IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION

ERICSSON INC., et al.,	§	
	§	
Plaintiffs,	§	
	§	
v.	§	CIVIL ACTION NO. 6:10-cv-473
	§	
D_LINK CORPORATION et al.,	§	JURY TRIAL DEMANDED
	§	
Defendants.	§	

REBUTTAL EXPERT REPORT OF SCOTT NETTLES, PH.D. REGARDING VALIDITY OF U.S. PATENT NOS. 6,424,625; 6,330,435; 6,519,223; 6,772,215; 6,466,568; AND 5,987,019

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1. With respect to this report, I have been retained as a technical expert by Ericsson Inc. and Telefonaktiebolaget LM Ericsson (collectively "Ericsson") to address the issues of validity of U.S. Patent Nos. 5,987,019 ('019 Patent), 6,466,568 ('568 Patent), 6,330,435 ('435 Patent), 6,424,625 ('625 Patent), 6,519,223 ('223 Patent), and 6,772,215 ('215 Patent) (collectively "Patents-in-Suit")

2. I am being paid for my work in this litigation at the rate of $450 per hour. My compensation does not depend on the outcome of this litigation. I have no personal interest in the outcome of this litigation.

3. I reserve the right to modify or supplement my opinion, as well as the bases for my opinion, based on the nature and content of the documentation, data, proof, and other evidence or testimony that the defendants or its expert(s) may present or based on any additional discovery or other information provided to me or found by me in this matter. I expect to testify at trial regarding the matters set forth in this report if asked about these matters by the Court or the parties' attorneys.

4. I hereby incorporate my Expert Report on Infringement dated January 4, 2013.

I. EXPERT QUALIFICATIONS

5. I have attached a current copy of my curriculum vitae as Exhibit 1. A list of the cases during at least the last five years in which I have signed a Protective Order, have testified as an expert either at a trial, hearing, or deposition, or have submitted statements/opinions is included as Exhibit 1.

6. I attended Michigan State University from 1977 to 1981 as a Merit Scholar and an Alumni Distinguished Scholar, and received a bachelor's degree in Chemistry. I later attended Carnegie Mellon University from 1988 to 1995, during which time I received both a master's

degree (1992) and a Ph.D. (1996) in Computer Science. My dissertation was entitled "Safe and Efficient Persistent Heaps" and focused on high performance automatic storage management for advanced database systems.

7. Before earning my Ph.D., I worked for over four years in industry at Silicon Solutions, Inc. and Digital Equipment Corporation, developing computer aided design (CAD) software for the semiconductor and computer sectors. For example, I designed and implemented systems for VLSI mask generation and VLSI design rule checking. I also built the first graphical drawing editor for the X window system, Artemis, which included a sophisticated graphical user interface.

8. I have worked as a professor at three universities since 1995; the University of Pennsylvania, the University of Arizona, and The University of Texas at Austin. I was the recipient of a National Science Foundation CAREER award for "CAREER: Advancing Experimental Computer Science in Storage Management and Education" while I was an Assistant Professor at the University of Pennsylvania. During this time, I also was part of the DARPA funded SwitchWare project, which was one of the pioneering groups in the area of Active Networking ("AN"). My group developed PLAN, the first domain-specific programming language for programmable packets, as well as PLANet, the first purely active inter-network.

9. I joined the faculty of The University of Texas at Austin ("UT"), in the Department of Electrical and Computer Engineering in 1999. In 2005, I was appointed Associate Professor with tenure. At UT, my graduate teaching has focused on networking, including numerous advanced seminars on mobile and wireless networking. My undergraduate teaching has included networking, operating systems, and one of UT's required programming class, which focuses on programming with abstractions, Java, and data structures.

10. At UT, I continued to develop AN technology and in 2002, my Ph.D. student, Mike Hicks, won the ACM SIGPLAN dissertation award for our joint work on software updating. Along with my Ph.D. student, Seong-kyu Song, I focused my AN work on mobile and wireless networking. As a result, my research shifted away from AN to mobile and wireless networking in general, especially interactions between the network, the radios, and the physical world.

11. Most of my current research involves the development of Hydra, which is a working prototype of an advanced software-implemented WiFi network funded primarily by NSF. The Hydra testbed implements all of the key 802.11N technologies, including MIMO and frame aggregation (with block acknowledgements). This is documented in my CV and as a result, I have significant direct experience with the technologies embodied in the patents.

II. REVIEW AND USE OF DOCUMENTS

12. In forming the opinions presented in this report, I have reviewed and relied upon among other things:

- Response to Opinions of Dr. Heegard and Dr. Gibson Relating to the '223 Patents
- U.S. Patent No. 5,987,019
- File History of U.S. Patent No. 5,987,019
- U.S. Patent No. 6,466,568
- File History of U.S. Patent No. 6,466,568
- U.S. Patent No. 6,330,435
- File History of U.S. Patent No. 6,330,435
- U.S. Patent No. 6,424,625
- File History of U.S. Patent No. 6,424,625
- U.S. Patent No. 6,519,223
- File History of U.S. Patent No. 6,519,223
- U.S. Patent No. 6,772,215
- File History of U.S. Patent No. 6,772,215
- Transcripts and exhibits for depositions taken in this matter
- All documents cited in this report
- Parties' Claim Construction Briefs

- The Expert Report of Dr. Chris Heegard and prior art references cited therein
- The Expert Report of Dr. Jerry Gibson and prior art references cited therein
- The Expert Report of Matthew Shoemake
- The Expert Reports of Ray Perryman
- The Rule 26 Disclosure of Dietmar Petras and accompanying exhibits
- The Rule 26 Disclosure of Robert Adams and accompanying exhibits
- The Rule 26 Disclosure of John Fenn and accompanying exhibits
- The Rule 26 Disclosure of Fengmin Gong and accompanying exhibits
- The Rule 26 Disclosure of Dean Kawaguchi and accompanying exhibits
- The Rule 26 Disclosure of Grant McGibney and accompanying exhibits
- Defendants' Amended Invalidity Contentions

13. Unless otherwise noted, the deposition transcripts that I relied upon are final, and I have also reviewed the exhibits thereto. In the case that the transcripts are "roughs" or if the exhibits are not yet available, I reserved the right to review the final version and/or exhibits as they become available. The documents I have reviewed and considered for this report are given in Exhibit 2.

III. LEVEL OF ORDINARY SKILL

14. I hereby incorporate my discussion of the level of ordinary skill in the art from my initial infringement report. I note that Dr. Gibson and I are in general agreement as to the level of ordinary skill in the art. However, Dr. Heegard has proposed a higher level of skill in the art. Nonetheless, even under Dr. Heegard's interpretation of the level of ordinary skill in the art, my conclusions remain unchanged.

IV. SUMMARY OF OPINION

15. As explained in detail in my report, in my opinion the asserted claims of the Patents-in-Suit (collectively, "the asserted claims") are valid. The claims meet the requirements of 35 U.S.C. § 102 and 103.

V. CLAIM CONSTRUCTION

16. I have been informed that proper infringement analysis begins with determination or construction of the meaning of terms in the Asserted Claims. I understand that the claims are to be construed based upon their ordinary meaning as understood by one of ordinary skill in the art,. The following chart contains the claim construction for all asserted claims, including those terms construed by the Court and those to which the parties agreed to the construction of. I have applied these constructions throughout my analysis of any and all claim limitations, both in the body of this report and in all attached exhibits and charts.

17. The table below presents the claim terms currently before the court and Ericsson's proposed constructions:

Patent/Claim	Claim Term	Ericsson's Proposed Construction	Defendants' Proposed Construction
'215 patent Claims 1, 15, 25	responsive to the receiving step, constructing a message field . . . including a type identifier field	responsive to the receiving step, generating a message field including a field that identifies the message type of the feedback response message from a number of different message types	responsive to the receiving step, generating a message field including a field identifying the type of feedback response that is selected from multiple available feedback responses in order to minimize the size or number of feedback responses
'215 patent Claim 45	means for sending a plurality of first data units over said communication link to said second peer entity	**Recited Function:** sending a plurality of first data units over said communication link to said second peer entity. **Corresponding Structure:** the sender of a peer entity or equivalents thereof.	**Recited function:** the transmission of first data units by a first peer unit to a second peer unit **Corresponding Structure:** *Invalid*
'215 patent Claim 45	means for receiving said plurality of first data units, and constructing . . .	**Recited Function:** receiving said plurality of first data units, and constructing one to several message fields for a second data unit, said one to several message fields including a type identifier field and at least one of a sequence number field, a length field, a content field, a plurality of erroneous sequence number fields, and a plurality of erroneous sequence number length fields, each of said	**Recited function:** receiving the plurality of first data units and generating a message field including a field identifying the type of feedback response that is selected from multiple available feedback responses in order to minimize the size or number of feedback responses. **Corresponding Structure:** (a) FIG. 4, FIG. 5, FIG. 6, Table

Patent/Claim	Claim Term	Ericsson's Proposed Construction	Defendants' Proposed Construction
		plurality of erroneous sequence number fields associated with a respective one of said plurality of erroneous sequence number length fields **Corresponding Structure:** the receiver of a peer entity, see '215::29-30, whereby different mechanisms can be used to indicate erroneous data units so as to optimize performance, see '215::5:53-56, and the mechanisms refer to any of the methods described for constructing a bitmap feedback response message disclosed at '215::3:17-28 and '215::6:8-48, any of the methods for constructing a compressed bitmap feedback response message disclosed at '215::6:49-54, any of the methods for constructing a list feedback response message disclosed at '215::2:63-3:16 and '215::7:28-51, and/or the method for constructing a feedback response message combining the list and bitmap methods, and any equivalents thereof	1, 3:6-13, 36-42, 4:1-54, 5:50-6:49, 6:55-64, 7:28-51 (b) Invalid under 35 U.S.C. § 112, ¶¶ 2, 6
'435 patent Claim 1	data packet discard notification message from the transmitter to the receiver indicating data packets the transmitter has discarded	a control message in an Automatic Repeat Request protocol that indicates data packets that the transmitter has discarded	message containing the identity of unacknowledged data packets the transmitter has discarded
'019 patent Claim 19 '568 patent Claim 1	separate from said first field	*No construction is necessary.*	in a different portion of a radio channel from said first field
'019 patent Claim 19 '568 patcnt Claim 1	a service type identifier which identifies a type of payload information	an identifier which identifies transmission characteristics of payload information	an identifier that identifies the type of information (e.g., video, voice or data) conveyed in the payload

18. I have applied Ericsson's proposed claim constructions for the purposes of my analysis. However, my conclusions as to invalidity will be unchanged if the Court adopts Defendants' proposed claim constructions, as noted throughout this report.

19. The table below presents the construction of the terms or phrase agreed by the parties.

Patent/Claim	Claim Term	Agreed Construction
'223 patent	means for transmitting a 'move receiving window' request when said discard timer expires and said acknowledgement message for each said at least one protocol data unit has not been received	The claim term is a means-plus-function limitation under 35 U.S.C. § 112, ¶ 6. **Recited Function:** transmitting a 'move receiving window' request when said discard timer expires and said acknowledgement message for each said at least one protocol data unit has not been received **Corresponding Structure:** the transmitter, as described in 3:65-67 and illustrated in Fig. 2 and equivalents thereof

VI. USE OF DEMONSTRATIVES

20. I reserve the right to make demonstratives (including product demonstrations, product usage, and videos thereof), charts, graphs, or other similar visual aids for trial based upon the opinions expressed in this report, the data contained in this report, the exhibits or other things cited in this report and/or attached as exhibits to this report.

VII. LEGAL STANDARDS APPLIED IN THIS REPORT

21. I am informed by counsel that the following legal principles apply to the subject matter of this expert report.

22. I understand that the Court will instruct the jury on the law of validity and I will follow such instructions. I set forth my understanding of the law of validity below.

23. I am informed that a Patent Office Examiner is a person with technical expertise, and that he or she is familiar with the level of ordinary skill in the art. It is my understanding that a U.S. patent is awarded to an inventor or inventors only if the United States Patent and Trademark Office decides, after a period of evaluation, that the subject matter claimed is (1) not anticipated, (2) not obvious, and (3) meets the written description, definiteness, and enablement requirements. (I discuss each of these further, elsewhere in this report). I also understand the Patent Office evaluates whether the patent sets forth patentable subject matter within the meaning of the patent statute (35 U.S.C. § 101). I am informed that once the United States Patent and Trademark Office issues a patent, that patent is presumed to be valid, which means that by law, there is a presumption that each claim in Plaintiffs' United States patents is (1) not anticipated, (2) not obvious, (3) meets the written description requirement, (4) is definite, (5) meets the enablement requirement, and (6) claims patentable subject matter.

24. It is my understanding that to anticipate a patent claim, a single asserted prior art reference must disclose each and every element of the claimed invention to a person of ordinary skill in the art. I understand that an issued patent has a presumption of validity, and that the standard of proof required to invalidate a patent claim is clear and convincing evidence. I've applied this standard to my analysis herein.

25. I also understand that prior art can take the form of printed publications or patents that were published more than one year prior to the filing date of the patent. I understand that a printed publication asserted as prior art must enable one of ordinary skill in the art to practice the elements alleged to be contained within the printed publication prior art without undue

experimentation. I understand that it is the defendants burden to show enablement of printed publication prior art and that the asserted printed publication prior art meets the statutory requirements for qualifying as prior art. I also understand that a reference qualifies as a printed publication only if it is reasonably accessible to persons of ordinary skill in the art.

26. In analyzing whether or not a reference is considered prior art, I understand that one must consider the requirements of 35 U.S.C. § 102:

> A person shall be entitled to a patent unless—
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for patent, or
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of the application for patent in the United States, or
>
> (c) he has abandoned the invention, or
>
> (d) the invention was first patented or caused to be patented, or was the subject of an inventor's certificate, by the applicant or his legal representatives or assigns in a foreign country prior to the date of the application for patent in this country on an application for patent or inventor's certificate filed more than twelve months before the filing of the application in the United States, or
>
> (e) the invention was described in
>
> (1) an application for patent, published under section 122 (b), by another filed in the United States before the invention by the applicant for patent or
>
> (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351 (a) shall have the effects for the purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language; or
>
> (f) he did not himself invent the subject matter sought to be patented, or
>
> (g)

> (1) during the course of an interference conducted under section 135 or section 291, another inventor involved therein establishes, to the extent permitted in section 104, that before such person's invention thereof the invention was made by such other inventor and not abandoned, suppressed, or concealed, or
>
> (2) before such person's invention thereof, the invention was made in this country by another inventor who had not abandoned, suppressed, or concealed it. In determining priority of invention under this subsection, there shall be considered not only the respective dates of conception and reduction to practice of the invention, but also the reasonable diligence of one who was first to conceive and last to reduce to practice, from a time prior to conception by the other.

27. In analyzing whether or not a single item of prior art anticipates a patent claim, I understand that one of ordinary skill in the art at the time of the invention would consider that which is expressly stated or present in the item of prior art and also that which is "inherently" present. Something is inherent in an item of prior art if it is always present in the prior art or always results from the practice of the prior art and if a person of ordinary skill in the art would understand that to be the case.

28. I understand that "conception" is the formation in the mind of the inventor of a definite and permanent idea of the complete and operative invention, as it is to be applied in practice. Conception is established when the invention is made sufficiently clear to enable one skilled in the art to reduce it to practice without the exercise of extensive experimentation or the exercise of inventive skill. I understand that conception must be corroborated. I understand that "reduction to practice" occurs either as of the filing of the patent application or when the invention was actually made and was shown to work for its intended purpose.

29. I also understand that a patent claim is invalid if the differences between the claimed invention and the prior art are such that the claimed subject matter as a whole would have been obvious to a person having ordinary skill in the art at that the time the invention was

made. In making a determination of obviousness, I understand that there are several factors to consider. The first consideration is the scope and content of the prior art. The next is the level of ordinary skill in the art at the time the invention was made. The differences between the claimed invention and the prior art are then addressed in light of the first two considerations. I understand that where all elements of a claim are found separately in multiple prior art references, a motivation to combine those references is helpful to this inquiry.

30. I understand that when evaluating obviousness, one must not consider whether the claimed invention would have been obvious to a layman or to an expert; not use hindsight when comparing the prior art to the claimed invention; not consider what was learned from the teachings of the patent, or use the patent as a road map for selecting and combining items of prior art. Instead, one must put oneself in the place of a person of ordinary skill at the time the invention was made and consider only what was known before the invention was made and not consider what is known today.

31. Moreover, it is my understanding that consideration of objective indicia of nonobviousness is also relevant to determining whether or not a patent claim is obvious. Objective indicia of non-obviousness include, but are not limited to: (1) commercial success; (2) long felt need; (3) failure of others; (4) surprising results; (5) praise by others; (6) teaching away; (7) copying by others; and (8) other relevant factors. I discuss these factors in the sections that follow. Based on the evaluation that I set forth below, it is my opinion that the claims of the Asserted Patents are not obvious.

32. I understand that to invalidate a patent claim due to inadequate written description would require clear and convincing evidence that the patent specification does not contain a written description of the claimed invention.

33. I understand that to invalidate a patent claim due to non-enablement would require clear and convincing evidence that the patent specification does not describe the invention in clear and concise terms such as to enable a person of ordinary skill in the art to make and use the invention without undue experimentation.

34. I understand that to invalidate a patent claim due to indefiniteness would require a court to construe claim language such that the claims do not clearly and distinctly point out the subject matter which the applicant regards as his invention.

35. I discuss these factors in the sections that follow. Based on the evaluation that I set forth below, it is my opinion that the claims of the Asserted Patents are not anticipated.

36. I discuss these factors in the sections that follow. Based on the evaluation that I set forth below, it is my opinion that the claims of the Asserted Patents are not obvious.

37. In reaching my opinions, I have considered the scope and content of the prior art, the level of ordinary skill in the art at the time the claimed invention was made, and the differences between the claimed invention and the prior art. The bases for my opinions follow.

VIII. RESPONSE TO STATEMENTS REGARDING PRINTED PUBLICATIONS

38. A number of references discussed by Drs. Heegard and Gibson do not appear to be prior art references under 35 U.S.C. § 102. These references include:

Comnets student documents

- Hettich, Development and Performance Evaluation of a Selective Repeat-Automatic Repeat Request (SR-ARQ) Protocol for Transparent, Mobile ATM Access ("Hettich Comnets Thesis")
- Vornefeld, Simulative and Analytical Study of Measures Supporting the Quality of Service in a Radio-Based ATM Network ("Vornefeld Comnets Thesis")
- Petras, Development and Performance Evaluation of an ATM Radio Interface ("Petras Comnets Thesis")

39. With regard to the Comnets student documents, Dr. Gibson relies on the deposition testimony of Rosalia Sohnen and the disclosure of Dietmar Petras to conclude that the date on the face of the document is the date that this document was "publicly available." Dr. Heegard relies on the deposition of Rosalia Sohnen to conclude that this reference qualifies as prior art under 35 U.S.C. § 102(b). I disagree with these conclusions.

40. These references do not appear to be publications on their face. Instead they appear to be student papers which would not be generally available or searched for by persons of skill in the art. In fact, the Hettich and Vorenefeld theses state that they are for "internal use only." In addition, although these papers are dated, the dates do not appear to be publication dates. While diploma papers such as this can be useful for grading students, their primary purpose is not to act as a scientific publication.

41. The Petras disclosure merely states that student theses were submitted to the Aachen University library and searchable via the University's Allegro system.

42. When questioned about how accessible the specific student theses were, the Aachen librarian could only testify that these theses are available by searching for the author's name or the title of the paper. She was unaware if the library had key word searching available for these papers.[1] In other words, a person interested in the subject matter of these papers would already need to know the author or title of these papers in order to locate them. In addition, although she testified that these papers were mentioned in an annual report mailed out by the University, she also testified that this report was not mailed out on the date cited in the report,

[1] R. Sohnen Depo. at 38:9-39:19.

and she was uncertain when the report was actually mailed out.[2] In my opinion, one of skill in the art would not consider these references to be printed publications or publicly available.

43. In addition, to the extent the Petras Comnets Thesis was published, it was published in 1999. However, without a month of publication, there is no way to confirm that this article was published prior to any of the patents-in-suit.

ETSI Contributions

- Dietmar Petras, et al. Candidate Protocol Stack (MAC + LLC) for a Wireless ATM Air Interface ("Petras Comnets Submission")
- Hettich, Vornefeld, Rapp, ARQ Protocols for Wireless ATM Systems: Requirements and Solutions, ETSI EP BRAN WG3 Temporary Document 42 ("Hettich Comnets Submission")
- Efficient Transmission of ARQ Feedback ("Lucent January 1999 Submission")
- EGPRS ELC Performance with Efficient Transmission of ARQ Feedback ("Lucent March 1999 Submission")
- GSM 03 64 V6.0.0 Draft ("GPRS Radio Interface")
- S2.22: RLC Protocol Specification ("WCDMA RLC Protocol")

44. With regard to the ETSI contributions, Dr. Gibson relies on the disclosures of Dietmar Petras and John Fenn to conclude on the dates that these documents were "publicly available." I disagree with these conclusions.

45. The ETSI contributions do not appear to be publicly available publications. Rather, these documents appear to be proprietary standards related documents. For example, the WCDMA RLC Protocol and the GPRS Radio Interface documents state that reproduction of the documents is "only permitted for the purpose of standardization work undertaken within ETSI."

46. The disclosure of John Fenn confirms that these documents were only distributed to ETSI contributions by being distributed at members' only meetings or being posted on a members only ftp site. Moreover, even if these documents were posted on a public ftp site, they do not appear to have been cataloged in a meaningful way. For example, a person of skill in the

[2] R. Sohnen Depo. at 40:16-45:19.

art would have to know the specific meeting where a document was discussed in order to locate it. Although Mr. Fenn contends that many entities were members of ETSI, it is not clear that a person of skill in the art could join ETSI without being an employee of or affiliated with a suitable company or organization.

IEEE Contributions

- IEEE P802.11-93/20b3 Proposed Draft Standard
- IEEE P802.11-93/146, "The Need for MAC Data Delimiters in the PHY," Wim Diepstraten ("Diepstraten 146")
- IEEE P802.11-94/258x, "Detailed Draft Text Changes to Support DTBS," Wim Diepstraten ("Diepstraten 258x")
- IEEE P802.11-93/190, "DFWMAC: Distributed Foundation Wireless Medium Access Control," Wim Diepstraten ("Diepstraten 190")

47. With regard to the IEEE contributions, Dr. Gibson relies on the disclosure of Dean Kawaguchi to conclude on the dates that these documents were "publicly available." I disagree with these conclusions.

48. The IEEE contributions do not appear to be publicly available publications. Rather, these documents appear to be proprietary standards related documents. Some of these documents, for example the draft 802.11 standard, do not even appear to be final versions of documents intend for release to others.

49. The disclosure of Dean Kawaguchi confirms that these documents were only distributed to participants at IEEE 802.11 meetings, instead of being made generally available to the public. Accordingly, these documents were not publicly available to persons of ordinary skill in the art, at least not on the dates indicated by Dr. Gibson.

Conference Papers

- Bakker, et al., An Air Interface for High Bandwidth Cellular Digital Communications on Microwave Frequencies, Vehicular Technology Conference ("Bakker")
- Petras and Hettich, Performance Evaluation of the ASR-ARQ Protocol for Wireless ATM ("Petras Comnets 1995 Article")

- Petras and Hettich, Performance Evaluation of a Logical Link Control Protocol for an ATM Air Interface ("Petras Comnets 1997 Article")
- Petras, Functionality of the ASR-ARQ Protocol for MBS ("Petras Comnets RACE 1995 article")
- Walke, Wireless ATM: Air Interface and Network Protocols of the Mobile Broadband System ("Walke Comnets Article 1996")
- Tasaka, Integrated Video and Data Transmission in the TDD ALOHA-Reservation Wireless LAN ("Tasaka IEEE Article")
- Gong, An Application Oriented Error Control Scheme for High Speed Networks ("Gong 1996 article")
- Raychaudhuri, ATM-Based Transport Architecture for Multiservices Wireless Personal Communications ("Raychaudhuri Article")

50. With regard to the conference papers, these references appear to be papers written for or related to various conferences or organizations such as the IEEE. As a practical matter, conference papers may not be published at the time of the conference. Rather, the author may present a summary of the paper's content, which will later be written up as a final paper. In addition, in some cases, papers may be submitted for conferences but not accepted. These papers may never be published at all and would have only been viewed by those individuals reviewing papers for the conference, not the general public. Accordingly, the dates listed on these documents may not reflect actual publication dates.

IX. DR. GIBSON AND DR. HEEGARD HAVE NOT SHOWN THE PATENTS-IN-SUIT TO BE INVALID

A. U.S. PATENT NO. 5,987,019 AND U.S. PATENT NO. 6,466,568

51. Dr. Gibson and Dr. Heegard allege that the asserted claims of the '019/'568 patents are anticipated by prior art. I disagree. None of the references cited by Dr. Gibson or Dr. Heegard teaches or discloses all the limitations of the asserted claims.

52. Dr. Gibson and Dr. Heegard also allege that these references render the asserted claims of the '019/'568 patents obvious either alone or in combination with one or more other references. I disagree. None of the prior art references taught or disclosed all limitations of the

asserted claims. As one example, no prior art reference taught or disclosed a method (or apparatus or system) that contains "a service type identifier which identifies a type of payload information." Dr. Gibson and Dr. Heegard further did not identify how a specific combination of references would render the asserted claims obvious, and without doing so they cannot meet the requisite clear and convincing evidentiary standard. As discussed below, none of the references identified by Dr. Gibson and Dr. Heegard teaches each limitation of the asserted claims of the '019/'568 patent. Nor does any identified combination of reference render such claims obvious.

53. The application that issued as U.S. Patent Nos. 5,987,019 and U.S. 6,466,568 entitled "Multi-Rate Radiocommunication Systems and Terminals" was filed on October 15, 1996. The '019 patent issued on November 16, 1999. The '568 patent issued on October 15, 2002.

1. Claim Construction

54. The parties have identified two terms for construction:

U.S. Patent Nos. 5,987,019 and 6,466,568		
Disputed Terms	**Ericsson's Proposed Construction**	**Defendants' Proposed Construction**
"separate from said first field"	No construction is necessary.	in a different portion of a radio channel from said first field
"a service type identifier which identifies a type of payload information"	an identifier which identifies transmission characteristics of payload information	an identifier that identifies the type of information (e.g., video, voice or data) conveyed in the payload

55. Regardless of which party's construction the Court adopts for these two terms, my conclusions regarding the invalidity of the '019/'568 patents remain unchanged.[3]

[3] I understand that the Court may construe the terms of these patents in ways that differ from the parties' proposals. I reserve the right to update or supplement this report if necessary based on any rulings from the Court.

a) "a service type identifier which identifies a type of payload information"

56. I have concluded that none of the references identified by Dr. Heegard or Dr. Gibson disclose "a service type identifier which identifies a type of payload information." This conclusion remains the same under either party's construction. Under Ericsson's proposal, the service type identifier must identify transmission characteristics of the payload information. The '019/'568 patents explain that these transmission characteristics may include, for example, bandwidth considerations, error protection, and ability to tolerate delay.[4] As explained more fully below, none of the references identified by Dr. Heegard or Dr. Gibson disclose this claim limitation.

57. Under Defendants' proposal, the service type identifier must identify the type of information conveyed in the payload. Although Defendants' proposal does not explicitly mention transmission characteristics, Defendants apparently do not dispute that the service type identifier must identify the "service type" of payload information.

58. Data may be simultaneously associated with multiple types. For example, a video file may be considered a video by a user, an avi. file by an operating system, a specific type of .avi file requiring a specific codec by a video player application, or data with a TID value "video" by a wireless receiver. Although data may be simultaneously categorized by all of these types, the patents refer to a service type identifier.

59. The patents equate the "type" of information in the payload with the "service" conveyed in the payload.[5] The patents also explain that each service has optimal transmission

[4] '019 patent at 2:26-2:55.

[5] '019 patent at 2:26 -2:28 ("These various types of information communication (also referred to herein as 'services') will likely have different optimal transmission characteristics.")

characteristics.[6] This is appropriate given that the patents are concerned with wireless transmission of data. Thus, the patents require that the service type identifier identify the service such that the devices in the system can account for the transmission characteristics of the service.

b) "separate from said first field"

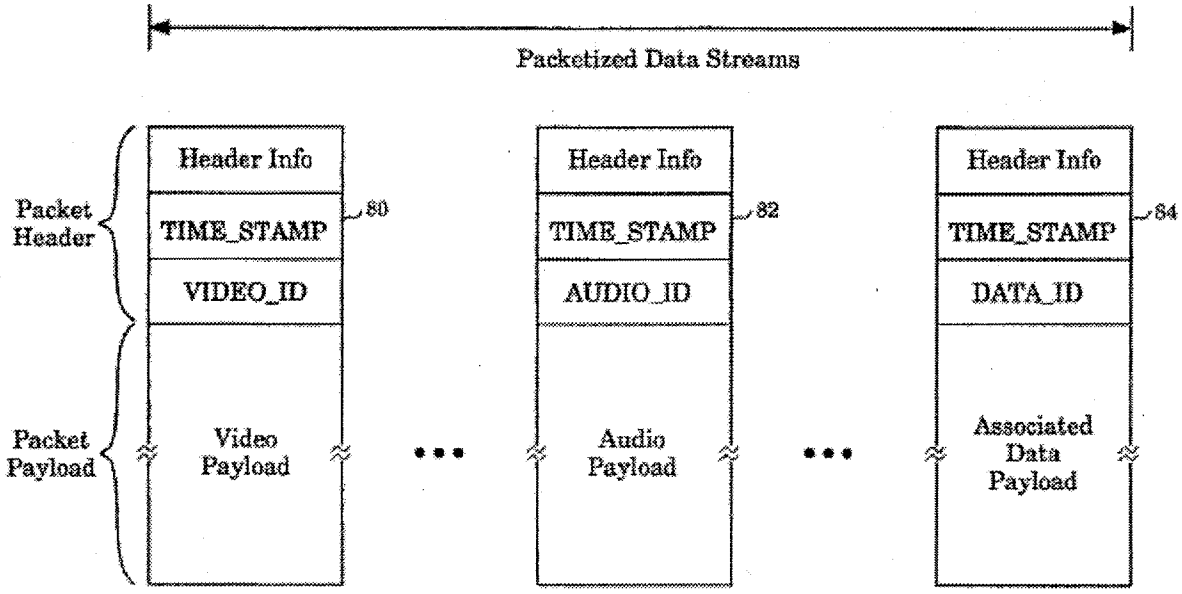
60. As explained in my opening report, data in different fields cannot occupy the same portion of a radio channel. Drs. Gibson and Heegard do not appear to dispute this conclusion. Accordingly, regardless of whether the Court adopts Defendants' proposed constructions, my opinions regarding invalidity remain unchanged.

[6] '019 patent at 2:26 -2:28 ("These various types of information communication (also referred to herein as 'services') will likely have different optimal transmission characteristics.")

2. Response to Alleged Anticipation References

a) Adams '662

61. Adams discloses a specific system for delivering multimedia content to computers and/or televisions via a satellite network. This system relies on devices with separate subsystems for processing three different types of information: video, audio, and data. When a device in this system receives a packet of information, it checks an ID tag in the packet to determine which subsystem should receive the packet.



Adams Fig. 5.

> The satellite receiver **14** enables reception of packetized digital data streams over a satellite link. For one embodiment, the incoming packetized digital data streams received by the satellite receiver **14** conform to the motion picture engineering group (MPEG) video transport standard. The packetized digital data streams received by the satellite receiver **14** include video data packets, audio data packets, and associated data packets. The satellite receiver **14** transfers the received digital data stream packets to the computer system **10** over a communication line **30**.

Adams at 4:5-4:14.

FIG. **2** illustrates the computer system **10** for one embodiment. The computer system **10** comprises a processor **52**, a memory subsystem **54**, a graphics display subsystem **56**. The computer system **10** further comprises a data modem **58**, a disk drive **60**, an audio subsystem **62**. The processor **52** communicates with the memory subsystem **54**, the graphics display subsystem **56**, the data modem **58**, the disk drive **60**, and the audio subsystem **62** via a system bus **51**.

Adams at 5:23-5:30.

FIG. **5** illustrates the packetized digital data stream received by the data selector **76** over the communication line **30** for one embodiment. The incoming packetized digital data stream on the communication line **30** includes a video packet **80**, an audio packet **82**, and an associated data packet **84**.

The video packet **80**, the audio packet **82**, and the associated data packet **84** each comprise a packet header and a packet payload. The packet header of the video packet **80**, the audio packet **82** and the associated data packet **84** each include a time stamp (TIME_STAMP) that synchronizes the video, audio and associated data carried in the packets **80-84**.

The video packet **80** includes a video payload that provides digital video data for display in the video display window **40**. The video packet **80** is identified as a packet that carries video data by the video identifier (VIDEO_ID) in the packet header.

The audio packet **82** includes an audio payload for transfer to the audio subsystem **64** to drive the speaker **24**. The audio packet **82** is identified as a packet that carries audio data by the audio identifier (AUDIO_ID) in the packet header.

The associated data packet **84** includes an associated data payload that specifies interactive video command and control functions for the computer system **10**. The associated data packet **84** is identified as a packet that carries associated data by the associated data identifier (DATA_ID) in the packet header.

Adams at 7:9-7:37.

(1) Claim 19 of the '019 Patent and Claim 1 of the '568 Patent

62. Adams does not anticipate claim 19 of the '019 patent or claim 1 of the '568 patent.

providing at least one first field in which payload information is disposed;

63. Both Dr. Heegard and Dr. Gibson contend that the video, audio, and data ID tags disclosed in Adams act as service type identifiers.

64. The video, audio, and data ID tags disclosed in Adams do not meet the requirement of "a service type identifier which identifies a type of payload information." These tags merely specify whether a packet should be sent to the video, audio, or data subsystem. As a result, these tags do not allow devices in the system to account for different transmission characteristics of different types of information.

65. Adams teaches away from the '019/'568 patent by requiring the receiver to contain specialized subsystems for receiving voice, audio, and data. In contrast, the inventors of the '019/'568 patent intended to create an invention that would allow existing devices to accommodate multiple services, including services that may be developed in the future.[7] Accordingly, the inventors taught the use of a service type identifier which identifies a type of payload information.

66. In addition, I note that one of the inventors of the Adams patent, Robert Adams, explains that the ID tags disclosed in this reference is a "trivial technique" which had been

[7] '019 patent at 2:56-2:64.

known in the prior art.[8] Accordingly, this technique is different from the novel technique disclosed in the '019/'568 patents.

(2) Claim 22 of the '019 Patent and Claim 2 of the '568 Patent

67. Because Adams fails to anticipate claim 19 of the '019 patent or claim 1 of the '568 patent, it also fails to anticipate this claim.

(3) Claim 23 of the '019 patent and Claim 3 of the '568 Patent

68. Because Adams fails to anticipate claim 19 of the '019 patent or claim 1 of the '568 patent, it also fails to anticipate this claim.

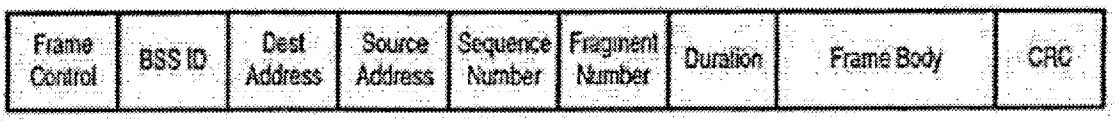
(4) Claim 24 of the '019 Patent and Claim 4 of the '568 Patent

69. Because Adams fails to anticipate claim 19 of the '019 patent or claim 1 of the '568 patent, it also fails to anticipate this claim.

b) IEEE P802.11-93/20b3 Proposed Draft Standard

70. 802.11-draft 1994 is an early draft of the standard what would eventually become the 802.11 standard. 802.11-draft 1994 contains a number of significant differences from later versions of the standard. For example, the MAC frame format for 802.11-draft 1994 does not contain fields for TID access category information.

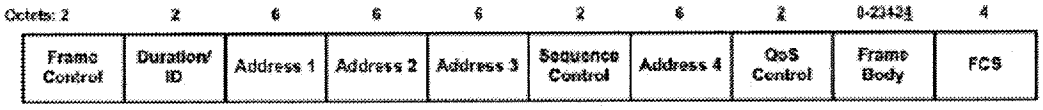
71. MAC Frame Format in 802.11-draft 1994 (Figure 4-1):



72. In contrast, the 802.11n standard MAC frame format requires a QoS Control Field which specifies the TID value of each packet.

73. MAC Frame Format in 802.11-2007 (Figure 7-1):

[8] Adams Rule 26 Disclosure at ¶ 20.



In addition, the 802.11-draft 1994 standard contains only one data subtype. In contrast, the 802.11n standard contains several specific data subtypes for QoS data and non-QoS data.

74. Data types in 802.11-draft 1994 (Table 4.1):

10	Data	0000	Asynchronous Data
10	Data	0001-1111	Reserved

75. Data Types in 802.11-2007 (Table 7-1):

10	Data	0000	Data
10	Data	0001	Data + CF-Ack
10	Data	0010	Data + CF-Poll
10	Data	0011	Data + CF-Ack + CF-Poll
10	Data	0100	Null (no data)
10	Data	0101	CF-Ack (no data)
10	Data	0110	CF-Poll (no data)
10	Data	0111	CF-Ack + CF-Poll (no data)
10	Data	1000	QoS Data
10	Data	1001	QoS Data + CF-Ack
10	Data	1010	QoS Data + CF-Poll
10	Data	1011	QoS Data + CF-Ack + CF-Poll
10	Data	1100	QoS Null (no data)
10	Data	1101	Reserved
10	Data	1110	QoS CF-Poll (no data)
10	Data	1111	QoS CF-Ack + CF-Poll (no data)

(1) Claim 19 of the '019 Patent and Claim 1 of the '568 Patent

76. The 802.11-draft 1994 standard does not anticipate claim 19 of the '019 patent or claim 1 of the '568 patent.

providing at least one first field in which payload information is disposed;

77. Dr. Gibson and Dr. Heegard contend that the type/subtype field of the 802.11-draft 1994 standard constitutes "a service type identifier which identifies a type of payload information." I disagree with this conclusion.

78. Under Defendants' proposed construction, Drs. Gibson and Heegard fail to explain how the type/subtype field identifies the type of payload information (e.g., voice, video, or data). In addition, Drs. Gibson and Heegard fail to explain how this field could allow a device in the system to account for different transmission characteristics of different types of payload information.

79. Under Plaintiffs' proposed construction, Drs. Gibson and Heegard fail to explain how the type/subtype field identifies information regarding transmission characteristics. Notably, the type and subtypes of the 802.11-draft 1994 standard do not allow a device to distinguish between QoS and non-QoS data or between packets that have different TID values.

80. In addition, the 802.11-draft 1994 standard does not disclose this limitation because the type/subtype field does not identify a service type of the payload information. In the '019 patent, the term "service" refers to information communication, i.e., user data.[9] As shown in the table below, the type/subtype field only allows a device to distinguish between "data," i.e., user data, and various types of control and management frames. The type/subtype field does not distinguish between various types of services that may be contained in a data frame.

[9] See, e.g., '019 patent at 2:27-2:30.

4.1.2.1.2. Type and Subtype

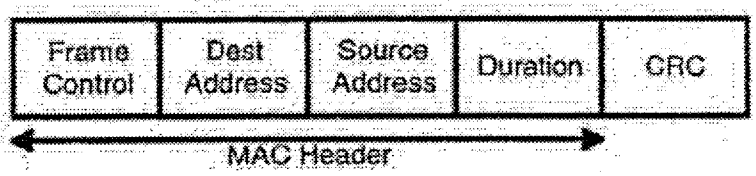
The Type and Subtype fields shall identify the function and interpretation of a frame. There are three frame types: control, data and management. Each of the frame types may have several subtypes. The table below lists the valid combination of Type and Subtype.

Type Value	Type Description	Subtype Value	Subtype Description
00	Management	0000	Association Request
00	Management	0001	Association Response
00	Management	0010	Reassociation Request
00	Management	0011	Reassociation Response
00	Management	0100	Probe Request
00	Management	0101	Probe Response
00	Management	0110	Privacy Request
00	Management	0111	Privacy Response
00	Management	1000	Beacon
00	Management	1001	ATIM
00	Management	1010	Disassociation
00	Management	1011	Authentication
00	Management	1100-1111	Reserved
01	Control	0000-1010	Reserved
01	Control	1011	RTS
01	Control	1100	CTS
01	Control	1101	ACK
01	Control	1110	CF End
01	Control	1111	Poll
10	Data	0000	Asynchronous Data
10	Data	0001-1111	Reserved
11	Contention Free	0000	Data
11	Contention Free	0001	Data + ACK
11	Contention Free	0010-1111	Reserved

Table 4-1: Valid Type/Subtype Combinations

81. Control and management frames only provide administrative information, they do not contain user information.[10] Drs. Heegard and Gibson contend that payload information is provided in the frame body of a MAC frame. However, Control frames do not contain a frame body field. See for example the RTS frame format below:

[10] Although 802.11-draft 1994 also specifies the "Contention Free" type, this type is not defined in this draft of the standard.



82. 802.11-draft 1994 at § 4.2.1.1. Additional portions of section 4.2.1 of the 802.11-draft 1994 standard indicate that none of the control frame formats contain frame body fields. Because a control frame does not contain a frame body field, the type/subtype field of a control frame is not "a service type identifier which identifies a type of payload information."

83. Management frames do contain a frame body field, however, for many subtypes, the frame body field is null. For management frames with non-null frame body fields, the frame body only contains administrative information such as addresses, algorithm numbers, beacon information, etc.[11] This information does not constitute a "service." Accordingly, the type/subtype field of a management frame is not "a service type identifier which identifies a type of payload information."

84. Drs. Heegard and Gibson also seem to assert that the 802.11-draft 1994 standard mentions QoS features. It is unclear how they contend these portions of the reference disclose any of the limitations of the '019/'568 patents. Nonetheless, the cited QoS portions of the 802.11-draft 1994 standard illustrate why this reference fails to anticipate the '019/'568 patents.

85. While the 802.11-draft 1994 standard mentions general concepts such as "Quality of Service," "Transit Delay," "User Priority," etc., it is unclear how these concepts are incorporated into this draft standard. For example, section 5.2.13.1 states that "Knowledge of the characteristics and type of service provided (i.e., the parameters, formats, and options that affect the transfer of data) is made available to the MAC Service user through *some layer*

[11] *See* 802.11-draft 1994 at 4.2.3.1 - 4.2.3.12.

management interaction prior to (any) invocation of the MAC connectionless-mode service." In addition, portions of the standard which may have clarified some details, were not yet prepared for this draft standard. For example, section 5.2.13.4 entitled "Channel Access Priority Mechanism" is blank.

86. Even if some portions of the 802.11-draft 1994 standard do mention QoS features, the portions cited by Drs. Heegard and Gibson merely indicate that a device may be able to track information related to "transit delay," "delay variance," and "user priority." For example, section 5.2.13.1 states that "Thus the MAC Service user not only has knowledge of the characteristics of the parties with which it can communicate, it also has knowledge of the statistical characteristics of the service it can expect to be provided with for each MAC service request."

87. Finally, Dr. Gibson mentions that the 802.11-draft 1994 standard supports two MSDU delivery service types. Dr. Gibson does not explain how this citation relates to the patents.

(2) Claim 22 of the '019 Patent and Claim 2 of the '568 Patent

88. Because this reference fails to anticipate claim 19 of the '019 patent or claim 1 of the '568 patent, it also fails to anticipate this claim. In addition, because 802.11-draft 1994 only contains one data subtype, it does not disclose adjusting a value of said service type identifier to correspond to a second type of information.

(3) Claim 23 of the '019 patent and Claim 3 of the '568 Patent

89. Because this reference fails to anticipate claim 19 of the '019 patent or claim 1 of the '568 patent, it also fails to anticipate this claim. In addition, the type/subtype field of the 802.11-draft 1994 standard cannot be used to distinguish between video, voice, data as it only distinguishes between user data and management/control information.

(4) Claim 24 of the '019 Patent and Claim 4 of the '568 Patent

90. Because this reference fails to anticipate claim 19 of the '019 patent or claim 1 of the '568 patent, it also fails to anticipate this claim. In addition, the type/subtype field of the 802.11-draft 1994 standard cannot be used to distinguish between multimedia as it only distinguishes between user data and management/control information.

c) U. S. Patent No. 5,761,292 ("Wagner")

91. Wagner describes a method of transmitting voice and data information over existing wired telephone networks. Rather than transferring information over a single channel, Wagner proposes transferring information over a main channel or a separate side channel. Wagner proposes using the main channel to transfer voice and/or data, and using the side channel to transfer data and/or control information. Although Wagner describes various physical layer aspects of the disclosed system, it is silent as to many implementation details for higher layers.

92. For example, Wagner states that the system can accommodate "computer data," but it does not provide thorough details on the format and structure of this data. Instead, Wagner provides physical layer descriptions such as:

> In the preferred embodiment, data is transferred across main channel 312 using a high speed modem technology such as a quadrature amplitude modulation (QAM) technology. Control information and data is transferred across side channel 314 using a lower capacity transmission technology such as a frequency shift keying (FSK) technology. Using

Wagner at 5:44-5:49.

> A main data modulator **432** receives computer data from lines **436** from variable length buffer **422**. Main data modulator **432** modulates the computer data into a frequency range corresponding to main channel **312**. In the preferred embodiment, main data modulator **432** is a quadature amplitude modulation (QAM) circuit for high speed data transmission. QAM modulation is a technique well known to those of ordinary skill in the art. The modulated computer data is output by main data modulator **432** on lines **442**.

Wagner at 8:53-8:61.

93. In addition, figures 1-5 depict physical layer implementation details and merely indicate data and voice arriving at that layer without explanation.

94. Wagner discloses that information from the side channel is used to determine which hardware should accept information received on the main channel. Receive Channel Control Logic 524 and Voice/Data Select 530 route data to the Main Data Demodulator and route voice to voice enhancement logic or voice out, if no enhancement logic is necessary. See for example:

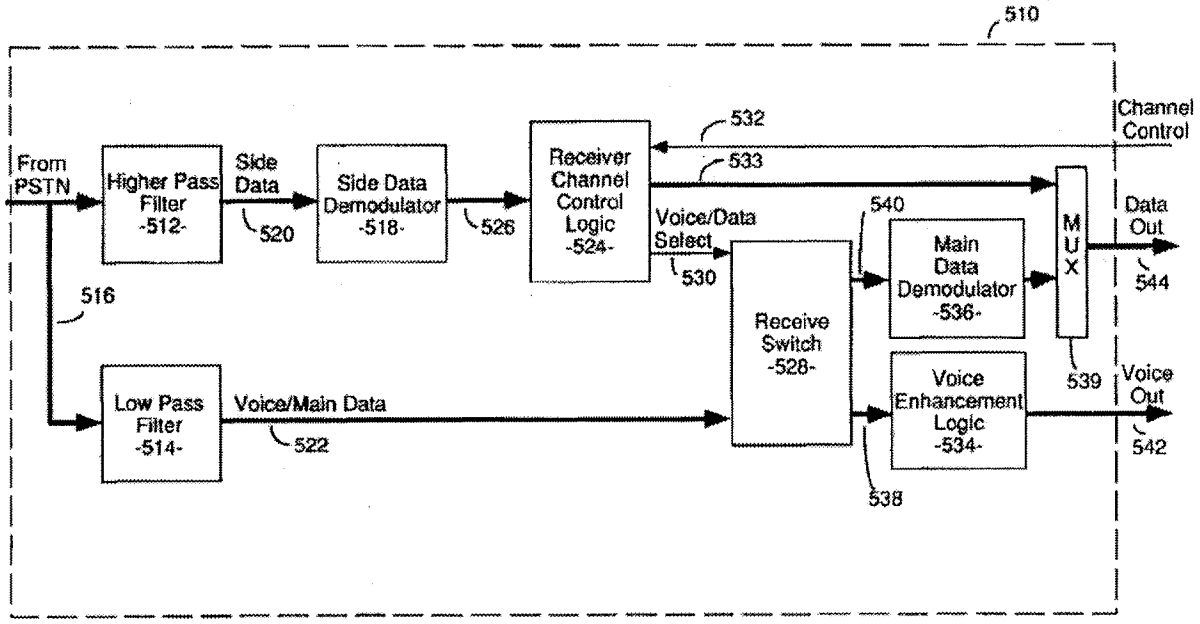


FIGURE 5

526. This demodulated side data is output to receiver channel control logic 524. Control logic 524 decodes control information received on side channel 314 via lines 526. Side channel control information is used by control logic 524 to select a mode by which information is received on main channel 312. Predetermined codes within this side data are used to define either a main channel voice receive mode or a main channel data receive mode. This mode is selected by control logic 524 with an output on voice/data select line 530. If side data indicates a voice receive mode, control logic 524 outputs a voice select signal on line 530. If, however, side data indicates a data receive mode, control logic 524 outputs a data select signal on line 530. The side

Wagner at 10:12-10:24.

(1) Claim 19 of the '019 Patent and Claim 1 of the '568 Patent

95. Wagner does not anticipate claim 19 of the '019 patent and claim 1 of the '568 patent.

providing at least one first field in which payload information is disposed;

96. Wagner does not disclose providing at least one first field in which payload information is disposed. Because Wagner focuses on physical layer implementation descriptions, Wagner is silent as to whether and how data should be provided in fields. Drs. Heegard and Gibson identify citations from Wagner indicating that the telephone line channel should be split into two sub-channels. None of these citations specify that information provided on these sub-channels should be provided in fields.

providing at least one second field, separate from said first field, which includes a service type identifier which identifies a type of payload information provided in said at least one first field; and

97. Drs. Heegard and Gibson contend that the control information provided in the side channel described in Wagner acts as "a service type identifier which identifies a type of payload information." As an initial matter, because Wagner does not disclose the use of fields, Wagner cannot disclose this limitation. In addition, Drs. Gibson and Heegard fail to explain how the control information in the side channel could allow a device in the system to account for different transmission characteristics of different types of information. Rather, the control information is merely used to route received information to the appropriate hardware in the receiver.

98. Wagner teaches away from the '019/'568 patent by requiring the receiver to contain specialized hardware for receiving voice and data. In contrast, the inventors of the '019/'568 patent intended to create an invention that would allow existing devices to accommodate multiple services, including services that may be developed in the future.[12] Accordingly, the inventors taught the use of a service type identifier which identifies a type of payload information.

transmitting said at least one first field and said at least one second field on said radio channel.

99. Wagner does not disclose transmitting information on a radio channel, let alone transmitting multiple fields on a radio channel. Instead Wagner discloses transferring information over "a single telephone line."[13] None of the citations provided by Drs. Heegard or Gibson disclose transferring information on a radio channel.

[12] '019 patent at 2:56-2:64.

[13] See, e.g., Wagner patent Abstract.

(2) Claim 22 of the '019 Patent and Claim 2 of the '568 Patent

100. Because this reference fails to anticipate claim 19 of the '019 patent or claim 1 of the '568 patent, it also fails to anticipate this claim.

(3) Claim 23 of the '019 patent and Claim 3 of the '568 Patent

101. Because this reference fails to anticipate claim 19 of the '019 patent or claim 1 of the '568 patent, it also fails to anticipate this claim.

