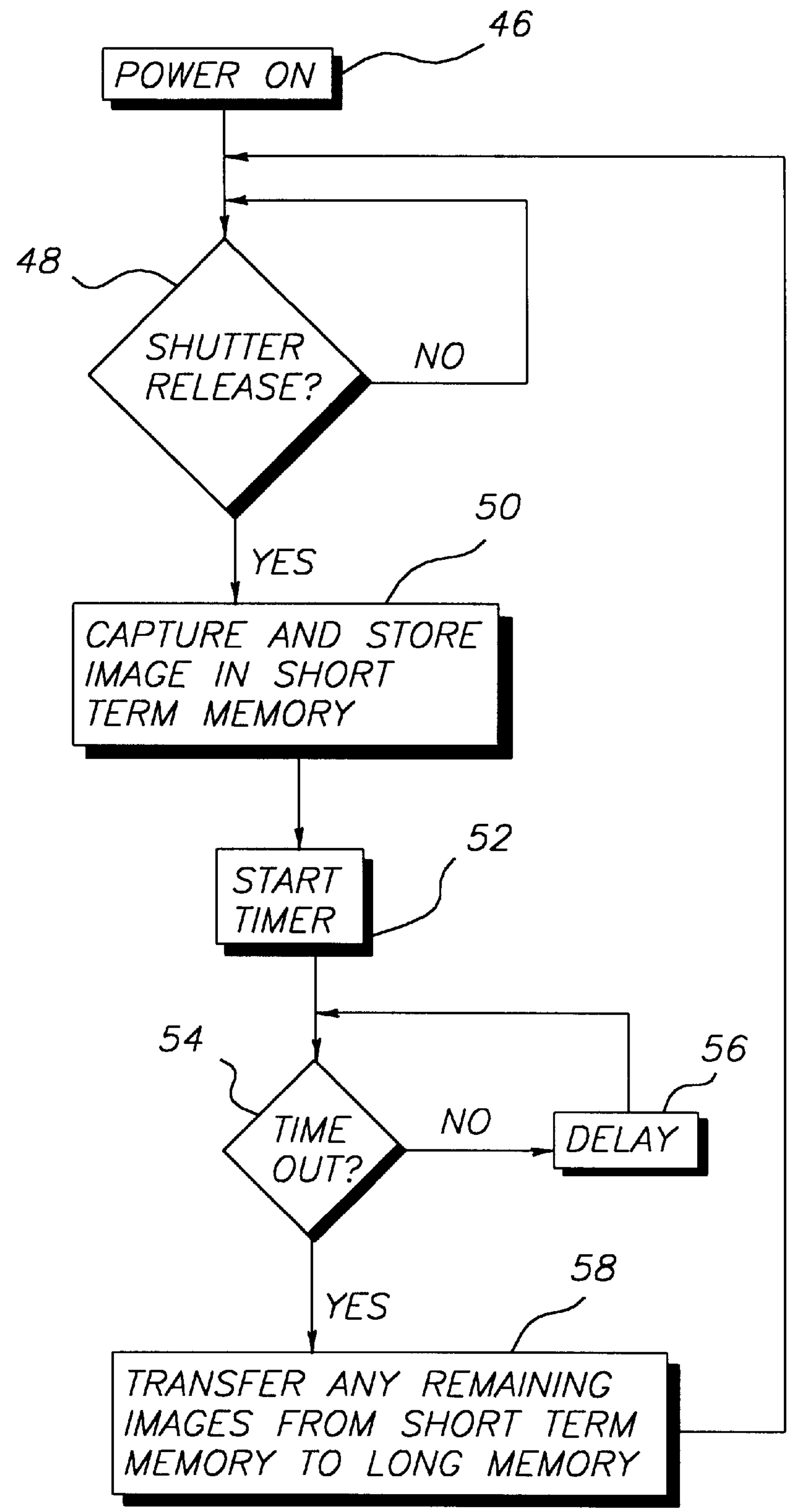

46
POWER ON
48
SHUTTER RELEASE?
NO
YES
50
CAPTURE AND STORE IMAGE IN SHORT TERM MEMORY
52
START TIMER
54
TIME OUT?
NO
56
DELAY
YES
58
TRANSFER ANY REMAINING IMAGES FROM SHORT TERM MEMORY TO LONG MEMORY

FIG. 2

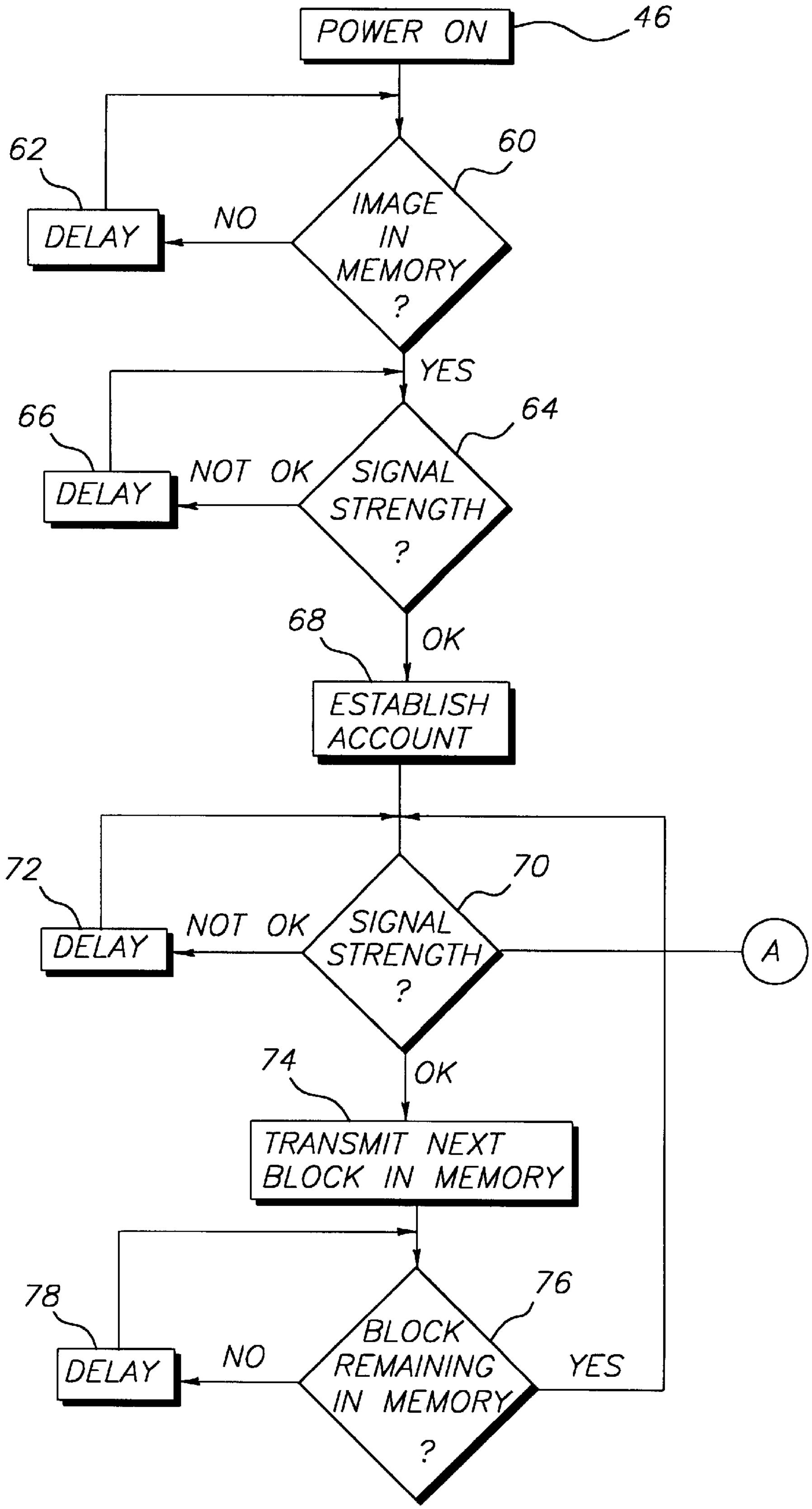

POWER ON
46
62
60
DELAY
NO
IMAGE IN MEMORY ?
YES
66
64
DELAY
NOT OK
SIGNAL STRENGTH ?
68
OK
ESTABLISH ACCOUNT
72
70
DELAY
NOT OK
SIGNAL STRENGTH ?
A
74
OK
TRANSMIT NEXT BLOCK IN MEMORY
78
76
DELAY
NO
BLOCK REMAINING IN MEMORY ?
YES

FIG. 3

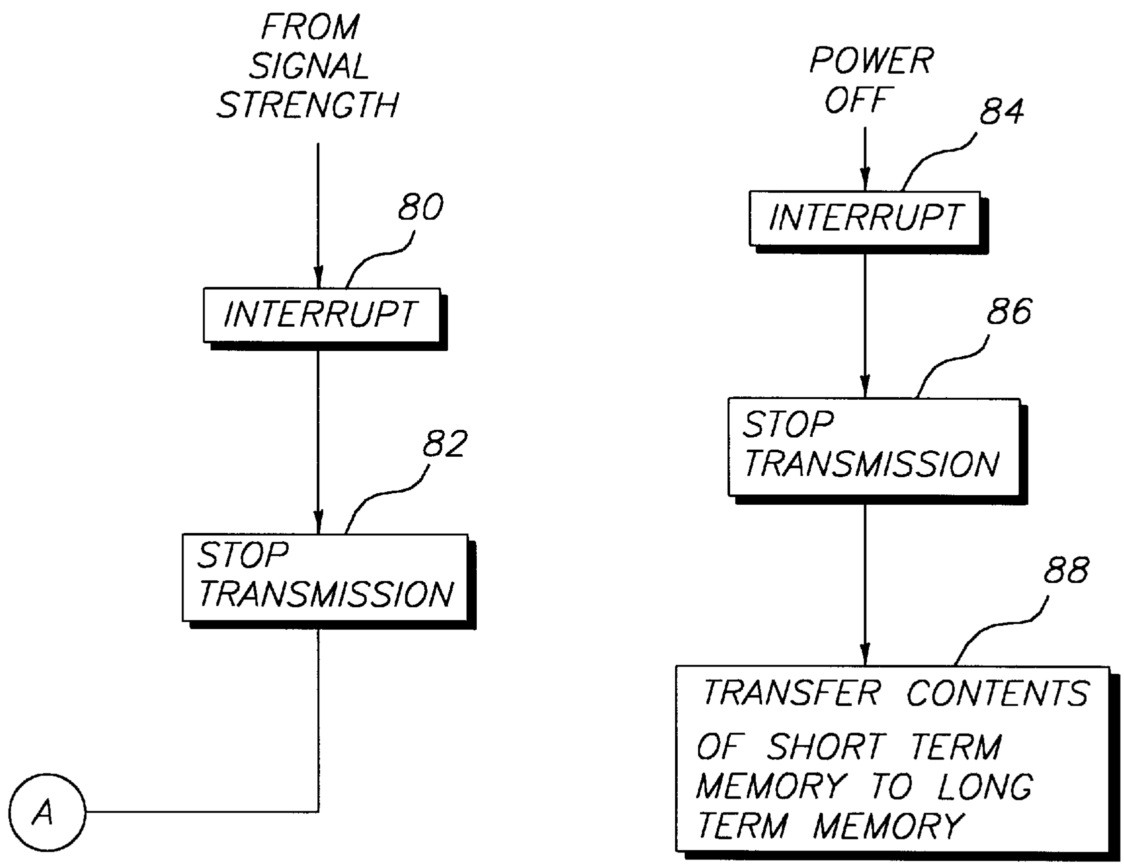

FROM
SIGNAL
STRENGTH
80
INTERRUPT
82
STOP
TRANSMISSION
A
POWER
OFF
84
INTERRUPT
86
STOP
TRANSMISSION
88
TRANSFER CONTENTS
OF SHORT TERM
MEMORY TO LONG
TERM MEMORY

FIG. 4

SYSTEM AND METHOD FOR DIGITAL IMAGE CAPTURE AND TRANSMISSION

FIELD OF THE INVENTION

The invention relates generally to the field of electronic photography, and in particular to an electronic camera having a wireless communication link.

BACKGROUND OF THE INVENTION

It is known in the art that digital data can be transmitted to a destination by using a wireless link. It is also known that electronic cameras are capable of capture and transmission of digital images via a wireless link. An example of such a system is shown in U.S. Pat. No. 4,884,132, issued Nov. 28, 1989, to Morris et al. wherein a personal security system includes an electronic camera that is used to capture an image of an assailant. A wireless transmitter associated with the camera transmits the image via a cellular phone network to a storage device connected to the phone network.

In a wireless electronic camera system, once the image is captured it is then transmitted via a wireless communication link to an image fulfillment server for storage and further image processing. The system works well as long as the photographer stays within range of the image fulfillment server. But once the photographer moves out of range of the image fulfillment server, the transmission will be incomplete and that condition is not known to the photographer until he attempts to transmit another image. Once the photographer moves back in range of the image fulfillment server he needs to stop taking photographs, retrieve the image from memory and attempt to re-transmit the whole image. This results in lower productivity due to the loss of time and increased power consumption from the camera batteries. Presently, one of the main limitations in the use of portable electronic cameras is the availability of sufficient power from the batteries. There is a need therefore for improvements that reduce power consumption in portable electronic cameras.

SUMMARY OF THE INVENTION

The present invention is directed to overcoming one or more of the problems set forth above. Briefly summarized, according to one aspect of the present invention, a system for digital image capture and transmission includes an image fulfillment server, having a transceiver for sending and receiving channel assessment signals and receiving a digital image file and a memory for storing the received digital image file. The system also includes a digital camera having an electronic image sensor for sensing an image and producing a digital image; a short term memory for storing digital images produced by the image sensor in digital image files; a transceiver for communicating with and transmitting the digital image files to the image fulfillment server; a signal strength detector for monitoring the registration signal from the fulfillment server and producing a transmit enable signal; a long term memory for storing the digital image files; means responsive to the transmit enable signal for disabling transmission of the digital image data when the channel assessment signal indicates that successful transmission of the digital image data is not possible; and a timer means for transferring the digital image file from the short term memory to the long tern memory after a predetermined period of time.

These and other aspects, objects, features and advantages of the present invention will be more clearly understood and appreciated from a review of the following detailed description of the preferred embodiments and appended claims, and by reference to the accompanying drawings.

ADVANTAGEOUS EFFECT OF THE INVENTION

The present invention has the advantages of reduced power consumption by avoiding unsuccessful transmission attempts and re-transmission when transmission of the image data is not possible.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a schematic diagram of a digital image capture and transmission system according to the present invention;

FIG. **2** is a flow chart illustrating the sequence of image capture operations performed by a camera in a system according to the present invention;

FIG. **3** is a flow chart illustrating the sequence of image transmission operations performed by a camera in a system according to the present invention; and

FIG. **4** is a flow chart illustrating interrupt logic associated with the image capture and transmission sequences.

To facilitate understanding, identical reference numerals have been used, where possible, to designate identical elements that are common to the figures.

DETAILED DESCRIPTION OF THE INVENTION

Beginning with FIG. **1**, a system according to the present invention is shown. The system includes an image fulfillment server **10**, having a wireless transceiver **12** with an antenna **14**. Wireless transceiver **12** is connected to a central processor **16**, such as a personal computer or communications server. A printer **18** for printing digital images is connected to the central processor **16**. Memory device **19**, such as an EPROM, for short term storage of digital images is connected to the central processor **16**. A removable media writer **20** for recording digital images on a removable media such as optical disks or solid state memory modules is also connected to central processor **16**. The image fulfillment server **10** communicates with a digital camera **22** over wireless communication link **24**. The communication protocol employed by the system is preferably an IEEE 802.11 communications protocol, wherein the transceiver **12** continually emits a channel assessment signal that is used by another remote transceiver to assess the strength and quality of the signal so that a decision can be made as to whether successful communications between the two transceivers is possible.

The digital camera **22** includes a viewfinder **26**, and a lens **28** for forming an image of the scene on a solid state image sensor **30**. A suitable digital camera for use with the present invention is the DCS 460™ brand digital camera sold by the Eastman Kodak Company, Rochester, N.Y., suitably modified to include the transceiver, signal strength detector, and logic described below. An Analog to Digital converter **32** converts the signal formed by solid state image sensor **30** to a digital image signal. The digital camera **22** is controlled by a micro processor **34** which receives the digital image signal and stores it temporarily in short term memory **36**. The digital camera **22** includes a camera power switch **37** for applying power to the camera components and a "shutter release" button **39** that is connected to micro processor **34** to signal the camera to take a picture. A wireless transceiver **38** is connected to micro processor **34** for transmitting a digital image signal through antenna **40** over wireless communications link **24** to image fulfillment server **10**, and to receive the channel assessment signal transmitted by transceiver **12** in image fulfillment server **10**.

The digital camera **22** includes a signal strength and quality detector **42** that processes the channel assessment signal transmitted by the image fulfillment server **10** and received by wireless transceiver **38**. A suitable transceiver and signal strength and quality detector are available on a single chip such as the chip number HSP3824 manufactured by Harris Corporation. The signal strength and quality detector **42** determines if a successful transmission between transceivers **12** and **38** is possible and supplies a signal to the micro processor **34** representing the ability of image fulfillment server **10** to receive transmissions from camera **22**. The digital camera **22** also includes a long term memory **44** such as a magnetic disk memory or a rewritable optical disk memory that is connected to microprocessor **34** for longer storage of digital image files.

Referring now to FIG. **2**, the digital image capture portion of the system according to the present invention will be described. After the power is turned on **46** to the camera **22**, actuation **48** of the shutter release causes the camera to capture and store **50** a digital image in short term memory **36**. The microprocessor **34** starts a timer **52** associated with the image stored in blocks (e.g. 512 bytes each) short term memory **36**. The timer **52** has a time period on the order of minutes (e.g. 10 minutes) The microprocessor then periodically checks **54** to determine whether the timer has timed out. If the timer has not timed out, the microprocessor executes a short delay **56** and rechecks the time. When timer **52** times out, any image data remaining in short term memory is transferred **58** to long term memory **44** and the microprocessor waits for the next shutter release **48**.

Referring to FIG. **3**, the sequence of operations for transmitting an image in either short term or long term memory will be described. When the camera **22** is first turned on **46** by actuating camera power switch **37**, a check is made **60** to determine if there is any image data in either short term **36** or long term memory **44**. If there is no image data to transmit, a short delay **62** is executed, and the check **60** is made again. If there is some image data to transmit, a check is made **64** to determine if the signal strength and quality as detected by detector **42** is sufficient to insure successful transmission of the data. If the signal strength and quality are insufficient for transmission, a short delay **66** is executed and the check **64** is made again. When the signal strength and quality are sufficient for transmission, the camera **22** transmits a message **68** to establish an account with the image fulfillment server **10**. The message may include, for example the serial number of the camera, and date and time of transmission. After the account data is transmitted, the camera **22** again checks to see if the signal strength and quality are sufficient for successful transmission **70**. If not, a short delay **72** is executed and the check is made again. When the signal strength detector **42** indicates that successful transmission is possible, the next block in memory is transmitted **74**. A check is then made to see if any blocks of image data remain to be transmitted **76**. If there are remaining blocks of image data in either memory, the check for signal strength **70** is repeated, and the next block is transmitted. All of the blocks in long term memory **44** are transmitted, first in first out, then any blocks in short term memory are transmitted. When all of the blocks in either of the short term or long term memories have been transmitted, a short delay is executed **78**, and the check for the presence of image data in the memory **76** is repeated.

Referring to FIG. **4**, if at any time during the image transmission, the signal strength and quality become insufficient for successful transmission, an interrupt **80** is executed and transmission of the current block of data is stopped **82**. The sequence of operations then returns to delay **72** in FIG. **3**. Similarly, if at any time during the capture or transmission sequences, the power to the camera is turned off, an interrupt **84** is executed, transmission of the image data is stopped **86**, and any image data in short term memory **36** is transferred **88** to long term memory **44** prior to removing power from the camera.

The transceiver **44** consumes a relatively large amount of power compared with the rest of the elements in camera **10**. The system of the present invention significantly reduces power consumption by not attempting transmission when successful transmission would not be possible. Since the short term memory **36** can be accessed more rapidly than long term memory **44**, the system of the present invention also results in more timely transmission of the image data by transmission directly from short term memory when successful transmission is possible.

