Samsung Electronics Co. LTD., Apple Inc., and Samsung Electronics America, Inc. (Petitioner)
v.
Smart Mobile Technologies, LLC (Patent Owner)

Petitioner Demonstratives

Case No. IPR2022-01004
U.S. Patent No. 9,614,943
Before Hon. Hyun J. Jung, Nathan A. Engels, and Paul J. Korniczky

Exhibit 1080
Samsung v. Smart Mobile
IPR2022-01004

FISH.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

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Background / Overview

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DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Overview of the ’943 Patent

(12) **United States Patent**
Rao et al.

(10) **Patent No.: US 9,614,943 B1**
(45) **Date of Patent: Apr. 4, 2017**

(54) **SYSTEM TO INTERFACE INTERNET PROTOCOL (IP) BASED WIRELESS DEVICES WITH SUBTASKS AND CHANNELS**

(71) Applicants: **Sunil K. Rao**, Palo Alto, CA (US); **Sanjay K. Rao**, Palo Alto, CA (US); **Rekha K. Rao**, Palo Alto, CA (US)

(72) Inventors: **Sunil K. Rao**, Palo Alto, CA (US); **Sanjay K. Rao**, Palo Alto, CA (US); **Raman K. Rao**, Palo Alto, CA (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.

(21) Appl. No.: **13/621,294**

(22) Filed: **Sep. 17, 2012**

Related U.S. Application Data

(63) Continuation of application No. 12/912,607, filed on Oct. 26, 2010, now Pat. No. 8,824,434, which is a continuation of application No. 10/940,428, filed on Sep. 13, 2004, now Pat. No. 7,848,300, which is a continuation of application No. 09/617,608, filed on Jul. 17, 2000, now Pat. No. 7,286,502, which is a continuation-in-part of application No. 09/281,739, filed on Jun. 4, 1999, now Pat. No. 6,169,789, which is a continuation-in-part of application No. 08/764,903, filed on Dec. 16, 1996, now abandoned.

(51) **Int. Cl.**
H04W 4/00 (2009.01)
H04M 1/02 (2006.01)
H04B 7/0404 (2017.01)

(52) **U.S. Cl.**
CPC ***H04M 1/026*** (2013.01); *H04B 7/0404* (2013.01)

(58) **Field of Classification Search**
None
See application file for complete search history.

(56) **References Cited**

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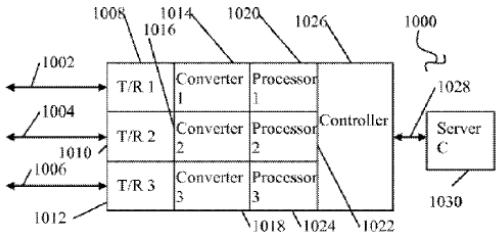
Primary Examiner — Phirin Sam

(57) **ABSTRACT**

A method and apparatus in which multiple Internet Protocol (IP) based wireless data transmissions are simultaneously provided between a wireless device and a server, including providing multiple antennas, multiple T/R units, multiple processors and multiple I/O ports on the wireless device. The method includes receiving multiple IP data packets on the I/O ports at substantially the same time, and sending multiple data packets from the wireless device to the server, whereby the transmission rate between the wireless device and the server is increased.

20 Claims, 15 Drawing Sheets



EX-1001 (’943 patent), Cover.

- U.S. Patent No. 9,614,943 (the “**’943 Patent**” or “**EX-1001**”) has an earliest possible priority claim to U.S. patent application 08/764,903 filed Dec. 16, 1996.
- Challenged Claims
  - Independent claims 1, 5, 8, and 12
  - Dependent claims 2-4, 6, 7, 9, and 13-20

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Overview of the ’943 Patent

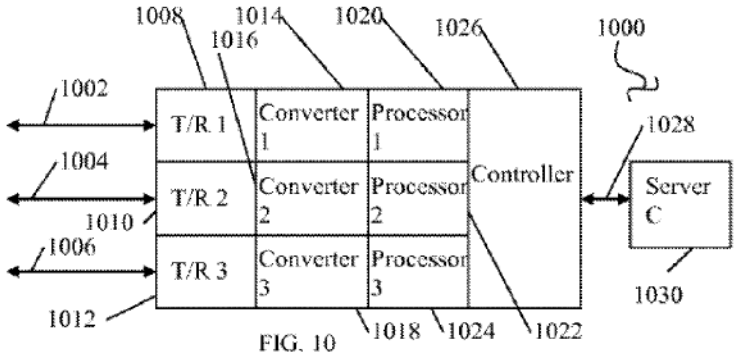

FIG. 10

Petition, 3-4; EX-1001 (’943 patent), Figure 10

FIG. **10** is an embodiment of the present invention showing a data system **1000** with three data streams DS**1** **1002**, DS**2** **1004** and DS**3** **1006**. In FIG. **10**, three wireless T/R units **1008**, **1010**, and **1012** are shown. The three data streams **1002**, **1004**, and **1006** are processed by the three T/R units **1008**, **1010** and **1012**, converted by converters **1014**, **1016**, and **1018**, and presented to processors **1020**, **1022**, and **1024** under the control of controller **1026**. The data streams may be interfaced separately with server C **1030** or combined into data stream **1028** and interfaced to Server C **1030**. The processor or CPU speed is seldom a limiting factor, so the improvement in speed by providing multiple data paths is fully realized by the present invention. Each subtask being processed can be assigned to a separate channel. The rate at which the data is acquired, processed and converted is dependent on the type of electronic components. Therefore, component limitations can be overcome in a straightforward and convenient way by parallel processing. In such cases, the processor speed is seldom a limitation, and conversion speed of RF to electrical and electrical to RF, becomes the primary bottleneck in data transfers for wireless systems. By providing, for example, a single chip, multichip, or hybrid converter for parallel conversions in accordance with the present invention under the supervision of the Server C **910**, this bottleneck is avoided. Each channel may be sampled and clocked individually as necessary to optimally process each data stream and combine the individual data packets.

Petition, 3-4; EX-1001 (’943 patent), 7:26-52

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Independent Claim 1

’943 Patent

1[pre]	1. A wireless communication device comprising:
1[a]	a plurality of antennas; and
1[b]	a communication component coupled to the plurality of antennas, the communication component including a processor, a transmitter, and a receiver,
1[c]	wherein the communication component is configured to communicate via a first frequency band using a wireless communication protocol; and
1[d]	wherein one or more subtasks are assigned to one or more channels, and the one or more channels are sampled and clocked individually; and
1[e]	wherein the processor comprises multiple ones of the one or more channels and is further configured to process a first data stream and a second data stream in parallel.

EX-1001 (’943 patent), Claim 1

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Dependent Claims 3-4

’943 Patent

3. The device of claim **1**, further in communication with a network switch box configured with a plurality of ports and configured to connect to a plurality of networks to forward packets between different networks and join a virtual network.

EX-1001 (’943 patent), Claim 3

4. The device of claim **3**, further in communication with a second network switch box, wherein the first network switch box is configured to transmit and receive a plurality of data packets from and to the second network switch box over at least one network path.

EX-1001 (’943 patent), Claim 4

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Independent Claim 5

'943 Patent

5[pre]	5. A wireless communication device comprising:
5[a]	a plurality of antennas; and
5[b]	a communication component coupled to the plurality of antennas, the communication component including a processor, a transmitter, and a receiver,
5[c]	wherein the communication component includes at least one additional transmitter;
5[d]	wherein the transmitter is configured to transmit on a first frequency and the at least one additional transmitter is configured to transmit on a second frequency;
5[e]	wherein the transmitter is configured to transmit using a first communication protocol and the at least one additional transmitter is configured to transmit using a second communication protocol, wherein the first communication protocol is different than the second communication protocol; and
5[f]	wherein one or more subtasks are assigned to one or more channels, and the one or more channels are sampled and clocked individually; and
5[g]	wherein the processor comprises multiple ones of the one or more channels and is further configured to process a first data stream and a second data stream in parallel.

EX-1001 ('943 patent), Claim 5

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Dependent Claims 6-7

’943 Patent

6. The device of claim **5**, in communication with a server configured with a controller in communication with a plurality of network devices wherein the server supervises the connection of a plurality of wireless devices.

7. The device of claim **6**, wherein the device operates with a plurality of streams including a first stream and a second stream and multipath communication.

EX-1001 (’943 patent), Claims 6-7

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Independent Claim 8

’943 Patent

8[pre]	8. A wireless communication device comprising:
8[a]	a plurality of antennas; and
8[b]	a communication component coupled to the plurality of antennas, the communication component including a processor, a transmitter, and a receiver,
8[c]	wherein the communication component includes at least one additional receiver;
8[d]	wherein the receiver is configured to receive using a first communication protocol and the at least one additional receiver is configured to receive using a second communication protocol, wherein the first communication protocol is different than the second communication protocol; and
8[e]	wherein one or more subtasks are assigned to one or more channels, and the one or more channels are sampled and clocked individually; and
8[f]	wherein the processor comprises multiple ones of the one or more channels and is further configured to process a first data stream and a second data stream in parallel.

EX-1001 (’943 patent), Claim 8

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Independent Claim 12

’943 Patent

12[pre]	12. A wireless communication device comprising:
12[a]	a plurality of antennas; and
12[b]	a communication component coupled to the plurality of antennas, the communication component including a processor, a transmitter, and a receiver,
12[c]	wherein a first set of antennas of the plurality of antennas is configured to operate in a first frequency band and a second set of antennas of the plurality of antennas is configured to operate in a second frequency band, wherein the first frequency band is different than the second frequency band;
12[d]	wherein the first set of antennas of the plurality of antennas is configured to operate using a first communication protocol and the second set of antennas of the plurality of antennas is configured to operate using a second communication protocol, wherein the first communication protocol is different than the second communication protocol; and
12[e]	wherein one or more subtasks are assigned to one or more channels, and the one or more channels are sampled and clocked individually; and
12[f]	wherein the processor comprises multiple ones of the one or more channels and is further configured to process a first data stream and a second data stream in parallel.

EX-1001 (’943 patent), Claim 12

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Instituted Grounds

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
1, 5–9	103(a)	Byrne
3, 4	103(a)	Byrne, WO748
12	103(a)	Byrne, Johnston, Pillekamp
13, 14	103(a)	Byrne, Johnston, Pillekamp, Billstrom
1, 2, 5–9	103(a)	Raleigh, Byrne
3, 4	103(a)	Raleigh, Byrne, WO748
12, 15, 18–20	103(a)	Raleigh, Byrne, Pillekamp
13, 14	103(a)	Raleigh, Byrne, Pillekamp, Billstrom
16, 17	103(a)	Raleigh, Byrne, Pillekamp, WO748

Institution Decision, 7

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Issue 1

Byrne Renders Obvious The “Processor” Limitations (1[e], 5[g], 8[f], and 12[f])

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Byrne Renders Obvious The "Processor" Limitations

Limitations 1[e], 5[g], 8[f], and 12[f]

wherein the processor comprises multiple ones of the one or more channels and is further configured to process a first data stream and a second data stream in parallel.

EX-1001 ('943 patent), Claims 1, 5, 8, and 12

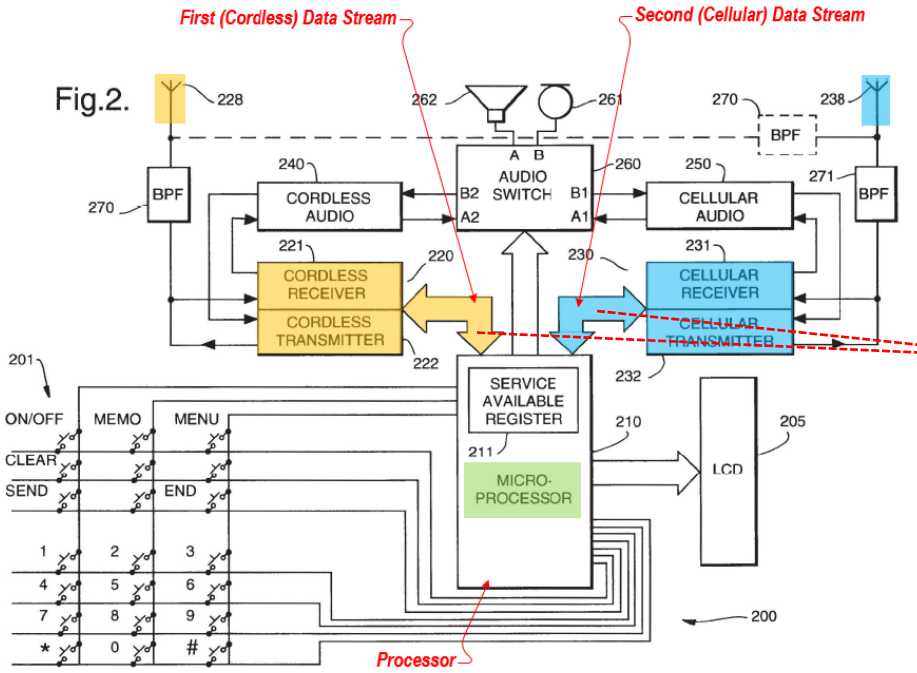
1-1. Byrne's "Microprocessor" Receives and Processes Data Streams

1-2. Byrne's "Microprocessor" Processes Data Streams "In Parallel"

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

1.1. Byrne's "Microprocessor" Receives and Processes Data Streams

Byrne's Figure 2



EX-1008, Figure 2[1]

Dr. Jensen

Data (not "instructions") received by the transceivers 220, 230 and sent to the microprocessor 210 ***for processing***

EX-1048 (Jensen 2nd Decl.), [3]-[4]

"Byrne nowhere limits transceiver output to instructions."

EX-1048 (Jensen 2nd Dec.), [5]

Petitioner's Reply, 2

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DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

1.1. Cordless Processing By Byrne's "Microprocessor"

Byrne

When operating as a cordless telephone control signals from the microprocessor 210 enable cordless receiver 221 and cordless transmitter 222. The microprocessor 210 also monitors signals from the cordless receiver 221 indicating received signal strength and for detecting receive data, and from the cordless transmitter 222 for sending transmit data. Additionally, the microprocessor 210 monitors control signals from the cordless transceiver 220 for detecting incoming calls (ringing), security codes and broadcast information relevant to the cordless system, and for sending dialling information.