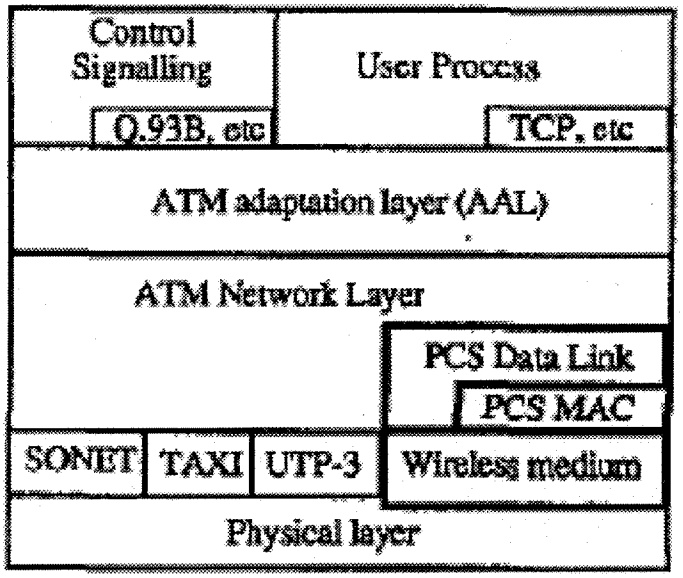
(4) Claim 24 of the '019 Patent and Claim 4 of the '568 Patent

102. Because this reference fails to anticipate claim 19 of the '019 patent or claim 1 of the '568 patent, it also fails to anticipate this claim.

d) ATM-Based Transport Architecture for Multiservices Wireless Personal Communication Networks, Dipankar Raychaudhuri and Newman D. Wilson ("Raychaudhuri Article")

103. The Raychaudhuri Article describes research efforts into developing a multimedia-capable wireless network, which it refers to as a personal communication network ("PCN"). The Raychaudhuri acknowledges that significant design work must be done to adapt wired networking techniques for wireless networks. The Raychaudhuri article attempts to describe a wireless system with a protocol stack harmonized with the ATM protocol. Figure 4 depicts this protocol stack and highlights in bold the wireless specific layers (the physical, MAC, and data link layers).[14]

[14] See Raychaudhuri article at 1404.



104. The Raychaudhuri article states that the wireless system is required to handle multiple traffic types: connection oriented constant bit rate (CBR), connection oriented variable bit rate (VBR), connectionless packet data, and burst data. While discussing the MAC layer, the Raychaudhuri article identifies two different multiplexing schemes. Which scheme may ultimately be chosen for a wireless system would depend upon physical layer considerations.[15] These two different schemes, CDMA and TDMA are depicted in figures 5 and 6.

[15] See Raychaudhuri article at 1405.

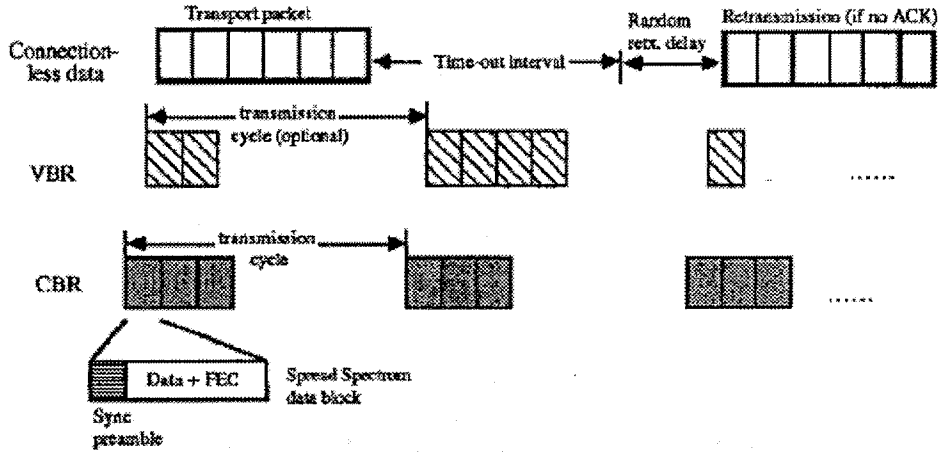


Fig. 5. Alternative transmission modes in packet CDMA.

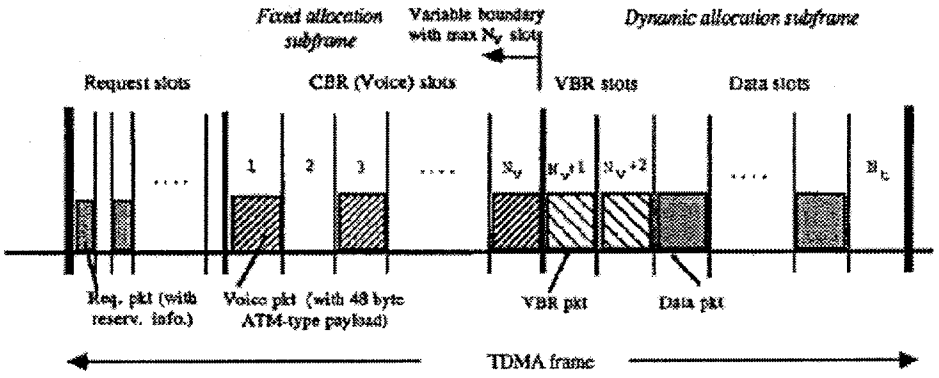


Fig. 6. Multiservice dynamic reservation (MDR) TDMA frame format.

105. The Raychaudhuri article separately discusses the packet format of the data link layer. However, full implementation details of this packet format are not provided.[16] This format is depicted in figure 7.

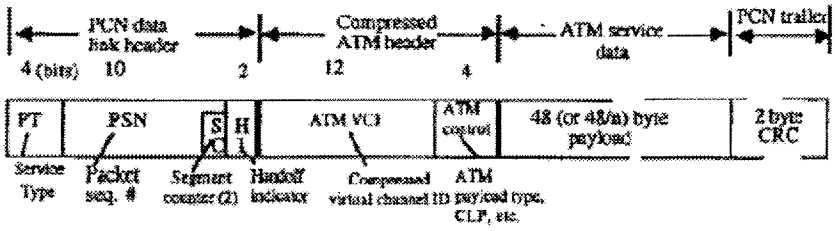


Fig. 7. Example PCN data-link packet format.

[16] Raychaudhuri article at 1407 ("A complete definition of the PCN data-link header is not presented here, since several issues are currently under study.")

106. The Raychaudhuri article also briefly describes several additional concepts, including error control, segmentation, and handoffs, without providing specific implementation details. For example, in the error control section, the article recognizes that retransmission of some packets may be necessary. However, the article provides little explanation as to how this should be achieved:

> Alternatively, if some buffering delay can be tolerated, the PCN data-link layer may optionally attempt time-constrained retransmission within a permissible sequence number window (this option would be selected at call setup).

Raychaudhuri article at 1407.

107. The article concludes by stating that an ATM compatible wireless system is feasible, but that "much further work remains before the viability of such systems can be conclusively demonstrated."[17]

(1) Claim 19 of the '019 Patent and Claim 1 of the '568 Patent

108. The Raychaudhuri article does not anticipate claim 19 of the '019 patent and claim 1 of the '568 patent.

providing at least one second field, separate from said first field, which includes a service type identifier which identifies a type of payload information provided in said at least one first field; and

109. Dr. Heegard does not contend that this article anticipates the '019/'568 patent. Dr. Gibson contends that the service type field of the PCN header ("PT field") acts as a "service type identifier which identifies a type of payload information." I disagree with this conclusion.

110. Definition of the PT field is provided below:

[17] Raychaudhuri article at 1413.

> *Service Type Definition:* A suitable field (e.g., 4 bits) in the PCN header may be provided to indicate whether a packet is of type supervisory/control, CBR, VBR, data, burst, etc. This simplifies base station protocol processing and resource allocation, enabling segregation and prioritization of data types without reference to VC-level call setup information.

111. Raychaudhuri article at 1407. Under Defendants' proposed construction, Dr. Gibson fails to explain how the PT field identifies the type of payload information (e.g., voice, video, or data). In addition, Dr. Gibson fails to explain how this field could allow a device in the system to account for different transmission characteristics of different types of information.

112. The Raychaudhuri article teaches away from the '019/'568 patent because it acknowledges that different types of information communication may have different transmission characteristics, but it does not disclose using the PT field to identify those characteristics. For example, the article provides several examples of services:

> By the time next-generation PCN is deployed, many new services such as text e-mail, client-server data, digital audio, and some video/multimedia applications may be expected in addition to conventional telephony. These services span a fairly broad range of bit-rate, service class, and quality-of-service (QoS) requirements. As in B-ISDN's integrated framework, services may either be connection-oriented (CO) or connectionless (CL). Connection-oriented services include constant bit rate (CBR) with selectable fixed bandwidth, and

variable bit-rate (VBR) with statistically multiplexed bandwidth allocation. Connectionless services include "best effort" or "available bit-rate (ABR)" packet data (similar to that provided by current packet switching networks) as well as high-throughput burst data service for file transfer, etc. Estimates for bit-rate and QoS of typical applications in the 3–5 year time frame are given in Table I above:

Raychaudhuri article at 1402.

TABLE I
TYPICAL APPLICATION REQUIREMENTS FOR NEXT-GENERATION PCN

Applications	Service Type	QoS	Bit-rate range
Voice telephony	CO/CBR	Call blocking permitted; Low-med cell loss OK; Isochronous.	2.4 - 32 kbps
Digital audio	CO/CBR	Call blocking permitted; Low cell loss reqd.; Low delay jitter.	128 - 512 Kbps
Teleconference Multimedia comm. Digital video	CO/CBR or CO/VBR	Statistical mux (for VBR); Call blocking permitted; Low-med cell loss OK; Low delay jitter.	64 Kbps - 384 Kbps (teleconf) 1- 6 Mbps (TV/VCR quality)
Digital HDTV	CO/CBR	Call blocking permitted; Low-med cell loss OK; Low delay jitter.	15 - 20 Mbps
General computer data	CL Best effort packet	No call blocking; Low cell loss reqd; Med delay & jitter OK.	0.1 - 1 Mbps
E-mail	CL Best effort packet	Low transfer rate; No call blocking; low cell loss OK; High delay OK.	9.6 - 128 Kbps
High-speed data (file transfer, multimedia)	CL Burst mode packet data	High transfer rate; Very low cell loss reqd; Med delay & jitter OK	1 - 10 Mbps

113. Although the Raychaudhuri article identifies video, voice, audio, and data as different types of information, the PT field does not identify these different types of information. Instead, the PT field is used to identify control/supervisory, CBR, VBR, data, etc. Because some types of information (e.g., multimedia) can use CBR or VBR, providing a PT field to distinguish

CBR from VBR cannot act as a "service type identifier which identifies a type of payload information."

114. I also disagree with Dr. Gibson's contention that the PT field "allows for prioritization of data by type."[18] First, because the PT field is not a "service type identifier which identifies a type of payload information," it cannot allow for prioritization of data by type. Moreover, the portions of the Raychaudhuri article cited by Dr. Gibson do not disclose using a service type identifier to prioritize video over data, for example. Instead, the PT field may be used to segregate data in the base station to form appropriate frames. For example, when using TDMA, the base station must place information in predefined time slots for VBR, CBR, etc.[19]

115. In addition, the Raychaudhuri article does not disclose using the PT field to implement QoS. For example, Table 1 identifies different QoS parameters for different applications, but the PT field does not identify that information. Furthermore, the article explains that additional advancements in this area will be needed:

> utilizations in the region of 55–60%. These QoS levels may be acceptable for many near-term nomadic multimedia applications, and may be further improved by operating at lower channel efficiency. More significant improvements in QoS and/or channel efficiency may be expected as transmission bit-rates are increased to the 8–16 Mbps (or higher) that may later prove to be feasible in micro and picocellular environments.

Raychaudhuri article at 1413.

116. To the extent Drs. Gibson and Heegard rely on this reference as disclosing the use of coding rate information, this same invalidity issue was raised during prosecution of the '568

[18] Dr. Gibson Invalidity Report at 2692.

[19] See Raychaudhuri article at Fig. 6.

patent. The examiner identified Raith '813 as an invalidating reference. In response, Ericsson explained that this reference disclosed using a field to identify channel coding information, but it did not disclose using a field as a service type identifier which identifies a type of payload information. Moreover, regarding claim 19 of the '019 patent, Ericsson explained that "the plain language of this claim makes clear that Applicants are claiming the use of a field to identify the type of payload information and not the type of channel coding."[20] Accordingly, this reference cannot anticipate this claim.

(2) Claim 22 of the '019 Patent and claim 2 of the '568 Patent

117. Because this reference fails to anticipate claim 19 of the '019 patent or claim 1 of the '568 patent, it also fails to anticipate this claim.

(3) Claim 23 of the '019 patent and claim 3 of the '568 patent

118. Because this reference fails to anticipate claim 19 of the '019 patent or claim 1 of the '568 patent, it also fails to anticipate this claim. In addition, the PT field does not distinguish between video, voice, or data.

(4) Claim 24 of the '019 Patent and claim 4 of the '568 patent

119. Because this reference fails to anticipate claim 19 of the '019 patent or claim 1 of the '568 patent, it also fails to anticipate this claim. In addition the PT field does not identify multimedia information.

[20] '568 patent prosecution history.

e) Multimedia Personal Communication Networks (PCN): System Design Issues, Dipankar Raychaudhuri and Newman D. Wilson ("Raychaudhuri Book")

120. The Raychaudhuri Book describes a multimedia-capable wireless network, which it refers to as a personal communication network ("PCN"). The Raychaudhuri book acknowledges that significant design work must be done to create a functioning PCN. The reference concludes that a TDMA-based system is promising, "provided that the system is augmented with additional features for effective support of time critical traffic."[21]

121. The Raychaudhuri article states that the PCN system should be required to handle multiple traffic types: connection oriented constant bit rate (CBR), connection oriented variable bit rate (VBR), connectionless packet data, and burst data.[22] Support for these traffic types is required because the PCN is designed to combine cellular voice communication functionality with wireless data functionality.

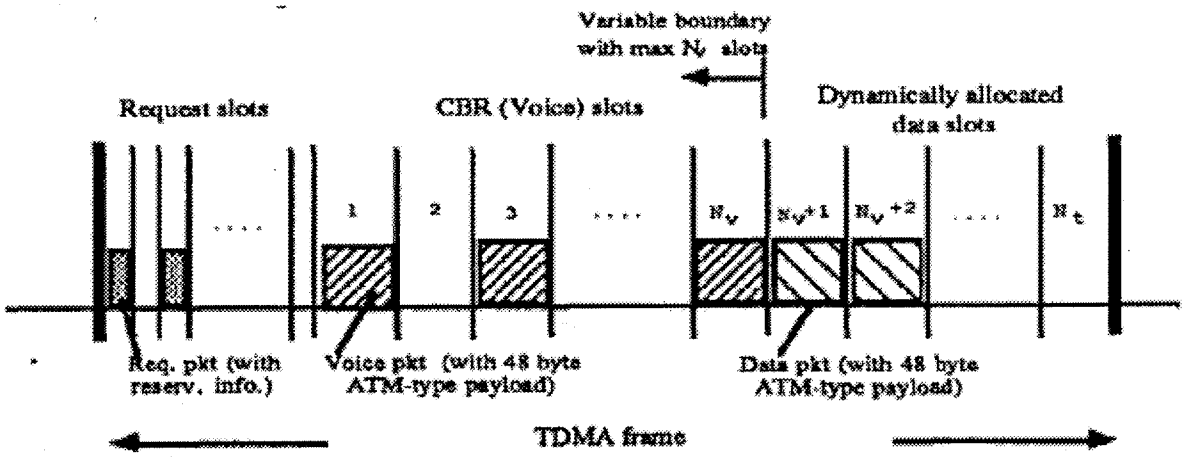
122. The TDMA based system described in the Raychaudhuri book allows for voice and data packets to be transmitted in time slots. Priority is automatically assigned to voice packets, with remaining available time slots being used for data packets. The ratio of voice time slots to data time slots is an implementation decision that must be made for the system.

addition to the 2 byte transmission preamble. Of the N_t message slots, a maximum of $N_v < N_t$ slots in each frame can be assigned for connection-oriented CBR voice traffic. Datagram type messages are dynamically assigned one or more 48 byte slots in the TDMA interval following the last allocated voice slot in a frame. Long data messages which cannot be accommodated in a single frame may be segmented for transmission in multiple frames.

Raychaudhuri Book at 297.

[21] Raychaudhuri Book at 304.

[22] Raychaudhuri Book at 292.



(1) Claim 19 of the '019 Patent and Claim 1 of the '568 Patent

123. The Raychaudhuri Book does not anticipate claim 19 of the '019 patent and claim 1 of the '568 patent.

providing at least one second field, separate from said first field, which includes a service type identifier which identifies a type of payload information provided in said at least one first field; and

124. Dr. Gibson contends that the N_v variable described in the Raychaudhuri Book is "service type identifier which identifies a type of payload information." I disagree with this conclusion.

125. The N_v variable defines the number of time slots used for voice communication. This variable must be selected for the system.[23] None of the citations discussed by Dr. Gibson indicates that the value of this variable is provided in a second field or otherwise transmitted throughout the system.

[23] Raychaudhuri Book at 298 ("A key issue is the selection of a value of N_v (voice slot limit) which provides reasonable balance between voice and data performance. Here, N_v was chosen so that the frame time is divided roughly in proportion to the ratio between offered voice and data traffic.")

126. The Raychaudhuri Book teaches away from the '019/'568 patent by requiring that voice and data be placed in predefined time slots, rather than providing a service type identifier which identifies a type of payload information.

127. Even if the N_v variable were transmitted in a field, none of the citations identified by Dr. Gibson indicates that this variable acts as a "service type identifier which identifies a type of payload information." Rather, this variable merely identifies the number of voice time slots, which varies based on implementation.

128. In addition, the citations provided by Dr. Gibson do not indicate that one could use N_v variable to determine the type of payload information contained in a time slot. The Raychaudhuri book identifies numerous types of traffic. However, it is unclear which of these types of traffic are considered "voice" or "data." Accordingly, distinguishing between "voice" time slots and "data" time slots does not distinguish between types of payload information (e.g., a "voice" time slot may contain "telephony," "teleconference," or "digital audio." Each of these traffic types has its own transmission characteristics).

Table 1. Examples of PCN traffic sources and their performance requirements

Application	Data type	Avg. Data rate (Kbps)	Peak Data rate (Kbps)	Max.Delay (sec)	Max.Pkt Loss rate
e-mail, paging	VBR	10^{-2}-10^{-1}	10^{0}-10^{1}	$<10^{1}$-10^{2}	$<10^{-9}$
Computer data	VBR	10^{-1}-10^{0}	10^{1}-10^{2}	$<10^{0}$-10^{1}	$<10^{-9}$
Telephony	CBR	10^{1}-10^{2}	10^{1}-10^{2}	$<10^{-1}$-10^{0}	$<10^{-4}$
Digital audio	CBR	10^{2}-10^{3}	10^{2}-10^{3}	$<10^{-2}$-10^{-1}	$<10^{-5}$
Teleconference	CBR/VBR	10^{2}-10^{3}	10^{3}-10^{4}	$<10^{-3}$-10^{-2}	$<10^{-5}$

Raychaudhuri Book at 290.

129. To the extent Drs. Gibson and Heegard rely on this reference as disclosing the use of coding rate information, this same invalidity issue was raised during prosecution of the '568 patent. The examiner identified Raith '813 as an invalidating reference. In response, Ericsson

explained that this reference disclosed using a field to identify channel coding information, but it did not disclose using a field as a service type identifier which identifies a type of payload information. Moreover, regarding claim 19 of the '019 patent, Ericsson explained that "the plain language of this claim makes clear that Applicants are claiming the use of a field to identify the type of payload information and not the type of channel coding."[24] Accordingly, this reference cannot anticipate this claim.

(2) Claim 22 of the '019 Patent and Claim 2 of the '568 Patent

130. Because this reference fails to anticipate claim 19 of the '019 patent or claim 1 of the '568 patent, it also fails to anticipate this claim. In addition, the Raychaudhuri article does not disclose adjusting the N_v variable to correspond with a second type of information.

(3) Claim 23 of the '019 patent and Claim 3 of the '568 Patent

131. Because this reference fails to anticipate claim 19 of the '019 patent or claim 1 of the '568 patent, it also fails to anticipate this claim.

(4) Claim 24 of the '019 Patent and Claim 4 of the '568 Patent

132. Because this reference fails to anticipate claim 19 of the '019 patent or claim 1 of the '568 patent, it also fails to anticipate this claim.

f) CODIT, a Testbed Project Evaluating DS-CDMA for UMTS/FPLMTS, PG Andermo and G. Brismark ("Andermo Article")

133. The Andermo Article describes the experimental CODIT project (Code Division Testbed). The CODIT project was designed to test the viability of using CDMA for a third generation cellular system. The described system uses several different channels. After

[24] '568 patent prosecution history.

establishing a connection, the system uses two separate physical channels, a data channel ("PDCH") and a control channel ("PCCH").

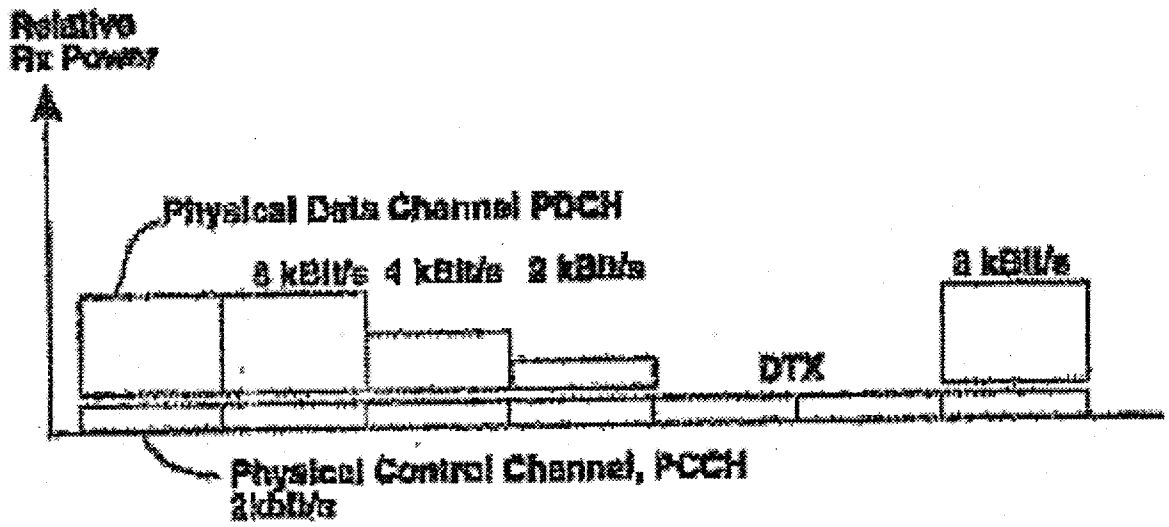


Figure 3: Example of a variable bit rate service.

Andermo Article at 23.

on. At call setup, the resource manager sets carrier frequency, bandwidth and a service specifier, telling which logical traffic channels will be used. Thereafter, the configuration unit can vary some parameters from frame to frame, such as channel coding rate and spreading factor.

Andermo Article at 22.

134. The PDCH is used to transmit user data having a variable bit rate. The PCCH is used to transmit control information such as the coding rate. The PCCH uses a defined coding rate already known by the receiver.[25]

(1) Claim 19 of the '019 Patent and Claim 1 of the '568 Patent

135. The Andermo article does not anticipate claim 19 of the '019 patent.

[25] Andermo Article at 22.

providing at least one second field, separate from said first field, which includes a service type identifier which identifies a type of payload information provided in said at least one first field; and

136. Dr. Gibson contends that the control information transmitted on the PCCH acts as a "service type identifier which identifies a type of payload information." I disagree with this conclusion.

137. The Andermo article explains that the PCCH provides information regarding the spreading factor for information in the PDCH and power control commands. It does not identify a type of service such as voice, video, or data.

> To make detection of the PDCH possible, information about the instantaneous spreading ratio on the PDCH, is transmitted to the receiver on the PCCH. The PCCH uses a different spreading code compared to the PDCH, and a fixed spreading factor a priori known in the receiver. In addition to the information about spreading factor of the PDCH, the PCCH is used to convey power control commands in the down link for closed loop power control of the uplink.

Andermo article at 23.

138. The spreading factor and power control information provided by the PCCH channel are basic pieces of information required in any CDMA system. In fact, CDMA is called code division multiple access because it uses spreading codes to allow multiple users to access a channel at the same time. Because the inventors of were well aware of this technology, they could not have intended to patent the prior art concept of using a spreading code in a CDMA system.[26]

[26] For example, see '019 patent at 4:11-4:19.

139. The PCCH does not identify the type of service of payload information. This same invalidity issue was raised during prosecution of the '568 patent. The examiner identified Raith '813 as an invalidating reference. In response, Ericsson explained that this reference disclosed using a field to identify channel coding information, but it did not disclose using a field as a service type identifier which identifies a type of payload information. Moreover, regarding claim 19 of the '019 patent, Ericsson explained that "the plain language of this claim makes clear that Applicants are claiming the use of a field to identify the type of payload information and not the type of channel coding."[27] Accordingly, the Andermo article cannot anticipate this claim.

transmitting said at least one first field and said at least one second field on said radio channel

140. The preamble of this claim explains that it covers transmitting information on a radio channel. The above limitation clarifies that both the service type identifier and payload field must be transmitted on the same radio channel. Because the PCCH and PDCH are separate channels, this limitation is not met.

(2) Claim 22 of the '019 Patent and Claim 2 of the '568 Patent

141. Because this reference fails to anticipate claim 19 of the '019 patent or claim 1 of the '568 patent, it also fails to anticipate this claim.

(3) Claim 23 of the '019 patent and Claim 3 of the '568 Patent

142. Because this reference fails to anticipate claim 19 of the '019 patent or claim 1 of the '568 patent, it also fails to anticipate this claim. In addition, the PCCH does not distinguish between video, voice, and data.

[27] '568 patent prosecution history.

(4) Claim 24 of the '019 Patent and Claim 4 of the '568 Patent

143. Because this reference fails to anticipate claim 19 of the '019 patent or claim 1 of the '568 patent, it also fails to anticipate this claim. In addition, the PCCH does not identify multimedia.

g) A Coherent Detection Scheme for the Uplink Channel in a CDMA System, G. Brismark et al. ("Brismark Article")

144. The Brismark Article describes the experimental CODIT project (Code Division Testbed). The CODIT project was designed to test the viability of using CDMA for a third generation cellular system. The described system uses several different channels. After establishing a connection, the system uses two separate physical channels, a data channel ("PDCH") and a control channel ("PCCH").

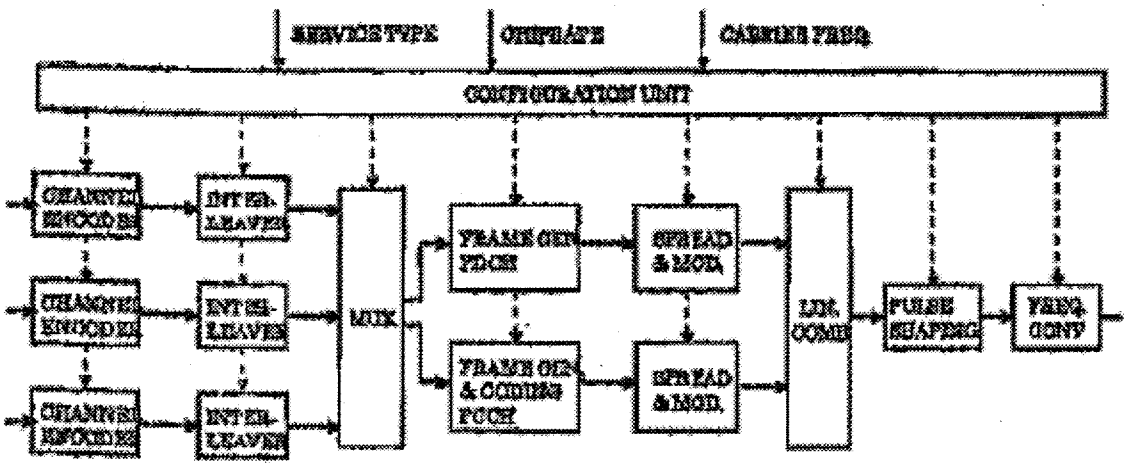


Fig. 1 Block diagram of generic transmission scheme.

Brismark Article at 730. The Brismark article explains that the PCCH provides information about channel coding and interleaving of information on the PDCH.

The radio interface is based on a DS-CDMA generic transmission scheme with a 10 ms frame structure, in which parameters such as channel coding and interleaving can easily be changed to meet the requirements of specific services. User data are transmitted through two channels using the same radio frequency channel but with different access codes. A physical channel is considered to be the combination of a radio frequency channel and an access code. The first channel, the Physical Data Channel (PDCH), carries the user information, while the second channel, the Physical Control Channel (PCCH), carries a frame type identifier needed to detect the user information. A powerful code is used to protect the frame type identifier ensuring that it is detected correctly.

Brismark article at 729.

(1) Claim 19 of the '019 Patent and Claim 1 of the '568 Patent

145. The Brismark article does not anticipate claim 19 of the '019 patent and claim 1 of the '568 patent.

providing at least one second field, separate from said first field, which includes a service type identifier which identifies a type of payload information provided in said at least one first field; and

146. Dr. Gibson contends that the control information transmitted on the PCCH acts as a "service type identifier which identifies a type of payload information." I disagree with this conclusion.

147. The Brismark article explains that the PCCH provides channel coding and interleaving information. The PCCH does not identify the type of service of payload information, such as voice, video, or data. This same invalidity issue was raised during

prosecution of the '568 patent. The examiner identified Raith '813 as an invalidating reference. In response, Ericsson explained that this reference disclosed using a field to identify channel coding information, but it did not disclose using a field as a service type identifier which identifies a type of payload information. Moreover, regarding claim 19 of the '019 patent, Ericsson explained that "the plain language of this claim makes clear that Applicants are claiming the use of a field to identify the type of payload information and not the type of channel coding."[28] Accordingly, the Brismark article cannot anticipate this claim.

transmitting said at least one first field and said at least one second field on said radio channel

148. The preamble of this claim explains that it covers transmitting information on a radio channel. The above limitation clarifies that both the service type identifier and payload field must be transmitted on the same radio channel. Because the PCCH and PDCH are separate channels, this limitation is not met.

(2) Claim 22 of the '019 Patent and Claim 2 of the '568 Patent

149. Because this reference fails to anticipate claim 19 of the '019 patent or claim 1 of the '568 patent, it also fails to anticipate this claim.

(3) Claim 23 of the '019 patent and Claim 3 of the '568 Patent

150. Because this reference fails to anticipate claim 19 of the '019 patent or claim 1 of the '568 patent, it also fails to anticipate this claim. In addition, the PCCH does not distinguish between video, voice, and data.

[28] '568 patent prosecution history.

(4) Claim 24 of the '019 Patent and Claim 4 of the '568 Patent

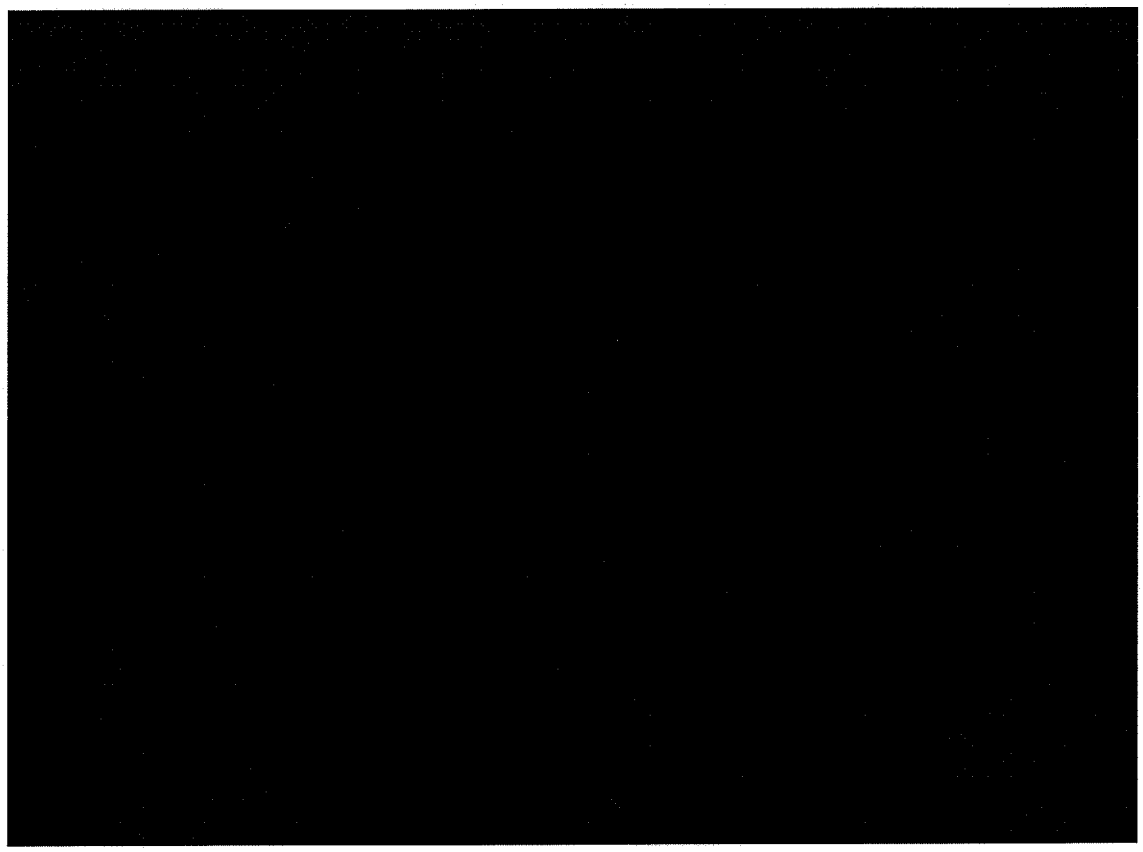
151. Because this reference fails to anticipate claim 19 of the '019 patent or claim 1 of the '568 patent, it also fails to anticipate this claim. In addition, the PCCH does not identify multimedia.

h) The CODIT System

152. Dr. Gibson identifies the CODIT system as a separate prior art reference. However, Dr. Gibson's description of the CODIT system comes from only three sources, the Brismark article, the Andermo article, and the testimony of Gustav Brismark. For the reasons explained in the sections above, descriptions of the CODIT system in the Brismark article and Andermo article do not anticipate the '019/'568 patent.

153. The testimony of Mr. Brismark does not contradict the Brismark article or the Andermo article, nor does it provide additional technical detail. Accordingly, the CODIT system does not anticipate the '019/'568 patent.

154. Dr. Gibson identifies the following testimony as supporting his conclusion:



Dr. Gibson Report at 2764.

155. As explained in my discussions of the Andermo article and Brismark article, the physical control channel (PCCH) provides channel coding information for the payload. Mr. Brismark does not contradict this conclusion. Accordingly, his testimony is consistent with the prior art technique described in the '019/'568 patent as disclaimed by the inventors: "another alternative is simply to allow the base station to transmit information pertaining to different services based on the differences in channel coding. . . . However, as the number of services expands beyond two, the complexity of discriminating between services in this manner becomes excessive. Thus, according to another exemplary embodiment of the present invention, the FOC fields may also serve the purpose of service type identifier." '019 patent at 9:15-9:28.

i) U.S. Patent No. 5,757,813 ("Raith '813 Patent")

156. Raith '813 describes a method for achieving optimal channel coding in a wireless system. The method is described in the context of TDMA. The method allows a mobile device to request an increase or decrease in the degree of channel coding based on channel conditions. The base station can then change the degree of channel coding and communicate this change to the mobile device using a channel that is "out of band."[29]

(1) Claim 19 of the '019 Patent and Claim 1 of the '568 Patent

157. Raith '813 does not anticipate claim 19 of the '019 patent and claim 1 of the '568 patent. This reference was distinguished during prosecution. In response to the examiner's identification of this reference, Ericsson explained that this reference disclosed using a field to identify channel coding information, but it did not disclose using a field as a service type identifier which identifies a type of payload information. Moreover, regarding claim 19 of the '019 patent and claim 1 of the '568 patent, Ericsson explained that "the plain language of this claim makes clear that Applicants are claiming the use of a field to identify the type of payload information and not the type of channel coding."[30]

> **providing at least one second field, separate from said first field, which includes a service type identifier which identifies a type of payload information provided in said at least one first field; and**

158. Although Dr. Gibson discusses this reference, he fails to explain how this reference discloses some elements of the asserted claims. For example, Dr. Gibson is unable to identify a service type identifier in this reference.

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[29] Raith '813 at 10:47-10:56.

[30] '568 patent prosecution history.

159. Dr. Heegard contends that the channel coding indicator bit acts as a "service type identifier which identifies a type of payload information." I disagree with this conclusion. The channel coding indicator bit only identifies the degree of channel coding. As explained during prosecution, this bit does not identify a type of payload information.

(2) Claim 22 of the '019 Patent and Claim 2 of the '568 Patent

160. Because this reference fails to anticipate claim 19 of the '019 patent or claim 1 of the '568 patent, it also fails to anticipate this claim.

(3) Claim 23 of the '019 patent and Claim 3 of the '568 Patent

161. Because this reference fails to anticipate claim 19 of the '019 patent or claim 1 of the '568 patent, it also fails to anticipate this claim. In addition, the indicator bit does not distinguish between video, voice, and data.

(4) Claim 24 of the '019 Patent and Claim 4 of the '568 Patent

162. Because this reference fails to anticipate claim 19 of the '019 patent or claim 1 of the '568 patent, it also fails to anticipate this claim. In addition, the indicator bit does not identify multimedia.

j) U.S. Patent No. 5,247,516 ("Bernstein")

163. Bernstein describes a method for transmitting information on a wired integrated services network. Bernstein explains that one purpose of this system is to account for "the phenomenon that different components of traffic in an integrated services network are affected differently by transmission characteristics of the network."[31]

164. Bernstein attempts to account for different components of traffic by specifying that data be grouped into different traffic components. When data is transmitted to an exit point,

[31] Bernstein at 4:4-4:10.

the subscriber requests a connection. At call setup, the transmitter sends a control frame which identifies the number of channels that will be used, and the traffic component type for each channel. Thus, data for each traffic component type is sent on its own dedicated channel. The number of channels and traffic component type for each channel may only be varied when a subscriber requests a connection or termination of a connection. See for example:

> **According to a feature of the present invention, the multimedia communication method and system utilizes a composite data frame configured with a multi-slotted payload, each slot being a channel which is allocated to a subscriber having requirements for transmission of a particular type of traffic component. The payload of the composite frame is divided into multiple channels and the channels are grouped according to traffic component type, with each grouping of plural channels in the frame referred to herein a traffic component slot, or simply, T-slot. The frames are composed with a particular configuration of channel assignments and inclusions on a per call connection basis, dedicated for the duration of the call connection, and may be reconfigured on request by subscriber according to established priorities or based on traffic conditions such as link congestion on the network.**

Bernstein at 4:44-4:60.

> Decomposition information is transmitted to the exit point for the composite frames in the network by specifying the number of channels being allocated and the traffic component type for each, in a separate control frame carried outside the composite data frames. The control frame is built by the local endpoint node and sent to the remote endpoint node, when a network subscriber requests a connection or termination of a connection. Each control frame is built to contain only the delta change from the prior frame format to the current frame format, identifying the channels being added or released in the composite frame to the network remote endpoint. When a channel or channels are added, the control frame must specify the traffic component type of each such channel.

Bernstein at 5:46-5:54.

(1) Claim 19 of the '019 Patent and Claim 1 of the '568 Patent

165. Bernstein does not anticipate claim 19 of the '019 patent and claim 1 of the '568 patent.

providing at least one second field, separate from said first field, which includes a service type identifier which identifies a type of payload information provided in said at least one first field; and

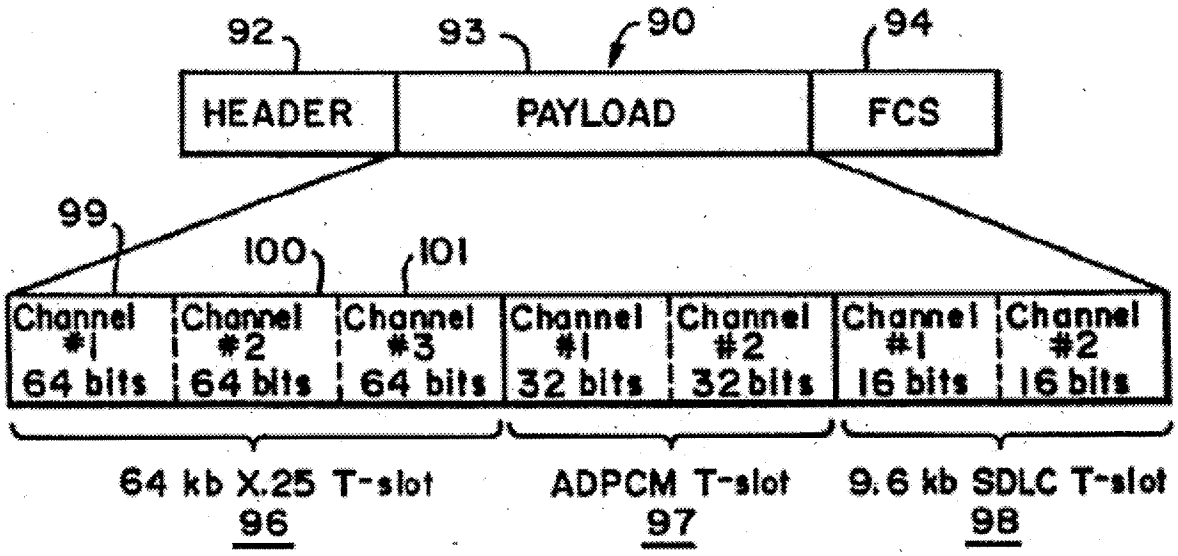
166. Although Dr. Gibson discusses this reference, he fails to explain how this reference discloses some elements of the asserted claims. For example, Dr. Gibson is unable to identify a service type identifier in this reference.

167. Dr. Heegard contends that Bernstein discloses "packets where the header indicates the type of information in the payload such that voice and data packets can be treated differently, with different transmission characteristics."[32] I disagree with this conclusion, and I

[32] Dr. Heegard report at 57.

note that none of the citations mentioned by Dr. Heegard as supporting this conclusion describe the contents of any packet header.

168. Dr. Heegard appears to be referring to the header depicted in Figure 5:



169. Although Bernstein identifies various traffic component types, this information is transmitted at call set up to establish dedicated channels. It is not transmitted in a packet header. For example, although the packet header contains a "packet type" field, this field is only used to distinguish between control frames and user data frames.[33] Because the packet header only distinguishes between user data and control data it does not act as a service type identifier which identifies a type of payload information (e.g., voice, video, or data).

170. In addition, the control frame transmitted at call setup to identify the various channels does not act as a service type identifier which identifies a type of payload information. This control frame identifies each channel, it does not identify the type of payload information

[33] Bernstein at 17:34-17:36 ("The PT (payload type) field identifies the frame type, i.e., a data frame or one of the defined control frames.").

contained in a first field. By using dedicated channels in this manner, Bernstein teaches away from the patented technique.

transmitting said at least one first field and said at least one second field on said radio channel.

171. None of the citations referenced by Drs. Heegard or Gibson disclose transmitting information on a radio channel. Furthermore, Bernstein discloses transmitting data for each traffic component type on a separate channel. Accordingly, Bernstein does not disclose this element.

(2) Claim 22 of the '019 Patent and Claim 2 of the '568 Patent

172. Because this reference fails to anticipate claim 19 of the '019 patent or claim 1 of the '568 patent, it also fails to anticipate this claim. In addition, because Bernstein establishes dedicated channels, Bernstein does not disclose changing said type of information from a first type to a second type during a connection . . . or adjusting a value of said service type identifier.

(3) Claim 23 of the '019 patent and Claim 3 of the '568 Patent

173. Because this reference fails to anticipate claim 19 of the '019 patent or claim 1 of the '568 patent, it also fails to anticipate this claim.

(4) Claim 24 of the '019 Patent and Claim 4 of the '568 Patent

174. Because this reference fails to anticipate claim 19 of the '019 patent or claim 1 of the '568 patent, it also fails to anticipate this claim.

k) U.S. Patent No. 5,488,610 ("Morley")

175. Morley discloses a multiplexer for use in transmitting voice information over a telephone line as well as data. The purpose of the invention is to eliminate transmission errors caused by clock errors. Because such a system may use separate clocks for voice and data, during communication, the voice and data may lose synchronization. Figure 1 illustrates this problem:

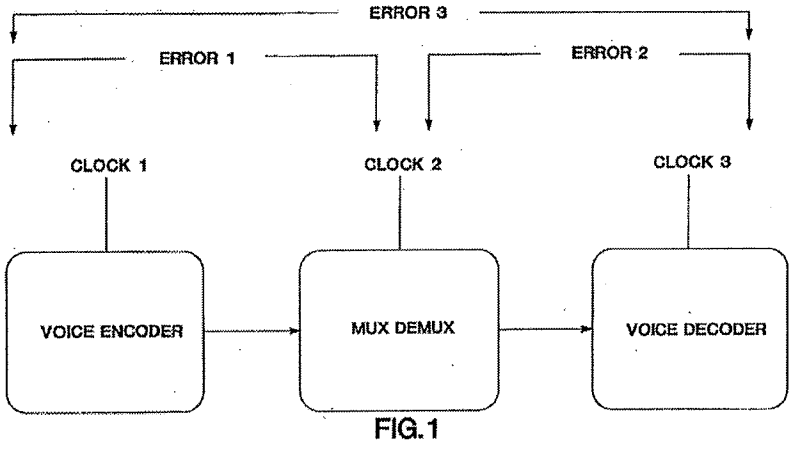


FIG. 1

FIG. 1 illustrates the potential for timing errors in such a scheme. A first clock 1 controls the voice encoder and a second clock 2 controls the multiplexer and hence the timing for the communications channel. A third clock 3 controls the timing of the receiving voice decoder.

Error 1 is the error between clocks 1 and 2. Error 2 is the error between the clocks 2 and 3. Error 3 is the cumulative error between the clocks 1 and 3.

If clocks 1 and 2 are synchronous to each other then the voice frames can be transmitted without error on the communications channel. If clocks 1 and 2 are not synchronous to each other then a clocking error (Error 1) builds up over time and voice frames may be lost. It may be difficult or impossible in many situations to lock the timing of the voice encoder and multiplexer in which case error 1 can lead to errors in the transmission of voice information.

At the receiving end, error 3 causes a similar problem and occasionally voice frames have to be dropped or repeated.

Morley at 1:17-1:36.

176. Morley proposes using a frame header which may contain the following values:

Header Type	Frame Type	Header Value
0	Sync	0 × 19b3
1	Extend	0 × 007f
2	Voice Only	0 × 4ce6
3	Not Defined	0 × 0000
4	Data 0	0 × 34e9
5	Data 0*	0 × 3366
6	Voice + Data 0	0 × 2ad5
7	Voice + Data 0*	0 × 1e3c
8	Data 1	0 × 4b69
9	Data 1*	0 × 52da
10	Voice + Data 1	0 × 552a
11	Voice + Data 1*	0 × 61c3
12	Data 2	0 × 664c
13	Data 2*	0 × 7870
14	Voice + Data 2	0 × 078f
15	Voice + Data 2*	0 × 4b16

Morley at 7:1-7:17.

177. Morley explains that this header is used for two purposes. First, the header identifies the "frame type." Based on the frame type, the receiver sorts received information to the appropriate voice or data hardware: "The header of a received frame is checked and status, voice and non voice fields are written to voice and data buffers 70 and 72 as appropriate."[34]

178. Second, when the receiver receives a header, it can compare the header value to one of the 16 unique header values shown above. If the header value matches one of these predetermined header values, the receiver knows that the frame should contain few errors. On the other hand, if the header does not match a predetermined header value, the receiver can

[34] Morley at 10:19-10:22.

determine that the frame contains errors. If a frame contains errors, the transmitter and receiver must resynchronize.[35]

> Synchronisation is maintained by checking headers in the receive data. When a frame has been received the two octets in the header position in the frame are 'scored' in turn against each header in the list of possible headers. This scoring is a bitwise exclusive-OR, the number of bits set to one after this operation indicates the number of bits different to the header being matched, ie the number of errors. Therefore, if the header in the receive frame is error free it will be a perfect match to one of the headers in the list of possible headers and the 'score' will be 0. If no headers score 0 then the header with the lowest score is chosen and a count of receive frame errors is incremented. If three consecutive frames are received with headers in error then a resynchronisation is forced.

Morley at 7:64-8:10.

(1) Claim 19 of the '019 Patent and Claim 1 of the '568 Patent

179. Morley does not anticipate claim 19 of the '019 patent and claim 1 of the '568 patent.

providing at least one second field, separate from said first field, which includes a service type identifier which identifies a type of payload information provided in said at least one first field; and

180. The frame headers disclosed in Morley do not meet the requirement of "a service type identifier which identifies a type of payload information." These headers merely specify whether data should be sent to the voice or data buffer. In addition, although these headers are used for synchronization, this process merely relies on comparing the header value to a pre-determined value. As a result, these headers do not allow devices in the system to account for different transmission characteristics of different types of information.

[35] The synchronization procedure is explained in Morley at 7:45-7:63.

181. Morley teaches away from the '019/'568 patent by requiring the receiver to contain specialized subsystems for receiving voice, audio, and data. In contrast, the inventors of the '019 patent intended to create an invention that would allow existing devices to accommodate multiple services, including services that may be developed in the future.[36] Accordingly, the inventors taught the use of a service type identifier which identifies a type of payload information.

(2) Claim 22 of the '019 Patent and Claim 2 of the '568 Patent

182. Because this reference fails to anticipate claim 19 of the '019 patent or claim 1 of the '568 patent, it also fails to anticipate this claim.

(3) Claim 23 of the '019 patent and Claim 3 of the '568 Patent

183. Because this reference fails to anticipate claim 19 of the '019 patent or claim 1 of the '568 patent, it also fails to anticipate this claim.