The invention has been described with reference to a preferred embodiment. However, it will be appreciated that variations and modifications can be effected by a person of ordinary skill in the art without departing from the scope of the invention.

PARTS LIST

10 image fulfillment server
12 wireless transceiver
14 antenna
16 central processor
18 printer
19 memory
20 removable media writer
22 digital camera
24 wireless communication link
26 view finder
28 lens
30 solid state image sensor
32 analog to digital converter
34 micro processor
36 short term memory
37 shutter button
38 wireless transceiver
39 switch
40 antenna
42 signal and quality strength detector
44 long term memory
46 power on step
48 shutter release inquiry step
50 capture and store image in short term memory step
52 start timer step
54 time out inquiry step
56 delay step
58 transfer remaining image from short term memory to long term memory step
60 image in memory inquiry step
62 delay step
64 signal strength and quality inquiry step
66 delay step
68 establish account step

70 signal strength and quality inquiry step

72 delay step

74 transmit next block in memory step

76 block remaining in memory step

78 delay step

80 interrupt step

82 stop transmission step

84 interrupt step

86 stop transmission step

88 transfer contents of short term memory to long term memory step

We claim:

1. A system for digital image capture and transmission, comprising:

a) an image fulfillment server, having:
   i) a transceiver for sending a channel assessment signal and receiving a digital image file;
   ii) a memory for storing the received digital image file; and

b) a digital camera having:
   i) an electronic image sensor for sensing an image and producing a digital image;
   ii) a short term memory for storing digital images produced by the image sensor in digital image files prior to transmission to the image fulfillment server;
   iii) a transceiver for communicating with and transmitting digital image files to the image fulfillment server;
   iv) a signal strength detector for monitoring the channel assessment signal from the fulfillment server and producing a transmit enable signal;
   v) a long term memory for storing the digital image files if they are not transmitted to the image fulfillment server within a predetermined time;
   vi) means responsive to the transmit enable signal for disabling transmission of the digital image data when the channel assessment signal indicates that successful transmission of the digital image data is not possible; and
   vii) timer means for transferring any image data remaining in the short term memory to the long term memory after the predetermined period of time.

2. The system for digital image capture and transmission claimed in claim **1**, further comprising means for transferring any digital image data in short term memory to long term memory in response to turning off power to the camera.

3. The system for digital image capture and transmission claimed in claim **1**, wherein the short term memory is a solid state memory and the long term memory is a magnetic disc drive.

4. The system for digital image capture and transmission claimed in claim **1**, wherein the short term memory is a solid state memory and the long term memory is an optical disc drive.

5. A method for digital image capture and transmission, comprising the steps of:

a) providing an image fulfillment server having a memory for storing the received digital image file and a transceiver for sending a channel assessment signal and receiving a digital image file;

b) sending the channel assessment signal from the image fulfillment server;

c) providing a digital camera having an electronic image sensor for sensing an image and producing a digital image, a short term memory for storing digital images produced by the image sensor in digital image files prior to transmission to the image fulfillment center, a transceiver for communicating with and transmitting digital image files to the image fulfillment server, a signal strength detector for monitoring the channel assessment signal from the fulfillment server and producing a transmit enable signal, and a long term memory for storing the digital image files if they have not been transmitted to the image fulfillment center within a predetermined time;

d) disabling transmission of the digital image data when the channel assessment signal indicates that successful transmission of the digital image data is not possible; and

e) transferring any image data remaining in the short term memory to the long term memory after the predetermined period of time.

6. The method for digital image capture and transmission claimed in claim **5**, further comprising the step of transferring any digital image data in short term memory to long term memory in response to turning off power to the camera.

* * * * *

EXHIBIT F

U.S. Patent 6,980,232

US006980232B2

(12) **United States Patent**
Suzuki

(10) **Patent No.:** **US 6,980,232 B2**
(45) **Date of Patent:** **Dec. 27, 2005**

(54) **IMAGE TRANSMITTING INTERNET CAMERA**

(75) Inventor: **Katsuyoshi Suzuki**, Tokyo (JP)

(73) Assignee: **PENTAX Corporation**, Tokyo (JP)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 647 days.

(21) Appl. No.: **09/785,172**

(22) Filed: **Feb. 20, 2001**

(65) **Prior Publication Data**

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(30) **Foreign Application Priority Data**

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(51) **Int. Cl.**[7] **H04N 5/225**
(52) **U.S. Cl.** **348/207**; 348/211; 709/102; 709/218
(58) **Field of Search** 348/207.1, 211.3, 348/207.11, 143, 152, 211, 552, 232, 207; 709/218, 102, 103

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,531,161 A 7/1985 Murakoshi
4,746,993 A 5/1988 Tada
4,853,733 A 8/1989 Watanabe et al.
5,032,918 A 7/1991 Ota et al.
5,034,804 A 7/1991 Sasaki et al.
5,040,068 A 8/1991 Parulski et al.
5,062,010 A 10/1991 Saito
5,099,262 A 3/1992 Tanaka et al.
5,138,459 A 8/1992 Roberts et al.
5,146,353 A 9/1992 Isoguchi et al.
5,185,667 A 2/1993 Zimmermann
5,231,501 A 7/1993 Sakai
5,283,644 A 2/1994 Maeno
5,283,655 A 2/1994 Usami
5,295,077 A 3/1994 Fukuoka
5,343,243 A 8/1994 Maeda
5,367,332 A 11/1994 Kerns et al.
5,402,170 A 3/1995 Parulski et al.
5,414,464 A 5/1995 Sasaki
5,475,441 A 12/1995 Parulski et al.
5,477,264 A 12/1995 Sarbadhikari et al.
5,479,206 A 12/1995 Ueno et al.
5,486,853 A 1/1996 Baxter et al.
5,488,558 A 1/1996 Ohki
5,506,617 A 4/1996 Parulski et al.
5,528,293 A 6/1996 Watanabe et al.
5,535,011 A 7/1996 Yamagami et al.
5,541,656 A 7/1996 Kare et al.

(Continued)

FOREIGN PATENT DOCUMENTS

JP 3-268583 11/1991

(Continued)

OTHER PUBLICATIONS

English Language Abstract of JP 8-315106.

(Continued)

Primary Examiner—Wendy R. Garber
Assistant Examiner—Gary C. Vieaux
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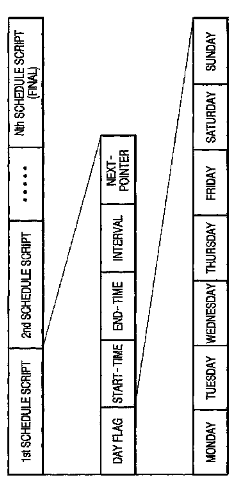
(57) **ABSTRACT**

An Internet camera is provided with an image capturing device that captures images and converts the captured images into digital data, a storage device that stores digital data corresponding to the captured images in a form of image data files, a memory that stores schedule data including a plurality of schedule scripts. A schedule merging device is further provided to merge the plurality of schedule scripts into a merged schedule. The image capturing device and a data transfer client are controlled, in accordance with the merged schedule, to capture images and transfer image data files corresponding to the captured images to a predetermined site on the Internet.

28 Claims, 6 Drawing Sheets



U.S. PATENT DOCUMENTS

5,544,315	A	8/1996	Lehfeldt et al.
5,550,586	A	8/1996	Kudo et al.
5,568,192	A	10/1996	Hannah et al.
5,581,299	A	12/1996	Raney et al.
5,587,928	A	12/1996	Jones et al.
5,606,365	A	2/1997	Maurinus et al.
5,612,732	A	3/1997	Yuyama et al.
5,631,701	A	5/1997	Miyake
5,633,678	A	5/1997	Parulski et al.
5,635,983	A	6/1997	Ohmori
5,640,204	A	6/1997	Tsutsui
5,646,684	A	7/1997	Nishizawa et al.
5,724,155	A	3/1998	Saito
5,734,425	A	3/1998	Takizawa et al.
5,754,227	A	5/1998	Fukuoka
5,796,426	A	8/1998	Gullichsen et al.
5,806,005	A	9/1998	Hull et al.
5,815,205	A	9/1998	Hashimoto et al.
5,818,537	A	10/1998	Enokida et al.
5,870,135	A	2/1999	Glatt et al.
5,887,140	A	3/1999	Itsumi et al.
5,911,044	A	6/1999	Lo et al.
5,917,542	A	6/1999	Moghadam
5,990,941	A	11/1999	Jackson et al.
6,005,611	A	12/1999	Gullichsen
6,006,039	A	12/1999	Steinberg et al.
6,034,716	A	3/2000	Whiteing et al.
6,038,296	A	3/2000	Brunson et al.
6,043,837	A	3/2000	Driscoll, Jr. et al.
6,047,264	A	4/2000	Fisher
6,061,502	A	5/2000	Ho et al.
6,065,062	A	5/2000	Periasamy
6,067,571	A	5/2000	Igarashi et al.
6,094,221	A	7/2000	Andersion
6,104,430	A	8/2000	Fukuoka
6,134,606	A	10/2000	Anderson et al.
6,147,598	A	11/2000	Murphy et al.
6,167,469	A	12/2000	Safai et al.
6,188,431	B1	2/2001	Oie
6,195,511	B1	2/2001	Harada
6,204,877	B1	3/2001	Kiyokawa
6,208,426	B1	3/2001	Saito
6,223,190	B1	4/2001	Aihara et al.
6,226,449	B1	5/2001	Inoue et al.
6,256,059	B1	7/2001	Fichtner
6,278,481	B1	8/2001	Schmidt
6,300,976	B1	10/2001	Fukuoka
6,331,869	B1	12/2001	Furlan et al.
6,353,848	B1	3/2002	Morris
6,360,362	B1	3/2002	Fichtner
6,374,406	B2	4/2002	Hiratai
6,389,464	B1	5/2002	Krishnamurthy et al.
6,407,752	B1	6/2002	Harnett
6,438,587	B2	8/2002	Kitamura
6,441,924	B1	8/2002	Matsui
6,452,629	B1	9/2002	Aizawa et al.
6,525,761	B2	2/2003	Sato et al.
6,539,547	B2	3/2003	Driscoll, Jr. et al.
6,556,241	B1	4/2003	Yoshimura et al.
6,567,122	B1	5/2003	Anderson et al.
6,571,271	B1	5/2003	Savitzky et al.
6,583,813	B1 *	6/2003	Enright et al. 348/150
6,591,279	B1	7/2003	Emens
6,594,032	B1	7/2003	Hiroki et al.
6,603,502	B2	8/2003	Martin
6,624,846	B1	9/2003	Lassiter
6,636,259	B1	10/2003	Anderson et al.
6,654,060	B1 *	11/2003	Kurosawa et al. 348/333.02
6,677,989	B1	1/2004	Aizawa et al.
6,720,987	B2	4/2004	Koyanagi et al.
6,747,692	B2	6/2004	Patel et al.
6,751,297	B2	6/2004	Nelkenbaum
2001/0024232	A1	9/2001	Suzuki
2002/0053087	A1	5/2002	Negishi et al.
2003/0025803	A1	2/2003	Nakamura et al.
2003/0208567	A1	11/2003	Gross
2004/0012811	A1	1/2004	Nakayama

FOREIGN PATENT DOCUMENTS

JP	4-980	1/1992
JP	5-153453	6/1993
JP	5-166090	7/1993
JP	5-167979	7/1993
JP	8-102837	4/1996
JP	8-171691	7/1996
JP	8-315106	11/1996
JP	8-317268	11/1996
JP	9-288684	11/1997
JP	09307794	11/1997
JP	10224676	8/1998
JP	10243153	9/1998
JP	10320685	12/1998
JP	11-27567	1/1999
JP	11-27650	1/1999
JP	11-341338	12/1999
JP	3034243	4/2000
WO	91/07850	5/1991
WO	96/02106	1/1996
WO	99/48276	9/1999
WO	00/07341	2/2000

OTHER PUBLICATIONS

English Language Abstract of JP 10-224676.
English Language Abstract of JP 10-320685.
A printout (labeled W-1) of a World Wide Web site (Web site) relating to a "Hitachi MPEGCAM", 5 pages, printed Jul. 8, 1997.
A printout (labeled W-2) of a Web site relating to a "Microplex NetWorkEye", 2 pages, printed Aug. 14, 1997.
A printout (labeled W-3) of a Web site relating to a "StarDot WinCam", 3 pages, printed Aug. 5, 1997.
A printout (labeled W-4) of a Web site relating to an "MRT Observer", 1 page, printed Aug. 14, 1997.
A printout (labeled W-6A) of a Web site relating to an "EarthCam Internet Camera", 2 pages, printed Aug. 14, 1997.
A printout (labeled W-6B) of a Web site relating to the "EarthCam Internet Camera", 10 pages, printed Oct. 3, 1997.
A printout (labeled W-7) of a Web site relating to an "Axis NetEye", 1 page, printed Aug. 14, 1997.
Ricoh Digital Electronic Still (Video) Camera, Instruction Manual for Using DC-1, 1995, along with a partial English language translation.
3.3 Connectionless Transport: UDP, Ross and Kurose, http://www-net.cs.umass.edu/kurose/transport/UDP.html, 1996-2000.
English Language Abstract of JP8-171691.
English Language Abstract of JP8-102837.
P.M. Corcoran et al., "Internet Enabled Digital Photography", IEEE, pp. 84-85.
Eng. Trans of NEC Picona digital, Instruction Manual for PC-DC200 and PC-DC200K.
A printout of a News Release from NEC dated Feb. 13, 1997, relating to Picona digital camera.
NEC Picona digital camera, Instruction Manual for PC-DC200 and PC-DC200K.
Printout of a Website relating to Samsung "Webthru" cameras, printed on Aug. 14, 2001.

Samsung Webthru SWC 101/104 User's Guide, printed from Webthru web site on Aug. 14, 2001.
Samsung Webthru SWC160 User's Guide, printed from Webthru web site on Aug. 14, 2001.
A printout of a News Release from Apple dated May 13, 1996, relating to QuickTime image capture system.
"Apple's New Image-Capture Platform", Apple Directions, Aug. 1996, pp. 1, 15, 17-21.
A printout of a Press Release from Apple dated Feb. 17, 1997, relating to QuickTake 200 digital camera.
A printout of Apple Service Source Manual for QuickTake 200 digital camera.
A printout of Press Release from FlashPoint dated Dec. 8, 1997, relating to Digita operating system.
A printout of a Press Release from FlashPoint dated Jun. 15, 1998, relating to Kodak DC 220 and DC 260 cameras with Digita operating system.
"Digita Camera Operating System", the Kleper Report on Digital Publishing, Issue 3.6, Nov./Dec. 1998.
"FlashPoint shows how to process digital photos without a PC", EE Times, posted Apr. 16, 1998.
"Intranet TCP/IP Bible", Chapter 5, "TCP and UDP", pp. 62-99, Nobukazu Iguchi, Ohm Inc., May 30, 1997, together with an English language translation.
"Internet Yearbook '96", vol. 1, Sections 2, 4, pp. 28-33, 208-229, Gijyuto Hyouroun Inc., Apr. 5, 1996, together with an English language translation of the same.
Written Opposition to the Grant of a Patent issued with regard to Japanese Patent No. 3034243, together with an English language translation of the same.
Various "Sharp Zaurus MI-506" materials, including an "Introductory" Instruction Manual pp. 18-19, 22-27, 182-193, 234-235; a "Functional" Instruction Manual, pp. 1-5, 82-83; a "Zaurus Communication" Instruction Manual, pp. 1-7, 74-75, 124-125, 128-129; and a press release dated Jun. 23, 1997, pp. 1/11-11/11, together with an English language translation of each.
Correspondence of Page Numbers Between the Pages in Japanese Documents and the Pages in the English Translations.
Notice of Sending Copies of Written Opinions issued with regard to Japanese Patent No. 3034243, together with an English language translation of the same.
Written Opposition to the Grant of a Patent issued with regard to Japanese Patent No. 3034243, together with an English language translation of the same.
English language translation of a Notice of Reasons for Revocation, issued with regard to Japanese Patent No. 3034243.
A copy of a facsimile press release, PR Newswire file No. p1210083.106, transmitted Dec. 10, 1996, relating to an "Axis NetEye 200".
A printout (labeled W-5) of a Web site relating to a "Carecams RCS5000", 1 page, printed Aug. 14, 1997.
A printout (labeled W-8) of a Web site relating to "Omniview: Electronic Aim and Zoom Camera", printed on Feb. 6, 2001.
A printout (labeled W-9) of a Web site relating to "Interactive Pictures Presents the Whole Picture", printed on Feb. 6, 2001.
A printout (labeled W-10A) of a Web site relating to "Omniview Motionless Camera Orientation System", printed on Feb. 6, 2001.
A printout (labeled W-10B) of a Web site relating to "Stationary Camera Aims and Zooms Electronically", printed on Feb. 6, 2001.
English language Abstract of JP11-27567.
English language Abstract of JP11-27650.
English language Abstract of JP3034243.