The microprocessor 210 controls the CCT 200 in a similar way when operating as a cellular telephone, but appropriately modified for the signalling protocols and data encryption used in the cellular system. The signalling protocols, data encryption techniques and the like used in respective telephone systems are well known in the art, and the microprocessor can be arranged to operate in a known manner to effect control of the signals in such systems.

EX-1008 (Byrne), 8:16-38

Dr. Jensen

Signals that enable Byrne's microprocessor to detect "signal strength" and received "***data***" are data streams, not "instructions."

EX-1048 (Jensen 2nd Dec.), [5]

Control signals that represent ***data*** (e.g., security codes, broadcast information) that is passed to the microprocessor for processing are data streams, not "instructions."

EX-1048 (Jensen 2nd Dec.), [5]

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

1.1. Cellular Processing By Byrne's "Microprocessor"

Byrne

When operating as a cordless telephone control signals from the microprocessor 210 enable cordless receiver 221 and cordless transmitter 222. The microprocessor 210 also monitors signals from the cordless receiver 221 indicating received signal strength and for detecting receive data, and from the cordless transmitter 222 for sending transmit data. Additionally, the microprocessor 210 monitors control signals from the cordless transceiver 220 for detecting incoming calls (ringing), security codes and broadcast information relevant to the cordless system, and for sending dialling information.

The microprocessor 210 controls the CCT 200 in a similar way when operating as a cellular telephone, but appropriately modified for the signalling protocols and data encryption used in the cellular system. The signalling protocols, data encryption techniques and the like used in respective telephone systems are well known in the art, and the microprocessor can be arranged to operate in a known manner to effect control of the signals in such systems.

EX-1008 (Byrne), 8:16-38

Dr. Jensen

For cellular signaling and data encryption, a POSITA would have understood that the microprocessor processes the cellular ***data***.

EX-1048 (Jensen 2nd Dec.), [6]

It was known that the microprocessor needs to access ***data*** to perform data encryption and decryption.

EX-1048 (Jensen 2nd Dec.), [6]

Corroborating Evidence

178. The microprocessor 158 continues encrypting until all the data block has been encrypted. After the last data

EX-1075 (US4352952), 6:21-22

cations path **130**. In applications where voice security is desired, the voice signal from microphone **129** is converted to a digital signal and encrypted by microprocessor **122**. The

EX-1076 (US6144848), 18:10-12

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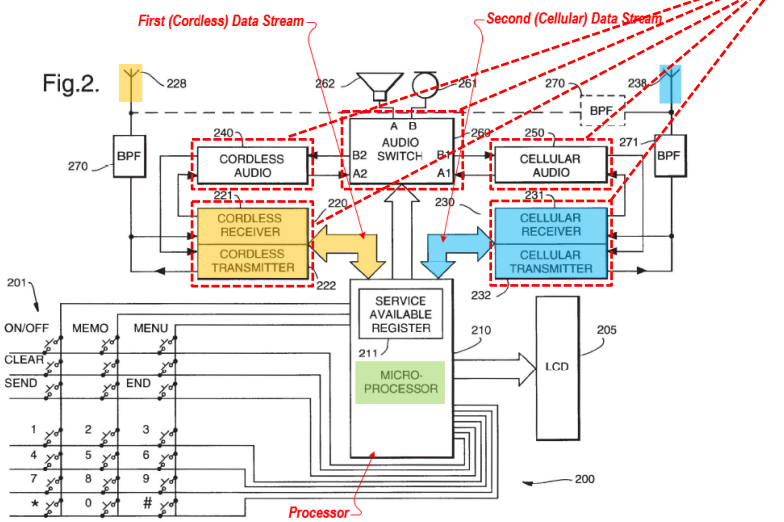
1.1. Byrne's "Microprocessor" Receives and Processes Data Streams

Byrne's Figure 2



EX-1008, Figure 2[1]

Petitioner's Reply, 2

Dr. Jensen

"***Byrne does not call out any other components (e.g., transceivers 220/230, audio channels 240/250, audio switch 260) that are responsible for any type of data processing***."

EX-1048 (Jensen 2nd Dec.), [8]

"Based on my review, Byrne does not provide additional processors or other components for encryption or other data processing, particularly between the microprocessor 210 and the respective transceivers 220 and 230."

EX-1048 (Jensen 2nd Dec.), [8]

Dr. Cooklev

Dr. Cooklev agrees that encryption is not limited to being performed by a transmitter or a receiver.

```
     Q.   I'm not limiting you -- when you describe
that it's possible that -- at least conceptually
possible that encryption is performed by another
component, did you mean another component to refer to
something other than a transmitter or a receiver?
     A.   Yes.
```

EX-1049 (Cooklev Dep. Tr.), 28:10-15

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DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

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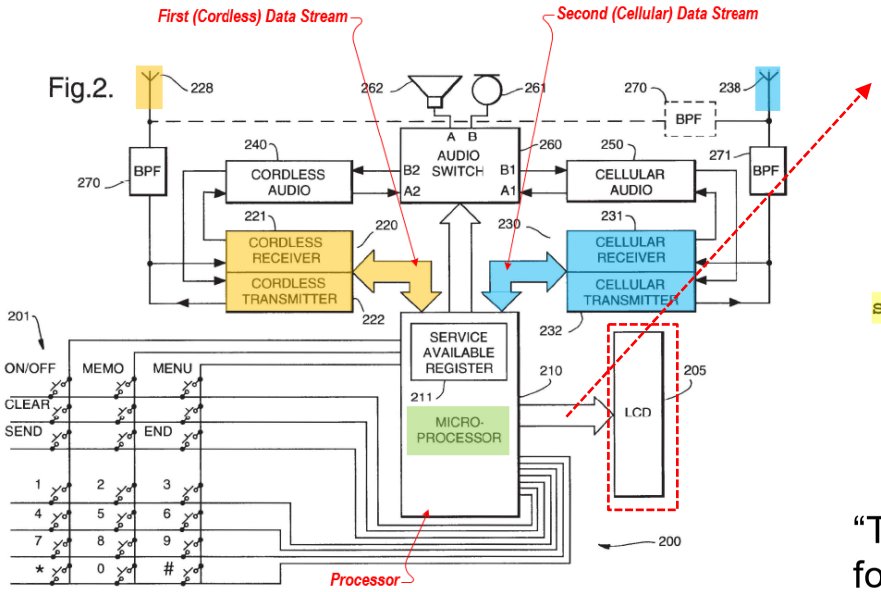
1.1. Byrne's "Microprocessor" Receives and Processes Data Streams

Byrne's Figure 2



EX-1008, Figure 2[1]

Petitioner's Reply, 2

Byrne

availability. If the cellular and/or cordless system are available the microprocessor 210 updates the display 205 and SAR 211 at step 304. Next at

EX-1008 (Byrne), 8:54-56

Dr. Cooklev

A. I think in Figure 2, the microprocessor supplies the LCD with data.

EX-1049 (Cooklev Dep. Tr.), 32:8-9

Dr. Jensen

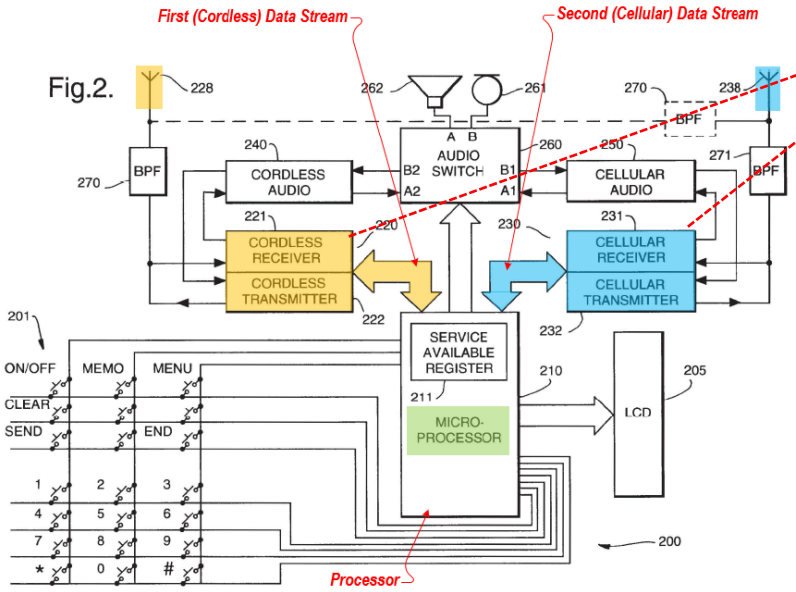
"Therefore, a POSITA would have understood and found obvious that the data for updating the display are transmitted from the respective transceivers 220, 230 to the microprocessor 210, which then processes the received data streams and supplies data to the "LCD" display 205, as clearly illustrated in Byrne's Figure 2."

EX-1048 (Jensen 2nd Dec.), [9]

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

1.1. Byrne's "Microprocessor" Receives and Processes Data Streams

Byrne's Figure 2



EX-1008, Figure 2[1]

Petitioner's Reply, 2

Byrne

"***conventional***" transceivers

EX-1008 (Byrne), 7:39-41, 7:48-49

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DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

1.1. Byrne's "Microprocessor" Receives and Processes Data Streams

Dr. Jensen

10. Patent Owner's limited reading of Byrne's microprocessor contradicts its own position that Byrne's other components, such as transceivers 220/230 and audio switch 260, would have processing capability that the microprocessor allegedly lacks. Dr. Cooklev indicated that he was not aware of any transceivers designed for processing data streams before the Critical Date. EX-1049, 39:14-20. However, he still concluded that the processing in Byrne occurs in the transceivers, instead of the microprocessor. EX-1049, 39:14-20. Based on my review of the record, his conclusion relies solely on the illustration of Byrne's Figure 2 and Byrne's description that "conventional" transceivers can implement Byrne's cordless and cellular transceivers. EX-1049, 40:2-41:6; EX-1008, 7:39-41, 7:48-49. However, Dr. Cooklev did not identify any conventional transceivers that were capable of performing data stream processing in cordless/cellular telephone networks as of 1999. EX-1049, 43:16-44:1. In fact, Dr. Cooklev recognized that Byrne did not de-

Dr. Cooklev

Q. Okay. So -- you may have a basis for not doing it, but my question is -- is a bit simpler. It's whether you did or did not identify any conventional receiver and transmitter components that existed in cordless and cellular telephone networks as of 1999 where those components were capable of performing processing on data streams. I think the answer is, no, you didn't, and that's the extent of my question for now.

A. I -- well, I think -- I think that's the short answer, that I did not. But in your question,

EX-1049 (Cooklev Dep. Tr.), 43:16-44:1

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

1.1. Byrne's "Microprocessor" Receives and Processes Data Streams

Dr. Jensen

1999. EX-1049, 43:16-44:1. In fact, Dr. Cooklev recognized that Byrne did not describe that the transceivers 220 and 230, "audio channel" 240 and 250, or "audio switch 260" have data processing capability. EX-1049, 46:1-47:4. Byrne's disclosure is consistent with abundant evidence confirming that transceivers did not provide data processing around the Critical Date. The evidence confirms that microprocessors, not transceivers, process cordless/cellular data streams, and that a POSITA would have understood or found obvious that, in a system where a microprocessor receives input from a transceiver, the microprocessor, not the transceiver, processes data streams received by the transceiver.

EX-1048 (Jensen 2nd Dec.), [10]

Dr. Cooklev

Q. The passage that you read, sir, beginning at Column 8, line 39, I don't see the term "data processing" or "data stream" in that passage.

Am I correct?

A. Well, the -- the words "data processing" do not appear -- very clearly do not appear in this passage, but --

EX-1049 (Cooklev Dep. Tr.), 46:1-47:4

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

1.1. Byrne's "Microprocessor" Receives and Processes Data Streams

Representative chipsets for cellular and cordless communications around 1999 support Byrne's microprocessor as the component for cordless/cellular data stream processing.

EX-1048 (Jensen 2nd Dec.), [11]-[19] (citing EX-1050, EX-1051)

Dr. Jensen

11. For example, the technology capabilities around the Critical Date of the '943 patent support the need for processing capabilities, such as those provided by Byrne's microprocessor, in digital cellular and cordless systems. As an example, Analog Devices, a leading manufacturer of semiconductor devices, announced a chipset, the AD6523 and AD6524, in 1999. EX-1050, 1-3. According to Analog Devices, "[t]ogether, the two ICs supply the main functions necessary for implementing dual- or triple-band radios for GSM cellular telephones." EX-1050, 1.

16. Given this analysis, a POSITA would have understood or found obvious that the AD6523/AD6524 chipset, along with some of the other components shown in Figure 1 of EX-1050, would perform the functionality of the cellular receiver 231, the cellular transmitter 232, the BPF (band pass filter) 271, and the antenna 238 shown in Figure 2 of Byrne. Because processing is not included in this chipset and supporting components, it would have been understood that processing is performed separately.

EX-1048 (Jensen 2nd Dec.), [11]-[16]

Othello™: A New Direct-Conversion Radio Chip Set Eliminates IF Stages

by Dan Fague

INTRODUCTION

Analog Devices recently announced the revolutionary Othello direct-conversion radio for mobile applications. By eliminating intermediate-frequency (IF) stages, this chip set will permit the mobile electronics industry to reduce the size and cost of radio sections and enable flexible, multistandard, multimode operation. The radio consists of two integrated circuits, the AD6523 Zero-IF Transceiver and the AD6524 Multiband Synthesizer. The AD6523 contains the main functions necessary for both a direct-conversion receiver and a direct VCO transmitter, known as the Virtual-IF™ transmitter. It also includes the local-oscillator generation block and a complete on-chip regulator that supplies power to all active circuitry for the radio. The AD6524 is a fractional-*N* synthesizer that features extremely fast lock times to enable advanced data services over cellular telephones—such as high-speed circuit-switched data (HSCSD) and general packet *radio services (GPRS)*.