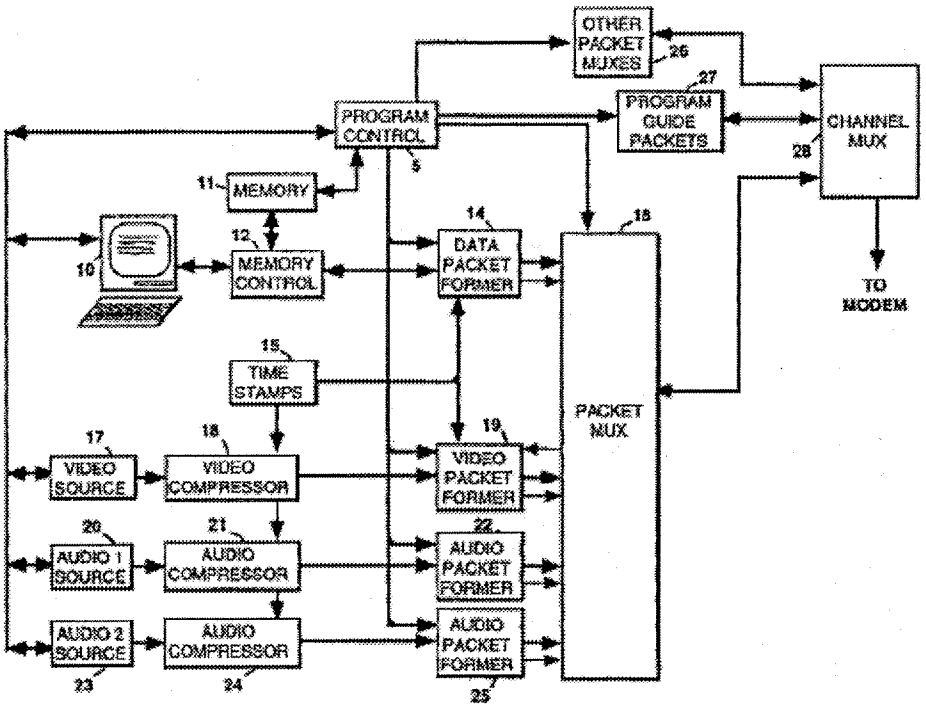
(4) Claim 24 of the '019 Patent and Claim 4 of the '568 Patent

184. Because this reference fails to anticipate claim 19 of the '019 patent or claim 1 of the '568 patent, it also fails to anticipate this claim.

l) U.S. Patent No. 5,548,532 ("Menand")

185. Menand discloses a system for transmitting audio, video, and data television signals throughout a satellite network. A device in this system contains separate hardware for handling these three types of information.

[36] '019 patent at 2:56-2:64.



Menand Figure 1.

186. The purpose of the Menand system is to facilitate audio-video-interactive ("AVI") programs. Information sent in the Menand system is organized by SCID. Video packets are associated with $SCID_{Vi}$ values, audio packets are associated with $SCID_{Ai}$ values, and code/data packets are associated with $SCID_{Di}$ values.[37] When a receiver receives transmission packets, it determines the SCID values for the packets, and then compares those values to information in a program guide. In this way, the receiver can identify a specific game show for example, and then pull together the appropriate video SCID, audio SCID, and data SCID packets for that program.

[37] See Menand at 1:30-1:52.

> components are selected. The program controller assigns respective SCID's for respective audio, video and interactive components of respective programs. The presumption is made that respective receivers will access a program guide to determine which SCID's associate AVI program components, and then select transport packets from the transmitted signal stream containing the associated SCID's. The audio,

Menand at 2:49-2:55.

187. One alternative way of organizing TV guide information would be to assign the same SCID value to the audio, video, and data components of a program. However, Menand uses different SCID values so that the system can mix and match these components. For example, if two game shows use the same interactive data component to allow users to play along, the system can just send that data component once with a single SCID value, and then associate that SCID with both game shows in the program guide.

> The audio, video and interactive components are assigned different SCID's so that one or more of the components of one AVI program may conveniently be utilized in the formation of alternate AVI programs. For example, consider that two similar TV game shows are being concurrently produced, and that it is desired that both be interactive using the same user interaction format. The same interactive component may be used simply by associating its SCID with both AVI programs, if the interactive component is substantially independent of the video program. Using Differing SCID's also facilitates editing audio from one program with video from another.

Menand at 2:55-2:67.

188. Once a transmitter in this system has prepared packets for transmission, those packets are sent in the system using time division multiplexing. Specific time slots are

hardcoded for video, audio, and data.[38] Menand does not allow for these hardcoded time slots to change. For example, if a user selects a television program without audio, the system cannot fill the unnecessary audio time slots with video or data packets because those time slots are hard coded for audio only:

> occur at a rate as high as the video packets. If audio packets do not occur at the audio multiplexing rate, the multiplexer may be arranged to simply not pass an audio packet in the audio multiplex time slot, or to repeat the last audio packet.

Menand at 5:53-5:56.

(1) Claim 19 of the '019 Patent and Claim 1 of the '568 Patent

189. Morley does not anticipate claim 19 of the '019 patent and claim 1 of the '568 patent.

providing at least one second field, separate from said first field, which includes a service type identifier which identifies a type of payload information provided in said at least one first field; and

190. Drs. Gibson and Heegard contend that the SCID is a service type identifier. I disagree with this contention. A SCID is assigned to the audio, video, or data portion of a television program. A receiver uses this SCID to navigate the TV Guide. Accordingly, the SCID does not meet the requirement of "a service type identifier which identifies a type of payload information."

191. While Menand recognizes that video packets may need to be prioritized over audio packets, Menand teaches away from the '019/'568 patent by requiring that a system hard code time slots to only contain one type of data. This system fails to account for the fact that the type of data being sent may vary rapidly.

[38] See for example Menand at Figs. 8-10.

192. Drs. Gibson and Heegard appear to contend that the SCID value somehow provides information related to transmission characteristics. For the reasons explained above, I disagree. Beyond the reasons I have described, Menand does not identify any other uses for the SCID that would allow a device to account for transmission characteristics. Moreover, to the extent the SCID is simply used to route packets to appropriate audio or video hardware, it fails to meet this claim limitation.

193. Menand teaches away from the '019/'568 patent by requiring the receiver to contain specialized subsystems for receiving voice, audio, and data. In contrast, the inventors of the '019 patent intended to create an invention that would allow existing devices to accommodate multiple services, including services that may be developed in the future.[39] Accordingly, the inventors taught the use of a service type identifier which identifies a type of payload information.

(2) Claim 22 of the '019 Patent and Claim 2 of the '568 Patent

194. Because this reference fails to anticipate claim 19 of the '019 patent or claim 1 of the '568 patent, it also fails to anticipate this claim. In addition, While Menand recognizes that video packets may need to be prioritized over audio packets, Menand teaches away from the '019 patent by requiring that a system hard code time slots to only contain one type of data. This system fails to account for the fact that the type of data being sent may vary rapidly.

(3) Claim 23 of the '019 patent and Claim 23 of the '568 Patent

195. Because this reference fails to anticipate claim 19 of the '019 patent or claim 1 of the '568 patent, it also fails to anticipate this claim.

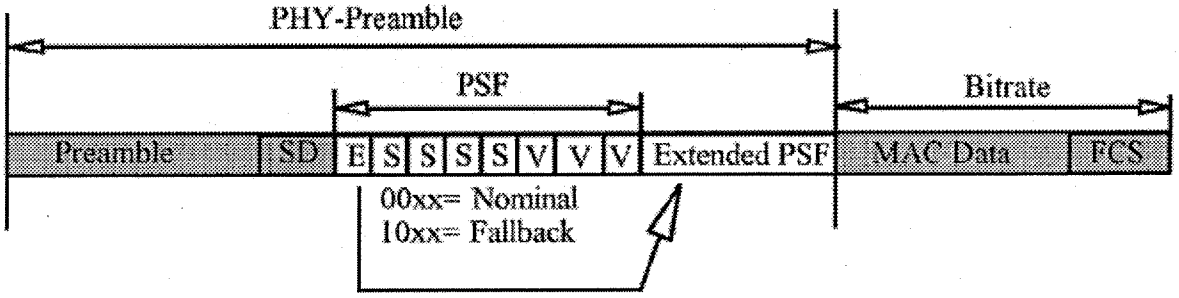
[39] '019 patent at 2:56-2:64.

(4) Claim 24 of the '019 Patent and Claim 4 of the '568 Patent

196. Because this reference fails to anticipate claim 19 of the '019 patent or claim 1 of the '568 patent, it also fails to anticipate this claim.

m) IEEE P802.11-93/146, "The Need for MAC Data Delimiters in the PHY," Wim Diepstraten ("Diepstraten 146")

197. Diepstraten 146 proposes an amendment to a draft version of an 802.11 standard. Diepstraten 146 discusses a delimiter at the PHY layer to provide information on bit rate, proprietary information or other future uses.



- 1-E bit: The First in Time (FIT) bit is an extension bit, that indicates whether or not an additional PSF octet is following.
- 4-S bits: for 802.11 standerdized functions (2 bits for speed, others may be reserved)
- 3-V bits: for vendor specific functions.

Diepstraten 146 at 5.

(1) Claim 19 of the '019 Patent and Claim 1 of the '568 Patent

198. Diepstraten 146 does not anticipate claim 19 of the '019 patent and claim 1 of the '568 patent.

providing at least one second field, separate from said first field, which includes a service type identifier which identifies a type of payload information provided in said at least one first field; and

199. Drs. Heegard appears to contend that the 4-S bits of the PSF act as a service type identifier. Dr. Gibson does not specify how this element is met. I disagree with their conclusions.

200. Diepstraten 146 states that the 4-S bits provide "2 bits for speed." These bits do not identify the service type of payload information such as voice, video, or data. Beyond this explanation, the implementation details of how these bits provide information, and how this information can be associated with a payload are not provided. Diepstraten provides some additional information on the motivation for the PSF, but it is unclear how this purpose is to be realized:

> In this concept, it is important that a receiver can dynamically recognize the speed at which a packet is received. It will be able to receive the packet and retrieve the correct clock to send it to the MAC. In addition an indication of the bitrate with which this packet was received needs to be reported to the MAC. This indication will be needed by the MAC to build a database of the bitrate selection needed per destination station.

Diepstraten 146 at 4.

201. Accordingly, Diepstraten 146 does not disclose a service type identifier which identifies a type of payload information provided in said at least one first field. Even if the PSF provides information that allows a receiver to determine the speed at which a packet is received, such a technique does not identify a type of payload information. The PSF does not identify voice, video, or data, etc. This same invalidity issue was raised during prosecution of the '568 patent. The examiner identified Raith '813 as an invalidating reference. In response, Ericsson explained that this reference disclosed using a field to identify channel coding information, but it did not disclose using a field as a service type identifier which identifies a type of payload information. Moreover, regarding claim 19 of the '019 patent, Ericsson explained that "the plain

language of this claim makes clear that Applicants are claiming the use of a field to identify the type of payload information and not the type of channel coding."[40]

(2) Claim 22 of the '019 Patent and Claim 2 of the '568 Patent

202. Because this reference fails to anticipate claim 19 of the '019 patent or claim 1 of the '568 patent, it also fails to anticipate this claim.

(3) Claim 23 of the '019 patent and Claim 3 of the '568 Patent

203. Because this reference fails to anticipate claim 19 of the '019 patent or claim 1 of the '568 patent, it also fails to anticipate this claim. In addition, the PSF field does not distinguish between video, voice, and data.

(4) Claim 24 of the '019 Patent and Claim 4 of the '568 Patent

204. Because this reference fails to anticipate claim 19 of the '019 patent or claim 1 of the '568 patent, it also fails to anticipate this claim. In addition, the PSF field does not distinguish between multimedia.

n) IEEE P802.11-94/258x, "Detailed Draft Text Changes to Support DTBS," Wim Diepstraten ("Diepstraten 258x")

205. Diepstraten 258x provides some specific amendments to the 802.11 draft 1994 standard. For the same reasons that the 802.11 draft 1994 standard does not anticipate the asserted claims of this patent, Diepstraten 258 does not anticipate the asserted claims of this patent.

(1) Claim 19 of the '019 Patent and Claim 1 of the '568 Patent

206. Diepstraten 258x does not anticipate claim 19 of the '019 patent and claim 1 of the '568 patent.

[40] '568 patent prosecution history.

providing at least one second field, separate from said first field, which includes a service type identifier which identifies a type of payload information provided in said at least one first field; and

207. Drs. Heegard and Gibson fail to specify a field in Diepstraten 258x that acts as a service type identifier. Although Drs. Heegard and Gibson cite to portions of this reference that discuss QoS, these citations do not identify at least one second field, separate from said first field, which includes a service type identifier which identifies a type of payload information provided in said at least one first field.

208. To the extent Drs. Heegard and Gibson contend that the functionality identified with respect to the 802.11-draft 1994 standard or on of the other Diepstraten references satisfies this claim limitation, my explanations with respect to those references are equally applicable with respect to this reference.

(2) Claim 22 of the '019 Patent and Claim 2 of the '568 Patent

209. Because this reference fails to anticipate claim 19 of the '019 patent or claim 1 of the '568 patent, it also fails to anticipate this claim.

(3) Claim 23 of the '019 patent and Claim 3 of the '568 Patent

210. Because this reference fails to anticipate claim 19 of the '019 patent or claim 1 of the '568 patent, it also fails to anticipate this claim.

(4) Claim 24 of the '019 Patent and Claim 4 of the '568 Patent

211. Because this reference fails to anticipate claim 19 of the '019 patent or claim 1 of the '568 patent, it also fails to anticipate this claim.

o) IEEE P802.11-93/190, "DFWMAC: Distributed Foundation Wireless Medium Access Control," Wim Diepstraten ("Diepstraten 190")

212. Diepstraten 190 provides an earlier version of a draft for an 802.11 standard that shares some descriptions with the 802.11 draft 1994 standard. For the same reasons that the 802.11 draft 1994 standard does not anticipate the asserted claims of this patent, Diepstraten 258 does not anticipate the asserted claims of this patent.

(1) Claim 19 of the '019 Patent and Claim 1 of the '568 Patent

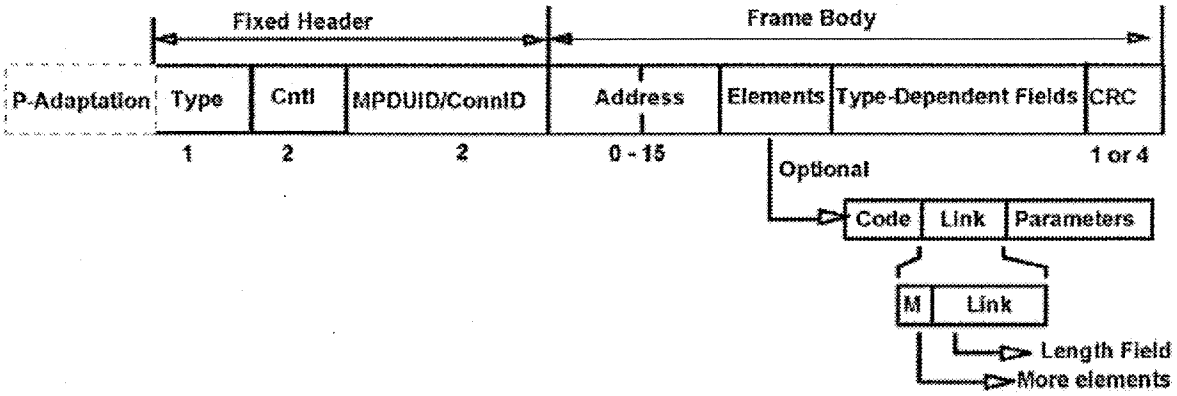
213. Diepstraten 190 does not anticipate claim 19 of the '019 patent and claim 1 of the '568 patent.

providing at least one second field, separate from said first field, which includes a service type identifier which identifies a type of payload information provided in said at least one first field; and

214. Dr. Gibson identifies the data field as a first field in which payload information is disposed. Dr. Gibson appears to identify the type field of the fixed header as a service type identifier. Diepstraten describes multiple frame types that include the frame types in the 802.11-draft 1994 standard.

215. The purpose of the type field is to identify the format of a frame, not the type of payload information. For example, the frame type "data" identifies a frame as containing a data field (i.e., the field identified by Dr. Gibson as a payload field). This is the only frame type that contains a data field. Because the type field only identifies the format of a frame that contains a data field, it cannot act as a service type identifier which identifies a type of payload information provided in said at least one first field.

216. The general PHY and MAC format of a frame is shown below:



A description of the different frame types, and the frame formats is shown below:

Type

1 octet, including a 4 bit type field and 3 control bits. The control bits indicate asynchronous or timebounded service, whether or not the frame is encrypted, and whether or not the frame is compressed. The type subfield takes the following values:

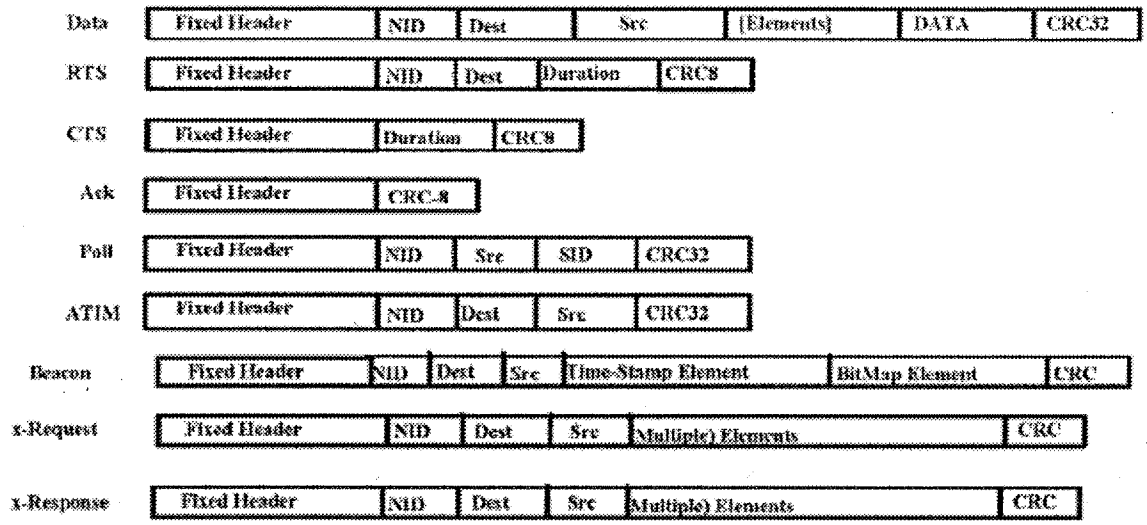
Asynchronous

0 Reserved
1 RTS (Request to Send)
2 CTS (Clear to Send)
3 Data
4 Ack
5 Poll
6 Beacon
7 ATIM (Ad-hoc Traffic Indication Map)
8 Request
9 Response

Time Bounded

0 Reserved
1 TB-Up
2 TB-Down
3 TB-CTS
4 Ack

Diepstraten 190 at 63-64.



Diepstraten 190 at 66.

217. In addition, under Defendants' proposed construction, Dr. Gibson fails to explain how the type field identifies the type of payload information (e.g., voice, video, or data). In addition, Dr. Gibson fails to explain how this field could allow a device in the system to account for different transmission characteristics of different types of information. In other words, the limited type variations used in Diepstraten 190 fail to identify the service type of payload information.

218. Under Plaintiffs' proposed construction, Dr. Gibson fails to explain how the type field identifies information regarding transmission characteristics. Notably, the type field does not allow a device to distinguish between QoS and non-QoS data or between packets that have different TID values.

219. In addition, Diepstraten 190 does not disclose this limitation because the type field does not identify a service type of the payload information. In the '019/'568 patent, the term "service" refers to information communication, i.e., user data.[41] As shown in the excerpts

[41] See, e.g., '019 patent at 2:27-2:30.

above, the type field only allows a device to distinguish between "data," i.e., user data, and various types of administrative frames. The type/subtype field does not distinguish between various types of services that may be contained in a data frame.

(2) Claim 22 of the '019 Patent and Claim 2 of the '568 Patent

220. Because this reference fails to anticipate claim 19 of the '019 patent or claim 1 of the '568 patent, it also fails to anticipate this claim.

(3) Claim 23 of the '019 patent and Claim 3 of the '568 Patent

221. Because this reference fails to anticipate claim 19 of the '019 patent or claim 1 of the '568 patent, it also fails to anticipate this claim.

(4) Claim 24 of the '019 Patent and Claim 4 of the '568 Patent

222. Because this reference fails to anticipate claim 19 of the '019 patent or claim 1 of the '568 patent, it also fails to anticipate this claim.

3. Response to Alleged Obviousness References

223. As explained above, none of the asserted obviousness references disclose providing at least one second field, separate from said first field, which includes a service type identifier which identifies a type of payload information provided in said at least one first field. Accordingly, no combination of references can disclose this limitation. Even if one or more references discloses one of this limitation, it is not obvious to combine elements from different wireless systems without further analysis. For example, commands and messages in one protocol may have unexpected or undesirable effects when introduced into a different protocol. It would not be obvious to combine the information conveyed in identifiers from multiple references into a single identifier. This is because each identifier is designed for a specific system. For example, the ID tags of Adams correspond to the specific subsystems in Adams. It would not be obvious to specify additional information in the headers disclosed in Adams,

because the Adams system is designed to work without requiring that information. In general, a system should be designed to minimize the amount of overhead transmitted on the channel.

4. Response to Dr. Gibson's Section 112 Arguments

224. I disagree that the asserted claims of the '019 patent fail to comply with the provisions of 35 USC § 112. Some of Dr. Gibson's arguments appear to relate to infringement issues. Accordingly, I hereby incorporate my infringement report.

225. Dr. Gibson contends that the limitation "providing at least one second field, separate from said first field, which includes a service type identifier which identifies a type of payload information provided in said at least one first field" is indefinite, lacks written description, and is not enabled. Dr. Gibson appears to contend that the asserted claims are invalid because the specification does not disclose a "QoS Control field" or TID subfield. However, given that this patent was invented well before these terms were added to the 802.11n standard, it is unsurprising that the do not appear in the patent. To the extent that Dr. Gibson contends that this patent does not disclose prioritizing data, I disagree. The patent discloses dynamically providing data in more or fewer time slots depending on the demands of the service.[42] This is one way to prioritize one type of service in a TDMA system. For additional arguments related to this limitation, I hereby incorporate the claim construction section of this report for this patent.

B. U.S. PATENT NO. 6,424,625

226. Dr. Gibson and Dr. Heegard allege that the asserted claim of the '625 patent is anticipated by prior art. I disagree. None of the references cited by Dr. Gibson or Dr. Heegard teaches or discloses all the limitations of the asserted claim. And some of these references are

[42] '019 patent at 2:15-2:65.

not prior art as they are not entitled to a priority date before conception and reduction to practice of the asserted claim of the '625 patent.

227. Dr. Gibson and Dr. Heegard also allege that these references render the asserted claims of the '625 patent obvious either alone or in combination with one or more other references. I disagree. None of the prior art references taught or disclosed all limitations of the asserted claims. Dr. Gibson and Dr. Heegard further did not identify how a specific combination of references would render the asserted claims obvious, and without doing so they cannot meet the requisite clear and convincing evidentiary standard. As discussed below, none of the references identified by Dr. Gibson and Dr. Heegard teaches each limitation of the asserted claims of the '625 patent. Nor does any identified combination of reference render such claims obvious.

228. The application that issued as U.S. Patent No. 6,424,625 entitled "Method and Apparatus for Discarding Packets in a Data Network Having Automatic Repeat Request" was filed on October 28, 1998. The '625 patent issued on July 23, 2002. The technology disclosed in the '625 patent was conceived of in and around July 1997, [redacted] To the extent this conception date predates the publication date of any reference cited against the '625 patent, such references fail to anticipate the '625 patent.

229. [redacted]

230. [redacted]

1. Claim Construction

231. The parties have not identified any terms in the '625 patent for construction.

2. Response to Alleged Anticipation References

a) Dietmar Petras, Ulrich Vornefeld, Markus Scheilbenbogen, Candidate protocol stack (MAC + LLC for a Wireless ATM air interface, ("Petras' ComNets Submission")

232. Both Dr. Heegard and Dr. Gibson contend that the paper "Candidate protocol stack (MAC + LLC) for a Wireless ATM air interface" by Dietmar Petras, Ulrich Vornefeld, and Markus Scheilbenbogen ("Petras' ComNets Submission") anticipates the '625 patent. I disagree with this conclusion. This reference fails to disclose a transmitter commanding a receiver to receive a non-consecutive packet and to release expectations of receiving outstanding packets have sequence numbers below that non-consecutive packet.

(1) Background

233. Petras' ComNets Submission discloses a discard message sent from a transmitter to a receiver that indicates that the transmitter has discarded a packet. Petras provides an example in which a transmitter sends packets 0, 1, 2, and 3 to a receiver, but packets 0 and 2 are lost in transmission, as seen in the Figure below. The transmitter discards packet 2 before receiving the retransmission request for packet 2. In response to the retransmission request, the transmitter sends a discard message to the receiver indicating that packet 2 has been discarded.

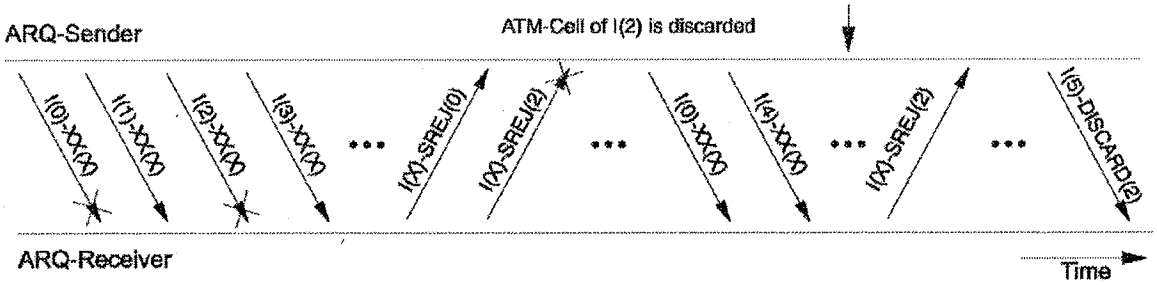


Figure 11 from Petras' ComNets Submission

(2) Claim 1 of the '625 Patent

> *1. A method for discarding packets in a data network employing a packet transfer protocol including an automatic repeat request scheme, comprising the steps of:*
>
> *a transmitter in the data network commanding a receiver in the data network to a) receive at least one packet having a sequence number that is not consecutive with a sequence number of a previously received packet and b) release any expectation of receiving outstanding packets having sequence numbers prior to the at least one packet; and*
>
> *the transmitter discarding all packets for which acknowledgment has not been received, and which have sequence numbers prior to the at least one packet.*

234. Both Dr. Heegard and Dr. Gibson contend that the "DISCARD(N)" message is a command to release any expectation of receiving outstanding packets having sequence numbers prior to the non-consecutive packet. Dr. Gibson contends that "informing the receiver that the transmitter has discarded cell(s) also commands the receiver to treat as received the cell(s) subsequent in sequence number to the discarded cell(s). . . ." Similarly, Dr. Heegard contends that forwarding non-consecutive packets to the higher layers after receiving a discard message is a command to receive at least one packet having a sequence number that is not consecutive with a sequence number of a previously received packet.

235. Petras' ComNets Submission fails to teach a "command" to receive a packet having a sequence number that is not consecutive with a sequence number of a previously

received packet. The '625 teaches a transmitter which *commands* the receiver to receive an out of sequence packet by including an enforcement bit that forces the receiver to receive the packet, regardless of sequence number. Petras' ComNets Submission, on the other hand, discloses a system in which the receiver may reject an out-of-sequence packet sent by the transmitter if the packet is outside of the reception window.

236. Petras' ComNets Submission proposes a standard SR-ARQ protocol with one modification – a discard message that notifies the receiver that the transmitter has discarded a packet. Standard SR-ARQ protocols that existed when this paper was written rejected packets that were outside of the reception window. Because Petras' ComNets Submission utilizes the standard SR-ARQ protocol (in combination with a discard message), the Petras' ComNets Submission receiver will reject packets outside of the reception window. Therefore, the Petras' ComNets Submission transmitter does not *command* the receiver to receive these non-consecutive packets.

237. For example, a transmitter may send receiver four packets, having sequence numbers 1, 2, 3, and 4, respectively. If packet 3 is lost in transmission and the reception window is only 3 packets (i.e., the receiver expects to receive packets 1, 2, and 3), the '625 transmitter will receive packet 4 if it includes an enforcement bit, even though packet 4 is out of the reception window. Petras' ComNets Submission's receiver, on the other hand, will consider packet 4 "invalid" and reject it because it is out of the reception window.

238. Furthermore, Petras' ComNets Submission results in unacceptable delays. Petras' ComNets Submission describes a system in which the transmitter only sends a discard message after it receives a retransmission request. If the retransmission request is lost, the transmitter cannot send the discard message or move its transmission window forward. While the

transmitter waits, packets will begin to queue in the transmit buffer. The receiver will not send another retransmission request until it receives another packet from the transmitter, but the ensuing packets and retransmission requests may also be lost, resulting in a significant delay before the transmitter can finally send a discard message. As time passes, the packets backlogged in the transmitter will begin to expire as well. This unnecessary loss of a substantial amount of data is an unacceptable consequence of Petras' ComNets Submission's reliance on receiving a retransmission request.

b) Andreas Hettich, Development and Performance Evaluation of a Selective Repeat-Automatic Repeat Request (SR-ARQ) Protocol for Transparent, Mobile ATM Access ("Hettich's ComNets Thesis")

239. Both Dr. Heegard and Dr. Gibson contend that the paper "Development and performance evaluation of a Selective Repeat-Automatic Repeat Request (SR-ARQ) protocol for transparent, mobile ATM Access" ("Hettich's ComNets Thesis") by Andreas Hettich anticipates the '625 patent. I disagree with this conclusion. This reference fails to disclose a transmitter commanding a receiver to receive a non-consecutive packet and to release expectations of receiving outstanding packets have sequence numbers below that non-consecutive packet. This reference also fails to enable one skilled in the art to implement a discard notification scheme which anticipates the '625 patent.

(1) Background

240. Hettich's ComNets Thesis discloses a discard message (called a "Delay PDU") sent from a transmitter to a receiver that indicates that the transmitter has discarded a packet. "The Delay PDU is used to inform receivers that cells have been discarded. It is only sent if the receiver requested a discarded cell (using RR or SREJ)." DEFS00007377.

(2) Claim 1 of the '625 Patent

1. A method for discarding packets in a data network employing a packet transfer protocol including an automatic repeat request scheme, comprising the steps of:

a transmitter in the data network commanding a receiver in the data network to a) receive at least one packet having a sequence number that is not consecutive with a sequence number of a previously received packet and b) release any expectation of receiving outstanding packets having sequence numbers prior to the at least one packet; and

the transmitter discarding all packets for which acknowledgment has not been received, and which have sequence numbers prior to the at least one packet.

241. Both Dr. Heegard and Dr. Gibson contend that the Delay PDU message is a command to release any expectation of receiving outstanding packets having sequence numbers prior to the non-consecutive packet. Dr. Gibson contends that "informing the receiver that the transmitter has discarded cell(s) also commands the receiver to treat as received the cell(s) subsequent in sequence number to the discarded cell(s). . . ." Similarly, Dr. Heegard contends that forwarding non-consecutive packets to the higher layers after receiving a discard message is a command to receive at least one packet having a sequence number that is not consecutive with a sequence number of a previously received packet.

242. Hettich's ComNets Thesis fails to teach a "command" to receive a packet having a sequence number that is not consecutive with a sequence number of a previously received packet. The '625 teaches a transmitter which *commands* the receiver to receive an out of sequence packet by including an enforcement bit which forces the receiver to receive the packet, regardless of sequence number. Hettich's ComNets Thesis, on the other hand, discloses a system in which the receiver may reject an out-of-sequence packet sent by the transmitter if the packet is outside of the reception window.

243. Hettich's ComNets Thesis proposes a standard SR-ARQ protocol using *S*elective *REJ*ect (SREJ) PDUs with one relevant modification – a discard message that notifies the receiver that the transmitter has discarded a packet. DEFS00007373-7375. Standard SR-ARQ protocols that existed when this paper was written rejected packets that were outside of the reception window. Because Hettich's ComNets Thesis utilizes the standard SR-ARQ protocol (in combination with a discard message), the Hettich's ComNets Thesis receiver will reject packets outside of the reception window, as Hettich indicates on p.28:

> SR ARQ also results in a window of size n in the receiver. In contrast to the sender (chapter 5.1.2), no further sequence numbers are required in the receiver to identify the receipt window. *RN* now refers to the lowest frame that has not yet been correctly received. In other words, the receiver accepts all frames for which the following applies for the sequence number:
>
> $$RN \leq SN \leq RN + n - 1 \qquad (5.7)$$

Excerpt from Hettich's ComNets Thesis, p. 28

According to this excerpt, the Hettich's ComNets Thesis receiver will only accept packets falling within the stated range. Packets outside of this range will be rejected as "invalid." Therefore, the Hettich's ComNets Thesis transmitter does not *command* the receiver to receive these non-consecutive packets.

244. For example, a transmitter may send receiver four packets, having sequence numbers 1, 2, 3, and 4, respectively. If packet 3 is lost in transmission and the reception window is only 3 packets (i.e., the receiver expects to receive packets 1, 2, and 3), the '625 transmitter will receive packet 4 if it includes an enforcement bit, even though packet 4 is out of the reception window. Hettich's ComNets Thesis's receiver, on the other hand, will consider packet 4 "invalid" and reject it because it is out of the reception window.

c) Ulrich Vornefeld, Simulative and analytical study of measures supporting the quality of service in a radio-based ATM network ("Vornefeld's ComNets Thesis")

245. Both Dr. Heegard and Dr. Gibson contend that the diploma Paper "Simulative and analytical study of measures supporting the quality of service in a radio-based ATM network" ("Vornefeld's ComNets Thesis") by Ulrich Vornefeld anticipates the '625 patent. I disagree with this conclusion. This reference fails to disclose a transmitter commanding a receiver to receive a non-consecutive packet and to release expectations of receiving outstanding packets have sequence numbers below that non-consecutive packet. This reference also fails to enable one skilled in the art to implement a discard notification scheme which anticipates the '625 patent.

(1) Background

246. Vornefeld's ComNets Thesis discloses two discard message implementations: (i) a message which explicitly notifies a receiver that the transmitter has discarded a packet ("Vornefeld-1") and (ii) an implicit notification to the receiver that the transmitter has discarded a packet by sending packets outside of the reception window ("Vornefeld-2").

247. Vornefeld-1 discloses a discard message sent from a transmitter to a receiver that indicates that the transmitter has discarded a packet. Vornefeld's ComNets Thesis provides an example in which a transmitter sends packets 0, 1, 2, and 3 to a receiver, but packets 0 and 2 are lost in transmission, as seen in the Figure below. The transmitter discards packet 2 before receiving the retransmission request for packet 2. In response to the retransmission request, the transmitter sends a discard message to the receiver indicating that packet 2 has been discarded.

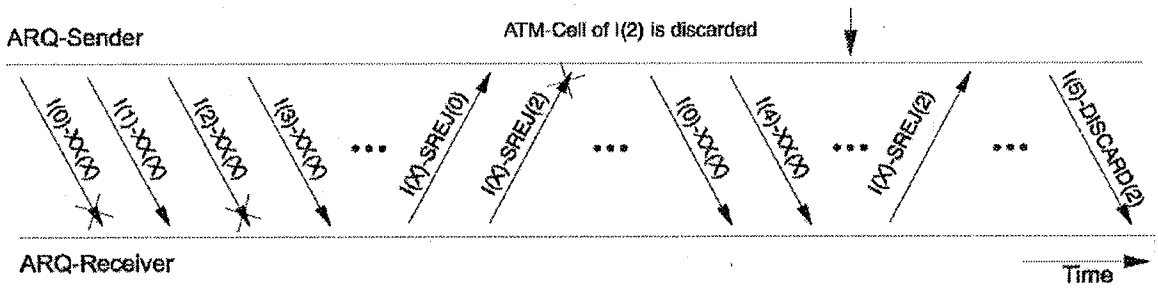


Figure 5.2 from Vornefeld's ComNets Thesis

248. Vornefeld-2 discloses an implicit notification to the receiver that the transmitter has discarded a packet by sending a packet outside of the reception window. When the receiver receives the out-of-window packet, it believes that the transmitter has discarded cells and shifts the window forward so that the end of the window corresponds with the out-of-window packet. For example, a receiver may have a reception window of 4 cells, numbered 1 through 4. If the receiver receives cell 5 before cells 1 through 4, it will shift its window forward one cell. The new reception window will be cells 2 through 5.

(2) Claim 1 of the '625 Patent

> *1. A method for discarding packets in a data network employing a packet transfer protocol including an automatic repeat request scheme, comprising the steps of:*
>
> *a transmitter in the data network commanding a receiver in the data network to a) receive at least one packet having a sequence number that is not consecutive with a sequence number of a previously received packet and b) release any expectation of receiving outstanding packets having sequence numbers prior to the at least one packet; and*
>
> *the transmitter discarding all packets for which acknowledgment has not been received, and which have sequence numbers prior to the at least one packet.*

249. Both Dr. Heegard and Dr. Gibson contend that the "DISCARD(N)" message is a command to release any expectation of receiving outstanding packets having sequence numbers prior to the non-consecutive packet. Dr. Gibson contends that "informing the receiver that the

transmitter has discarded cell(s) also commands the receiver to treat as received the cell(s) subsequent in sequence number to the discarded cell(s). . . ." Similarly, Dr. Heegard contends that forwarding non-consecutive packets to the higher layers after receiving a discard message is a command to receive at least one packet having a sequence number that is not consecutive with a sequence number of a previously received packet.

(a) Vornefeld-1

250. Vornefeld-1 fails to teach a "command" to receive a packet having a sequence number that is not consecutive with a sequence number of a previously received packet. The '625 teaches a transmitter which *commands* the receiver to receive an out of sequence packet by including an enforcement bit which forces the receiver to receive the packet, regardless of sequence number. Vornefeld-1, on the other hand, discloses a system in which the receiver may reject an out-of-sequence packet sent by the transmitter if the packet is outside of the reception window, as evidenced by Section 5.3.1.2.

251. Section 5.3.1.2, describes how Vornefeld-2's SR-ARQ protocol differs from Vornefeld-1's SR-ARQ protocol:

> ATM-cells that have already been assigned a sequence number can also be discarded without the transfer of discard messages by having the transmitter moving their transmission window correspondingly when rejecting cells. Through this, I-frames are delivered, which are outside of the recipient window *and which would be invalid by the standard SR-ARQ-protocols.* (emphasis added).

DEFS00007570.

252. Vornefeld-2 purports to allow reception of packets outside the window "which would be invalid by the standard SR-ARQ protocol" utilized in Vornefeld-1. Because Vornefeld-1 utilizes the standard SR-ARQ protocol (in combination with a discard message), the

Vornefeld-1 receiver will reject packets outside of the reception window. Therefore, the Vornefeld-1 transmitter does not *command* the receiver to receive these non-consecutive packets.

253. For example, a transmitter may send receiver four packets, having sequence numbers 1, 2, 3, and 4, respectively. If packet 3 is lost in transmission and the reception window is only 3 packets (i.e., the receiver expects to receive packets 1, 2, and 3), the '625 transmitter will receive packet 4 if it includes an enforcement bit, even though packet 4 is out of the reception window. Vornefeld-1's receiver, on the other hand, will consider packet 4 "invalid" and reject it because it is out of the reception window.

254. Furthermore, Vornefeld-1 will result in unacceptable delays. Vornefeld-1 describes a system in which the transmitter only sends a discard message after it receives a retransmission request. If the retransmission request is lost, the transmitter cannot send the discard message or move its transmission window forward. While the transmitter waits, packets will begin to queue in the transmit buffer. The receiver will not send another retransmission request until it receives another packet from the transmitter, but the ensuing packets and retransmission requests may also be lost, resulting in a significant delay before the transmitter can finally send a discard message. As time passes, the packets backlogged in the transmitter will begin to expire as well. This unnecessary loss of a substantial amount of data is an unacceptable consequence of Vornefeld-1's reliance on receiving a retransmission request.

(b) Vornefeld-2

255. Vornefeld-2 does not anticipate the '625 patent because it does not command a receiver to release expectation of receiving outstanding packets having sequence numbers prior to a non-consecutive packet. Vornefeld-2 describes a system in which the end of a reception window moves forward to the most recently received packet. So for example, if the current reception window comprises packets 1 through 4, and packet 5 is received, then the reception

window will shift forward and comprise packets 2 through 5. If packet 4 was lost in transmission, then packet 5 would be received out-of-sequence. However, the window only shifts to packet 2, releasing expectation of packet 1. The receiver still expects to receive packet 4, which is an outstanding packet with a sequence number prior to non-consecutively received packet 5. Thus, Vornrefeld-2 does not teach a transmitter *commanding* a receiver to release expectation of receiving outstanding packets having sequence numbers prior to a non-consecutive packet.

256. Furthermore, Vornefeld-2 does not enable one skilled in the art to implement a discard notification scheme which anticipates the '625 patent because it can result in deadlock due to incorrectly sorted cells. As acknowledged by Vornefeld himself, the Vornefeld-2 receiver cannot distinguish between discarded packets and packets received incorrectly outside of the reception window. Vornefeld explained how this shortcoming of his invention could result in a failure in Figure 5.4 of his paper, reproduced below as Figure 3, which Vornefeld labeled "Incorrect exchange of ATM-cells in phases with a high frame error ratio."

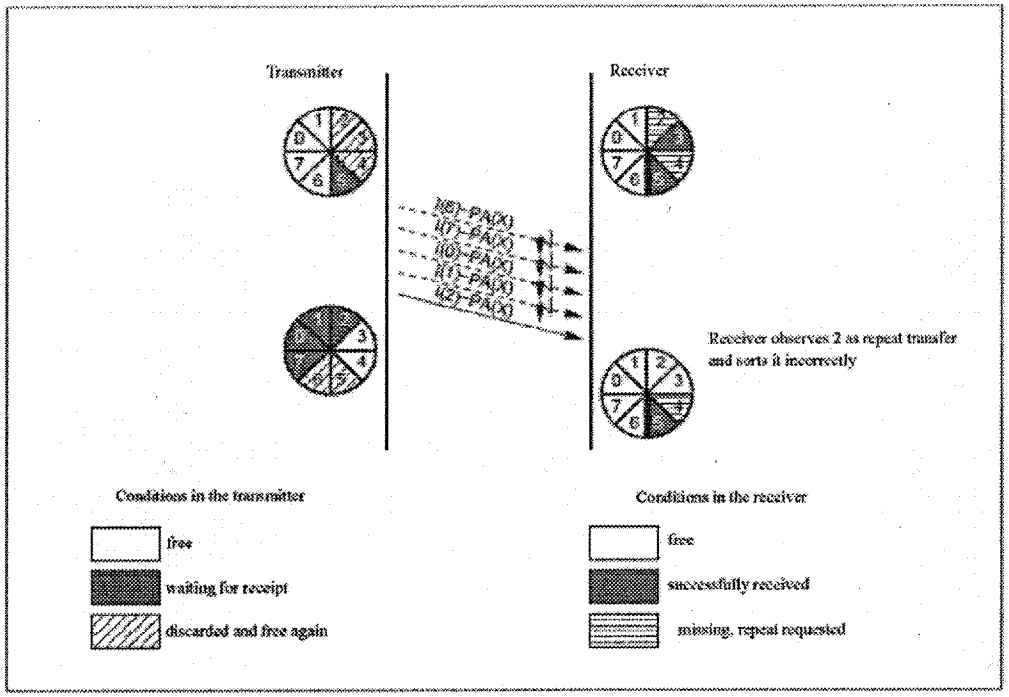


Figure 5.4: Incorrect exchange of ATM-cells in phases with a high frame error ratio

Figure 3: System Failure Using Vornefeld-2

DEFS00007572. In Vornefeld's example, packets 2 through 5 are sent to the transmitter, and packets 2 and 4 are lost in transmission. The transmitter then attempts to transmit packets 6, 7, 0, 1, and 2 in order, but packets 6, 7, 0, and 1 are lost in transmission. When the receiver receives packet 2, it observes packet 2 as a retransmission "and sorts it incorrectly," resulting in system gridlock.

d) Petras and Hettich, Performance Evaluation of the ASR-ARQ Protocol for Wireless ATM, Proceeding of the 1995 IEEE Wireless Communication System Symposium, (Nov. 1995) ("Petras' ComNets 1995 Article")

257. Both Dr. Heegard and Dr. Gibson contend that the article "Performance Evaluation of the ASR-ARQ Protocol for Wireless ATM" ("Petras' ComNets 1995 Article") by Dietmar Petras and Andreas Hettich anticipates the '625 patent. I disagree with this conclusion. This reference fails to disclose a transmitter commanding a receiver to receive a non-consecutive

packet and to release expectations of receiving outstanding packets have sequence numbers below that non-consecutive packet. This reference also fails to enable one skilled in the art to implement a discard notification scheme which anticipates the '625 patent.

(1) Background

258. Petras' ComNets 1995 Article discloses a discard message (called a "Delay PDU") sent from a transmitter to a receiver that indicates that the transmitter has discarded a packet. The Delay PDU is used to inform receivers that cells have been discarded. It is only sent if the receiver requested a discarded cell (using RR or SREJ).

(2) Claim 1 of the '625 Patent

> *1. A method for discarding packets in a data network employing a packet transfer protocol including an automatic repeat request scheme, comprising the steps of:*
>
> *a transmitter in the data network commanding a receiver in the data network to a) receive at least one packet having a sequence number that is not consecutive with a sequence number of a previously received packet and b) release any expectation of receiving outstanding packets having sequence numbers prior to the at least one packet; and*
>
> *the transmitter discarding all packets for which acknowledgment has not been received, and which have sequence numbers prior to the at least one packet.*

259. Both Dr. Heegard and Dr. Gibson contend that the Delay PDU message is a command to release any expectation of receiving outstanding packets having sequence numbers prior to the non-consecutive packet. Dr. Gibson contends that "informing the receiver that the transmitter has discarded cell(s) also commands the receiver to treat as received the cell(s) subsequent in sequence number to the discarded cell(s). . . ." Similarly, Dr. Heegard contends that forwarding non-consecutive packets to the higher layers after receiving a discard message is a command to receive at least one packet having a sequence number that is not consecutive with a sequence number of a previously received packet.

260. Petras' ComNets 1995 Article fails to teach a "command" to receive a packet having a sequence number that is not consecutive with a sequence number of a previously received packet. The '625 teaches a transmitter which *commands* the receiver to receive an out of sequence packet by including an enforcement bit which forces the receiver to receive the packet, regardless of sequence number. Petras' ComNets 1995 Article, on the other hand, discloses a system in which the receiver may reject an out-of-sequence packet sent by the transmitter if the packet is outside of the reception window.

261. Petras' ComNets 1995 Article proposes a standard SR-ARQ protocol using *S*elective *REJ*ect (SREJ) PDUs with one relevant modification – a discard message that notifies the receiver that the transmitter has discarded a packet. Standard SR-ARQ protocols that existed when this paper was written rejected packets that were outside of the reception window. Because Petras' ComNets 1995 Article utilizes the standard SR-ARQ protocol (in combination with a discard message), the Petras' ComNets 1995 Article receiver will reject packets outside of the reception window. Therefore, the Petras' ComNets 1995 Article transmitter does not *command* the receiver to receive these non-consecutive packets.

262. For example, a transmitter may send receiver four packets, having sequence numbers 1, 2, 3, and 4, respectively. If packet 3 is lost in transmission and the reception window is only 3 packets (i.e., the receiver expects to receive packets 1, 2, and 3), the '625 transmitter will receive packet 4 if it includes an enforcement bit, even though packet 4 is out of the reception window. Petras' ComNets 1995 Article's receiver, on the other hand, will consider packet 4 "invalid" and reject it because it is out of the reception window.

263. Petras' ComNets 1995 Article similarly fails to teach a command to release expectation of receiving outstanding packets having sequence numbers prior to the non-

consecutive packet. The Delay message notifies the receiver of a single packet that has been discarded, but provides no information about outstanding packets other than that identified in the Delay message. In Petras' article, he gives an example in which a single packet, packet 1, is discarded by the transmitter and never successfully received by the receiver. The transmitter "transmit an I_Delay frame . . . informing the mobile station, not to wait for frame 1 because this has been discarded. Receiving Delay(4,1) frame successfully, the receiver is able to shift its window, no longer waiting for frame 1." DEFS00014150. Petras does not state that the receiver would similarly stop waiting for other outstanding packets below packet 1. Therefore, Petras' ComNets 1995 Article fails to teach a command to release expectation of receiving *all outstanding packets* having sequence numbers prior to the non-consecutive packet.

264. Furthermore, Petras' ComNets 1995 Article will result in unacceptable delays. Petras' ComNets 1995 Article describes a system in which the transmitter only sends a discard message after it receives a retransmission request. If the retransmission request is lost, the transmitter cannot send the discard message or move its transmission window forward. While the transmitter waits, packets will begin to queue in the transmit buffer. The receiver will not send another retransmission request until it receives another packet from the transmitter, but the ensuing packets and retransmission requests may also be lost, resulting in a significant delay before the transmitter can finally send a discard message. As time passes, the packets backlogged in the transmitter will begin to expire as well. This unnecessary loss of a substantial amount of data is an unacceptable consequence of Petras' ComNets 1995 Article's reliance on receiving a retransmission request.

e) Petras and Hettich, Performance evaluation of a logical link control protocol for an ATM air interface, (1997) ("Petras' ComNets 1997 Article")

265. Both Dr. Heegard and Dr. Gibson contend that the paper "Performance Evaluation of a Logical Link Control Protocol for an ATM Air Interface" ("Petras' ComNets 1997 Article") by Dietmar Petras and Andreas Hettich anticipates the '625 patent. I disagree with this conclusion. This reference fails to disclose a transmitter commanding a receiver to receive a non-consecutive packet and to release expectations of receiving outstanding packets have sequence numbers below that non-consecutive packet. This reference also fails to enable one skilled in the art to implement a discard notification scheme which anticipates the '625 patent.

(1) Background

266. Petras' ComNets 1997 Article discloses a discard message sent from a transmitter to a receiver that indicates that the transmitter has discarded a packet. Petras provides an example in which a transmitter sends packets 0, 1, 2, and 3 to a receiver, but packets 0 and 2 are lost in transmission, as seen in the Figure below. The transmitter discards packet 2 before receiving the retransmission request for packet 2. In response to the retransmission request, the transmitter sends a discard message to the receiver indicating that packet 2 has been discarded.

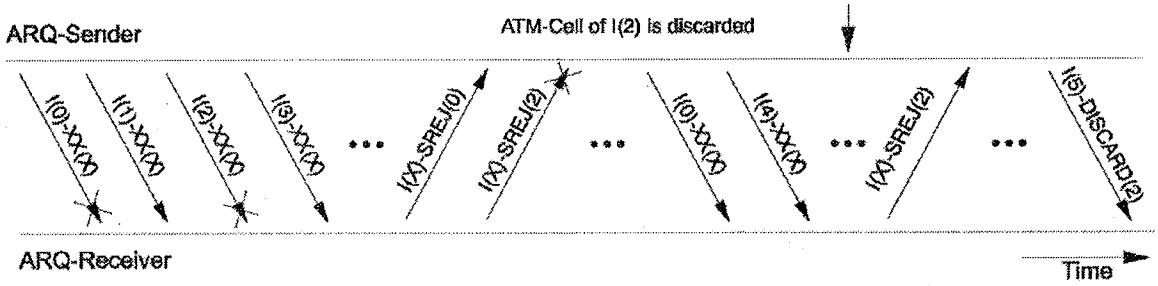


Figure 4 from Petras' ComNets 1997 Article

(2) Claim 1 of the '625 Patent

1. A method for discarding packets in a data network employing a packet transfer protocol including an automatic repeat request scheme, comprising the steps of:

a transmitter in the data network commanding a receiver in the data network to a) receive at least one packet having a sequence number that is not consecutive with a sequence number of a previously received packet and b) release any expectation of receiving outstanding packets having sequence numbers prior to the at least one packet; and

the transmitter discarding all packets for which acknowledgment has not been received, and which have sequence numbers prior to the at least one packet.