* cited by examiner

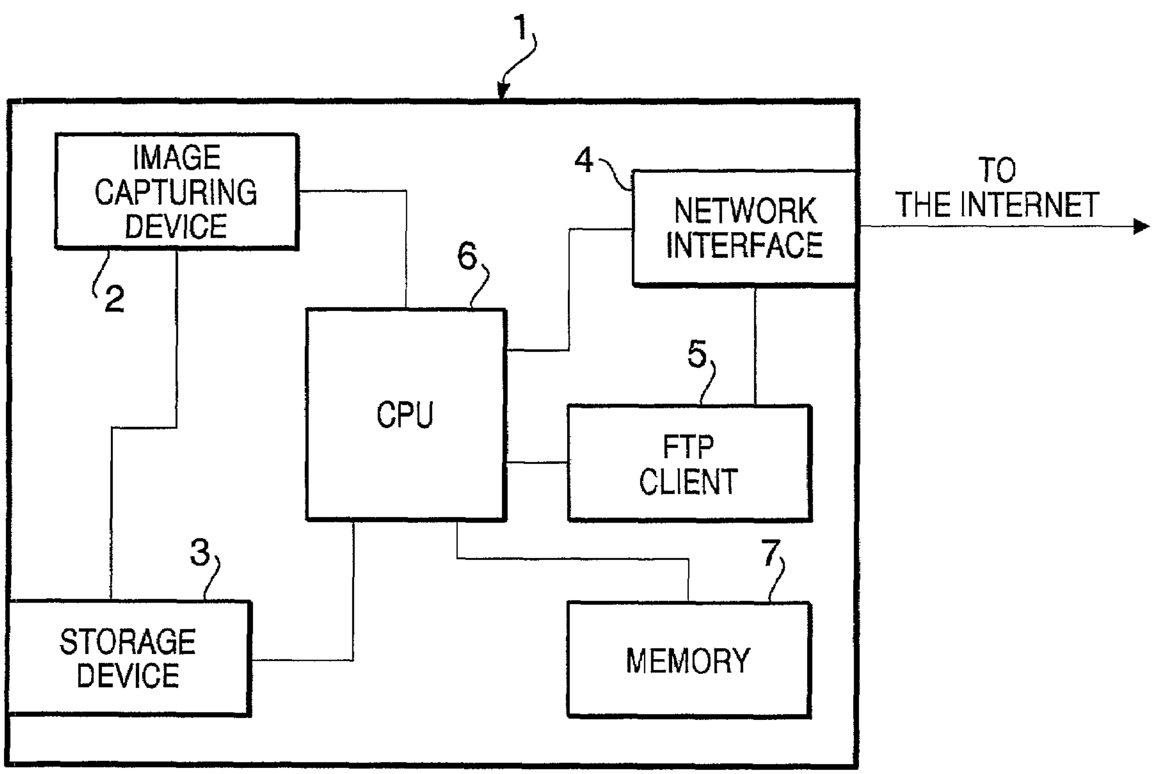

1
IMAGE CAPTURING DEVICE
2
4
NETWORK INTERFACE
TO THE INTERNET
6
CPU
5
FTP CLIENT
3
STORAGE DEVICE
7
MEMORY

FIG. 1

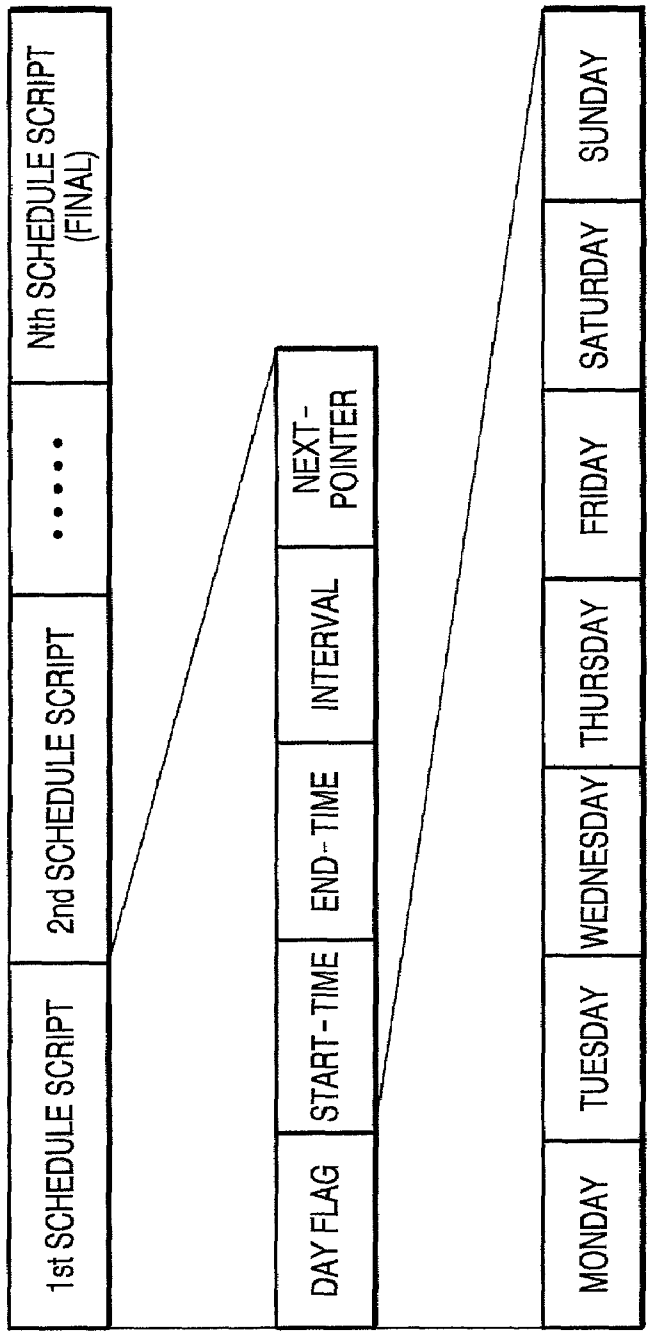


FIG.2A

FIG.2B

FIG.2C

FIG. 3

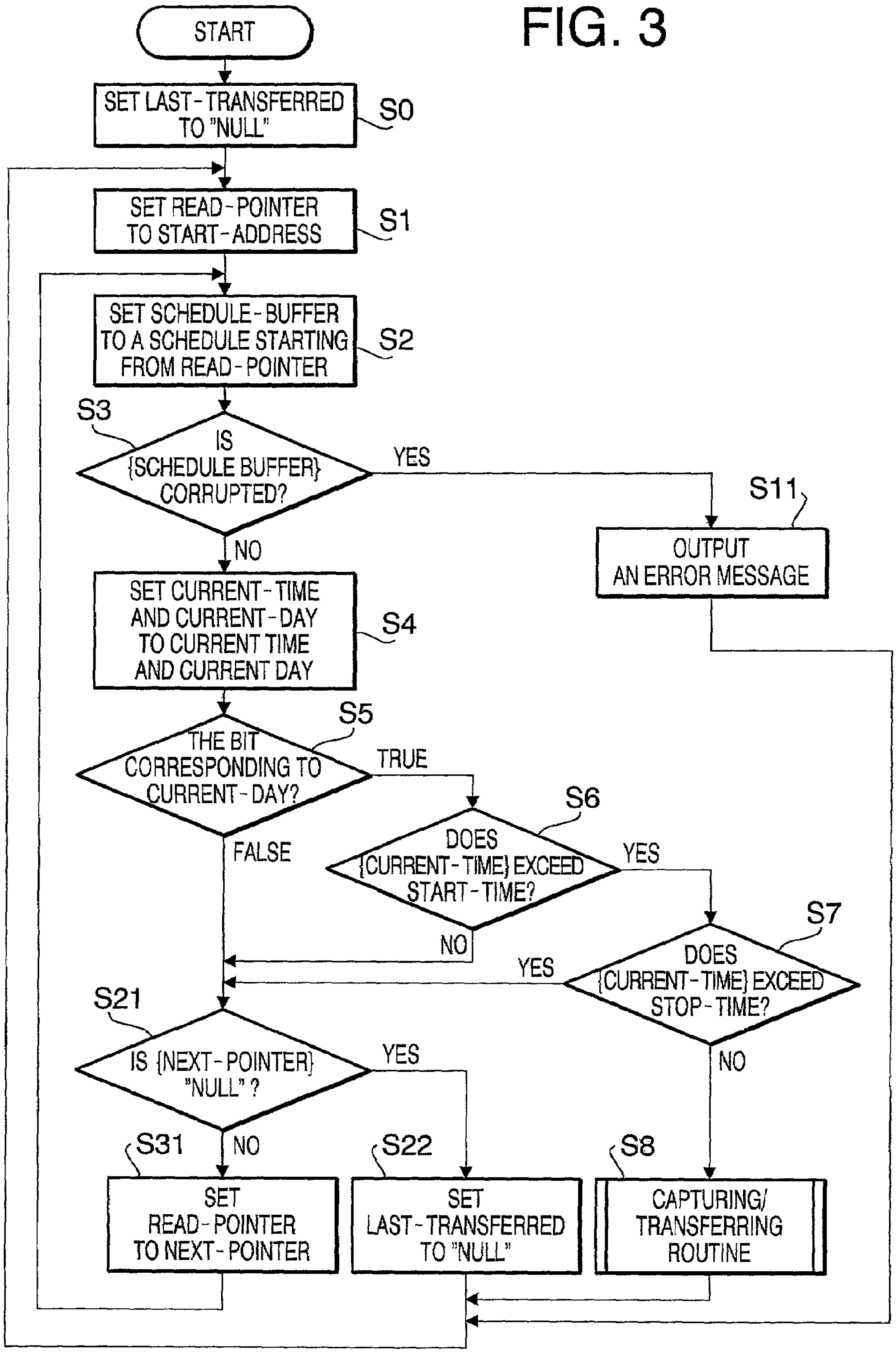

START
SET LAST-TRANSFERRED TO "NULL"
S0
SET READ-POINTER TO START-ADDRESS
S1
SET SCHEDULE-BUFFER TO A SCHEDULE STARTING FROM READ-POINTER
S2
S3
IS {SCHEDULE BUFFER} CORRUPTED?
YES
NO
S11
OUTPUT AN ERROR MESSAGE
SET CURRENT-TIME AND CURRENT-DAY TO CURRENT TIME AND CURRENT DAY
S4
S5
THE BIT CORRESPONDING TO CURRENT-DAY?
TRUE
FALSE
S6
DOES {CURRENT-TIME} EXCEED START-TIME?
YES
NO
S7
DOES {CURRENT-TIME} EXCEED STOP-TIME?
YES
NO
S21
IS {NEXT-POINTER} "NULL" ?
YES
NO
S31
SET READ-POINTER TO NEXT-POINTER
S22
SET LAST-TRANSFERRED TO "NULL"
S8
CAPTURING/ TRANSFERRING ROUTINE

FIG. 4

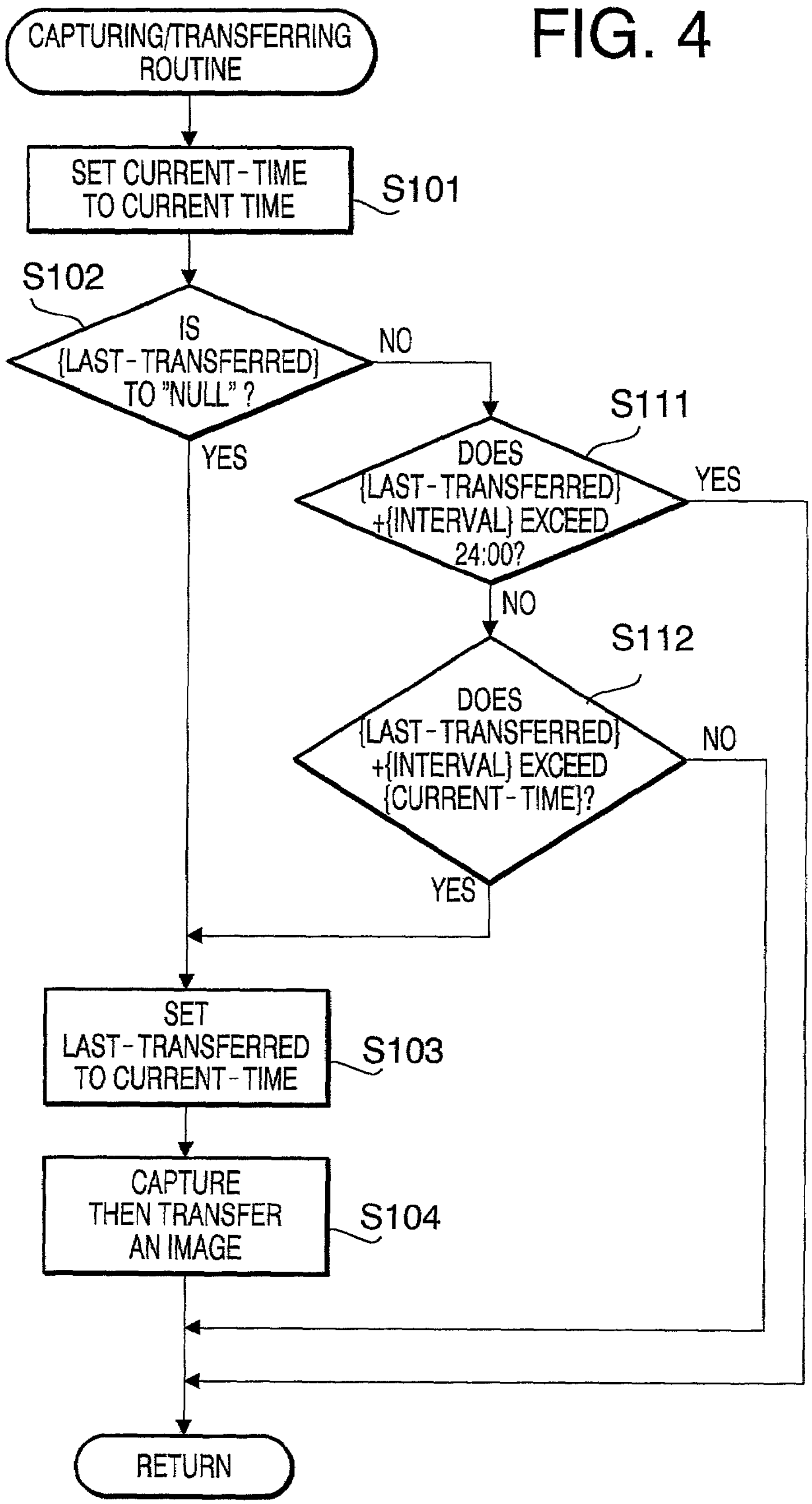

CAPTURING/TRANSFERRING ROUTINE
SET CURRENT-TIME TO CURRENT TIME
S101
S102
IS {LAST-TRANSFERRED} TO "NULL"?
NO
YES
S111
DOES {LAST-TRANSFERRED} +{INTERVAL} EXCEED 24:00?
YES
NO
S112
DOES {LAST-TRANSFERRED} +{INTERVAL} EXCEED {CURRENT-TIME}?
NO
YES
SET LAST-TRANSFERRED TO CURRENT-TIME
S103
CAPTURE THEN TRANSFER AN IMAGE
S104
RETURN

FIG. 5

ADDRESS	PARAMETER			
START-ADDRESS	DAY-FLAG	MON.	FALSE	FIRST SCHEDULE
		TUE.	TRUE	
		WED.	TRUE	
		THU.	TRUE	
		FRI.	TRUE	
		SAT.	FALSE	
		SUN.	FALSE	
	START-TIME		0:00	
	END-TIME		8:00	
	INTERVAL		15 MINUTES	
	NEXT-POINTER		ADDRESS 2	
ADDRESS 2	DAY-FLAGS	MON.	TRUE	SECOND SCHEDULE
		TUE.	TRUE	
		WED.	TRUE	
		THU.	TRUE	
		FRI.	FALSE	
		SAT.	FALSE	
		SUN.	FALSE	
	START-TIME		21:00	
	END-TIME		24:00	
	INTERVAL		15 MINUTES	
	NEXT-POINTER		0	

FIG. 6

ADDRESS	PARAMETER			
START-ADDRESS	DAY-FLAG	MON.	TRUE	FIRST SCHEDULE
		TUE.	TRUE	
		WED.	TRUE	
		THU.	TRUE	
		FRI.	TRUE	
		SAT.	FALSE	
		SUN.	FALSE	
	START-TIME		8:00	
	END-TIME		17:00	
	INTERVAL		10 MINUTES	
	NEXT-POINTER		ADDRESS 2	
ADDRESS 2	DAY-FLAGS	MON.	TRUE	SECOND SCHEDULE
		TUE.	TRUE	
		WED.	TRUE	
		THU.	TRUE	
		FRI.	TRUE	
		SAT.	TRUE	
		SUN.	TRUE	
	START-TIME		0:00	
	END-TIME		24:00	
	INTERVAL		30 MINUTES	
	NEXT-POINTER		0	

IMAGE TRANSMITTING INTERNET CAMERA

BACKGROUND OF THE INVENTION

The present invention relates to an Internet camera which is connected to the Internet and transmits image data files to a predetermined site of a file server on the Internet.

Conventionally, a digital camera has been widely used. The digital camera captures an image, converts the image to digital data, and store the digital data in a form of data files in a storage device such as a hard disk.

Recently, as an application of the digital camera, an Internet camera has been used. An example of the Internet camera is disclosed in U.S. patent application Ser. No. 09/204,289, the teachings of which are incorporated herein by reference.

The conventional Internet camera typically includes a network interface such as a modem for sending the data files via the Internet, and a data transfer client such as an FTP (File Transfer Protocol according to RFC 959) client for controlling the network interface in order to transfer the data files stored in the storage device to a predetermined site of a file server such as an FTP server on the Internet.

In such an Internet camera, images are captured and the image data files are transmitted automatically, in accordance with a predetermined schedule.

Conventionally, however, the schedule includes only one script which defines a start time, an end time and an interval, and the camera operates in a similar manner everyday. The image capturing and/or transferring operations are repeatedly executed at the defined intervals during a period from the start time to the end time.

Since the schedule include only one script, the conventional Internet camera cannot capture the images according to a relatively complicated schedule such as a schedule extending in two days, e.g., a schedule for capturing images from 23:00 of a day to 1:00 of the next day.

SUMMARY OF THE INVENTION

It is therefore an object of present invention for providing an Internet camera for capturing and transferring images according to a relatively complicated schedule as described above.

For the above object, according to the invention, there is provided an Internet camera that captures images of an object and transmitting image data to a predetermined site on the Internet, which camera is provided with an image capturing device that captures images and converts the captured images into digital data, a storage device that stores digital data corresponding to the captured images in a form of image data files, respectively, a memory that stores schedule data which includes a plurality of schedule scripts, a network interface connected to the Internet, a data transfer client that controls the network interface to transfer the image data file to a predetermined site on the Internet, a schedule merging device that merges the plurality of schedule scripts into a merged schedule, and a controller that controls the image capturing device to capture images in accordance with the merged schedule, and controls the data transfer client to transfer the image data file corresponding to the captured image in accordance with the merged schedule to the predetermined site.

With the above configuration, since the image capturing operations and data transferring operations can be performed in accordance with a merged schedule which is generated by

combining a plurality of schedule scripts, even if each having a relatively simple data structure, a complicated scheduling can be achieved easily.

Optionally, the schedule merging device may assign priorities to the plurality of schedule scripts, respectively, procedures defined by a schedule script having a higher priority being executed if two or more schedule scripts overlap.

Further optionally, each of the plurality of schedule scripts may include a start time and an end time, between which the images are to be captured and the image data files are to be transferred, and a designation of days of a week, on which the images are to be captured and the image data files are to be transferred.

In this case, each of the plurality of schedule scripts may further include an interval, at every occurrence of which an image is to be captured and an image data file is to be transferred.

According to another aspect of the invention, there is provided an Internet camera that captures images of an object and transmitting image data to a predetermined site on the Internet, which camera is provided with an image capturing device that captures images and converts the captured images into digital data, a storage device that stores digital data corresponding to the captured images in a form of image data files, respectively, a memory that stores schedule data which includes a plurality of schedule scripts, a schedule merging device that merges the plurality of schedule scripts into a merged schedule, and a controller that controls the image capturing device to capture images in accordance with the merged schedule.

With the above configuration, since the image capturing operations can be performed in accordance with a merged schedule, which is generated by combining a plurality of schedule scripts, a complicated scheduling can be achieved easily.

Optionally, the schedule merging device may assign priorities to the plurality of schedule scripts, respectively, procedures defined by a schedule script having a higher priority being executed if two or more schedule scripts overlap.

Further optionally, each of the plurality of schedule scripts may include a start time and an end time, between which the images are to be captured, and a designation of days of a week, on which the images are to be captured.

Still optionally, each of the plurality of schedule scripts may further include an interval, at every occurrence of which an image is to be captured.

According to a further aspect of the invention, there is provided an Internet camera that captures images of an object and transmitting image data to a predetermined site on the Internet, which camera is provided with a memory that stores schedule data which includes a plurality of schedule scripts, a network interface connected to the Internet, a data transfer client that controls the network interface to transfer the image data files as stored to a predetermined site on the Internet, a schedule merging device that merges the plurality of schedule scripts into a merged schedule, and a controller that controls the data transfer client to transfer the stored image data files in accordance with the merged schedule to the predetermined site.

With the above configuration, since the image data transferring operations can be performed in accordance with a merged schedule which is generated by combining a plurality of schedule scripts, a complicated scheduling can be achieved easily.

Optionally, the schedule merging device may assign priorities to the plurality of schedule scripts, respectively, procedures defined by a schedule script having a higher priority being executed if two or more schedule scripts overlap.

Further optionally, each of the plurality of schedule scripts may include a start time and an end time, between which the stored image data files are to be transferred, and a designation of days of a week, on which the stored image data files are to be transferred.

In this case, each of the plurality of schedule scripts may further include an interval, at every occurrence of which the stored image data files are to be transferred.

BRIEF DESCRIPTION OF THE ACCOMPANYING DRAWINGS

FIG. **1** is a block diagram of an Internet camera according to an embodiment of the present invention;

FIGS. **2**A–**2**C show a structure of the schedule data;

FIG. **3** is a flowchart showing an operation in the embodiment of the present invention;

FIG. **4** is a flowchart showing the detailed operation of step S**8** of FIG. **3**;

FIG. **5** is an example of a schedule data of the embodiment of the present invention; and

FIG. **6** is another example of a schedule data of the embodiment of the present invention.

DETAILED DESCRIPTION OF THE EMBODIMENTS

FIG. **1** is a block diagram of an Internet camera according to an embodiment of the present invention. The Internet camera **1** includes an image capturing device **2**, a storage device **3**, a controller **6** including a CPU, a memory **7**, an FTP client **5**, and a network interface **4**, such as a modem. It should be noted that the network interface may include a LAN card interface connectable to the Internet through a proxy server.

In the Internet camera **1**, the controller **6** controls the image capturing device **2** that captures an image and obtains image data. The image data is stored in the storage device **3** as an image data file. The storage device **3** is capable of storing a plurality of image data files captured at different timings.

The FTP client **5**, which is controlled by the controller **6**, controls the network interface **4** to transfer the image data files stored in the storage device **3** to a predetermined site of an FTP server (not shown) on the Internet.

In the memory **7**, schedule data is stored. Specifically, the schedule data is stored in a form of a data file, which may contain one or more schedule scripts. The controller **6** retrieves the schedule data, and controls the Internet camera **1** to capture images and transfer the image data files in accordance with the schedule script(s) included in the schedule data. It should be noted that, in the embodiment, an image is captured and then an image data file corresponding to the captured image is transmitted to the predetermined site immediately, in accordance with the schedule data. However, the control may be modified such that only one of the image capturing operation or data transmitting operation is executed in accordance with the schedule data, or the image capturing operation and the image data transmitting operation are executed in accordance with different schedules, respectively.