Together, the two ICs supply the main functions necessary for implementing dual- or triple-band radios for GSM cellular phones. The direct conversion technology, combined with a new twist on the translation loop (or direct VCO) modulator, reduces the amount of external filtering needed in the radio to an absolute minimum.

EX-1050, 1

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DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

1.1. Byrne's "Microprocessor" Receives and Processes Data Streams

Representative chipsets for cellular and cordless communications around 1999 support Byrne's microprocessor as the component for cordless/cellular data stream processing.

EX-1048 (Jensen 2nd Dec.), [11]-[19] (citing EX-1050, EX-1051)

Dr. Jensen

17. Further, EX-1051 discloses a similar chipset from February 1999 for DECT cordless telecommunications. This transceiver chipset and supporting circuitry provides the functionality to the cordless receiver 221, the cordless transmitter 222, the BPF 270, and the antenna 228 in Figure 2 of Byrne. Careful analysis of EX-1051 shows that for this cordless transceiver, the output of the chipset from the receiver is a baseband signal that needs to be properly digitized and fed into a processor. The transmitter path of the chipset takes data that has already been processed and converts it into radio signals that can be transmitted from the antenna. As in the case of the cellular transceiver chipset, it would have been understood that the required processing on the digital signals would be performed separately.

EX-1048 (Jensen 2nd Dec.), [17]

MP 4.2 A DECT Transceiver Chip Set Using SiGe Technology

Matthias Bopp, Martin Alles, Meinolf Arens, Dirk Eichel, Stephan Gerlach, Rainer Götzfried, Frank Gruson, Michael Kocks, Gerald Krimmer, Reinhard Reimann, Bernd Roos, Martin Siegle, Jürgen Zieschang

TEMIC Semiconductor GmbH, Heilbronn, Germany

A fully-integrated RF-transceiver for DECT comprises two bipolar ICs including power amplifier, low-noise amplifier and VCO. Non-blind-slot and multi-slot capability is achieved by closed-loop modulation. The complete transceiver, which operates from 2.7 to 5V, avoids mechanical tuning, and requires <50 external components.

EX-1051, 1

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Byrne Renders Obvious The "Processor" Limitations

Limitations 1[e], 5[g], 8[f], and 12[f]

wherein the processor comprises multiple ones of the one or more channels and is further configured to process a first data stream and a second data stream in parallel.

EX-1001 ('943 patent), Claims 1, 5, 8, and 12

1-1. Byrne's "Microprocessor" Receives and Processes Data Streams

1-2. Byrne's "Microprocessor" Processes Data Streams "In Parallel"

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

1.2. Byrne's "Microprocessor" Processes Data Streams "In Parallel"

Byrne

The microprocessor 210 illustrated in Figure 2 is adapted to operate in accordance with the flow charts illustrated in Figures 3 - 4, for controlling the CCT 200 as a cordless telephone, a cellular telephone or a cellular cordless telephone. Thus, in accordance with the present invention the CCT 200 may operate, as far as a user is concerned, simultaneously as a cellular telephone and a cordless telephone. For the sake of explanation and clarity, it should be noted that the CCT 200 can be so arranged such that both cellular and cordless operations are in progress at the same time. Alternatively, if components are shared between cellular and cordless parts, cellular and cordless operations can be performed at different times although this would be done at a speed sufficient for it to be undetectable by the user and therefore appear to be simultaneous operation.

EX-1008 (Byrne), 7:56-8:15

Dr. Jensen

Byrne identifies a "***cellular cordless telephone***" as one of three modes. EX-1048 (Jensen 2nd Dec.), [22]

Byrne expressly discusses simultaneous/parallel operation of cellular/cordless systems.

EX-1048 (Jensen 2nd Dec.), [22]

FISH.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

26

1.2. Byrne's "Microprocessor" Processes Data Streams "In Parallel"

Byrne

Suitably, at least one predetermined criterion can be one or a combination of the following requirements that the selected radio system is one for which:

i) the received signal strength at the radio telephone is greatest;
ii) the radio telephone has access rights;
iii) the selected radio telephone system requests selection;
iv) the bit error rate, frame error rate or the like is the lowest; and
v) the user velocity is appropriate.

EX-1008 (Byrne), 4:46-56

Dr. Jensen

23. Further, Byrne describes parallel monitoring of signal characteristics that indicate parallel connections to its cellular and cordless systems. For example, Byrne describes simultaneously considering "received signal strength," "bit error rate, frame error rate or the like" in assessing the cellular and cordless systems. EX-1008, 4:46-56. To compare signal strength and bit/frame error rate, a POSITA would have understood and found obvious that Byrne's system maintains parallel open connections and processes signals received over the parallel open connections to assess signal strength and error rate of data (e.g., bit/frame) conveyed in those signals. Based on my review of the record and my knowledge and experience, Byrne's parallel assessment of these data transfer characteristics confirms that Byrne's microprocessor processes data from multiple connections simultaneously. Based on Byrne's disclosure, a POSITA would have understood that parallel open connections would have been an obvious way to receive and process signals for the assessment described in Byrne.

EX-1048 (Jensen 2nd Dec.), [23]

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

1.2. Byrne's "Microprocessor" Processes Data Streams "In Parallel"

Byrne's ***handover*** supports that the microprocessor processes cellular and cordless data streams in parallel.

Petitioner's Reply, 9-10;
EX-1048 (Jensen 2nd Dec.), [25]

Byrne

based on the predetermined criterion. For example, if the user were travelling out of a system service area and the service breaks down, a radio telephone operable in accordance with the present invention may automatically handover to a system having a good service (e.g. cordless to cellular). Similarly, if a user was engaged in a call on a high cost system and a low cost system became available such a radio telephone may automatically handover the call to the low cost system. Examples of inter-system handover are disclosed in co-pending British Patent Applications No. 9320814.8, No. 9320815.8 and No. 9326169.1.

EX-1008 (Byrne), 4:9-21

Dr. Jensen

25. Byrne's handover, as illustrated in Figures 3-4, further supports that its microprocessor processes cellular and cordless data streams in parallel. Byrne describes that, if "the user were travelling out of a system service area and the service breaks down," its device will "automatically handover to a system having a good service (e.g. cordless to cellular)" so that it does not lose an ongoing call ("actual open connection"). EX-1008, 4:9-14. Therefore, it would have been understood and obvious that Byrne's phone processes both cordless and cellular data streams in parallel during the handover process, which transitions a call from one service to another without losing it. The British applications that are referenced in

EX-1048 (Jensen 2nd Dec.), [25]

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

1.2. Byrne's "Microprocessor" Processes Data Streams "In Parallel"

Byrne's ***handover*** supports that the microprocessor processes cellular and cordless data streams in parallel.

Petitioner's Reply, 9-10;
EX-1048 (Jensen 2nd Dec.), [25]

Byrne

based on the predetermined criterion. For example, if the user were travelling out of a system service area and the service breaks down, a radio telephone operable in accordance with the present invention may automatically handover to a system having a good service (e.g. cordless to cellular). Similarly, if a user was engaged in a call on a high cost system and a low cost system became available such a radio telephone may automatically handover the call to the low cost system. Examples of inter-system handover are disclosed in co-pending British Patent Applications No. 9320814.8, No. 9320815.8 and No. 9326169.1.

EX-1008 (Byrne), 4:9-21

British App. 9320814.8

connection with the selected base station. After the establishment of the connection is completed the mobile station part informs the cordless telephone part about the matter and the latter releases the radio path of the cordless telephone system. Thus, the invention allows a terminal initiated handover from a cordless telephone system to a mobile system which utilizes a network initiated handover procedure.

EX-1069 (GB2282730A), 4:9-21

Dr. Jensen

dio path of the cordless telephone system." EX-1069, 5-6. As such, during the handover, an existing call connection over one service is released only after a new connection over the other service is established. Prior to such release, overlap and processing are both necessary and obvious. Similarly, Byrne-198 confirms that the

EX-1048 (Jensen 2nd Dec.), [25]

FISH.
DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

1.2. Byrne's "Microprocessor" Processes Data Streams "In Parallel"

Patent Owner

Byrne's discussion of simultaneous "cellular and cordless operations" refers only to ***control*** operations and "not actual open connections"

POR, 20-22

Operations are not limited to control operations

Byrne

phone or a cellular cordless telephone. Thus, in accordance with the present invention the CCT 200 may operate, as far as a user is concerned, simultaneously as a cellular telephone and a cordless telephone. For the sake of explanation and clarity, it should be noted that the CCT 200 can be so arranged such that both cellular and cordless operations are in progress at the same time. Alternatively, if components are shared between cellular and cordless parts, cellular and cordless operations can be performed at different times although this would be done at a speed sufficient for it to be undetectable by the user and therefore appear to be simultaneous operation.

When operating as a cordless telephone control signals from the microprocessor 210 enable cordless receiver 221 and cordless transmitter 222. The microprocessor 210 also monitors signals from the cordless receiver 221 indicating received signal strength and for detecting receive data, and from the cordless transmitter 222 for sending transmit data. Additionally, the microprocessor 210 monitors control signals from the cordless transceiver 220 for detecting incoming calls (ringing), security codes and broadcast information relevant to the cordless system, and for sending dialling information.

EX-1008 (Byrne), 8:2-28

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

1.2. Byrne's "Microprocessor" Processes Data Streams "In Parallel"

Dr. Jensen

26. Even assuming that Patent Owner is correct that Byrne's discussion of simultaneous "cellular and cordless operations" refers only to control operations and "not actual open connections," it would have been obvious that Byrne's microprocessor processes cellular and cordless data streams simultaneously in performing the control operations. As mentioned above, Byrne's microprocessor quite clearly describes parallel consideration of signal strength and bit/frame error rate. EX-1008, 4:46-56. Even assuming this consideration is limited to assessment of control signals, it still involves parallel processing of data streams. In fact, Byrne describes control signals with "***broadcast information*** relevant to the cordless system." EX-1008, 8:23-28. Processing this "information" while a cellular call is in progress involves processing a first data stream (e.g., the broadcast information) in parallel with a second data stream (e.g., the cellular call data). Neither the claims, nor the '943 patent's specification, requires audio from two networks to be simultaneously processed. Thus, even assuming that Patent Owner is correct in asserting that Byrne's simultaneous operation is limited to simultaneous processing of control information, that simultaneous processing still satisfies the claims.

EX-1048 (Jensen 2nd Dec.), [26]

Byrne

data. Additionally, the microprocessor 210 monitors control signals from the cordless transceiver 220 for detecting incoming calls (ringing), security codes and broadcast information relevant to the cordless system, and for sending dialling information.

EX-1008 (Byrne), 8:23-28

FISH.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

31

1.2. Byrne's "Microprocessor" Processes Data Streams "In Parallel"

Byrne

housing. The preference for operating in a particular system is user defined as disclosed in US patent number 4 989 230.

EX-1008 (Byrne), 1:27-29

In order for a user to be able to utilise both cellular and cordless telephone systems via a single radio telephone handset a so-called cellular cordless telephone (CCT) has been proposed in US patent US 4 989 230. Both the cellular system

EX-1008 (Byrne), 2:42-46

Furthermore, the prior art CCT disclosed in US 4 989 230 requires the user to select transfer of a cordless call to the cellular system should the cordless signals deteriorate (eg the user moves out of range of a cordless base station or the user's velocity increases). Additionally, optimisation of the available systems is likely not to be achieved if the user is left to decide which system is to be used. One of the disadvantages of the CCT disclosed in US 4 989 230 is that a user might not know if a signal is deteriorating until it is too late and the ongoing call is lost. For example, a visual indication

EX-1008 (Byrne), 2:58-3:11

which does fulfil the aforesaid criteria. Such a system could utilise a form of call forwarding as disclosed in US patent US 4 989 230. However, such

EX-1008 (Byrne), 10:37-39

Well-known "***three-way linking***" as an example of processing two data streams in parallel

Petitioner's Reply, 9;
EX-1048 (Jensen 2nd Dec.), [24]

US 4989230 (Gillig)

FIG. 7 is a flow chart for the process used by the cellular cordless telephones in FIGS. 2 and 3 for simultaneously processing both a cellular telephone call and a cordless telephone call and three-way linking both calls.

EX-1052 (US4989230, Gillig), 1:62-66, 3:26-31, 6:35-7:16

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Issue 2

The Byrne-WO748 Combination Renders Obvious Claims 3-4 (Ground 1B)

FISH.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Byrne-WO748 Renders Obvious a "Virtual Network" (Claims 3-4)

'943 Patent

3. The device of claim **1**, further in communication with a network switch box configured with a plurality of ports and configured to connect to a plurality of networks to forward packets between different networks and join a virtual network.

EX-1001 ('943 patent), Claim 3

FISH.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Byrne-WO748 Renders Obvious a "Virtual Network" (Claims 3-4)

Dr. Jensen

"VPNs were well-known and could be conveniently implemented" in a network like WO748 for known benefits, and the implementation "does not require explicit instructions or details."

EX-1048 (Jensen 2nd Dec.), [29]

29. Based on my knowledge and experience in the field, virtual networks and VPNs were well-known and could be conveniently implemented such that a POSITA would have found it obvious to consider use of VPNs in such a network as WO748 given their "strong demand," prevalent use, and known benefits, such as "taking advantage of the efficiencies of a common communications infrastructure" and "communications privacy." EX-1072, 3; EX-1073, 2:3-21 ("to provide adequate assure the security and quality thereof."). Given the popularity and technical convenience, a POSITA would have understood that the implementation of VPNs in the WO748's system does not require explicit instructions or details in WO748.

EX-1048 (Jensen 2nd Dec.), [29]

35

FISH.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Byrne-WO748 Renders Obvious a "Virtual Network" (Claims 3-4)

Dr. Jensen

28. Based on my knowledge and experience in the relevant field, implementing a VPN for the networks like those described in Byrne-WO748 was well-known and would have been obvious to a POSITA. EX-1068 ("Paulsen"), 1:13-43, 4:64-5:35. By way of example, it would have been obvious to use a VPN as evi-

EX-1048 (Jensen 2nd Dec.), [28]

Corroborating Evidence

more attractive than the use of the public network for the target customers. As fluctuations in inter-site traffic levels occur, then the VPN can handle the variations without blocking or overflow to the public network, and therefore provide a cost effective and flexible solution.