267. Both Dr. Heegard and Dr. Gibson contend that the "DISCARD(N)" message is a command to release any expectation of receiving outstanding packets having sequence numbers prior to the non-consecutive packet. Dr. Gibson contends that "informing the receiver that the transmitter has discarded cell(s) also commands the receiver to treat as received the cell(s) subsequent in sequence number to the discarded cell(s). . . ." Similarly, Dr. Heegard contends that forwarding non-consecutive packets to the higher layers after receiving a discard message is a command to receive at least one packet having a sequence number that is not consecutive with a sequence number of a previously received packet.

268. Petras' ComNets 1997 Article fails to teach a "command" to receive a packet having a sequence number that is not consecutive with a sequence number of a previously received packet. The '625 teaches a transmitter which *commands* the receiver to receive an out of sequence packet by including an enforcement bit which forces the receiver to receive the packet, regardless of sequence number. Petras' ComNets 1997 Article, on the other hand, discloses a system in which the receiver may reject an out-of-sequence packet sent by the transmitter if the packet is outside of the reception window.

269. Petras' ComNets 1997 Article proposes a standard SR-ARQ protocol with one modification – a discard message that notifies the receiver that the transmitter has discarded a packet. Standard SR-ARQ protocols that existed when this paper was written rejected packets that were outside of the reception window. Because Petras' ComNets 1997 Article utilizes the standard SR-ARQ protocol (in combination with a discard message), the Petras' ComNets 1997 Article receiver will reject packets outside of the reception window. Therefore, the Petras' ComNets 1997 Article transmitter does not *command* the receiver to receive these non-consecutive packets.

270. For example, a transmitter may send receiver four packets, having sequence numbers 1, 2, 3, and 4, respectively. If packet 3 is lost in transmission and the reception window is only 3 packets (i.e., the receiver expects to receive packets 1, 2, and 3), the '625 transmitter will receive packet 4 if it includes an enforcement bit, even though packet 4 is out of the reception window. Petras' ComNets 1997 Article's receiver, on the other hand, will consider packet 4 "invalid" and reject it because it is out of the reception window.

271. Furthermore, Petras' ComNets 1997 Article will result in unacceptable delays. Petras' ComNets 1997 Article describes a system in which the transmitter only sends a discard message after it receives a retransmission request. If the retransmission request is lost, the transmitter cannot send the discard message or move its transmission window forward. While the transmitter waits, packets will begin to queue in the transmit buffer. The receiver will not send another retransmission request until it receives another packet from the transmitter, but the ensuing packets and retransmission requests may also be lost, resulting in a significant delay before the transmitter can finally send a discard message. As time passes, the packets backlogged in the transmitter will begin to expire as well. This unnecessary loss of a substantial

amount of data is an unacceptable consequence of Petras' ComNets 1997 Article's reliance on receiving a retransmission request.

f) Petras, Functionality of the ASR-ARQ Protocol for MBS, RACE Mobile Telecommunication Summit ("Petras' ComNets RACE 1995 Article")

272. Both Dr. Heegard and Dr. Gibson contend that the paper "Functionality of the ASR-ARQ Protocol for MBS" ("Petras' ComNets RACE 1995 Article") by Dietmar Petras anticipates the '625 patent. I disagree with this conclusion. This reference fails to disclose a transmitter commanding a receiver to receive a non-consecutive packet and to release expectations of receiving outstanding packets have sequence numbers below that non-consecutive packet. This reference also fails to enable one skilled in the art to implement a discard notification scheme which anticipates the '625 patent.

(1) Background

273. Petras' ComNets RACE 1995 Article discloses a discard message that notifies a receiver that the transmitter has discarded a packet.

(2) Claim 1 of the '625 Patent

> *1. A method for discarding packets in a data network employing a packet transfer protocol including an automatic repeat request scheme, comprising the steps of:*
>
> *a transmitter in the data network commanding a receiver in the data network to a) receive at least one packet having a sequence number that is not consecutive with a sequence number of a previously received packet and b) release any expectation of receiving outstanding packets having sequence numbers prior to the at least one packet; and*
>
> *the transmitter discarding all packets for which acknowledgment has not been received, and which have sequence numbers prior to the at least one packet.*

274. Both Dr. Heegard and Dr. Gibson contend that the discard message is a command to release any expectation of receiving outstanding packets having sequence numbers prior to the

non-consecutive packet. Dr. Gibson contends that "informing the receiver that the transmitter has discarded cell(s) also commands the receiver to treat as received the cell(s) subsequent in sequence number to the discarded cell(s). . . ." Similarly, Dr. Heegard contends that forwarding non-consecutive packets to the higher layers after receiving a discard message is a command to receive at least one packet having a sequence number that is not consecutive with a sequence number of a previously received packet.

275. Petras' ComNets RACE 1995 Article fails to teach a "command" to receive a packet having a sequence number that is not consecutive with a sequence number of a previously received packet. The '625 teaches a transmitter which *commands* the receiver to receive an out of sequence packet by including an enforcement bit which forces the receiver to receive the packet, regardless of sequence number. Petras' ComNets RACE 1995 Article, on the other hand, discloses a system in which the receiver may reject an out-of-sequence packet sent by the transmitter if the packet is outside of the reception window.

276. Petras' ComNets RACE 1995 Article proposes a standard SR-ARQ protocol with one modification – a discard message that notifies the receiver that the transmitter has discarded a packet. Standard SR-ARQ protocols that existed when this paper was written rejected packets which were outside of the reception window. Because Petras' ComNets RACE 1995 Article utilizes the standard SR-ARQ protocol (in combination with a discard message), the Petras' ComNets RACE 1995 Article receiver will reject packets outside of the reception window. Therefore, the Petras' ComNets RACE 1995 Article transmitter does not *command* the receiver to receive these non-consecutive packets.

277. For example, a transmitter may send receiver four packets, having sequence numbers 1, 2, 3, and 4, respectively. If packet 3 is lost in transmission and the reception window

is only 3 packets (i.e., the receiver expects to receive packets 1, 2, and 3), the '625 transmitter will receive packet 4 if it includes an enforcement bit, even though packet 4 is out of the reception window. Petras' ComNets RACE 1995 Article's receiver, on the other hand, will consider packet 4 "invalid" and reject it because it is out of the reception window.

278. Petras' ComNets RACE 1995 Article similarly fails to teach a command to release expectation of receiving outstanding packets having sequence numbers prior to the non-consecutive packet. The discard message notifies the receiver of a single packet that has been discarded, but provides no information about outstanding packets other than that identified in the discard message. In Petras' article, he gives an example in which a single packet, packet 1, is discarded by the transmitter and never successfully received by the receiver. The transmitter "sends an I frame transporting the ATM cell with *N(S)* = 5, which is next to be dealt with, and sets the discard number *N(D)* to 1. When receiving this frame the mobile station knows that the pending I frame with N(S) = 1 will not be send [sic] again, since it has been discarded." DEFS00021662. Petras does not state that the receiver would similarly stop waiting for other outstanding packets below packet 1. Therefore, Petras' ComNets RACE 1995 Article fails to teach a command to release expectation of receiving *all outstanding packets* having sequence numbers prior to the non-consecutive packet.

g) Hettich and Vornefeld and Rapp, ARQ Protocols for Wireless ATM Systems: Requirements and Solutions, ETSI EP BRANWG3 Temporary Document 42 ("Hettich's ComNets Submission")

279. Dr. Gibson contends that the paper "ARQ Protocols for Wireless ATM Systems: Requirements and Solutions" ("Hettich's ComNets Submission") by A. Hettich , U. Vornefeld, and J. Rapp anticipates the '625 patent. I disagree with this conclusion. This reference fails to disclose a transmitter commanding a receiver to receive a non-consecutive packet and to release expectations of receiving outstanding packets have sequence numbers below that non-

consecutive packet. This reference also fails to enable one skilled in the art to implement a discard notification scheme which anticipates the '625 patent.

(1) Background

280. Hettich's ComNets Submission discloses two discard message implementations. First, Hettich proposes a system ("Hettich-1") in which a transmitter will discard an expired packet and move the transmission window forward to enable transmission of new cells. When the receiver receives a packet outside of the reception window, the receiver shifts its reception window forward so that the end of the reception window corresponds with the newly received cell. Second, Hettich proposes a system ("Hettich-2") in which a transmitter discards expired packets and sends a special discard acknowledgment message to the receiver.

(2) Claim 1 of the '625 Patent

> *1. A method for discarding packets in a data network employing a packet transfer protocol including an automatic repeat request scheme, comprising the steps of:*
>
> *a transmitter in the data network commanding a receiver in the data network to a) receive at least one packet having a sequence number that is not consecutive with a sequence number of a previously received packet and b) release any expectation of receiving outstanding packets having sequence numbers prior to the at least one packet; and*
>
> *the transmitter discarding all packets for which acknowledgment has not been received, and which have sequence numbers prior to the at least one packet.*

281. Dr. Gibson contends that the discard notification message is a command to release any expectation of receiving outstanding packets having sequence numbers prior to the non-consecutive packet. He further contends that informing the receiver that the transmitter has discarded cell(s) also commands the receiver to treat as received the cell(s) subsequent in sequence number to the discarded cell(s).

(a) Hettich-1

282. Hettich-1 does not anticipate the '625 patent because it does not command a receiver to release expectation of receiving outstanding packets having sequence numbers prior to a non-consecutive packet. Hettich-1 describes a system in which the end of a reception window moves forward to the most recently received packet. So for example, if the current reception window comprises packets 1 through 4, and packet 5 is received, then the reception window will shift forward and comprise packets 2 through 5. If packet 4 was lost in transmission, then packet 5 would be received out-of-sequence. However, the window only shifts to packet 2, releasing expectation of packet 1. The receiver still expects to receive packet 4, which is an outstanding packet with a sequence number prior to non-consecutively received packet 5. Thus, Hettich-1 does not teach a transmitter *commanding* a receiver to release expectation of receiving outstanding packets having sequence numbers prior to a non-consecutive packet.

283. Furthermore, Hettich-1 does not enable one skilled in the art to implement a discard notification scheme which anticipates the '625 patent because it can result in deadlock due to incorrectly sorted cells. The Hettich-1 receiver cannot distinguish between discarded packets and packets received incorrectly outside of the reception window, the same problem acknowledged by Vornefeld in his diploma paper. Vornefeld explained how this shortcoming could result in a failure in Figure 5.4 of his paper, reproduced below as Figure 3, which Vornefeld labeled "Incorrect exchange of ATM-cells in phases with a high frame error ratio."

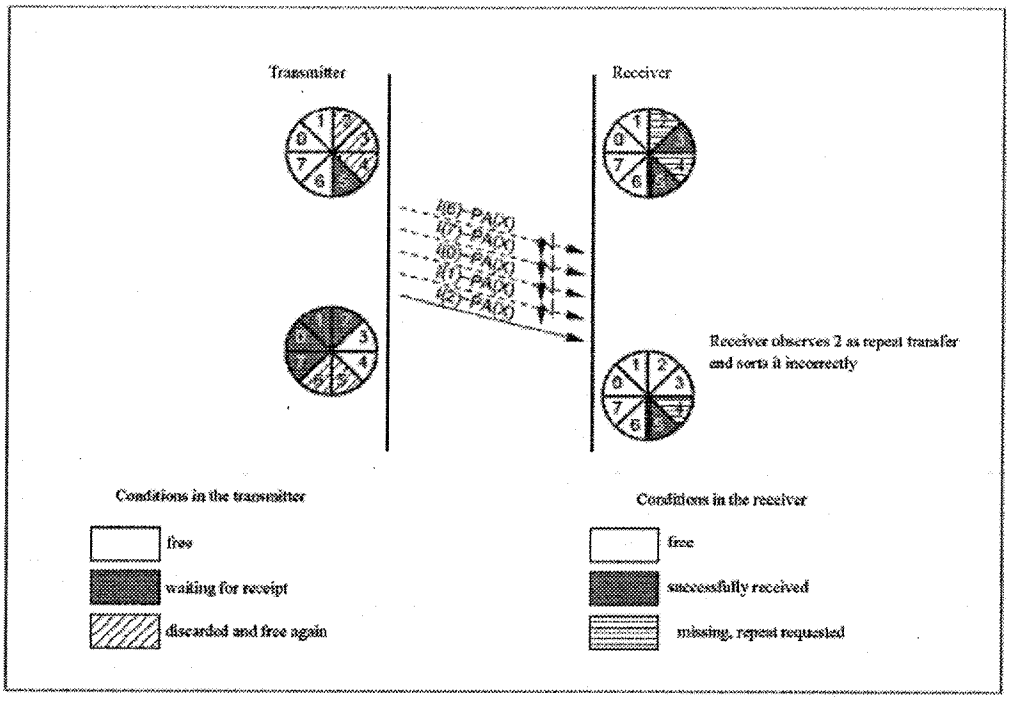


Figure 5.4: Incorrect exchange of ATM-cells in phases with a high frame error ratio

Figure 3: System Failure Using Hettich-1

DEFS00007572.

284. In Vornefeld's example, packets 2 through 5 are sent to the transmitter, and packets 2 and 4 are lost in transmission. The transmitter then attempts to transmit packets 6, 7, 0, 1, and 2 in order, but packets 6, 7, 0, and 1 are lost in transmission. When the receiver receives packet 2, it observes packet 2 as a retransmission "and sorts it incorrectly," resulting in system gridlock.

(b) Hettich-2

285. Hettich-2 fails to teach a "command" to receive a packet having a sequence number that is not consecutive with a sequence number of a previously received packet. The '625 teaches a transmitter which *commands* the receiver to receive an out of sequence packet by including an enforcement bit which forces the receiver to receive the packet, regardless of sequence number. Hettich-2, on the other hand, discloses a system in which the receiver may

reject an out-of-sequence packet sent by the transmitter if the packet is outside of the reception window. Because Hettich-2 utilizes the standard SR-ARQ protocol (in combination with a discard message), the Hettich-2 receiver will reject packets outside of the reception window. Therefore, the Hettich-2 transmitter does not *command* the receiver to receive these non-consecutive packets.

286. For example, a transmitter may send receiver four packets, having sequence numbers 1, 2, 3, and 4, respectively. If packet 3 is lost in transmission and the reception window is only 3 packets (i.e., the receiver expects to receive packets 1, 2, and 3), the '625 transmitter will receive packet 4 if it includes an enforcement bit, even though packet 4 is out of the reception window. Hettich-2's receiver, on the other hand, will consider packet 4 "invalid" and reject it because it is out of the reception window.

287. Hettich-2 similarly fails to teach a command to release expectation of receiving outstanding packets having sequence numbers prior to the non-consecutive packet. The discard message notifies the receiver of a single packet that has been discarded, but provides no information about outstanding packets other than that identified in the discard message. Hettich-2 states that "[t]he receiver is informed about *the* discarded cell by sending a special discard" message. (Emphasis added). Hettich-2 does not state that the receiver would similarly stop waiting for other outstanding packets below the packet identified in the discard message. Therefore, Hettich-2 fails to teach a command to release expectation of receiving *all outstanding packets* having sequence numbers prior to the non-consecutive packet.

288. Furthermore, Hettich's ComNets Submission will result in unacceptable delays. Hettich's ComNets Submission describes a system in which the transmitter only sends a discard message after it receives a retransmission request. If the retransmission request is lost, the

transmitter cannot send the discard message or move its transmission window forward. While the transmitter waits, packets will begin to queue in the transmit buffer. The receiver will not send another retransmission request until it receives another packet from the transmitter, but the ensuing packets and retransmission requests may also be lost, resulting in a significant delay before the transmitter can finally send a discard message. As time passes, the packets backlogged in the transmitter will begin to expire as well. This unnecessary loss of a substantial amount of data is an unacceptable consequence of Hettich's ComNets Submission's reliance on receiving a retransmission request.

h) Broadband Radio Access Networks (BRAN), Inventory of broadband radio technologies and techniques, TR 101 173 V1.1.1 ("The Toolkit")

289. Both Dr. Heegard and Dr. Gibson contend that the document "Broadband Radio Access Networks (BRAN), Inventory of broadband radio technologies and techniques" ("The Toolkit") anticipates the '625 patent. I disagree with this conclusion. This reference fails to disclose a transmitter commanding a receiver to receive a non-consecutive packet and to release expectations of receiving outstanding packets have sequence numbers below that non-consecutive packet. This reference also fails to enable one skilled in the art to implement a discard notification scheme which anticipates the '625 patent.

(1) Background

290. The Toolkit discloses two discard message implementations. First, Hettich proposes a system ("Toolkit-1") in which a transmitter will discard an expired packet and move the transmission window forward to enable transmission of new cells. When the receiver receives a packet outside of the reception window, the receiver shifts its reception window forward so that the end of the reception window corresponds with the newly received cell.

Second, Hettich proposes a system ("Toolkit -2") in which a transmitter discards expired packets and sends a special discard acknowledgment message to the receiver.

(2) Claim 1 of the '625 Patent

> *1. A method for discarding packets in a data network employing a packet transfer protocol including an automatic repeat request scheme, comprising the steps of:*
>
> *a transmitter in the data network commanding a receiver in the data network to a) receive at least one packet having a sequence number that is not consecutive with a sequence number of a previously received packet and b) release any expectation of receiving outstanding packets having sequence numbers prior to the at least one packet; and*
>
> *the transmitter discarding all packets for which acknowledgment has not been received, and which have sequence numbers prior to the at least one packet.*

291. Both Dr. Heegard and Dr. Gibson contend that the discard message is a command to release any expectation of receiving outstanding packets having sequence numbers prior to the non-consecutive packet. Dr. Gibson contends that "informing the receiver that the transmitter has discarded cell(s) also commands the receiver to treat as received the cell(s) subsequent in sequence number to the discarded cell(s). . . ." Similarly, Dr. Heegard contends that forwarding non-consecutive packets to the higher layers after receiving a discard message is a command to receive at least one packet having a sequence number that is not consecutive with a sequence number of a previously received packet.

(a) Toolkit-1

292. Toolkit-1 does not anticipate the '625 patent because it does not command a receiver to release expectation of receiving outstanding packets having sequence numbers prior to a non-consecutive packet. Toolkit-1 describes a system in which the end of a reception window moves forward to the most recently received packet. So for example, if the current reception window comprises packets 1 through 4, and packet 5 is received, then the reception

window will shift forward and comprise packets 2 through 5. If packet 4 was lost in transmission, then packet 5 would be received out-of-sequence. However, the window only shifts to packet 2, releasing expectation of packet 1. The receiver still expects to receive packet 4, which is an outstanding packet with a sequence number prior to non-consecutively received packet 5. Thus, Toolkit-1 does not teach a transmitter *commanding* a receiver to release expectation of receiving outstanding packets having sequence numbers prior to a non-consecutive packet.

293. Furthermore, Toolkit-1 does not enable one skilled in the art to implement a discard notification scheme which anticipates the '625 patent because it can result in deadlock due to incorrectly sorted cells. The Toolkit-1 receiver cannot distinguish between discarded packets and packets received incorrectly outside of the reception window, the same problem acknowledged by Vornefeld in his diploma paper. Vornefeld explained how this shortcoming could result in a failure in Figure 5.4 of his paper, reproduced below as Figure 3, which Vornefeld labeled "Incorrect exchange of ATM-cells in phases with a high frame error ratio."

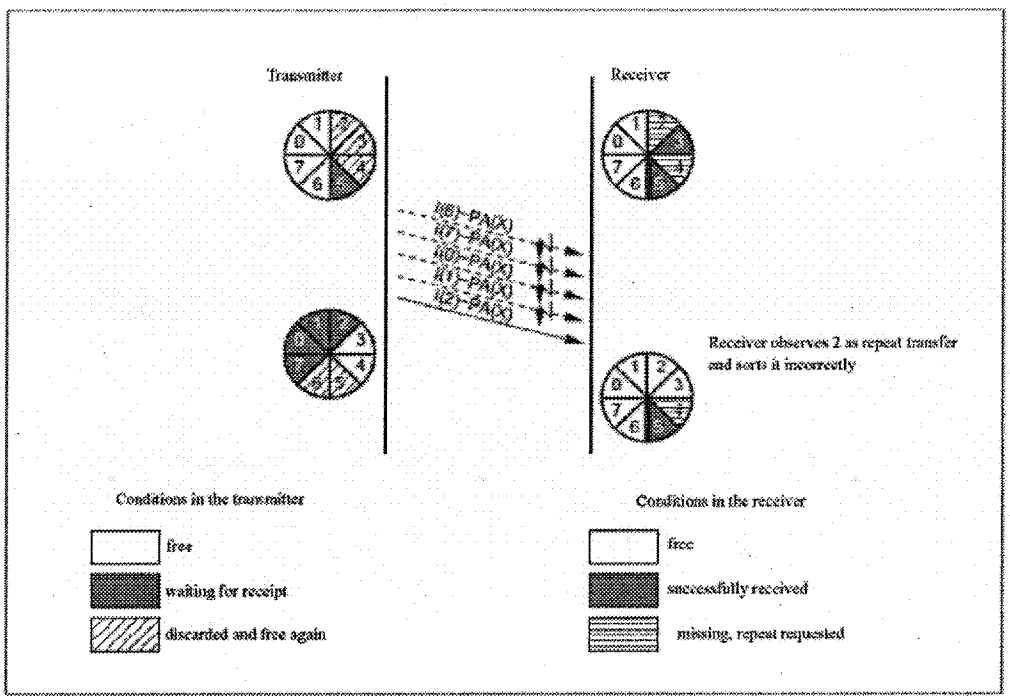


Figure 5.4: Incorrect exchange of ATM-cells in phases with a high frame error ratio

Figure 3: System Failure Using Toolkit-1

DEFS00007572.

294. In Vornefeld's example, packets 2 through 5 are sent to the transmitter, and packets 2 and 4 are lost in transmission. The transmitter then attempts to transmit packets 6, 7, 0, 1, and 2 in order, but packets 6, 7, 0, and 1 are lost in transmission. When the receiver receives packet 2, it observes packet 2 as a retransmission "and sorts it incorrectly," resulting in system gridlock.

(b) Toolkit-2

295. Toolkit-2 fails to teach a "command" to receive a packet having a sequence number that is not consecutive with a sequence number of a previously received packet. The '625 teaches a transmitter which *commands* the receiver to receive an out of sequence packet by including an enforcement bit which forces the receiver to receive the packet, regardless of sequence number. Toolkit-2, on the other hand, discloses a system in which the receiver may

reject an out-of-sequence packet sent by the transmitter if the packet is outside of the reception window. Because Toolkit-2 utilizes the standard SR-ARQ protocol (in combination with a discard message), the Toolkit-2 receiver will reject packets outside of the reception window. Therefore, the Toolkit-2 transmitter does not *command* the receiver to receive these non-consecutive packets.

296. For example, a transmitter may send receiver four packets, having sequence numbers 1, 2, 3, and 4, respectively. If packet 3 is lost in transmission and the reception window is only 3 packets (i.e., the receiver expects to receive packets 1, 2, and 3), the '625 transmitter will receive packet 4 if it includes an enforcement bit, even though packet 4 is out of the reception window. Toolkit-2's receiver, on the other hand, will consider packet 4 "invalid" and reject it because it is out of the reception window.

297. Toolkit-2 similarly fails to teach a command to release expectation of receiving outstanding packets having sequence numbers prior to the non-consecutive packet. The discard message notifies the receiver of a single packet that has been discarded, but provides no information about outstanding packets other than that identified in the discard message. Toolkit-2 states that "[t]he receiver is informed about *the* discarded cell by sending a special discard" message. (Emphasis added). Toolkit-2 does not state that the receiver would similarly stop waiting for other outstanding packets below the packet identified in the discard message. Therefore, Toolkit-2 fails to teach a command to release expectation of receiving *all outstanding packets* having sequence numbers prior to the non-consecutive packet.

298. Furthermore, Toolkit-2 will result in unacceptable delays. The Toolkit describes a system in which the transmitter only sends a discard message after it receives a retransmission request. If the retransmission request is lost, the transmitter cannot send the discard message or

move its transmission window forward. While the transmitter waits, packets will begin to queue in the transmit buffer. The receiver will not send another retransmission request until it receives another packet from the transmitter, but the ensuing packets and retransmission requests may also be lost, resulting in a significant delay before the transmitter can finally send a discard message. As time passes, the packets backlogged in the transmitter will begin to expire as well. This unnecessary loss of a substantial amount of data is an unacceptable consequence of Toolkit-2's reliance on receiving a retransmission request.

i) U.S. 6,621,799 (Kemp, et al.) ("Kemp Patent")

299. Both Dr. Heegard and Dr. Gibson contend that patent US 6,621,799 ("Kemp Patent") anticipates the '625 patent. I disagree with this conclusion. This reference fails to disclose a transmitter commanding a receiver to receive a non-consecutive packet and to release expectations of receiving outstanding packets have sequence numbers below that non-consecutive packet. This reference also fails to enable one skilled in the art to implement a discard notification scheme which anticipates the '625 patent.

(1) Background

300. The Kemp Patent discloses a method whereby a transmitter sends a receiver a data packet. If the receiver receives a packet out of sequence, then it will send a selective acknowledgment back to the transmitter indicating that it is missing a packet. In response to the selective acknowledgment, the transmitter will retransmit the packet. This process repeats itself until the packet exceeds the maximum number of retries. When the transmitter receives a selective acknowledgment for a packet that has exceeded the maximum number of retries, it will send a "done" message indicating the packet has been discarded.

(2) Claim 1 of the '625 Patent

> *1. A method for discarding packets in a data network employing a packet transfer protocol including an automatic repeat request scheme, comprising the steps of:*
>
> *a transmitter in the data network commanding a receiver in the data network to a) receive at least one packet having a sequence number that is not consecutive with a sequence number of a previously received packet and b) release any expectation of receiving outstanding packets having sequence numbers prior to the at least one packet; and*
>
> *the transmitter discarding all packets for which acknowledgment has not been received, and which have sequence numbers prior to the at least one packet.*

301. Both Dr. Heegard and Dr. Gibson contend that the discard message is a command to release any expectation of receiving outstanding packets having sequence numbers prior to the non-consecutive packet. Dr. Gibson contends that "informing the receiver that the transmitter has discarded cell(s) also commands the receiver to treat as received the cell(s) subsequent in sequence number to the discarded cell(s). . . ." Similarly, Dr. Heegard contends that forwarding non-consecutive packets to the higher layers after receiving a discard message is a command to receive at least one packet having a sequence number that is not consecutive with a sequence number of a previously received packet.

302. The Kemp Patent fails to teach a "command" to receive a packet having a sequence number that is not consecutive with a sequence number of a previously received packet. The '625 teaches a transmitter which *commands* the receiver to receive an out of sequence packet by including an enforcement bit which forces the receiver to receive the packet, regardless of sequence number. The Kemp Patent, on the other hand, discloses a system in which the receiver may reject an out-of-sequence packet sent by the transmitter if the packet is outside of the reception window.

303. The Kemp Patent proposes a standard SR-ARQ protocol with one modification – a discard message that notifies the receiver that the transmitter has discarded a packet. Standard SR-ARQ protocols that existed when this paper was written rejected packets that were outside of the reception window. Because the Kemp Patent utilizes the standard SR-ARQ protocol (in combination with a discard message), the Kemp Patent receiver will reject packets outside of the reception window. Therefore, the Kemp Patent transmitter does not *command* the receiver to receive these non-consecutive packets.

304. For example, a transmitter may send receiver four packets, having sequence numbers 1, 2, 3, and 4, respectively. If packet 3 is lost in transmission and the reception window is only 3 packets (i.e., the receiver expects to receive packets 1, 2, and 3), the '625 transmitter will receive packet 4 if it includes an enforcement bit, even though packet 4 is out of the reception window. The Kemp Patent's receiver, on the other hand, will consider packet 4 "invalid" and reject it because it is out of the reception window.

305. The Kemp Patent does not enable one skilled in the art how to command a receiver to release expectation of receiving *all* outstanding packets below a non-consecutively received packet. The patent states that it maintains a register which tracks the highest sequence number of the packets it will not retransmit, but does not indicate how or when such register should be sent to the receiver, stating vaguely that the "GRE module 320 *at times* (described below) sends the stored done 478 the remote GRE module 320." 7:43-45 (emphasis added.). The Kemp Patent later states "[a]fter a configured number of retransmissions, the GRE module 'gives up' if it has not received an acknowledgment for that packet and notifies the receiving GRE module that the packet will no longer be retransmitted." 8:43-47. The former passage indicates that the discard notifications identified in the register are sent "at times," a term never

defined, while the latter passage indicates that a discard notification should be sent separately for each packet discarded by the transmitter. The latter passage also fails to teach discarding of *all* outstanding packets below a particular sequence number, rather indicating only the discordance of a single packet. The patent never reconciles these methodologies and fails to explain how to implement them individually or in tandem. Thus, one skilled in the art cannot implement the discard notification scheme identified in the Kemp Patent.

306. Furthermore, Kemp's Patent will result in unacceptable delays. Kemp's Patent describes a system in which the transmitter only sends a discard message after it receives a retransmission request. If the retransmission request is lost, the transmitter cannot send the discard message or move its transmission window forward. While the transmitter waits, packets will begin to queue in the transmit buffer. The receiver will not send another retransmission request until it receives another packet from the transmitter, but the ensuing packets and retransmission requests may also be lost, resulting in a significant delay before the transmitter can finally send a discard message. As time passes, the packets backlogged in the transmitter will begin to expire as well. This unnecessary loss of a substantial amount of data is an unacceptable consequence of Kemp's Patent's reliance on receiving a retransmission request.

j) JP H10-126772 ("Suzuki")

307. Both Dr. Heegard and Dr. Gibson contend that Japanese Patent Application ("JP H10-126772) dated May 15, 1998 ("Suzuki") anticipates the '625 patent. I disagree with this conclusion. This reference fails to disclose a transmitter commanding a receiver to receive a non-consecutive packet and to release expectations of receiving outstanding packets have sequence numbers below that non-consecutive packet. This reference also fails to enable one skilled in the art to implement a discard notification scheme which anticipates the '625 patent.

(1) Background

308. Suzuki discloses a method for dynamic picture image data transfer, wherein dynamic picture image data is made up of a plurality of image frames. The sender converts the images to packets and sends them sequentially to the receiver. If the receiver sends a retransmission request for a packet that has been discarded, the sender will send a "dump notice" indicating to the receiver that the packet has been discarded. Upon reception of the dump notice, the receiver treats the packet has having been received and terminates the resend request.

(2) Claim 1 of the '625 Patent

> *1. A method for discarding packets in a data network employing a packet transfer protocol including an automatic repeat request scheme, comprising the steps of:*
>
> *a transmitter in the data network commanding a receiver in the data network to a) receive at least one packet having a sequence number that is not consecutive with a sequence number of a previously received packet and b) release any expectation of receiving outstanding packets having sequence numbers prior to the at least one packet; and*
>
> *the transmitter discarding all packets for which acknowledgment has not been received, and which have sequence numbers prior to the at least one packet.*

309. Both Dr. Heegard and Dr. Gibson contend that the dump notice is a command to release any expectation of receiving outstanding packets having sequence numbers prior to the non-consecutive packet. Dr. Gibson contends that "informing the receiver that the transmitter has discarded cell(s) also commands the receiver to treat as received the cell(s) subsequent in sequence number to the discarded cell(s). . . ." Similarly, Dr. Heegard contends that forwarding non-consecutive packets to the higher layers after receiving a discard message is a command to receive at least one packet having a sequence number that is not consecutive with a sequence number of a previously received packet.

310. Suzuki fails to teach a "command" to receive a packet having a sequence number that is not consecutive with a sequence number of a previously received packet. The '625 teaches a transmitter which *commands* the receiver to receive an out of sequence packet by including an enforcement bit which forces the receiver to receive the packet, regardless of sequence number. Suzuki, on the other hand, discloses a system in which the receiver may reject an out-of-sequence packet sent by the transmitter if the packet is outside of the reception window.

311. Suzuki proposes a standard SR-ARQ protocol with one modification – a dump notice that notifies the receiver that the transmitter has discarded a packet. Standard SR-ARQ protocols that existed when this patent application was written rejected packets that were outside of the reception window. Because Suzuki utilizes the standard SR-ARQ protocol (in combination with a discard message), the Suzuki receiver will reject packets outside of the reception window. Therefore, the Suzuki transmitter does not *command* the receiver to receive these non-consecutive packets.

312. For example, a transmitter may send receiver four packets, having sequence numbers 1, 2, 3, and 4, respectively. If packet 3 is lost in transmission and the reception window is only 3 packets (i.e., the receiver expects to receive packets 1, 2, and 3), the '625 transmitter will receive packet 4 if it includes an enforcement bit, even though packet 4 is out of the reception window. Suzuki's receiver, on the other hand, will consider packet 4 "invalid" and reject it because it is out of the reception window.

313. Suzuki similarly fails to teach a command to release expectation of receiving outstanding packets having sequence numbers prior to the non-consecutive packet. The discard message notifies the receiver of a single packet that has been discarded, but provides no

information about outstanding packets other than that identified in the discard message. Suzuki states that when the transmitter "is not holding a packet for which a resent request has been given from the receiving side, [it] issues a dump notice indicating to the receiving side that the packet has already been dumped, and the receiving side treats *the* packet as having been received. . . ." DEFS00006019 (emphasis added). Suzuki does not state that the receiver would similarly stop waiting for other outstanding packets below the packet identified in the dump message. Therefore, Suzuki fails to teach a command to release expectation of receiving *all outstanding packets* having sequence numbers prior to the non-consecutive packet.

314. Furthermore, Suzuki will result in unacceptable delays. Suzuki describes a system in which the transmitter only sends a discard message after it receives a retransmission request. If the retransmission request is lost, the transmitter cannot send the discard message or move its transmission window forward. While the transmitter waits, packets will begin to queue in the transmit buffer. The receiver will not send another retransmission request until it receives another packet from the transmitter, but the ensuing packets and retransmission requests may also be lost, resulting in a significant delay before the transmitter can finally send a discard message. As time passes, the packets backlogged in the transmitter will begin to expire as well. This unnecessary loss of a substantial amount of data is an unacceptable consequence of Suzuki's reliance on receiving a retransmission request.

k) DE 19543280 (Walke, et al.) ("Walke's ComNets Patent")

315. Both Dr. Heegard and Dr. Gibson contend that the German patent DE 18543280 ("Walke's ComNets Patent") anticipates the '625 patent. I disagree with this conclusion. This reference fails to disclose a transmitter commanding a receiver to receive a non-consecutive packet and to release expectations of receiving outstanding packets have sequence numbers

below that non-consecutive packet. This reference also fails to enable one skilled in the art to implement a discard notification scheme which anticipates the '625 patent.

(a) Background

316. Walke's ComNets Patent discloses a discard message labeled a "Delay PDU" used in a standard SR-ARQ protocol that notifies a receiver that the transmitter has discarded a packet. The Delay PDU is used to inform receivers that cells have been discarded and is only sent after the receiver sends a retransmission request.

(2) Claim 1 of the '625 Patent

> *1. A method for discarding packets in a data network employing a packet transfer protocol including an automatic repeat request scheme, comprising the steps of:*
>
> *a transmitter in the data network commanding a receiver in the data network to a) receive at least one packet having a sequence number that is not consecutive with a sequence number of a previously received packet and b) release any expectation of receiving outstanding packets having sequence numbers prior to the at least one packet; and*
>
> *the transmitter discarding all packets for which acknowledgment has not been received, and which have sequence numbers prior to the at least one packet.*

317. Both Dr. Heegard and Dr. Gibson contend that the Delay PDU message is a command to release any expectation of receiving outstanding packets having sequence numbers prior to the non-consecutive packet. Dr. Gibson contends that "informing the receiver that the transmitter has discarded cell(s) also commands the receiver to treat as received the cell(s) subsequent in sequence number to the discarded cell(s). . . ." Similarly, Dr. Heegard contends that forwarding non-consecutive packets to the higher layers after receiving a discard message is a command to receive at least one packet having a sequence number that is not consecutive with a sequence number of a previously received packet.

318. Walke's ComNets Patent fails to teach a "command" to receive a packet having a sequence number that is not consecutive with a sequence number of a previously received packet. The '625 teaches a transmitter which *commands* the receiver to receive an out of sequence packet by including an enforcement bit which forces the receiver to receive the packet, regardless of sequence number. Walke's ComNets Patent, on the other hand, discloses a system in which the receiver may reject an out-of-sequence packet sent by the transmitter if the packet is outside of the reception window.

319. Walke's ComNets Patent proposes a standard SR-ARQ protocol using *S*elective *REJ*ect (SREJ) PDUs with one relevant modification – a discard message that notifies the receiver that the transmitter has discarded a packet. Standard SR-ARQ protocols that existed when this paper was written rejected packets that were outside of the reception window. Because Walke's ComNets Patent utilizes the standard SR-ARQ protocol (in combination with a discard message), the Walke's ComNets Patent receiver will reject packets outside of the reception window. Therefore, the Walke's ComNets Patent transmitter does not *command* the receiver to receive these non-consecutive packets.

320. For example, a transmitter may send receiver four packets, having sequence numbers 1, 2, 3, and 4, respectively. If packet 3 is lost in transmission and the reception window is only 3 packets (i.e., the receiver expects to receive packets 1, 2, and 3), the '625 transmitter will receive packet 4 if it includes an enforcement bit, even though packet 4 is out of the reception window. Walke's ComNets Patent's receiver, on the other hand, will consider packet 4 "invalid" and reject it because it is out of the reception window.

321. Walke's ComNets Patent similarly fails to teach a command to release expectation of receiving outstanding packets having sequence numbers prior to the non-

consecutive packet. The Delay message notifies the receiver of a single packet that has been discarded, but provides no information about outstanding packets other than that identified in the Delay message. In Walke' ComNets Patent, he gives an example in which a single packet, packet 1, is discarded by the transmitter and never successfully received by the receiver. The transmitter "sends an N frame with sequence number 4 which piggybacks the delays (1) command. This tells the receiver not to wait for anything else *on frame 1* and it is able to widen it's receive window." Walke's ComNets Patent, col. 13. Walke does not state that the receiver would similarly stop waiting for other outstanding packets below packet 1. Therefore, Walke's ComNets Patent fails to teach a command to release expectation of receiving *all outstanding packets* having sequence numbers prior to the non-consecutive packet.

322. Furthermore, Walke's ComNets Patent will result in unacceptable delays. Walke's ComNets Patent describes a system in which the transmitter only sends a discard message after it receives a retransmission request. If the retransmission request is lost, the transmitter cannot send the discard message or move its transmission window forward. While the transmitter waits, packets will begin to queue in the transmit buffer. The receiver will not send another retransmission request until it receives another packet from the transmitter, but the ensuing packets and retransmission requests may also be lost, resulting in a significant delay before the transmitter can finally send a discard message. As time passes, the packets backlogged in the transmitter will begin to expire as well. This unnecessary loss of a substantial amount of data is an unacceptable consequence of Walke's ComNets Patent's reliance on receiving a retransmission request.

l) Walke and Petras and Plassmann, Wireless ATM: Air Interface and Network Protocols of the Mobile Broadband System ("Walke ComNets Article")

323. Dr. Gibson contends that the article "Wireless ATM: Air Interface and Network Protocols of the Mobile Broadband System" ("Walke's ComNets Article") by Bernhard Walke, Dietmar Petras, and Dieter Plassmann anticipates the '625 patent. I disagree with this conclusion. This reference fails to disclose a transmitter commanding a receiver to receive a non-consecutive packet and to release expectations of receiving outstanding packets have sequence numbers below that non-consecutive packet. This reference also fails to enable one skilled in the art to implement a discard notification scheme which anticipates the '625 patent.

(1) Background

324. Walke's ComNets Article discloses a discard message that notifies a receiver that the transmitter has discarded a packet.

(2) Claim 1 of the '625 Patent

> *1. A method for discarding packets in a data network employing a packet transfer protocol including an automatic repeat request scheme, comprising the steps of:*
>
> *a transmitter in the data network commanding a receiver in the data network to a) receive at least one packet having a sequence number that is not consecutive with a sequence number of a previously received packet and b) release any expectation of receiving outstanding packets having sequence numbers prior to the at least one packet; and*
>
> *the transmitter discarding all packets for which acknowledgment has not been received, and which have sequence numbers prior to the at least one packet.*

325. Dr. Gibson contends that the discard message is a command to release any expectation of receiving outstanding packets having sequence numbers prior to the non-consecutive packet and that "informing the receiver that the transmitter has discarded cell(s) also

commands the receiver to treat as received the cell(s) subsequent in sequence number to the discarded cell(s). . . ."

326. Walke's ComNets Article fails to teach a "command" to receive a packet having a sequence number that is not consecutive with a sequence number of a previously received packet. The '625 teaches a transmitter which *commands* the receiver to receive an out of sequence packet by including an enforcement bit which forces the receiver to receive the packet, regardless of sequence number. Walke's ComNets Article, on the other hand, discloses a system in which the receiver may reject an out-of-sequence packet sent by the transmitter if the packet is outside of the reception window.

327. Walke's ComNets Article proposes a standard SR-ARQ protocol with one modification – a discard message that notifies the receiver that the transmitter has discarded a packet. Standard SR-ARQ protocols that existed when this paper was written rejected packets that were outside of the reception window. Because Walke's ComNets Article utilizes the standard SR-ARQ protocol (in combination with a discard message), the Walke's ComNets Article receiver will reject packets outside of the reception window. Therefore, the Walke's ComNets Article transmitter does not *command* the receiver to receive these non-consecutive packets.

328. For example, a transmitter may send receiver four packets, having sequence numbers 1, 2, 3, and 4, respectively. If packet 3 is lost in transmission and the reception window is only 3 packets (i.e., the receiver expects to receive packets 1, 2, and 3), the '625 transmitter will receive packet 4 if it includes an enforcement bit, even though packet 4 is out of the reception window. Walke's ComNets Article's receiver, on the other hand, will consider packet 4 "invalid" and reject it because it is out of the reception window.

329. Walke's ComNets Article similarly fails to teach a command to release expectation of receiving outstanding packets having sequence numbers prior to the non-consecutive packet. The discard message notifies the receiver of a single packet that has been discarded, but provides no information about outstanding packets other than that identified in the discard message. Walke's ComNets Article does not state that the receiver would similarly stop waiting for outstanding packets other than that identified in the discard message. Therefore, Walke's ComNets Article fails to teach a command to release expectation of receiving *all outstanding packets* having sequence numbers prior to the non-consecutive packet.

330. Furthermore, Walke's ComNets Article will result in unacceptable delays. Walke's ComNets Article describes a system in which the transmitter only sends a discard message after it receives a retransmission request. If the retransmission request is lost, the transmitter cannot send the discard message or move its transmission window forward. While the transmitter waits, packets will begin to queue in the transmit buffer. The receiver will not send another retransmission request until it receives another packet from the transmitter, but the ensuing packets and retransmission requests may also be lost, resulting in a significant delay before the transmitter can finally send a discard message. As time passes, the packets backlogged in the transmitter will begin to expire as well. This unnecessary loss of a substantial amount of data is an unacceptable consequence of Walke's ComNets Article's reliance on receiving a retransmission request.

m) U.S. 6,683,850 (Dunning, et al.) ("Intel '850 Patent")

331. Dr. Gibson contends that the patent US 6,683,850 anticipates the '625 patent. I disagree with this conclusion. This reference fails to disclose a transmitter commanding a receiver to receive a non-consecutive packet and to release expectations of receiving outstanding packets have sequence numbers below that non-consecutive packet. This reference also fails to

enable one skilled in the art to implement a discard notification scheme which anticipates the '625 patent.

(1) Background

332. The Intel '850 Patent discloses a discard message that notifies a receiver that the transmitter has discarded a packet.

(2) Claim 1 of the '625 Patent

> *1. A method for discarding packets in a data network employing a packet transfer protocol including an automatic repeat request scheme, comprising the steps of:*
>
> *a transmitter in the data network commanding a receiver in the data network to a) receive at least one packet having a sequence number that is not consecutive with a sequence number of a previously received packet and b) release any expectation of receiving outstanding packets having sequence numbers prior to the at least one packet; and*
>
> *the transmitter discarding all packets for which acknowledgment has not been received, and which have sequence numbers prior to the at least one packet.*

333. Dr. Gibson's analysis of the Intel '850 patent is unclear. He fails to identify what constitutes a command of any sort, and specifically, what constitutes a command to receive a non-consecutive packet or a command to release expectation of receiving outstanding packets below the non-consecutive packet. The '850 patent does not teach a discard notification, receiving non-consecutive packets, or a receiver releasing expectation of receiving outstanding packets below the non-consecutive packet. Rather, the '850 patent teaches that when a receiver fails to respond to a message after several retries, the "undeliverable packet is sent back to the source" and "the device shuts down the link, preventing it from carrying any further traffic." Intel '850 patent col. 9:1-10.

334. Though he has not done so clearly in his report, Dr. Gibson may argue that after shutdown, the transport layer "is appraised of the problem [and] sends one last packet, flushing

the failing path," and this constitutes the "command" identified in the '625 patent. This language does not constitute a command as contemplated by the '625 patent, nor does it enable one skilled in the art to implement such a command. The patent does not indicate which entity sends the last packet, where the last packet is sent, or what is included in the last packet. Even if sent from the transmitter to the receiver, the patent does not indicate whether the packet is non-consecutive or whether it has a sequence number at all. The patent does not indicate whether the receiver must receive the packet even if out of the reception window, nor does it indicate what the receiver should do in response to receiving this packet. Furthermore, the patent apparently sought to address a situation in which the receiver fails to respond. If so, the receiver would never receive this final packet.

335. Finally, the Intel '850 patent does not discard all packets for which acknowledgment has not been received and which have sequence numbers prior to the non-consecutive packet. The patent provides that if a packet is undeliverable, the transmitter does not discard the message but rather "return[s] the undeliverable packet to its source." Intel '850 Patent Abstract.

n) U.S. 5,610,595 (Garrabrant, et al.) ("Garrabrant's Patent")

336. Dr. Gibson contends that the patent US 5,610,595 ("Garrabrant's Patent") filed by Gary Garrabrant, Jay C. Cho, and Joseph T. Savarese anticipates the '625 patent. I disagree with this conclusion. This reference fails to disclose a transmitter commanding a receiver to receive a non-consecutive packet and to release expectations of receiving outstanding packets have sequence numbers below that non-consecutive packet. This reference also fails to enable one skilled in the art to implement a discard notification scheme which anticipates the '625 patent.

(1) Background

337. Garrabrant's Patent discloses a transmitter that transmits packets to a receiver, and a receiver that rejects all packets that fall outside of the window of expected packets. If the receiver fails to receive five packets in a row, and then receives the sixth packet, then as long as the sixth packet is within the window of expected packets, the receiver will accept the packet and shift the window forward.

(2) Claim 1 of the '625 Patent

> *1. A method for discarding packets in a data network employing a packet transfer protocol including an automatic repeat request scheme, comprising the steps of:*
>
> *a transmitter in the data network commanding a receiver in the data network to a) receive at least one packet having a sequence number that is not consecutive with a sequence number of a previously received packet and b) release any expectation of receiving outstanding packets having sequence numbers prior to the at least one packet; and*
>
> *the transmitter discarding all packets for which acknowledgment has not been received, and which have sequence numbers prior to the at least one packet.*

338. Dr. Gibson's analysis of Garrabrant's Patent is unclear. He fails to identify what constitutes a command of any sort, and specifically, what constitutes a command to receive a non-consecutive packet or a command to release expectation of receiving outstanding packets below the non-consecutive packet. Garrabrant's Patent does not teach a discard notification, a command to receive non-consecutive packets, or a receiver releasing expectation of receiving outstanding packets below the non-consecutive packet.

339. Garrabrant's Patent fails to teach a "command" to receive a packet having a sequence number that is not consecutive with a sequence number of a previously received packet. The '625 teaches a transmitter which *commands* the receiver to receive an out of sequence packet by including an enforcement bit which forces the receiver to receive the packet,

regardless of sequence number. Garrabrant's Patent, on the other hand teaches that *if* a receiver receives a packet within the reception window, the receiver will shift its window forward to the received packet. Garrabrant's Patent repeatedly states that if a packet is received outside of the reception window, the packet will be rejected. See, e.g., 9:27-31 ("A message received by a unit in a packet radio communication system of the present invention will be rejected unless the number stored in the sequence number field 92 is in the "valid" window 142."); 9:5-8 ("Each of the units in the packet radio communication system maintains a set of acceptable sequence numbers which designate which sequence numbers that particular unit will receive. All other messages will be discarded by that unit."). Therefore, Garrabrant's Patent's transmitter does not *command* the receiver to receive these non-consecutive packets.

340. Garrabrant's Patent also does not teach discarding all packets for which acknowledgment has not been received and which have sequence numbers prior to the non-consecutive packet. The patent explains that under certain circumstances, the transmitter will discard some packets, but there is no indication that packets are discarded after the window moves forward. Garrabrant's Patent provides an example in Figures 8A and 8B. In figure 8A, a system is depicted in which packets 2, 3, 4, 5, and 6 are lost in transmission. After packet 7 arrives, the receiver shifts its window forward to packet 8. Garrabrant's Patent does not indicate whether the transmitter discards packets 2 through 6.

o) Ohta, et al., PRIME ARQ A Novel ARQ Scheme for High-speed Wireless ATM, ("Ohta")

341. Dr. Gibson contends that the article "PRIME ARQ: A Novel ARQ Scheme for High-Speed Wireless ATM ("Ohta's IEEE article") by Atsushi Ohta, Masafumi Yoshioka, Takatoshi Sugiyama, and Masahiro Umehira anticipates the '625 patent. I disagree with this conclusion. This reference fails to disclose a transmitter commanding a receiver to receive a

non-consecutive packet and to release expectations of receiving outstanding packets have sequence numbers below that non-consecutive packet. This reference also fails to enable one skilled in the art to implement a discard notification scheme which anticipates the '625 patent.

(1) Background

342. Ohta's IEEE article discloses a transmitter that transmits packets to a receiver, and a receiver that notifies the receiver which packets it did not receive. Upon reception of this notification, the transmitter resends the packets. Neither the transmitter nor the receiver discards packets and thus the transmitter never sends a discard notification.

(2) Claim 1 of the '625 Patent

> *1. A method for discarding packets in a data network employing a packet transfer protocol including an automatic repeat request scheme, comprising the steps of:*
>
> *a transmitter in the data network commanding a receiver in the data network to a) receive at least one packet having a sequence number that is not consecutive with a sequence number of a previously received packet and b) release any expectation of receiving outstanding packets having sequence numbers prior to the at least one packet; and*
>
> *the transmitter discarding all packets for which acknowledgment has not been received, and which have sequence numbers prior to the at least one packet.*

343. Dr. Gibson's analysis of Ohta's IEEE article is unclear. He fails to identify what constitutes a command of any sort, and specifically, what constitutes a command to receive a non-consecutive packet or a command to release expectation of receiving outstanding packets below the non-consecutive packet. Ohta's IEEE article does not teach a discard notification, a command to receive non-consecutive packets, or a receiver releasing expectation of receiving outstanding packets below the non-consecutive packet.

344. Ohta's IEEE article fails to teach a "command" to receive a packet having a sequence number that is not consecutive with a sequence number of a previously received

packet. The '625 teaches a transmitter which *commands* the receiver to receive an out of sequence packet by including an enforcement bit which forces the receiver to receive the packet, regardless of sequence number. Ohta's IEEE article, on the other hand, discloses a system in which the receiver may reject an out-of-sequence packet sent by the transmitter if the packet is outside of the reception window.