FIGS. **2**A–**2**C schematically show an example of the structure of the schedule data. FIG. **2**A shows a data structure of the schedule data. The schedule data is stored from a predetermined address (START-ADDRESS) of the memory **7**. In the example shown in FIG. **2**A, the schedule data includes a plurality of schedule scripts, i.e., a first through N-th schedule scripts. FIG. **2**B shows an example of a structure of a schedule script. As shown in FIG. **2**B, each schedule script includes a DAY-FLAG parameter, a START-TIME parameter, an END-TIME parameter, an INTERVAL parameter, and a NEXT-POINTER parameter.

FIG. **2**C shows a structure of the DAY-FLAG parameter. As shown in FIG. **2**C, the DAY-FLAG parameter is a 7-bit parameter. Each of the bits corresponds to each day of a week. That is, from the LSB (Least Significant Bit) of the DAY-FLAG parameter, the bits of the DAY-FLAG parameter represent the TRUE/FALSE states for Monday, Tuesday, Wednesday, Thursday, Friday, Saturday and Sunday, respectively.

If a bit of the DAY-FLAG parameter corresponding to a certain day is "TRUE", at least one capturing operation is executed on the day, between a start time defined by the START-TIME parameter and an end time defined by the END-TIME parameter.

Specifically, the first capturing operation on the day, whose status is "TRUE", is executed at the start time that is defined by the START-TIME.

The INTERVAL parameter indicates an interval. The image capturing and transferring operations are to be executed at the intervals indicated by the INTERVAL parameter, between the start time and the end time. For example, if the START-TIME parameter indicates "11:00", the END-TIME parameter indicates "13:00" and the INTERVAL parameter indicates "30 minutes", images are captured and transferred at 11:00, 11:30, 12:00, 12:30 and 13:00.

The NEXT-POINTER parameter represents a top address in the memory **7** at which the next schedule script is stored if it is included in the schedule data. If no further schedule script is included in the schedule data, the value of the NEXT-POINTER parameter is set to "Null".

FIG. **3** shows an image capturing/transferring procedure according to the embodiment of the present invention. The procedure uses a READ-POINTER variable, a CURRENT-TIME variable, a CURRENT-DAY variable, a LAST-TRANSFERRED variable, and a SCHEDULE-BUFFER variable. In the following description, { } represents a data value of the variables. For example, {CURRENT-TIME} represents the time set to the CURRENT-TIME variable.

In S**0**, the LAST-TRANSFERRED variable is set to "Null", and in S**1**, the READ-POINTER is set to {START-ADDRESS}, i.e., the value of the START-ADDRESS.

Then, in S**2**, a schedule script, which starts from an address indicated by the Read-Pointer, is copied to the SCHEDULE-BUFFER. Then in step S**3**, it is judged whether the schedule script copied in the SCHEDULE-BUFFER is corrupted. If the schedule script in the SCHEDULE-BUFFER is not corrupted (S**3**: NO), then, in S**4**, the CURRENT-TIME and CURRENT-DAY variables are set to the current time and current day, respectively. In the embodiment, the current time and current day may be obtained from a time-server on the Internet using a Network Time Protocol. Alternatively, the current time and the current day are obtained from a real-time clock (not shown) of the controller **6**. In such a case, the real-time clock may be adjusted based on the time and day obtained from the time-server on the Internet.

In S5, the status of a bit of the DAY-FLAG corresponding to the CURRENT-DAY is set to "TRUE" or "FALSE". If the bit is "TRUE" (S5: TRUE), then, in S6, it is judged whether the {CURRENT-TIME} is after the {START-TIME} of the SCHEDULE-BUFFER. If the {CURRENT-TIME} is after the {START-TIME} (S6: YES), then, in S7, it is judged whether the {CURRENT-TIME} is on or before the {END-TIME} of the Schedule-Buffer.

If the {CURRENT-TIME} does not exceed the {END-TIME} (S7: NO), then, in S8, a procedure for capturing images, storing image data files converted from the captured image, and transferring the image data files is executed at intervals defined by the INTERVAL parameter. Then, control returns to S1, and the image capturing/transferring operation according to another schedule script will be executed.

If the {SCHEDULE-BUFFER} is determined to be corrupted (S3: YES), then, in S11, an error message is output. The error messages may be transferred, as an error message file, to the predetermined site, through the FTP client 5, in order to inform a client remote from the Internet camera 1 of the fact the a schedule script is corrupted. Alternatively or optionally, the error message may be transferred to a user as an e-mail message through a not-shown SMTP client. Then, in order to copy the schedule script again from the memory 7 to the SCHEDULE-BUFFER, control returns to S1 and the setting of the pointer at S1 and the data-loading operation at S2 are executed again.

If the bit corresponding to the CURRENT-DAY is set to "FALSE" in S5, then, in S21, it is judged whether the {NEXT-POINTER} of the SCHEDULE-BUFFER is "NULL". If the {NEXT-POINTER} is "Null" (S21: YES), then, in S22, the LAST-TRANSFERRED variable is cleared, and control returns to S1. If the {NEXT-POINTER} is not "Null" (S21: NO), then, in S31, the READ-POINTER is set to the {NEXT-POINTER}, and control returns to S2, at which another image capturing/transferring operations according to the next schedule script will be executed.

If the {CURRENT-TIME} does not exceed the {START-TIME} (S6: NO), then, in S21, it is judged whether the {NEXT-POINTER} is "Null".

If the {CURRENT-TIME} exceeds the {END-TIME} (S7: YES), then, in S21, it is judged whether the {NEXT-POINTER} of the {SCHEDULE-BUFFER} is "Null".

When the {CURRENT-TIME} is outside the programmed time in the current schedule, controls proceeds from S6 or S7 to S21 to judge whether the {NEXT-POINTER} is "Null". If the {NEXT-POINTER} is not "Null", control returns to S2 vial S31 to operate in accordance with the next schedule. Therefore, when the schedules do not overlap in programmed time for the same day, each schedule is accommodated. This permits at least day-spanning merged schedules. Even if more than two schedule scripts are provided, unless the schedules do not overlap in programmed time for the same day, all the schedules can be accommodated.

Further, when the {CURRENT-TIME} is within the programmed time, control proceeds from S6 to S7, and then S8, and S31 is not executed. In other words, control does not check the next schedule until the {CURRENT-TIME} is outside the programmed time in the current schedule. Therefore, if the schedules overlap in programmed time for the same day, the current schedule overrides or has priority over the next schedule. Accordingly, by appropriately assigning the priorities to the schedule scripts, at least variable-interval schedules can be performed.

FIG. 4 is a flowchart showing the detailed procedure of step S8 of FIG. 3. In S101, the CURRENT-TIME variable is set to the current time. Then in S102, it is judged whether the {LAST-TRANSFERRED} variable is "Null". If the {LAST-TRANSFERRED} is "Null" (S102: YES), then, in S103, the {LAST-TRANSFERRED} variable is set to the {CURRENT-TIME}, i.e., the value (i.e., time) of the CURRENT-TIME variable. Then in S104, the controller 6 controls the image capturing device 2, the storage device 3 and the FTP client 5 to capture an image, convert the captured image into image data, store the image data in the storage device 3 as an image data file, then transfer the image data file to the predetermined site.

If the LAST-TRANSFERRED variable is not "Null" (S102: NO), then, in S111, it is judged whether the value "{LAST-TRANSFERRED}+{INTERVAL}" exceeds 24:00 of the day. If the time does not exceed 24:00 of the day (S111: YES), then, in S112, it is judged whether the time "{LAST-TRANSFERRED}+{INTERVAL}" exceeds the {CURRENT-TIME}. If the time "{LAST-TRANSFERRED}+{INTERVAL}" exceeds the {CURRENT-TIME} (S112: YES), then, in S103, the LAST-TRANSFERRED variable is set to the {CURRENT-TIME}, i.e., the value (i.e., time) of the CURRENT-TIME. Then, in S104, an image is captured, converted into image data, stored in the memory 7 as an image data file, and the image data file is transferred to the predetermined site. It should be noted that, since the LAST-TRANSFERRED variable is set to the {CURRENT-TIME}, steps S103 and S104 are executed once at every interval between the start time and end time.

In step S111, if the time represented by "{LAST-TRANSFERRED}+{INTERVAL}" exceeds 24:00 of the day (S111: YES), then, the procedure shown in FIG. 4 is terminated.

In S112, if the time represented by "{LAST-TRANSFERRED}+{INTERVAL}" exceeds the CURRENT-TIME (S112: YES), then, the procedure shown in FIG. 4 is terminated.

Exemplary Schedule Data

FIG. 5 is an example of the schedule data consisting of first and second schedule scripts. According to the first schedule script, images are captured and transferred at every 15-minute interval, from 0:00 to 8:00, on Tuesday, Wednesday, Thursday and Friday.

According to the second schedule script, the images are captured and transferred at 15-minute intervals, from 21:00 to 24:00, on Monday, Tuesday, Wednesday and Thursday.

In accordance with the procedure shown in FIGS. 3 and 4, the two schedule scripts are merged, and therefore the images are captured and transferred, at 15-minute intervals, from 21:00 of Monday, Tuesday, Wednesday and Thursday to 8:00 of the next day, respectively. Thus, according to the embodiment, a schedule which extends in two days can easily be realized.

FIG. 6 is another example of the schedule data which consists of two schedule scripts. According to the first schedule script, the images are captured and transferred at 10-minute intervals, from 8:00 to 17:00, on Monday, Tuesday, Wednesday, Thursday and Friday.

According to the second schedule script, the images are captured and transferred everyday, at 30-minute intervals, from 0:00 to 24:00.

According to the embodiment, as understood from the flowchart shown in FIG. 3, priorities are assigned to the schedule scripts: the first schedule script has a higher priority than the second schedule script. Therefore, during the time period, which is referred to by both of the first and second schedule scripts, only the first schedule script is valid, and the second schedule script is invalidated.

Therefore, in the second example, the operation according to the second schedule script will not be executed from 8:00 to 17:00 of Monday through Friday. That is, on Monday, Tuesday, Wednesday, Thursday and Friday, the images are captured and transferred at 30-minute intervals from 0:00 to 8:00, at 10-minute intervals from 8:00 to 17:00, and at 30-minute intervals from 17:00 to 24:00, and on Saturday and Sunday, images are captured and transferred at 30-minute intervals, from 0:00 to 24:00.

As above, according to the present invention, by combining a plurality of schedule scripts, each having a relatively simple data structure, a complicated scheduling can be achieved easily.

It should be noted that the present invention is not restricted to the embodiment and examples described above. For instance, the camera **1** may not use the FTP client **5** and a network interface **4** (e.g., a modem), so that the images are merely captured and stored in the storage device **3** as image data files, according to the schedule data. Since the storage device **3** is capable of storing a plurality of image data files, the images captured according to the schedule data are observed by controlling the digital camera manually. Alternatively, the stored image data files may be transferred in accordance with a procedure which is different from the image capturing procedure.

The present disclosure relates to the subject matter contained in Japanese Patent Application No. 2000-041764, filed on Feb. 18, 2000, which is expressly incorporated herein by reference in its entirety.

What is claimed is:

1. An Internet camera that captures images of an object and transmits image data to a predetermined site on the Internet, comprising:

an image capturing device that captures images and converts the captured images into digital data;

a storage device that stores digital data corresponding to the captured images in a form of image data files, respectively;

a memory that stores schedule data which includes a plurality of schedule scripts;

a network interface connected to the Internet;

a data transfer client that controls the network interface to transfer the image data file to said predetermined site on the Internet;

a schedule merging device that merges said plurality of schedule scripts into a merged schedule; and

a controller that controls said image capturing device to capture images in accordance with the merged schedule, and controls said data transfer client to transfer the image data file corresponding to the captured image in accordance with the merged schedule to said predetermined site.

2. The Internet camera according to claim **1**, wherein said schedule merging device assigns priorities to said plurality of schedule scripts, respectively, procedures defined by a schedule script having a higher priority being executed if two or more schedule scripts overlap.

3. The Internet camera according to claim **1**, wherein each of said plurality of schedule scripts includes:

a start time and an end time, between which the images are to be captured and the image data files are to be transferred; and

a designation of days of a week, on which the images are to be captured and the image data files are to be transferred.

4. The Internet camera according to claim **3**, wherein each of said plurality of schedule scripts further includes an interval, at every occurrence of which an image is to be captured and an image data file is to be transferred.

5. The Internet camera according to claim **1**, further comprising a hand-operable input device configured to change the schedule data based on manual input.

6. An Internet camera that captures images of an object and transmits image data to a predetermined site on the Internet, comprising:

an image capturing device that captures images and converts the captured images into digital data;

a storage device that stores digital data corresponding to the captured images in a form of image data files, respectively;

a memory that stores schedule data which includes a plurality of schedule scripts;

a schedule merging device that merges said plurality of schedule scripts into a merged schedule; and

a controller that controls said image capturing device to capture images in accordance with the merged schedule.

7. The Internet camera according to claim **6**, wherein said schedule merging device assigns priorities to said plurality of schedule scripts, respectively, procedures defined by a schedule script having a higher priority being executed if two or more schedule scripts overlap.

8. The Internet camera according to claim **6**, wherein each of said plurality of schedule scripts includes:

a start time and an end time, between which the images are to be captured; and

a designation of days of a week, on which the images are to be captured.

9. The Internet camera according to claim **8**, wherein each of said plurality of schedule scripts further includes an interval, at every occurrence of which an image is to be captured.

10. The Internet camera according to claim **6**, further comprising a hand-operable input device configured to change the schedule data based on manual input.

11. An Internet camera that captures images of an object to store image data corresponding to the captured images and transmits the stored image data to a predetermined site on the Internet, comprising:

a memory that stores schedule data which includes a plurality of schedule scripts;

a network interface connected to the Internet;

a data transfer client that controls the network interface to transfer the stored image data to a predetermined site on the Internet;

a schedule merging device that merges said plurality of schedule scripts into a merged schedule; and

a controller that controls said data transfer client to transfer the stored image data in accordance with the merged schedule to said predetermined site.

12. The Internet camera according to claim **11**, wherein said schedule merging device assigns priorities to said plurality of schedule scripts, respectively, procedures defined by a schedule script having a higher priority being executed if two or more schedule scripts overlap.

13. The Internet camera according to claim **11**, wherein each of said plurality of schedule scripts includes:

a start time and an end time, between which the stored image data is to be transferred; and a designation of days of a week, on which the stored image data is to be transferred.

14. Then Internet camera according to claim **13**, wherein each of said plurality of schedule scripts further includes an interval, at every occurrence of which the stored image data is to be transferred.

15. The Internet camera according to claim **11**, further comprising a hand-operable input device configured to change the schedule data based on manual input.

16. An Internet camera that captures images of an object and transmits image data to a predetermined site on the Internet, comprising:

a memory that stores schedule data which includes a plurality of schedule scripts;

a network interface connected to the Internet;

a data transfer client that controls the network interface to transfer the image data to a predetermined site on the Internet;

a schedule merging device that merges said plurality of schedule scripts into a merged schedule; and

a controller that controls said data transfer client to transfer the image data in accordance with the merged schedule to said predetermined site.

17. The Internet camera according to claim **16**, further comprising a hand-operable input device configured to change the schedule data based on manual input.

18. An Internet camera for capturing images and transmitting image data to a site on the Internet, comprising:

an image capturing device configured to capture images and convert the captured images into digital data;

a storage device configured to store digital data corresponding to the respective captured images as image data files;

a memory configured to store schedule data including a plurality of schedule scripts having at least first and second schedule scripts, the first schedule script specifying a first capture time or transfer time extending through a final hour of a first day of the week, and the second schedule script specifying a second capture time or transfer time extending from a start of a first hour of a second day of the week consecutively following the first day of the week;

a network interface connected to the Internet;

a data transfer client configured to control the network interface to transfer the image data file to the site on the Internet;

a schedule merging device configured to merge the plurality of schedule scripts into a merged schedule, the merged schedule specifying at least the first and second capture or transfer times such that the first and second capture or transfer times occur consecutively across a boundary between the first and second days of the week; and

a controller configured to control the image capturing device to capture images in accordance with the merged schedule, and configured to control the data transfer client to transfer the image data file corresponding to the captured image in accordance with the merged schedule to the site on the Internet.

19. The Internet camera according to claim **18**, further comprising a hand-operable input device configured to change the schedule data based on manual input.

20. An Internet camera for capturing images and transmitting image data to a site on the Internet, comprising:

an image capturing device configured to capture images and convert the captured images into digital data;

a storage device configured to store digital data corresponding to the respective captured images as image data files;

a memory configured to store schedule data including a plurality of schedule scripts having at least first and second schedule scripts, the first schedule script specifying a first interval corresponding to a first period for capture or transfer of image data, the second schedule script specifying a second interval corresponding to a second period for capture or transfer of image data, the second period overlapping the first period along an overlap period, and the first schedule script having a higher priority than the second schedule script;

a network interface connected to the Internet;

a data transfer client configured to control the network interface to transfer the image data file to the site on the Internet;

a schedule merging device configured to merge the plurality of schedule scripts into a merged schedule; and

a controller configured to control the image capturing device to capture images in accordance with the merged schedule, and configured to control the data transfer client to transfer the image data file corresponding to the captured image in accordance with the merged schedule to the site on the Internet,

wherein either the first and second intervals differ, the first and second periods differ, or the first and second intervals and periods both differ, and

wherein the merged schedule specifies the first interval within the overlap period, excluding the second interval from the overlap period.

21. The Internet camera according to claim **20**, further comprising a hand-operable input device configured to change the schedule data based on manual input.

22. An Internet camera for capturing images and transmitting image data to a site on the Internet, comprising:

an image capturing device configured to capture images and convert the captured images into digital data;

a storage device configured to store digital data corresponding to the respective captured images as image data files;

a memory configured to store schedule data including a plurality of schedule scripts for capturing images;

a network interface connected to the Internet;

a data transfer client configured to control the network interface to transfer the image data file to the site on the Internet;

a schedule merging device configured to merge the plurality of schedule scripts for capturing images into a merged schedule for capturing images; and

a controller configured to control the image capturing device to capture images in accordance with the merged schedule for capturing images.

23. The Internet camera according to claim **22**, further comprising a hand-operable input device configured to change the schedule data based on manual input.

24. An Internet camera for capturing images and transmitting image data, comprising:

an image capturing device configured to capture images and convert the captured images into digital data;

a storage device configured to store digital data corresponding to the respective captured images as image data files;

a memory configured to store schedule data including a plurality of schedule scripts;

a schedule merging device configured to merge the plurality of schedule scripts into a merged schedule; and

a controller configured to control the image capturing device to capture images in accordance with the merged schedule.

25. The Internet camera according to claim **24**, wherein the schedule merging device assigns a respective priority to each of the plurality of schedule scripts.

26. The Internet camera according to claim **24**, further comprising a hand-operable input device configured to change the schedule data based on manual input.

27. The Internet camera according to claim **24**, wherein each of the plurality of schedule scripts respectively includes:

a start time and an end time, between which the images are to be captured; and

a designation of at least one day of the week, on which the images are to be captured.

28. The Internet camera according to claim **27**, wherein each of the plurality of schedule scripts further respectively includes an interval, at every occurrence of which an image is to be captured.

* * * * *

EXHIBIT G

U.S. Patent 7,936,391

US007936391B2

(12) **United States Patent**
Ward et al.

(10) **Patent No.:** **US 7,936,391 B2**

(45) **Date of Patent:** ***May 3, 2011**

(54) **DIGITAL CAMERA WITH COMMUNICATIONS INTERFACE FOR SELECTIVELY TRANSMITTING IMAGES OVER A CELLULAR PHONE NETWORK AND A WIRELESS LAN NETWORK TO A DESTINATION**

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(73) Assignee: **Eastman Kodak Company**, Rochester, NY (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **12/625,692**

(22) Filed: **Nov. 25, 2009**

(65) **Prior Publication Data**

US 2010/0073489 A1 Mar. 25, 2010

Related U.S. Application Data

(60) Continuation of application No. 11/692,224, filed on Mar. 28, 2007, now Pat. No. 7,742,084, which is a continuation of application No. 09/783,437, filed on Feb. 14, 2001, now Pat. No. 7,256,823, which is a division of application No. 09/004,046, filed on Jan. 7, 1998, now Pat. No. 6,784,924.