VPN's provide a solution to a business need to connect more than one site together. This need can arise out of a business expanding out of a single site, or the desire to replace existing solutions. Existing solutions are usually the direct use of public network dialling between sites, or private circuits providing a company dial plan.

EX-1028 ("Virtual Private Networking – The Flexible Approach"), 2
(cited in EX-1003 (Jensen Orig. Dec.), [120])

Paulsen

This invention relates generally to apparatus and methods for accessing computer networks and in particular to establishing a secure connection between a remote computer and a private computer network using a public computer network.

In the past, organizations and companies have used private (internal) computer data networks to connect its users to each other. These private networks are not accessible to the public and permit sensitive data to be transferred between users within the company. However, due to the increasing numbers of people who need access to the private computer data network and the disparate locations of these people, there are several disadvantages of these conventional private computer networks.

As the number of people in a company grows, the workforce becomes more dispersed among different locations and there are more employees who are mobile, such as salespeople who travel around a region of the United States. For example, some employees may telecommute which requires dial-up access to the private computer data network. The dispersed workforce and the mobile workforce make a private computer data network unmanageable because this mobility requires at least two network connections for each user. In addition, since cellular telephone access has also become more available, additional connections to the network for this access is needed. In addition, full-time telecommuters dramatically increase the number of permanent "remote offices" a company must interconnect which further complicates the private computer data network administration and topology. In addition, as companies increase in size, due to acquisitions, mergers and expansion, the private computer data network must support more remote offices and more network nodes. Thus, as a organization expands, the private computer data network of the organization becomes unwieldy and unmanageable.

EX-1068 (Paulsen), 1:8-43

FISH.
DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Byrne-WO748 Renders Obvious a "Virtual Network" (Claims 3-4)

Dr. Jensen

FIG. **2** is a block diagram illustrating a virtual private network (VPN) **40** in accordance with the invention. The VPN may include a private network **42** which communicates data using a first communications protocol, a public network **44** which communicates data using a second communications protocol, and a client node **46** that is connected for secure communications to the private network **42** through the public network **44** as described below. The private network **42** may be any type of computer network, such as an AppleTalk network. The public network may be any type of publicly accessible computer network such as the Internet.

EX-1068 (Paulsen), 4:64-5:8

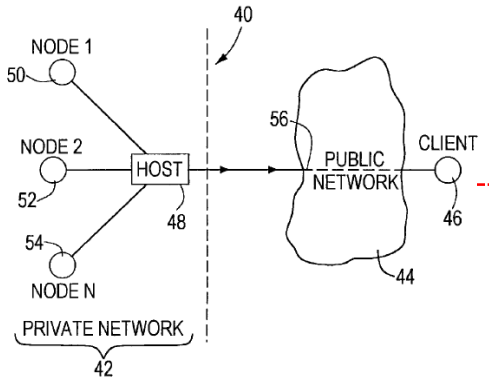
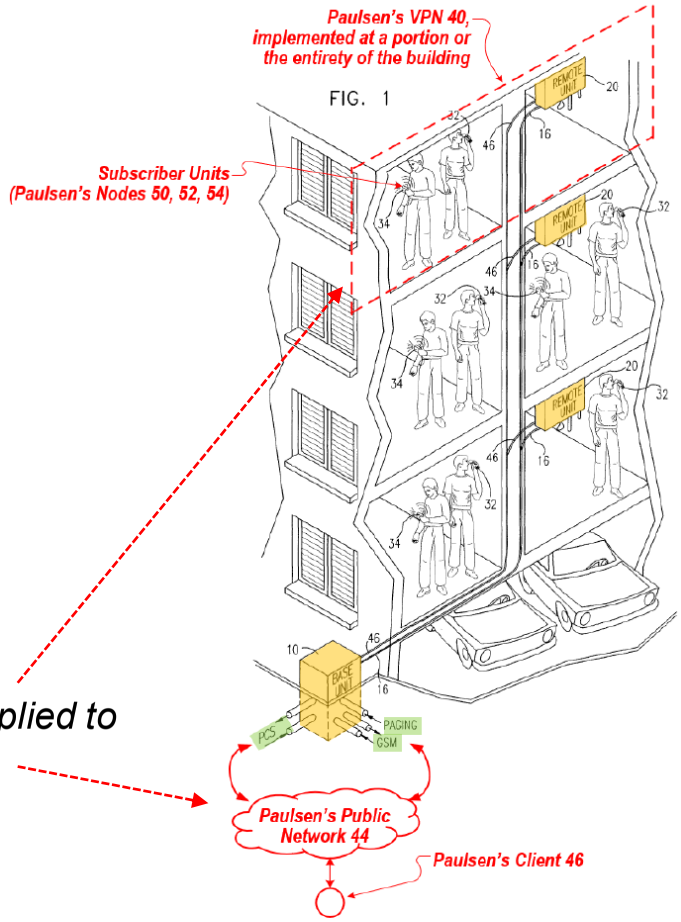


FIG. 2

EX-1068 (Paulsen), Figure 2

Paulsen's VPN applied to WO748's network



EX-1007, Figure 1

EX-1048 (Jensen 2nd Dec.), [28]

FISH.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Issue 3

Reasonable Expectation of Success For The Byrne-WO748 Combination (Ground 1B)

FISH.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

A Reasonable Expectation of Success Exists For The Byrne-WO748 Combination (Ground 1B)

Patent Owner

"Dr. Jensen's POSITA could not design a wired and wireless infrastructure communication system to be used with the Byrne telephone or to modify Byrne's telephone to communicate in WO748's microcells."

POR, 26

Dr. Jensen

Understand maybe they're only designing some piece based on their expertise, but they're understanding the architecture into which their piece will fit and how their design is going to impact that architecture and the overall functioning of the system.

EX-2006 (Jensen Dep. Tr. in IPR2022-00766 for US 8824434), 30:10-15

Dr. Jensen

32. As discussed in the Petition and my Original Declaration, Petitioner sufficiently demonstrated how the infrastructure ("microcells"), as known in WO748, would fit for portable devices like Byrne's CCTs. Petition, 25-27. With this disclosure, a POSITA would have understood and found it obvious to modify WO748's architecture ("microcells") to accommodate devices like Byrne's CCTs (which are already similar to WO748's subscriber units) because she has an "understanding [of] the architecture [e.g., WO748's microcell] into which their pieces [e.g., Byrne's CCTs] will fit and how their design is going to impact that architecture and the overall functioning of the system." EX-2006, 29:13-31:5. Similarly, based on the understanding of WO748's "architecture" and "overall functioning," a POSITA would have understood how Byrne's CCTs would be modified to be operable in WO748's architecture. EX-2006, 29:13-31:5

EX-1048 (Jensen 2nd Dec.), [32]

FISH.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

39

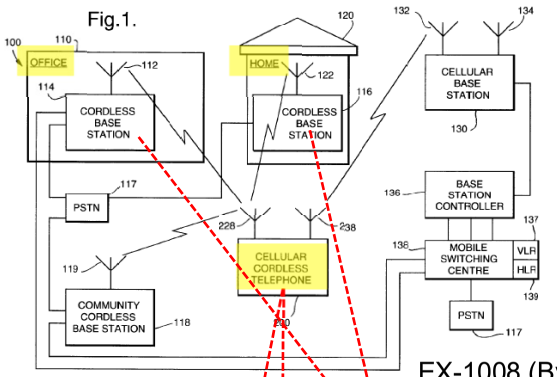
A Reasonable Expectation of Success Exists For The Byrne-WO748 Combination (Ground 1B)

Similarity between Byrne and WO748 confirms a reasonable expectation of success for the combination.

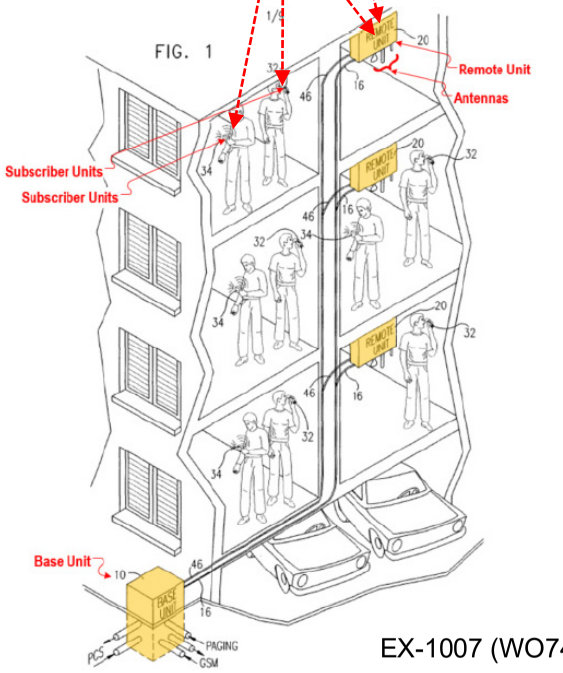
Dr. Jensen

33. Indeed, a POSITA would have understood that the Byrne-WO748 combination would be predictable and well within her capabilities. For example, as noted in the Petition and my Original Declaration, WO748 already describes subscriber units that are similar to Byrne's portable phones and communicate over multiple networks in a similar manner to Byrne's phones. EX-1007, 5 ("subscriber units such as cellular telephones 32 operating on one or more networks"); EX-1008, 13:4-7 ("For example, a multi-system radio telephone could be operable for more than two radio systems, and not necessarily for a cellular and a cordless system."). Because of such technical similarity and flexibility in the references, a POSITA would have found it routine and predictable to add Byrne's standard-based networks (e.g., GSM, DECT) to the WO748 network, which already describes how to accommodate multiple networks for multiple devices that resemble Byrne's phones.

EX-1048 (Jensen 2nd Dec.), [33]



EX-1008 (Byrne), Figure 1



EX-1007 (WO748), Figure 1

EX-1007, Figure 1

FISH.
DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

A Reasonable Expectation of Success Exists For The Byrne-WO748 Combination (Ground 1B)

The '943 patent provides limited disclosure of components ("network switch box," "virtual network," etc.) and, instead, relies on the state of art for its disclosure. This confirms a POSITA would have sufficient knowledge and skill to implement the Byrne-WO748 combination.

Dr. Jensen

34. Notably, the '943 patent offers very limited disclosure of its "network switch box" and "virtual network" and relies on a POSITA's knowledge and skill for its own disclosure. EX-1065, 80:3-81:25 ("a patent specification need not teach everything that a person of skill in the art knows."). Because the '943 patent's specification relies on the POSITA's knowledge and skill for its disclosure of the implementation details of "network switch box" and "virtual network," the same knowledge and skill is available for assessment of the obviousness of implementing the Byrne-WO748 combination. For example, the '943 patent merely describes that the "network switch box" is "very similar in many ways" to a "CT/MD" but different from the "CT/MD" in that "the CT/MD provid[es] personal services and the network switch box provid[es] system services." EX-1001, 3:16-20. However, the '943 patent does not describe what the "network switch box" is or what components constitute it. Further, as described above, the '943 patent provides limited discussion of virtual networks or VPN, much less explaining the details of implementing "a network switch box ... configured to ... join a virtual network," as required in claim 3. EX-1001, 4:47-51, 8:17-9:4 (merely describing "VPN 1302 is shown with a network switch box 1316, server 1318, and a CT/MD 1320, which allows multipath communication through the network switch box 1316 to server 1318."), 10:43-60. Therefore, the '943 patent relies on the state of the art for its disclosure, which confirms that a POSITA would have had sufficient knowledge and skill to implement the techniques of Byrne and WO748 and their combination. The disclosure of Byrne and WO748 cannot be held to a higher standard than the '943 patent's disclosure.

EX-1048 (Jensen 2nd Dec.), [34]

FISH.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Issue 4

Reasonable Expectation of Success For The Byrne-Johnston-Pillekamp Combination (Ground 1C)

42

FISH.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

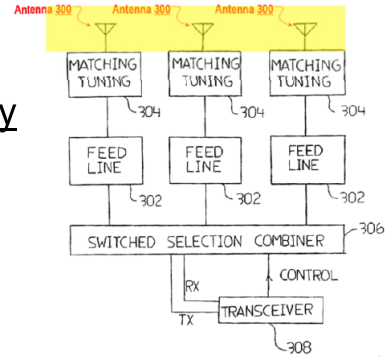
A Reasonable Expectation of Success Exists For The Byrne-Johnston-Pillekamp Combination (Ground 1C)

Claim 12

12[d] wherein a first set of antennas of the plurality of antennas is configured to operate in a first frequency band and a second set of antennas of the plurality of antennas is configured to operate in a second frequency band, wherein the first frequency band is different than the second frequency band;

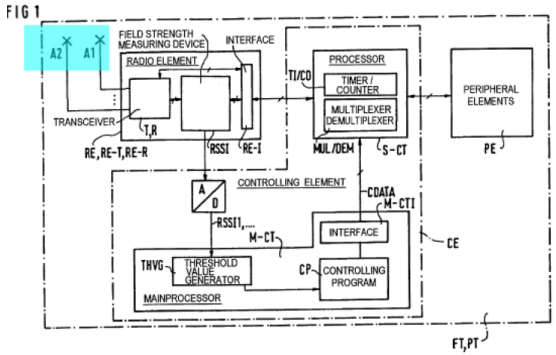
12[e] wherein the first set of antennas of the plurality of antennas is configured to operate using a first communication protocol and the second set of antennas of the plurality of antennas is configured to operate using a second communication protocol, wherein the first communication protocol is different than the second communication protocol; and

Johnston's Antenna Diversity



EX-1006, Figure 29A

Pillekamp's Antenna Diversity



EX-1009, Figure 1

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

A Reasonable Expectation of Success Exists For The Byrne-Johnston-Pillekamp Combination (Ground 1C)

Dr. Jensen

36. In particular, antennas, combining circuitry, and a processor for antenna diversity in wireless communications (e.g., cellular and cordless) were well-known long before the Critical Date. EX-1022, 149 ("An existing mobile antenna can be replaced by a diversity antenna with combiner so that existing systems can be improved without the need for implementing a signaling diversity scheme."); EX-1023, 1 ("The classical approach is to use multiple antennas at the receiver and perform combining or selection and switching in order to improve the quality of the received signal."); EX-1040, 141 ("An effective means to combat multipath fading is diversity, which implies that several copies of the transmitted signal are acquired at the receiver and subsequently combined to improve performance."); EX-1079, 1 ("This paper introduces a low-complexity antenna diversity receiver suitable for TDMA handset implementation."); EX-1041, 1532-1536. In fact, Dr. Cooklev agreed that antenna diversity techniques existed as of 1999, and he did not dispute that the circuitry for antenna diversity, such as that taught in Johnston and Pillekamp, was available before the Critical Date. EX-1049, 59:24-25, 62:17-63:7.