345. Ohta's IEEE article proposes a standard SR-ARQ protocol with one modification – a mechanism whereby the receiver indicates that at least three packets were not received; the transmitter retransmits the three packets and retransmits all packets with sequence numbers higher than the third packet. Standard SR-ARQ protocols that existed when this paper was written rejected packets that were outside of the reception window, and Ohta's modification makes no change to the protocol in this respect. Because Ohta's IEEE article utilizes the standard SR-ARQ protocol, Ohta's receiver will reject packets outside of the reception window. Therefore, Ohta's IEEE article transmitter does not *command* the receiver to receive these non-consecutive packets.

346. For example, a transmitter may send receiver four packets, having sequence numbers 1, 2, 3, and 4, respectively. If packet 3 is lost in transmission and the reception window is only 3 packets (i.e., the receiver expects to receive packets 1, 2, and 3), the '625 transmitter will receive packet 4 if it includes an enforcement bit, even though packet 4 is out of the reception window. Ohta's IEEE article's receiver, on the other hand, will consider packet 4 "invalid" and reject it because it is out of the reception window.

347. Ohta's IEEE article similarly fails to teach a command to release expectation of receiving outstanding packets having sequence numbers prior to the non-consecutive packet. Ohta's IEEE article does not teach a transmitter that discards packets, but rather a transmitter that

simply continues to send packets until they are received. The transmitter has no need to command the receiver to release expectation of receiving any packets. Thus, Ohta's IEEE article fails to teach a command to release expectation of receiving outstanding packets having sequence numbers prior to the non-consecutive packet.

348. Ohta's IEEE article also does not teach discarding all packets for which acknowledgment has not been received and which have sequence numbers prior to the non-consecutive packet. As previously explained, Ohta's IEEE article does not teach a transmitter that discards packets, but rather a transmitter that continues to send packets until they are received. Ohta gives no indication that the transmitter discards packets other than in the ordinary course of an SR-ARQ protocol.

3. Response to Alleged Obviousness References

349. As explained above, none of the asserted obviousness references disclose commanding a receiver in the data network to receive at least one packet having a sequence number that is not consecutive with a sequence number of a previously received packet. Accordingly, no combination of references can disclose this limitation. Even if one or more references discloses this limitation, it is not obvious to combine elements from different retransmission protocols. A change such as this which fundamentally alters the implementation of the reception window may have unexpected or undesirable effects when combined with other modifications to the standard SR-ARQ protocol.

4. Response to Dr. Gibson's Section 112 Arguments

350. I disagree that the asserted claims of the '625 patent fail to comply with the provisions of 35 USC § 112. Some of Dr. Gibson's arguments appear to relate to infringement issues. Accordingly, I hereby incorporate my infringement report.

a) "commanding a receiver in the data network to . . . receive at least one packet having a sequence number that is not consecutive with a sequence number of a previously received packet"

351. Dr. Gibson contends that the limitation "commanding a receiver in the data network to . . . receive at least one packet having a sequence number that is not consecutive with a sequence number of a previously received packet" is indefinite, lacks written description, and is not enabled. I disagree. Dr. Gibson argues that the patent should be limited to situations in which the "command is to command the receiver to receive the packet that is the subject of the command." The accused functionality is a command to receive a packet that is the subject of the command. The accused IEEE 802.11n devices send explicit and implicit block acknowledgment requests commanding the receiver to receive an out-of-sequence packet. The out-of-sequence packet is the subject of the command. The specification also states that the transmitter can send a separate control message to inform the receiver that packets have been discarded. *See, e.g.*, '625 col. 8:9-11. Dr. Gibson also argues that no such command is made, but as previously stated, this is a non-infringement argument – not a written description argument. The accused IEEE 802.11n devices do send a command, in the form of explicit and implicit block acknowledgment requests.

352. Dr. Gibson also argues that a person of ordinary skill in the art would not be able to determine what the claims cover and what they do not cover because Ericsson is reading the claim limitation "to cover circumstances where no such command is transmitted or needed." Again, Dr. Gibson is making a non-infringement argument. The accused IEEE 802.11n devices send explicit and implicit block acknowledgment requests commanding the receiver to receive an out-of-sequence packet. The out-of-sequence packet is the subject of the command. It is my opinion that one of ordinary skill in the art would be able to determine the claims cover such a command.

b) "commanding a receiver in the data network to . . . release any expectation of receiving outstanding packets having sequence numbers prior to the at least one packet"

353. Dr. Gibson contends that the limitation "commanding a receiver in the data network to . . . release any expectation of receiving outstanding packets having sequence numbers prior to the at least one packet" is indefinite, lacks written description, and is not enabled. I disagree. Dr. Gibson argues that the purpose of the command is to cause the "receiver to receive the packet that is the subject of the command." However, the purpose of the command is also to cause the receiver to release expectation of receiving outstanding data packets have sequence numbers prior to the non-consecutive packet. *See, e.g.*, '625 cols. 5:22-25; 7:38-41; 8:4-62. The accused IEEE 802.11n devices send explicit and implicit block acknowledgment requests commanding the receiver to release expectation of receiving outstanding data packets having sequence numbers prior to the non-consecutive packet. Dr. Gibson also argues that no such command is made, but as previously stated, this is a non-infringement argument – not a written description argument. The accused IEEE 802.11n devices do send a command, in the form of explicit and implicit block acknowledgment requests.

354. Dr. Gibson also argues that a person of ordinary skill in the art would not be able to determine what the claims cover and what they do not cover because Ericsson is reading the claim limitation "to cover circumstances where no such command is transmitted or needed." Again, Dr. Gibson is making a non-infringement argument. The accused IEEE 802.11n devices send explicit and implicit block acknowledgment requests commanding the receiver to release expectation of receiving packets having sequence numbers lower than the non-consecutive packet. It is my opinion that one of ordinary skill in the art would be able to determine the claims cover such a command.

C. U.S. PATENT NO. 6,330,435

355. Dr. Gibson and Dr. Heegard allege that the asserted claims of the '435 patents are anticipated by prior art. I disagree. None of the references cited by Dr. Gibson or Dr. Heegard teaches or discloses all the limitations of the asserted claims.

356. Dr. Gibson and Dr. Heegard also allege that these references render the asserted claims of the '435 patent obvious either alone or in combination with one or more other references. I disagree. None of the prior art references taught or disclosed all limitations of the asserted claims. Dr. Gibson and Dr. Heegard further did not identify how a specific combination of references would render the asserted claims obvious, and without doing so they cannot meet the requisite clear and convincing evidentiary standard. As discussed below, none of the references identified by Dr. Gibson and Dr. Heegard teaches each limitation of the asserted claims of the '435 patent. Nor does any identified combination of reference render such claims obvious.

357. The application that issued as U.S. Patent No. 6,330,435 entitled "Data Packet Discard Notification" was filed on March 18, 1999. The '435 patent issued on December 11, 2001.

1. Claim Construction

a) "data packet discard notification message..."

Patent/Claim	Claim Term	Ericsson's Proposed Construction	Defendants' Proposed Construction
'435 patent Claim 1	data packet discard notification message from the transmitter to the receiver indicating data packets the transmitter has discarded	a control message in an Automatic Repeat Request protocol that indicates data packets that the transmitter has discarded	message containing the identity of unacknowledged data packets the transmitter has discarded

358. Regardless of which party's construction the Court adopts for these two terms, my conclusions regarding the invalidity of the '435 patent remain unchanged.[43] I have concluded that none of the references cited by Dr. Heegard or Dr. Gibson disclose removing entries from a first list indicating data packets expected to be received from the transmitter, wherein the entries correspond to data packets identified in the computing step.

2. Response to Alleged Anticipation References

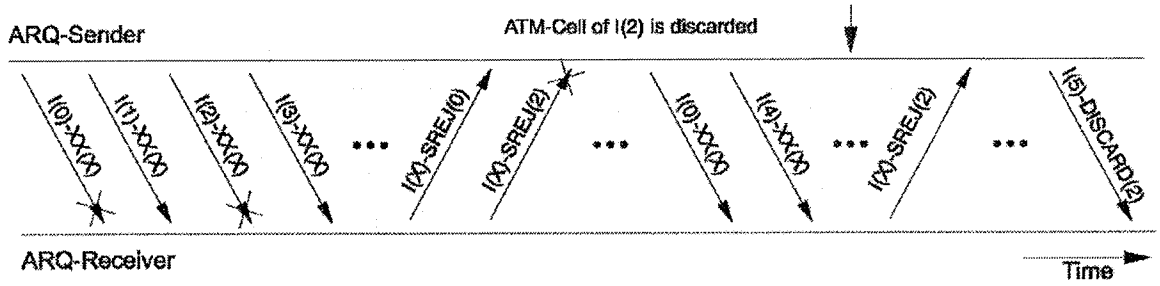
a) Dietmar Petras, Ulrich Vornefeld, Markus Scheilbenbogen, Candidate protocol stack (MAC + LLC for a Wireless ATM air interface, ("Petras' ComNets Submission")

359. Both Dr. Heegard and Dr. Gibson contend that the paper "Candidate protocol stack (MAC + LLC) for a Wireless ATM air interface" by Dietmar Petras, Ulrich Vornefeld, and Markus Scheilbenbogen ("Petras' ComNets Submission") anticipates the '435 patent. I disagree with this conclusion. This reference fails to disclose removing entries from a first list indicating data packets expected to be received from the transmitter, wherein the entries correspond to data packets identified in the computing step. This reference also fails to enable one skilled in the art to implement a discard notification scheme which anticipates the '435 patent.

[43] I understand that the Court may construe the terms of these patents in ways that differ from the parties' proposals. I reserve the right to update or supplement this report if necessary based on any rulings from the Court.

(1) Background

360. Petras' ComNets Submission discloses a discard message sent from a transmitter to a receiver which indicates that the transmitter has discarded a packet. Petras provides an example in which a transmitter sends packets 0, 1, 2, and 3 to a receiver, but packets 0 and 2 are lost in transmission, as seen in the figure below. The transmitter discards packet 2 before receiving the retransmission request for packet 2. In response to the retransmission request, the transmitter sends a discard message to the receiver indicating that packet 2 has been discarded.



361. Figure 11 from Petras' ComNets Submission

(2) Claim 1 of the '435 Patent

> *1. A method for discarding packets in a system having a transmitter and a receiver, wherein the method is complementary to the Selective Repeat Automatic Repeat Request protocol and comprises the steps of:*
>
> *transmitting a data packet discard notification message from the transmitter to the receiver indicating data packets the transmitter has discarded;*
>
> *receiving the data packet discard notification message;*
>
> *computing which data packets have been discarded by the transmitter based on the data packet discard notification message*
>
> *removing entries from a first list indicating data packets expected to be received from the transmitter, wherein the entries correspond to data packets identified in the computing step.*

362. Both Dr. Heegard and Dr. Gibson contend that the "DISCARD(N)" message is a data packet discard notification message from the transmitter to the receiver indicating data

packets the transmitter has discarded; the receiver receives the "DISCARD(N)" message and computes which data packets have been discarded by the transmitter based on the "DISCARD(N)" message; and the receiver remove entries from a list indicating data packets expected to be received from the transmitter, wherein the entries correspond to data packets identified in the computing step. Dr. Heegard fails to identify a list in this reference, but instead notes that "it would have been obvious to one of skill in the art to keep track of the expected packets using a list data structure." I disagree. Dr. Gibson identifies a "receiver buffer" as the list indicating data packets expected to be received from the transmitter.

363. Dr. Gibson identifies the "receiver buffer" described in Petras' ComNets Submission as a list of expected packets. However, receiver buffers used in SR-ARQ protocols at the time did not comprise a list of expected packets. Rather, receive buffers stored packets they received and held those packets until the reception window moved forward. When the reception window moved forward, the packets in the receiver buffer with sequence numbers lower than the starting sequence number of the reception window were sent up to the next layer. Petras' ComNets Submission gives no indication that his receiver buffer maintained an explicit list of packets expected to be received.

364. Even if the receiver buffer could be considered a list, Petra's ComNets Submission does not disclose "removing entries from a first list indicating data packets expected to be received from the transmitter." Although Petras' ComNets Submission generally mentions that the discard message moves the window, it does not specifically disclose how this mechanism should be implemented. Thus, Petras' ComNets Submission fails to teach a receiver which removes entries from a first list indicating data packets expected to be received from the transmitter, wherein the entries correspond to data packets identified in the computing step.

365. Furthermore, Petras' ComNets Submission will result in unacceptable delays. Petras' ComNets Submission describes a system in which the transmitter only sends a discard message after it receives a retransmission request. If the retransmission request is lost, the transmitter cannot send the discard message or move its transmission window forward. While the transmitter waits, packets will begin to queue in the transmit buffer. The receiver will not send another retransmission request until it receives another packet from the transmitter, but the ensuing packets and retransmission requests may also be lost, resulting in a significant delay before the transmitter can finally send a discard message. As time passes, the packets backlogged in the transmitter will begin to expire as well. This unnecessary loss of a substantial amount of data is an unacceptable consequence of Petras' ComNets Submission's reliance on receiving a retransmission request.

(3) Claim 2 of the '435 Patent

> *2. The method of claim 1, wherein the data packet discard notification message contains a field indicating a format of the message.*

366. Because Petras' ComNets Submission fails to anticipate claim 1 of the '435 patent, it also fails to anticipate this claim.

367. Dr. Heegard fails to identify a field indicating a format of the discard notification message, but instead notes that "it would have been obvious to one of skill in the art to include a field in the DISCARD message as one way to indicate a format of the message." It is my opinion that it would not have been obvious to one skilled in the art to include a field in the data packet discard notification message to indicate the format of the message.

368. Dr. Gibson contends that the type field of the LLC PDU depicted in Figure 10 of Petras' ComNets Submission is the field indicating the format of the data packet discard notification message. The type field indicates whether up to 24 additional acknowledgments are

transmitted instead of an I-PDU. Dr. Gibson contends that because the priority of the DISCARD message relative to acknowledgments is included in a section discussing acknowledgment priorities, the DISCARD message must be an acknowledgment, and therefore the type field indicates the format of a DISCARD message. I disagree.

369. First, a DISCARD Message is not an acknowledgment. An acknowledgment is a message sent from one entity to another indicating either that a packet was or was not received. The DISCARD message, on the other hand, is sent from one entity to another to notify it that a packet has been discarded. Petras himself states that "[d]iscard messages compete with acknowledgements," strongly suggesting that discard message and acknowledgments fall under two separate categories. 75748DOC0058954. Petras likely included discussion of DISCARD message priority in the same section as the discussion of acknowledgement priority because they compete with each other and establishing priority rules between them is necessary to avoid instability of the protocol. *Id.*

370. Second, a DISCARD message is not sent *instead* of an I-PDU, but is piggybacked on an I-PDU. The I-PDU itself remains unchanged, so the PDU-type field would indicate only that an I-PDU is being sent. Petras' ComNets Submission gives no indication that the type field of such an I-PDU would indicate that a DISCARD message is being piggybacked on the I-PDU.

b) Andreas Hettich, Development and Performance Evaluation of a Selective Repeat-Automatic Repeat Request (SR-ARQ) Protocol for Transparent, Mobile ATM Access ("Hettich's ComNets Thesis")

371. Both Dr. Heegard and Dr. Gibson contend that the paper "Development and performance evaluation of a Selective Repeat-Automatic Repeat Request (SR-ARQ) protocol for transparent, mobile ATM Access" ("Hettich's ComNets Thesis") by Andreas Hettich anticipates the '435 patent. I disagree with this conclusion. This reference fails to disclose removing entries from a first list indicating data packets expected to be received from the transmitter, wherein the

entries correspond to data packets identified in the computing step. This reference also fails to enable one skilled in the art to implement a discard notification scheme which anticipates the '435 patent.

(1) Background

372. Hettich's ComNets Thesis discloses a discard message (called a "Delay PDU") sent from a transmitter to a receiver which indicates that the transmitter has discarded a packet. "The Delay PDU is used to inform receivers that cells have been discarded. It is only sent if the receiver requested a discarded cell (using RR or SREJ)." DEFS00007377.

(2) Claim 1 of the '435 Patent

> *1. A method for discarding packets in a system having a transmitter and a receiver, wherein the method is complementary to the Selective Repeat Automatic Repeat Request protocol and comprises the steps of:*
>
> *transmitting a data packet discard notification message from the transmitter to the receiver indicating data packets the transmitter has discarded;*
>
> *receiving the data packet discard notification message;*
>
> *computing which data packets have been discarded by the transmitter based on the data packet discard notification message*
>
> *removing entries from a first list indicating data packets expected to be received from the transmitter, wherein the entries correspond to data packets identified in the computing step.*

373. Both Dr. Heegard and Dr. Gibson contend that the Delay PDU is a data packet discard notification message from the transmitter to the receiver indicating data packets the transmitter has discarded; the receiver receives the Delay PDU and computes which data packets have been discarded by the transmitter based on the Delay PDU; and the receiver remove entries from a list indicating data packets expected to be received from the transmitter, wherein the entries correspond to data packets identified in the computing step. Dr. Heegard fails to identify

a list in this reference, stating generally without citation that the receiver updates its "internal list." Dr. Gibson identifies the "resequencing buffer" and the "receiver window" as lists indicating data packets expected to be received from the transmitter.

374. Dr. Gibson identifies the "resequencing buffer" described in Petras' ComNets Submission as a list of expected packets. However, resequencing buffers used in SR-ARQ protocols at the time did not comprise a list of expected packets. Rather, resequencing buffers stored packets they received and held those packets until the reception window moved forward. When the reception window moved forward, the packets in the receiver buffer with sequence numbers lower than the starting sequence number of the reception window were sent up to the next layer. Petras' ComNets Submission gives no indication that his resequencing buffer maintained an explicit list of packets expected to be received.

375. Dr. Gibson also identifies the "receiver window" as a list of packets expected to be received. A reception window comprises only a starting and ending sequence number. A reception window does not comprise a *list* of each and every packet expected to be received.

376. Hettich's ComNets Thesis also fails to enable one skilled in the art to implement a discard notification message because it fails to indicate how the Delay PDU impacts the Receive_Data and Receive_Data_Object buffers. While the effect of the Delay PDU on the reception window is discussed generally in Chapter 5 of his thesis, Hettich fails to indicate how to implement the Delay PDU in Chapter 6 of his thesis, titled "Implementing the ASR ARQ Protocols." Hettich provides an example of how to implement his ASR ARQ protocol in the receiver in Table 6.2, shown below.

	Current State	Event	Action	Subsequent State
1	IDLE	**DATA indication**	Save SDU Start FORWARD_TIMER	RECEIVED
2		**REJECT**	Start REJECT_Timer *reject_count* = 0	SREJ
3	RECEIVED	**ACKNOWLEDGE**	Forward SDU Stop FORWARD_Timer	IDLE
4		**FORWARD_Timer expired**	Start_Forwarding	IDLE
5	SREJ	**DATA indication**	Save SDU Stop REJECT_Timer Start FORWARD_Timer	RECEIVED
6		**REJECT_TIMER expired** *reject_count* < *N2*	*reject_count* + + Start REJECT_Timer	SREJ
7		**REJECT_Timer expired** *reject_count* ≥ *N2*	Trigger Reset	IDLE

Table 6.2: State Transitions of the **Receive_Data_Object**

377. Hettich describes how to implement rejections, reject timers, and acknowledgments, but notably fails to describe how to implement the Delay PDU in the example above. Mr. Hettich, Dr. Heegard, and Dr. Gibson all failed to provide analysis or commentary explaining how they theorize the Delay PDU would affect the Receive_Data and Receive_Data_Object buffers.

(3) Claim 2 of the '435 Patent

> *2. The method of claim **1**, wherein the data packet discard notification message contains a field indicating a format of the message.*

378. Because Hettich's ComNets Thesis Standard fails to anticipate claim 1 of the '435 patent, it also fails to anticipate this claim.

c) Ulrich Vornefeld, Simulative and analytical study of measures supporting the quality of service in a radio-based ATM network ("Vornefeld's ComNets Thesis")

379. Both Dr. Heegard and Dr. Gibson contend that the diploma Paper "Simulative and analytical study of measures supporting the quality of service in a radio-based ATM network" ("Vornefeld's ComNets Thesis") by Ulrich Vornefeld anticipates the '435 patent. I disagree with this conclusion. This reference fails to disclose removing entries from a first list indicating data packets expected to be received from the transmitter, wherein the entries correspond to data packets identified in the computing step. This reference also fails to enable one skilled in the art to implement a discard notification scheme which anticipates the '435 patent.

(1) Background

380. Vornefeld's ComNets Thesis discloses two discard message implementations: (i) a message which explicitly notifies a receiver that the transmitter has discarded a packet ("Vornefeld-1") and (ii) an implicit notification to the receiver that the transmitter has discarded a packet by sending packets outside of the reception window ("Vornefeld-2").

381. Vornefeld-1 discloses a discard message sent from a transmitter to a receiver which indicates that the transmitter has discarded a packet. Vornefeld's ComNets Thesis provides an example in which a transmitter sends packets 0, 1, 2, and 3 to a receiver, but packets 0 and 2 are lost in transmission, as seen in the Figure below. The transmitter discards packet 2 before receiving the retransmission request for packet 2. In response to the retransmission request, the transmitter sends a discard message to the receiver indicating that packet 2 has been discarded.

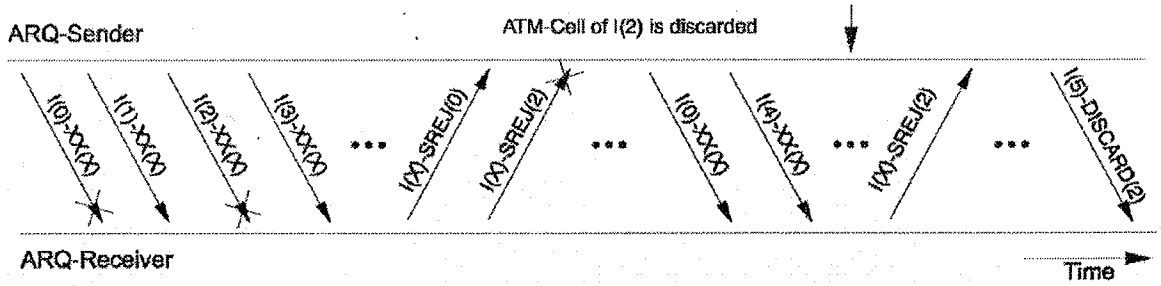


Figure 5.2 from Vornefeld's ComNets Thesis

382. Vornefeld-2 discloses an implicit notification to the receiver that the transmitter has discarded a packet by sending a packet outside of the reception window. When the receiver receives the out-of-window packet, it believes that the transmitter has discarded cells and shifts the window forward so that the end of the window corresponds with the out-of-window packet. For example, a receiver may have a reception window of 4 cells, numbered 1 through 4. If the receiver receives cell 5 before cells 1 through 4, it will shift its window forward one cell. The new reception window will be cells 2 through 5.

(2) Claim 1 of the '435 Patent

> *1. A method for discarding packets in a data network employing a packet transfer protocol including an automatic repeat request scheme, comprising the steps of:*
>
> *a transmitter in the data network commanding a receiver in the data network to a) receive at least one packet having a sequence number that is not consecutive with a sequence number of a previously received packet and b) release any expectation of receiving outstanding packets having sequence numbers prior to the at least one packet; and*
>
> *the transmitter discarding all packets for which acknowledgment has not been received, and which have sequence numbers prior to the at least one packet.*

383. Both Dr. Heegard and Dr. Gibson contend that the "DISCARD(N)" message is a data packet discard notification message from the transmitter to the receiver indicating data packets the transmitter has discarded; the receiver receives the "DISCARD(N)" message and

computes which data packets have been discarded by the transmitter based on the "DISCARD(N)" message; and the receiver remove entries from a list indicating data packets expected to be received from the transmitter, wherein the entries correspond to data packets identified in the computing step. Dr. Heegard fails to identify a list in this reference, but instead notes that "it would have been obvious to one of skill in the art to keep track of the expected packets using a list data structure." I disagree. Dr. Gibson also fails to specifically identify list, vaguely suggesting that the reception window as a list.

384. Thus, Vornefeld's ComNets Thesis fails to teach a receiver which removes entries from a first list indicating data packets expected to be received from the transmitter, wherein the entries correspond to data packets identified in the computing step. Dr. Gibson vaguely references a reception window, but a reception window comprises only a starting and ending sequence number. A reception window does not comprise a *list* of each and every packet expected to be received.

385. Even if the reception window could be considered a list, Vornefeld's ComNets Thesis does not disclose "removing entries from a first list indicating data packets expected to be received from the transmitter." Although Vornefeld's ComNets Thesis generally mentions that the discard message moves the window, it does not specifically disclose how this mechanism should be implemented. Thus, Vornefeld's ComNets Thesis fails to teach a receiver which removes entries from a first list indicating data packets expected to be received from the transmitter, wherein the entries correspond to data packets identified in the computing step.

386. Furthermore, Vornefeld's ComNets Thesis will result in unacceptable delays. Vornefeld's ComNets Thesis describes a system in which the transmitter only sends a discard message after it receives a retransmission request. If the retransmission request is lost, the

transmitter cannot send the discard message or move its transmission window forward. While the transmitter waits, packets will begin to queue in the transmit buffer. The receiver will not send another retransmission request until it receives another packet from the transmitter, but the ensuing packets and retransmission requests may also be lost, resulting in a significant delay before the transmitter can finally send a discard message. As time passes, the packets backlogged in the transmitter will begin to expire as well. This unnecessary loss of a substantial amount of data is an unacceptable consequence of Vornefeld's ComNets Thesis's reliance on receiving a retransmission request.

(3) Claim 2 of the '435 Patent

> *2. The method of claim 1, wherein the data packet discard notification message contains a field indicating a format of the message.*

387. Because Vornefeld's ComNets Thesis fails to anticipate claim 1 of the '435 patent, it also fails to anticipate this claim.

388. Dr. Heegard fails to identify a field indicating a format of the discard notification message, but instead notes that "it would have been obvious to one of skill in the art to include a field in the DISCARD message as one way to indicate a format of the message." It is my opinion that it would not have been obvious to one skilled in the art to include a field in the data packet discard notification message to indicate the format of the message.

389. Dr. Gibson also fails to identify a field indicating a format of the discard notification message. Dr. Gibson vaguely references "fields indicat[ing] the structure of data units," but he cannot point to a specific field anywhere in Vornefeld's ComNets Thesis that indicates the format of the discard notification message. Vornefeld does not clearly identify what he means by a field indicating the "structure of data units," nor does such a field seem to indicate the *format* of a packet. Indeed, Vornefeld's ComNets Thesis states that "the recipient

treats the discard messages like a normal I-frame," suggesting that there is no field which uniquely identifies the message as a discard message.

d) Dietmar Petras, *Development and Performance Evaluation of an ATM Radio Interface*, Aachen Contributions to Mobile and Telecommunications, ("Petras' ComNets Thesis")

390. Dr. Gibson contends that the paper "Candidate protocol stack (MAC + LLC) for a Wireless ATM air interface" by Dietmar Petras, Ulrich Vornefeld, and Markus Scheilbenbogen ("Petras' ComNets Thesis") anticipates the '435 patent. I disagree with this conclusion. This reference fails to disclose removing entries from a first list indicating data packets expected to be received from the transmitter, wherein the entries correspond to data packets identified in the computing step. This reference also fails to enable one skilled in the art to implement a discard notification scheme which anticipates the '435 patent.

(1) Background

391. Petras' ComNets Thesis discloses a discard message sent from a transmitter to a receiver which indicates that the transmitter has discarded a packet. Petras provides an example in which a transmitter sends packets 0, 1, 2, and 3 to a receiver, but packets 0 and 2 are lost in transmission, as seen in the Figure below. The transmitter discards packet 2 before receiving the retransmission request for packet 2. In response to the retransmission request, the transmitter sends a discard message to the receiver indicating that packet 2 has been discarded.

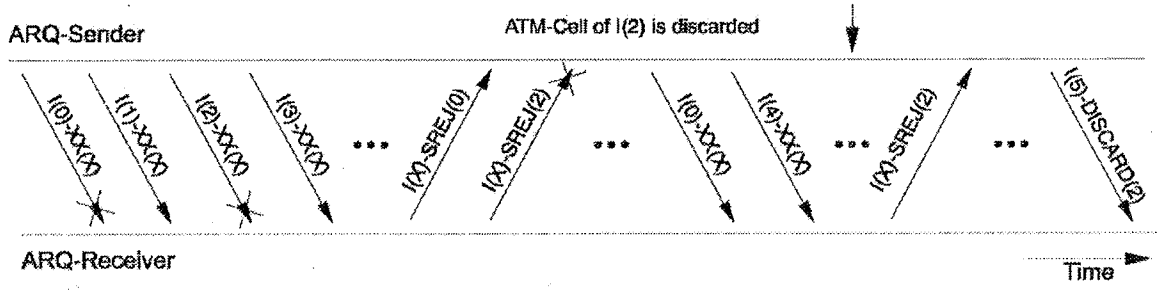


Figure 8.11 from Petras' ComNets Thesis

(2) Claim 1 of the '435 Patent

1. A method for discarding packets in a system having a transmitter and a receiver, wherein the method is complementary to the Selective Repeat Automatic Repeat Request protocol and comprises the steps of:

transmitting a data packet discard notification message from the transmitter to the receiver indicating data packets the transmitter has discarded;

receiving the data packet discard notification message;

computing which data packets have been discarded by the transmitter based on the data packet discard notification message

removing entries from a first list indicating data packets expected to be received from the transmitter, wherein the entries correspond to data packets identified in the computing step.

392. Dr. Gibson contends that the "DISCARD(N)" message is a data packet discard notification message from the transmitter to the receiver indicating data packets the transmitter has discarded; the receiver receives the "DISCARD(N)" message and computes which data packets have been discarded by the transmitter based on the "DISCARD(N)" message; and the receiver remove entries from a list indicating data packets expected to be received from the transmitter, wherein the entries correspond to data packets identified in the computing step. Dr. Gibson identifies a "receiver buffer" or a "receiver window" as the list indicating data packets expected to be received from the transmitter.

393. Dr. Gibson identifies the "receiver buffer" described in Petras' ComNets Thesis as a list of expected packets. However, receiver buffers used in SR-ARQ protocols at the time did not comprise a list of expected packets. Rather, receive buffers stored packets they received and held those packets until the reception window moved forward. When the reception window moved forward, the packets in the receiver buffer with sequence numbers lower than the starting sequence number of the reception window were sent up to the next layer. Petras' ComNets

Thesis gives no indication that his receiver buffer maintained an explicit list of packets expected to be received.

394. Dr. Gibson also identifies the "receiver window" as a list of packets expected to be received. A reception window comprises only a starting and ending sequence number. A reception window does not comprise a *list* of each and every packet expected to be received.

395. Even if the receiver buffer or receiver window could be considered a list, Petra's ComNets Submission does not disclose "removing entries from a first list indicating data packets expected to be received from the transmitter." Although Petras' ComNets Thesis generally mentions that the discard message moves the window, it does not specifically disclose how this mechanism should be implemented. Thus, Petras' ComNets Thesis fails to teach a receiver which removes entries from a first list indicating data packets expected to be received from the transmitter, wherein the entries correspond to data packets identified in the computing step.

396. Furthermore, Petras' ComNets Thesis will result in unacceptable delays. Petras' ComNets Thesis describes a system in which the transmitter only sends a discard message after it receives a retransmission request. If the retransmission request is lost, the transmitter cannot send the discard message or move its transmission window forward. While the transmitter waits, packets will begin to queue in the transmit buffer. The receiver will not send another retransmission request until it receives another packet from the transmitter, but the ensuing packets and retransmission requests may also be lost, resulting in a significant delay before the transmitter can finally send a discard message. As time passes, the packets backlogged in the transmitter will begin to expire as well. This unnecessary loss of a substantial amount of data is an unacceptable consequence of Petras' ComNets Thesis's reliance on receiving a retransmission request.

(3) Claim 2 of the '435 Patent

> 2. The method of claim **1**, wherein the data packet discard notification message contains a field indicating a format of the message.

397. Because Petras' ComNets Thesis fails to anticipate claim 1 of the '435 patent, it also fails to anticipate this claim.

398. Dr. Gibson fails to identify a specific field of the DISCARD(N) message indicating the format of the discard notification message because Petras does not identify such a field. Rather, Dr. Gibson vaguely references "various message formats including fields indicating structure" as the field indicating the format of the discard notification message. Gibson, p.xx-79. The excerpts Gibson referenced bear little if any relation to this statement and he provides no analysis indicating why he believes these excerpts show a field indicating the format of the DISCARD(N) message. Further, Petras' ComNets Thesis makes no reference to a format field within the DISCARD(N) message.

e) Petras and Hettich, Performance Evaluation of the ASR-ARQ Protocol for Wireless ATM, Proceeding of the 1995 IEEE Wireless Communication System Symposium, (Nov. 1995) ("Petras' ComNets 1995 Article")

399. Both Dr. Heegard and Dr. Gibson contend that the article "Performance Evaluation of the ASR-ARQ Protocol for Wireless ATM" ("Petras' ComNets 1995 Article") by Dietmar Petras and Andreas Hettich anticipates the '435 patent. I disagree with this conclusion. This reference fails to disclose removing entries from a first list indicating data packets expected to be received from the transmitter, wherein the entries correspond to data packets identified in the computing step. This reference also fails to enable one skilled in the art to implement a discard notification scheme which anticipates the '435 patent.

(1) Background

400. Petras' ComNets 1995 Article discloses a discard message (called a "Delay PDU") sent from a transmitter to a receiver which indicates that the transmitter has discarded a packet. The Delay PDU is used to inform receivers that cells have been discarded. It is only sent if the receiver requested a discarded cell (using RR or SREJ).

(2) Claim 1 of the '435 Patent

> *1. A method for discarding packets in a system having a transmitter and a receiver, wherein the method is complementary to the Selective Repeat Automatic Repeat Request protocol and comprises the steps of:*
>
> *transmitting a data packet discard notification message from the transmitter to the receiver indicating data packets the transmitter has discarded;*
>
> *receiving the data packet discard notification message;*
>
> *computing which data packets have been discarded by the transmitter based on the data packet discard notification message*
>
> *removing entries from a first list indicating data packets expected to be received from the transmitter, wherein the entries correspond to data packets identified in the computing step.*

401. Dr. Gibson contends that the "Delay PDU" message is a data packet discard notification message from the transmitter to the receiver indicating data packets the transmitter has discarded; the receiver receives the "Delay PDU" message and computes which data packets have been discarded by the transmitter based on the "Delay PDU" message; and the receiver remove entries from a list indicating data packets expected to be received from the transmitter, wherein the entries correspond to data packets identified in the computing step. Dr. Gibson identifies the "resequencing buffer" and the "receiver window" as lists indicating data packets expected to be received from the transmitter.

402. Petras' ComNets 1995 Article fails to teach a transmitter which transmits a data packet discard notification message from the transmitter to the receiver indicating *data packets* the transmitter has discarded. The Delay message notifies the receiver of a *single* packet that has been discarded, but provides no information about outstanding packets other than that identified in the Delay message. In Petras' article, he gives an example in which a single packet, packet 1, is discarded by the transmitter and never successfully received by the receiver. The transmitter "transmit an I_Delay frame . . . informing the mobile station, not to wait for frame 1 because this has been discarded. Receiving Delay(4,1) frame successfully, the receiver is able to shift its window, no longer waiting for frame 1." DEFS00014150. Petras does not state that the receiver would similarly stop waiting for other outstanding packets below packet 1. Therefore, Petras' ComNets 1995 Article fails to teach a transmitter which transmits a data packet discard notification message from the transmitter to the receiver indicating data packets the transmitter has discarded.

403. Dr. Gibson identifies the "resequencing buffer" described in Petras' ComNets 1995 Article as a list of expected packets. However, resequencing buffers used in SR-ARQ protocols at the time did not comprise a list of expected packets. Rather, resequencing buffers stored packets they received and held those packets until the reception window moved forward. When the reception window moved forward, the packets in the resequencing buffer with sequence numbers lower than the starting sequence number of the reception window were sent up to the next layer. Petras' ComNets 1995 Article gives no indication that his resequencing buffer maintained an explicit list of packets expected to be received.

404. Dr. Gibson also identifies the "receiver window" as a list of packets expected to be received. A reception window comprises only a starting and ending sequence number. A reception window does not comprise a *list* of each and every packet expected to be received.

405. Even if the resequencing buffer or receiver window could be considered a list, Petras' ComNets 1995 Article does not disclose "removing entries from a first list indicating data packets expected to be received from the transmitter." Although Petras' ComNets 1995 Article generally mentions that the discard message moves the window, it does not specifically disclose how this mechanism should be implemented. Thus, Petras' ComNets 1995 Article fails to teach a receiver which removes entries from a first list indicating data packets expected to be received from the transmitter, wherein the entries correspond to data packets identified in the computing step.

406. Furthermore, Petras' ComNets 1995 Article will result in unacceptable delays. Petras' ComNets 1995 Article describes a system in which the transmitter only sends a discard message after it receives a retransmission request. If the retransmission request is lost, the transmitter cannot send the discard message or move its transmission window forward. While the transmitter waits, packets will begin to queue in the transmit buffer. The receiver will not send another retransmission request until it receives another packet from the transmitter, but the ensuing packets and retransmission requests may also be lost, resulting in a significant delay before the transmitter can finally send a discard message. As time passes, the packets backlogged in the transmitter will begin to expire as well. This unnecessary loss of a substantial amount of data is an unacceptable consequence of Petras' ComNets 1995 Article's reliance on receiving a retransmission request.

(3) Claim 2 of the '435 Patent

2. The method of claim 1, wherein the data packet discard notification message contains a field indicating a format of the message.

407. Because Petras' ComNets 1995 Article does not satisfy all of the limitations of claim 1, it does not anticipate dependent claim 2.

f) Petras and Hettich, Performance evaluation of a logical link control protocol for an ATM air interface, (1997) ("Petras' ComNets 1997 Article")

408. Both Dr. Heegard and Dr. Gibson contend that the paper "Performance Evaluation of a Logical Link Control Protocol for an ATM Air Interface" ("Petras' ComNets 1997 Article") by Dietmar Petras and Andreas Hettich anticipates the '435 patent. I disagree with this conclusion. I disagree with this conclusion. This reference fails to disclose removing entries from a first list indicating data packets expected to be received from the transmitter, wherein the entries correspond to data packets identified in the computing step. This reference also fails to enable one skilled in the art to implement a discard notification scheme which anticipates the '435 patent.

(1) Background

409. Petras' ComNets 1997 Article discloses a discard message sent from a transmitter to a receiver which indicates that the transmitter has discarded a packet. Petras provides an example in which a transmitter sends packets 0, 1, 2, and 3 to a receiver, but packets 0 and 2 are lost in transmission, as seen in the Figure below. The transmitter discards packet 2 before receiving the retransmission request for packet 2. In response to the retransmission request, the transmitter sends a discard message to the receiver indicating that packet 2 has been discarded.

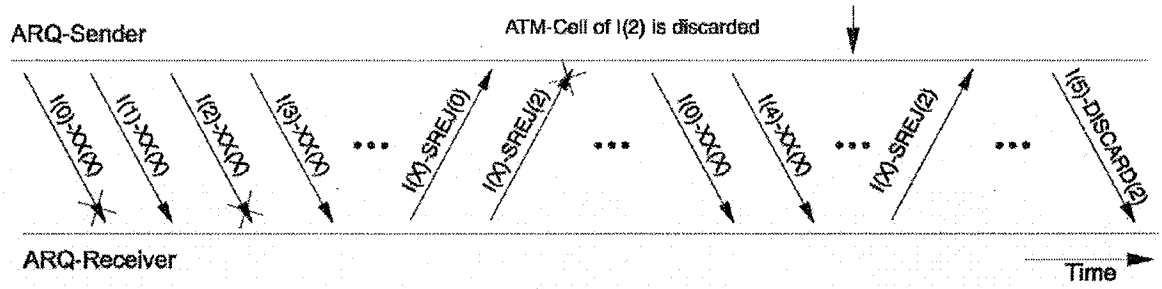


Figure 4 from Petras' ComNets 1997 Article

(2) Claim 1 of the '435 Patent

1. A method for discarding packets in a system having a transmitter and a receiver, wherein the method is complementary to the Selective Repeat Automatic Repeat Request protocol and comprises the steps of:

transmitting a data packet discard notification message from the transmitter to the receiver indicating data packets the transmitter has discarded;

receiving the data packet discard notification message;

computing which data packets have been discarded by the transmitter based on the data packet discard notification message

removing entries from a first list indicating data packets expected to be received from the transmitter, wherein the entries correspond to data packets identified in the computing step.

410. Dr. Gibson and Dr. Heegard contend that the "DISCARD(N)" message is a data packet discard notification message from the transmitter to the receiver indicating data packets the transmitter has discarded; the receiver receives the "DISCARD(N)" message and computes which data packets have been discarded by the transmitter based on the "DISCARD(N)" message; and the receiver remove entries from a list indicating data packets expected to be received from the transmitter, wherein the entries correspond to data packets identified in the computing step. Dr. Heegard fails to identify a list in this reference, but instead notes that "it would have been obvious to one of skill in the art to keep track of the expected packets using a

list data structure." I disagree. Dr. Gibson identifies a "resequencing buffer" as the list indicating data packets expected to be received from the transmitter.

411. Dr. Gibson identifies the "resequencing buffer" described in Petras' ComNets 1997 Article as a list of expected packets. However, resequencing buffers used in SR-ARQ protocols at the time did not comprise a list of expected packets. Rather, resequencing buffers stored packets they received and held those packets until the reception window moved forward. When the reception window moved forward, the packets in the resequencing buffer with sequence numbers lower than the starting sequence number of the reception window were sent up to the next layer. Petras' ComNets 1997 Article gives no indication that his resequencing buffer maintained an explicit list of packets expected to be received.

412. Even if the resequencing buffer could be considered a list, Petras' ComNets 1997 Article does not disclose "removing entries from a first list indicating data packets expected to be received from the transmitter." Although Petras' ComNets 1997 Article generally mentions that the discard message moves the window, it does not specifically disclose how this mechanism should be implemented. Thus, Petras' ComNets 1997 Article fails to teach a receiver which removes entries from a first list indicating data packets expected to be received from the transmitter, wherein the entries correspond to data packets identified in the computing step.

413. Furthermore, Petras' ComNets 1997 Article will result in unacceptable delays. Petras' ComNets 1997 Article describes a system in which the transmitter only sends a discard message after it receives a retransmission request. If the retransmission request is lost, the transmitter cannot send the discard message or move its transmission window forward. While the transmitter waits, packets will begin to queue in the transmit buffer. The receiver will not send another retransmission request until it receives another packet from the transmitter, but the

ensuing packets and retransmission requests may also be lost, resulting in a significant delay before the transmitter can finally send a discard message. As time passes, the packets backlogged in the transmitter will begin to expire as well. This unnecessary loss of a substantial amount of data is an unacceptable consequence of Petras' ComNets 1997 Article's reliance on receiving a retransmission request.

(3) Claim 2 of the '435 Patent

> *2. The method of claim 1, wherein the data packet discard notification message contains a field indicating a format of the message.*

414. Because Petras' ComNets 1997 Article fails to anticipate claim 1 of the '435 patent, it also fails to anticipate this claim.

415. Dr. Gibson fails to identify a specific field of the DISCARD(N) message indicating the format of the discard notification message. Rather, Dr. Gibson vaguely references "various messages containing fields" as the field indicating the format of the discard notification message. The excerpts Gibson referenced bear little if any relation to this statement and he provides no analysis indicating why he believes these excerpts show a field indicating the format of the DISCARD(N) message. Further, Petras' ComNets 1997 Article makes no reference to a format field within the DISCARD(N) message.

g) Hettich and Vornefeld and Rapp, ARQ Protocols for Wireless ATM Systems: Requirements and Solutions, ETSI EP BRANWG3 Temporary Document 42 ("Hettich's ComNets Submission")

416. Dr. Gibson contends that the paper "ARQ Protocols for Wireless ATM Systems: Requirements and Solutions" ("Hettich's ComNets Submission") by A. Hettich , U. Vornefeld, and J. Rapp anticipates the '435 patent. I disagree with this conclusion. This reference fails to disclose removing entries from a first list indicating data packets expected to be received from the transmitter, wherein the entries correspond to data packets identified in the computing step.

This reference also fails to enable one skilled in the art to implement a discard notification scheme which anticipates the '435 patent.

(1) Background

417. Hettich's ComNets Submission discloses two discard message implementations. First, Hettich proposes a system ("Hettich-1") in which a transmitter will discard an expired packet and move the transmission window forward to enable transmission of new cells. When the receiver receives a packet outside of the reception window, the receiver shifts its reception window forward so that the end of the reception window corresponds with the newly received cell. Second, Hettich proposes a system ("Hettich-2") in which a transmitter discards expired packets and sends a special discard acknowledgment message to the receiver.

(2) Claim 1 of the '435 Patent

> *1. A method for discarding packets in a system having a transmitter and a receiver, wherein the method is complementary to the Selective Repeat Automatic Repeat Request protocol and comprises the steps of:*
>
> *transmitting a data packet discard notification message from the transmitter to the receiver indicating data packets the transmitter has discarded;*
>
> *receiving the data packet discard notification message;*
>
> *computing which data packets have been discarded by the transmitter based on the data packet discard notification message*
>
> *removing entries from a first list indicating data packets expected to be received from the transmitter, wherein the entries correspond to data packets identified in the computing step.*

418. Dr. Gibson contends that the discard message is a data packet discard notification message from the transmitter to the receiver indicating data packets the transmitter has discarded; the receiver receives the discard message and computes which data packets have been discarded by the transmitter based on the discard message; and the receiver remove entries from

a list indicating data packets expected to be received from the transmitter, wherein the entries correspond to data packets identified in the computing step. Dr. Gibson identifies a "buffer" as the list indicating data packets expected to be received from the transmitter.

419. Hettich-2 fails to teach a discard notification message from the transmitter to the receiver indicating *data packets* the transmitter has discarded. The discard message notifies the receiver of a *single* packet that has been discarded, but provides no information about outstanding packets other than that identified in the discard message. Hettich-2 states that "[t]he receiver is informed about *the* discarded cell by sending a special discard" message. (Emphasis added). Hettich-2 does not state that the receiver would similarly stop waiting for other outstanding packets below the packet identified in the discard message. Therefore, Hettich-2 fails to teach a discard notification message from the transmitter to the receiver indicating *data packets* the transmitter has discarded.

420. Dr. Gibson identifies the "buffer" described in Hettich's ComNets Submission as a list of expected packets. However, buffers used in SR-ARQ protocols at the time did not comprise a list of expected packets. Rather, buffers stored packets they received and held those packets until the reception window moved forward. When the reception window moved forward, the packets in the buffer with sequence numbers lower than the starting sequence number of the reception window were sent up to the next layer. Hettich's ComNets Submission gives no indication that his receiver buffer maintained an explicit list of packets expected to be received.

421. Even if the receiver buffer could be considered a list, Hettich's ComNets Submission does not disclose "removing entries from a first list indicating data packets expected to be received from the transmitter." Although Petras' ComNets generally mentions that the

discard message moves the window, it does not specifically disclose how this mechanism should be implemented. Thus, Hettich's ComNets Submission fails to teach a receiver which removes entries from a first list indicating data packets expected to be received from the transmitter, wherein the entries correspond to data packets identified in the computing step.

422. Furthermore, Hettich's ComNets Submission will result in unacceptable delays. Hettich's ComNets Submission describes a system in which the transmitter only sends a discard message after it receives a retransmission request. If the retransmission request is lost, the transmitter cannot send the discard message or move its transmission window forward. While the transmitter waits, packets will begin to queue in the transmit buffer. The receiver will not send another retransmission request until it receives another packet from the transmitter, but the ensuing packets and retransmission requests may also be lost, resulting in a significant delay before the transmitter can finally send a discard message. As time passes, the packets backlogged in the transmitter will begin to expire as well. This unnecessary loss of a substantial amount of data is an unacceptable consequence of Hettich's ComNets Submission's reliance on receiving a retransmission request.

423. Hettich-1 also fails to enable one skilled in the art to implement a discard notification scheme which anticipates the '435 patent because it can result in deadlock due to incorrectly sorted cells. The Hettich-1 receiver cannot distinguish between discarded packets and packets received incorrectly outside of the reception window, the same problem acknowledged by Vornefeld in his diploma paper. Vornefeld explained how this shortcoming could result in a failure in Figure 5.4 of his paper, reproduced in the figure below, which Vornefeld labeled "Incorrect exchange of ATM-cells in phases with a high frame error ratio."

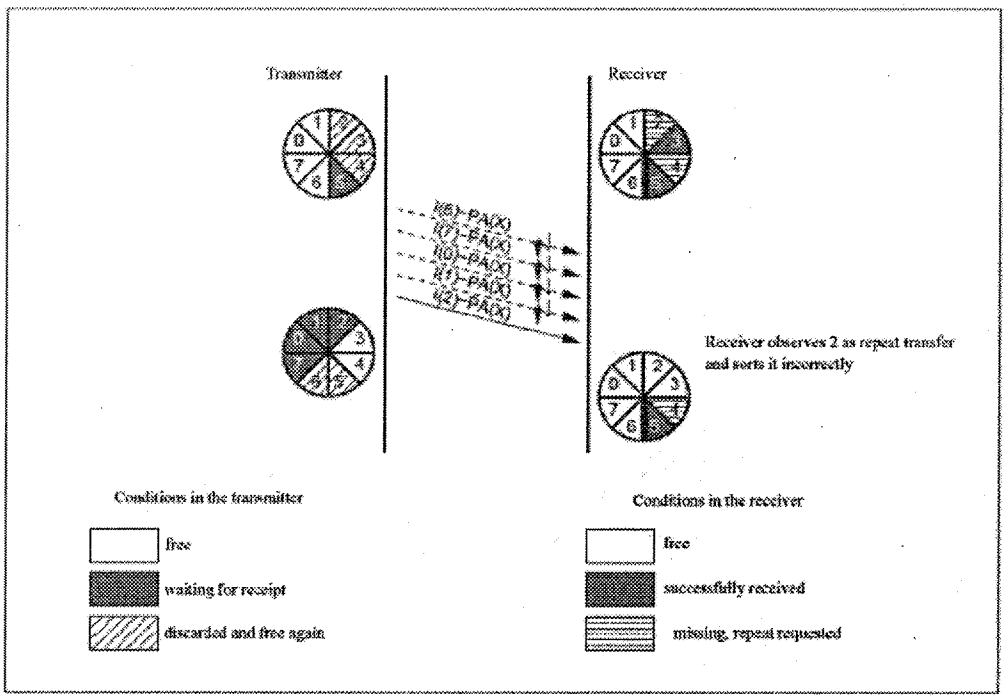


Figure 5.4: Incorrect exchange of ATM-cells in phases with a high frame error ratio

Figure 5.4: System Failure Using Hettich-1

DEFS00007572. In Vornefeld's example, packets 2 through 5 are sent to the transmitter, and packets 2 and 4 are lost in transmission. The transmitter then attempts to transmit packets 6, 7, 0, 1, and 2 in order, but packets 6, 7, 0, and 1 are lost in transmission. When the receiver receives packet 2, it observes packet 2 as a retransmission "and sorts it incorrectly," resulting in system gridlock.

(3) Claim 2 of the '435 Patent

> *2. The method of claim **1**, wherein the data packet discard notification message contains a field indicating a format of the message.*

424. Because Hettich's ComNets Submission fails to anticipate claim 1 of the '435 patent, it also fails to anticipate this claim.