(60) Provisional application No. 60/037,962, filed on Feb. 20, 1997.

(51) **Int. Cl.**
H04N 5/222 (2006.01)

(52) **U.S. Cl.** **348/333.02**

(58) **Field of Classification Search** 348/231.2–231.3, 348/211.2–211.4, 333.01–333.02
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,434,618	A	7/1995	Hayashi et al.
5,737,491	A	4/1998	Allen et al.

(Continued)

FOREIGN PATENT DOCUMENTS

JP	1994-268582	9/1994

OTHER PUBLICATIONS

Sharp Zaurus Infoweb/Wildbird registration handbook, pp. 1-29 (English Translation included).

(Continued)

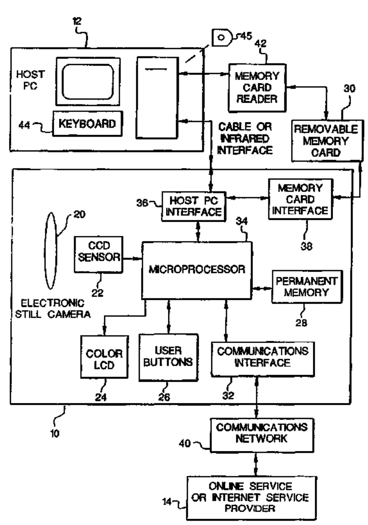
Primary Examiner — Tuan Ho

(74) *Attorney, Agent, or Firm* — Peyton C. Watkins

(57) **ABSTRACT**

Digital camera includes an image sensor receiving incident light of a scene, the digital camera captures an image corresponding to the incident light; display displays the plurality of captured images and displays a menu of destinations; at least one user input for selection of at least one image from the plurality of captured images and a destination from the menu of destinations displayed on the display; communications interface transmits the at least one selected image to the selected destination over one of a plurality of networks, the plurality of networks including at least two different types of wireless networks; memory; and processor coupled to the image sensor, the display, the at least one user input, the communications interface, and the memory, the processor controlling the transmission of the at least one selected image to the selected destination using either one of the at least two different types of wireless networks.

18 Claims, 4 Drawing Sheets



U.S. PATENT DOCUMENTS

5,806,005	A	9/1998	Hull et al.	
5,825,432	A *	10/1998	Yonezawa	348/563
6,111,604	A *	8/2000	Hashimoto et al.	348/220.1
6,209,048	B1	3/2001	Wolff	
6,226,362	B1	5/2001	Gerszberg et al.	
6,571,271	B1	5/2003	Savitzky et al.	
7,034,871	B2 *	4/2006	Parulski et al.	348/231.3

OTHER PUBLICATIONS

Sharp MI-10 Zaurus Camera Document, 3 pages (English translation included).

Sharp Zaurus MI-10 Users Manual, pp. 1-104 (English translation included).

* cited by examiner

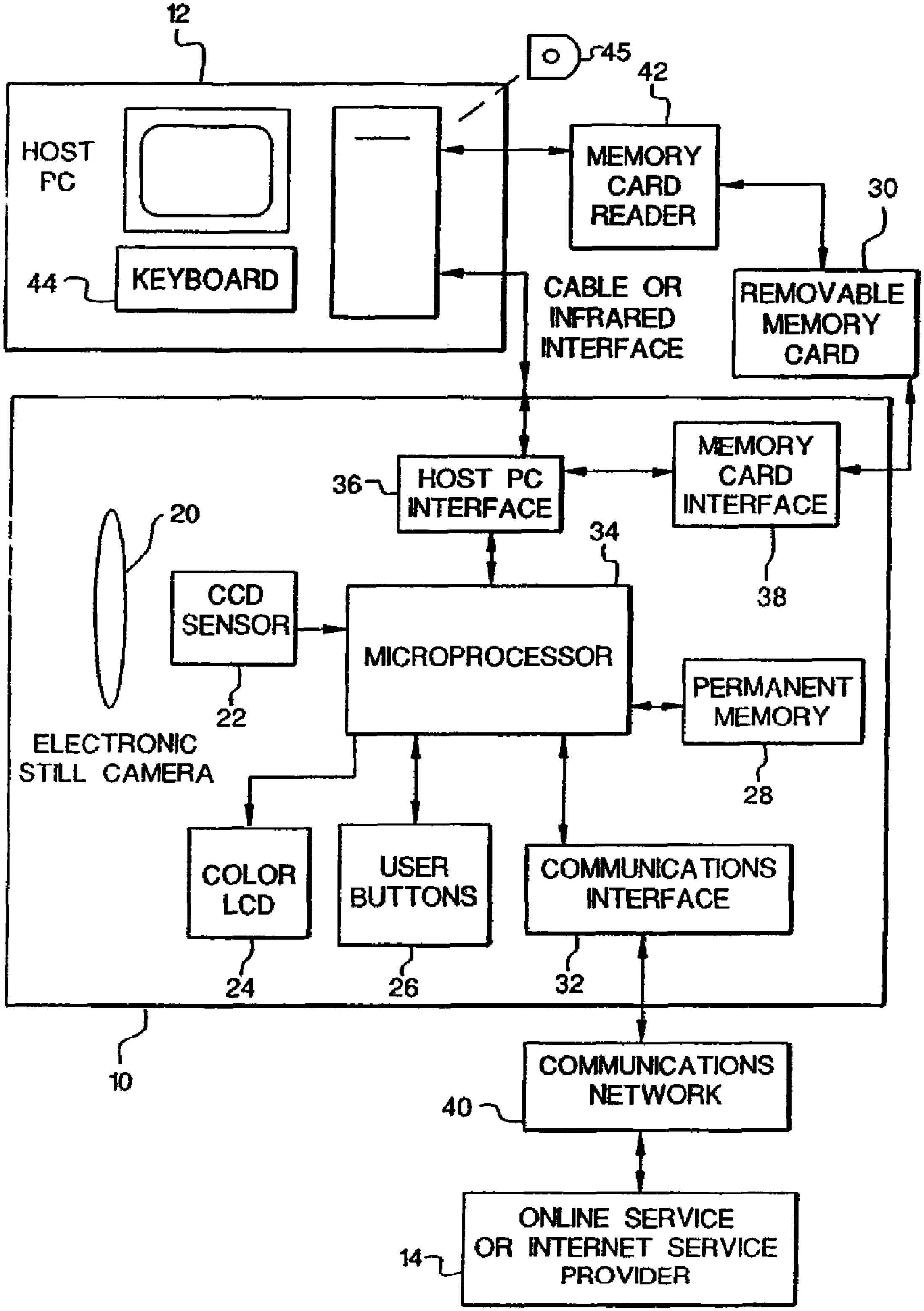

12
45
42
HOST
PC
MEMORY
CARD
READER
30
44
KEYBOARD
CABLE OR
INFRARED
INTERFACE
REMOVABLE
MEMORY
CARD
MEMORY
CARD
INTERFACE
36
HOST PC
INTERFACE
20
34
38
CCD
SENSOR
MICROPROCESSOR
22
PERMANENT
MEMORY
ELECTRONIC
STILL CAMERA
28
COLOR
LCD
USER
BUTTONS
COMMUNICATIONS
INTERFACE
24
26
32
10
COMMUNICATIONS
NETWORK
40
ONLINE SERVICE
OR INTERNET SERVICE
PROVIDER
14

FIG. 1

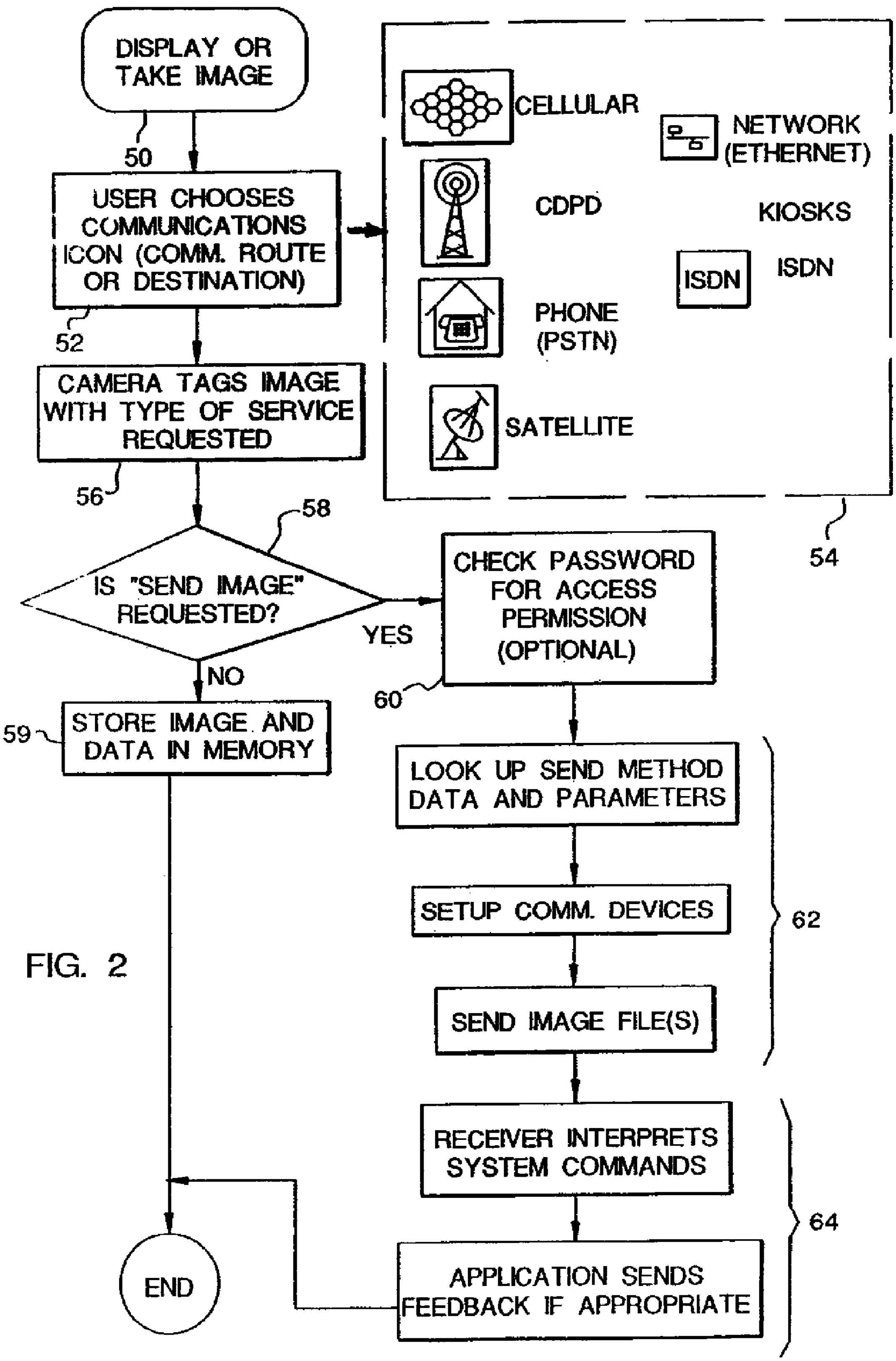

DISPLAY OR TAKE IMAGE
50
USER CHOOSES COMMUNICATIONS ICON (COMM. ROUTE OR DESTINATION)
52
CELLULAR
NETWORK (ETHERNET)
CDPD
KIOSKS
ISDN
ISDN
PHONE (PSTN)
SATELLITE
54
CAMERA TAGS IMAGE WITH TYPE OF SERVICE REQUESTED
56
58
IS "SEND IMAGE" REQUESTED?
YES
NO
CHECK PASSWORD FOR ACCESS PERMISSION (OPTIONAL)
60
59
STORE IMAGE AND DATA IN MEMORY
LOOK UP SEND METHOD DATA AND PARAMETERS
SETUP COMM. DEVICES
SEND IMAGE FILE(S)
62
RECEIVER INTERPRETS SYSTEM COMMANDS
APPLICATION SENDS FEEDBACK IF APPROPRIATE
64
END

FIG. 2

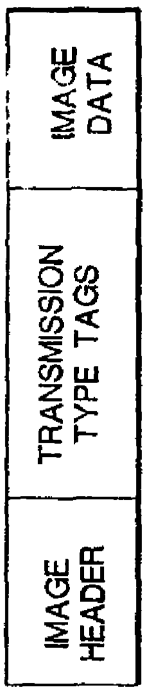


FIG. 3

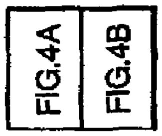


FIG. 4

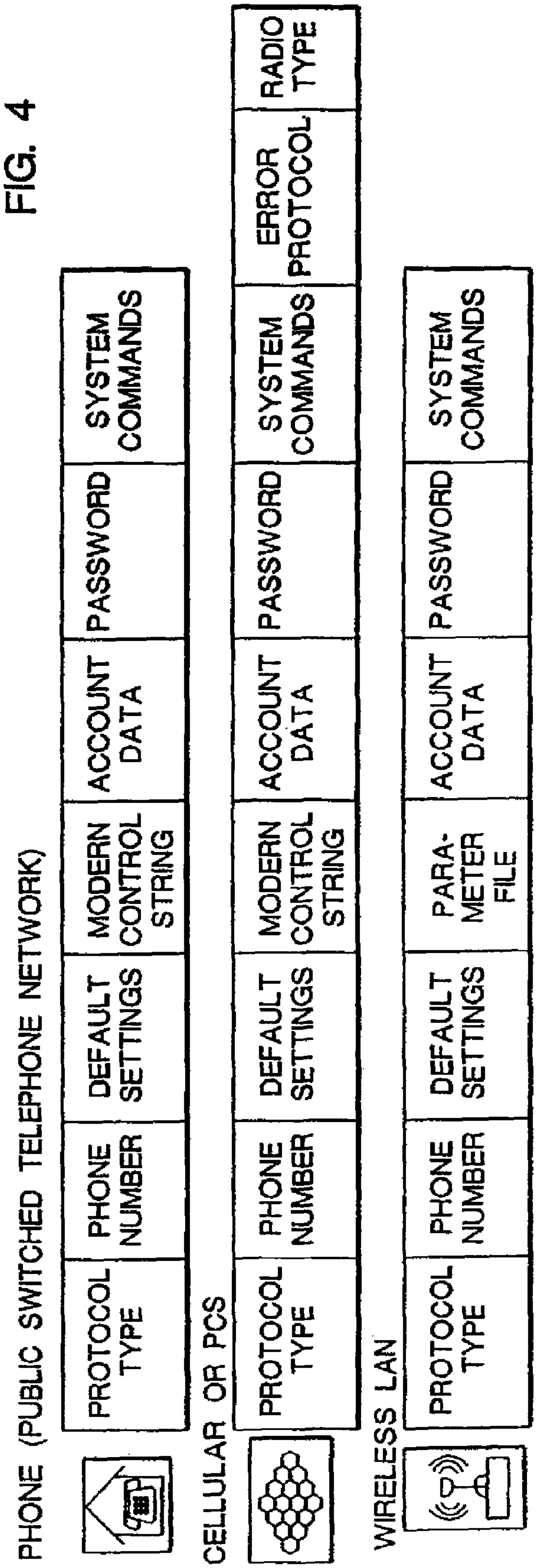


FIG. 4A

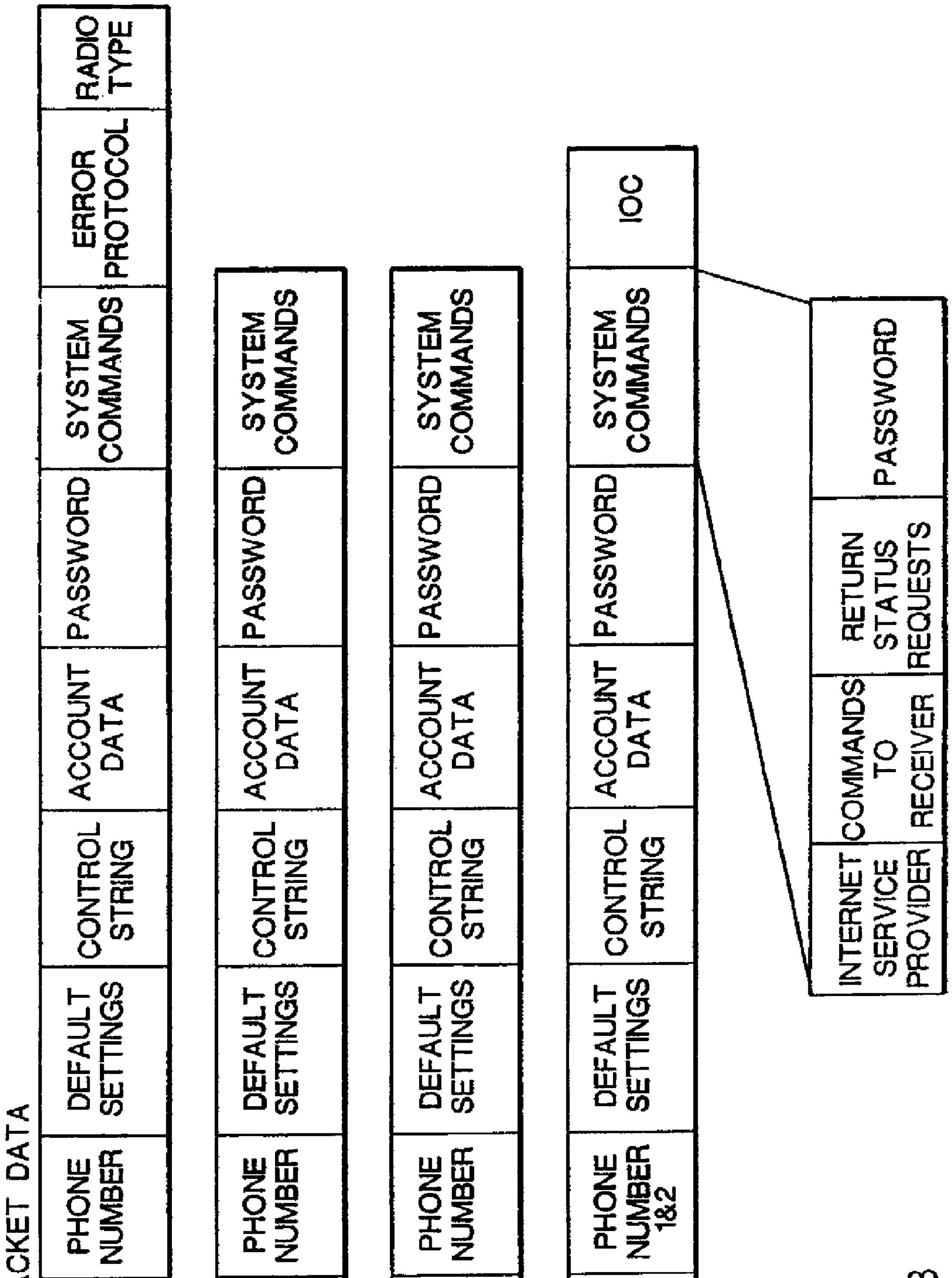

CELLULAR DIGITAL PACKET DATA
PROTOCOL TYPE
PHONE NUMBER
DEFAULT SETTINGS
CONTROL STRING
ACCOUNT DATA
PASSWORD
SYSTEM COMMANDS
ERROR PROTOCOL
RADIO TYPE
CLOCKS
PROTOCOL TYPE
PHONE NUMBER
DEFAULT SETTINGS
CONTROL STRING
ACCOUNT DATA
PASSWORD
SYSTEM COMMANDS
SATELLITE
PROTOCOL TYPE
PHONE NUMBER
DEFAULT SETTINGS
CONTROL STRING
ACCOUNT DATA
PASSWORD
SYSTEM COMMANDS
ISDN
ISDN
PROTOCOL TYPE
PHONE NUMBER 1&2
DEFAULT SETTINGS
CONTROL STRING
ACCOUNT DATA
PASSWORD
SYSTEM COMMANDS
IOC
INTERNET SERVICE PROVIDER
COMMANDS TO RECEIVER
RETURN STATUS REQUESTS
PASSWORD

FIG. 4B

DIGITAL CAMERA WITH COMMUNICATIONS INTERFACE FOR SELECTIVELY TRANSMITTING IMAGES OVER A CELLULAR PHONE NETWORK AND A WIRELESS LAN NETWORK TO A DESTINATION

CROSS-REFERENCE TO RELATED APPLICATIONS

This is a continuation of U.S. Ser. No. 11/692,224 filed Mar. 28, 2007, now U.S. Pat. No. 7,742,084, which is a continuation of U.S. Ser. No. 09/783,437 filed Feb. 14, 2001 (which issued as U.S. Pat. No. 7,256,823 on Aug. 14, 2007, which is now Reissue application Ser. No. 12/540,610) which is a divisional of U.S. Ser. No. 09/004,046 filed Jan. 7, 1998 (now U.S. Pat. No. 6,784,924 which issued on Aug. 31, 2004) which claims the benefit of U.S. Provisional Application No. 60/037,962 filed Feb. 20, 1997

FIELD OF THE INVENTION

The invention relates generally to the filed of photography, and in particular to electronic photography. More specifically, the invention relates to a digital camera that interfaces with a host computer.