EX-1048 (Jensen 2nd Dec.), [36]

FISH.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

A Reasonable Expectation of Success Exists For The Byrne-Johnston-Pillekamp Combination (Ground 1C)

Dr. Jensen

37. Given this knowledge, a POSITA, who understands the "architecture into which their pieces will fit and how their design is going to impact that architecture and the overall functioning" of these systems, would have known how to design and fit each of those known components into the system of Byrne to arrive at the claimed elements. EX-2006, 29:13-31:5; POR, 27-31. Indeed, Byrne's device already uses multiple antennas and a POSITA would have expected success in using the well-known technique of adding antenna diversity to each of Byrne's cellular and cordless systems. Therefore, a POSITA would have had a reasonable expectation of success in making the obvious Byrne-Johnston-Pillekamp combination. Petition, 33-38.

EX-1048 (Jensen 2nd Dec.), [37]

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Issue 5

The Raleigh-Byrne Combination Renders Obvious The "Processor" Limitations (1[e], 5[g], 8[f], and 12[f])

FISH.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Issue 5: Sub-Issues

5.1. **The Raleigh-Byrne Combination Provides An Additional Way That A Processor Processes Data Streams In Parallel**

5.2. Raleigh's Processor(s) Meet the Claimed Processor

5.3. Raleigh's Parallel Set of Signal Sequences Are Data Streams

5.4. Abundant Evidence Shows That A POSITA Would Have Been Motivated To Combine Raleigh and Byrne

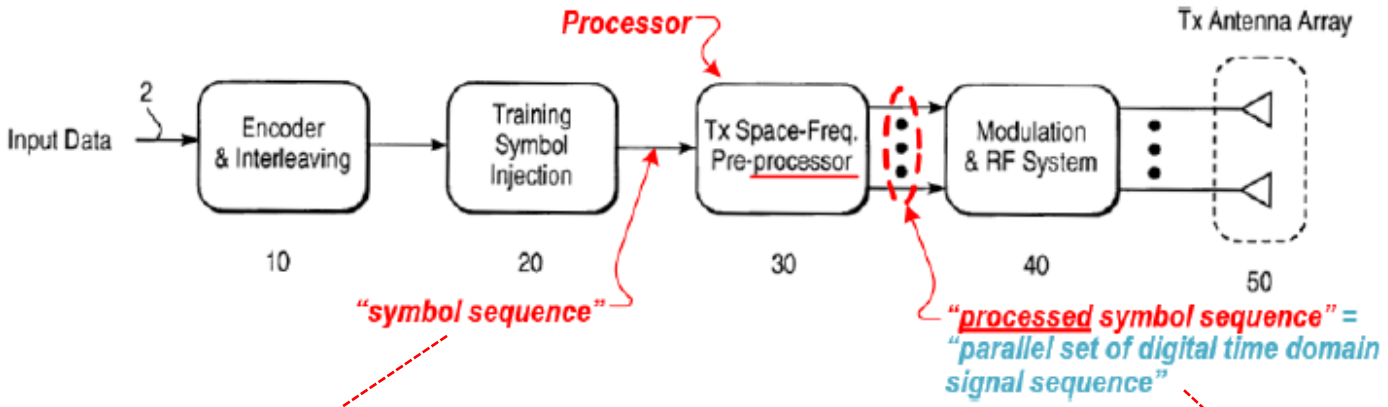
5.5. A Reasonable Expectation of Success Exists For The Raleigh-Byrne Combination

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

5.1. The Raleigh-Byrne Combination Provides An Additional Way That A Processor Processes Data Streams In Parallel

Dr. Jensen

EX-1048 (Jensen 2nd Dec.), [38]-[39]



EX-1005, Figure 1

Dr. Cooklev acknowledged that "the encoder symbol sequence is processed by the TSFP 30."

EX-1049 (Cooklev Dr. Tr.), 72:18-19

39. Raleigh clearly describes that its TSFP 30 (corresponding to the "processor") processes an "encoder symbol sequence" so that "the *processed* symbol sequence includes a *parallel* set of digital time domain signal sequences," which are respectively fed into the "Modulation and RF System block 40" for parallel transmission via multiple antennas. EX-1005, 7:24-28, Figure 1 (below). Dr. Cooklev recognizes these express teachings of Raleigh and also agreed that, "in the output of the TSFP 30, there is a parallel set of digital time domain signal sequences." EX-1049, 72:13-73:7.

EX-1048 (Jensen 2nd Dec.), [39]

Dr. Cooklev acknowledged that "in the output of the TSFP 30, there is a parallel set of digital time domain signal sequences."

EX-1049 (Cooklev Dep. Tr.), 72:25-73:1

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

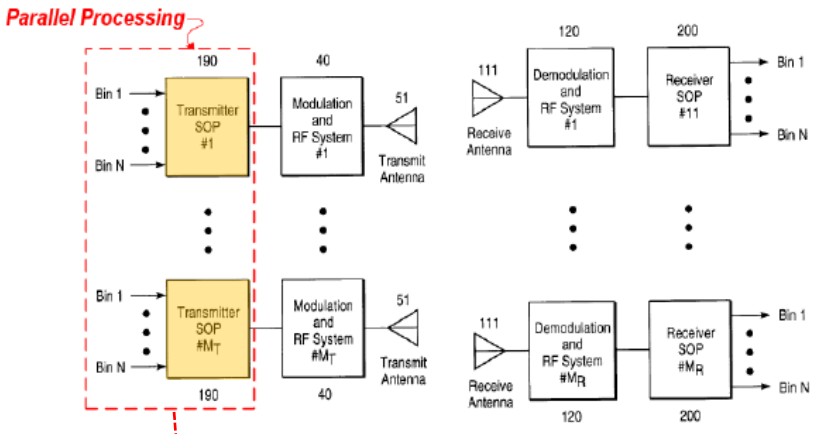
5.1. The Raleigh-Byrne Combination Provides An Additional Way That A Processor Processes Data Streams In Parallel

Dr. Jensen

Raleigh describes parallel processing (e.g., space-time processing, MIMO).

EX-1048 (Jensen 2nd Dec.), [40]

Raleigh's Figure 9 ("MIMO system")

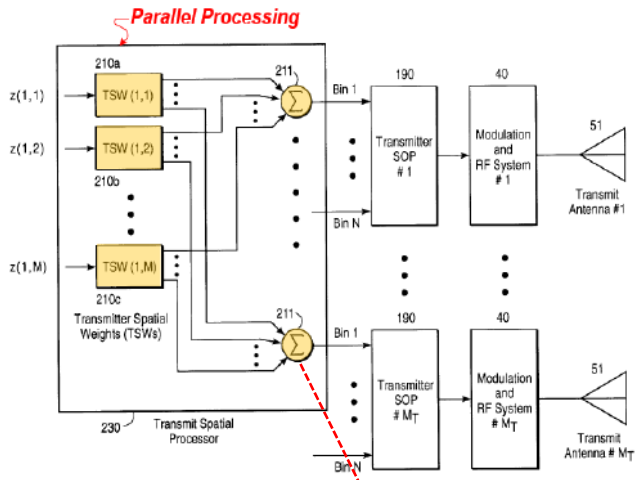


EX-1005, Figure 9 (annotated)

Referring to Figure 9 below, it is clear that these "Transmitter SOP processors" and "Receiver SOP processors" are arranged in parallel, meaning each Transmit SOP processor can perform its processing independently from and in parallel with the others, and each Receiver SOP processor can perform its processing independently from an in parallel with the others. Additionally, Figure 11 "shows M

EX-1048 (Jensen 2nd Dec.), [40]

Raleigh's Figure 11 ("spatial processing")



EX-1005, Figure 11 (annotated)

pendently from an in parallel with the others. Additionally, Figure 11 "shows M symbols: z(1,1) through z(1,M). … Each TSW 210A-C applies a weight vector to the symbol appearing at its input, and the elements of the resultant vector are routed to M_T summing junctions 211." EX-1005, 16:15-21. The fact that the weighted symbols are summed in each junction 211 means that they all need to be available at the same time, indicating that the weighting, which is a processing step, is performed in parallel. Identical processing is applied to all of the frequency

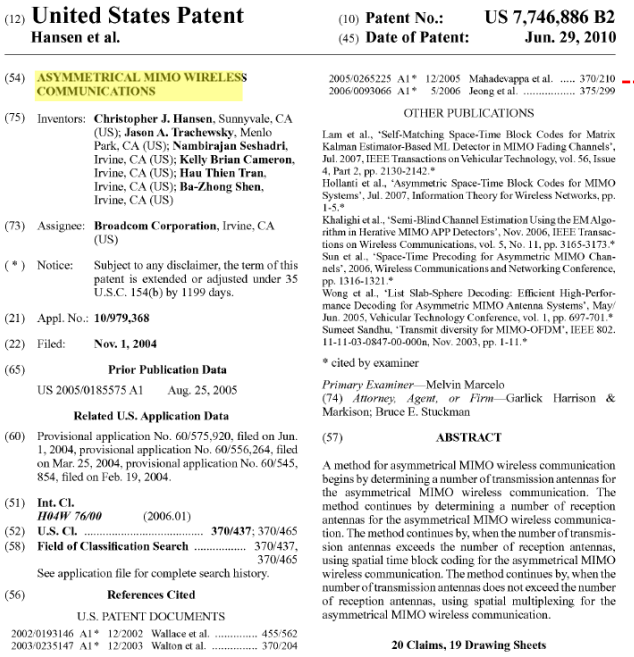
FISH.
DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

5.1. The Raleigh-Byrne Combination Provides An Additional Way That A Processor Processes Data Streams In Parallel

Dr. Jensen

As Dr. Cooklev agreed, parallel processing in Raleigh's technologies (e.g., space-time processing, MIMO) was well-known.

EX-1048 (Jensen 2nd Dec.), [40]



(12) **United States Patent**
Hansen et al.

(10) **Patent No.: US 7,746,886 B2**
(45) **Date of Patent: Jun. 29, 2010**

(54) **ASYMMETRICAL MIMO WIRELESS COMMUNICATIONS**

(75) Inventors: **Christopher J. Hansen**, Sunnyvale, CA (US); **Jason A. Trachewsky**, Menlo Park, CA (US); **Nambirajan Seshadri**, Irvine, CA (US); **Kelly Brian Cameron**, Irvine, CA (US); **Hau Thien Tran**, Irvine, CA (US); **Ba-Zhong Shen**, Irvine, CA (US)

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 1199 days.

(21) Appl. No.: **10/979,368**

(22) Filed: **Nov. 1, 2004**

(65) **Prior Publication Data**

US 2005/0185575 A1 Aug. 25, 2005

Related U.S. Application Data

(60) Provisional application No. 60/575,920, filed on Jun. 1, 2004, provisional application No. 60/556,264, filed on Mar. 25, 2004, provisional application No. 60/545,854, filed on Feb. 19, 2004.

(51) **Int. Cl.**
H04W 76/00 (2006.01)

(52) **U.S. Cl.** **370/437**; 370/465

(58) **Field of Classification Search** 370/437, 370/465

See application file for complete search history.

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Primary Examiner—Melvin Marcelo
(74) *Attorney, Agent, or Firm*—Garlick Harrison & Markison; Bruce E. Stuckman

(57) **ABSTRACT**

A method for asymmetrical MIMO wireless communication begins by determining a number of transmission antennas for the asymmetrical MIMO wireless communication. The method continues by determining a number of reception antennas for the asymmetrical MIMO wireless communication. The method continues by, when the number of transmission antennas exceeds the number of reception antennas, using spatial time block coding for the asymmetrical MIMO wireless communication. The method continues by, when the number of transmission antennas does not exceed the number of reception antennas, using spatial multiplexing for the asymmetrical MIMO wireless communication.

20 Claims, 19 Drawing Sheets

	Antenna 0	Antenna 1	Antenna 2	Antenna 3
Symbol m	s0	s1	s2	s3
Symbol m+1	-s1*	s0*	-s3*	s2*
Symbol m+2	s4	s5	s6	s7
Symbol m+3	-s4*	-s5*	s6*	s7*

EX-1078 (US 7746886), Cover

Ex-1078

For a multiple-input-multiple-output (MIMO) wireless communication, the transmitter and receiver each include multiple paths. In such a communication, the transmitter parallel processes data using a spatial and time encoding function to produce two or more streams of data. The transmitter includes multiple transmission paths to convert each stream of data into multiple RF signals. The receiver receives the multiple RF signals via multiple receiver paths that recapture the streams of data utilizing a spatial and time decoding function. The recaptured streams of data are combined and subsequently processed to recover the original data.

EX-1078 (US 7746886), 2:55-65

Dr. Cooklev

THE WITNESS: I -- I do not recall exactly investigating this, but it seems to me you -- you can have parallel processing in connection with MIMO.