425. Dr. Gibson fails to identify a specific field of the discard message indicating the format of the discard notification message because Petras does not identify such a field. Rather, Dr. Gibson vaguely states only that Hettich's ComNets Submission uses "various message formats," that discard messages are a type of acknowledgment, and that they can be piggybacked on a data cell. Gibson, p. xx-131-133. These statements fail to show a field indicating a format of the discard message. Dr. Gibson provides no analysis indicating why he believes the excerpts he cited show a field indicating the format of the discard message. Further, Hettich's ComNets Submission makes no reference to a format field within the discard message.

h) Broadband Radio Access Networks (BRAN), Inventory of broadband radio technologies and techniques, TR 101 173 V1.1.1 ("The Toolkit")

426. Both Dr. Heegard and Dr. Gibson contend that the document "Broadband Radio Access Networks (BRAN), Inventory of broadband radio technologies and techniques" ("The Toolkit") anticipates the '435 patent. I disagree with this conclusion. This reference fails to disclose removing entries from a first list indicating data packets expected to be received from the transmitter, wherein the entries correspond to data packets identified in the computing step. This reference also fails to enable one skilled in the art to implement a discard notification scheme which anticipates the '435 patent.

(1) Background

427. The Toolkit discloses two discard message implementations. First, Hettich proposes a system ("Toolkit-1") in which a transmitter will discard an expired packet and move the transmission window forward to enable transmission of new cells. When the receiver receives a packet outside of the reception window, the receiver shifts its reception window forward so that the end of the reception window corresponds with the newly received cell.

Second, Hettich proposes a system ("Toolkit -2") in which a transmitter discards expired packets and sends a special discard acknowledgment message to the receiver.

(2) Claim 1 of the '435 Patent

> *1. A method for discarding packets in a system having a transmitter and a receiver, wherein the method is complementary to the Selective Repeat Automatic Repeat Request protocol and comprises the steps of:*
>
> *transmitting a data packet discard notification message from the transmitter to the receiver indicating data packets the transmitter has discarded;*
>
> *receiving the data packet discard notification message;*
>
> *computing which data packets have been discarded by the transmitter based on the data packet discard notification message*
>
> *removing entries from a first list indicating data packets expected to be received from the transmitter, wherein the entries correspond to data packets identified in the computing step.*

428. Dr. Gibson contends that the discard message is a data packet discard notification message from the transmitter to the receiver indicating data packets the transmitter has discarded; the receiver receives the discard message and computes which data packets have been discarded by the transmitter based on the discard message; and the receiver remove entries from a list indicating data packets expected to be received from the transmitter, wherein the entries correspond to data packets identified in the computing step. Dr. Heegard fails to identify a list in this reference, but instead notes that "it would have been obvious to one of skill in the art to keep track of the expected packets using a list data structure." I disagree. Dr. Gibson also fails to specifically identify list, vaguely suggesting that because the reference describes resynchronization of the receiver and the receiver will request retransmission of cells, there must be a list.

429. Toolkit -2 fails to teach a discard notification message from the transmitter to the receiver indicating *data packets* the transmitter has discarded. The discard message notifies the receiver of a *single* packet that has been discarded, but provides no information about outstanding packets other than that identified in the discard message. Toolkit -2 states that "[t]he receiver is informed about *the* discarded cell by sending a special discard" message. (Emphasis added). Toolkit -2 does not state that the receiver would similarly stop waiting for other outstanding packets below the packet identified in the discard message. Therefore, Toolkit-2 fails to teach a discard notification message from the transmitter to the receiver indicating *data packets* the transmitter has discarded.

430. Dr. Gibson fails to specifically identify list, vaguely suggesting that because the reference describes resynchronization of the receiver and the receiver will request retransmission of cells, there must be a list. However, resynchronization and requesting retransmission of cells do not definitively show that the receiver uses a list.

431. Even if Dr. Gibson could show a list, the Tooklit does not disclose "removing entries from a first list indicating data packets expected to be received from the transmitter." Although the Tooklit generally mentions that the discard message moves the window, it does not specifically disclose how this mechanism should be implemented. Thus, the Tooklit fails to teach a receiver which removes entries from a first list indicating data packets expected to be received from the transmitter, wherein the entries correspond to data packets identified in the computing step.

432. Furthermore, The Toolkit will result in unacceptable delays. The Toolkit describes a system in which the transmitter only sends a discard message after it receives a retransmission request. If the retransmission request is lost, the transmitter cannot send the

discard message or move its transmission window forward. While the transmitter waits, packets will begin to queue in the transmit buffer. The receiver will not send another retransmission request until it receives another packet from the transmitter, but the ensuing packets and retransmission requests may also be lost, resulting in a significant delay before the transmitter can finally send a discard message. As time passes, the packets backlogged in the transmitter will begin to expire as well. This unnecessary loss of a substantial amount of data is an unacceptable consequence of The Toolkit's reliance on receiving a retransmission request.

433. Toolkit-1 also fails to enable one skilled in the art to implement a discard notification scheme which anticipates the '435 patent because it can result in deadlock due to incorrectly sorted cells. The Hettich-1 receiver cannot distinguish between discarded packets and packets received incorrectly outside of the reception window, the same problem acknowledged by Vornefeld in his diploma paper. Vornefeld explained how this shortcoming could result in a failure in Figure 5.4 of his paper, reproduced below as Figure 5.4, which Vornefeld labeled "Incorrect exchange of ATM-cells in phases with a high frame error ratio."

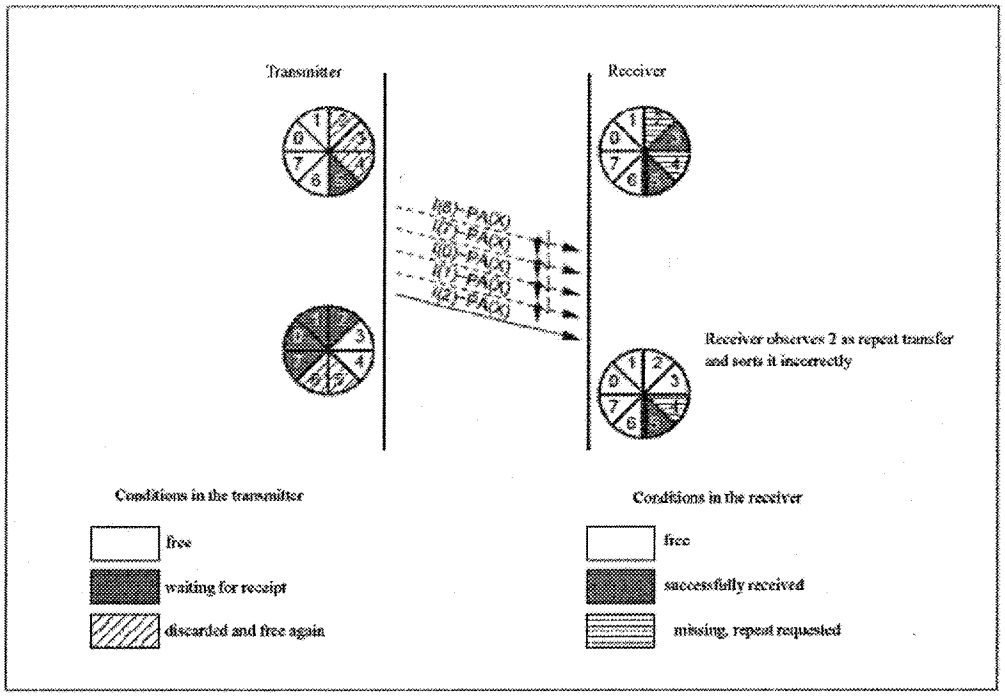


Figure 5.4: Incorrect exchange of ATM-cells in phases with a high frame error ratio

Figure 4: System Failure Using Hettich-1

DEFS00007572. In Vornefeld's example, packets 2 through 5 are sent to the transmitter, and packets 2 and 4 are lost in transmission. The transmitter then attempts to transmit packets 6, 7, 0, 1, and 2 in order, but packets 6, 7, 0, and 1 are lost in transmission. When the receiver receives packet 2, it observes packet 2 as a retransmission "and sorts it incorrectly," resulting in system gridlock.

(3) Claim 2 of the '435 Patent

> *2. The method of claim 1, wherein the data packet discard notification message contains a field indicating a format of the message.*

434. Because The Toolkit fails to anticipate claim 1 of the '435 patent, it also fails to anticipate this claim.

435. Dr. Heegard fails to identify a field indicating a format of the discard notification message, but instead notes that "it would have been obvious to one of skill in the art to include a field in the discard message as one way to indicate a format of the message." It is my opinion that it would not have been obvious to one skilled in the art to include a field in the data packet discard notification message to indicate the format of the message.

436. Dr. Gibson fails to identify a specific field of the discard message indicating the format of the discard notification message. Rather, Dr. Gibson vaguely states that The Toolkit "describes that messages have different structures and may have header fields." Certainly this is not an identification of format field indicating the format of the discard notification message. Gibson, p. xx-131-133. Indeed, Dr. Gibson provides no analysis indicating why he believes the excerpts he cited show a field indicating the format of the discard message. Further, The Toolkit makes no reference to a format field within the discard message.

i) U.S. 6,621,799 (Kemp, et al.) ("Kemp Patent")

437. Both Dr. Heegard and Dr. Gibson contend that patent US 6,621,799 ("Kemp Patent") anticipates the '435 patent. I disagree with this conclusion. This reference fails to disclose removing entries from a first list indicating data packets expected to be received from the transmitter, wherein the entries correspond to data packets identified in the computing step. This reference also fails to enable one skilled in the art to implement a discard notification scheme which anticipates the '435 patent.

(1) Background

438. The Kemp Patent discloses a method whereby a transmitter sends a receiver a data packet. If the receiver receives a packet out of sequence, then it will send a selective acknowledgment back to the transmitter indicating that it is missing a packet. In response to the selective acknowledgment, the transmitter will retransmit the packet. This process repeats itself

until the packet exceeds the maximum number of retries. When the transmitter receives a selective acknowledgment for a packet which has exceeded the maximum number of retries, it will send a "done" message indicating the packet has been discarded.

(2) Claim 1 of the '435 Patent

> *1. A method for discarding packets in a system having a transmitter and a receiver, wherein the method is complementary to the Selective Repeat Automatic Repeat Request protocol and comprises the steps of:*
>
> *transmitting a data packet discard notification message from the transmitter to the receiver indicating data packets the transmitter has discarded;*
>
> *receiving the data packet discard notification message;*
>
> *computing which data packets have been discarded by the transmitter based on the data packet discard notification message*
>
> *removing entries from a first list indicating data packets expected to be received from the transmitter, wherein the entries correspond to data packets identified in the computing step.*

439. Dr. Gibson and Dr. Heegard contend that the "Done" message is a data packet discard notification message from the transmitter to the receiver indicating data packets the transmitter has discarded; the receiver receives the "Done" message and computes which data packets have been discarded by the transmitter based on the "Done" message; and the receiver remove entries from a list indicating data packets expected to be received from the transmitter, wherein the entries correspond to data packets identified in the computing step. Dr. Gibson identifies the "receive buffer" as the list indicating data packets expected to be received from the transmitter. Dr. Heegard identifies the "read queue" as the list indicating data packets expected to be received from the transmitter. The "receive buffer" Dr. Gibson referred to appears to be the same structure as the "read queue" Dr. Heegard identified.

440. Dr. Gibson and Dr. Heegard identified the "receiver buffer" described in Kemp's Patent as a list of expected packets. However, receiver buffers used in SR-ARQ protocols at the time did not comprise a list of expected packets. Rather, receive buffers stored packets they received and held those packets until the reception window moved forward. When the reception window moved forward, the packets in the receiver buffer with sequence numbers lower than the starting sequence number of the reception window were sent up to the next layer. Kemp's Patent gives no indication that his receiver buffer maintained an explicit list of packets expected to be received.

441. Even if the receiver buffer could be considered a list, Kemp's Patent does not disclose "removing entries from a first list indicating data packets expected to be received from the transmitter." Although Kemp's Patent generally mentions that the discard message moves the window, it does not specifically disclose how this mechanism should be implemented. Thus, Kemp's Patent fails to teach a receiver which removes entries from a first list indicating data packets expected to be received from the transmitter, wherein the entries correspond to data packets identified in the computing step.

442. Furthermore, Kemp's Patent will result in unacceptable delays. Kemp's Patent describes a system in which the transmitter only sends a discard message after it receives a retransmission request. If the retransmission request is lost, the transmitter cannot send the discard message or move its transmission window forward. While the transmitter waits, packets will begin to queue in the transmit buffer. The receiver will not send another retransmission request until it receives another packet from the transmitter, but the ensuing packets and retransmission requests may also be lost, resulting in a significant delay before the transmitter can finally send a discard message. As time passes, the packets backlogged in the transmitter

will begin to expire as well. This unnecessary loss of a substantial amount of data is an unacceptable consequence of Kemp's Patent's reliance on receiving a retransmission request.

(3) Claim 2 of the '435 Patent

2. The method of claim 1, wherein the data packet discard notification message contains a field indicating a format of the message.

443. Because the Kemp Patent fails to anticipate claim 1 of the '435 patent, it also fails to anticipate this claim.

444. Dr. Gibson fails to identify a specific field of the done message indicating the message format. Rather, Dr. Gibson vaguely references "various message formats, including packets with header fields" as the field indicating the format of the discard notification message. Gibson, p. xx-164. The excerpts Gibson referenced bear little if any relation to this statement and he provides no analysis indicating why he believes these excerpts show a field indicating the format of the done message.

445. Dr. Heegard also fails to identify a specific field of the done message indicating the message format. Dr. Heegard identifies a "field in the header of a subsequent packet" as the field indicating the format of the discard notification message. P.56. Dr. Heegard cites a passage in Kemp's patent that states: "[s]ending the indication that the first data packet will not be further retransmitted can include transmitting a second data packet from the source to the destination which includes the indication that the first data packet will not be further retransmitter, for instance, in the header of the second data packet." This excerpt explains that a subsequent packet may indicate, in its header, that the previous packet will not be retransmitter. The excerpt gives no indication that the information sent in the header of the second packet represents the format of the first or second message. Further, Kemp's patent makes no reference to a format field within the done message.

j) JP H10-126772 ("Suzuki")

446. Both Dr. Heegard and Dr. Gibson contend that Japanese Patent Application ("JP H10-126772) dated May 15, 1998 ("Suzuki") anticipates the '435 patent. I disagree with this conclusion. This reference fails to disclose removing entries from a first list indicating data packets expected to be received from the transmitter, wherein the entries correspond to data packets identified in the computing step. This reference also fails to enable one skilled in the art to implement a discard notification scheme which anticipates the '435 patent.

(1) Background

447. Suzuki discloses a method for dynamic picture image data transfer, wherein dynamic picture image data is made up of a plurality of image frames. The sender converts the images to packets and sends them sequentially to the receiver. If the receiver sends a retransmission request for a packet which has been discarded, the sender will send a "dump notice" indicating to the receiver that the packet has been discarded. Upon reception of the dump notice, the receiver treates the packet has having been received and terminates the resend request.

(2) Claim 1 of the '435 Patent

> *1. A method for discarding packets in a system having a transmitter and a receiver, wherein the method is complementary to the Selective Repeat Automatic Repeat Request protocol and comprises the steps of:*
>
> *transmitting a data packet discard notification message from the transmitter to the receiver indicating data packets the transmitter has discarded;*
>
> *receiving the data packet discard notification message;*
>
> *computing which data packets have been discarded by the transmitter based on the data packet discard notification message*

removing entries from a first list indicating data packets expected to be received from the transmitter, wherein the entries correspond to data packets identified in the computing step.

448. Dr. Gibson and Dr. Heegard contend that the dump message is a data packet discard notification message from the transmitter to the receiver indicating data packets the transmitter has discarded; the receiver receives the dump message and computes which data packets have been discarded by the transmitter based on the dump message; and the receiver remove entries from a list indicating data packets expected to be received from the transmitter, wherein the entries correspond to data packets identified in the computing step. Dr. Gibson identifies the "sequence number list and receiver buffer" as lists indicating data packets expected to be received from the transmitter. Dr. Heegard identifies the "packet list" as the list indicating data packets expected to be received from the transmitter. The "sequence number list" Dr. Gibson referred to appears to be the same structure as the "packet list" Dr. Heegard identified.

449. Suzuki fails to teach a transmitter transmitting a data packet discard notification message from the transmitter to the receiver indicating data *packets* the transmitter has discarded. The dump message notifies the receiver of a *single* packet that has been discarded, but provides no information about outstanding packets other than that identified in the dump message. Suzuki states that when the transmitter "is not holding a packet for which a resent request has been given from the receiving side, [it] issues a dump notice indicating to the receiving side that the packet has already been dumped, and the receiving side treats *the* packet as having been received. . . ." DEFS00006019 (emphasis added). Suzuki does not state that the receiver would similarly stop waiting for other outstanding packets below the packet identified in the dump message. Therefore, Suzuki fails to teach a transmitter transmitting a data packet discard notification message from the transmitter to the receiver indicating data *packets* the transmitter has discarded.

450. Dr. Gibson identifies the "receiver buffer" described in Suzuki as a list of expected packets. However, receiver buffers used in SR-ARQ protocols at the time did not comprise a list of expected packets. Rather, receive buffers stored packets they received and held those packets until the reception window moved forward. When the reception window moved forward, the packets in the receiver buffer with sequence numbers lower than the starting sequence number of the reception window were sent up to the next layer. Suzuki gives no indication that his receiver buffer maintained an explicit list of packets expected to be received.

451. Dr. Heegard and Dr. Gibson also identify the "packet list" described in Suzuki as the "list indicating data packets expected to be received from the transmitter." To the contrary, Suzuki explicitly states that the packet list "indicates the sequence numbers of packets *received without errors*." Suzuki Patent para. 45. The receiver does not expect to receive packets from the transmitter that it has already received without errors, thus a list of packets correctly received is not a list indicating data packets expected to be received from the transmitter.

452. Even if the receiver buffer or packet list could be considered a list of expected packets, Suzuki does not disclose "removing entries from a first list indicating data packets expected to be received from the transmitter." Although Suzuki generally mentions that the discard message moves the window, it does not specifically disclose how this mechanism should be implemented. Thus, Suzuki fails to teach a receiver which removes entries from a first list indicating data packets expected to be received from the transmitter, wherein the entries correspond to data packets identified in the computing step.

453. Furthermore, Suzuki will result in unacceptable delays. Suzuki describes a system in which the transmitter only sends a discard message after it receives a retransmission request. If the retransmission request is lost, the transmitter cannot send the discard message or

move its transmission window forward. While the transmitter waits, packets will begin to queue in the transmit buffer. The receiver will not send another retransmission request until it receives another packet from the transmitter, but the ensuing packets and retransmission requests may also be lost, resulting in a significant delay before the transmitter can finally send a discard message. As time passes, the packets backlogged in the transmitter will begin to expire as well. This unnecessary loss of a substantial amount of data is an unacceptable consequence of Suzuki's reliance on receiving a retransmission request.

(3) Claim 2 of the '435 Patent

> *2. The method of claim 1, wherein the data packet discard notification message contains a field indicating a format of the message.*

454. Because Suzuki fails to anticipate claim 1 of the '435 patent, it also fails to anticipate this claim.

455. Dr. Gibson and Dr. Heegard fail to identify a specific field of the dump message indicating the message format. Rather, they state that there are "different types of messages, including data and control packets," apparently arguing that as a result, there must be a field indicating the format of the dump message. Gibson, p. xx-187. Dr. Gibson provides no supporting analysis whatsoever explaining this statement.

k) DE 19543280 (Walke, et al.) ("Walke's ComNets Patent")

456. Both Dr. Heegard and Dr. Gibson contend that the German patent DE 18543280 ("Walke's ComNets Patent") anticipates the '435 patent. I disagree with this conclusion. This reference fails to disclose removing entries from a first list indicating data packets expected to be received from the transmitter, wherein the entries correspond to data packets identified in the computing step. This reference also fails to enable one skilled in the art to implement a discard notification scheme which anticipates the '435 patent.

(1) Background

457. Walke's ComNets Patent discloses a discard message labeled a "Delay PDU" used in a standard SR-ARQ protocol which notifies a receiver that the transmitter has discarded a packet. The Delay PDU is used to inform receivers that cells have been discarded and is only sent after the receiver sends a retransmission request.

(2) Claim 1 of the '435 Patent

> *1. A method for discarding packets in a system having a transmitter and a receiver, wherein the method is complementary to the Selective Repeat Automatic Repeat Request protocol and comprises the steps of:*
>
> *transmitting a data packet discard notification message from the transmitter to the receiver indicating data packets the transmitter has discarded;*
>
> *receiving the data packet discard notification message;*
>
> *computing which data packets have been discarded by the transmitter based on the data packet discard notification message*
>
> *removing entries from a first list indicating data packets expected to be received from the transmitter, wherein the entries correspond to data packets identified in the computing step.*

458. Dr. Gibson and Dr. Heegard contend that the Delay PDU is a data packet discard notification message from the transmitter to the receiver indicating data packets the transmitter has discarded; the receiver receives the Delay PDU and computes which data packets have been discarded by the transmitter based on the Delay PDU; and the receiver remove entries from a list indicating data packets expected to be received from the transmitter, wherein the entries correspond to data packets identified in the computing step. Dr. Heegard fails to identify a list, stating only that "it would have been obvious to one of skill in the art to keep track of the expected packets using a list data structure." I disagree. Dr. Gibson also fails to identify a list

indicating packets expected to be received, rather stating only that the reference explains that the receiver is responsible for maintaining the sequence of received cells.

459. Walke's ComNets Patent fails to teach a transmitter transmitting a data packet discard notification message from the transmitter to the receiver indicating data *packets* the transmitter has discarded. The Delay PDU notifies the receiver of a *single* packet that has been discarded, but provides no information about outstanding packets other than that identified in the Delay PDU. In Walke' ComNets Patent, he gives an example in which a single packet, packet 1, is discarded by the transmitter and never successfully received by the receiver. The transmitter "sends an N frame with sequence number 4 which piggybacks the delays (1) command. This tells the receiver not to wait for anything else *on frame 1* and it is able to widen it's receive window." Walke's ComNets Patent, col. 13. Walke does not state that the receiver would similarly stop waiting for other outstanding packets below packet 1. Therefore, Walke's ComNets Patent fails to teach a transmitter transmitting a data packet discard notification message from the transmitter to the receiver indicating data *packets* the transmitter has discarded.

460. Walke's ComNets Patent also fails to teach a list indicating packets expected to be received. Dr. Gibson stated only that the reference explains that the receiver is responsible for maintaining the sequence of received cells. The receiver need not maintain a list of expected packets in order to maintain the sequence of received cells.

461. Even if Dr. Gibson could show a list, Walke's ComNets Patent does not disclose "removing entries from a first list indicating data packets expected to be received from the transmitter." Although Walke's ComNets Patent generally mentions that the discard message moves the window, it does not specifically disclose how this mechanism should be implemented. Thus, Walke's ComNets Patent fails to teach a receiver which removes entries from a first list

indicating data packets expected to be received from the transmitter, wherein the entries correspond to data packets identified in the computing step.

462. Furthermore, Walke's ComNets Patent will result in unacceptable delays. Walke's ComNets Patent describes a system in which the transmitter only sends a discard message after it receives a retransmission request. If the retransmission request is lost, the transmitter cannot send the discard message or move its transmission window forward. While the transmitter waits, packets will begin to queue in the transmit buffer. The receiver will not send another retransmission request until it receives another packet from the transmitter, but the ensuing packets and retransmission requests may also be lost, resulting in a significant delay before the transmitter can finally send a discard message. As time passes, the packets backlogged in the transmitter will begin to expire as well. This unnecessary loss of a substantial amount of data is an unacceptable consequence of Walke's ComNets Patent's reliance on receiving a retransmission request.

(3) Claim 2 of the '435 Patent

> *2. The method of claim 1, wherein the data packet discard notification message contains a field indicating a format of the message.*

463. Because Walke's ComNets Patent fails to anticipate claim 2 of the '435 patent, it also fails to anticipate this claim.

l) U.S. 6,424,625 (Larsson, et al.) ("Ericsson's '625 patent")

464. Both Dr. Heegard and Dr. Gibson contend that the U.S. 6,424,625 patent ("Ericsson's '625 patent") anticipates the '435 patent. I disagree with this conclusion. This reference does not disclose removing entries from a first list indicating data packets expected to be received from the transmitter, wherein the entries correspond to data packets identified in the computing step.

(1) Background

465. Ericsson's '625 patent discloses a method whereby a transmitter can command a receiver to receive a packet which is not consecutive with a previously received packet, and command the receiver to release expectation of all packets below that non-consecutive packet.

(2) Claim 1 of the '435 Patent

> *1. A method for discarding packets in a system having a transmitter and a receiver, wherein the method is complementary to the Selective Repeat Automatic Repeat Request protocol and comprises the steps of:*
>
> *transmitting a data packet discard notification message from the transmitter to the receiver indicating data packets the transmitter has discarded;*
>
> *receiving the data packet discard notification message;*
>
> *computing which data packets have been discarded by the transmitter based on the data packet discard notification message*
>
> *removing entries from a first list indicating data packets expected to be received from the transmitter, wherein the entries correspond to data packets identified in the computing step.*

466. Dr. Gibson and Dr. Heegard contend that the command is a data packet discard notification message from the transmitter to the receiver indicating data packets the transmitter has discarded; the receiver receives the command and computes which data packets have been discarded by the transmitter based on the command; and the receiver remove entries from a list indicating data packets expected to be received from the transmitter, wherein the entries correspond to data packets identified in the computing step. Dr. Heegard fails to identify a list, stating only that "it would have been obvious to one of skill in the art to keep track of the expected packets using a list data structure." I disagree. Dr. Gibson identified the receiver buffer as a list of packets expected to be received.

467. Dr. Gibson identifies the "receiver buffer" described in Ericsson's '625 patent as a list of expected packets. However, receiver buffers used in SR-ARQ protocols at the time did not comprise a list of expected packets. Rather, receive buffers stored packets they received and held those packets until the reception window moved forward. When the reception window moved forward, the packets in the receiver buffer with sequence numbers lower than the starting sequence number of the reception window were sent up to the next layer. Ericsson's '625 patent gives no indication that his receiver buffer maintained an explicit list of packets expected to be received.

468. Even if the receiver buffer could be considered a list, Ericsson's '625 patent does not disclose "removing entries from a first list indicating data packets expected to be received from the transmitter." Ericsson's '625 patent specifically describes how to move the reception window forward, but makes no mention of a list. Thus, Ericsson's '625 patent does not teach a receiver which removes entries from a first list indicating data packets expected to be received from the transmitter, wherein the entries correspond to data packets identified in the computing step.

(3) Claim 2 of the '435 Patent

> *2. The method of claim 1, wherein the data packet discard notification message contains a field indicating a format of the message.*

469. Because Ericsson's '625 patent fails to anticipate claim 1 of the '435 patent, it also fails to anticipate this claim.

m) IEEE Std. 802.11 1997 Standard ("802.11 1997 Standard")

470. Dr. Gibson contends that the IEEE Std. 802.11 1997 Standard ("802.11 1997 Standard") anticipates the '435 patent. I disagree with this conclusion. This reference does not

disclose removing entries from a first list indicating data packets expected to be received from the transmitter, wherein the entries correspond to data packets identified in the computing step.

(1) Background

471. 802.11 1997 Standard discloses a transmitter that fragments service data units ("SDUs") into at least one protocol data ("PDU") unit and transmits the PDUs to a receiver. Each PDU includes a field indicating whether the PDU is the last fragment of the SDU to be sent to the receiver.

(2) Claim 1 of the '435 Patent

> *1. A method for discarding packets in a system having a transmitter and a receiver, wherein the method is complementary to the Selective Repeat Automatic Repeat Request protocol and comprises the steps of:*
>
> *transmitting a data packet discard notification message from the transmitter to the receiver indicating data packets the transmitter has discarded;*
>
> *receiving the data packet discard notification message;*
>
> *computing which data packets have been discarded by the transmitter based on the data packet discard notification message*
>
> *removing entries from a first list indicating data packets expected to be received from the transmitter, wherein the entries correspond to data packets identified in the computing step.*

472. Dr. Gibson contends that sending a PDU with a control field indicating no other fragments of an ADU will be received is a data packet discard notification message from the transmitter to the receiver indicating data packets the transmitter has discarded; the receiver receives the PDU and computes which data packets have been discarded by the transmitter based on the control message; and the receiver remove entries from a list indicating data packets expected to be received from the transmitter, wherein the entries correspond to data packets

identified in the computing step. Dr. Gibson identified the defragmentation process as evidence that there is a list of packets expected to be received.

473. The 802.11 1997 Standard does not teach a list indicating packets expected to be received. Dr. Gibson identified the defragmentation process as evidence that the 802.11 1997 standard includes a list of expected packets. The receiver need not maintain a list of expected packets in order to perform defragmentation. The receiver need only keep track of the sequence numbers of received packets and note when it receives a packet indicating it is the last fragment has been sent. The receiver need not track packets "expected to be received."

(3) Claim 2 of the '435 Patent

> *2. The method of claim 1, wherein the data packet discard notification message contains a field indicating a format of the message.*

474. Because 802.11 1997 Standard fails to anticipate claim 1 of the '435 patent, it also fails to anticipate this claim.

n) U.S. 6,683,850 (Dunning, et al.) ("Intel '850 Patent")

475. Dr. Gibson contends that the patent US 6,683,850 anticipates the '435 patent. I disagree with this conclusion. This reference does not disclose removing entries from a first list indicating data packets expected to be received from the transmitter, wherein the entries correspond to data packets identified in the computing step.

(1) Background

476. The Intel '850 Patent teaches that when a receiver fails to respond to a message after several retries, the "undeliverable packet is sent back to the source" and "the device shuts down the link, preventing it from carrying any further traffic." Intel '850 patent col. 9:1-10. At this point, the transport layer "is appraised of the problem [and] sends one last packet, flushing the failing path."

(2) Claim 1 of the '435 Patent

1. A method for discarding packets in a system having a transmitter and a receiver, wherein the method is complementary to the Selective Repeat Automatic Repeat Request protocol and comprises the steps of:

transmitting a data packet discard notification message from the transmitter to the receiver indicating data packets the transmitter has discarded;

receiving the data packet discard notification message;

computing which data packets have been discarded by the transmitter based on the data packet discard notification message

removing entries from a first list indicating data packets expected to be received from the transmitter, wherein the entries correspond to data packets identified in the computing step.

477. Dr. Gibson's analysis of the Intel '850 patent is unclear. He apparently contends that the "last packet" sent from a transmitter to a receiver to "flush[] the failing path" is a discard notification message; that the receiver receives this last packet and computes which data packets have been discarded by the transmitter based on this last packet, and removes entries from a first list indicating data packets expected to be received.

478. The Intel' '850 patent does not teach a discard notification message, receiving such a message, computing which data packets have been discarded, or removing entries from a list of expected packets. Rather, the '850 patent teaches that when a receiver fails to respond to a message after several retries, the "undeliverable packet is sent back to the source" and "the device shuts down the link, preventing it from carrying any further traffic." Intel '850 patent col. 9:1-10. The transmitter then "sends one last packet, flushing the failing path." The Intel '850 patent does not clarify what is meant by "flush the failing path," but there is no indication that the last packet indicates any packets that the transmitter discarded. The patent does not clearly identify which entity sends the last packet, where the last packet is sent, or what is included in

the last packet. Furthermore, the patent apparently sought to address a situation in which the receiver fails to respond. If so, the receiver would never receive this final packet. The Intel '850 patent therefore does not teach sending or receiving a discard notification message, or computing which packets have been discarded based on the discard notification message.

479. The Intel' '850 patent does not teach a list indicating packets expected to be received. Dr. Gibson identifies the "receiver buffer" described in the Intel' '850 patent as a list of expected packets. However, receiver buffers used in SR-ARQ protocols at the time did not comprise a list of expected packets. Rather, receive buffers stored packets they received and held those packets until the reception window moved forward. When the reception window moved forward, the packets in the receiver buffer with sequence numbers lower than the starting sequence number of the reception window were sent up to the next layer. The Intel' '850 patent gives no indication that his receiver buffer maintained an explicit list of packets expected to be received.

480. Even if the receiver buffer could be considered a list, the Intel' '850 patent does not disclose "removing entries from a first list indicating data packets expected to be received from the transmitter." The Intel' '850 patent provides absolutely no description of how this mechanism should be implemented. Thus, the Intel' '850 patent fails to teach a receiver which removes entries from a first list indicating data packets expected to be received from the transmitter, wherein the entries correspond to data packets identified in the computing step.

(3) Claim 2 of the '435 Patent

> *2. The method of claim **1**, wherein the data packet discard notification message contains a field indicating a format of the message.*

481. Because 802.11 1997 Standard fails to anticipate claim 1 of the '435 patent, it also fails to anticipate this claim.

o) U.S. 6,181,704 (Drottar, et al.) ("Intel '704 Patent")

482. Dr. Gibson contends that the patent US 6,181,704 anticipates the '435 patent. I disagree with this conclusion. This reference does not disclose removing entries from a first list indicating data packets expected to be received from the transmitter, wherein the entries correspond to data packets identified in the computing step.

(1) Background

483. The Intel '704 Patent teaches a method for transmitting data in a network from a source node to an intermediary point to a destination node. A copy of each packet is stored at the source node until it receives an acknowledged that the packet was correctly received. If it receives a negative acknowledgment, the source node will resend the incorrectly received packet and all subsequent packets to the destination node.

(2) Claim 1 of the '435 Patent

> *1. A method for discarding packets in a system having a transmitter and a receiver, wherein the method is complementary to the Selective Repeat Automatic Repeat Request protocol and comprises the steps of:*
>
> *transmitting a data packet discard notification message from the transmitter to the receiver indicating data packets the transmitter has discarded;*
>
> *receiving the data packet discard notification message;*
>
> *computing which data packets have been discarded by the transmitter based on the data packet discard notification message*
>
> *removing entries from a first list indicating data packets expected to be received from the transmitter, wherein the entries correspond to data packets identified in the computing step.*

484. Dr. Gibson's analysis of the Intel '704 patent is unclear. The Intel '704 Patent does not teach discarding incorrectly received packets, and therefore does not teach sending a discard notification from the transmitter to the receiver indicating data packets the transmitter

has discarded, a receiver receiving the discard notification, a receiving computing which packets have been discarded, or a receiver removing entries from a list indicating data packets expected to be received. Indeed, the only packets arguably discarded in the Intel '704 Patent are packets which have been correctly received by the receiver and for which the transmitter has received acknowledgments. The Intel '704 Patent does not contemplate a transmitter discarding packets which were not correctly received and notifying the receiver of the packet(s)' discardance.

(3) Claim 2 of the '435 Patent

> *2. The method of claim 1, wherein the data packet discard notification message contains a field indicating a format of the message.*

485. Because 802.11 1997 Standard fails to anticipate claim 1 of the '435 patent, it also fails to anticipate this claim.

3. Response to Alleged Obviousness References

486. As explained above, none of the asserted obviousness references disclose removing entries from a first list indicating data packets expected to be received from the transmitter, wherein the entries correspond to data packets identified in the computing step.. Accordingly, no combination of references can disclose this limitation. Even if one or more references discloses this limitation, it is not obvious to combine elements from different retransmission protocols. A change such as this which fundamentally alters the implementation of the reception window may have unexpected or undesirable effects when combined with other modifications to the standard SR-ARQ protocol.

4. Response to Dr. Gibson's Section 112 Arguments for the '435 patent

487. I disagree that the asserted claims of the '435 patent fail to comply with the provisions of 35 USC § 112. Some of Dr. Gibson's arguments appear to relate to infringement issues. Accordingly, I hereby incorporate my infringement report.

a) "transmitting a data packet discard notification message"

488. Dr. Gibson contends that the limitation "transmitting a data packet discard notification message" is indefinite, lacks written description, and is not enabled. I disagree. Dr. Gibson argues that the patent does not disclose a discard notification message that does not identify each and every packet acknowledged and discarded, or does not allow the receiver to compute which packets were discarded. The '435 specification identifies multiple embodiments which do not specifically identify each and every packet acknowledged and discarded. *See, e.g.*, '435 cols. 2:43-3:44. For example, the patent describes an embodiment utilizing a starting sequence number and a length field indicating how many packets should be discarded. *See, e.g.*, '435 cols. 2:47-53. Regardless, the accused functionality enables the receiver to compute which packets were discarded. The accused IEEE 802.11n devices send explicit and implicit block acknowledgment requests notifying the receiver that all packets below the sequence number identified in the BAR have been discarded. One of ordinary skill in the art would recognize that the specification describes such a discard notification message, would be able to make the invention work without undue experimentation, and would be able to determine what the claims cover.

b) "indicating data packets the transmitter has discarded"

489. Dr. Gibson contends that the limitation "indicating data packets the transmitter has discarded" is indefinite, lacks written description, and is not enabled. I disagree. Dr. Gibson argues that the patent does not disclose a discard notification message that does not identify each and every packet acknowledged and discarded, or does not allow the receiver to compute which packets were discarded. The '435 specification identifies multiple embodiments which do not specifically identify each and every packet acknowledged and discarded. *See, e.g.*, '435 cols. 2:43-3:44. For example, the patent describes an embodiment utilizing a starting sequence

number and a length field indicating how many packets should be discarded. *See, e.g.*, '435 cols. 2:47-53. Regardless, the accused functionality enables the receiver to compute which packets were discarded. The accused IEEE 802.11n devices send explicit and implicit block acknowledgment requests notifying the receiver that all packets below the sequence number identified in the BAR have been discarded. One of ordinary skill in the art would recognize that the specification describes such a discard notification message indicating data packets the transmitter has discarded, would be able to make the invention work without undue experimentation, and would be able to determine what the claims cover.

c) "computing which data packets have been discarded by the transmitter"

490. Dr. Gibson contends that the limitation "computing which data packets have been discarded by the transmitter" is indefinite, lacks written description, and is not enabled. I disagree. Dr. Gibson argues that the patent does not disclose a discard notification message that does not identify each and every packet acknowledged and discarded, or does not allow the receiver to compute which packets were discarded. The '435 specification identifies multiple embodiments which do not specifically identify each and every packet acknowledged and discarded. *See, e.g.*, '435 cols. 2:43-3:44. For example, the patent describes an embodiment utilizing a starting sequence number and a length field indicating how many packets should be discarded. *See, e.g.*, '435 cols. 2:47-53. Regardless, the accused functionality enables the receiver to compute which packets were discarded. The accused IEEE 802.11n devices send explicit and implicit block acknowledgment requests notifying the receiver that all packets below the sequence number identified in the BAR have been discarded. One of ordinary skill in the art would recognize that the specification describes such a discard notification message and a receiver which could compute which data packets have been discarded by the transmitter based

on that message, would be able to make the invention work without undue experimentation, and would be able to determine what the claims cover.

d) "the data packet discard notification message contains a field indicating the format of the message"

491. Dr. Gibson contends that the limitation "the data packet discard notification message contains a field indicating the format of the message" is indefinite, lacks written description, and is not enabled. I disagree. Dr. Gibson argues that the patent does not disclose such a field "that does not indicate the format of the claimed data packet discard notification message." To the contrary, the patent discloses a field that indicates the format of the discard notification message. *See, e.g.*, 2:45-49 ("The CDN message 200 optionally includes a CDN message identification field CDNM ID, which can indicate that the message is a CDN message, and which can indicate the type of format of the CDN message 200."). Furthermore, the accused IEEE 802.11n devices indicate the format of the explicit and implicit block acknowledgment requests, the discard notification messages. One of ordinary skill in the art would recognize that the specification describes such a format field, would be able to make the invention work without undue experimentation, and would be able to determine what the claims cover.

e) "removing entries from a first list indicating data packets expected to be received from the transmitter"

492. Dr. Gibson contends that the limitation "removing entries from a first list indicating data packets expected to be received from the transmitter" is indefinite, lacks written description, and is not enabled. I disagree. Dr. Gibson argues that the patent does not disclose a discard notification message that does not identify each and every packet acknowledged and discarded, or does not allow the receiver to compute which packets were discarded. The '435 specification identifies multiple embodiments which do not specifically identify each and every packet acknowledged and discarded. *See, e.g.*, '435 cols. 2:43-3:44. For example, the patent

describes an embodiment utilizing a starting sequence number and a length field indicating how many packets should be discarded. *See, e.g.*, '435 cols. 2:47-53. Furthermore, the specification explains that the receiver should alter the list of packets it expects to receive based on the computation of discarded packets. *See, e.g.*, '435 cols. 2:30-34; 4:1-8. Regardless, the accused functionality enables the receiver to compute which packets were discarded and remove entries from a list indicating data packets expected to be received from the transmitter. The accused IEEE 802.11n devices send explicit and implicit block acknowledgment requests notifying the receiver that all packets below the sequence number identified in the BAR have been discarded, and upon reception, the receiver removes the entries associated with those discarded packets from the list of packets expected to be received. One of ordinary skill in the art would recognize that the specification describes how to remove entries from a first list indicating data packets expected to be received from the transmitter based on the information provided in such a discard notification message, would be able to make the invention work without undue experimentation, and would be able to determine what the claims cover.

D. U.S. PATENT NO. 6,519,223

493. Dr. Gibson and Dr. Heegard allege that the asserted claims of the '223 patent are anticipated by prior art. I disagree. None of the references cited by Dr. Gibson or Dr. Heegard teaches or discloses all the limitations of the asserted claims.

494. Dr. Gibson and Dr. Heegard also allege that these references render the asserted claims of the '223 patent obvious either alone or in combination with one or more other references. I disagree. None of the prior art references taught or disclosed all limitations of the asserted claims. Dr. Gibson and Dr. Heegard further did not identify how a specific combination of references would render the asserted claims obvious, and without doing so they cannot meet the requisite clear and convincing evidentiary standard. As discussed below, none of the

references identified by Dr. Gibson and Dr. Heegard teaches each limitation of the asserted claims of the '223 patent. Nor does any identified combination of reference render such claims obvious.

495. The application that issued as U.S. Patent No. 6,519,223 entitled "System and Method for Implementing a Semi Reliable Retransmission Protocol" was filed on April 6, 1999. The '223 patent issued on February 11, 2003.

1. Claim Construction

496. The parties have agreed on a construction for the following term:

Patent/Claim	Claim Term	Agreed Construction
'223 patent	means for transmitting a 'move receiving window' request when said discard timer expires and said acknowledgement message for each said at least one protocol data unit has not been received	The claim term is a means-plus-function limitation under 35 U.S.C. § 112, ¶ 6. **Recited Function:** transmitting a 'move receiving window' request when said discard timer expires and said acknowledgement message for each said at least one protocol data unit has not been received **Corresponding Structure:** the transmitter, as described in 3:65-67 and illustrated in Fig. 2 and equivalents thereof

I have applied this construction in my analysis.

2. Response to Alleged Anticipation References

497. Asserted claims 1, 11, and 19 all require the use of a retransmission timer which is initialized when an SDU is passed to the data link layer. By starting the timer at this moment, a transmitter is able to account for processing delays at the MAC and physical layers as well as delays inherent in transmitting packets wirelessly. In contrast, if the timer were started at the moment of packet transmission, the transmitter could have an inaccurate picture of packet delay because the timer would not account for processing delays occurring at the MAC and physical layer.

498. In addition, dependent claims 14 and 21 both require that the transmitter send a move receiving window request message when the discard timer expires. This process ensures that the receiver stays synchronized with the transmitter when the transmitter discards stale packets.

499. None of the asserted prior art references disclose either of these limitations.

a) Bakker, et al., An Air Interface for High Bandwidth Cellular Digital Communications on Microwave Frequencies, Vehicular Technology Conference ("Bakker")

500. Bakker describes a research project for a high bandwidth wireless system. The Link portion of the Bakker system is illustrated below:

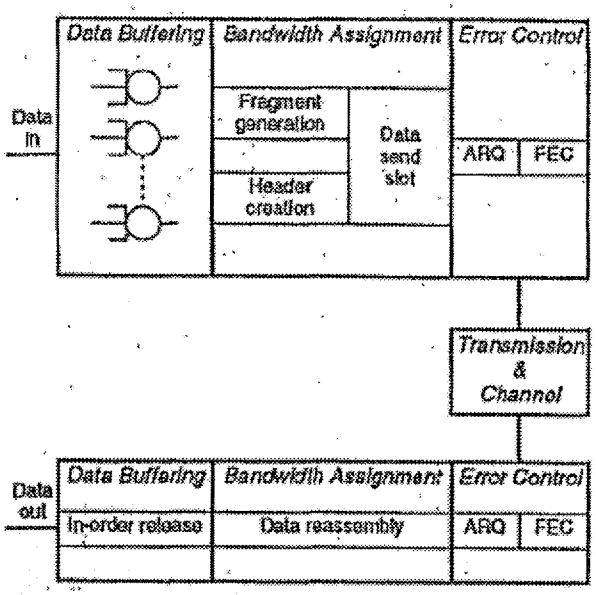


Figure 2 - Components of Link

501. The Link receives data from the higher layers and prepares it for release on the radio channel. Data enters the Link as datagrams. As each datagram is received, the Link analyzes the datagram to determine which traffic class it belongs to. This traffic class allows the Link to prioritize certain types of traffic. Datagrams are stored in buffers prior to being sent over the radio channel. When a datagram enters its buffer, a time stamp is entered. If a datagram remains in the buffer after the expiration of a class specific deadline, the datagram is deleted.

> QoS is determined by a number of parameters per service class. These parameters are priority, maximum number of retries and expiration time. Every QoS class has its own buffer, the depth of which is determined by the product of the allocated bandwidth and the expiration time for the class. Datagrams get a timestamp when they arrive in their buffer; if they remain in the buffer longer than the expiration time, they are deleted. Note that the expiration times also have impact on datagrams that are being retried. If a datagram expires while it is still being corrected by the ARQ algorithm, the sender will signal the receiver that it will stop retrying fragments of this datagram. At that point, the receiver will make a best-effort attempt at reconstructing the datagram before sending it on.

> Bandwidth is allocated using the per-class priority according to a simple algorithm. At the beginning of each frame, transmission is started with any ARQ retries of the datagrams of the traffic class with the highest priority, and after that the contents of the datagram buffer of this class. If

Bakker at pg. 136.

(1) Said discard timer being initialized when said service data unit is received by said data link layer

502. Bakker does not disclose initializing a timer when an SDU is received by the data link layer. It is unclear when the timer in Bakker is initialized. To the extent Drs. Gibson and Heegard contend that Bakker uses pre-buffering , this reference discloses receiving a datagram at the link layer, processing the packet for QOS considerations, and then starting a timer after the datagram is placed in a buffer for the QOS class. Under this scenario, the timer is initialized after the datagram enters the data link layer. However, this scenario has the drawback that datagrams must be stored in a QOS buffer, while fragments of datagrams must be stored Accordingly, this reference does not disclose initializing a timer when an SDU is received by the data link layer.

(2) Said service data unit being discarded by said transmitter and said receiver when said acknowledgement message is not transmitted for said at least one protocol data unit and said discard timer expires.

503. Bakker does not disclose a receiver discarding an SDU when an acknowledgement message is not transmitted and the discard timer expires. Instead, Bakker requires the receiver to forward the SDU to the higher layer.

> are deleted. Note that the expiration times also have impact on datagrams that are being retried. If a datagram expires while it is still being corrected by the ARQ algorithm, the sender will signal the receiver that it will stop retrying fragments of this datagram. At that point, the receiver will make a best-effort attempt at reconstructing the datagram before sending it on.

Bakker at pg. 136.

(3) Means for transmitting a "move receiving window" request

504. According to Dr. Gibson, the transmitter in Bakker sends a move receiving window request by sending a message that the transmitter will stop retrying fragments of a datagram:

> are deleted. Note that the expiration times also have impact on datagrams that are being retried. If a datagram expires while it is still being corrected by the ARQ algorithm, the sender will signal the receiver that it will stop retrying fragments of this datagram. At that point, the receiver will make a best-effort attempt at reconstructing the datagram before sending it on.

Bakker at pg. 136.

505. However, this short explanation identified by Dr. Gibson does not disclose a move receiving window request. Bakker does not disclose a receiver window, or any mechanism for moving a receiver window. The above citation from Bakker refers to a message sent to the receiver, but it is unclear if the receiver responds by moving its window (if it maintains a window). Even if Bakker did disclose a receiver that maintains a window, the receiver could move that window based on its own timer, or based on other commands or protocols. Accordingly, Bakker does not disclose sending a move receiving window request when a discard timer expires.

b) Dietmar Petras, et al. Candidate Protocol Stack (MAC + LLC) for a Wireless ATM Air Interface ("Petras Comnets Submission")

506. The Petras Comnets submission discloses some research findings to the ETSI BRAN project. The system described in this reference relies on an ARQ protocol for real time services. Each cell is assigned a max cell delay ($T_{d\ max}$). Before sending a cell, a transmitter

must determined the due date of the cell (time of arrival + $T_{d\,max}$). If a cell will not arrive at the receiver prior to the due date, the cell will not be transmitted.

- **Real-time ARQ protocol:** Real-time oriented CBR and VBR services have high demands in meeting the maximum cell delay $\tau_{d\,max}$. A newly developed ARQ protocol is used that automatically discards old cells after having exceeded their due-date.

As a real-time ARQ protocol for CBR and VBR services the newly developed *Selective Repeat with Discarding* (SR/D) ARQ protocol is used. The functionality of the SR/D protocol is based on a conventional selective repeat ARQ protocol. The SR/D protocol is able to adapt the effort for error recovery to the quality of service requirements (given by the maximum delay $\tau_{d\,max}$ at the air interface and maximum cell loss ratio, CLR) for each virtual connection. This adaptability is achieved by the following means:

- The number of retransmissions of an ATM cell is controlled by the current waiting time of the cell inside the transmit buffer or its due-date respectively. The quality of service requirements and the current channel load are taken into account.
- It is permitted to discard ATM cells which have exceeded their due-date.

Petras Comnets Submission at pg. 13.

507. The citations specified by Drs. Heegard and Gibson do not specify how to determine the max cell delay, or how a transmitter calculates the time of arrival of a cell.

(1) Said discard timer being initialized when said service data unit is received by said data link layer

508. The Petras Comnets Submission does not disclose initializing a timer when an SDU is received by the data link layer. Instead, this reference discloses the general goal of transmitting cells before their due dates expire, without specifying how to make the necessary calculations to achieve this goal. For example, this reference does not specify when to initialize a timer, or when to assign a time stamp to a cell, which can be measured against a running clock.

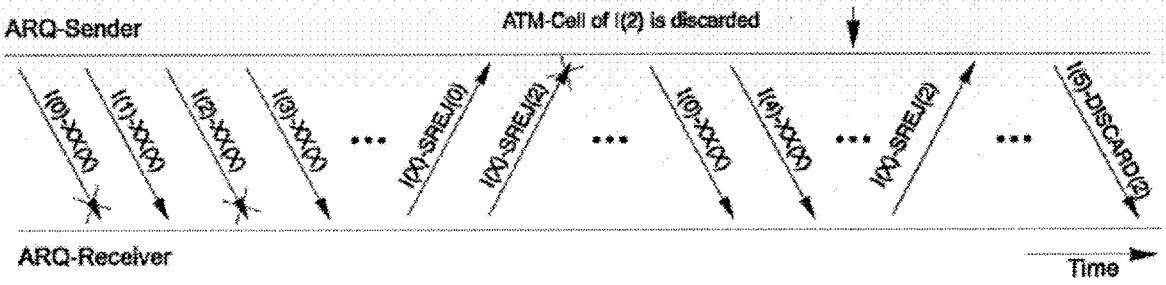
509. The Petras Comnets Submission requires the transmitter to keep track of two different variables: max cell delay and cell arrival time. Max cell delay is an amount of time (e.g., 5 ms), not a moment in time (when the cell is received by the data link layer). The cell arrival time is an estimated moment in time that occurs after the cell leaves the transmitter.

Accordingly, even if the Petras Comnets Submission disclosed the use of a timer for measuring one or both of these variables, it could not disclose initializing the timer when an SDU is received by the data link layer.

510. The functionality described in this reference is more complicated than using the '223 patent because the transmitter must constantly calculate arrival times. In addition, it is unclear how max cell delay is to be determined.

(2) Means for transmitting a "move receiving window" request

511. According to Dr. Gibson, the transmitter in the Petras Comnets submission sends a move receiving window request by sending a discard message:



Petras Comnets submission figure 11.

512. However, the discard message identified by Dr. Gibson is only sent in response to a selective reject message from the receiver. The discard message is not sent when the discard timer expires (if such a timer had been disclosed). As shown in figure 11, the transmitter discards cell 2, but does not send a discard message to the receiver. The transmitter only sends the discard message after the receiver sends a selective reject message for packet 2 (for the second time) to the transmitter. Accordingly, the Petras Comnets submission does not disclose sending a move receiving window request when a discard timer expires.

c) Hettich, Development and Performance Evaluation of a Selective Repeat-Automatic Repeat Request (SR-ARQ) Protocol for Transparent, Mobile ATM Access ("Hettich Comnets Thesis")

513. The Hettich Comnets Thesis describes a selective repeat ARQ protocol. When each cell is sent, a delay timer is started. If the delay timer expires before the transmitter receives an acknowledgement, the cell is deleted.[44]

Three measures are provided to discard cells:

1. Cells from the first transmission are discarded once they have exceeded the maximum delay. These cells are not transferred to the transmission window, i.e. are removed from the transmission window and replaced with newer cells. This is the only case where the receiver does not need to be informed of the discard, before the first transmission.
2. A *Delay Timer* is set in the sender to control the remaining lifecycle of the cells in the transmission window. If the time expires, the cell is discarded. If the cell was already being transmitted, the receiver must be informed that it was discarded. This information is transmitted using a *Delay* PDU (chapter 5.2.4).
3. The remaining lifecycle of cells in the receiver that had to be stored temporarily as the receiver was waiting for frames missing in the sequence are monitored. If the time runs out, the wait process is terminated and any cells that have already been received are forwarded to the upper layer. The remaining lifecycle must be transmitted as well for this measure, which means it involves an increased overhead. This measure is only reasonable in connection with measure 2." Hettich ComNets Thesis p. 34;

514. When a cell is discarded due to an expired delay timer, the transmitter does not automatically notify the receiver. Rather, the transmitter only sends a discard message in response to a request from the receiver: "The Delay PDU is used to inform receivers that cells have been discarded. It is only sent if the receiver requested a discarded cell (using RR or SREJ).[45]

[44] See Generally Hettich Comnets Thesis at pgs. 40-46.

[45] Hettich Comnets Thesis at pg. 34.

(1) Said discard timer being initialized when said service data unit is received by said data link layer

515. The Hettich Comnets Thesis does not disclose initializing a timer when an SDU is received by the data link layer. Instead, this reference discloses initializing a timer when a cell is placed in a specific Send_Data_Object. Because LLC layer processing is necessary before a cell arrives at that location, this reference does not disclose initializing a discard timer when an SDU is received by the data link layer. For example, see below:

> The **ARQ Splitter** is the central object of the upper LLC layer. It assembles and disassembles channels by assembling and disassembling ARQ instances. The **Link Control** also manages the assignment of ARQ instances to virtual channels. The entire inner-layer management communication runs through the **Link Control** and all other objects have access to it. If the **Link Control** receives a connection request from the upper layer, it forwards the request to the **Reallocate Control** to determine whether there is sufficient capacity and if it receives a positive answer, it assembles an ARQ instance with the requested QoS parameters. The new channel is registered with the priority objects. The process is reversed if a connection is released.
>
> The **ARQ Splitter** distributes the ATM cell flow among the individual ARQ instances. When doing so, it evaluates the VC ID and, in the base station, the Mob (mobile station) ID and uses them to request the corresponding ARQ instance from the **Link Control**. If it is available, the data is forwarded to the **ConnectionHandler** of that instance. Data from the **ConnectionHandler** is passed to the higher layer.

Hettich Comnets Thesis at 40.

> When working with data from the **DCH Handler**, the **TCH Mux/Demux** behaves in the same manner as the **ARQ Splitter** and forwards data to the **ConnectionHandler** of the responsible ARQ instance. The current state is then determined by the **Link Control** by activating the corresponding function of the priority objects. To generate a PDU, the ARQ instance that most urgently needs to send use data (**ARQ Send Priority**) is determined and the **ConnectionHandler** of that instance is ordered to generate an Information PDU. Next, the ARQ that most urgently needs to send an acknowledgement (**ARQ Receive Priority**) is determined. If necessary, that instance assembles a Piggyback PDU from the Information PDU and the acknowledgement. The **TCH Mux/Demux** returns the Piggyback PDU to the **DCH Handler**. If a connection request is received, it if forwarded to the **Link Control**, which constructs an ARQ instance. It does not need to ask the **Reallocate Control**, as that released the channel earlier on when the request was received in the partner instance. The connection request is then transferred to the **ConnectionHandler** of the new instance for further processing. The process is reversed when there is a request to release a connection, i.e. the request is processed in the **ConnectionHandler** first, and then the ARQ instance is assembled by the **Link Control** if so requested by the **TCH Mux/Demux**.

Hettich Comnets Thesis at 41.

516. This processing occurs before a packet arrives at Send_Data, which is before a packet arrives at Send_Data_Object were the timer is initialized.

(2) Means for transmitting a "move receiving window" request

517. According to Dr. Gibson, the transmitter in the Petras Comnets submission sends a move receiving window request by sending a Delay PDU:

> "If the receiver receives a Delay PDU, it stops waiting for cells where the following applies for the number: $N \leq RN$. It then shifts the window and issues a corresponding acknowledgement." Hettich ComNets Thesis p. 35;

518. However, the discard message identified by Dr. Gibson is only sent in response to a selective reject message from the receiver.[46] The discard message is not sent when the discard timer expires. Instead, the transmitter transitions to a WAIT or IDLE state without sending a discard message:

5		**DELAY_TIMER expired** *count* > 0	Delete SDU	WAIT
6		**DELAY_TIMER expired** *count* == 0	Delete SDU Start Refresh	IDLE

Hettich Comnets Thesis at pgs. 44-46.

519. If the transmitter is in an IDLE state, it is because the cell was never transmitted and so the receiver will not request retransmission. If the transmitter is in a WAIT state, the transmitter will wait until receiving a reject message from the receiver before sending a Delay PDU. Accordingly, the Hettich Comnets Thesis does not disclose sending a move receiving window request when a discard timer expires.

[46] Hettich Comnets Thesis at pg. 34.

d) Vornefeld, Simulative and Analytical Study of Measures Supporting the Quality of Service in a Radio-Based ATM Network ("Vornefeld Comnets Thesis")

520. The system described in this reference relies on an ARQ protocol for real time services. Each cell is assigned a max cell delay. Before sending a cell, a transmitter must determined the due date of the cell.

Here the date T_{dd} of an ATM cell is defined as the sum of the arrival time of the cell T_a and the maximum allowed delay T_{dmax}: $T_{dd} = T_a + T_{dmax}$ (4.1)
Vornefeld ComNets Thesis p. 21

521. If a cell will not arrive at the receiver prior to the due date, the cell will not be transmitted.

5.3.1 Discarding ATM-cells

By discarding cells that have exceeded their schedules, short-term overload situations can be avoided or dismounted, the waiting times of the following cells can be shortened and their probability of exceeding the schedule can be lowered." p. 40.

522. The citations specified by Drs. Heegard and Gibson do not specify how to determine the max cell delay, or how a transmitter calculates the time of arrival of a cell.

(1) Said discard timer being initialized when said service data unit is received by said data link layer

523. The Vornefeld Comnets Thesis does not disclose initializing a timer when an SDU is received by the data link layer. Instead, this reference discloses the general goal of transmitting cells before their due dates expire, without specifying how to make the necessary calculations to achieve this goal. For example, this reference does not specify when to initialize a timer, or when to assign a time stamp to a cell, which can be measured against a running clock.

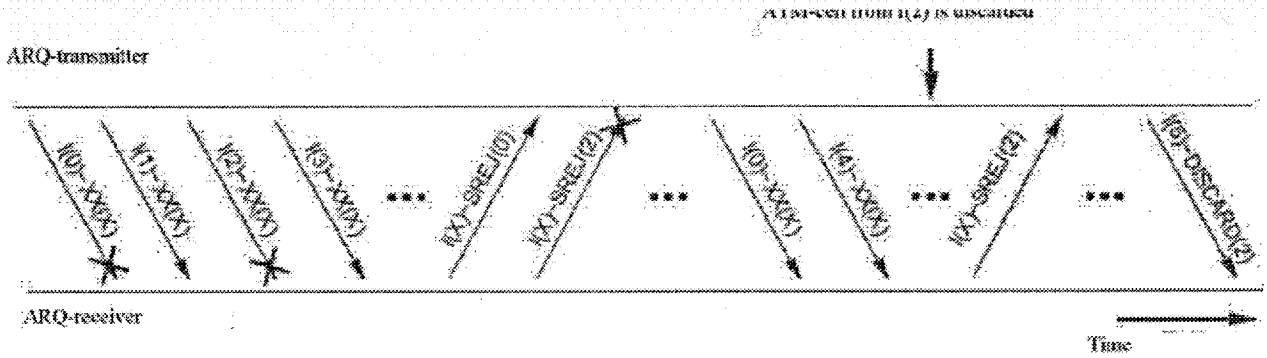
524. The Vornefeld Comnets Thesis requires the transmitter to keep track of two different variables: max cell delay and cell arrival time. Max cell delay is an amount of time (e.g., 5 ms), not a moment in time (when the cell is received by the data link layer). The cell

arrival time is an estimated moment in time that occurs after the cell leaves the transmitter. Accordingly, even if the Vornefeld Comnets Thesis disclosed the use of a timer for measuring one or both of these variables, it could not disclose initializing the timer when an SDU is received by the data link layer.

525. The functionality described in this reference is more complicated than using the '223 patent because the transmitter must constantly calculate arrival times. In addition, it is unclear how max cell delay is to be determined.

(2) Means for transmitting a "move receiving window" request

526. According to Dr. Gibson, the transmitter in the Petras Comnets submission sends a move receiving window request by sending a discard message:



Vornefeld Comnets Thesis Figure 5.2.

527. However, the discard message identified by Dr. Gibson is only sent in response to a selective reject message from the receiver. The discard message is not sent when the discard timer expires (if such a timer had been disclosed). As shown in figure 5.2, the transmitter discards cell 2, but does not send a discard message to the receiver. The transmitter only sends the discard message after the receiver sends a selective reject message for packet 2 (for the second time) to the transmitter. Accordingly, the Vornefeld Comnets Thesis does not disclose sending a move receiving window request when a discard timer expires.

e) Petras and Hettich, Performance Evaluation of the ASR-ARQ Protocol for Wireless ATM ("Petras Comnets 1995 Article")

528. The Petras Comnets 1995 Article discloses aspects of an ASR-ARQ protocol.

(1) Said discard timer being initialized when said service data unit is received by said data link layer

529. The Petras Comnets 1995 Article does not disclose initializing a timer when an SDU is received by the data link layer. Instead, this reference discloses the general goal of transmitting cells before their due dates expire, without specifying how to make the necessary calculations to achieve this goal. For example, this reference does not specify when to initialize a timer, or when to assign a time stamp to a cell, which can be measured against a running clock.

530. The Petras Comnets 1995 Article requires the transmitter to keep track of the max cell delay. Max cell delay is an amount of time (e.g., 5 ms), not a moment in time (when the cell is received by the data link layer). Accordingly, even if the Petras Comnets 1995 Article disclosed the use of a timer for measuring this variable, it could not disclose initializing the timer when an SDU is received by the data link layer. In addition, it is unclear how max cell delay is to be determined.

"The queuing delay of every buffered ATM cell is stored in order to automatically adapt the number of retransmission to the maximum delay, the maximum cell loss rate and the current channel load. ATM cells, which exceed their maximum delay, will be treated in a special way explained in section B." Petras ComNets 1995 Article p. 73;

"*B. Treatment of delayed ATM cells.* The sending station has the possibility to discard cells, which have reached their maximum allowed delay. If discarded cells have not been involved into the transmission progress until the moment of their discardance, the receiver does not have to be informed about the discardance. A different situation occurs if the receiving station has requested the discarded cell for being retransmitted. In this case the sender has to signal that the rejected cell will not be sent again. This is done by the Delay command which is treated as an acknowledgement generated by the sender and delivered to the receiver." Petras ComNets 1995 Article p. 75;

(2) Means for transmitting a "move receiving window" request

531. According to Dr. Gibson, the transmitter in the Petras Comnets submission sends a move receiving window request by sending a Delay frame:

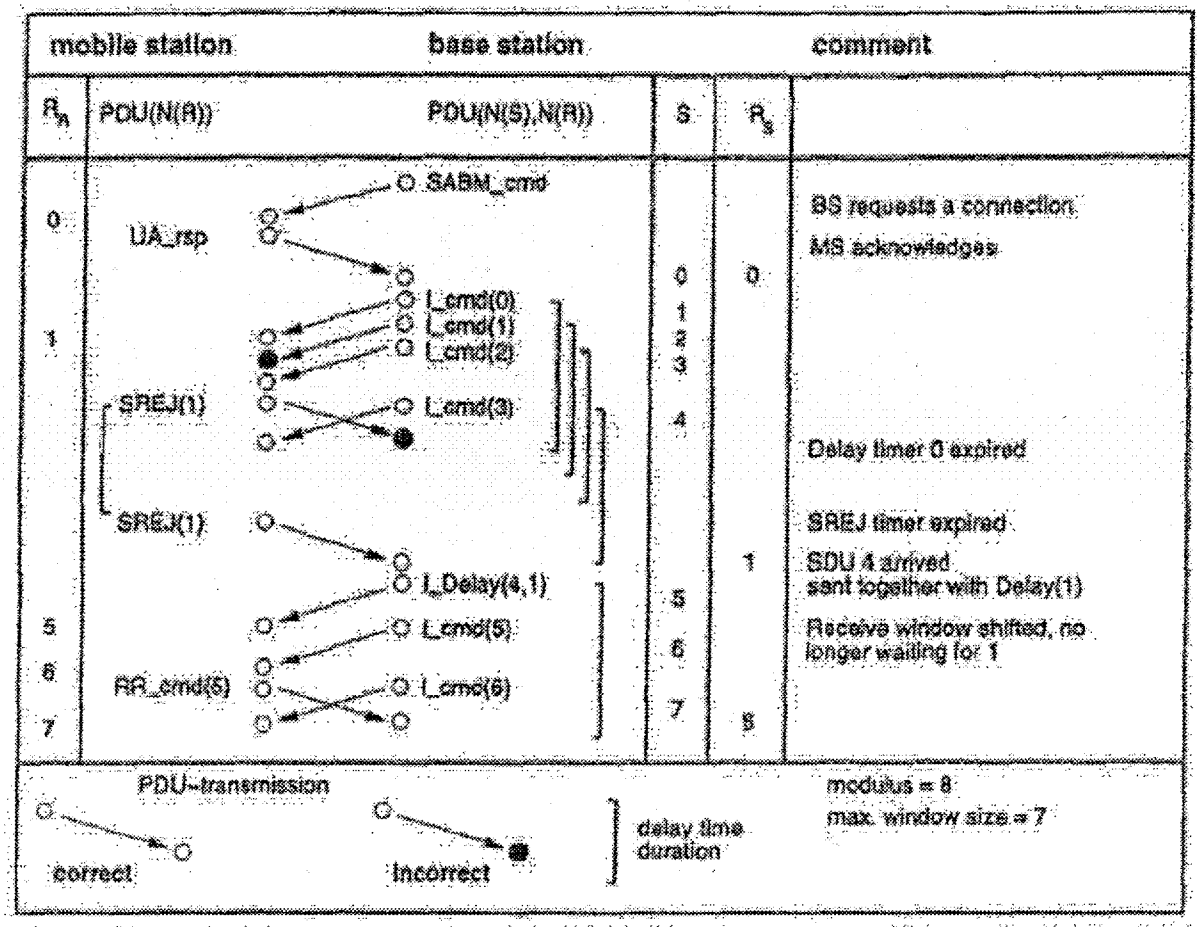


Figure 5: Treatment of discarded ATM cells

532. However, the discard message identified by Dr. Gibson is only sent in response to a selective reject message from the receiver. The discard message is not sent when the discard timer expires (if such a timer had been disclosed). As shown in figure 5, the transmitter discards cell 1, but does not send a discard message to the receiver. The transmitter only sends the discard message after the receiver sends a selective reject message for packet 1 (for the second

time) to the transmitter. Accordingly, the Petras Comnets 1995 Article does not disclose sending a move receiving window request when a discard timer expires.

f) Petras and Hettich, Performance Evaluation of a Logical Link Control Protocol for an ATM Air Interface ("Petras Comnets 1997 Article")

533. The Petras Comnets 1997 Article discloses aspects of an ASR-ARQ protocol.

(1) Said discard timer being initialized when said service data unit is received by said data link layer

534. The Petras Comnets 1997 Article does not disclose initializing a timer when an SDU is received by the data link layer. Instead, this reference discloses the general goal of transmitting cells before their due dates expire, without specifying how to make the necessary calculations to achieve this goal. For example, this reference does not specify when to initialize a timer, or when to assign a time stamp to a cell, which can be measured against a running clock.

535. The Petras Comnets 1997 Article requires the transmitter to keep track of the max cell delay. Max cell delay is an amount of time (e.g., 5 ms), not a moment in time (when the cell is received by the data link layer). Accordingly, even if the Petras Comnets 1997 Article disclosed the use of a timer for measuring this variable, it could not disclose initializing the timer when an SDU is received by the data link layer. In addition, it is unclear how max cell delay is to be determined.

> For VBR services we developed the Selective-Reject-with-Discarding (SR/D) ARQ protocol [6], which retransmits ATM cells as long as a service-specific maximum delay is not exceeded. When exceeding its due date, an ATM cell may be discarded.

Petras Comnets 1997 Article at pg. 227.

(2) Means for transmitting a "move receiving window" request

536. According to Dr. Gibson, the transmitter in the Petras Comnets submission sends a move receiving window request by sending a Delay frame:

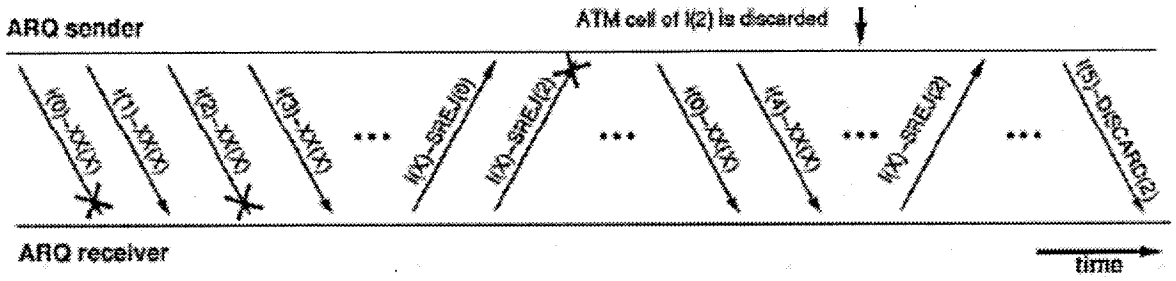


Fig. 4. Example of a protocol sequence of the SR/D-ARQ protocol with discarding of information

537. However, the discard message identified by Dr. Gibson is only sent in response to a selective reject message from the receiver. The discard message is not sent when the discard timer expires (if such a timer had been disclosed). As shown in figure 4, the transmitter discards cell 2, but does not send a discard message to the receiver. The transmitter only sends the discard message after the receiver sends a selective reject message for packet 2 (for the second time) to the transmitter. Accordingly, the Petras Comnets 1997 Article does not disclose sending a move receiving window request when a discard timer expires.

g) Petras, Development and Performance Evaluation of an ATM Radio Interface ("Petras Comnets Thesis")

538. The Petras Comnets Thesis discloses aspects of an ASR-ARQ protocol.

(1) Said discard timer being initialized when said service data unit is received by said data link layer

539. The Petras Comnets Thesis does not disclose initializing a timer when an SDU is received by the data link layer. Instead, this reference discloses the general goal of transmitting cells before their due dates expire, without specifying how to make the necessary calculations to

achieve this goal. For example, this reference does not specify when to initialize a timer, or when to assign a time stamp to a cell, which can be measured against a running clock.

540. The Petras Comnets Thesis requires the transmitter to keep track of two different variables: max cell delay and cell arrival time. Max cell delay is an amount of time (e.g., 5 ms), not a moment in time (when the cell is received by the data link layer). The cell arrival time is an estimated moment in time that occurs after the cell leaves the transmitter. Accordingly, even if the Petras Comnets Submission disclosed the use of a timer for measuring one or both of these variables, it could not disclose initializing the timer when an SDU is received by the data link layer.

> The control of the number of repeated transmissions occurs in the cooperation with the scheduler arranged below the ARQ-instances. It attempts to transmit an ATM-cell until its due date (arrival time + $\tau_{d\,max}$, cf. chapter 7) has expired and the ATM cell is discarded. The actual number of repeated transmissions of an ATM-cell results from its priority in the scheduler as well as by the present channel utilization. By the application of a due date – oriented relative urgency (RU) strategy in the scheduler repeated transmissions are processed with priority.

Petras Comnets Thesis at 93.

541. The functionality described in this reference is more complicated than using the '223 patent because the transmitter must constantly calculate arrival times. In addition, it is unclear how max cell delay is to be determined.

(2) Means for transmitting a "move receiving window" request

542. According to Dr. Gibson, the transmitter in the Petras Comnets submission sends a move receiving window request by sending a discard message:

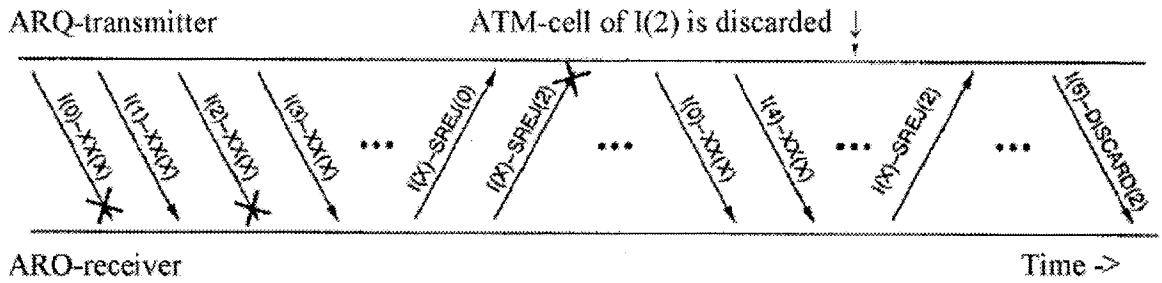


Fig. 8.11: Exemplary protocol sequence of the SR/D-ARQ-protocol discarding ATM-cells and informing the receiver via discard messages

543. However, the discard message identified by Dr. Gibson is only sent in response to a selective reject message from the receiver. The discard message is not sent when the discard timer expires (if such a timer had been disclosed). As shown in figure 8.11, the transmitter discards cell 2, but does not send a discard message to the receiver. The transmitter only sends the discard message after the receiver sends a selective reject message for packet 2 (for the second time) to the transmitter. Accordingly, the Petras Comnets Thesis does not disclose sending a move receiving window request when a discard timer expires.

h) Hettich, Vornefeld, Rapp, ARQ Protocols for Wireless ATM Systems: Requirements and Solutions, ETSI EP BRAN WG3 Temporary Document 42 ("Hettich Comnets Submission")

544. The Hettich Comnets Submission discloses aspects of an ASR-ARQ protocol.

(1) Said discard timer being initialized when said service data unit is received by said data link layer

545. The Hettich Comnets Submission does not disclose initializing a timer when an SDU is received by the data link layer. Instead, this reference discloses the general goal of transmitting cells before their due dates expire, without specifying how to make the necessary calculations to achieve this goal. For example, this reference does not specify when to initialize a timer, or when to assign a time stamp to a cell, which can be measured against a running clock.

In addition, although this reference mentions terms such as maximum delay and due date, it does not explain those terms or explain how the system accounts for them.

"An ARQ protocol for real-time services has to retransmit ATM cells as long as a service specific maximum delay is not exceeded. When exceeding its due-date, an ATM cell may be discarded." Hettich ComNets Submission, p. 6;

"ARQ protocols within the LLC layer are on a link basis. The re-transmission basis is one ATM cell and therefore much shorter than the AAL packets. Furthermore, the round-trip delay on one link is much shorter then on an end-to-end basis. This enables ARQ protocols within the LLC layer to deal with much higher net cell losses than end-to-end ARQ protocols." Hettich ComNets Submission, p. 8.

546. Accordingly, this reference does not disclose initializing the timer when an SDU is received by the data link layer.

(2) Means for transmitting a "move receiving window" request

547. This reference contains some of the same text as other Comnets references, but even less detail as to how to implement this system. This reference does not specify when a discard notification is to be sent.

"The ARQ protocol described in [6], [7] is able to discard packets even if a sequence number has already been assigned to it. Two extensions to conventional ARQ protocols have been developed and extensively investigated by simulation runs in order to inform the receiver about the discarding of the ATM cell:

1. A packet being assigned a sequence number may be discarded. In this case the window will be shifted without waiting for an acknowledgement, enabling further transmissions of newer ATM cells. When receiving the newer cells, the receiver will synchronise to the window shift automatically. This means that the exact execution of the ARQ protocol is temporarily disabled, enabling fast transmissions without error control, until the congestion event has been resolved.
2. A packet being assigned a sequence number may be discarded. The receiver is informed about the discarded cell by sending a special discard acknowledgement, which in contrast to normal acknowledgements is sent in the forward direction. As a consequence, discarding ATM cells is only useful if subsequently an efficient transmission of the discard acknowledgement is possible."

Hettich ComNets Submission, p. 6;

548. Accordingly, the Petras Comnets Thesis does not disclose sending a move receiving window request when a discard timer expires.

i) BRAN, Inventory of Broadband Radio Technologies and Techniques, TR 101 173 V1.1.1 ("Toolkit")

549. Toolkit provides some early ideas from the HIPERLAN standardization effort. This reference does not disclose a complete standard or system. Rather it is a collection of ideas and goals, which may represent incompatible competing positions. None of the citations identified by Drs. Heegard or Gibson identify the use of a retransmission timer. At most, this reference recognizes certain needs for a retransmission scheme without providing significant details. Accordingly, this reference does not enable one of skill in the art to practice the claimed invention

(1) Said discard timer being initialized when said service data unit is received by said data link layer

550. Toolkit does not disclose initializing a timer when an SDU is received by the data link layer. Instead, this reference discloses the general goal of transmitting cells before their due dates expire, without specifying how to make the necessary calculations to achieve this goal. For example, this reference does not specify the use of a timer, when to initialize a timer, or when to assign a time stamp to a cell, which can be measured against a running clock. In short, this reference recognizes the need for the '223 patent without realizing the solution of the invention.

"Candidate ARQ protocols are go back N and selective repeat protocols (see references [41] and [42]).
8.2.1 ARQ protocols for real-time requirements
An ARQ protocol for real-time services has to retransmit ATM cells as long as a service specific maximum delay is not exceeded. When exceeding its due-date, an ATM cell may be discarded.

Discarding old ATM cells contributes to avoid and resolve congestion events, since the delay of the following cells can be shortened and the probability to exceed further due-dates is reduced. Therefore, special procedures have been developed in order to allow discarding ATM cells within an ARQ protocol which has been designed for no losses at all." Toolkit p. 40

551. Accordingly, this reference does not disclose initializing the timer when an SDU is received by the data link layer.

(2) Said service data unit being discarded by said transmitter and said receiver when said acknowledgement message is not transmitted for said at least one protocol data unit and said discard timer expires.

552. Because this reference does not disclose using a retransmission timer, it cannot disclose discarding packets when said timer expires.

(3) Means for transmitting a "move receiving window" request

553. Because this reference does not disclose using a timer to monitor retransmission of packets, it cannot disclose sending a move receiving request when such a timer expires.

j) IEEE 802.11-1997 Standard

554. The 802.11-1997 is an early version of the 802.11 standard, which contains many differences from the 802.11n standard used by the accused products. For example, while the 802.11-1997 standard identifies a timer, this timer is initialized when a packet is transmitted.

The source STA shall maintain a transmit MSDU timer for each MSDU being transmitted. The attribute aMaxTransmitMSDULifetime specifies the maximum amount of time allowed to transmit an MSDU. The timer starts on the attempt to transmit the first fragment of the MSDU. If the timer exceeds aMaxTransmitMSDULifetime, then all remaining fragments are discarded by the source STA and no attempt is made to complete transmission of the MSDU. § 9.4

555. In contrast, the 802.11n standard initializes a retransmission timer when an MSDU is passed to the MAC layer:

QoS STAs shall maintain a transmit MSDU timer for each MSDU passed to the MAC. The MIB attribute dot11EDCATableMSDULifetime specifies the maximum amount of time allowed to transmit an MSDU for a given AC. The transmit MSDU timer shall be started when the MSDU is passed to the MAC. If the value of this timer exceeds the appropriate entry in dot11EDCATableMSDULifetime, then the MSDU, or any remaining, undelivered fragments of that MSDU, shall be discarded by the source STA without any further attempt to complete delivery of that MSDU.

IEEE Std 802.11-2007 at 291-92.

Insert the following paragraph at the end of 9.9.1.6:

When A-MSDU aggregation is used, the HT STA maintains a single timer for the whole A-MSDU. The timer is restarted each time an MSDU is added to the A-MSDU. This procedure ensures that no MSDU in the A-MSDU is discarded before a period of dot11EDCATableMSDULifetime has elapsed.

IEEE Std 802.11n-2009 at 126.

(1) Said discard timer being initialized when said service data unit is received by said data link layer

556. As explained above, the 802.11-1997 contains a timer that is initialized when the first fragment of an MSDU is transmitted. Accordingly, this reference does not disclose "said timer being initialized when said service data unit is received by said data link layer."

(2) Means for transmitting a "move receiving window"

557. None of the citations included in Drs. Heegard's or Gibson's reports disclose this limitation. Instead of using a move receiving window request message, the 802.11-1997 standard teaches that the receiver should maintain its own timer which it uses to determine if it should discard packets. This sort of receive timer has drawbacks such as the risk of losing synchronization with the transmitter, and the fact that it leads to wasted bandwidth. For

example, in the 802.11-1997 standard, when packets are received which the receiver knows have been discarded by the transmitter, the receiver must still receive the packets, send ACKs for them, and then discard the packets.

"The destination STA shall maintain Receive Timer for each MSDU or MMPDU being received, for minimum of three MSDUs or MMPDUs. The STA may implement additional timers to be able to receive additional concurrent MSDUs or MMPDUs. The receiving STA shall discard all fragments that are part of an MSDU or MMPDU for which timer is not maintained. There is also an attribute, aMaxReceiveLifetime, that specifies the maximum amount of time allowed to receive an MSDU. The receive MSDU or MMPDU timer starts on the reception of the first fragment of the MSDU or MMPDU. If the receive MSDU timer exceeds aMaxReceiveLifetime, then all received fragments of this MSDU or MMPDU are discarded by the destination STA. If additional fragments of directed MSDU or MMPDU are received after its aMaxReceiveLifetime is exceeded, those fragments shall be acknowledged and discarded." § 9.5;

k) U.S. Patent No. 6,621,799 ("Kemp")

558. Kemp discloses a protocol for limiting retransmission attempts at the network layer. Kemp describes the invention in terms of a system that encapsulates IP packets in a Point-to-Point Protocol (PPP) data stream using an extension of the Generic Routing Encapsulation Protocol (GRE). These protocols generally relate to transmitting data at the network layer, not the data link layer.

> Although the system described below uses IP and communication over the Internet, alternative versions of the system could use other data networks and other network layer protocols. Similarly, alternatives to PPP can be used to encapsulate network layer protocols for transmission over the data network.

Kemp at 5:35-5:40.

559. Kemp also describes multiple layers of encapsulation. For example, IP module 230 supplies network layer functionality, and tunnel module 240 provides data link layer functionality for IP module 230. However, once data passes from tunnel module 240, it is

passed to another network layer module, IP module 250. IP module 250 then relies on a separate data link layer.

> Rather than sending data directly from IP module **230** to data link module **260** and then to Internet **120**, a tunnel connection can be established between two computers **100**. Two IP modules **230**, one on each computer then communicate with one another as if the tunnel connection were a physical connection. In particular, at the sending computer **100**, IP module **230** communicates with a combination of modules **235**, which together provide data link layer services to IP module **230**. In this combination of modules **235**, a tunnel module **240** provides data link layer services to IP module **230**. Tunnel module **240** establishes transport layer connections to one or more tunnel modules on other computers using the services of IP module **250**. IP module **250** in turn uses the data link layer services of data link module **260**. On a particular computer **100**, IP module **250** can be a separate from IP module **230** (i.e., a separate instance), or can be part of a single software module, which implements the functionality of both IP module **230** and IP module **250**.

Kemp at 6:17-6:34.

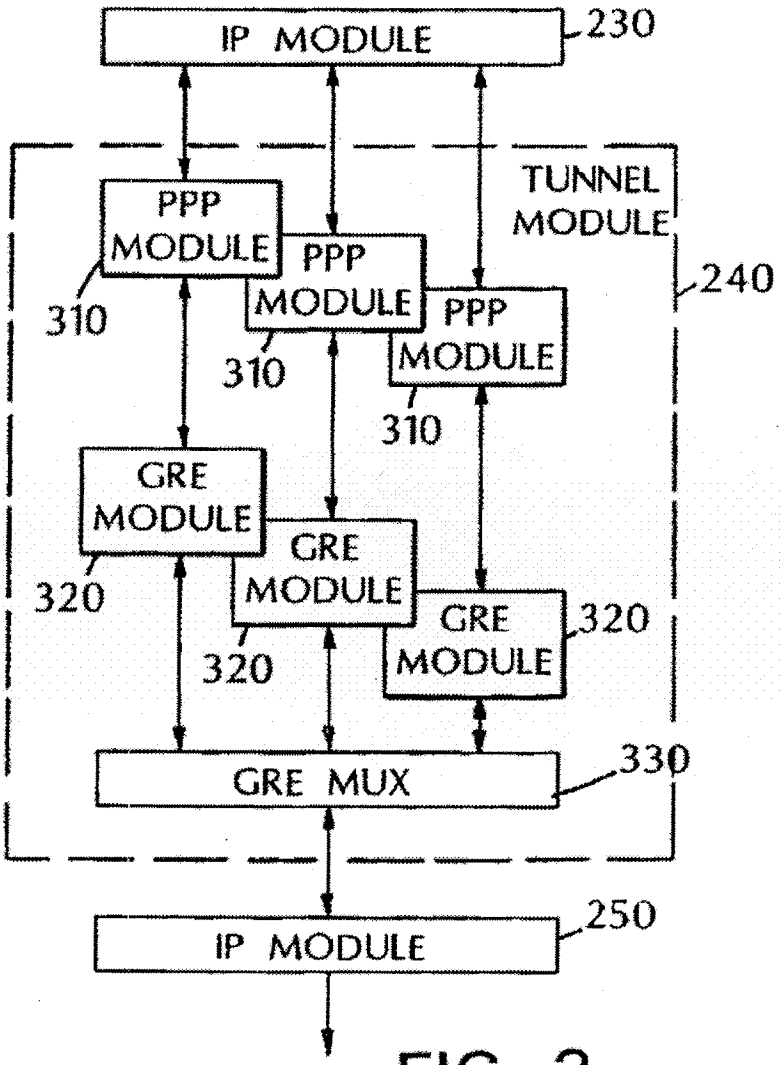


FIG. 3

560. Kemp provides further explanation as to the operation of this "virtual" data link layer, i.e. tunnel module 240. Data enters GRE Module 320 after it is passed from PPP module 310. Within GRE module 320, the data may pass through a series of buffers before being transmitted. GRE module 320 also adds a header to each data packet. At this point, the packet is passed to the GRE MUX 330, which in turn passes the packet out of the tunnel module and to IP module 250. When this occurs, ATO timer 450 is started within the GRE module 320.

> Referring to FIG. 6, after GRE module **320** builds the header, it passes the combined header and data to GRE Mux **330** (line **603**). GRE Mux **330** then passes the packet (i.e., the combined header and data) to IP **250**. ATO timer **450** is started if it is not already running for a previously transmitted packet, and the transmission time is recorded in the entry **422** in the retransmit queue. If ATO timer **450** is already running, then a previously sent packet has not yet been acknowledged or selectively acknowledged and the timer is set to expire at the end of the time interval allowed for receipt of an acknowledgment for the previously sent packet. In addition to setting the transmission time, GRE module **320** initializes the number of retries for the packet to zero in entry **422**. GRE module **320** uses this counter of retries to determine when to "give up" on transmissions of this packet.

Kemp at 9:23-9:38.

561. ATO timer 450 is used to monitor how long a packet waits in the retransmission queue. When the ATO timer expires, the transmitter attempts to transmit the packet again. Kemp may cease transmission of packets based on a retransmission counter.

ATO timer 450 Expires:

Process retransmit queue 420

IF no packets were sent from retransmit queue 420 THEN

    Clear retransmit queue 420

END IF

FIG. 15

> packet. In addition to setting the transmission time, GRE module **320** initializes the number of retries for the packet to zero in entry **422**. GRE module **320** uses this counter of retries to determine when to "give up" on transmissions of this packet.

Kemp at 9:34-9:38.

> If for some reason, GRE module **320A** had not received the selective ack of packet **4 (1644)**, then packet **3** would have been retransmitted at the expiration of the ATO timer which was started when packet **3** was transmitted.

Kemp at 13:51-13:54.

(1) Said discard timer being initialized when said service data unit is received by said data link layer

562. Dr. Gibson contends that ATO timer 450 acts as a discard timer. However, this timer is not started when an SDU is passed to a data link layer. Instead, this timer is started when a packet leaves tunnel module 240, which is acting as a virtual data link layer. Because Kemp uses multiple layers of encapsulation, it is also correct to say that this timer is started when the packet is passed to the network layer, i.e. IP Module 250. Thus, Kemp does not disclose initializing a timer when an SDU is received by the data link layer.

(2) Said service data unit being discarded by said transmitter and said receiver when said acknowledgement message is not transmitted for said at least one protocol data unit and said discard timer expires.

563. Kemp does not disclose discarding an SDU when a discard timer expires. Instead, Kemp uses the ATO timer to determine when to re-transmit packets. Kemp uses a retransmit counter to determine when to "give up" on retransmissions and hence discard packets.

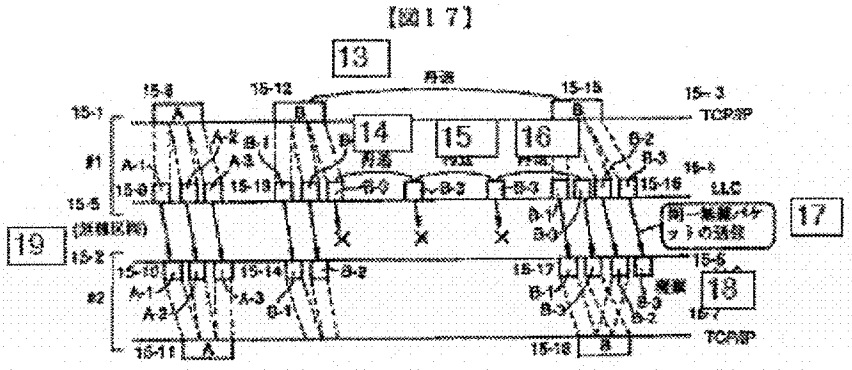
(3) Means for transmitting a "move receiving window"

564. None of the citations included in Drs. Heegard's or Gibson's reports disclose this limitation. Kemp does not specify the operation of the receive buffer in sufficient detail for this element to be disclosed. For example, Kayama does not describe window operation, or how a transmitter could affect that operation.

l) JP 11-046217 ("Kayama")

565. Kayama discloses a method for optimizing retransmission protocols where multiple overlapping retransmission protocols are used. For example, Kayama explains that when TCP is used with HIPERLAN, there is a risk that some wireless packets may be needlessly transmitted. Figure 17 illustrates this problem:

【図17】



1-re-transmission, 2-re-transmission, 3- abandon, 4- wireless section, 5-re-transmission, 6-re-transmission, 7-re-transmission, 8-re-transmision, 9-re-transmission, 10-abandon, 11-wireless section, 12-network section, 13-re-transmission, 14-re-transmission, 15-re-transmission, 16-retransmission, 17-transmission of same wireless packet, 18-abandon, 19-wireless section

566. Figure 17 shows a data packet B split into three wireless packets B-1, B-2, B-3. Wireless packets B-1 and B-2 are successfully transmitted wireless, but B-3 fails after three attempts. At this point, because of the TCP retransmission protocol, the transmitter re-fragments data packet B and re-transmits wireless packets B-1, B-2, B-3. At the same time, because of the wireless retransmission protocol, wireless packet B-3 is retransmitted again. As a result, wireless packet B-3 is re-transmitted more than necessary.

567. To solve this problem, Kayama, discloses a method of calculating a retransmission time which prevents excessive retransmission caused by overlapping retransmission protocols.

(1) Said discard timer being initialized when said service data unit is received by said data link layer

568. Although Kayama discloses a timer, this time is not initialized when an SDU is received at that data link layer. Instead Kayama explains that a data packet is passed to the logical link control ("LLC"). Then, the LLC performs various calculations to determine the appropriate retransmission delay time. Although it is not clear when the timer is started, it appears to start at the interface with the physical layer. Thus, Kayama does not disclose initializing a timer when an SDU is received by the data link layer.

> [0021] FIG. 9 shows the transmission flow of Embodiment 2's wireless terminal/wireless base station. Using the TCP protocol as previously described, usually the total delay D1 is monitored and the re-transmission timer value is determined. After receipt of the data packet from the upper layer using LLC (8-2), calculate the allowed re-transmission delay time that is sought by subtracting 2 times (2D) the previously described intranetwork delay from this re-transmission timer value (8-3). Continuing, after starting the timer (8-4), perform generation of the wireless packet (8-5) and transmit the wireless packet (8-7). Here, before the transmission of the data packet is completed (8-8), when the previously described timer has expired from re-transmission, etc., (8-6), among the wireless packets generated by dividing the data packet during transmission, destroy the wireless packets that remain within the buffer that have yet to be transmitted (8-9).

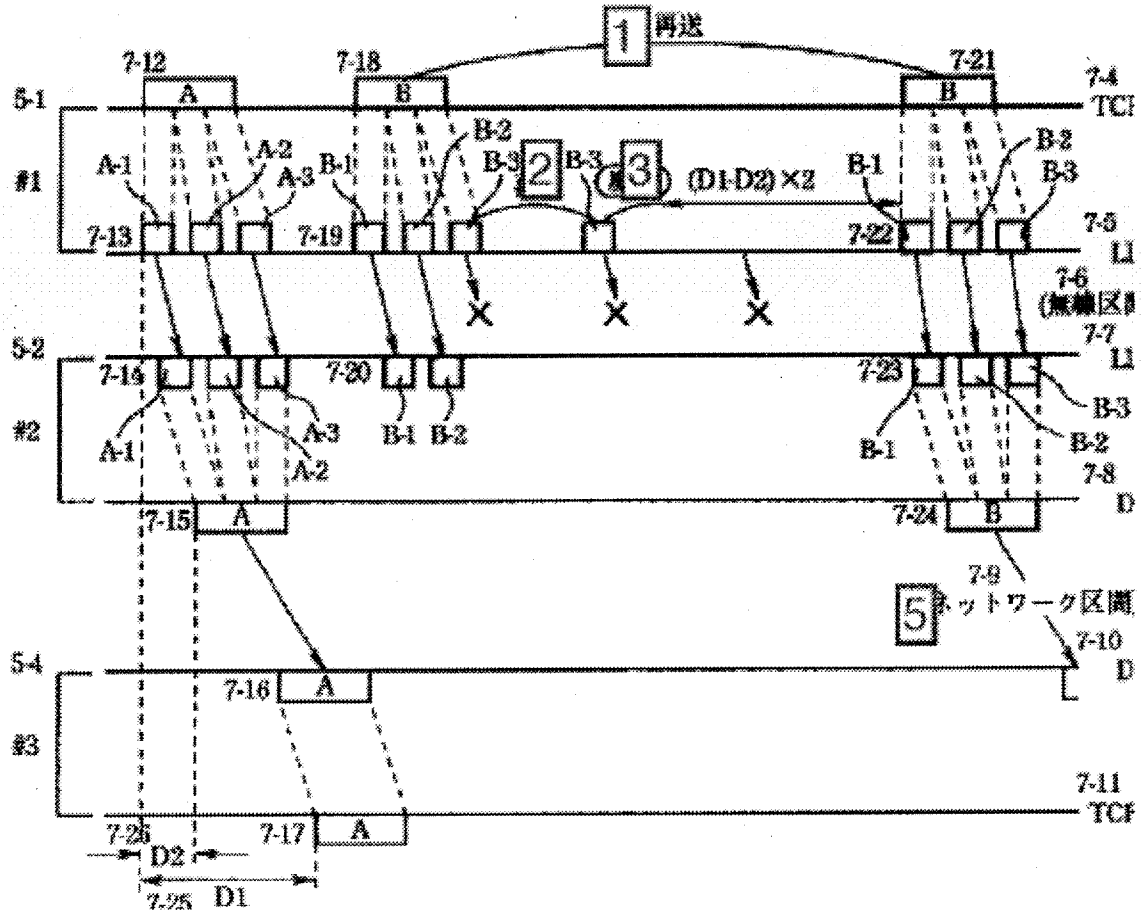
Kayama para. 21.

(2) Said service data unit being discarded by said transmitter and said receiver when said acknowledgement message is not transmitted for said at least one protocol data unit and said discard timer expires.

569. Kayama does not disclose discarding an SDU. Drs. Heegard and Gibson appear to contend that the data packet of Kayama corresponds to an SDU and the wireless packet of Kayama corresponds to a PDU. If this correspondence is correct, Kayama does not disclose the transmitter discarding an SDU when an acknowledgment is not transmitted and the discard timer

expires. Instead, Kayama discloses that the transmitter should discard outstanding PDUs when the discard timer expires. Instead of discarding the SDU, the TCP layer of the transmitter re-sends the SDU to the LLC which then attempts to retransmit PDUs corresponding with that SDU. See for example Figure 8:

【図８】



1-re-transmission, 2re-transmission, 3-abandon 4-wireless section, 5-network section

(3) Means for transmitting a "move receiving window"

570. None of the citations included in Drs. Heegard's or Gibson's reports disclose this limitation. Kayama does not specify the operation of the receive buffer in sufficient detail for

this element to be disclosed. For example, Kayama does not describe window operation, or how a transmitter could affect that operation.

m) DE 19543280 ("Walke")

(1) Said discard timer being initialized when said service data unit is received by said data link layer

571. Walke does not disclose initializing a timer when an SDU is received by the data link layer. Instead, this reference discloses the general goal of transmitting cells before their due dates expire, without specifying how to make the necessary calculations to achieve this goal. For example, this reference does not specify when to initialize a timer, or when to assign a time stamp to a cell, which can be measured against a running clock.

> In another embodiment of the error-correction process according to the invention, the sending station can reject ATM cells that have exceeded their maximum permitted delay. If an ATM cell to be rejected has not yet been incorporated into the window algorithm, and therefore has not yet been given a sequence number, it can be rejected without the receiver's knowledge. Another situation is that in which the receiver issues a repeat transmission request for an ATM cell after an unsuccessful transmission, but the cell reaches its maximum delay in the meantime. If the sender then rejects this ATM cell, for example to reduce an overload situation, it must inform the receiver that this ATM cell will not be repeated any more. It does this using a delay order, which is treated in the same way as an acknowledgment, but generated by the sender and sent to the receiver." cols. 12-13;

572. Accordingly, this reference does not disclose initializing the timer when an SDU is received by the data link layer.

(2) Means for transmitting a "move receiving window" request

573. To the extent Dr. Gibson identifies the Delay PDU as the move receiving window request, this message is not sent when a discard timer expires (if such a timer had been disclosed). This message is sent in response to a selective reject message from the receiver. Accordingly, Walke does not disclose sending a move receiving window request when a discard timer expires.

n) U.S. Patent No. 6,683,850 ("Dunning")

574. Dunning discloses a variation on the go back n ARQ protocol for use in system networking. It is not focused on developing a protocol for wireless transmission.

> The present invention provides a method for transmitting data between switches in a fabric having a plurality of links, which includes the steps of transmitting the data in a plurality of packets from point to point, and retaining each packet in a buffer at a transmitting point until receiving either an acknowledgment indicating that each packet was successfully received or an error indication that a received version of each packet included at least one error, while simultaneously transmitting additional packets. According to the present invention, successful receipt of all packets between the last acknowledged packet and a particular packet is indicated by sending a single acknowledgment. According to another aspect of the present invention, a single negative acknowledgment is used to indicate that a packet associated with the negative acknowledgment includes at least one error and to simultaneously indicate that all previous packets received prior to the packet associated with the negative acknowledgment were received correctly. The present invention provides a method and apparatus for controlling the flow of data in a system area network that takes advantage of the context in which the method and apparatus will be used. If the packet received in error lies in the first half of the window, only that portion of the data stream following the error is retransmitted, rather than the entire window, as in the prior art. Furthermore, positive acknowledgments are not required for each and every packet, thereby improving latency.

Dunning at 3:51-4:30.

575. Dr. Gibson identifies one short passage in Dunning as describing this timer, but it is unclear how this timer is implemented, and what its purpose is.

> Each transmitter has a configurable interval timer for the link acknowledge cycle. Each transmitter has a configurable iteration counter for NAK. Rather than congest the link, a transmitter that has run through either counter is obliged to return the undeliverable packet to its source.

Dunning at 9:56-9:60.

(1) Said discard timer being initialized when said service data unit is received by said data link layer

576. Dunning discloses the use of an "interval timer," but Dunning does not explain when this timer is meant to be initialized. Dr. Gibson identifies one short passage in Dunning as describing this timer, but it is unclear how this timer is implemented, and what its purpose is. Thus, Dunning does not disclose initializing a timer when an SDU is received by the data link layer.

> Each transmitter has a configurable interval timer for the link acknowledge cycle. Each transmitter has a configurable iteration counter for NAK. Rather than congest the link, a transmitter that has run through either counter is obliged to return the undeliverable packet to its source.

Dunning at 9:56-9:60.

(2) Said service data unit being discarded by said transmitter and said receiver when said acknowledgement message is not transmitted for said at least one protocol data unit and said discard timer expires.

577. Although Dunning discloses an "interval timer," Dunning does not specify that packets are to be discarded when this timer expires. Rather this timer may be used to control retransmissions or update the iteration counter. While Dunning states that a transmitter may run through "either counter," it is unclear what this statement means given that Dunning only discloses one counter. Finally, Dunning does not disclose discarding packets. Rather, Dunning discloses returning undeliverable packets to their source. Such a system may result in the packets being re-prepared for transmission. This scenario is not unlikely given that Dunning is not specifically concerned with wireless transmission

(3) Means for transmitting a "move receiving window"

578. None of the citations included in Dr. Gibson's report disclose this limitation. Dunning does not specify the operation of a receiver in sufficient detail for this element to be disclosed. For example, Dunning does not describe window operation, or how a transmitter could affect that operation.

o) Tasaka, Integrated Video and Data Transmission in the TDD ALOHA-Reservation Wireless LAN ("Tasaka IEEE Article")

579. Tasaka discloses a video and data wireless transmission system. In this system, the transmitter estimates how long it will take to transmit each packet. Each packet also contains a time stamp indicating the time by which the packet must be received (D_{Vmax}). If the transmitter cannot send the packet to the receiver within that time limit, the packet will be discarded.

2.5 Packet Discard Control

In this paper, we also examine the applicability of a *packet discard (PD)* control scheme to the video transmission to meet the delay requirements. Each video frame must be received by the application entity at the destination with a delay less than a threshold value, which depends on the application. This imposes a delay bound on the MAC layer.

Let D_{Vmax} denote the delay upper bound in the MAC layer. The source terminal and the base station discard video packets with elapsed time of more than D_{Vmax}. Specifically, when the base station allocates slots, it inspects the time stamp of each video packet and examines whether the packet can be delivered to the destination within D_{Vmax}; if not, the base station discards the packet[3].

Tasaka at 1389-90.

580. Tasaka does not specify when this time stamp is assigned. However, Tasaka does indicate that the time stamp is inspected at the physical layer when allocating slots for packets.

(1) Said discard timer being initialized when said service data unit is received by said data link layer

581. Tasaka does not disclose a timer being initialized when an SDU is received by the data link layer. Instead Tasaka discloses that a time stamp is applied to a packet at an unspecified time, and that this time stamp is inspected when the packet is passed to the physical layer. None of the citations identified by Drs. Heegard or Gibson specify when this time stamp is applied. It appears that Tasaka does not consider the importance of selecting an appropriate time for timer initialization.

(2) Said service data unit being discarded by said transmitter and said receiver when said acknowledgement message is not transmitted for said at least one protocol data unit and said discard timer expires.

582. Tasaka does not disclose discarding a packet when a discard timer expires. Instead, Tasaka discloses estimating how long it will take to process and send a packet, and discarding the packet if that process cannot be completed within a threshold time. This approach is more complicated and less reliable than the '223 invention.

(3) Means for transmitting a "move receiving window"

583. None of the citations included in Drs. Heegard's or Gibson's reports disclose this limitation. Tasaka does not specify the operation of the receive buffer in sufficient detail for this element to be disclosed. For example, Tasaka does not describe window operation, or how a transmitter could affect that operation.

3. Response to Alleged Obviousness References

584. As explained above, none of the asserted obviousness references disclose initializing a discard timer when an SDU is passed to the data link layer or sending a move receiving window request message when a discard message expires. Accordingly, no combination of references can disclose those limitations. Even if one or more references

discloses one of these limitations, it is not obvious to combine elements from different ARQ protocols without further analysis. For example, commands and messages in one protocol may have unexpected or undesirable effects when introduced into a different protocol. I note that Dr. Gibson has not undertaken an analysis to ensure that the protocol of Tasaka, for example, is compatible with the protocol of Walke.

585. I specifically disagree with Drs. Heegard and Gibson's contentions that Bakker in combination with other references that disclose discarding packets at the receiver render the asserted claims of this patent obvious. Bakker's system selects packet and frame sizes, QoS parameters, and other features designed to work together. It is not obvious that this system could achieve the same results by simply discarding packets received at the receiver. Such a change could require modification of the ARQ protocol, the timer mechanism, or frame size for example, to ensure that data is transmitted quickly and efficiently.

4. Response to Dr. Gibson's Section 112 Arguments

586. I disagree that the asserted claims of the '223 patent fail to comply with the provisions of 35 USC § 112. Some of Dr. Gibson's arguments appear to relate to infringement issues. Accordingly, I hereby incorporate my infringement report.

587. Dr. Gibson contends that the limitation "said data link layer segmenting said service data unit into at least one protocol data unit" and the limitation "assembling said at least one protocol data unit back into said service data unit" is indefinite, lacks written description, and is not enabled. Dr. Gibson appears to contend that if an SDU is segmented into only one PDU, it is not segmented. I disagree. Segmentation refers to preparing an SDU for transmission to a different layer. A PDU is used for this purpose.[47] When a PDU is received, the receiver

[47] See generally '223 patent at 3:49-4:27; 5:49-6:25.

must extract any SDUs for transmission to higher layers. This process works just as well for multiple PDUs or a single PDU. Even some of the prior art references cited by Dr. Gibson recognize that the number of segments in a PDU may vary. Accordingly, there is no reason why a PDU may not contain one SDU. Even if the term "segmenting" did refer to dividing an SDU into more than one PDU, the claim clarifies that it covers a situation where an SDU is segmented into "at least one" PDU.

E. U.S. PATENT NO. 6,772,215

588. Dr. Gibson and Dr. Heegard allege that the asserted claims of the '215 patents are anticipated by prior art. I disagree. None of the references cited by Dr. Gibson or Dr. Heegard teaches or discloses all the limitations of the asserted claims.

589. Dr. Gibson and Dr. Heegard also allege that these references render the asserted claims of the '215 patent obvious either alone or in combination with one or more other references. I disagree. None of the prior art references taught or disclosed all limitations of the asserted claims. Dr. Gibson and Dr. Heegard further did not identify how a specific combination of references would render the asserted claims obvious, and without doing so they cannot meet the requisite clear and convincing evidentiary standard. As discussed below, none of the references identified by Dr. Gibson and Dr. Heegard teaches each limitation of the asserted claims of the '215 patent. Nor does any identified combination of reference render such claims obvious.

590. The application that issued as U.S. Patent No. 6,772,215 entitled "Method for Minimizing Feedback Responses in ARQ Protocols" was filed on March 29, 2000 and a provisional application was filed on April 9, 1999. The '215 patent issued on August 3, 2004.

1. Claim Construction

591. Ericsson asserts claims 1, 2, 4, 6, 8, 25, 26, 29, 32, 34, 45, 46, 49, 52, and 54 of the '215 patent against Defendants. The parties have identified the following terms for construction:

Patent/Claim	Claim Term	Ericsson's Proposed Construction	Defendants' Proposed Construction
'215 patent Claims 1, 15, 25	responsive to the receiving step, constructing a message field . . . including a type identifier field	responsive to the receiving step, generating a message field including a field that identifies the message type of the feedback response message from a number of different message types	responsive to the receiving step, generating a message field including a field identifying the type of feedback response that is selected from multiple available feedback responses in order to minimize the size or number of feedback responses
'215 patent Claim 45	means for sending a plurality of first data units over said communication link to said second peer entity	**Recited Function:** sending a plurality of first data units over said communication link to said second peer entity. **Corresponding Structure:** the sender of a peer entity or equivalents thereof.	**Recited function:** the transmission of first data units by a first peer unit to a second peer unit **Corresponding Structure:** *Invalid*
'215 patent Claim 45	means for receiving said plurality of first data units, and constructing . . .	**Recited Function:** receiving said plurality of first data units, and constructing one to several message fields for a second data unit, said one to several message fields including a type identifier field and at least one of a sequence number field, a length field, a content field, a plurality of erroneous sequence number fields, and a plurality of erroneous sequence number length fields, each of said plurality of erroneous sequence number fields associated with a respective one of said plurality of erroneous sequence number length fields **Corresponding Structure:** the receiver of a peer entity, see '215::29-30, whereby different mechanisms can be used to indicate erroneous data units so as to optimize performance, see '215::5:53-56, and the mechanisms refer to any of the methods described for	**Recited function:** receiving the plurality of first data units and generating a message field including a field identifying the type of feedback response that is selected from multiple available feedback responses in order to minimize the size or number of feedback responses. **Corresponding Structure:** (a) FIG. 4, FIG. 5, FIG. 6, Table 1, 3:6-13, 36-42, 4:1-54, 5:50-6:49, 6:55-64, 7:28-51 (b) Invalid under 35 U.S.C. § 112, ¶¶ 2, 6

Patent/Claim	Claim Term	Ericsson's Proposed Construction	Defendants' Proposed Construction
		constructing a bitmap feedback response message disclosed at '215::3:17-28 and '215::6:8-48, any of the methods for constructing a compressed bitmap feedback response message disclosed at '215::6:49-54, any of the methods for constructing a list feedback response message disclosed at '215::2:63-3:16 and '215::7:28-51, and/or the method for constructing a feedback response message combining the list and bitmap methods, and any equivalents thereof	

592. Regardless of which party's construction the Court adopts for these two terms, my conclusions regarding the invalidity of the '215 patent remain unchanged.[48]

a) "responsive to the receiving step, constructing a message field . . . including a type identifier field"

593. I have concluded that none of the references identified by Dr. Heegard or Dr. Gibson disclose "a type identifier field." This conclusion remains the same under either party's construction. Under Ericsson's proposal, the field "identifies the message type of the feedback response message from a number of different message types." This means that for a given feedback response, there are different types that may consist of formatting differences to be anticipated by the system by use of the type identifier field. The '215 patent distinguishes the type identifier field from the field that defines the category of feedback message being transmitted—which has a known format. For example, the '215 patent discusses a prior-art "PDU_format" field which defines the feedback response, but does not indicate a type for that feedback response:

[48] I understand that the Court may construe the terms of these patents in ways that differ from the parties' proposals. I reserve the right to update or supplement this report if necessary based on any rulings from the Court.

FIG. 2
PRIOR ART

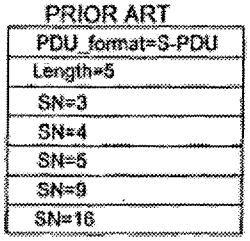
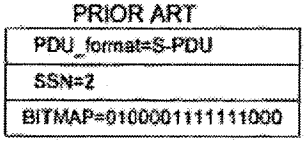


FIG.3
PRIOR ART



594. In the prior art, the type of the feedback response was fixed for any given feedback response. In the prior art depicted above, an S-PDU was defined to present data in a list format (as shown in Fig. 2) or defined to present data in a bitmap format (as shown in Fig. 3). The '215 patent introduces a "type identifier field" which indicates the type for a given feedback response, allowing the contents of the feedback response to vary in how they are formatted.

FIG.4

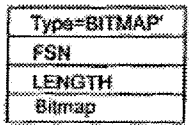


FIG. 5

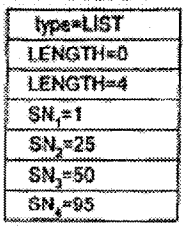
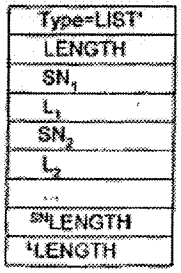


FIG. 6



595. As explained more fully below, none of the references identified by Dr. Heegard or Dr. Gibson disclose this claim limitation.

596. The patent's discussion of the prior art is consistent with how the inventors developed the patented invention. The inventors were involved in standardizing Wideband CDMA. The draft specification at the time offered the functionality to distinguish between different types of PDUs, but it did not contain a type identifier field which indicates the type of a given feedback response. As a result, Ericsson submitted this functionality to the standard. The

fact that this submission was ultimately accepted by members of the standard setting organization provides objective evidence that the asserted claims are not invalid.[49]

597. Moreover, during prosecution, the patent office initially rejected the claims of the '215 patent. In response, the applicants amended the claims to clarify that each feedback response must contain a type identifier field.[50] With this novel aspect included in the claims, the patent issued.

598. Under Defendants' proposal, the service type identifier must be selected to minimize the number of feedback responses. Because this construction arguably introduces additional limitations into the claims, it does not affect my opinion that the references identified by Dr. Heegard and Dr. Gibson do not disclose a type identifier field.

b) 112 ¶ 6 Means-For Limitations

599. The Defendants have argued for a finding that the "means for sending . . ." and "means for receiving . . ." terms of claim 45 are invalid. For the purposes of my analysis, I have presumed these terms are valid and reserve the right to alter my opinions should the Court hold otherwise.

2. Response to Alleged Anticipation References

a) Seo '176 Patent

600. Seo provides for a redundant NAK mechanism, *i.e.*, it combines bitmaps and lists in the NAK. Seo describes a new NAK format that is larger than what it refers to as a prior art NAK format. Seo does not acknowledge that increasing the size of a NAK frame can decrease throughput. Instead, Seo focuses on providing more information in the NAK frame so that fewer total NAK frames may be sent. This is in contrast to the '215 patent which focused on reducing

[49] See generally Erik Schon Depo. at 216:1-223:25; Michael Meyer Depo. at 185:1-197:25.

[50] See '215 patent prosecution history, January 7, 2004 Response to Office Action.

the size of feedback responses. In other words, Seo is aimed at solving a different problem from the '215 patent, and it does not acknowledge the problem the '215 patent solves.

(1) Seo '176 Patent Does Not Disclose a "type identifier field" as Required by All Asserted Claims of the '215 Patent.

601. Figure 4 shows the format of this NAK:

FIELD	LENGTH (BITS)
SEQ	8
CTL	4
RE_NUM	2
NAK_TYPE	2
NAK_SEQ	4
L_SEQ_HI	4
FIRST	12
LAST	12
FCS	16
PADDING	VARIABLE
NAK_Map_Count	2
NAK_Map	
NAK_Map_SEQ	12
NAK_Map	8

FIG. 4

602. Seo explains that when a field does not exist, a device must enter 00s for that field:

> The field FIRST represents the 8 bit sequence number of a first data frame for which a retransmission is required. The field FIRST is used only in case of an NAK and its value is "00" except such case. The field LAST indicates the 8 bit sequence number of a last data frame for which the retransmission is required. The field LAST is also used only in case of the NAK and its value becomes "00" except such case.

(Seo '176 Patent at Col. 2:10-17).

603. When describing the Figure 4 NAK format, Seo describes when certain fields "exist" based on the NAK_Type field. Seo does not explain what it means for a field to exist or not exist, other than to explain that a field not in use is one filled with 00's. This is consistent with claims 10 and 23 of Seo, which require a NAK containing all of the fields shown in Figure 4. The patent office would never have allowed such claims if they were not supported by the specification. This is further consistent with the fact that Figure 4 depicts only one padding field—i.e. there is no separate padding field following the last NAK_Map that would be needed to pad the frame to the needed frame length.

604. The NAK_TYPE field is not fully defined in Seo, although Seo provides enough space for four variations of the NAK_TYPE field, it only provides an explanation for values "00" and "01." These two values are used to specify whether the FIRST, LAST, etc. fields will be filled with 00's or whether the NAK_MAP fields will be filled with 00's. Because the NAK_TYPE field merely identifies which fields have non-zero content, it does not specify the format of a feedback response. Accordingly, it is not a type identifier field.

(2) Seo '176 Patent Is Not Enabling Prior Art.

605. Moreover, Seo is not anticipatory prior art because a person of ordinary skill in the art could not carry out the techniques described in Seo without undue experimentation. First, Seo's NAK packet includes a PADDING field of variable length, but does not address how a system would demarcate the padding field from other data when NAK_Map_Count, NAK_Map, or NAK_Map_Seq fields "exist." Second, Seo's Figure 4 depicts two NAK_Map fields, but does not specify the length of the first NAK_Map field or whether it, or the second NAK_Map, is associated with the NAK_Map_Seq field. Third, Seo '176 states:

is missing. If a value of the field NAK_TYPE is "00", the fields FIRST, LAST, FCS, padding, exist. If a value of the field NAK_TYPE is "01", the field NAK_MAP_COUNT exits. If a value of the field NAK_MAP_COUNT+1 exists, there exist the fields NAK_MAP_SEQ and NAK_MAP.

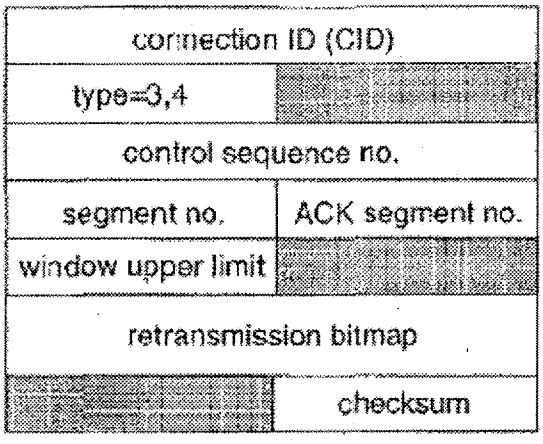
(Seo '176 at Col. 6 at 18-22). Seo '176 does not explain what "[i]f a value of the field NAK_MAP_COUNT+1 exists" means, nor would one of ordinary skill in the art understand its meaning from this disclosure. As such, a person of ordinary skill the art would not know how to properly use the NAK control frame of Seo '176 without undue experimentation.

b) Gong 1996 Article

606. Gong proposes use of Segment Streaming Transport Protocol ("SSTP") over other protocols, such as SNR, which involves the periodic exchange of state information between the sender and receiver. Gong posits that SSTP is superior in that it minimizes the total number of transmission rounds, resulting in diminished retransmission overhead. Thus, SSTP reduces the total number of transmission rounds rather than the number of packets. This is distinguished from the '215 patent, which focuses on reducing the size of feedback responses.

(1) Gong 1996 Article Does Not Disclose a "type identifier field" as Required by All Asserted Claims of the '215 Patent.

607. Gong explains that PACKs and SNAKs are the two types of acknowledgements SSTP uses to convey information regarding which packets have been accepted and which need retransmitting. A PACK informs the sender that certain segments have been accepted and can be released, while a SNAK is used to request retransmissions from the sender. Accordingly, disclosed within Gong is the use of two different feedback messages: PACKs and SNAKs, depicted as type 3 or 4, respectively, in the following diagram:



(b)

Gong 1996 article at 674.

608. What Gong lacks, however, is disclosure of a type identifier field. Neither PACK nor SNAK includes a type identifier field, disclosing the type of feedback and allowing the format of the feedback to change based on that type.

c) Mansfield '249 Patent

609. While the '215 patent is focused on reducing the size of the feedback responses, Mansfield focuses on reducing the message traffic through the use of an aggregated acknowledgement message ("AACK") indicating which data segments were successfully transmitted to date, thus, eliminating the retransmission of those segments successfully received, while transmitting those segments not successfully received.

(1) Mansfield '249 Patent Does Not Disclose a "type identifier field" as Required by All Asserted Claims of the '215 Patent.

610. Mansfield discloses the use of an AACK to indicate those segments successfully and, thus, unsuccessfully received as a means to reduce message traffic. Nowhere does Mansfield teach the use of a "type identifier field" as required by every asserted claim of the '215 patent. FIG. 9A of Mansfield sets forth an exemplary AACK, essentially the crux of the Mansfield invention:

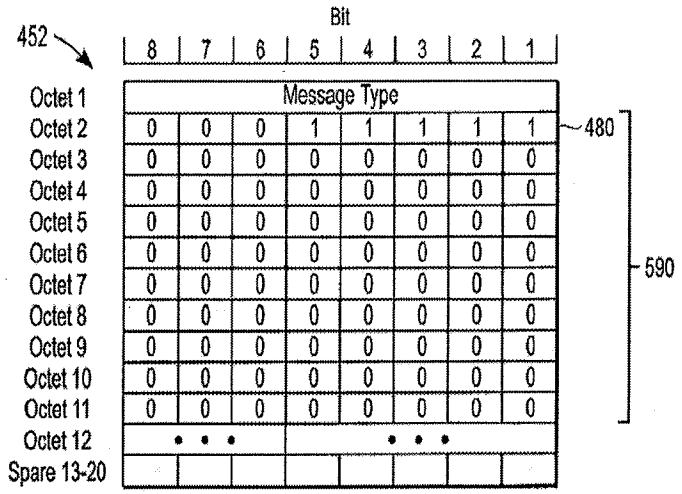


FIG. 9A

Mansfield '249 Patent at FIG. 9A.

611. As Mansfield explains,

> The AACK message **452**, generally depicted in **FIG. 9A**, has the first five bits of its bit map **485** set to a value of one. Specifically, bits one through five of the second octet **480** of AACK message **452** are each set to a value of one, indicating that data segments one through five respectively were successfully transmitted.

Id. at col. 13, ll. 16–21. There is, thus, simply no disclosure of the requisite "type identifier field" in Mansfield.

d) Lucent January 1999 Submission

612. Lucent January 1999 Submission sets forth a proposal to manage the longer bitmaps associated with the larger window sizes that are required in EGPRS. Part of that proposal includes, among other techniques, transmission of ARQ feedback through the use of bitmaps indicating those individual RLC blocks that are received and not received (ACK/NACK). Thus, while the focus of the '215 patent is reduction of the size of feedback responses, the Lucent January 1999 Submission discusses and seeks out additional techniques for the efficient transmission of the longer bitmaps required in EGPRS.

(1) Lucent January 1999 Submission Does Not Disclose a "type identifier field" as Required by All Asserted Claims of the '215 Patent.

613. One of the techniques discussed in Lucent January 1999 Submission to efficiently transmit the longer bitmaps required in EGPRS is the use of fields that define the feedback message—ACK and NACK—which indicate the RLC blocks received and not received:

> As in GPRS, ARQ feedback in EGPRS will be provided through the use of bitmaps indicating the received/not received (ACK/NACK) status of individual RLC blocks. For example, a 0 is used to indicate that a particular RLC block has not been correctly received; a 1 is used to indicate that a particular RLC block has been correctly received.

Lucent January 1999 Submission at 1.

614. Nowhere in the Lucent January 1991 Submission, however, is there even a mention of a "type identifier field," let alone disclosure of such a field indicating what type the feedback message is and a change in the formatting based on that type.

e) Lucent March 1999 Submission

615. Lucent March 1999 Submission is a follow-up of the January submission. While the January submission set forth bitmap size distribution, bitmap compressibility, and schemes for management of ACK/NAK signaling, the Lucent March 1999 Submission investigates bitmap compression schemes based on the ITU T.4 standard.

(1) Lucent March 1999 Submission Does Not Disclose a "type identifier field" as required by all asserted claims of the '215 patent

616. Because of the focus of Lucent March 1999 Submission—bitmap compression schemes—the use of fields that define the feedback message—ARQ feedback indicating the block was received or not received—is only discussed in passing:

> ARQ feedback in EGPRS is provided through the use of bitmaps indicating the receipt status of individual RLC blocks. A 0 is used to indicate that a particular block has not been received and a 1 is used to indicate that a particular RLC block has been correctly received.

Lucent March 1999 Submission at 1.

617. With Lucent March 1999 Submission's focus nearly entirely on the disclosure and testing of a compression algorithm for the bitmap, there is no mention of a "type identifier field," let alone disclosure of such a field indicating what type the feedback message is and a change in the formatting based on that type.

f) WCDMA RLC Protocol

618. WCDMA RLC Protocol describes the RLC protocol—a protocol that provides a range of transport services between an RLC peer entities, such as an RLC entity in the UE and an RLC entity in the UTRAN. In peer-to-peer communication, PDUs are exchanged between peer RLC entities:

> **3. Acknowledged mode data transfer**
> RLC receives PDUs through one of the logical channels from the MAC sublayer. The PDUs are placed in the receiver buffer until a complete SDU has been received. The receiver buffer requests retransmissions of PDUs by sending negative acknowledgements to the peer entity. After that the headers are removed from the PDUs and the PDUs are reassembled into a SDU. Finally the SDU is delivered to the higher layer.

WCDMA RLC Protocol at 10.

619. The RLC PDU names and descriptions are provided below:

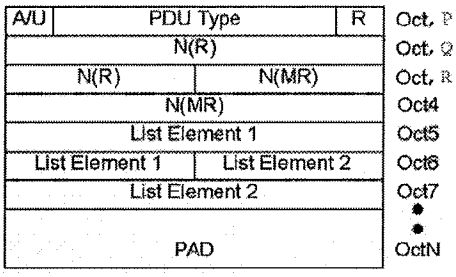
Functionality	PDU name	Description
Establishment	BGN	Request Initialization
	BGAK	Request Acknowledgement
	BGREJ	Connection Reject
Release	END	Disconnect Command
	ENDAK	Disconnect Acknowledgement
Acknowledged Data Transfer	AMD	Sequenced acknowledged mode data
	STAT	Solicited Status Report
	USTAT	Unsolicited Status Report
Unacknowledged Data Transfer	UMD	Sequenced unacknowledged mode data

Id. at 15. The USTAT PDU set forth above

is transmitted upon detection of an erroneous transmission of one or more data PDUs. It is used to inform the transmitter side about missing AMD PDUs at the receiver RLC.

620. *Id.* The WCDMA RLC Protocol describes the use of fields that define the feedback messages. For example, for the USTAT PDU, the "PDU Type" is a field contained therein:

USTAT PDU



(1) WCDMA RLC Protocol Does Not Disclose a "type identifier field" as Required by All Asserted Claims of the '215 Patent.

621. While the WCDMA RLC Protocol discloses fields defining the feedback message in the form of "PDU Type," there is no disclosure of a "type identifier field." There is, thus, an absence of a field that indicates the type of feedback and allows a formatting change based on that particular type.

g) Wilson '526 Patent

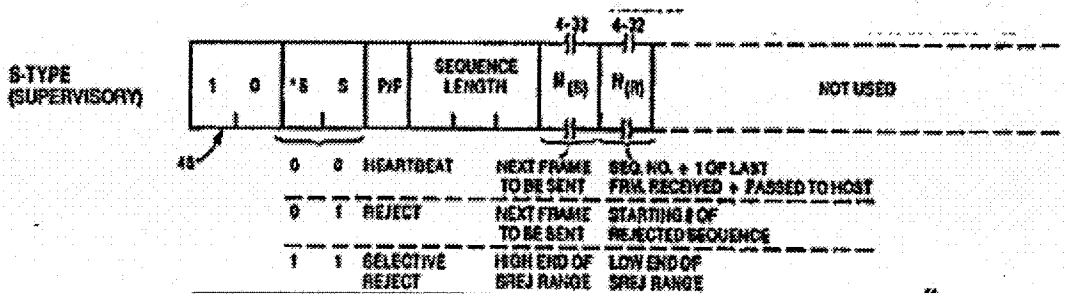
622. Among other aspects of the invention disclosed in Wilson is the use of a receiving station sending a single acknowledgement message that specifies the upper and lower limits of a range of identification numbers of frames unsuccessfully received, which eliminates the need to send messages for each identification number for each frame not received, thus, improving the efficiency of the system.

(1) Wilson '526 Does Not Disclose a "type identifier field" as Required by All Asserted Claims of the '215 Patent.

623. Wilson discloses a field that defines the feedback message in the form of a "heartbeat," "reject," or "selective reject" message types within the supervisory or S type frame:

> The supervisory type frame is used to send a reject, a selective reject, or a status message called a heartbeat, along with the designation of the frame which is being selectively rejected, or the first frame of the sequence which is being rejected

624. Wilson '526 at col. 13, ll. 50–55. The supervisory type frame, as well as the field defining the feedback message of "heartbeat," "reject," and "selective reject," is shown below:



Id. at FIG. 3. The foregoing excerpt from FIG. 3 is discussed in detail below:

> An S type frame is identified by a logic 1 in the first bit and a logic 0 in the second bit of the control block. The logical value of bits 3 and 4 of the control block indicate whether the transmitting/receiving station from which the frame was sent: (1) is sending a heart beat (0,0); (2) is rejecting a sequence of frames starting at the indicating sequence number (0,1); or (3) is selectively rejecting the frame for the indicated sequence number (1,1).

Id. at col. 14, ll. 27–35.

625. Accordingly, the foregoing makes clear that while Wilson discloses fields that define the feedback message (of "heart beat," "reject," or "selective reject" within the supervisory type frame), it does not disclose what type the feedback message is and, thus, lacks the claimed "type identifier field" disclosed in the '215 patent.

h) Drynan '657

626. Drynan discloses a procedure for the transmission and acknowledgement of information in a packet data transmission system to ensure only those packets not received are retransmitted, resulting in a more efficient system. In contrast, the focus of the '215 patent is the reduction of the size of feedback responses.

(1) Drynan '657 Does Not Disclose a "type identifier field" as Required by All Asserted Claims of the '215 Patent.

627. The procedure disclosed in Drynan '657 for the transmission and acknowledgement of information in a packet data transmission system involves the use of a control field:

> The control field of each information packet includes a bit which indicates whether or not there is a piggybacked acknowledgement.

628. Drynan '657 at Abstract. Drynan '657 describes other means of transmitting the acknowledgement of receipt of packets:

> Acknowledgements can also be transmitted separately in control packets having no information field. Each acknowledgement consists of not only the sequence number of a correctly received information packet, but also the acknowledgement status of a plurality of preceding information packets whereby these can be negatively acknowledged if necessary.

Id.

629. The use of piggybacking to acknowledge successful receipt of information packets is discussed below and illustrated in FIG. 5:

> In general, correctly received packets are acknowledged by each node by piggybacking the acknowledgements onto the control fields of information packets which are being transmitted. However, this piggybacking is effected selectively to provide for efficient transmission of acknowledgements between the nodes. The type bit in the first byte of the control field of each information packet serves to indicate whether or not an acknowledgement is piggybacked onto the control field. In the upper diagram in FIG. 5, there is no piggybacked acknowledgement and this type bit (the second bit as shown) is 0. Such a situation will occur when, for example, a node is transmitting more information packets than it is receiving, so that not all of the information packets being transmitted need to carry acknowledgements. In the lower diagram in FIG. 5, the type bit is 1 and an acknowledgement, comprising at least one byte 52 and possibly 1 or 2 further bytes 54, is piggybacked onto the control field.

630. *Id.* at col. 6, ll. 27–45.

> The second bit (as illustrated) is a type bit which is 1, as shown in the middle diagram of FIG. 5, for an acknowledgement control field and is 0, as shown in the upper and lower diagrams of FIG. 5, for other control packets which are discussed further below. The third bit is an extension bit E which is reserved for future extension purposes. This is unused in this embodiment, but for example could be used in acknowledgement control fields to indicate the presence of multiple acknowledgements in a single control packet.

631. *Id.* at col. 7, ll. 28–37.

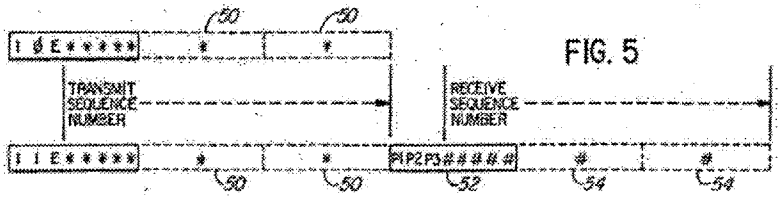


FIG. 5

632. *Id.* at FIG. 5. Thus, Drynan '657 discloses a field that defines the feedback message. However, no "type identifier field" is disclosed, which would allow for identification of the type of feedback and formatting change based on that type.

i) Schiebel '240 Patent

633. Schiebel discloses a method and apparatus for conveying data between communications devices, so as to utilize the most efficient means to retransmit corrupted data by

employing a modulation rate specific to the quantity of data blocks to be retransmitted. This results in efficient use of the radio frequency (RF) channel bandwidth. Thus, while Schiebel focuses on the use of a modulation rate that corresponds to the quantity of retransmitted data blocks as a means to efficiently use bandwidth, the '215 Patent is focused on reducing the size of feedback responses.

(1) Schiebel '240 Patent Does Not Disclose a "type identifier field" as Required by All Asserted Claims of the '215 Patent.

634. Schiebel discloses the use of fields that define the feedback message, as set forth in the text and FIG. 2 below:

> Upon receiving data message **220**, the target communication device responds with another acknowledgment message **226**. ACK message **226** comprises a message header **227** and a bitmap. The bitmap in this case contains two bit positions **228, 229** corresponding to data blocks **222, 223**, respectively. Acknowledgment message **226** indicates that one data block (data block **223**) was not received by the target communication device. Therefore, the data contained in data block **223** must be resent to the target communication device.

635. Schiebel '240 Patent at col. 5, ll. 8–17.

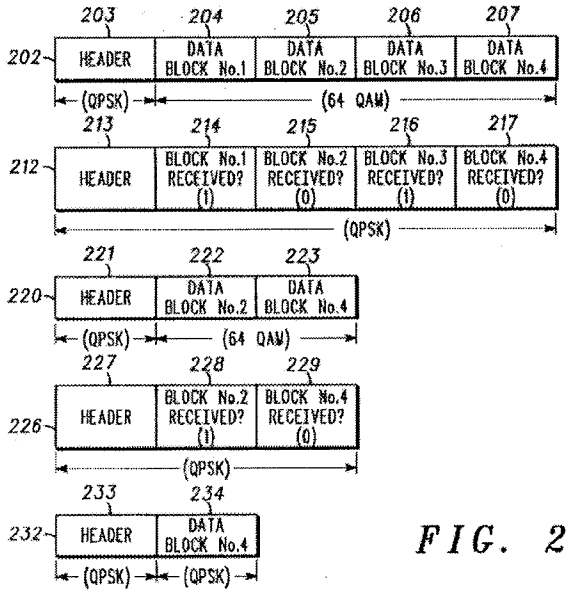


FIG. 2

636. *Id.* at FIG. 2. While Schiebel discloses fields defining feedback messages, there is no disclosure of a "type identifier field," which indicates the type of feedback and changes the format of the feedback based on the type.

j) Petras ComNets Submission

637. Petras provides a detailed description of a candidate protocol stack for a wireless ATM air interface. Within that proposed protocol stack is an "SR/D-ARQ protocol for the real-time oriented CBR and VBR services". Petras ComNets Submission at 16. Petras sets forth an acknowledgement strategy, recognizing that:

- frequent transmission of acknowledgements enables earlier retransmissions and reduces cell delays
- acknowledgements compete with information frames and thus increase delays

638. *Id.* at 22. To effectively address these competing factors, Petras discloses the prioritizing of acknowledgements to be transmitted. The focus of Petras, thus, differs from that of the '215 Patent, which is focused on reducing the size of feedback responses.

(1) Petras ComNets Submission Does Not Disclose a "type identifier field" as Required by All Asserted Claims of the '215 Patent.

639. While Petras discloses an acknowledgement strategy that employs prioritization of acknowledgements to balance the need to frequently transmit acknowledgements to reduce cell delays with the fact that acknowledgements compete with information frames and increase delays, there is no disclosure of a "type identifier field" that identifies what type the feedback message is and changes the formatting of that feedback message based on that type.

k) Ayanoglu '759 Patent

640. Ayanoglu discloses a restoration mechanism for use in ATM networks having wireless links, whereby a failure message is generated to indicate the failure of a network element and to identify the particular failed element, so as to eliminate that failed element from

the routes in the ATM networks. In contrast to Ananoglu, the '215 Patent is focused on reducing the size of the feedback responses.

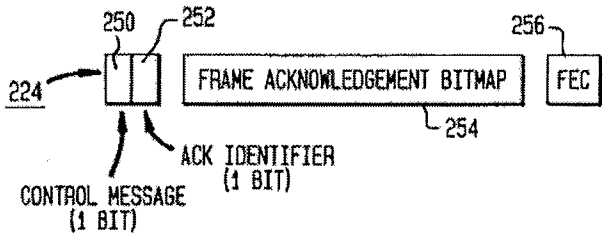
(1) Ayanoglu '759 Patent Does Not Disclose a "type identifier field" as Required by All Asserted Claims of the '215 Patent.

641. Ayanoglu discloses fields that define the feedback message—namely, the "ACK identifier":

> Referring to FIG. **22**, there is shown one preferred representation of a block acknowledgment (ACK) control message **224**. The ACK message is transmitted from the receiver of a transmission to the transmitter of that transmission in order to acknowledge the receipt of messages. As has been described previously, there are three types of control messages, ACK, BOF and EOF. Each control message begins with a control message identified field **250** (1 bit) that is equal to 0, thereby identifying the message as a control message. A second field **252** is an ACK identifier, also 1 bit, which is set to 0 so as to identify this message as an acknowledgment message.

642. Ayanoglu '759 Patent at col. 20, ll. 16–27. FIG. 22 described above is set forth below:

FIG. 22



643. *Id.* at FIG. 22. While Ayanoglu discloses fields that define the feedback message (the "ACK identifier"), no disclosure is made of a "type identifier field" as claimed in the '215 Patent.

3. Response to Alleged Obviousness Combinations

a) Combination of SSCOP Protocol with GPRS Radio Interface

644. SSCOP discloses a peer-to-peer protocol for the transfer of information and control between SSCOP entities, and it specifies the interactions between SSCOP and an SSCF,

SSCOP and the AAL Common Part, and SSCOP and the AAL management plane. In specifying those interactions, SSCOP discloses "STAT and USTAT PDU codings". SSCOP Protocol at p. 16, § 7.2.5. The PDU names, as well as the PDU type field, description, and functionality are set forth in Table 2/Q.2110 of SSCOP. STAT and USTAT PDU codings are defined as follows:

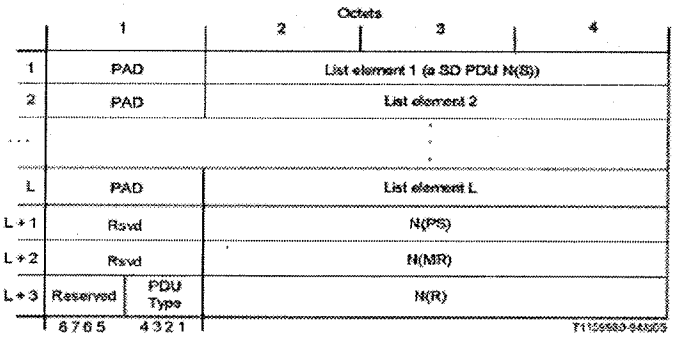
l) STAT PDU (Solicited Status Response)

The **STAT PDU** is used to respond to a status request (POLL PDU) received from a peer SSCOP entity. It contains information regarding the reception status of SD PDUs, credit information for the peer transmitter, and the sequence number [N(PS)] of the POLL PDU to which it is in response.

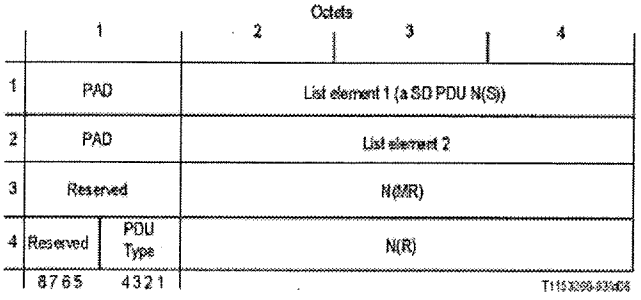
m) USTAT PDU (Unsolicited Status Response)

The **USTAT PDU** is used to respond to a detection of one or more new missing SD PDUs, based on the examination of the sequence number of the SD PDU. It contains information regarding the reception status of SD PDUs and credit information for the peer transmitter.

645. *Id.* at 10, § 7.1. Figures 5/Q.2110 and 6/Q.2110 set forth the format of the STAT PDU and USTAT PDU, respectively:



646. *Id.* at 11, Figure 5/Q.2110: Solicited Status PDU (STAT PDU).



647. *Id.* at 12, Figure 6/Q.2110: Unsolicited Status PDU (USTAT PDU).

648. GPRS Radio Interface provides a description of lower-layer functions of GPRS radio interface, including:

- The services offered to higher-layer functions,
- The distribution of required functions into functional groups,
- A definition of the capabilities of each functional group and their possible distribution in the network equipment,
- Service primitives for each functional group, including a detailed description of what services and information flows are to be provided, and
- A model of operation for information flows within and between the functions.

649. GPRS Radio Interface at 9. Given the focus of GPRS Radio Interface, it does not disclose fields defining the feedback message, as found in SSCOP Protocol.

(1) Neither of SSCOP Protocol nor GPRS Radio Interface Discloses a "type identifier field" as Required by All Asserted Claims of the '215 Patent.

650. One of ordinary skill would not have been motivated to combine SSCOP Protocol with GPRS Radio Interface or use the methods and instrumentalities disclosed in SSCOP Protocol in practicing or creating the methods and instrumentalities disclosed in GPRS Radio Interface, and/or vice versa. The fact that individuals who authored those references were members of common technical organizations and the references involve the same subject matter is not sufficient motivation to combine those references.

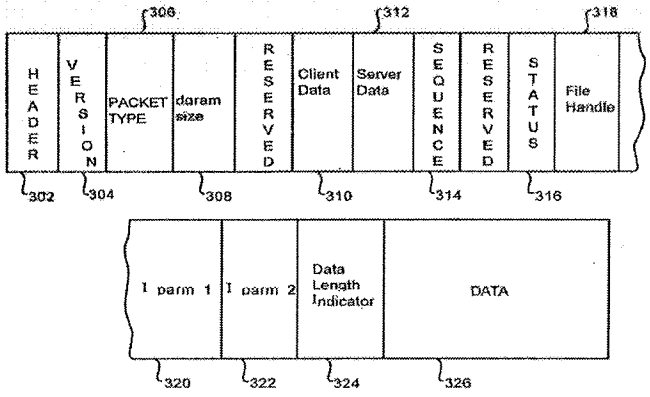
651. Moreover, as set forth above, SSCOP Protocol discloses fields that define the feedback message—specifically the "PDU Type" field. It does not, however, disclose a "type identifier field" that indicates the type of feedback and changes the format of the feedback based on that type. Likewise, GPRS Radio Interface provides no disclosure for the "type identifier field" element of the '215 Patent. Accordingly, assuming *arguendo* that there was a motivation to combine those two references, which there was not, given that neither discloses the "type identifier field" element of the '215 Patent, such motivation would be immaterial.

b) Combination of Intel Day '116 Patent with Intel Drottar '704 Patent

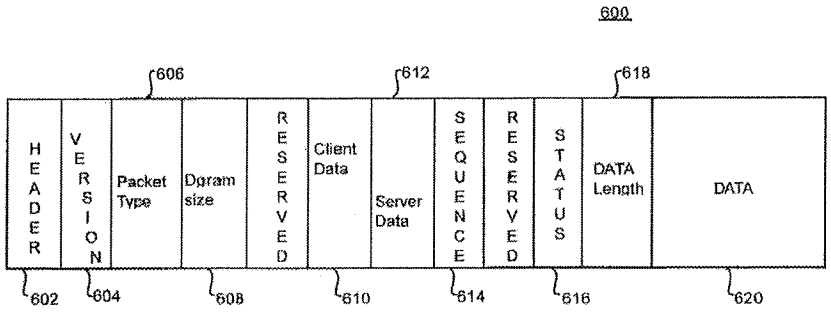
652. Intel Day discloses a network management service for facilitating the management of network management applications. Part of that network management service is use of a field that defines the feedback message, in the form of a "packet type field":

> The packet type field **306** of file transfer datagram **300** indicates the request or reply type for the current packet. For example, packet type **306** will indicate whether the current request is an open, close, cancel, etc. The dgram_size field **308** specifies the maximum packet size that can be accepted by the sender of the datagram (i.e., datagram **300**).

653. Intel Day '116 Patent at col. 7, ll. 20–25. FIG. 3 sets forth an example file transfer datagram containing the "packet type field":



654. *Id.* at FIG. 3. The packet type field is also represented in FIG. 6, which is an example of a datagram communication packet:



Id. at FIG. 6.

655. While Intel Day discloses a field that defines the feedback message, Intel Drottar does not. Intel Drottar is focused on solving

> the problem of developing a method and apparatus for controlling the flow of data between nodes in a system area network that improves the efficiency of the communication without overly complicating the processing at the receiving end.

Intel Drottar '704 Patent at col. 27, ll. 27–31.

(1) Neither of Intel Day '116 Patent nor Intel Drottar '704 Patent Discloses a "type identifier field" as Required by All Asserted Claims of the '215 Patent.

656. There was no motivation to combine Intel Day with Intel Drottar, nor was there a motivation to use the methods and instrumentalities disclosed in Intel Day in practicing or creating the methods and instrumentalities disclosed in Intel Drottar, and/or vice versa. The fact that individuals who authored those references were from the same company, those references share common subject matter, and the patents applications were filed a year apart is not sufficient motivation to combine the teachings of those references. Even if there was such a motivation, because neither reference discloses a "type identifier field", which is required of every asserted patent claim, neither reference, either separately or in combination with one another anticipates or renders obvious the inventions disclosed in the '215 Patent.

c) Combination of Wilson '526 Patent with GPRS Radio Interface

657. There was no motivation to combine Wilson with GPRS Radio Interface, nor was there a motivation to use the methods and instrumentalities disclosed in Wilson in practicing or creating the methods and instrumentalities disclosed in GPRS Radio Interface, and/or vice versa. The fact that individuals who authored those references were members of common technical

organizations and that the references involve the same subject matter would not have been sufficient to motivate one of ordinary skill to combine the references' teachings.

(1) Neither of Wilson '526 Patent nor GPRS Radio Interface Discloses a "type identifier field" as Required by All Asserted Claims of the '215 Patent.

658. Even if there was a motivation to combine Wilson with GPRS Radio Interface, given that neither discloses a "type identifier field"—a requirement of all asserted claims of the '215 Patent—the references cannot individually or combined anticipate or render obvious the inventions claimed in the '215 Patent.

d) Combination of Drynan '657 Patent with GPRS Radio Interface

659. One of ordinary skill would not have been motivated to combine Drynan with GPRS Radio Interface or use the methods and instrumentalities disclosed in Drynan in practicing or creating the methods and instrumentalities disclosed in GPRS Radio Interface, and/or vice versa. The fact that individuals who authored those references were members of common technical organizations and the references involve the same subject matter is not sufficient motivation to combine those references.

(1) Neither of Drynan '657 Patent nor GPRS Radio Interface Discloses a "type identifier field" as Required by All Asserted Claims of the '215 Patent.

660. Even assuming that one of ordinary skill in the relevant field had been motivated to combine Drynan with GPRS Radio Interface, given that neither discloses a "type identifier field"—a requirement of all asserted claims of the '215 Patent—the references cannot on their own or combined with one another anticipate or render obvious the inventions claimed in the '215 Patent.

e) Combination of Lucent January 1999 Submission with the Lucent March 1999 Submission and GPRS Radio Interface

661. No motivation exists to combine Lucent January 1999 Submission with the Lucent March 1999 Submission and GPRS Radio Interface. That individuals who authored those references were members of common technical organizations and that the references involve the same subject matter is not sufficient motivation to combine the teachings disclosed in those references.

(1) None of Lucent January 1999 Submission, Lucent March 1999 Submission, or GPRS Radio Interface Discloses a "type identifier field" as Required by All Asserted Claims of the '215 Patent.

662. Even if one of ordinary skill in the relevant field had been motivated to combine Lucent January 1999 Submission with Lucent March 1999 Submission and GPRS Radio Interface, given that none of those references discloses a "type identifier field"—a requirement of all asserted claims of the '215 Patent—the references cannot on their own or combined with one another anticipate or render obvious the inventions claimed in the '215 Patent.

4. Response to Section 112 Arguments

a) "minimizing feedback responses in an ARQ protocol"

663. Drs. Heegard and Gibson argue that the independent claims of the '215 patent are invalid as indefinite, lacking written description and not enabled due to the phrase contained in the preamble "minimizing feedback responses in an ARQ protocol." In my opinion, a person of ordinary skill in the art would not read this portion of the preamble as a limitation of the claims. Rather, this describes a possible use for the claimed invention.

664. Regardless, this use is supported by the specification which explains that feedback responses can be minimized by switching between, for example, list and bitmap responses. The

patent even provides multiple tables indicating when to use different types of responses.[51] Based on this information, a person of skill in the art could use known techniques to implement the claimed invention. Accordingly, the independent claim preambles are supported by the specification such that a person of ordinary skill in the art would be enabled to practice the invention.

b) "responsive to the receiving step"

665. Drs. Heegard and Gibson argue that the independent claims of the '215 patent are invalid as indefinite, lacking written description and not enabled with regard to the limitation "responsive to the receiving step." However, the complete limitation reads: "responsive to the receiving step [i.e. 'receiving said plurality of first data units'] constructing a message field for a second data unit." The second data unit referenced in the claim is the feedback response. The '215 patent provides ample disclosure that this feedback response is generated in response to receiving data units. It also describes how to construct the feedback response and provides exemplary figures.[52]

c) "means for receiving said plurality of first data units, and constructing one to several message fields for a second data unit, said one to several message fields including a type identifier field and at least one of a sequence number field, a length field, a content field, a plurality of erroneous sequence number fields, and a plurality of erroneous sequence number length fields, each of said plurality of erroneous sequence number fields associated with a respective one of said plurality of erroneous sequence number length fields"

666. Drs. Heegard and Gibson argue that the independent claims of the '215 patent are invalid as indefinite, lacking written description and not enabled with regard to the limitation quoted above. Drs. Heegard and Gibson appear to argue that this limitation is not supported in

[51] See generally '215 patent at 3:45-9:50.

[52] See generally '215 patent at 3:45-9:50, figures 1, 4-13.

the specification because the inventors do not disclose structure that supports this function and that minimizes the number of feedback responses in an ARQ protocol. Accordingly, this argument is duplicative of the other 112 arguments discussed above. Dr. Heegard also contends that to the extent this claim limitation requires disclosure of an algorithm, the patent does not disclose such an algorithm. However, the patent does explain how to select between list, bitmap, and hybrid feedback responses. Accordingly, the patent enables one of skill in the art to practice this use of the invention using known techniques.

X. CONCLUSION

667. As discussed throughout my report, it is my opinion that asserted claims 1-5 of the '568 patent are valid. Specifically, it is my opinion that none of the references cited by Dr. Gibson or Dr. Heegard, alone or in combination, render the asserted claims of the '568 patent invalid.

668. As discussed throughout my report, it is my opinion that asserted claims 19 and 22-24 of the '019 patent are valid. Specifically, it is my opinion that none of the references cited by Dr. Gibson or Dr. Heegard, alone or in combination, render the asserted claims of the '019 patent invalid.

669. As discussed throughout my report, it is my opinion that asserted claims 1-3, 11-14, 19, 21, and 22 of the '223 patent are valid. Specifically, it is my opinion that none of the references cited by Dr. Gibson or Dr. Heegard, alone or in combination, render the asserted claims of the '223 patent invalid.

670. As discussed throughout my report, it is my opinion that asserted claim 1 of the '625 patent is valid. Specifically, it is my opinion that none of the references cited by Dr.

Gibson or Dr. Heegard, alone or in combination, render the asserted claim of the '625 patent invalid.

671. As discussed throughout my report, it is my opinion that asserted claims 1 and 2 of the '435 patent are valid. Specifically, it is my opinion that none of the references cited by Dr. Gibson or Dr. Heegard, alone or in combination, render the asserted claims of the '435 patent invalid.

672. As discussed throughout my report, it is my opinion that asserted claims 1, 2, 4, 6, 8, 25, 26, 29, 32, 34, 45, 46, 49, 52, and 54 of the '215 patent are valid. Specifically, it is my opinion that none of the references cited by Dr. Gibson or Dr. Heegard, alone or in combination, render the asserted claims of the '215 patent invalid.

673. I reserve the right to amend or supplement my opinions upon any future finding by the Court regarding claim construction, or receipt of any additional information.

Scott M. Nettles Ph.D.

February 12, 2013

Scott M. Nettles Ph.D.