BACKGROUND OF THE INVENTION

Digital cameras, such as the Kodak Digital Science DC25™ camera, allow images to be utilized on a home computer (PC) and to be incorporated into e-mail documents and personal home pages on the World Wide Web. Presently, images must be copied to the PC and transmitted as e-mail, for example using an online service or an Internet Service Provider (ISP), via a modem from the user's PC. It would be desirable to be able to transmit pictures directly from the digital camera instead of first transferring the pictures to a PC. For instance, on a vacation trip, it is desirable to immediately share pictures with friends or relatives via e-mail or Internet access. It is also desirable to transmit pictures from a location without PC access in order to free up camera storage to take additional pictures. There are a wide variety of connection means to online services such as America On Line, ISPs, and bulletin board services. Each of these services typically requires an account name and password, as well as local telephone access numbers, and specific communications settings. It would be difficult to provide an easy-to use means with buttons or menus on a small digital camera to input and/or modify all of these required settings.

SUMMARY OF THE INVENTION

The present invention is directed to overcoming one or more of the problems set forth above. Briefly summarized, according to one aspect of the present invention, the invention resides in a digital camera for capturing a plurality of images comprising an image sensor for receiving incident light of a scene, the digital camera capturing an image corresponding to the incident light of the scene; a display for displaying the plurality of captured images and for displaying a menu of destinations; at least one user input for selection of at least one image from the plurality of captured images and a destination from the menu of destinations displayed on the display; a communications interface for transmitting the at least one selected image to the selected destination over one of a plurality of networks, the plurality of networks including at least two different types of wireless networks; a memory; and a processor coupled to the image sensor, the display, the at least one user input, the communications interface, and the memory, the processor controlling the transmission of the at least one selected image to the selected destination using either one of the at least two different types of wireless networks.

These and other aspects, objects, features and advantages of the present invention will be more clearly understood and appreciated from a review of the following detailed description of the preferred embodiment and appended claims, and by reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a system block diagram of the invention.

FIG. **2** is a diagram showing the steps used to automatically transmit images using the network configuration file.

FIG. **3** is a diagram of an image file.

FIG. **4** is a diagram showing several versions of the network configuration file.

DETAILED DESCRIPTION OF THE INVENTION

Because imaging systems and devices are well known, the present description will be directed in particular to elements forming part of, or cooperating more directly with, apparatus in accordance with the present invention. Elements not specifically shown or described herein may be selected from those known in the art. Some aspects of the present description may be implemented in software. Unless otherwise specified, all software implementation is conventional and within the ordinary skill I the programming arts.

A system block diagram of the invention is shown in FIG. **1** including an electronic still camera **10**, a host computer (PC) **12** and a service provider **14**. The camera includes an optical section **20** for imaging a scene upon a CCD sensor **22** and generating an image signal, a liquid crystal display (LCD) **24** for displaying images and other information, a number of user input buttons **26**, both permanent memory **28** and removable memory **30**, and an internal communications interface (**32**) (e.g., modem). This interface may connect to a variety of known networks, such as a public switched telephone network (PSTN), ISDN, an RF cellular phone network, or Ethernet. The camera **10** also includes a microprocessor **34** for generally controlling the camera functions, as well as the interchange of data with the host PC **12** and the memory card **30** through a host PC interface **36** and a memory card interface **38**, respectively. Besides the host PC **12**, the system includes a network connection **40** to the online service or ISP (Internet Service Provider) **14**. Alternately, the network **40** can connect to the user's home PC **12**.

When the camera **10** is first purchased (or at any time thereafter), it is connected to the PC **12** via the host PC **36** interface and a software application (stored on a disc **45**) running on the host PC **12** will enable the user to specify the name of a destination ISP or online service and to input from the host PC keyboard **44** the appropriate communication settings and account information. This information generates a network configuration file, which then can then be downloaded to the camera **10** through the host PC interface **36**, which may be a wired or infrared (e.g., IrDA) interface, and written to the camera's internal memory **28** and/or the removable memory card **30**. Alternatively, a host PC equipped with a memory card reader/writer **42** can write the information directly to the card **30** without connecting the camera through its host PC interface **36**. Also, this information could be predetermined by the user and stored in a "preferences" file on the host PC **12** and then transferred to the camera **10** from this file without further intervention by the user. Multiple sets of destination services can be stored on the memory card **30**. Typically, keyword or graphic descriptors (e.g., icons) accompany the information in the network configuration file about destination services to enable easy access by the camera user.

The steps used to automatically transmit images using the network configuration file are shown in FIG. **2**. After disconnecting the camera from the host PC, the user operates the camera to take pictures (step **50**). This is typically done at a remote location, for example while traveling to another city. As the user takes or reviews images on the image LCD display, the decision can be made to transmit one or more images (step **52**). This is done by choosing one of the keywords or icons in a menu **54** shown in FIG. **2**, which are displayed on the LCD **24** and selected, e.g., through the user buttons **26**. (Note that a camera will typically only include a subset (only those desired by the user) of all the different services shown.) The selected image files may be tagged with a code (step **56**) indicating which service is requested, as shown in FIG. **3**. (Alternately, an "image utilization" file can be created in the camera storing a list of images to be transmitted by a particular method, as described in the cross-referenced copending patent application (U.S. Ser. No. 60/037,963). As described in that patent application, the details of an order, e.g., number of print copies to be made from an image and the size of the prints and/or a list of images to be e-mailed to various recipients, is written into the "utilization" file, which identifies the order and includes pointers to the image files that store the images required to "fulfill" the order. The "utilization" file is stored in the internal memory **28** or the memory card **30**.)

Next, the system determines whether a request exists to send an image (step **58**). If no request is present, the image and associated data is stored in either permanent memory **28** or the memory card **30** (step **59**). (Typically, all images are initially saved in memory whether eventually sent or not.) Otherwise, if there is a request to send an image, the user ensures that the camera is connected to the appropriate service (wired telephone line, cellular phone, kiosk, etc.) and pushes a "send" button in the user button section **26**, or selects a "send" menu option on the LCD **24**. The camera then utilizes the appropriate network configuration file, shown in FIG. **4**. Each network configuration file contains items such as the protocol type, phone number, etc., as described in Appendix I. The user password may be checked against the password in the network configuration file to ensure that the user is authorized to connect the camera to the desired service (step **60**). Alternately, the stored password in the appropriate configuration file can be used. Next, the camera uses the parameters in the configuration file to establish communications with the service and send one or more image files as selected by the user (steps **62**). The service receiver interprets the system commands issued by the camera from the network configuration file list and sends appropriate feedback (such as "transfer in progress" and "transfer complete") which are interpreted by the camera and displayed on the LCD **24** (steps **64**).

For example, when the camera uses a normal wired telephone (Public Switched Telephone Network) connection (i.e., network **40**) to the camera's internal modem **32**, after the user selects the images to be sent and presses the "send" button, the camera performs the following steps without user intervention:

1) Read the appropriate connection parameters from the network configuration file (on the memory card **30** or internal camera memory **28**), dial the phone and establish the connection to the destination service **14**.
2) Read the user's account name and password and transmit these to "log-on" to the service **14**.
3) Using the appropriate communications protocol (FTP, mailto, etc.), transmit the selected image or images to the destination service **14**.

The invention has been described with reference to a preferred embodiment. However, it will be appreciated that variation and modifications can be effected by a person of ordinary skill in the art without departing from the scope of the invention.

APPENDIX I

These are descriptions of the tags listed in the previous drawing:

Protocol Type

Each communication method has its own protocol, or rules to communicate. This tag identifies that protocol and where to find it. For example, the Network may use TCP/IP and a modem may use XModem.

Phone Number

This is the number of the receiving service. If internet access is requested, this could be the number of the Internet Service Provider. For ISDN, some systems require two phone numbers, dialed and connected to in sequence.

Default Settings

Standard settings that make the communications device compatible with the imaging device.

Modem Control String

Modem and communications devices have a command language that can set them up before they are used. For example, modems have many options controlled by command strings including volume level, the amount of time the carrier is allowed to fail before the system hangs up, and so on.

Account Data

This can be internet account data, charge number data, phone card data, billing address, and data related to the commerce part of the transmission.

Password

Any password needed to get into the communications system. Other passwords to get into the remote application or destination are located in the System Commands section.

System Commands

These are commands that control the end destination.

Error Protocol

In cellular and some other wireless communications, error protocols are used to increase the robustness of the link. For example, MNP10 or ETC may be used for cellular links.

Radio Type

The type of radio used for this communications feature may be identified here. Some cell phones have modems built in, others will have protocols for many communications functions built in. The radio type will make the imaging device adapt to the correct interface.

IOC

ISDN Ordering Code identifies what features are available on the ISDN line provided by the teleco. It is used to establish the feature set for that communications link.

Internet Service Provider

This identifies the actual service provider and any specific information or sequence of information that the service wants to see during connection and logoff. It also tells the device how to handle the return messages, like "time used" that are returned by the server.

Commands to Receiver

This may be a list of commands to control the receiving application. For example, a command to print one of the images and save the data to a particular file on a PC may be embedded here.

Return Status Requests

This tag can set up the ability of the application to tell if an error has occurred, or what the status of the application might be. The data here will help the device decide if it should continue communicating and a set user interface response can be developed around this feedback.

The invention claimed is:

1. A digital camera for capturing a plurality of images comprising:

an image sensor for receiving incident light of a scene, the digital camera capturing an image corresponding to the incident light of the scene;

a display for displaying the plurality of captured images and for displaying a menu of destinations;

at least one user input for selection of at least one image from the plurality of captured images and a destination from the menu of destinations displayed on the display;

a communications interface for transmitting the at least one selected image to the selected destination over one of a plurality of networks, the plurality of networks including at least two different types of wireless networks;

a memory; and

a processor coupled to the image sensor, the display, the at least one user input, the communications interface, and the memory, the processor controlling the transmission of the at least one selected image to the selected destination using either one of the at least two different types of wireless networks.

2. The digital camera of claim **1**, wherein the at least two different types of wireless networks include a cellular phone network and a wireless LAN.

3. The digital camera of claim **2**, wherein the image sensor, the display, the at least one user input, and the communications interface are directly coupled to the processor, and the memory is coupled to the processor via a memory interface, and wherein the memory stores first information used by the processor to control the communications interface to enable transmission over the cellular phone network, and stores second information used by the processor to control the communications interface to enable transmission over the wireless LAN.

4. The digital camera of claim **3**, wherein the first information is stored in a first configuration file and the second information is stored in a second configuration file.

5. The digital camera of claim **4**, wherein the first and second configuration files are generated by a separate device, and transferred from the separate device to the memory of the digital camera.

6. The digital camera of claim **5**, wherein the separate device is a computer.

7. The digital camera of claim **1**, wherein the memory is an internal memory.

8. The digital camera of claim **1**, wherein the memory is a removable memory card.

9. The digital camera of claim **3**, wherein the first information includes a phone number associated with the selected destination.

10. The digital camera of claim **3**, wherein the first and second information include account data.

11. A digital camera for capturing a plurality of images comprising:

an image sensor for receiving incident light of a scene, the digital camera capturing an image corresponding to the incident light of the scene;

a display for displaying the plurality of captured images;

at least one user input for selection of at least one image from the plurality of captured images;

a communications interface for transmitting the at least one selected image over one of a plurality of networks, the plurality of networks including a cellular phone network and a wireless LAN;

a processor coupled to the image sensor, the display, the at least one user input, and the communications interface, the processor controlling the transmission of the at least one selected image to a destination;

a memory coupled to the processor for storing first information used by the processor to control the communications interface to transmit to the destination over the cellular phone network when the camera is connected to the cellular phone network, and for storing second information used by the processor to control the communications interface to transmit to the destination over the wireless LAN when the camera is connected to the wireless LAN.

12. The digital camera of claim **11**, wherein the first information is stored in a first configuration file and the second information is stored in a second configuration file.

13. The digital camera of claim **12**, wherein the first and second configuration files are generated by a separate device, and transferred from the separate device to said memory of said digital camera.

14. The digital camera of claim **13**, wherein the separate device is a computer.

15. The digital camera of claim **11**, wherein the memory is an internal memory.

16. The digital camera of claim **11**, wherein the memory is a removable memory card coupled to the processor via a memory card interface, and wherein the image sensor, the display, the at least one user input, and the communications interface are directly coupled to the processor.

17. The digital camera of claim **11**, wherein the first information includes a phone number associated with the destination.

18. The digital camera of claim **11**, wherein the first and second information include account data.

* * * * *

EXHIBIT H

U.S. Patent Application 2005/0197156

US 20050197156A1

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Fourquin et al. (43) Pub. Date: Sep. 8, 2005

(54) METHOD OF SELECTING A COMMUNICATION NETWORK FOR A MOBILE COMMUNICATION TERMINAL ON THE BASIS OF INFORMATION ON WIRELESS NETWORK ACCESS POINTS

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(30) Foreign Application Priority Data

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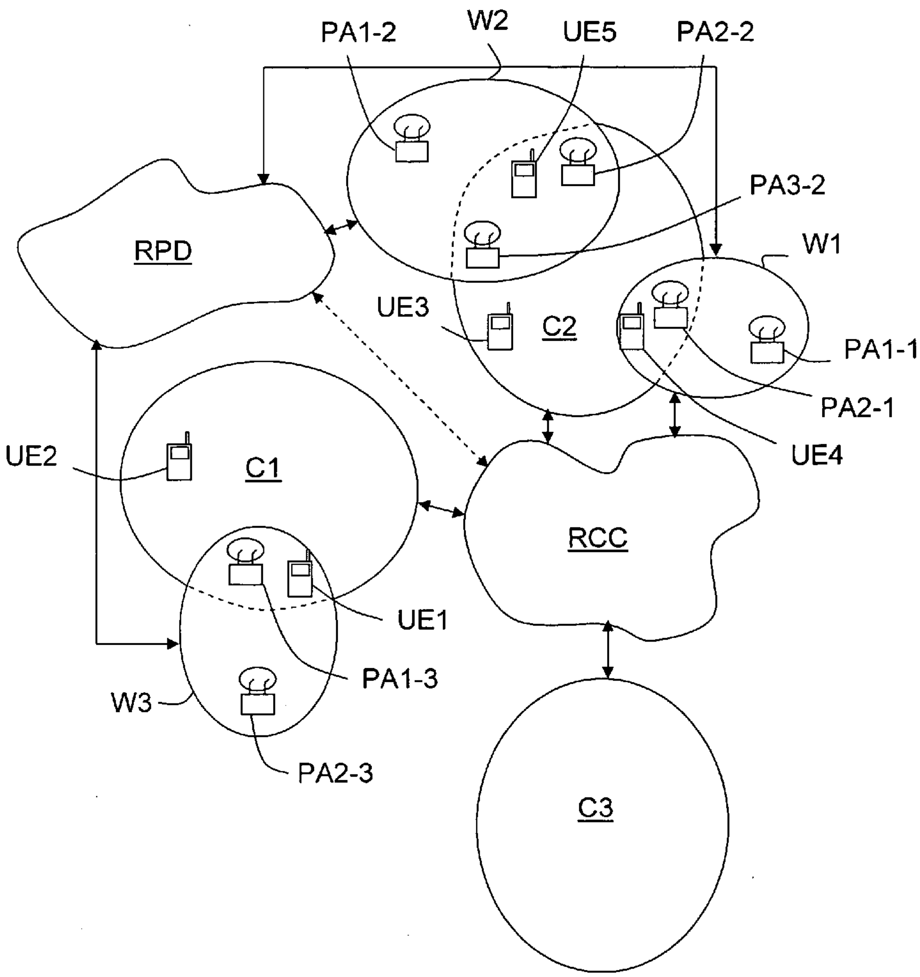
(52) U.S. Cl. 455/553.1

(57) ABSTRACT

A method is dedicated to selecting a communication network for a dual mode mobile communication terminal. This method consists in the mobile terminal listening to a chosen signaling channel of its parent cellular communication network on which is transmitted, in a chosen mode, information data on access points to at least one wireless local area network, accessible in the cell in which the mobile terminal is situated, and in selecting one of the accessible access points as a function of at least one chosen selection criterion, so that the mobile terminal can communicate with a remote communication terminal via the selected access point, given the transmitted information data, if the latter is more suitable for the communication than the cellular network.



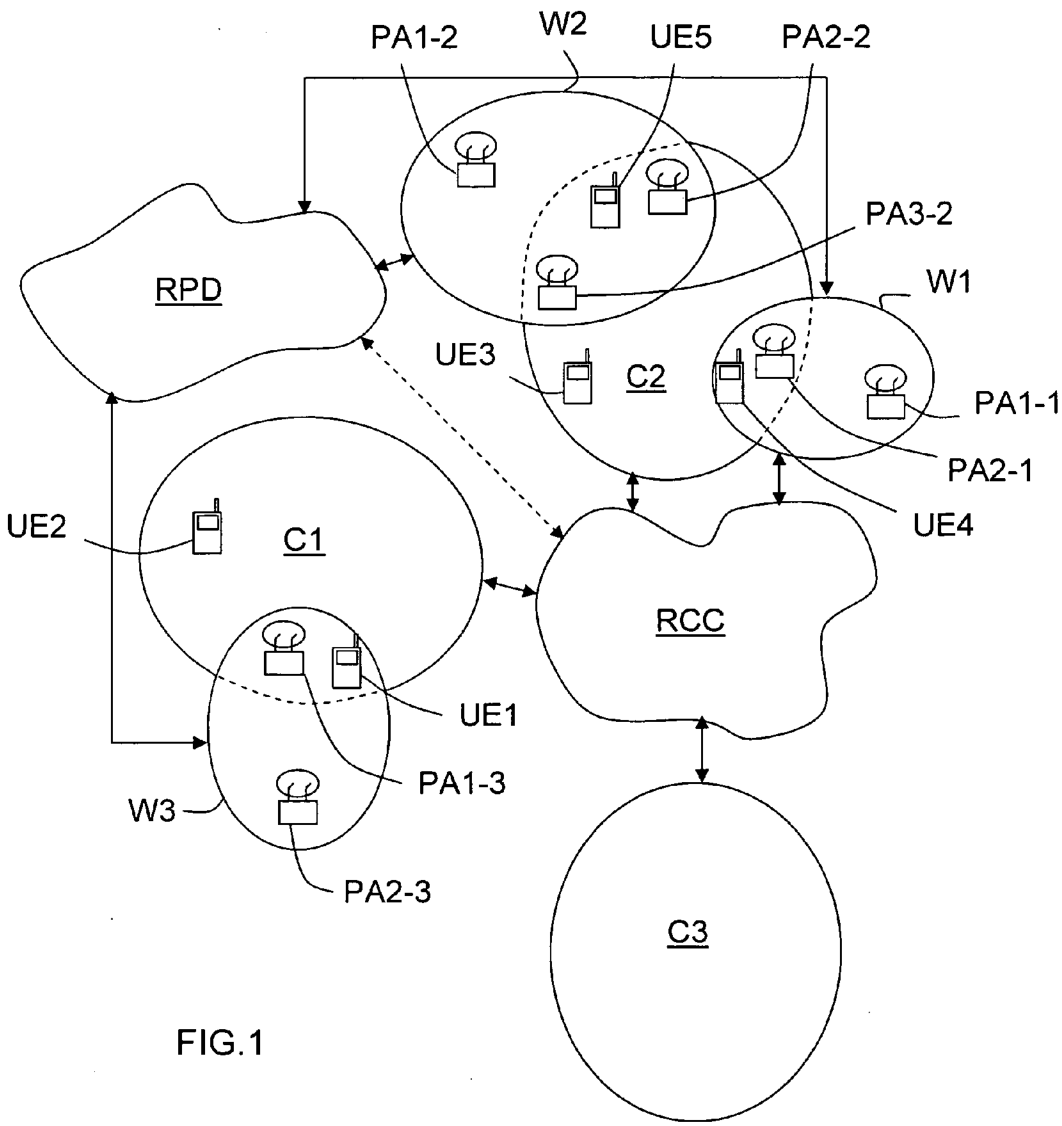

PA1-2
W2
UE5
PA2-2
PA3-2
W1
RPD
UE3
C2
PA1-1
PA2-1
UE4
UE2
C1
RCC
UE1
PA1-3
W3
PA2-3
C3

FIG.1

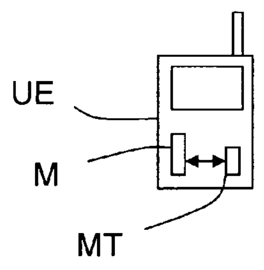

UE
M
MT

FIG.2

METHOD OF SELECTING A COMMUNICATION NETWORK FOR A MOBILE COMMUNICATION TERMINAL ON THE BASIS OF INFORMATION ON WIRELESS NETWORK ACCESS POINTS

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is based on French Patent Application No. 04 50 229 filed Oct. 02, 2004, the disclosure of which is hereby incorporated by reference thereto in its entirety, and the priority of which is hereby claimed under 35 U.S.C. §119.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] The invention concerns the field of communication networks and more precisely setting up communications between dual mode mobile communication terminals and remote other communication terminals.