EX-1049 (Cooklev Dep. Tr.), 75:16-18

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Issue 5: Sub-Issues

5.1. The Raleigh-Byrne Combination Provides An Additional Way That A Processor Processes Data Streams In Parallel

5.2. **Raleigh's Processor(s) Meet the Claimed Processor**

5.3. Raleigh's Parallel Set of Signal Sequences Are Data Streams

5.4. Abundant Evidence Shows That A POSITA Would Have Been Motivated To Combine Raleigh and Byrne

5.5. A Reasonable Expectation of Success Exists For The Raleigh-Byrne Combination

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

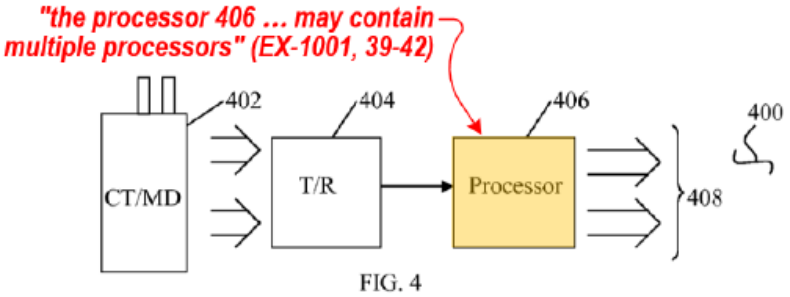
5.2. Raleigh's Processor(s) Meet the Claimed Processor

'943 Patent

1. A wireless communication device comprising:
a plurality of antennas; and
a communication component coupled to the plurality of antennas, the communication component including a processor, a transmitter, and a receiver,
wherein the communication component is configured to communicate via a first frequency band using a wireless communication protocol; and
wherein one or more subtasks are assigned to one or more channels, and the one or more channels are sampled and clocked individually; and
wherein the processor comprises multiple ones of the one or more channels and is further configured to process a first data stream and a second data stream in parallel.

EX-1001 ('943 patent), Claim 1

- The term "a" is generally interpreted as "one or more." *Elkay Mfg. Co. v. Ebco Mfg. Co.*, 192 F.3d 973, 977 (Fed. Cir. 1999)
- The claims do not recite a "single processor."
- The '943 patent describes that "the processor 406 is not limited to only one processor and may contain multiple processors." EX-1001, 4:21-23, 4:39-42.



EX-1001, Figure 4 (annotated)

FISH.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

5.2. Raleigh's Processor(s) Meet the Claimed Processor

Dr. Jensen

43. Even assuming that Raleigh's SOP processors were considered as separate components, Raleigh describes the claimed "processor" through its combination of those processors, as originally discussed in the Petition and my Declaration. Petition, 56-67. In fact, Patent Owner's interpretation of Raleigh aligns exactly with the '943 patent's examples of a processor as including multiple processors. In particular, the claims do not recite a "single processor," but, instead, simply recite "a processor." Further, the claims do not characterize the processor as a specific type of processor and broadly cover any type of processor, including processors with multiple processing elements (e.g., multiprocessor, multi-core processor, multiple-thread processor), such as those described in the '943 patent.

EX-1048 (Jensen 2nd Dec.), [43]

44. Reviewing the general description of the term "processor" in the claims, a POSITA would have understood that the claims cover known types of processors. Based on my knowledge and experience, well-known examples of a "processor" include a multiprocessor (EX-1045, EX-1046, EX-1054, EX-1055) or a "multiple-thread processor" (EX-1056), each of which include multiple processing elements. EX-1054, Abstract; EX-1055, 3:62-64; EX-1056, 7:12-15. Nota-

EX-1048 (Jensen 2nd Dec.), [44]

53

FISH.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

5.2. Raleigh's Processor(s) Meet the Claimed Processor

Well-Known Processors with Multiple Processing Elements

The Case for a Single-Chip Multiprocessor

EX-1045 ("The Case for a Single-Chip Multiprocessor"), Title

mance microprocessors are available. A design option that is becoming increasingly attractive is a multiprocessor architecture.

EX-1046 ("Evaluation of Design Alternatives for a Multiprocessor Microprocessor"), 1

A method for maintaining coherent data in a multiprocessor system having a plurality of processors coupled to main memory, where each processor has an internal cache which is

EX-1054 (US 7,584,330), Abstract

single integrated circuit die. The multiple processors are vertically threaded to form a processor with both vertical and horizontal threading, augmenting executing efficiency and decreasing latency in a multiplicative fashion. In FIG. 2C

EX-1056 (US 7,587,581), 7:12-15

In accordance with the present invention, a single-chip multiprocessor system with explicit parallelism architecture processors and an operation method of this system is based on

EX-1055 (US 7,895,587), 3:62-64

All cited in EX-1048 (Jensen 2nd Dec.), [44]

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

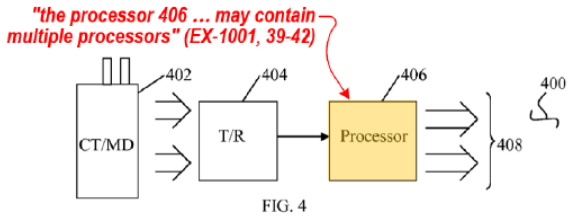
5.2. Raleigh's Processor(s) Meet the Claimed Processor

Dr. Jensen

cessing elements. EX-1054, Abstract; EX-1055, 3:62-64; EX-1056, 7:12-15. Notably, this is exactly what the '943 patent contemplates. EX-1001, 4:21-23 ("In FIG. 4 the processor 406 is shown as a single processor, however, ***the processor 406*** is not limited to only one processor and ***may contain multiple processors***."), 4:39-42 ("In FIG. 5A, in addition to multiple antennas 508 and multiple T/R units 504 the figure also shows ***multiple processors 506 in a process unit functional block*** in a CT/MD.").

be delivered on the desired output port. In FIG. **4** the processor **406** is shown as a single processor, however, the processor **406** is not limited to only one processor and may contain multiple processors. Alternately, the single proces-

EX-1001 ('943 Patent), 4:21-24



EX-1001, Figure 4 (annotated)

EX-1048 (Jensen 2nd Dec.), [44]

EX-1048 (Jensen 2nd Dec.), [44]

present invention in a dual band system **500**. In FIG. **5**A, in addition to multiple antennas **508** and multiple T/R units **504** the figure also shows multiple processors **506** in a process unit functional block in a CT/MD. The system may com-

EX-1001 ('943 Patent), 4:41-44

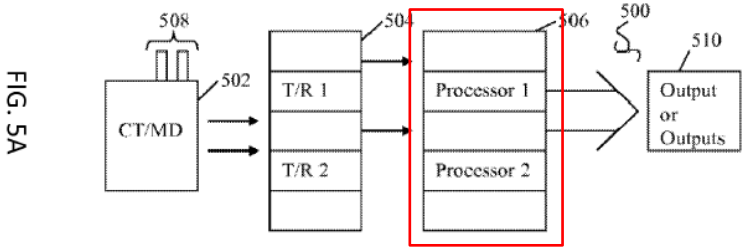


FIG. 5A

EX-1001 ('943 Patent), Figure 5A

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

5.2. Raleigh's Processor(s) Meet the Claimed Processor

Dr. Jensen

45. In addition, Raleigh suggests an implementation where the functionalities of multiple "SOP processors 190" are performed by a "single processor." For example, Raleigh's Figure 9 illustrates the components with blocks, thereby constituting a block diagram, similar to Figure 13 that is expressly identified as a "block diagram." EX-1008, 17:1-6. It is well-known that a block diagram is used to visualize the ***functional*** aspects of components. EX-1057, 47 (defining "block diagram" as "[a] diagram that represents graphically the interconnection relationships

EX-1048 (Jensen 2nd Dec.), [45]

the ***functions*** of the parts and their ***functional relationships***."). Therefore, a POSITA would have understood that at least some components illustrated in Raleigh's Figure 9 do not necessarily represent or correspond to specific physical structures but rather indicate the functionalities of the components. For example, a POSITA would have understood that Raleigh's SOP processors 190 represent their processing functionalities. Further, it was widely known or would have been obvi-

EX-1048 (Jensen 2nd Dec.), [45]

block diagram A diagram that represents graphically the interconnection relationships between elements of an electronic system, e.g. a computer system. These elements may range from circuits to major *functional units; they are described as labeled geometric

EX-1057 (A Dictionary of Computing)

Block Diagram A graphic way to show different elements of a program or process by the use of squares, rectangles, diamonds and various shapes connected by lines to show what must be done, when it must be done and what happens if it's done this way or that. In short, it shows how all the small

EX-1058 (Newton's Telecom Dictionary)

block diagram (software) A diagram of a system, computer, or device in which the principal parts are represented by suitably annotated geometrical figures to show both the functions of the parts and their functional relationships. *Synonym:* con-

EX-1059 (IEEE 100 The Authoritative Dictionary of IEEE Standards Terms)

interconnecting lines. Synonym: flowchart. 4. A chart that graphically depicts the functional relationships of hardware making up a system. The block diagram serves to indicate the various data and control signal paths between functional units of the system hardware. 5. A drawing in which circuit functions are represented as blocks of various geometries.

EX-1060 (Modern Dictionary of Electronics)

FISH.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

5.2. Raleigh's Processor(s) Meet the Claimed Processor

Dr. Jensen

46. Again, based on my knowledge and experience in the relevant field, single processor systems were well-known and a POSITA would have been motivated to implement Raleigh using a single processor to gain the known benefits of single processor systems, such as (i) a simple and easy design without requiring complicated synchronization between multiple processors, (ii) an easy integration with other hardware, (iii) a relatively small size, (iv) a lower power consumption, and (v) a cost effective design. EX-1061, 1-2, 6-7; EX-1062, 1-2.

EX-1048 (Jensen 2nd Dec.), [45]

ADVANTAGES OF A SINGLE PROCESSOR DESIGN
The use of a single, multitasking processor design for the attribute measurement system offers advantages in the areas of hardware integration, size, apparent simplicity and network security.

EX-1061, 6

- It is easier to design a single processor system as compared to a multiprocessor system. This is because all the processors in the multiprocessor system need to be synchronized and this can be quite complicated.

EX-1062, 2

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DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

57

Issue 5: Sub-Issues

5.1. The Raleigh-Byrne Combination Provides An Additional Way That A Processor Processes Data Streams In Parallel

5.2. Raleigh's Processor(s) Meet the Claimed Processor

5.3. **Raleigh's Parallel Set of Signal Sequences Are Data Streams**

5.4. Abundant Evidence Shows That A POSITA Would Have Been Motivated To Combine Raleigh and Byrne

5.5. A Reasonable Expectation of Success Exists For The Raleigh-Byrne Combination

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

5.3. Raleigh's Parallel Set of Signal Sequences Are "Data Streams"

Patent Owner

The "data streams" require two different types of wireless communication (e.g., cellular and cordless).

POR, 38-39

Dr. Jensen

49. Based on my review of the record and my knowledge and experience in the field, the plain meaning of "data stream" is not tied to a type of network. In fact, none of the claims or the '943 patent's specification require different types of network for the first and second data streams. I noted that the '943 patent's specification uses the term "data stream" several times, but none of those instances provides a clear definition tied to a network type. EX-1001, 4:24-31, 4:36-38, 4:54-59, 6:65-67, 7:2-4, 7:20-35, 7:50-62; EX-1049, 66:21-67:8 ("as long as they are dis-

EX-1048 (Jensen 2nd Dec.), [49]

'943 Patent

contain multiple processors. Alternately, the single processor may have multiple channels for parallel processing of each data stream to process accurately two distinct signals **408** that were more optimally received by two dedicated antennas and two separate T/R units contained within the CT/MD to improve performance and quality of output. An example is a CT/MD **402** which is optimized for video and voice.

Having more than one T/R unit gives a performance edge as each signal can be better processed and tuned to the specific frequency band of the signal. Thus better quality of output can be achieved for each type of signal and application. As an example, by having each of the data streams sampled at differing clock frequencies the performance can be better optimized.

EX-1001 ('943 patent), 4:24-38

Server C controls the communication protocols in conjunction with the network switching box or other devices, such as CT/MD **502**. The multiple processors **506** allow for parallel and custom processing of each signal or data stream to achieve higher speed and better quality of output. This can also be done with a single processor that has the parallelism and pipeline capability built in for handling one or more data streams simultaneously. Processor **506** is the complete elec-

EX-1001 ('943 patent), 4:52-59

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

5.3. Raleigh's Parallel Set of Signal Sequences Are "Data Streams"

Dr. Jensen

tinct"). Further, Dr. Cooklev recognized that cellular and Wi-Fi "*could be*" examples of the first and second data streams, and he did not dispute that the distinct signals from the same type of network can meet the first and second data streams.

EX-1049, 65:8-67:17.

EX-1048 (Jensen 2nd Dec.), [49]

Dr. Cooklev

THE WITNESS: Well, it does not leave open the question that they have to be distinct. So as long as they are distinct, I think this passage, at least, is what -- about Figure 4, that -- that's what it says here, two distinct signals.

EX-1049 (Cooklev Dep. Tr.), 65:8-67:17

FISH.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Issue 5: Sub-Issues

5.1. The Raleigh-Byrne Combination Provides An Additional Way That A Processor Processes Data Streams In Parallel

5.2. Raleigh's Processor(s) Meet the Claimed Processor

5.3. Raleigh's Parallel Set of Signal Sequences Are Data Streams

5.4. **Abundant Evidence Shows That A POSITA Would Have Been Motivated To Combine Raleigh and Byrne**

5.5. A Reasonable Expectation of Success Exists For The Raleigh-Byrne Combination

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

5.4. Abundant Evidence Shows That A POSITA Would Have Been Motivated To Combine Raleigh and Byrne

Petitioner

- Patent Owner treats the proposed combination as starting with Byrne and modifying Byrne's cellular cordless telephone (CCT) based on Raleigh's teaching.
- Raleigh is the primary reference in the combination and Patent Owner's analysis is reversed

Petitioner's Reply, 22;
EX-1048 (Jensen 2nd Dec.), [50]-[51]

Patent Owner

Petitioner argues that a POSITA would have been motivated to incorporate Raleigh's techniques" into Byrne in order to capture certain purported benefits.

POR, 39

Here, Raleigh neither teaches nor suggests that it can be incorporated into a handheld device like Byrne's mobile phone. EX-2004, ¶74. Raleigh's remote unit is

POR, 40

Further, contrary to Petitioner's argument, a POSITA would have been *discouraged* from incorporating Raleigh's SOP system into Byrne's handheld phone

POR, 41

Petitioner has failed to carry its burden to establish that a POSITA would have been motivated to implement Raleigh's SOP system in Byrne's handheld mobile phone. The Board should therefore reject Ground 2. *See Hulu, LLC v. Sound View*

POR, 48

Here, the Petition fails to explain why a POSITA would have had a reasonable expectation of success in modifying Byrne as Petitioner proposes, as well as incorporating advanced features from Raleigh into that modified device.

POR, 52

FISH.
DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

5.4. Abundant Evidence Shows That A POSITA Would Have Been Motivated To Combine Raleigh and Byrne

Preambles of Challenged Claims

1. A wireless communication device comprising:

5. A wireless communication device comprising:

8. A wireless communication device comprising:

12. A wireless communication device comprising:

The Challenged Claims are directed to "wireless communication device," ***not*** "handheld device" or other consumer products with limited form factor.

The proposed Raleigh-Byrne combination is not limited to a handheld device but to cover devices of various types and sizes, such as a ***vehicle device*** or ***building unit***, which fall within the "wireless communication devices."

EX-1048 (Jensen 2nd Dec.), [52]-[53];
Petition, 43-48

Byrne

The CCT 200 may be a mobile unit installed in a vehicle, a so called transportable unit or a hand held portable unit. CCT 200 comprises an antenna

EX-1008 (Byrne), 7:11-13

Raleigh

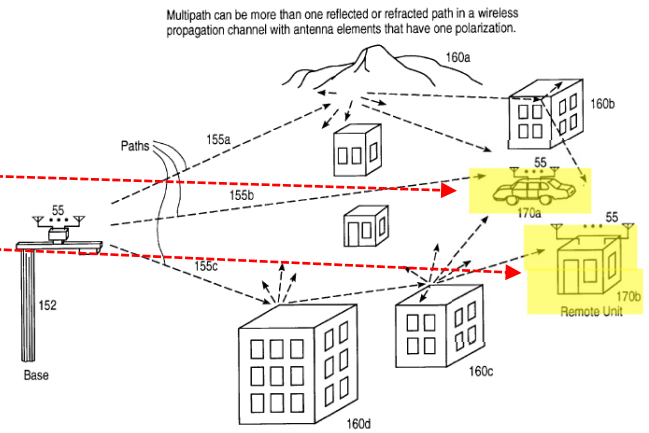


FIG. 4

EX-1005 (Raleigh), Figure 4

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

5.4. Abundant Evidence Shows That A POSITA Would Have Been Motivated To Combine Raleigh and Byrne

Dr. Cooklev

Are the claims of the '943 patent drafted in a way to limit the size or form factor of a communication device?

A. Well, let me here qualify that first. It is Byrne that talks about a radio telephone, so Byrne's CCT is a consumer device. This is why I believe I answered correctly your question that -- that if a person of skill in the art -- not only was discouraged but just would not get succeeded. There was no chance that they would get succeeded at the time of the invention in bringing Raleigh into Byrne because Byrne is a consumer device, is a consumer product. And so these practical constraints, they would apply.

EX-1049 (Cooklev Dep. Tr.), 84:2-15

Q. Okay. So earlier I believe you described design constraints that would discourage a combination of the Raleigh and Byrne references, and you framed those as a -- as unlikely or undesirable to achieve a consumer product.

Did I misunderstand your testimony?

A. No. Generally, you did not.

Q. I did not?

A. No.

EX-1049 (Cooklev Dep. Tr.), 83:15-23

Dr. Jensen

52. Notably, the Challenged Claims recite a "wireless communication device" in the preambles, but do not require it to be a consumer product like a handheld device. Dr. Cooklev did not dispute this, but he acknowledged that his entire opinion of the design constraints was premised on it being applied to a consumer product, such as a "handheld device," as opposed to devices "designed to be used in vehicles and buildings." EX-1049, 82:23-83:23, 84:16-85:1; POR, 40-51. Further, Patent Owner and Dr. Cooklev mischaracterize the proposed Raleigh-Byrne combination as being only directed to consumer products, such as a handheld device. Based on my review, this is erroneous. EX-1049, 78:8-79:23, 84:5-7.

EX-1048 (Jensen 2nd Dec.), [52]

FISH.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

5.4. Abundant Evidence Shows That A POSITA Would Have Been Motivated To Combine Raleigh and Byrne

The test for obviousness is whether a person having ordinary skill in the art would have been motivated to combine the "teachings" of the references to arrive at the claimed solution. *Allied Erecting & Dismantling Co. v. Genesis Attachments, LLC*, 825 F.3d 1373, 1381 (Fed. Cir. 2016).

"[S]imultaneous advantages and disadvantages" would not make the modification nonobvious. *Id.*

Prior art references need not be "physically combinable," as the "test for obviousness is not … bodily incorporate[ion]." *Id.*

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

5.4. Abundant Evidence Shows That A POSITA Would Have Been Motivated To Combine Raleigh and Byrne

Dr. Jensen

55. Even if the Raleigh-Byrne combination were to be limited to a handheld device as assumed throughout the POR, Patent Owner's reliance on potential technical disadvantages and a lack of commercially-available products does not negate the Petition's reasoned obviousness analysis. In particular, Patent Owner raises disadvantages of implementing Raleigh's remote unit as a "handheld device" (by incorrectly equating this with Byrne's CCT) and argues that "the purported benefits of Petitioner's Byrne-Raleigh device are spurious and would have been outweighed by the difficulty and detriments of the combination." POR, 40. However, simply mentioning disadvantages would not obviate the Petition's obviousness analysis. Petition, 43-49.

EX-1048 (Jensen 2nd Dec.), [55]

Allied Erecting & Dismantling, 825 F.3d, at 1381

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

5.4. Abundant Evidence Shows That A POSITA Would Have Been Motivated To Combine Raleigh and Byrne

Dr. Jensen

57. As noted in the Petition and my Original Declaration, there were numerous motivations for a POSITA to implement Raleigh's remote unit as a mobile handheld device. Petition, 43-49; EX-1003, ¶¶160-168. Wireless/cellular mobile phones were gaining increased popularity, and a huge demand existed for improving the functionalities of mobile phones. A POSITA would have been prompted to modify Raleigh's remote unit as a portable handheld device for apparent benefits afforded by wireless and cellular devices, such as portability and freedom to use without wired connection. Indeed, Raleigh's remote unit 170b is exemplified as a vehicle unit, which is considered as a portable mobile device. EX-1005, Figure 4. Therefore, a POSITA would have understood or found obvious that Raleigh's remote unit would include or be modified as a mobile handheld device, as evidenced in several references. EX-1063, 6:38-53 ("the remote mobile units 15 are hand-

EX-1048 (Jensen 2nd Dec.), [57]

Corroborating Evidence

signals back into sound waves. In recent years, wireless and cellular telephones have been rising in popularity, due to their mobility. Users are no longer tied to a stationary telephone, but are free to carry their telephones with them.

EX-1063 (Gernert), 1:34-37

Cellular telephone systems have gained widespread acceptance as an efficient means of mobile voice and data communications. While early mobile units were large and complex, miniaturization has made possible hand-held units with full functional capabilities allowing the user freedom to use the phone unit without connection to the vehicle. Unfortunately, this miniaturization has made portable and or hand-held units less practical for vehicular use. For example, battery charging, remote antenna connections, voice and data communications, and most importantly, what is known as "hands free" operation require physical connection to the phone unit.

EX-1064 (Braitberg), 1:16-27

As the users of the future wireless communication systems continually push handset manufacturers to add more functionalities, the manufacturers are confronted with trade-offs among cost, size, power and packaging constraints. It is anticipated that RF MEMS will emerge as a breakthrough

EX-2008 ("Technology Trend"), 22

FISH.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

5.4. Abundant Evidence Shows That A POSITA Would Have Been Motivated To Combine Raleigh and Byrne

Dr. Jensen

58. Patent Owner asserts that Raleigh has no suggestion of implementing its techniques in a portable handheld device. POR, 40-41. With the clear industry trend in mind, however, Raleigh's "high-level" discussion of a "remote unit" would have actually encouraged a POSITA to consider ways to implement and improve Raleigh's remote unit in a manner that meets the market demand. Petition, 44-45; EX-1003, ¶161.

59. Indeed, Raleigh's specification uses the term "remote unit" without limitation and a POSITA would have readily considered and found obvious handheld devices as example remote units known at the time. Although Raleigh depicts vehicles and buildings in its figures, Raleigh does not actually describe these examples and certainly does not limit its remote units to them. For example,

60. As shown in my Original Declaration, a POSITA, with this background, would have investigated known solutions, such as those taught by the other references in the combination, such as Byrne. Petition, 43-49; EX-1003, ¶¶160-168. Indeed, Raleigh has no description that teaches away from use of

EX-1048 (Jensen 2nd Dec.), [58]-[60]

FISH.

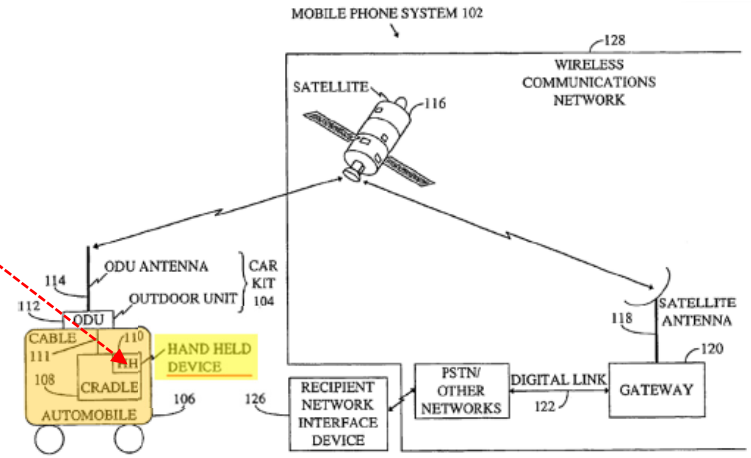
DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

5.4. Abundant Evidence Shows That A POSITA Would Have Been Motivated To Combine Raleigh and Byrne

Dr. Jensen

61. For example, based on my knowledge and experience, several examples of Raleigh's vehicle or building units 170a and 170b were well known. For example, it would have been understood and obvious that one well-known example of Raleigh's vehicle unit 170a would be a "hand held wireless device[] 110" that can be "mounted in or coupled to a car kit 104" that is "mounted in a vehicle." EX-1066, 5:25-35, Figure 1 (below); EX-1067, 5:60-6:13, 8:31-9:63 ("The cellular vehicle mobile telephone has a telephone control unit 116 (FIG. 1), handset 118, and cradle 120.").

EX-1048 (Jensen 2nd Dec.), [61]

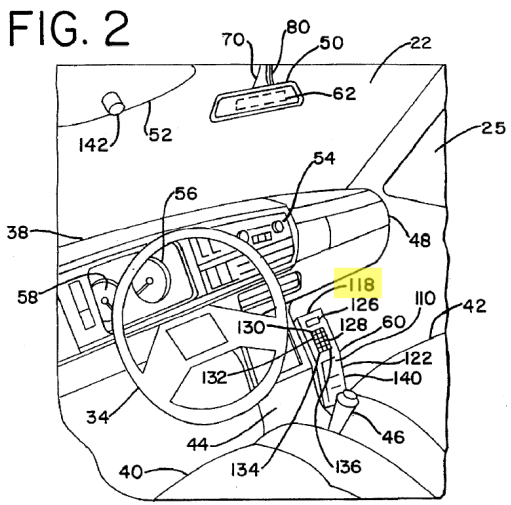


EX-1066, Figure 1 (annotated)

EX-1066, Figure 1

The cellular vehicle mobile telephone has a telephone control unit **116 (FIG. 1), handset 118, and cradle 120.** The

EX-1067, 8:31-32, Figure 2



69

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

5.4. Abundant Evidence Shows That A POSITA Would Have Been Motivated To Combine Raleigh and Byrne

Dr. Cooklev's testimony aligns with the well-known understanding of Raleigh's vehicular remote unit 170a.

- a vehicle is "mobile," which is "more than portable."
- a vehicle can be used to transport portable devices by allowing a person to carry a portable device in the vehicle.

EX-1048 (Jensen 2nd Dec.), [62]

Q. And a vehicle is portable, correct?

MR. HWANG: Objection. Form.

THE WITNESS: I think it's -- seems to me more accurate to say that a vehicle is mobile, even.

BY MR. KAZI:

Q. So you would not agree that a vehicle is a portable device?

A. No, I -- I'm saying that it's -- it's -- in a sense, it's more than portable. It is mobile.

Q. Okay. And a vehicle can be used to transport portable devices, right?

A. Well, you -- a person can carry with them a portable device and be in a vehicle, if that's what you mean. That's possible.

Dr. Cooklev agreed that Raleigh's vehicle unit already satisfies the "portable" and "mobile" features

Dr. Cooklev agreed that Raleigh's vehicle unit can contain "handheld" devices.

EX-1037 (Cooklev Dep. Tr.), 92:9-22

FISH.

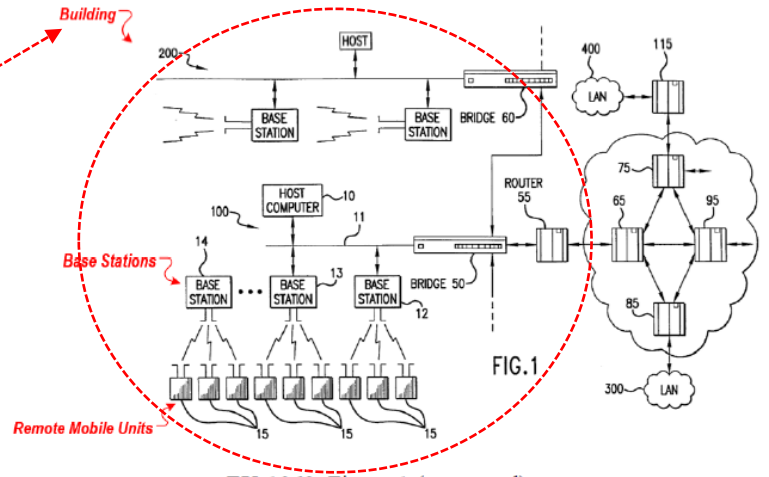
DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

5.4. Abundant Evidence Shows That A POSITA Would Have Been Motivated To Combine Raleigh and Byrne

Dr. Jensen

63. Further, it would have been understood and obvious that one well-known example of Raleigh's building unit 170b would include "base stations" and other wireless/wired network components, so that multiple "remote mobile units" (e.g., "hand-held, battery-operated data terminals portable digital assistants or voice communication handsets") are in wireless communication in the building. EX-1063, 6:38-7:13, Figure 1 (below); EX-1007, 3 ("[a] building which requires improved coverage for more than one wireless service"), 6-7, Figure 1.