[0004] 2. Description of the Prior Art

[0005] The expression "dual mode mobile communication terminal" means any type of mobile terminal capable of exchanging data with a cellular communication network and with a wireless local area network (for example a WLAN). Consequently, this could be, for example a mobile telephone, a personal digital assistant (PDA), or a portable computer equipped with a radio communication interface, provided that it is also equipped with a network interface controller card or a wireless adapter operating, in the case of a WLAN, under any version of the Ethernet 802.11 standard.

[0006] In certain types of data communication, transmission may require high bit rates unavailable to a GSM/GPRS or UMTS mobile terminal via its parent cellular network, although it could be effected via a wireless local area network at least partly in the coverage area of said cellular network. Moreover, a mobile terminal may find it impossible to establish communication via its parent cellular network at a given time, because the latter is saturated, although communication could be effected via a wireless local area network at least partly in the coverage area of said cellular network.

[0007] A dual mode mobile terminal being able to operate only in cellular mode or in wireless local area (for example WLAN) mode, its user must therefore determine prior to each communication the type of network to which his terminal must connect, given the type of communication envisaged. Furthermore, a dual mode mobile terminal cannot switch from a network of a given type, for example a cellular network, to a network of another type, for example a WLAN, while it is communicating.

[0008] An object of the invention is therefore to remedy this drawback and in particular to enable selection of the type of network that is most suited to the instantaneous requirements of a dual mode terminal.

SUMMARY OF THE INVENTION

[0009] To this end it proposes a method of selecting a communication network for a dual mode (cellular and wireless local area) mobile communication terminal, characterized in that it consists in the mobile terminal listening to a chosen signaling channel of its parent cellular communication network on which is transmitted, in a chosen mode, information data on access points to at least one wireless local area network, accessible in the cell in which the mobile terminal is situated, and in selecting one of the accessible access points as a function of at least one chosen selection criterion, so that the mobile terminal can communicate with a remote communication terminal via the selected access point, given the transmitted information data, if the latter is more suitable for the communication than the cellular network.

[0010] At least some of the information data is preferably transmitted periodically by the cellular network in broadcast mode.

[0011] For example, the information data for each access point accessible in a cell represents at least its identifier (and preferably its name).

[0012] In this case, selection may be effected from a list of at least one access point designated by its identifier. The information data representative of an access point identifier from the list may be associated with information data representative of at least one characteristic of the access point. For example, the characteristics are chosen in a group comprising at least the radio frequency type, the bit rate, the radio signal level, the proximity, the load level, the cost of communication, the relevant operator, and the authentication method to be used.

[0013] The list may be ordered as a function of at least one selection criterion applied to at least one chosen characteristic associated with the identifier of each access point from the list. An access point is then selected as a function of its position in the list. For example, the selection criterion may apply to the comparison of the current values of the chosen characteristic for the access points from the list.

[0014] The access point may instead be selected as a function of a comparison of the current values of at least one chosen characteristic for the access points from the list.

[0015] At least a portion of the selection may be effected by the mobile terminal on the basis of information data received from the cellular network. Accordingly, in the event of selection relating at least to the radio signal level, the mobile terminal, may, for example, effect signal transmission tests in respect of each access point from the list to determine the one that offers the highest radio signal level and select the latter.

[0016] However, selection may also be effected at least in part by the cellular network.

[0017] For example, certain characteristics may be chosen as a function of the type of communication that the mobile terminal wishes to establish. This is especially suitable for situations in which selection is effected by the mobile terminal.

[0018] At least a portion of the selection may be effected before establishing a communication, or during a communication via a cellular network or a wireless local area network, in such a manner as to switch to the wireless local area network or the cellular network. For example, in the event of switching from a cellular network to a wireless local area network, the communication established via the cellular network may be put on hold and, in the event of further switching from the wireless local area network to the cellular network, the communication initially established via the cellular network may be re-established and the communication via the wireless local area network is terminated.

[0019] Other features and advantages of the invention will become apparent on examining the following detailed description and the appended drawing.

BRIEF DESCRIPTION OF THE DRAWING

[0020] FIG. 1 is a diagram of one example of a communication installation including a cellular communication network (RCC), a public data network (RPD) and three wireless local area networks (W1 to W3).

[0021] FIG. 2 is a diagram of one embodiment of a mobile telephone (UE) adapted to implement the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0022] The appended drawings constitute part of the description of the invention as well as, if necessary, contributing to the definition of the invention.

[0023] An object of the invention is to allow the selection of a communication network for a mobile communication terminal.

[0024] The communication installation shown in FIG. 1 by way of example includes at least one cellular communication network RCC, one public data network RPD and at least one wireless local area network Wi.

[0025] In this example of a communication installation, only one cellular network RCC is shown, but there could be several of them. This cellular network RCC belongs to a mobile telephone operator and has a radio coverage defined by a set of cells Cj (here j=1 to 3, but j can take any non-zero value). Moreover, this cellular network RCC may be connected to a public telephone network, for example a public switched telephone network (PSTN), and/or to one or more public land mobile networks (PLMN).

[0026] It is considered hereinafter that the cellular network RCC is a UMTS network. However, any other type of cellular network may be envisaged, and in particular GSM, GSM/GPRS and EDGE networks. UMTS networks being well known to the person skilled in the art, they will not be described in detail. Suffice to say that, broadly speaking, a UMTS network may be summarily described as a core network coupled to a radio access network (UTRAN). The radio access network includes one or more base stations known as Node Bs connected to the core network by one or more nodes known as radio network controllers (RNCs). Each Node B is associated with at least one cell Cj covering a radio area that may contain one or more mobile communication terminals UE. Moreover, each Node B is responsible for processing the signal and in particular for managing requests to access the UMTS network from communication terminals UE in the cell Cj that it controls.

[0027] Moreover, it is considered hereinafter that the public data network PDR is the Internet.

[0028] Also, three wireless local area networks Wi are shown (i=1 to 3), but there could be more of them, or fewer of them, provided that the installation includes at least one of them. These wireless local area networks Wi may belong to a single business, for example the operator of the cellular network RCC, or to a group of businesses associated with the same entity, or different businesses. It is considered hereinafter that the wireless local area networks Wi are WLAN conforming to the standardized 802.11x technology. They could be of some other type, however, for example Bluetooth or UWB (Ultra Wide Band).

[0029] Each wireless local area network Wi conventionally has one or more access points PAk-i, also known as "WiFi hotspots", allowing dual mode mobile communication terminals UE to connect to it.

[0030] Here the expression "dual mode mobile communication terminal" means any type of mobile terminal capable of exchanging data with a cellular communication network RCC and a wireless local area network Wi. It will be considered hereinafter, by way of example, that the dual mode mobile terminals are mobile (or cellular) telephones equipped with an access network card (or network interface controller) or a wireless adapter conforming to the version of the Ethernet 802.11 standard used by the wireless local area networks Wi. However, they could also be personal digital assistants (PDAs) or portable computers equipped with a cellular radio communication interface with a cellular communication network RCC and an access network card or wireless adapter conforming to the Ethernet 802.11 standard allowing access to a local area network LAN and/or to the Internet. The expression "communication module (MC)" used hereinafter refers to the hardware and/or software elements of the mobile terminal UE responsible for communication with the cellular network RCC, to be more precise its Node Bs, and with the wireless local area networks Wi, to be more precise their access points PA.

[0031] In the example shown, each wireless local area network Wi is connected to the Internet RPD, but this is not obligatory. Although this is not shown, this connection is effected conventionally by way of an edge router providing the call server function.

[0032] Moreover, in the example shown, only the wireless local area network W1 is connected to the cellular network RCC, for example because it belongs to its operator, or because their respective operators have entered into agreements. However, this is not obligatory. The wireless local area network W1 is also connected to the cellular network RCC via the edge router, which in this case is responsible for establishing the connections between dual mode mobile terminals UE in the coverage area of the wireless local area network Wi, and are therefore able to connect by radio to the access points PA to which it is coupled, and the cellular network RCC and the data network RPD.

[0033] It is important to note that an edge router (or call server) may be installed in the (or a) controller of access points PA of the wireless local area network Wi. This is particularly advantageous because the controller of access points PA has access to the data network RPD, for example ADSL access to the public Internet, and/or to the cellular network RCC, via a cable, preferably an Ethernet cable, or by radio, for example by an 802.11 b radio link. With a configuration of this kind, a cellular network RCC operator may offer its customers very high bit rate extensions for end-to-end services such as digital television, video on demand, broadcasting and voice over Internet protocol (VoIP), for example.

[0034] In order for a mobile telephone UE to be able to benefit at all times from the communication network best suited to its requirements, for example in terms of network resources or communication cost, the invention proposes to transmit on a chosen signaling channel of its parent cellular network RCC, in a chosen mode, information data on access points PAk-i to a wireless local area network Wi accessible in the cell Cj in which it is situated.

[0035] Accordingly, when the mobile telephone UE listens to this signaling channel, it has access to information enabling it, if it so wishes, to communicate with a remote communication terminal via an access point PAk-i selected as a function of at least one chosen selection criterion.

[0036] As will emerge hereinafter, an access point PAk-i may be selected at the level of the cellular network RCC and/or at the level of the mobile telephone UE.

[0037] In the example shown, there is a partial radio overlap on the one hand between the cell C**1** and the wireless local area network W**3** and on the other hand between the cell C**2** and the wireless local area networks Wi and W**2**. To be more precise, the access point PA**1**-**3** of the network W**3** is in the coverage area of the cell C**1**, the access point PA**2**-**1** of the network W**1** is in the coverage area of the cell C**2**, and the access points PA**2**-**2** and PA**3**-**2** of the network W**2** are in the coverage area of the cell C**2**.

[0038] Consequently, the access point PA**1**-**3** is accessible to the mobile telephone UE**1** that is both in its coverage area and in that of the cell C**1**, the access point PA**2**-**1** is accessible to the mobile telephone UE**4** that is both in its coverage area and in that of the cell C**2** and the access points PA**2**-**2** and PA**3**-**2** are accessible to the mobile telephone UE**5** that is both in their coverage areas and in that of the cell C**2**.

[0039] On the other hand, in this example, the mobile telephones UE**2** and UE**3** that are in the coverage areas of the cells C**1** and C**2**, respectively, but outside the coverage areas of the networks W**3** and W**2** are temporarily unable to benefit from the network selection facility offered by the invention. The same would apply to any mobile telephone UE anywhere in the coverage area of the cell C**3**, because the latter does not overlap anywhere the coverage area of a wireless local area network.

[0040] There are at least two selection modes.

[0041] A first mode consists in transmitting to the mobile telephones UE situated in a cell Cj only information data representative of the identifier (and preferably the name) of each access point PAk-i accessible in said cell Cj. In this case, each mobile telephone UE has an internal memory for storing a table of the correspondences between identifiers of access points PAk-i and one or more associated characteristics, for example their radio frequency type (for example **11***a*, **11***b*, **11***g*, . . .), their capacity in terms of resource, their communication cost, the operator to which they belong, and the authentication method to be used in the wireless local area network Wi.

[0042] Two situations may then be envisaged, according to whether the information data takes the form of an ordered list or a non-ordered list.

[0043] In the case of an ordered list, the various access points PAk-i accessible in a cell Cj (which may belong to different wireless local area networks Wi) are classified as a function of at least one chosen selection criterion. The mobile telephone UE that wishes to establish communication via an access point PA from the list extracts from its memory the characteristics of the access point PA at the top of the list and then attempts to establish a radio connection with it (it is assumed here that the mobile telephone is obliged to respect the order of the list). If it is not in the overlap area of its cell and the access points, it is unable to establish this connection, and it therefore attempts to establish a radio connection with the access point PA that is second in the list. If the connection is set up, if its radio level is sufficient, and if the access point has sufficient available resources, the communication is established. Otherwise, the mobile telephone UE attempts to establish a radio connection with the access point PA that is third in the list, and so on. If no connection can be established with an access point from the list, then communication is only possible via the parent cellular network RCC of the mobile telephone UE, provided that its capacities allow this.

[0044] Of course, in some situations, a list may comprise only one access point identifier.

[0045] The ordered list is transmitted to the mobile telephones UE by their parent cellular network RCC. It may be determined either within the core network or within the radio access network, for example at the level of the RNCs (although it is equally possible at the level of the Nodes B).

[0046] This ordering is effected as a function of at least one chosen selection criterion. The main selection criteria include the bit rate, the radio signal level, the proximity, the charge level, the cost of communication, and the relevant operator. For example, the operator of the cellular network RCC may offer only the access points PAk-i of a wireless local area network Wi that belongs to it or with whose operator it has an agreement for use, and classify the accessible access points as a function of their load level. Certain selection criteria depending on the current values of characteristics that depend on measurements effected by the mobile telephones or by the radio access network, it is therefore advantageous if at least a portion of the selection process is effected at the level of said radio access network. The operator of the cellular network RCC can therefore exploit, optimize and customize its service offers, in particular by controlling the evolution of its installed base of access points PA (or hotspots) and the updating of the various lists of access points.

[0047] In the case of a non-ordered list, the mobile telephone UE that wishes to establish communication via an access point PA from the list must effect its own selection within that list. To this end, it must compare with each other the current values of at least one of the characteristics of the access points PA from the list, which are stored in the correspondence table, as a function of a chosen selection criterion, for example as a function of the required communication type. The main selection criteria include the bit rate, the radio signal level, the proximity, the load level, the cost of the communication, and the relevant operator. For example, the mobile telephone UE may require simultaneously the highest possible bit rate and the best radio signal level.

[0048] The current values of the characteristics of the access points PA are broadcast periodically by the Nodes B of the cellular network RCC on the signaling channel, for example, so that they can be regularly refreshed.

[0049] Once the mobile telephone UE has ordered the access points PA from the list as a function of its selection criterion or criteria, it extracts from its memory the characteristics of the access point PA at the top of the list and then attempts to establish a radio connection with it (it is assumed here that the mobile telephone is obliged to respect the order of the list). If it is not in the area of overlap of its cell Cj and the access point PA, it is unable to establish this connection, and it therefore attempts to establish a radio connection with the access point PA that is second in the list that it has ordered. If the connection is established, then communication may be established (provided that sufficient resources are available). If the connection cannot be established, the mobile telephone UE attempts to establish a radio connection with the access point PA that is third in the list that it has ordered, and so on. If no connection can be established with an access point PA from the list, then communication can be effected only via the parent cellular network of the mobile telephone UE, again provided that its capacities allow this.

[0050] Alternatively, once it has ordered the access points PA from the list, the mobile telephone UE may effect signal transmission tests with respect to each of them in order to determine those that it is actually able to contact, and possibly the radio signal level that they are offering. The classification can then be modified as a function of these tests, for example so as to give preference to, and thus to select, the access point PA that offers the highest radio signal level for substantially equal chosen characteristic values.

[0051] A second mode consists in transmitting to the mobile telephones UE in a cell Cj information data representative of the identifier (and preferably the name) of each access point PAk-i accessible in said cell Cj and of at least one of the associated characteristics, for example the radio frequency type, the bit rate, the load level (resources available), the proximity, the cost, the relevant operator, and the authentication method to be employed in the wireless local area network Wi.

[0052] The access points PA from the list transmitted may be classified as a function of a criterion specific to the operator or to each cell Cj. Consequently, the situation is again that of the first mode, described hereinabove, in which the list could be ordered or not. What distinguishes these two modes is simply the fact that in the second mode the information data representative of the characteristic(s) is transmitted at the same time as the identifiers of the access points PA and not stored in a memory.

[0053] Of course, a mixed mode of operation may be envisaged in which the mobile telephones UE store in a memory certain "static" characteristics of the access points PA and receive "dynamic" characteristics of the access points PA on the signaling channel of their parent cellular network RCC. Here the term "static characteristic" means a characteristic that does not vary quickly in time, for example the bit rate, the proximity, the cost, the authentication method or the relevant operator, and the term "dynamic characteristic" means a characteristic that may vary quickly in time, for example the radio signal level or the load level.

[0054] It is important to note that it is not an objective of the invention necessarily to select an access point PAk-i to a wireless local area network Wi. The main objective of the invention is in fact to determine the communication network that is the best suited to the immediate requirements of a mobile telephone UE, and if this is a wireless local area network Wi, the access point PAk-i that is deemed to be the best suited to said immediate requirements. Thus a mobile telephone UE may be configured by its user or by its parent cellular network RCC so as always to give preference to the cost of the communication and/or the bit rate and/or the radio signal level. Consequently, selection may lead to establishing communication with the parent cellular network RCC and not with an access point PAk-i.

[0055] Moreover, it is equally important to note that the invention enables an access point PA to be selected either before establishing a communication or during a communication via a cellular network RCC or via a wireless local area network Wi.

[0056] In fact, in certain situations, for example during communication with a remote terminal, a user may need to access the Internet to obtain information, although the network through which he has established the first communication does not allow this, or to transmit data, for example video data, although the network through which he established the first communication does not allow this or momentarily does not have sufficient resources available, or to switch to the network that offers the lowest communication cost.

[0057] In such situations, according to the invention, a mobile telephone UE is adapted to determine, in parallel with the established communication, the communication network that is best suited to its immediate requirements and to which it can connect.

[0058] The switching may be "definitive", for example if the user no longer requires to re-establish communication with the original remote terminal or requires to transmit data necessitating a high bit rate to the original remote terminal whilst continuing its conversation. However, it may equally be temporary, for example if the user requires to obtain information from another remote terminal or from a data server, to continue its original conversation with the user of the original remote terminal.

[0059] If a mobile telephone UE wishes to switch temporarily from its parent cellular network RCC to a wireless local area network Wi, it preferably addresses a hold request to a dedicated server of said cellular network RCC and then switches to the wireless local area network Wi via its selected access point PA, where applicable after requesting authorization from its user. Once it has obtained information via the wireless local area network Wi, it can then switch back to its parent cellular network RCC in order to resume the original conversation.

[0060] On the other hand, in the case of definitive switching, it is not necessary to alert the parent cellular network RCC since the switching automatically terminates the original communication.

[0061] It is of course equally possible to switch from a wireless local area network Wi to a cellular network RCC.

[0062] Selection may be refined with the aid of complementary messages provided by the cellular network RCC. In fact, in the environments in which the cellular network RCC can determine the position of the mobile terminal UE to within a few tens of meters and a wireless local area network Wi comprising a wide network of access points PA ("wide hotspot") can find itself at least partially in a coverage area of the cellular network RCC, said cellular network RCC can transmit one or more specific signaling messages to the mobile terminal (UE) to inform it of the access point or points that are the closest, for example, or that belong to the operator.

[0063] In other words, the information contained in the complementary messages may be used either to modify the order of a list previously transmitted to the mobile terminal UE or to facilitate selection at the level of the mobile terminal UE, for example by avoiding it having to carry out tests on the radio signal levels offered by the access points PA around it.

[0064] It may additionally be envisaged that these messages contain information dedicated to the user of the mobile terminal UE, for example a password (or "login"), keys, etc.

[0065] As shown in **FIG. 2**, in order to implement the invention, each mobile terminal UE must be equipped with a processing module MT coupled to its communication module MC. The disposition of the processing module MT depends on the function that it provides and more precisely on whether it is itself responsible or not for selecting the communication network best suited to its immediate requirements, even if only partially. However, regardless of the envisaged mode of operation, the processing module MT is responsible for sending instructions to the communication module MC in order for it to establish communication with the selected network (selected access point PA or Node B).

[0066] The processing module MT may either be preconfigured or configurable by the cellular network RCC and/or by its user to enable the choice of at least one of the selection criteria and/or operation with or without authorization by its user, in particular with regard to switching networks if the selection criterion or criteria is or are satisfied.

[0067] Moreover, to enable implementation of the invention, the cellular network RCC must include one or more network equipments, for example RNCs or Nodes B, provided with a management module MG whose disposition depends on the function provided, to be more precise on whether it is responsible for determining the information data representative of the access points PAk-i accessible in each of its cells Cj and/or for some or all of the selection process.

[0068] The processing modules MT and the management module(s) MG of the invention may be implemented in the form of electronic circuits, software (or data processing) modules, or a combination of circuits and software.

[0069] The invention is not limited to the embodiments of a mobile communication terminal and a communication network selection method described hereinabove by way of example only, and encompasses all variants that the person skilled in the art might envisage that fall within the scope of the following claims.

1. A method of selecting a communication network for a dual mode mobile communication terminal, characterized in that it comprises said mobile terminal listening to a chosen signaling channel of its parent cellular communication network on which is transmitted, in a chosen mode, information data on access points to at least one wireless local area network, accessible in the cell in which said mobile terminal is situated, and selecting one of said accessible access points as a function of at least one chosen selection criterion, so that said mobile terminal can communicate with a remote communication terminal via said selected access point, given said transmitted information data, if the latter is more suitable for said communication than said cellular network.

2. The method claimed in claim 1, characterized in that at least some of the information data is transmitted periodically by said cellular network in broadcast mode.

3. The method claimed in claim 1, characterized in that said information data for each access point accessible in a cell represents at least one access point identifier.

4. The method claimed in claim 3, characterized in that selection is effected from a list of at least one access point designated by its identifier.

5. The method claimed in claim 4, characterized in that said information data representative of an access point identifier from said list is associated with information data representative of at least one characteristic of said access point.

6. The method claimed in claim 5, characterized in that said characteristics are chosen from a group consisting of the radio frequency type, the bit rate, the radio signal level, the proximity, the load level, the cost of communication, the parent operator, and the authentication method to be used.

7. The method claimed in claim 5, characterized in that said list is ordered as a function of at least one selection criterion applied to at least one chosen characteristic associated with the identifier of each access point from the list, said access point then being selected as a function of its position in said list.

8. The method claimed in claim 7, characterized in that said selection criterion applies to the comparison of the current values of the chosen characteristic for the access points from the list.

9. The method claimed in claim 5, characterized in that said access point is selected as a function of a comparison of the current values of at least one chosen characteristic for said access points from said list.

10. The method claimed in claim 1, characterized in that at least a portion of said selection is effected by said mobile terminal on the basis of information data received from said cellular network.

11. The method claimed in claim 6 characterized in that at least a portion of said selection is effected by said mobile terminal on the basis of information data received from said cellular network, and further characterized in that in the event of selection relating at least to said radio signal level, said mobile terminal effects signal transmission tests in respect of each access point from said list to determine the one that offers the highest radio signal level.

12. The method claimed in claim 1, characterized in that said selection is effected by said cellular network.

13. The method claimed in claim 7, characterized in that said characteristic is chosen as a function of the type of communication that said mobile terminal wishes to establish.

14. The method claimed in claim 1, characterized in that at least a portion of said selection is effected before establishing a communication.

15. The method claimed in claim 1, characterized in that at least a portion of said selection is effected during a communication via a cellular network, respectively a wireless local area network, in such a manner as to switch to a wireless local area network, respectively a cellular network.

16. The method claimed in claim 15, characterized in that in the event of switching from a cellular network to a wireless local area network, the communication established via said cellular network is put on hold.

17. The method claimed in claim 16, characterized in that in the event of further switching from said wireless local area network to said cellular network, the communication initially established via said cellular network is re-established and the communication via said wireless local area network is terminated.

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EXHIBIT I

Wilhelm, A., *et al.*, *Photo Annotation on a Camera Phone*, CHI 2004 (April 24-29, 2004)

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Photo Annotation on a Camera Phone

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Abstract
In this paper we describe a system that allows users to annotate digital photos at the time of capture. The system uses camera phones with a lightweight client application and a server to store the images and metadata and assists the user in annotation on the camera phone by providing guesses about the content of the photos. By conducting user interface testing, surveys, and focus groups we were able to evaluate the usability of this system and motivations that will inform our development of future mobile media annotation applications. In this paper we present usability issues encountered in using a camera phone as an image annotation device immediately after image capture and users' responses to use of such a system.

Categories & Subject Descriptors: H.5.1 [Information interfaces and presentation (e.g., HCI)]: Multimedia; H.4.3 [Information systems applications]: Communications Applications; H.3.m [Information storage and retrieval]: Information Search and Retrieval

General Terms: Design, Human Factors

Keywords: Mobile Camera Phones, Automated Content Metadata, User Experience, User Motivation, Digital Image Management, Wireless Multimedia Applications

INTRODUCTION

With the number and adoption of consumer digital media capture devices increasing, more personal digital media is being produced, especially digital photos. As consumers produce more and more digital images, finding a specific image becomes more difficult. Often, images are effectively lost within thousands that are only demarcated by sequential file names. One solution to this image management problem is to enable users to create annotations of image content (i.e., "metadata" about media), therefore allowing consumers to find their photos by searching on information, instead of simply filenames.

Previous research in personal image management (surveyed in [5]) has facilitated annotation by using free-text, hierarchical and faceted metadata structures both textual [7] and iconic [1], drop down menus, drag and drop interfaces, and audio annotation with automated text transcription. Researchers have also sought to leverage the underlying temporal structure of photographed events to support browsing and retrieval. Consumer products are now beginning to appear which utilize metadata for image management, such as Adobe Photoshop Album 2.0, ACDSee, Apple iPhoto, and Adobe Photoshop CS. However, the vast majority of prior work on personal image management has assumed that image annotation occurs well after image capture *in a desktop context*. Time lag and context change then reduces the likelihood that users will perform the task, as well as their accurate recall of the content to be assigned to the photograph.

Mobile devices, however, are designed to take into account the users' physical environment and usage situations and can ultimately enable us to infer image content from mobile use context. Furthermore, by utilizing networked devices collaborative, co-operative applications are possible. If we can take advantage of the affordances of mobile imaging, we can overcome the loss of metadata in current digital photography due to time lapse and context change between image capture and image annotation, as well as use mobile contextual information to help to automate the image annotation process.

Networked mobile camera phones offer a good platform to apply these principles by providing us with a networked image capture device. While others have written about their effect on the content of photos (e.g., [3, 4]), we were interested in how they might be used to facilitate the annotation process. The purpose of our project was to create an infrastructure for networked cameras to allow users to assign metadata at the point of capture and to utilize a collaborative network, along with automatically captured environmental cues, to aide in automating the annotation process, thus reducing the effort required of the user.

METHODOLOGY

We built a framework ("MMM" for "Mobile Media Metadata") that enables image annotation at the point of capture using Nokia 3650 camera phones over the AT&T Wireless GSM/GPRS service [6]. We then gave 40 first year graduate students and 15 researchers camera phones to test our system for four months. We asked the students to brainstorm applications to build on top of this framework. Our evaluation consisted of three investigations. First, we performed user interface testing with five participants, giving them three scenarios each for phone use, videotaped their actions, and interviewed them afterwards about the use

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scenarios and their current habits of image capture, storage, sharing, and retrieval. Second, all 55 participants were administered a weekly survey for seven weeks, inquiring about their use of the phones and the implemented image annotation system. Third, two focus groups discussed their image capture, storage, sharing, and retrieval habits. One group (eight subjects) consisted of users of this system and the other (seven subjects) was a general group of students. The former group additionally discussed their use of image annotation systems and this one in particular.

SYSTEM OVERVIEW

Utilizing the camera phone's hardware, network access, and software programmability, we built a client-server architecture. The client side software consisted of two components. The first component implemented the picture taking functionality and automatically gathered available contextual metadata before users uploaded the captured images to a remote server over the GPRS connection. The second component was the phone's built-in XHTML browser. It was used for all subsequent user interaction between the client and the remote server, which communicated with a collaborative repository of annotated images in order to help automate and facilitate the annotation process.

The first component, named Image-Gallery, was developed in co-operation with Futurice[1] for the Symbian 6.1 operating system on the phone. Image-Gallery automatically captured location metadata by storing the GSM network cell ID. Then, utilizing the username associated with each phone, it automatically captured the user's identification, as well as time and date at the moment of capture. This information was sent with the photograph, via the GSM/GPRS network to our server, where it was matched against a repository of annotated images. After Image-Gallery launched the phone's web browser, annotation "guesses" generated by a server-side program were returned to the user, through the XHTML browser on the phone to await confirmation or correction.

Keeping the human-in-the-loop, the XHTML browser presented the user with a series of screens suggesting metadata about the photograph. For each screen the server-side program would try to "guess" each answer by matching any previously submitted information against the collaborative repository of annotated images. The "guesses" were presented as drop down lists of prepopulated answers. The choice at the top of each list was deemed the most probable based on server-side matching algorithms. The user could then confirm the suggested annotation with one simple click, or correct the annotation by selecting a

[1]http://www.futurice.fi

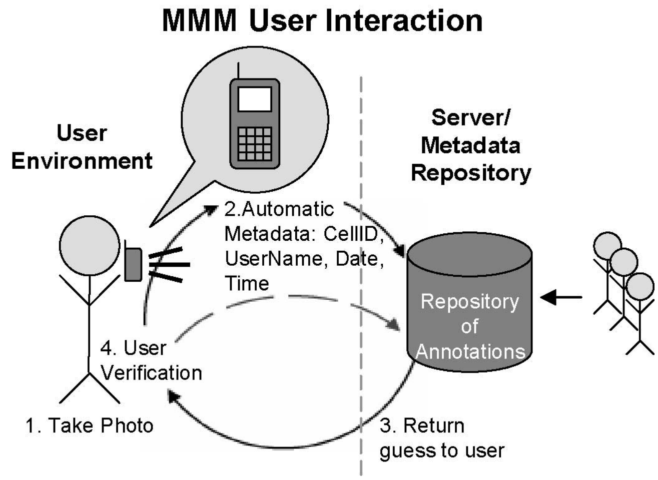

Figure 1. Mobile Media Metadata (MMM) User Interaction

different option, including inputting new annotation text altogether (see Figure 1).

The remote repository of metadata possessed a faceted hierarchical structure [1, 7]. By utilizing orthogonal hierarchies of descriptors that can be combined to make more complete descriptions, faceted classification structures enable rich description in ways that overcome the limitations of strictly hierarchical metadata structures and keyword based approaches used in most prior image annotation systems (e.g. FotoFile). One problem we faced, as we will discuss later, was the display and navigation of the faceted metadata structure on the limited screen size of the mobile phone.

USER INTERACTION CHALLENGES

By formally testing our infrastructure and by ongoing interaction with the 40 student subjects and 15 researchers we identified a set of challenges.

Network Unpredictability

The primary user difficulty was the unpredictability and limited availability of the GSM/GPRS network. The network often failed to transmit the image and/or metadata (both automated and user-assisted) to the server and was often very slow. Interactions that we had predicted would take 30 to 45 seconds per session often took 3 to 5 minutes. Users became very frustrated as the delay distracted their attention from their ongoing tasks and provided little feedback in the process. Users commented during testing:

"I have to keep staring at the screen to check for change even though I would rather pay attention to other things around me."

XHTML Browser Interaction

In effort to keep our prototype thin and simple [2], considering the large learning curve of the Symbian OS, we utilized the camera phone's XHTML browser as our principle user interface. The XHTML browser interaction, however, presented the users with interesting usability problems. Once the browser is launched, the form buttons contained within the XHTML page do not correlate with the hardware buttons (called "softkeys") located on the phone client. Instead, these two softkeys, located just below the screen, contain hard-coded browser functions. To customize these softkeys, client-side programming is necessary. To avoid excessive client-side programming, all of our navigational options were contained within a form, inside the XHTML pages. Therefore, unlike full-client programs, like Futurice's Image-Gallery, which interact with the user by both softkeys as well as a central scroll key, all interaction within the browser (including all navigational and annotation options) necessary for our application were navigated by one central scroll key. Subsequently, the interaction followed one of a desktop web application more with the center key substituted for the mouse. This presented problems for our users:

"It was confusing to alternate from using the two big buttons under the screen (options) [i.e., softkeys] because once you are in MMM you should never use them or else you'll get kicked off site."

Metadata Hierarchy Display

Finally, the small screen of the mobile phone presented challenges for traversing a large facetted hierarchical metadata display. Neither the breadth nor depth of the classification structure could be displayed easily, as the former encountered screen real-estate limitations and the latter sequential page load latencies. We therefore decided to carefully select key nodes of the hierarchy and present the user with a limited user-focused hierarchy. This hierarchy contained approximately three depth levels across four facets (Person, Location, Object, and Activity). Each descriptor exposed in the interface was carefully selected to correlate with its node in the larger backend hierarchy. Therefore users could select one salient descriptor on the interface, but actually annotate many more. For example, the user could specify a location as "South Hall", but the image would be annotated as: *US> California> Alameda County> Berkeley> UC Berkeley> South Hall.* Any implied metadata stored in the backend hierarchy would automatically be added to the user's annotation.

This user-focused hierarchy was traversed as a series of screens containing drop-down lists. The users reported that they understood the interaction, however, because of the limited choices they were often unsure where to categorize their photograph.

Furthermore, because we allowed users to add new items to the hierarchy, the drop-down selections became very long. Users seemed to tolerate scrolling through 12-15 items, but once the list exceeded that length they complained that no "jumping" or "short-cut" mechanisms were available to help quickly traverse the long list. One user requested:

"I would like menus that wrapped or some ability to jump down on a menu (alphabetically?)"

Lessons Learned

Though we did in many ways reduce the cost of annotation to users by allowing them to remain in their environment while annotating, as well as reducing keystroke entry by allowing drop-down selection from a repository of inferred metadata, the network and user interface issues we encountered severely limited usability. Most participants only used the annotation system to complete required classroom assignments and even then, only annotated one to two facets per photo.

However, we feel that we did make some progress in reducing annotation cost, as users ultimately noted:

"For the most part, it's fairly easy to select items and click 'Next.' The annotation process isn't that hard."

Subsequently, we feel that by taking into account these learned future versions will only improve:

- Design for network unpredictability and errors. One possible solution is to limit continual network interaction by creating a full-client application. (The network should also improve over time.)
- Web applications run through the XHTML browser on mobile phones do not simulate full-client application navigation well. Use a prototyping methodology that simulates the specific mobile interaction better to test user experience.
- Presentation of a limited version of the faceted hierarchical structure must not be so limited as to overly constrain or confuse the user. Use of a different display metaphor, may be a better approach and lists of 12-15 items should not be exceeded.

USE PATTERNS AND MOTIVATIONS

To design systems to support image capture and re-use in general, to improve this infrastructure, and to create useful applications using it, we need to understand how camera phones affect users' photographic habits, as well as their motivations for annotation. We addressed these questions in our focus groups, interviews, and surveys.

Digital Images: The Funnel Effect

When we asked users about digital images in general, participants in the focus groups described a funnel effect in digital picture taking, sharing, and printing. They took many pictures, kept some of them, shared a selected group of those, and printed an even smaller subset. Digital imaging was for many a key element in the large volume of "throwaway" pictures, since, unlike "regular" photos, the marginal cost of each photo was zero. They reported that they would like to annotate only a subset of those taken, mostly only those good enough to share.

Additionally, student subjects were generally unconcerned about metadata for future use: for example, identifying people in photos—they said that they already knew these people. We suspect that this short-term perspective may be due in part to the relative youth and childless status of most of our subjects. They did not seem concerned, for example, with sharing images with future generations.

Camera Phone Photos: The Power of Now

Because users were able to carry their camera phones much of the time, they reported taking more humorous or ad-hoc images than they would with their "normal" cameras, which they often only carried to specific events or for specific purposes. One user reported taking an image of a rather sad (droopy) palm tree outside of the school building because he wanted to capture its melancholy that day; another took pictures of students filling a water fountain with bubble bath. In such cases, the "power of now" was apparent. They were able to capture unique or funny moments in their daily lives and communicate them to others via images. This is consistent with other researchers' findings that people take different kinds of photos with camera phones [3, 4].

Like Ito and Okabe's [3] users, our users reported a short-term orientation toward the photos taken with the camera phones, with more interest in sharing than in searching or retrieving their photos. One group wrote a script that would automatically publish selected photos to a personal web page, with an attached caption (moblogging). Other users shared their photos by using the imaging device itself: showing people images on the camera phone. Still others used email, Bluetooth, and infrared capabilities to share images with others. Near the end of the semester, we supplied the students with a web-based browsing tool to view images and their annotations via the desktop. Users reported that this made sharing easier and added great value to the application. Furthermore, users preferred searching and browsing based on input metadata via the desktop rather than the phones and suggested further desktop-based annotation capabilities.

Selective Metadata Annotation

To our surprise, our subjects were generally not interested in fully annotating photos by keywords. They simply wanted to attach one or two salient identifiers. Annotations often took the form of captions rather than standard metadata: the reason why they took the picture, a witty remark, or something personal shared with the observer. This was true of photos taken with the camera phones and other cameras, but the immediacy of camera phone photos seemed particularly well-suited to this kind of annotation.

Lessons Learned

From the above, we conclude:

- Mobile camera phone use highlights the "power of now" in always being available for ad-hoc picture taking.
- For our camera phone users, sharing and browsing are more important than searching or retrieval.
- A desktop component adds great value to the mobile application by easing search, sharing, and quick browsing.
- User preferences for annotation are generally limited to a few favored images, and some key information for each photograph.

CONCLUSIONS

From this group of users, we conclude that mobile camera phones enable a new approach to annotating media that can reduce user effort by (1) facilitating metadata capture at the time of image capture, (2) adding some metadata automatically, and (3) leveraging networked collaborative metadata resources. As networks improve, our problems with network latency and unreliability will be reduced. However, user interface and system designs for mobile image annotation need to overcome the challenges of text entry and hierarchical display and navigation on mobile devices. We also need to develop hybrid solutions that integrate desktop and mobile application components into more complete and appropriate solutions than either can offer alone.

More generally, we need to understand and design for the emergent behavior resulting from changes in technology. Digital imaging, in general, and camera phones in particular, make new kinds of imaging behavior possible. The ready availability (and current low image quality) of camera phones encourages the capture of images for short-term uses affecting the kind of annotation currently desired. As image quality improves, we expect that users will add to these ad hoc uses more traditional (long-term) imaging behavior with more need for metadata.

REFERENCES

1. Davis, M. Media Streams: An Iconic Visual Language for Video Representation. in Baecker, R.M., Grudin, J., Buxton, W.A.S. and Greenberg, S. eds. Readings in Human-Computer Interaction: Toward the Year 2000, Morgan Kaufmann, San Francisco (1995) 854-866.
2. Edwards, K.W., Bellotti, V., Dey, A.K., Newman, and M.W., Stuck in the Middle: The Challenges of User-Centered Design and Evaluation for Infrastructure. Proc. CHI2003. AMC Press, 297-304.
3. Ito, M. and Okabe, D., "Camera phones changing the definition of picture-worthy," Japan Media Review (2003). http://www.ojr.org/japan/wireless/1062208524.php
4. Koskinen, I., Kurvinen, E. and Lehtonen, T.-K. Professional Mobile Image. IT Press, Helsinki (2002).
5. Rodden, K. and Wood, K.R., How Do People Manage Their Digital Photographs? Proc. CHI2003, ACM Press (2003), 409-416.
6. Sarvas, R., Herrarte, E., Wilhelm, A., and Davis, M., Metadata Creation System for Mobile Images. Proc. MobiSys2004, ACM Press (Forthcoming, 2004).
7. Yee, P., Swearingen, K., Li, K. and Hearst, M., Faceted Metadata for Image Search and Browsing. Proc. CHI2003, ACM Press (2003), 401-408.