EX-1048 (Jensen 2nd Dec.), [63]

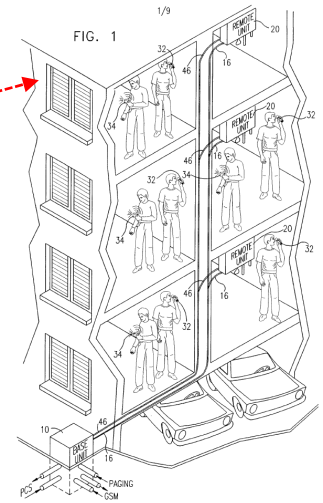


EX-1063, Figure 1 (annotated)

EX-1063, Figure 1

Conventionally, each wireless communications system has its own network for improved coverage in buildings and other shadowed areas. A building which requires improved coverage for more than one wireless service must be "wired" separately for each service.

EX-1007 (WO748), 3



EX-1007, Figure 1

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DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

5.4. Abundant Evidence Shows That A POSITA Would Have Been Motivated To Combine Raleigh and Byrne

Dr. Jensen

device as an obvious solution. Indeed, the '943 patent provides limited disclosure of how to implement a handheld device that incorporates the claimed features. Like Raleigh, the '943 patent leaves implementation details up to the knowledge and skill of a POSITA. The '943 patent does not teach anything new or invent anything about implementing the claimed features in a portable handheld device.

EX-1048 (Jensen 2nd Dec.), [65]

90:12, 91:17-18, 92:2-3. Because the '943 patent's specification (the same as the '291 patent) relies on the POSITA's knowledge and skill for its disclosure of handheld device implementation details, the same knowledge and skill is available for assessment of the obviousness of implementing Raleigh's techniques in a handheld device. Raleigh's disclosure cannot be held to a higher standard than the '943 patent's disclosure.

EX-1048 (Jensen 2nd Dec.), [66]

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

5.4. Abundant Evidence Shows That A POSITA Would Have Been Motivated To Combine Raleigh and Byrne

Dr. Jensen

67. Finally, Patent Owner's own evidence merely references general, technical considerations when implementing handheld devices, but never conveys that such implementations were impossible or impractical. EX-1049, 80:1-82:21. In fact, Patent Owner's identification of alleged technical limitations, largely backed only by Dr. Cooklev's conclusory, subjective opinions, are all general and do not rely on specific evidence that demonstrates impracticability or impossibility of the use of a portable handheld device in Raleigh. POR, 42-44 (e.g., "*special* hardware and *increased complexity*," "*complex* computations," "*more* physical space for the requisite hardware including a *large*, rechargeable battery," "*inherent* limitations that *larger* devices do not have, such as *limited* space"); EX-1049, 78:21-25 ("limited space, limited computation of power, limited memory"), 79:14-17 ("only if at the *significant cost*"), 79:18-21 ("something that's *much bigger*"), 80:1-17 (acknowledging that he didn't perform quantitative or objective analysis), 80:8-82:21 (limiting his opinion to the combination being discouraged or difficult). Patent Owner provides no quantitative or objective evidence that demonstrates why a POSITA would have considered use of a handheld device in Raleigh as so difficult the POSITA would not have considered it. To the contrary, handheld devices were one of the most obvious types of remote units known at the time of the '943 patent.

EX-1048 (Jensen 2nd Dec.), [67]

FISH.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Issue 5: Sub-Issues

5.1. The Raleigh-Byrne Combination Provides An Additional Way That A Processor Processes Data Streams In Parallel

5.2. Raleigh's Processor(s) Meet the Claimed Processor

5.3. Raleigh's Parallel Set of Signal Sequences Are Data Streams

5.4. Abundant Evidence Shows That A POSITA Would Have Been Motivated To Combine Raleigh and Byrne

5.5. **A Reasonable Expectation of Success Exists For The Raleigh-Byrne Combination**

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DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

5.5. A Reasonable Expectation of Success Exists For The Raleigh-Byrne Combination

Dr. Jensen

68. In the POR, Patent Owner contends that a POSITA's reasonable expectation of success would be limited by the POSITA's "relatively low level of experience." POR, 52. Based on my review of the record, however, Patent Owner does not dispute the level of skill. The '943 patent also offers very limited disclosure and relies on a POSITA's knowledge/skill for its own disclosure. As discussed above, the '943 patent describes similar technology (e.g. MIMO) as Raleigh, but several components for the technology are not described in the '943 patent because "a patent specification need not teach everything that a person of skill in the art knows." EX-1065, 80:3-81:25; EX-1005, 11:42-49. As such, the '943 patent's limited disclosure of specific details in implementing its invention (e.g., MIMO) indicates that a POSITA would have had the requisite skill to implement Raleigh's system as modified by at least Byrne to arrive at the limitations required in the Challenged Claims.

EX-1048 (Jensen 2nd Dec.), [68]

69. For example, the '943 patent provides limited discussion of processors, transmitters/receivers, and antennas, much less all of the components and implementation details necessary for MIMO. EX-1001, 4:12-6:47. Therefore, the '943 patent relies on the state of the art for its disclosure, which confirms that a POSITA would have had sufficient knowledge and skill to implement Raleigh's techniques and the combination involving Raleigh and Byrne. As discussed above, the '943 patent's limited disclosure of other features (e.g., handheld device) also confirms that a POSITA would have had sufficient knowledge/skill to implement those features in the combinations involving Raleigh and Byrne.

EX-1048 (Jensen 2nd Dec.), [69]

Dr. Cooklev

THE WITNESS: Well, first, I don't see the relevance of this question to my declaration.

And, second, it's my understanding that a patent specification need not teach everything that a person of skill in the art knows. And preferably omits that.

EX-1037 (Cooklev Dep. Tr. in IPR2022-01005 for US 9084291), 80:3-81:24

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

5.5. A Reasonable Expectation of Success Exists For The Raleigh-Byrne Combination

Dr. Jensen

70. In the POR, Patent Owner further attacks the Petition's reasonable expectation of success analysis by, once again, referring to alleged technical challenges in the Raleigh-Byrne combination. POR, 53-55 ("ten processors"; "physical size and power requirement"; "valuable physical space and resources within the device"). As noted in the Petition and my Original Declaration, however, there were abundant advantages/motivations for a POSITA to combine the teachings of Raleigh and Byrne. Petition, 43-49; EX-1003, ¶¶160-168. Dr. Cooklev didn't dispute this. EX-1049, 100:8-102:7.

EX-1048 (Jensen 2nd Dec.), [70]

71. Notably, as an example of Patent Owner's overly narrow view of obviousness, Patent Owner counted the number of "processors" used in Raleigh ("ten processors") as a way to show how difficult it would be to modify Raleigh. POR, 54. As discussed above, however, Raleigh illustrates each processor as a "block." EX-1005, Figures 1, 3, 11-16, 22, 24, 25, 6:21-23 ("Transmitter Space-Frequency Pre-Processor (TSFP) ***block***"), 8:1-2 ("Receiver Space-Frequency Processor (RSFP) ***block***"). As discussed above, block diagrams visualize the ***functional*** aspects of components. EX-1057, 47; EX-1058, 101; EX-1059, 77; EX-1060, 108. Therefore, a POSITA would have understood that the processors illustrated in Raleigh do not necessarily represent or correspond to specific physical structures and, instead, indicate the functionalities of the components. As explained above and in the Petition, a POSITA would have recognized and found it obvious to implement the teachings of Raleigh and Byrne in a handheld device or other portable devices for numerous known benefits (e.g., reduced cost, size, weight, power, hardware complexity).

EX-1048 (Jensen 2nd Dec.), [71]

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Issue 6

Claims 6-7 (Ground 2A)

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DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

The Raleigh-Byrne Combination Renders Obvious Claims 6-7 (Ground 2A)

'943 Patent

6. The device of claim **5**, in communication with a server configured with a controller in communication with a plurality of network devices wherein the server supervises the connection of a plurality of wireless devices.

EX-1001 ('943 patent), Claim 6

Patent Owner

Patent Owner contends that Ground 2A of the Petition "fails to address where the server supervises the connection of a plurality of wireless devices."

POR, 56

Petitioner

Patent Owner ignores the Petition's reference to "claim 6 in Ground 1A" and the explanation in Ground 1A how Byrne's server—the same server referenced in Ground 2A—"supervises the connection of a plurality of wireless devices."

Petitioner's Reply, 27; Petition, 19-20, 65

78

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

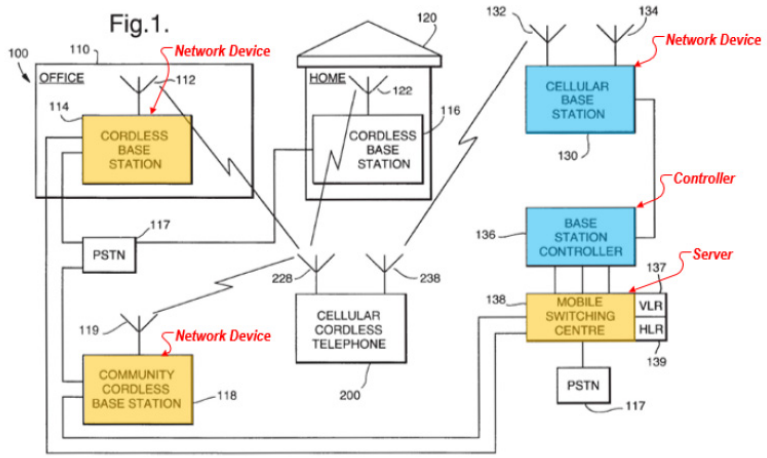
The Raleigh-Byrne Combination Renders Obvious Claims 6-7 (Ground 2A)

Dr. Jensen

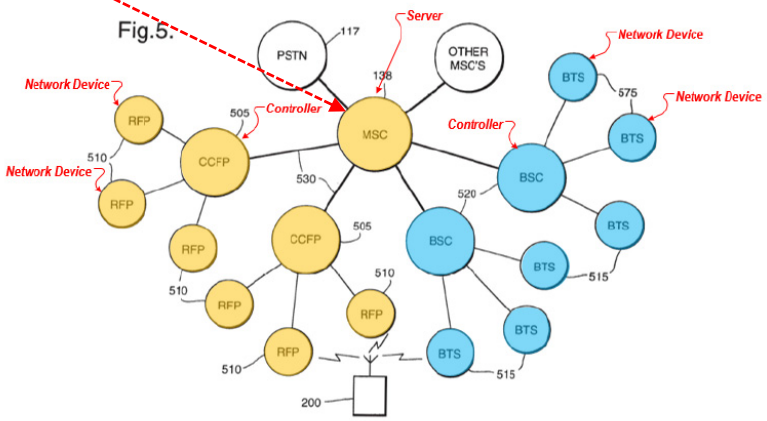
73. Based on my review, Patent Owner does not dispute that Byrne's "Mobile Switching Centre (MSC)" corresponds to the server required in claim 6. POR, 56. As already discussed in the Petition and my Original Declaration, Byrne elaborates MSC's various operations for connected wireless devices, such as having "a database of all the subscribes," enabling a wireless device to "register its presence in the area assigned to that particular MSC," routing calls, transmitting control signals "to facilitate automatic paging between systems and automatic handover between systems," directing "a call originating on any particular system," "communicat[ing] with the non-preferred system's MSC or network control centre and instruct[ing] it to handover the call to the preferred system," etc. EX-1008, 7:4-10, 10:52-13:32; Petition, 19, 65; EX-1003, ¶¶97, 205-206. A POSITA would have understood and found obvious that these operations of MSCs ("server") amount to, or are related to, "supervis[ing] the connection of a plurality of wireless devices."

EX-1048 (Jensen 2nd Dec.), [73]

Byrne



EX-1008, Figure 1



EX-1008, Figure 5

Petition, 19-20

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Issue 7

The Raleigh-Byrne-WO748 Combination
(Claims 3-4 in Ground 2B)

80

FISH.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

The Raleigh-Byrne-WO748 Combination Renders Obvious Claims 3-4 (Ground 2B)

A POSITA Would Have Reasonably Expected Success in Making the Raleigh-Byrne-WO748 Combination.

Patent Owner

Patent Owner contends that there was no reasonable expectation of success in combining Raleigh-Byrne-WO748 because of the alleged lack of capability of a POSITA.

POR, 56-58

Petitioner

As discussed in the Petition and reiterated above, a POSITA would have had a reasonable expectation of success in making the obvious Byrne-WO748 combination and the obvious Raleigh-Byrne combination.

Petitioner's Reply, 27-28

FISH.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

The Raleigh-Byrne-WO748 Combination Renders Obvious Claims 3-4 (Ground 2B)

Patent Owner

Patent Owner additionally contends that the Raleigh-Byrne-WO748 combination would be much harder than the Byrne-WO748 combination because of one of Raleigh's example techniques (OFDM).

POR, 57-58

Dr. Jensen

harder than the Byrne-WO748 combination. However, Raleigh describes OFDM as an example technique to implement MIMO. EX-1005, 2:46-50, 11:42-12:54. Even if OFDM or MIMO techniques would be implemented at Raleigh-Byrne's device, the principles and level of any modification to WO748's system would not have changed substantially. Therefore, the same analysis laid out above applies here.

EX-1048 (Jensen 2nd Dec.), [75]

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Issue 8

Claims 12, 15, and 18-20
(Grounds 2C and 2E)

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DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

83

The Raleigh-Byrne-Pillekamp Combination Renders Obvious Claims 12, 15, and 18-20 (Grounds 2C and 2E)

Patent Owner

Patent Owner simply refers to the arguments in the Raleigh-Byrne combination.

POR, 58

Petitioner

The same analysis as to the Raleigh-Byrne combination above applies here.

Petitioner's Reply, 28

FISH.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE