

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

LG ELECTRONICS INC.,

Petitioner,

v.

PANTECH WIRELESS, LLC,

Patent Owner.

Case IPR2023-01272

U.S. Patent No. 9,065,486

DECLARATION OF FRIEDHELM RODERMUND
IN SUPPORT OF A PETITION FOR *INTER PARTES* REVIEW OF
U.S. PATENT NO. 9,065,486

TABLE OF CONTENTS

	Page
I. INTRODUCTION AND ENGAGEMENT	1
II. BACKGROUND AND QUALIFICATIONS	4
III. SUMMARY OF MY OPINIONS	9
IV. OVERVIEW OF 3GPP BUSINESS PRACTICES	11
A. Overview of 3GPP.....	11
B. 3GPP FTP Server and Website	13
1. The Internet Archive	15
C. 3GPP Working Groups.....	17
D. Technical Contributions to 3GPP Working Groups	18
E. 3GPP Technical Specifications	24
F. 3GPP Email Exploders and Archives	35
G. 3GPP Working Group Meetings	39
V. PUBLIC AVAILABILITY OF SPECIFIC DOCUMENTS.....	41
A. T-doc R1-01-1014 (Ex. 1006) and T-doc R1-01-1081 (Ex. 1087).....	42
1. Authentication.....	42
2. Distribution Via 3GPP_TSG_RAN_WG1 Reflector	43
3. Available On 3GPP Public FTP Server	44
4. Distribution at RAN WG1 HSDPA Ad-Hoc	51
5. Contemporaneous Citation to R1-01-1014.....	53
6. Conclusion	53
B. T-doc R1-01-1047 (Ex. 1007).....	54
1. Authentication.....	54
2. Available On 3GPP Public FTP Server	55
3. Distribution at RAN WG1 HSDPA Ad-Hoc	60
4. Conclusion	61
C. TS 25.212 V5.1.0 (Ex. 1008)	62

Declaration of Friedhelm Rodermund

1.	Authentication.....	62
2.	Publication by 3GPP and ETSI.....	62
3.	Available On 3GPP Public FTP Server and 3GPP Website.....	64
4.	Contemporaneous Citation to TS 25.212 V5.1.0.....	71
5.	Conclusion	72
D.	TS 25.212 V3.5.0 (Ex. 1036)	72
1.	Authentication.....	72
2.	Publication by 3GPP and ETSI.....	73
3.	Available On 3GPP Public FTP Server and 3GPP Website.....	75
4.	Conclusion	81
E.	TS 25.222 V3.8.0 (Ex. 1011)	81
1.	Authentication.....	81
2.	Publication by 3GPP and ETSI.....	82
3.	Available On 3GPP Public FTP Server and 3GPP Website.....	84
4.	Conclusion	90
VII.	RIGHT TO SUPPLEMENT.....	91
VIII.	SIGNATURE	91

Declaration of Friedhelm Rodermund

I, Friedhelm Rodermund, do hereby declare as follows:

I. INTRODUCTION AND ENGAGEMENT

1. I have been retained in this matter by the Petitioner to provide testimony regarding the standard business practices of 3rd Generation Partnership Project (“3GPP”) for record keeping and publishing technical specifications, change request proposals, reports, and other documents developed during the course of standards activities carried out by 3GPP and the European Telecommunications Standards Institute (“ETSI”).¹

2. I have been asked to provide my opinions regarding the authenticity and date the following 3GPP documents were made available to the public, and the manner in which a person of ordinary skill in the art (POSITA) exercising reasonable diligence would have been able to locate the documents:

- T-doc R1-01-1014, which represents a 3GPP document with the title
“A New Hybrid-ARQ Scheme Using Incremental Redundancy”

¹ Each of Exs. 1051 - 1119 is a true and correct copy of the webpage or document available at the hyperlink associated with the exhibit, as identified herein, except that each page includes an exhibit label and page numbers on the bottom right corner added by counsel. Although the format of some screen captures may be arranged in a different manner than their corresponding exhibits, they both reflect the same information for purposes of my opinions herein. Moreover, the screen captures herein may reflect an excerpt of a larger webpage or document, with the full webpage or document available in the referenced exhibit.

(hereinafter “R1-01-1014”) (Ex. 1006) and T-doc R1-01-1081, which represents a 3GPP document with the title “A New Hybrid-ARQ Scheme Using Incremental Redundancy” (hereinafter “R1-01-1081”) (Ex. 1087) (which incorporates the disclosures of R1-01-1014).

- T-doc R1-01-1047, which represents a 3GPP document with the title “Overview of Proposed Schemes for Incremental Redundancy” (hereinafter “R1-01-1047”) (Ex. 1007)
- Version 5.1.0 of technical specification 3GPP TS 25.212 (“Technical Specification Group Radio Access Network; Multiplexing and channel coding (FDD) (Release 5)”) (hereinafter “TS 25.212 V5.1.0”) (Ex. 1008)
- Version 3.5.0 of technical specification 3GPP TS 25.212 (“Technical Specification Group Radio Access Network; Multiplexing and channel coding (FDD) (Release 3)”) (hereinafter “TS 25.212 V3.5.0”) (Ex. 1036)
- Version 3.8.0 of technical specification 3GPP TS 25.222 (“Technical Specification Group Radio Access Network; Multiplexing and channel coding (TDD) (Release 1999)”) (hereinafter “TS 25.222 V3.8.0”) (Ex. 1011)

Declaration of Friedhelm Rodermund

3. I have been informed that Petitioner is asserting that a person of ordinary skill in the art (POSITA) in 2002 would have had a bachelor's degree in electrical and computer engineering, computer science, or the equivalent thereof, and at least two years of experience with networking and wireless communication systems. I further understand that the Patent Owner has not yet provided its proposed definition of a POSITA.²

4. As an ETSI Project Manager and Secretary, from June 1998 to December 2004, I have personal knowledge of 3GPP's standard business and records keeping practices. I continued following 3GPP's work ever since. Thus, based on my experience, personal knowledge, and review of 3GPP's business records, I am able to testify regarding the authenticity of certain documents published by 3GPP and the timing of their publication.

5. I am also knowledgeable about document management practices and the usage of email reflectors in 3GPP TSG RAN WG1. This is due to the fact that all 3GPP working groups used the same document repository on <ftp.3gpp.org> and all working groups use the same email exploder tool. Thus, I'm able to testify regarding the availability and authenticity of any 3GPP documents.

² Regardless, for the reasons discussed herein, a person having a bachelor's degree in an engineering discipline or in computer science in 2001/2002 would have had the requisite computer skills to locate materials using the available tools on the 3GPP website and FTP server.

Declaration of Friedhelm Rodermund

6. I am being compensated for my time spent on this matter at my usual rate of €450 per hour. My fee is not contingent on the outcome of this or any matter, or on the content of any of the testimony I give in this declaration. I have no financial interest in the Petitioner. I have been informed that Pantech Wireless, LLC (“Pantech” or “Patent Owner”) is the current assignee of U.S. Patent No. 9,065,486 (“the ’486 Patent”) (Ex. 1001). I have no financial interest in the Patent Owner or the ’486 patent.

7. In forming my opinions, I have considered the cited exhibits, including the exhibits identified in Appendix B, and my academic and professional training and experience in the field of wireless communications and standards development as described herein. While my opinions are organized into various chapters, my opinions expressed herein are supported by the entirety of the declaration.

II. BACKGROUND AND QUALIFICATIONS

8. I have more than 20 years of experience working with standards development organizations including 3GPP, ETSI, and the Open Mobile Alliance (“OMA”). I have particular experience with the development of standards related to cellular telecommunications, including the standards for the Universal Mobile Telecommunications System (“UMTS”), Long Term Evolution (“LTE”), and 5G, which are all standards developed by the 3GPP.

Declaration of Friedhelm Rodermund

9. I attended the University of Technology Aachen in Aachen, Germany, where I performed graduate studies in Electrical Engineering with a focus on telecommunications technologies (“Dipl.-Ing. TH” degree). I also attended the University of Technology Trondheim in Trondheim, Norway, and completed my Diploma thesis, “Design of a dual processor computer for digital signal processing in power electronics,” in 1993.

10. From December 1993 to June 1998, I worked at Mannesmann Mobilfunk as a System Engineer and Project Manager in Quality Assurance and Technical Standards. One of my responsibilities was to ensure by managing and performing related test activities that cellular network equipment was compatible with the Global System for Mobile Communications (“GSM”) standard developed by ETSI. During that time, I also started working as a standards delegate. I attended my first ETSI meeting in 1996 (although I was already following ETSI developments from 1992 during my studies).

11. From June 1998 to December 2004, I worked at ETSI as a project manager for various ETSI Special Mobile Group (“SMG”) and 3GPP working groups. First, I served as a secretary of SMG4 “Data Services” and SMG8 “Base Stations Testing.” Then, as a project manager with the ETSI Mobile Competence Center (“MCC”), I supported establishing 3GPP as the new international standards development organization for cellular telecommunications. One of my roles was

Declaration of Friedhelm Rodermund

acting as Secretary for 3GPP's Technical Specifications Group Terminals, Working Group ("T2"), the group which played a leading role in the creation of standards for Multimedia such as the Multimedia Messaging Service ("MMS").

12. Later, I was a secretary of the highest-level Technical Specifications Group Terminals, which, in addition to other things, was responsible for the development of test specifications including tests for the radio interface.

13. I edited all technical specifications produced by my working groups and presented results to the parent body for approval. I attended all meetings (apart from some sub-working group meetings) and was also responsible for compiling meeting reports, for handling all the meeting documents, and managing the work plan. It was also my role to guide the groups and to advise the chairmen regarding 3GPP working methods and procedures including document handling, and to make sure delegates were aware of their company's obligations under the 3GPP Intellectual Property Rights policy.

14. As part of my responsibilities at ETSI, I acted as a 3GPP custodian of records by personally managing 3GPP's public File Transfer Protocol (FTP) folders, which I used to make publicly available various 3GPP documents, including versions of 3GPP specifications, technical reports, liaison statements, change requests, contributions, agendas, meeting reports, and other 3GPP documents from my working groups. I am also knowledgeable about document management

Declaration of Friedhelm Rodermund

practices used in other working groups and within 3GPP in general with regard to making documents publicly available through the same public FTP server of 3GPP.

15. Since I left ETSI as a staff member in 2005, I have been continuously involved in standardization activities, including with OMA, ETSI, and 3GPP. Since 2017, I also have been attending the ETSI Intellectual Property Rights (“IPR”) Special Committee, which is responsible for the maintenance of the ETSI IPR Policy.

16. After I left ETSI, I worked from January 2005 to October 2014 at Vodafone, first as a Project Manager for Mobile Broadcast Standards, and then as Vice Chairman of the Device Management working group of the Open Mobile Alliance, and then as a Senior Standards Strategist, all with responsibilities as described on my curriculum vitae. At Vodafone, I was deeply involved in standards work with ETSI and 3GPP and other standards setting organizations, including as a delegate to 3GPP SA1 “Services.” As part of my responsibilities, I attended selected 3GPP meetings, submitted documents to 3GPP, used 3GPP resources (including 3GPP’s FTP server) extensively, and remained knowledgeable about 3GPP policies and procedures with regard to document management and public availability. I was also involved in the creation of patents, defense activities related to patent litigations, and patent evaluation, mostly in the context of standards development.

Declaration of Friedhelm Rodermund

17. Since leaving Vodafone in 2014, I have performed consulting work regarding Internet of Things (IoT) and Machine to Machine (M2M) technology and standards, first at Friedhelm Rodermund Consulting and then as the Founder and Director of IOTECC GmbH. In connection with my work, I regularly deal with standards such as OMA's Lightweight M2M (LwM2M) and 3GPP's LTE, Narrowband IoT (NB-IoT) and 5G standards. And I have extensively used 3GPP resources and have remained knowledgeable about 3GPP policies and procedures with regard to document management and public availability.

18. I also provide consulting services related to patents, in particular around 3GPP Standard Essential Patents ("SEPs"), and I have worked as an expert witness on a number of occasions. I continue to closely follow the maintenance of the ETSI IPR Policy as a delegate to the ETSI IPR Special Committee. Furthermore, I am conducting a seminar on SEPs and the Internet of Things at the Technical University of Ilmenau, Germany.

19. At the time of writing this declaration, I am following – including attending selected meetings – the following standards committees: ETSI oneM2M, ETSI IPR Special Committee, OMA, and 3GPP.

20. A copy of my curriculum vitae, which includes a detailed description of my experience and education, is attached as Appendix A. A list of litigation

matters on which I have worked over the last five years is also included in my curriculum vitae.

III. SUMMARY OF MY OPINIONS

21. It is my opinion that Ex. 1006 is an authentic copy of 3GPP T-doc R1-01-1014 that was disseminated on October 23, 2001 via email to at least 900 interested members of the public subscribed to the 3GPP_TSG_RAN_WG1 email reflector, including delegates of the 3GPP member companies; uploaded and made available via the 3GPP FTP server to the general public where interested members of the public, such as POSITAs, would have been able to locate the reference exercising reasonable diligence by January 28, 2002; discussed at the RAN WG1 HSDPA Ad-Hoc meeting on November 6, 2001 (at least as part of R1-01-1081); and made available to at least 60 attendees of the RAN WG1 HSDPA Ad-Hoc meeting by no later than November 7, 2001. It is also my opinion that Ex. 1087 is an authentic copy of 3GPP T-doc R1-01-1081 (which incorporates the disclosures of R1-01-1014) that was uploaded and made available via the 3GPP FTP server to the general public where interested members of the public, such as POSITAs, would have been able to locate the reference exercising reasonable diligence by January 28, 2002; discussed at the RAN WG1 HSDPA Ad-Hoc meeting on November 6, 2001; and made available to 60 attendees of the RAN WG1 WG1 HSDPA Ad-Hoc, by no later than November 6, 2001.

Declaration of Friedhelm Rodermund

22. It is my opinion that Ex. 1007 is an authentic copy of 3GPP T-doc R1-01-1047 that was uploaded and made available via the 3GPP FTP server to the general public where interested members of the public, such as POSITAs, would have been able to locate the reference exercising reasonable diligence by January 28, 2002; discussed at the RAN WG1 HSDPA Ad-Hoc meeting on November 6, 2001; and made available to at least 60 attendees of the RAN WG1 HSDPA Ad-Hoc meeting by no later than November 7, 2001.

23. It is my opinion that Ex. 1008 is an authentic copy of 3GPP TS 25.212 V5.1.0 that was published by 3GPP by no later than June 28, 2002; published by ETSI by no later than July 9, 2002; and uploaded and made available via the 3GPP FTP server to the general public where interested members of the public, such as POSITAs, would have been able to locate the reference exercising reasonable diligence by June 28, 2002.

24. It is my opinion that Ex. 1036 is an authentic copy of 3GPP TS 25.212 V3.5.0 that was published by 3GPP by no later than January 2, 2001; published by ETSI by no later than February 12, 2001; and uploaded and made available via the 3GPP FTP server to the general public where interested members of the public, such as POSITAs, would have been able to locate the reference exercising reasonable diligence by January 2, 2001.

25. It is my opinion that Ex. 1011 is an authentic copy of 3GPP TS 25.222 V3.8.0 that was published by 3GPP by no later than March 29, 2002; published by ETSI by no later than April 23, 2002; and uploaded and made available via the 3GPP FTP server to the general public where interested members of the public, such as POSITAs, would have been able to locate the reference exercising reasonable diligence by March 29, 2002.

IV. OVERVIEW OF 3GPP BUSINESS PRACTICES

A. Overview of 3GPP

26. Unless otherwise noted, the foregoing and following is an accurate description of 3GPP general practices from 1998 to the present, regardless of whether I use the present or past tense to describe those practices.

27. 3GPP was established in 1998 by a group of telecommunications standard development organizations from Japan, Korea, China, Europe, and the United States to jointly develop worldwide standards for mobile telecommunications. Today, 3GPP consists of seven partners: Association of Radio Industries and Businesses, Japan (“ARIB”), Alliance for Telecommunications Industry Solutions, USA (“ATIS”), China Communications Standards Association (“CCSA”), European Telecommunications Standards Institute (“ETSI”), Telecommunications Standards Development Society, India (“TSDSI”), Telecommunications Technology Association, Korea (“TTA”), and

Declaration of Friedhelm Rodermund

Telecommunication Technology Committee, Japan (“TTC”). In addition to being one of the founding partners, ETSI hosts the Mobile Competence Centre (“MCC”), which provides administrative and technical support for the day-to-day work of 3GPP. Furthermore, ETSI manages 3GPP’s IT services such as the 3GPP website, FTP server, and email exploders.

28. 3GPP is the world’s leading organization for developing and maintaining cellular telecommunications standards. When ETSI formed 3GPP to develop the next generation of 3G cellular standards in 1998, 3GPP adopted several of the business practices of ETSI and continues to use those practices today. As noted above and in my curriculum vitae, I began working for 3GPP, as part of my work at ETSI, the European-based organizational partner of 3GPP.

29. In the ordinary course of its regularly conducted business activities, and pursuant to its standard business practices, 3GPP publishes technical specifications, proposals, reports, and other documents related to the development of cellular telecommunications standards. Such documents are published for the purposes of discussion and establishment of industry standards for cellular telecommunications. This has been 3GPP’s ordinary course of business since I began working at ETSI in 1998.

30. By 1999, at least 100 companies were members of 3GPP (719 companies by December 2020), ranging from Bosch to Ericsson to Nokia to LGE to

Samsung and generally including those interested in the discussion, creation, and adoption of cellular telecommunications standards, including UMTS and LTE. Each of these companies typically delegated multiple individuals to regularly participate in 3GPP meetings.

31. Shortly after 3GPP's foundation in December 1998, its FTP server and email exploder lists became well-known to persons interested in the cellular telecommunications industry, including POSITAs, as a source of public information regarding industry standards and technological advances. 3GPP encourages the open and free exchange of information. Therefore, as discussed below, 3GPP materials, including those on the FTP server and shared by the email reflectors, T-docs, technical specifications, and other meeting materials such as agendas and meeting minutes are shared freely without any expectation of confidentiality.

B. 3GPP FTP Server and Website

32. In the ordinary course of 3GPP's regularly conducted business activities, and pursuant to its standard business practices, all draft technical specifications, proposals, reports, and other temporary documents to be discussed or considered in relation to 3GPP's telecommunications standards activities were, and continue to be, assigned a temporary document number and made publicly available and without restriction, including on the FTP server associated with the 3GPP website, currently residing at <ftp.3gpp.org>. Such documents are referred to as "T-

docs.” Final versions of the technical specifications also were, and continue to be, publicly available from that same FTP server.

33. As early as December 1998, 3GPP’s FTP server was freely accessible to the general public at <ftp.3gpp.org> or using the corresponding web interface to the server at <http://ftp.3gpp.org> or <http://3gpp.org/ftp/> with no login, password, or membership requirement.

34. The timestamp on 3GPP’s FTP server shows the date when the document was uploaded the last time. Thus, the timestamp shows the latest possible date the document became publicly available and accessible on 3GPP’s FTP server. The given document might have been available earlier and the original timestamp might have been overwritten because the document was uploaded again. According to my experience, this is something which happened occasionally. Thus, the FTP timestamp is reliable as the latest possible upload date, but one cannot determine whether it represents the first upload of a document to the FTP server.

35. 3GPP’s working practice to store their documents on its FTP server, as described above, has not changed over time. Starting from the first 3GPP meetings in 1998 until present, all WGs and plenary meetings are represented by dedicated meeting folders on the FTP server. These meeting folders include the documents discussed at the meetings. Both the folders and the documents are accessible to the public. Almost every week, a new meeting folder with the respective documents is

added. In addition to the plenary and WG meeting folders, and some other folders, there is also the “Specs” folder, which holds all 3GPP specifications including “snapshot” and archive folders. Since the early days of 3GPP a new folder is added inside the “Specs” folder after each TSG plenary meeting to hold the latest versions of specifications approved at those TSG plenary meetings. This is still 3GPP’s working practice today; thus, this practice has not changed over time.

36. 3GPP maintains a set of publicly available documents³ providing further details on its way of working:

- 3GPP Working Procedures
- Vocabulary for 3GPP Specifications 3GPP TR 21.905
- Working Methods 3GPP TR 21.900
- Specification Drafting Rules 3GPP TR 21.801

1. The Internet Archive

37. The Internet Archive is a non-profit organization that is not associated with 3GPP or ETSI.⁴ The Internet Archive, and its Wayback Machine tool, captures and archives copies of webpages that are freely available on the Internet. The

³ All available from <https://www.3gpp.org/delegates-corner/3gpp-working-procedures>. These documents are also available on the 3GPP FTP server.

⁴ <https://archive.org/about/>

Declaration of Friedhelm Rodermund

Internet Archive “automatically stores copies of files available via the Internet, [with] each file preserved as it existed at a particular point in time.”⁵

38. “The Internet Archive assigns a URL on its site to the archived files in the format `http://web.archive.org/web/[Year in yyyy][Month in mm][Day in dd][Time code in hh:mm:ss]/[Archived URL]` aka an ‘extended URL’. Thus, the extended URL `http://web.archive.org/web/19970126045828/http://www.archive.org/` would be the URL for the record of the Internet Archive home page HTML file (`http://www.archive.org/`) archived on January 26, 1997 at 4:58 a.m. and 28 seconds (1997/01/26 at 04:58:28).”⁶

39. In the course of my work authenticating and establishing the public availability of 3GPP materials, I regularly consult the Internet Archive as further evidence of the authenticity and availability of 3GPP materials. Internet Archive materials are the type of evidence that experts in the field of authenticating and establishing the public availability of 3GPP materials regularly rely upon.

40. The existence of an archived copy of a webpage or document from the 3GPP website in the Internet Archive provides independent evidence that the webpage or document was accessible at the identified location as of the date it was archived by the Internet Archive. On the other hand, the absence of a reference from

⁵ <https://archive.org/legal/affidavit.php> (Ex. 1051 ¶4)

⁶ <https://archive.org/legal/affidavit.php> (Ex. 1051 ¶5).

Declaration of Friedhelm Rodermund

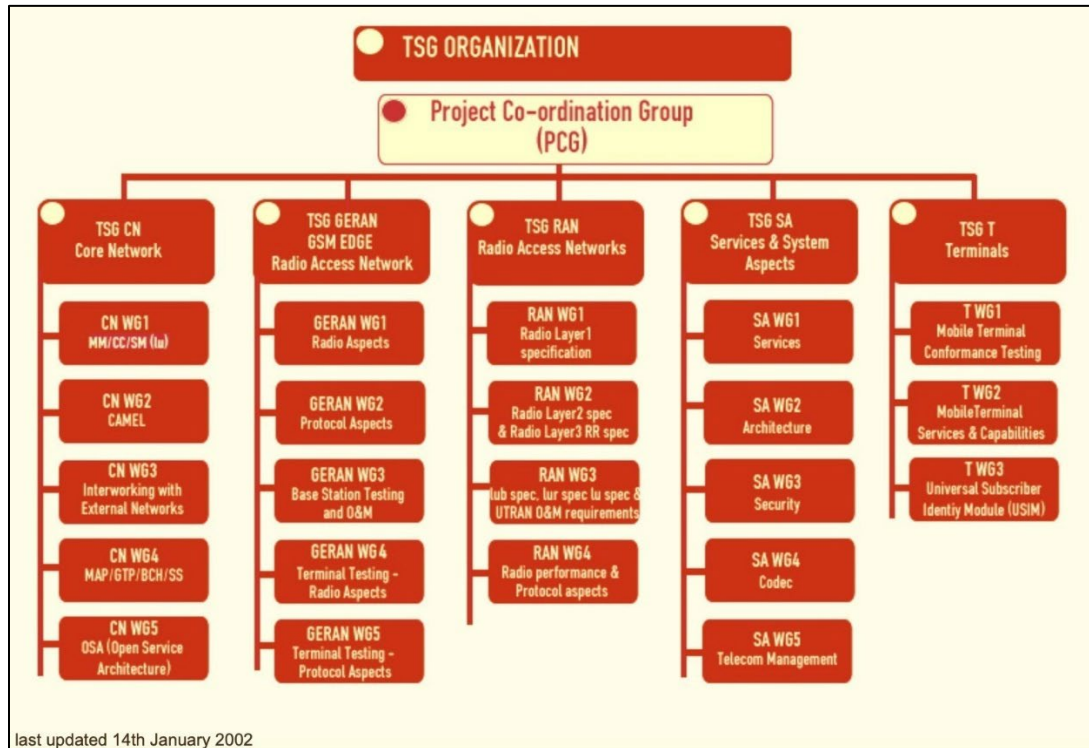
the Internet Archive does not mean that the webpage or document was not available, because the Internet Archive is not capable of constantly crawling and archiving every webpage on the Internet. In circumstances where a webpage or file has been archived by the Internet Archive, I rely on the business records of 3GPP to authenticate and establish the public availability of the reference and rely on the Internet Archive to confirm 3GPP's business records. Otherwise, I rely on the business records of 3GPP to authenticate and establish the public availability of the reference. In circumstances where a 3GPP webpage or file available from 3gpp.org is different than the version that was available in the past, I may rely on the Internet Archive's capture of the webpage or file from the relevant timeframe to reflect the information that would have been available from 3gpp.org at that time.⁷

C. 3GPP Working Groups

41. The names and the structure of 3GPP working groups, as of 2001/2002, is reproduced below⁸:

⁷ Although the Internet Archive does not offer a record of certain webpages or documents cited herein within the relevant timeframe around 2002, the relevant content for purposes of my opinions was substantially the same around 2002 based on my personal knowledge of 3GPP's standard business practices and my personal recollection.

⁸ <https://web.archive.org/web/20020126155238/http://www.3gpp.org:80/TB/home.htm> (Ex. 1052).



D. Technical Contributions to 3GPP Working Groups

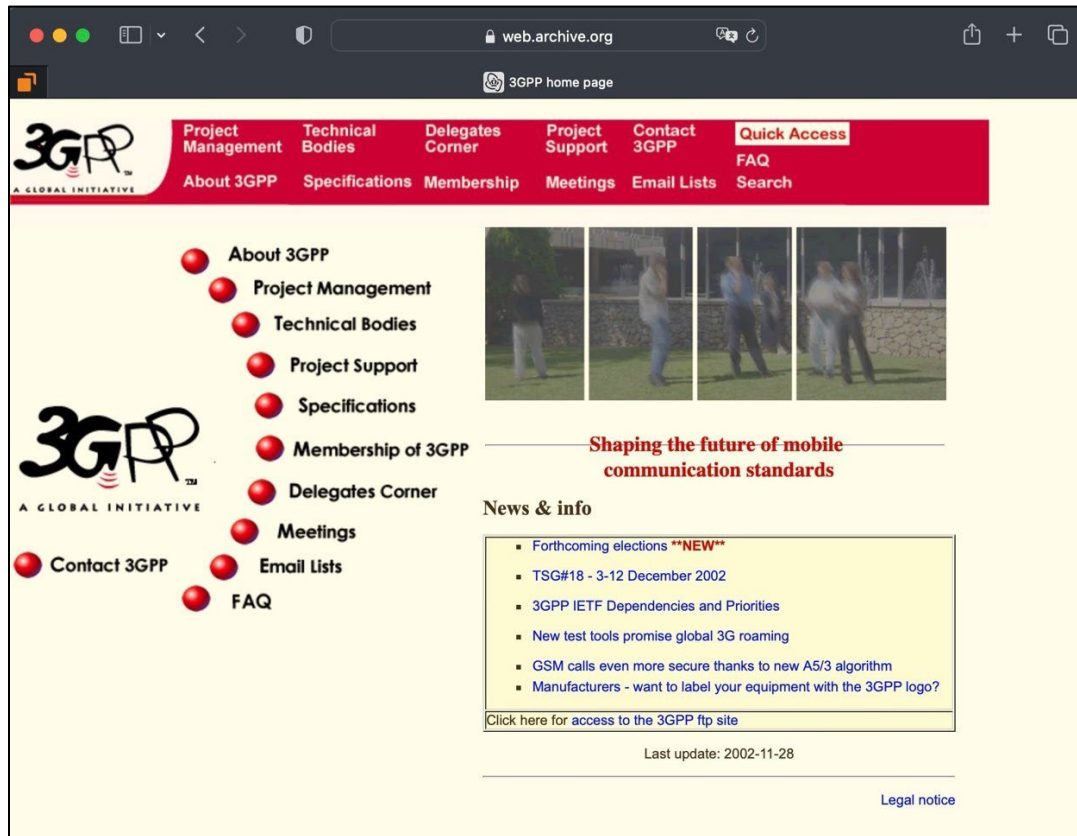
42. Each Technical Specification Group (TSG) or Working Group, according to 3GPP's standard business practices, adopts a structured numbering system for the documents associated with their meetings, and those systems follow a consistent numbering system as shown in the following example: xminnnzzzz. The numbering system normally comprises five logical elements: (1) x: a single letter corresponding to the TSG; wherein in 2002 x was one of R (Radio Access Network), C (Core Network), S (Service and System Aspects), G (GSM/EDGE Radio Access Network), or T (Terminals); (2) m: a single character corresponding to the Working Group identity (typically 1, 2, 3, etc.) or, in the case of the TSG itself, the letter "P"; (3) i: a hyphen character "-"; (4) nn: the calendar year of the meeting to which the

document was submitted; and (5) zzzz: a running number (some working groups use 5 digits). During the early years of 3GPP some working groups used a hyphen character between the calendar year and the running number (such as the T-Docs authenticated in this declaration). The T-doc number serves as a unique identifier for the document.

43. As part of the ordinary course of 3GPP's regularly conducted business activities, and pursuant to its standard business practices, T-docs are uploaded to 3GPP's FTP server and website before the meeting where they are to be discussed. Documents created or revised during the course of a meeting are first stored on a local server at the meeting location, and then uploaded at the latest during the week following the meeting (e.g., the meeting report of the meeting is typically published for review during the week following the meeting).

44. One possible way for a member of the public, such as a POSITA, to find specific documents in 2001/2002 would have been through the 3GPP website, www.3gpp.org. Members of the public interested in cellular and wireless communications in 2001/2002 would have been independently aware of the 3GPP website as the definitive source for wireless standard development.

45. The homepage of 3GPP as of September 2002 as recorded by the Internet Archive is shown below:⁹



46. Starting from the 3GPP homepage, one way of finding the desired information and documents was to discover the technical responsibilities of the different 3GPP working groups by clicking on “Technical Bodies”. This led to the webpage shown above (paragraph 41) where a POSITA would have observed that RAN WG1 has responsibility for “Radio Layer 1 specification”. Clicking on “RAN WG1” led to a page titled “TSG RAN WG1 (Radio layer 1)” showing several links

⁹ <https://web.archive.org/web/20020926134824/http://www.3gpp.org:80/> (Ex. 1053).

Declaration of Friedhelm Rodermund

leading to further information about RAN WG1 (terms of reference, work items, meetings, email exploder list, specifications, documents, chairpersons and secretary contacts), as shown below:¹⁰

The screenshot shows the 3GPP RAN1 Homepage. The header includes the 3GPP logo and navigation links: Project Management, Technical Bodies, Delegates Corner, Project Support, Contact 3GPP, and Quick Access (FAQ, Search). Below the header, there is a section for TSG RAN WG1 (Radio layer 1) with an overview and a table of useful links and information. The table lists the following links: Terms of Reference, Next meeting, Meeting calendar, Email exploder lists, Work items, Specifications, Documents area, and Contact RAN1 @.

List of officials			
Position	Name / Telephone	Company / Partner	Elected on
Chairman	Antti TOSKALA +358 (0) 718030746	Nokia / ETSI	2001-03-01
Vice-Chairman	Masafumi USUDA +81 468-40-3190	NTT DoCoMo / ARIB	2001-03-01
Vice-Chairman	Hyeon Woo LEE +82 31 779 6613	Samsung Electronics / TTA	2001-03-01
Secretary	Tsukasa SASAKI +33 4 92 94 43 22	3GPP Support	n/a

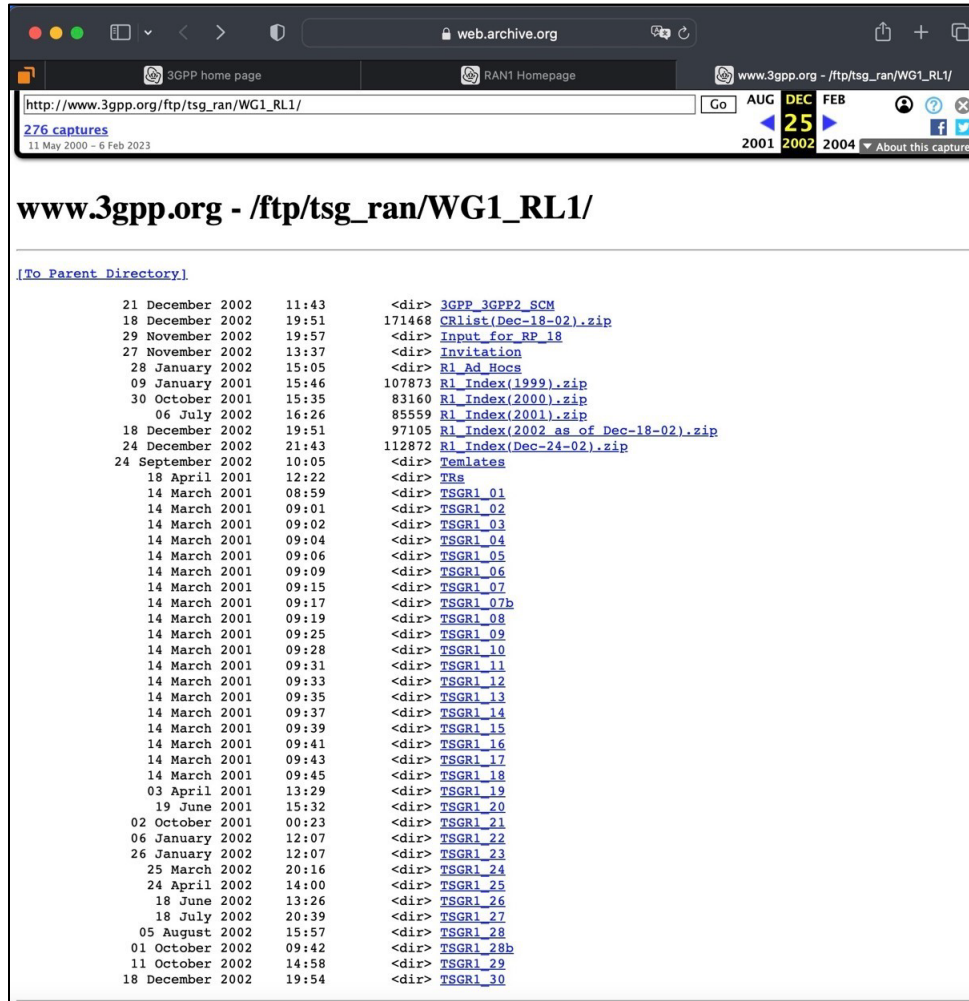
Last update: 28th November 2002 - Election information added

47. For a member of the public, such as a POSITA, interested in learning more about the activities of the working group, the “Documents area” link on the above webpage led to 3GPP’s folder for RAN WG1 (named WG1_RL1 where “RL1” stands for radio layer 1) hosted on 3GPP’s FTP server. Besides other documents such as document indexes (“R1_Index”), the folder largely consists of

¹⁰ <https://web.archive.org/web/20021015011140/http://www.3gpp.org:80/TB/RAN/RAN1/RAN1.htm> (Ex. 1054).

Declaration of Friedhelm Rodermund

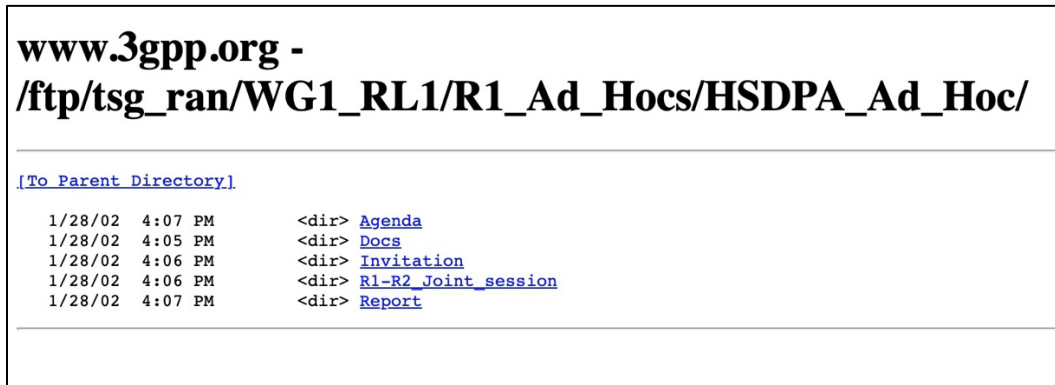
numbered meeting folders which include the documents of specific meetings. Below is an image of the folder structure as of August 2002:¹¹



48. Each meeting folder has at least the following dedicated folders: “Agenda”, “Docs”, “Invitation”, and “Report”, as shown below for HSDPA_Ad_Hoc, which was located in the R1_Ad_Hocs folder listed above:¹²

¹¹ https://web.archive.org/web/20020806041024/http://www.3gpp.org/ftp/tsg_ran/WG1_RL1/ (Ex. 1055).

¹² https://web.archive.org/web/20020403145941/http://www.3gpp.org:80/ftp/tsg_ran/WG1_RL1/R1_Ad_Hocs/HSDPA_Ad_Hoc/ (Ex. 1056).



49. As one example, it would have been straightforward for members of the public, including POSITAs, to identify documents related to specific technical topics via the report of a meeting which was able to be downloaded from the “Reports” folder. The meeting report includes information about all documents registered for a meeting, including the T-doc number, title describing the subject matter of the contribution, the author(s), the status of the document, and any related discussion of the T-doc from the meeting. The T-doc numbers enable any person to retrieve the document from the “Docs” folder and study and share the document without restrictions.

50. Furthermore, members of the public, including POSITAs, would have been informed of the activities of the working groups at specific times by looking at meeting agendas which list the technical areas and topics discussed at specific meetings and thereafter would have reviewed the T-doc submissions to meetings with subject matters of interest. Another source of information and guidance was

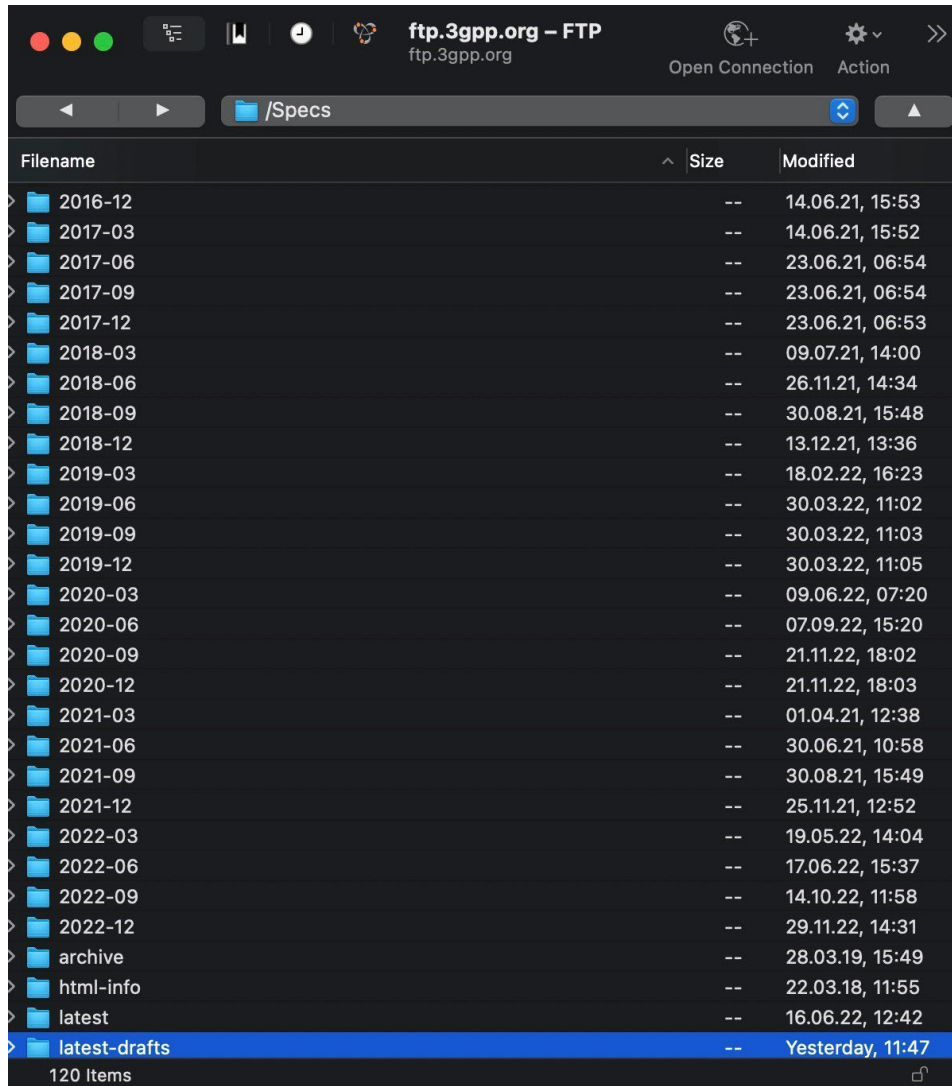
the 3GPP work plan¹³ which listed all work items handled by the working groups e.g. showing that the RAN Working Group 1 was active on defining aspects of the LTE radio layer, which would have informed members of the public, including POSITAs, of the subject matters discussed during relevant working group meetings.

E. 3GPP Technical Specifications

51. In 2001/2002, members of the public, such as POSITAs, would have been aware of 3GPP technical specifications as a definitive source of information regarding the implementation of the UMTS cellular standards. Members of the public, such as POSITAs, would have also known that each version of a 3GPP technical specification is then published by each of the 3GPP organizational partners (identified above), including ETSI shortly after approval by 3GPP. In 2001/2002, members of the public, such as POSITAs, would have been independently aware that 3GPP technical specifications for UMTS were available from 3GPP's website and from each of the 3GPP organization partners, including ETSI.

¹³ September 26, 2002 Work Plan, *archived at* https://web.archive.org/web/20060625054352/http://www.3gpp.org/ftp/Information/WORK_PLAN/older_versions/work_plan_3gpp_020926.zip ("work_plan_3gpp_020926.xls" Ex. 1057).

52. 3GPP specifications are almost always duplicated in at least two and sometimes more locations on the FTP server. The screenshot below shows an excerpt of the “Specs” folder at <ftp.3gpp.org>:¹⁴



53. In the ordinary course of 3GPP’s regularly conducted business activities, and pursuant to its standard business practices, 3GPP specifications are

¹⁴ <ftp.3gpp.org/Specs> (Ex. 1058 at 4).

Declaration of Friedhelm Rodermund

approved at each plenary meeting and then uploaded to 3GPP's FTP server and website shortly after the meeting, but typically no later than the month following the date of the meeting. For instance, a specification dated "2018-12" was approved at the 2018-12 meeting and would have been made available on the 3GPP website shortly after approval.

54. As discussed below, each technical specification is maintained in the "archive" subfolder; the current version of each technical specification is stored in the "latest" folder, until a new version of the technical specification is released; and after every plenary meeting cycle (e.g., every three months), the current set of technical specifications are included in a YEAR-MONTH folder.¹⁵ For instance, the 2018-12 snapshot folder contains a snapshot of the currently-approved specifications after the December 2018 3GPP plenary meetings.

55. In the ordinary course of 3GPP's regularly conducted business activities, it is 3GPP's standard business practice to upload a technical specification to the "latest" and "archive" folders on the 3GPP FTP server shortly after, and at most a few weeks after, a revised version of a technical specification is approved by the plenary group. The "latest" folder thereafter contains only the operative version of the 3GPP technical specification, while the "archive" folder contains each version

¹⁵ These YEAR-MONTH folders remain available for a period of time and are eventually archived and removed from the public FTP server.

of the technical specification over time. Thus, a POSITA would have accessed either the “latest” or “archive” directory to obtain the operative set of specifications or the “archive” directory to understand the development of and changes to the standard over time.

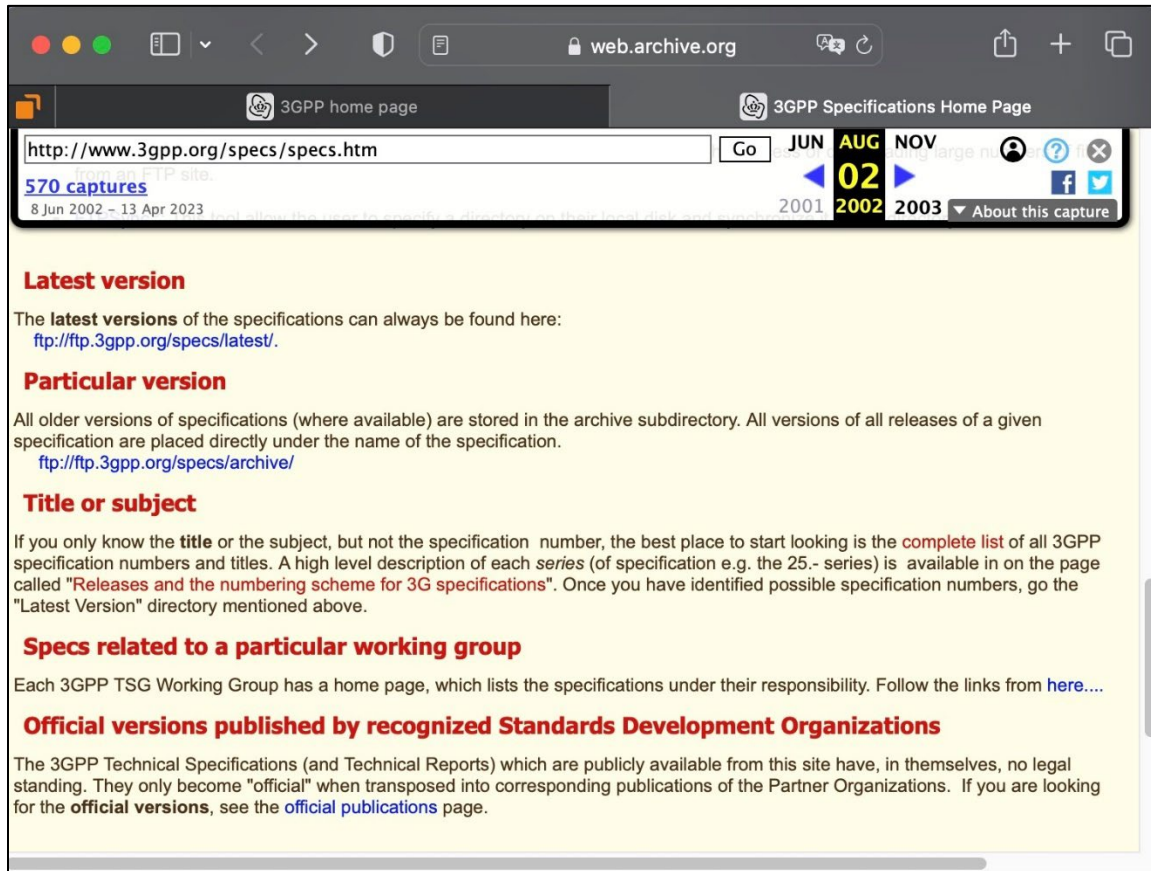
56. While 3GPP’s general business practice is to upload the updated specifications to all three locations at the same time, occasionally there may be a small difference in the upload date, and thus the date stamp, for the same specification uploaded to the three locations.

57. While any member of the public, such as a POSITA, interested in the development or implementation of cellular standards in 2001/2002 would have been aware of the 3GPP specifications and their availability from 3GPP, if such an individual required more information about the location of these materials on the FTP server, the 2001/2002 3GPP homepage included a link to “Specifications”.¹⁶

58. Clicking on the “Specifications” link provided a specifications webpage with various paths for locating specific specifications, such as “Latest version”, “Title or subject”, and “Specs related to a particular working group,” as shown below:¹⁷

¹⁶ <https://web.archive.org/web/20020806115924/http://www.3gpp.org/Default.htm> (Ex. 1059).

¹⁷ <https://web.archive.org/web/20020802092436/http://www.3gpp.org/specs/specs.htm> (Ex. 1060 at 2).



59. Under the “Latest version” header, the member of the public would be directed to the “latest” folder on the 3GPP FTP server, discussed above, while clicking on the link under the “Particular version” header would direct the member of the public to the “archive” folder on the 3GPP FTP server, also discussed above.

60. 3GPP specifications bear a specification number consisting of four or five digits, e.g., 09.02 or 29.002. The first two digits define the specification series which are defined to group the different aspects of the 3GPP system into, e.g., requirements, service aspects, radio aspects codecs, security aspects, and test

specifications. The series digits are followed by two additional digits for the 01 to 13 series or three further digits for the 21 to 55 series.

61. If a member of the public was not already aware of the specification number, the 3GPP website in 2001/2002 also included multiple indices identifying the technical subject matter covered by each technical specification.

62. For example, the subjects of the individual specification series for the 3GPP 3G and UTMS standards were explained on 3GPP's website by clicking on the "Releases" and "Numbering scheme" for 3G specifications links on the specifications webpage identified above.¹⁸ In 2001/2002, the subjects of the individual specification series were explained on the "Numbering scheme" 3GPP webpage, as shown below:¹⁹

¹⁸ <https://web.archive.org/web/20020802092436/http://www.3gpp.org/specs/specs.htm> (Ex. 1060 at 2).

¹⁹ <https://web.archive.org/web/20020806054349/http://www.3gpp.org/specs/numbering.htm> (Ex. 1061).

Declaration of Friedhelm Rodermund

The screenshot shows the 3GPP website's 'Numbering scheme' page. It features a navigation bar with links like 'Project Management', 'Technical Bodies', 'Delegates Corner', 'Project Support', 'Contact 3GPP', and 'Quick Access'. Below this, a red banner highlights the '3GPP Specifications - Numbering scheme' section. The page contains explanatory text about 3GPP specification numbering and a table detailing the series for different subjects.

All 3G and GSM specifications have a 3GPP specification number consisting of 4 or 5 digits. (e.g. 09.02 or 29.002). The first two digits define the series as listed in the table below. They are followed by 2 further digits for the 01 to 13 series or 3 further digits for the 21 to 52 series.

The full title, specification number and latest version number for every specification can be found in the [status list](#) and more information about terms such R99 and Rel-4 can be found on the [Releases and phases](#) page.

A specification in the 21 to 35 series may apply either to 3G only or to GSM and 3G. This can be determined by the third digit, where a "0" indicates that it applies to both systems. For example, 29.002 applies to 3G and GSM systems whereas 25.101 and 25.201 apply only to 3G. All other series apply only to GSM systems.

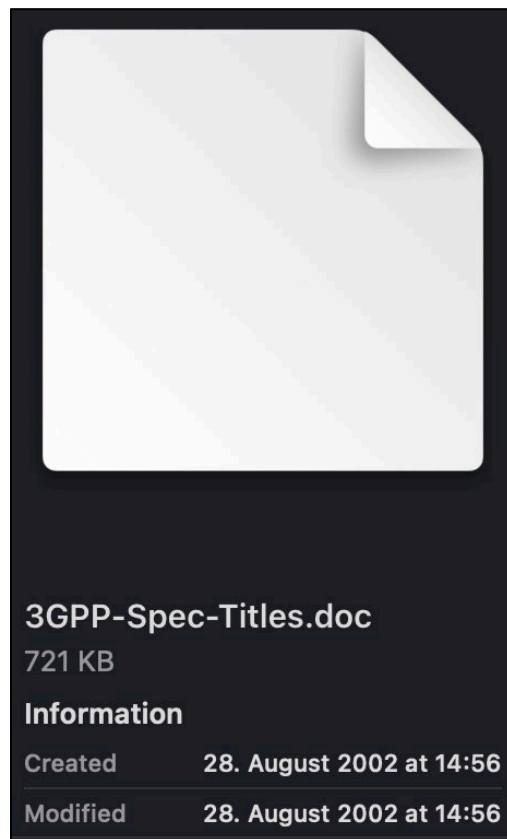
Subject of specification series	3G/GSM R99 and later	GSM only (Rel-4 and later)	GSM only (before Rel-4)
Requirements	21 series	41 series	01 series
Service aspects	22 series	42 series	02 series
Technical realization	23 series	43 series	03 series
Signalling protocols (user equipment to network)	24 series	44 series	04 series
Radio aspects	25 series	45 series	05 series
CODECs	26 series	46 series	06 series
Data	27 series	47 series	07 series
Signalling protocols (RSS-CN)	28 series	48 series	08 series
Signalling protocols (intra-fixed-network)	29 series	49 series	09 series
Programme management	30 series	50 series	10 series
User Identity Module (SIM / USIM)	31 series	51 series	11 series
O&M	32 series	52 series	12 series
Access requirements and test specifications		13 series (1)	13 series (1)
Security aspects	33 series	(2)	(2)
Test specifications	34 series	(2)	11 series
Security algorithms	35 series	(2)	(2)

Note (1): The 13 series GSM specifications relate to European-Union-specific regulatory standards. On the closure of ETSI TC SMG, responsibility for these specifications was transferred to [ETSI TC MSG](#), (Mobile Specification Group) and they do not appear on the 3GPP file server.

Note (2): The specification of these aspects were spread throughout several series.

63. For instance, the radio aspects of the 3GPP UMTS standard are covered in the “25 series,” as shown above, and are further subdivided into separate sections or specifications. The UMTS radio specification series starts at TS 25.053 and ends at TR 25.999.

64. Alternatively, the specifications webpage in 2001/2002 included a link to a “complete list of all 3GPP specification numbers and titles,”²⁰ which in-turn included a link to a downloadable copy of a complete list of 3G specifications.²¹ The downloadable list available in Ex. 1063 was last modified on August 28, 2002, as shown below:²²



²⁰ <https://web.archive.org/web/20020802092436/http://www.3gpp.org/specs/specs.htm> (Ex. 1060 at 2).

²¹ <https://web.archive.org/web/20020806092102/http://www.3gpp.org/specs/titles-numbers.htm> (Ex. 1062).

²² <https://web.archive.org/web/20071101043800/http://www.3gpp.org/specs/3GPP-Spec-Titles.zip> (Ex. 1063). Although the Internet Archive does not offer an earlier record of this file, the metadata of the file as downloaded shows a last modified date in August 2002.

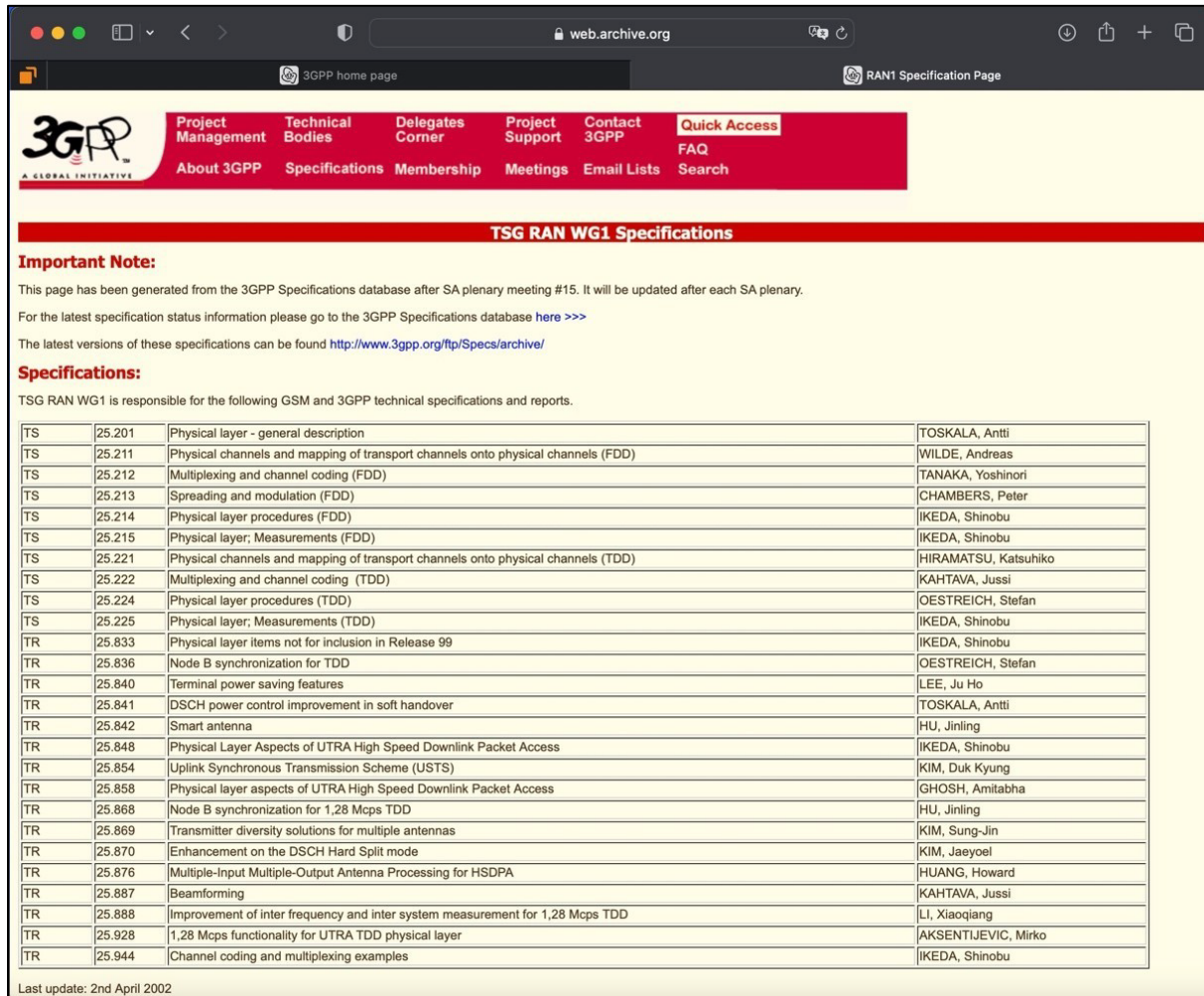
65. The list of specifications included a table of technical specifications, including a specification number (“Number”), title (“Title”), working group identification (“WG”), indication of which release(s) the specification relates to (“Ph1” through “Rel-6”), and whether the specification is active (“active”). *Id.*

66. Information regarding the subject matter of specific technical specifications covering the radio aspects in the 25 series of specifications was further explained by the “Specifications” link on the 2001/2002 RAN WG1 page,²³ which led to the RAN WG1 Specifications page describing the subject matter of the 25 series specifications as below:²⁴

²³ <https://web.archive.org/web/20021015011140/http://www.3gpp.org/TB/RAN/RAN1/RAN1.htm> (Ex. 1064).

²⁴ <https://web.archive.org/web/20021022011153/http://www.3gpp.org/TB/RAN/RAN1/specs.htm> (Ex. 1065).

Declaration of Friedhelm Rodermund



3GPP
A GLOBAL INITIATIVE

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TSG RAN WG1 Specifications

Important Note:
This page has been generated from the 3GPP Specifications database after SA plenary meeting #15. It will be updated after each SA plenary.
For the latest specification status information please go to the 3GPP Specifications database [here >>>](#)
The latest versions of these specifications can be found <http://www.3gpp.org/ftp/Specs/archive/>

Specifications:
TSG RAN WG1 is responsible for the following GSM and 3GPP technical specifications and reports.

TS	25.201	Physical layer - general description	TOSKALA, Antti
TS	25.211	Physical channels and mapping of transport channels onto physical channels (FDD)	WILDE, Andreas
TS	25.212	Multiplexing and channel coding (FDD)	TANAKA, Yoshinori
TS	25.213	Spreading and modulation (FDD)	CHAMBERS, Peter
TS	25.214	Physical layer procedures (FDD)	IKEDA, Shinobu
TS	25.215	Physical layer; Measurements (FDD)	IKEDA, Shinobu
TS	25.221	Physical channels and mapping of transport channels onto physical channels (TDD)	HIRAMATSU, Katsuhiko
TS	25.222	Multiplexing and channel coding (TDD)	KAHTAVA, Jussi
TS	25.224	Physical layer procedures (TDD)	OESTREICH, Stefan
TS	25.225	Physical layer; Measurements (TDD)	IKEDA, Shinobu
TR	25.833	Physical layer items not for inclusion in Release 99	IKEDA, Shinobu
TR	25.836	Node B synchronization for TDD	OESTREICH, Stefan
TR	25.840	Terminal power saving features	LEE, Ju Ho
TR	25.841	DSCH power control improvement in soft handover	TOSKALA, Antti
TR	25.842	Smart antenna	HU, Jinling
TR	25.848	Physical Layer Aspects of UTRA High Speed Downlink Packet Access	IKEDA, Shinobu
TR	25.854	Uplink Synchronous Transmission Scheme (USTS)	KIM, Duk Kyung
TR	25.858	Physical layer aspects of UTRA High Speed Downlink Packet Access	GHOSH, Amitabha
TR	25.868	Node B synchronization for 1,28 Mcps TDD	HU, Jinling
TR	25.869	Transmitter diversity solutions for multiple antennas	KIM, Sung-Jin
TR	25.870	Enhancement on the DSCH Hard Split mode	KIM, Jaeyoel
TR	25.876	Multiple-Input Multiple-Output Antenna Processing for HSDPA	HUANG, Howard
TR	25.887	Beamforming	KAHTAVA, Jussi
TR	25.888	Improvement of inter frequency and inter system measurement for 1,28 Mcps TDD	LI, Xiaoqiang
TR	25.928	1,28 Mcps functionality for UTRA TDD physical layer	AKSENTJEVIC, Mirko
TR	25.944	Channel coding and multiplexing examples	IKEDA, Shinobu

Last update: 2nd April 2002

67. Thus, a member of the public, such as a POSITA, interested in learning more about particular aspects of a 3GPP standard (e.g., UMTS) would have been independently aware of the 3GPP website as the definitive source of information regarding the development of the wireless and cellular standards, and once at the website would have consulted the list of technical specifications using the 3GPP webpages (as described above) to identify a subject matter of interest.

68. A member of the public, such as a POSITA, would have reviewed the instructions on the 3GPP webpages, such as the RAN WG1 specification page,

which states that “[t]he latest versions of these specifications can be found <http://www.3gpp.org/ftp/Specs/archive/>.” See Ex. 1065. The member of the public would have followed the hyperlink to the FTP server to download the relevant specification by navigating to the specification series folder of interest (*e.g.*, “25_series” folder)²⁵ and then the relevant specification within the series (*e.g.*, “25.212” folder),²⁶ and finally the relevant .zip file containing the version of the specification of interest within that folder (*e.g.*, “25212-510.zip”, where “510” represents version 5.1.0).²⁷ These steps would have been straightforward for a member of the public, such as a POSITA.

69. Alternatively, using the specification webpage discussed above, a member of the public, such as a POSITA, would have accessed the “latest” subfolder on the FTP server to obtain the current draft of a specification by navigating to the release folder for the specification (*e.g.*, “Rel-5” folder),²⁸ the specification series folder of interest (*e.g.*, “25_series” folder)²⁹ and then the relevant .zip file containing

²⁵ <https://web.archive.org/web/20020628215611/http://www.3gpp.org/ftp/specs/archive/> (Ex. 1066).

²⁶ https://web.archive.org/web/20020701091801/http://www.3gpp.org:80/ftp/specs/archive/25_series/ (Ex. 1067 at 1).

²⁷ https://web.archive.org/web/20020912200940/http://www.3gpp.org:80/ftp/Specs/archive/25_series/25.212/ (Ex. 1068).

²⁸ <https://web.archive.org/web/20020803112613/http://www.3gpp.org/ftp/Specs/latest/> (Ex. 1069).

²⁹ <https://web.archive.org/web/20020804015202/http://www.3gpp.org/ftp/Specs/latest/Rel-5/> (Ex. 1070).

the version of the specification of interest within that folder (e.g., “25212-510.zip”, where “510” represents version 5.1.0):³⁰

www.3gpp.org - /ftp/Specs/latest/Rel-5/25_series/				
[To Parent Directory]				
01 July 2002	16:39	816238	25101-530.zip	
01 July 2002	10:23	763384	25102-510.zip	
01 July 2002	10:22	528132	25104-530.zip	
01 July 2002	10:22	621011	25105-510.zip	
01 July 2002	10:22	68349	25106-510.zip	
01 July 2002	10:22	59481	25113-510.zip	
03 July 2002	10:21	482024	25123-510.zip	
03 July 2002	16:31	349787	25133-530.zip	
18 July 2002	15:11	755882	25141-531.zip	
03 July 2002	16:31	712493	25142-510.zip	
03 July 2002	10:15	119350	25143-510.zip	
29 March 2002	18:01	45745	25201-500.zip	
28 June 2002	09:28	168853	25201-510.zip	
28 June 2002	09:28	805288	25211-510.zip	
28 June 2002	09:29	500485	25212-510.zip	
28 June 2002	09:29	189494	25213-510.zip	
28 June 2002	09:29	311141	25214-510.zip	
29 March 2002	18:09	58615	25215-500.zip	
28 June 2002	09:29	338593	25221-510.zip	
28 June 2002	09:30	447320	25222-510.zip	
28 June 2002	09:30	186731	25223-510.zip	
28 June 2002	09:30	186066	25224-510.zip	
28 June 2002	09:30	78049	25225-510.zip	
10 June 2002	21:42	514391	25301-510.zip	
10 June 2002	14:40	288363	25302-510.zip	
10 June 2002	20:47	520455	25303-510.zip	
10 June 2002	15:05	183895	25304-510.zip	
19 March 2002	14:30	305048	25305-540.zip	
11 June 2002	21:07	76911	25306-510.zip	
19 March 2002	10:55	24754	25307-500.zip	
21 March 2002	13:58	288958	25308-520.zip	
10 June 2002	20:21	379397	25321-510.zip	
10 June 2002	23:42	291226	25322-510.zip	
10 June 2002	19:31	91789	25323-510.zip	
10 June 2002	19:52	48432	25324-510.zip	

F. 3GPP Email Exploders and Archives

70. In the ordinary course of 3GPP’s regularly conducted business activities, and pursuant to its standard business practices, 3GPP maintains archives that include different versions of the specifications, as well as email communications

³⁰ https://web.archive.org/web/20020812090150/http://www.3gpp.org:80/ftp/Specs/latest/Rel-5/25_series/ (Ex. 1071).

to its membership, including emails announcing the uploading of new or additional documents to 3GPP's FTP server. These archives are created at the time the emails are initially sent.

71. Pursuant to 3GPP's standard business practices, 3GPP working groups generally sent emails notifying members of the public subscribed to the working group's email reflector of the availability of documents as soon as new or additional documents had been uploaded to 3GPP's FTP server. Thus, not only did the general public have access to the documents on the FTP server, but interested members of the public—including those working to develop standards for cellular telecommunication or working to implement the standards—such as POSITAs—were also personally informed of their availability by email. Based on my experience with 3GPP and the telecommunications industry, I would expect any person implementing a cellular network or device, e.g., a UMTS, LTE or 5G network, to consult the corresponding specifications on the 3GPP FTP server, as well as other related documents, and to subscribe to the relevant email reflectors without restriction or expectation of confidentiality. The whole purpose of 3GPP creating and making these specifications available was so that engineers and other individuals interested in the development of cellular technologies would have ready access to them when developing and implementing cellular networks and devices.

72. At least as early as July 1999, all of 3GPP's email archives, including the dedicated email lists for TSG RAN WG1, were freely accessible to the general public with no login, password, or membership requirement and subscription was possible for every interested individual. The screenshot below represents the subscription page of the 3GPP RAN WG1 email list on list.etsi.org³¹ demonstrating that this webpage is publicly available and that only an email address and name have to be entered to join the email list. In 2001/2002, the registration webpage looked as follows:³²

³¹ In the past there was also list.3gpp.org which did not represent a dedicated website but instead redirected to list.etsi.org.

³² https://web.archive.org/web/20051103081215/http://list.3gpp.org/scripts/wa.exe?SUBED1=3gpp_tsg_ran_wg1&A=1 (Ex. 1072).

Subscription Settings

[Subscriber's Corner](#)
[Server Archives](#)
[Help](#)
[Log off](#)

Join or Leave the 3GPP_TSG_RAN_WG1 List

This screen allows you to join or leave the 3GPP_TSG_RAN_WG1 list. To confirm your identity and prevent third parties from subscribing you to a list against your will, an e-mail message with a confirmation code will be sent to the address you specify in the form. Simply wait for this message to arrive, then follow the instructions to confirm the operation.

Alternatively, you can [login with your LISTSERV password](#) (if you have one) and update your subscription interactively, without e-mail confirmation.

Your E-Mail Address:

Your Name:

Subscription Type:

☒ Regular [NODIGEST]
☐ Digest (traditional) [NOMIME DIGEST]
☐ Digest (MIME format) [NOHTML MIME DIGEST]
☐ Digest (HTML format) [HTML DIGEST]
☐ Index (traditional) [NOHTML INDEX]
☐ Index (HTML format) [HTML INDEX]

Mail Header Style:

☒ Normal LISTSERV-style header [FULLHDR]
☐ LISTSERV-style, with list name in subject [SUBJECTHDR]
☐ LISTSERV-style, short [SHORTHDR]
☐ "Dual" (second header in mail body) [DUALHDR]
☐ sendmail-style [IETFHDR]

Acknowledgements:

☐ No acknowledgements [NOACK NOREPRO]
☐ Short message confirming receipt [ACK NOREPRO]
☐ Receive copy of own postings [NOACK REPRO]
☒ [Special or obsolete setting]

Miscellaneous:

☐ Mail delivery disabled temporarily [NOMAIL]
☐ Address concealed from REVIEW listing [CONCEAL]

LIST.ETSI.ORG

73. Alternatively, anyone interested can obtain a LISTSERV password for managing subscriptions interactively without email confirmations.

74. Each of 3GPP's member companies typically assigned one or more individuals to regularly participate in these email lists. Thus, not only did the general public have access to the emails in 3GPP's email archives, but some of the most interested members of the public—those working to develop standards for cellular telecommunication—personally received copies of such emails through their participation in the email lists.

75. By June 1999, 3GPP's email archives were well-known to persons in the cellular telecommunications industry as a source of public information and for technical specifications, proposals, meeting announcements, technical discussions and reports regarding industry standards and technological advances.

76. Based on my experience with 3GPP and the telecommunications industry, I would expect a person interested in the development of cellular standards, e.g., UMTS, to consult the emails archives of the working groups and TSGs that person is interested in, and/or, to be subscribed to the corresponding email reflectors to receive any email notifications in real-time.

77. In many cases, the T-docs are also disseminated on the email exploder of the working group prior to the meeting, making the T-docs available to all those subscribed to the email distribution list.

G. 3GPP Working Group Meetings

78. The actual specification development is performed by the 3GPP working groups (WGs) which meet regularly to progress the work assigned to them by their parent groups, the Technical Specification Groups (TSGs). Pursuant to 3GPP's standard business practices, each WG holds four meetings per year, however, some WGs have additional interim meetings to cover with a high workload. Pursuant to 3GPP's standard business practices, meetings are planned half

a year or more ahead and announced e.g. via the email reflectors and the 3GPP website.

79. 3GPP member companies, including the leading companies in the development and implementation of cellular standards, send their delegates to the meetings and big companies typically send several delegates (sometimes more than 10) to the large working groups such as RAN WG1 or WG2. Where a company has sent one or more delegates to a 3GPP meeting, the delegates will frequently share meeting materials with others within their organization. Attendees of 3GPP meetings are free to share materials received at 3GPP meetings without restriction.

80. The WG chairman usually circulates a proposed agenda several weeks ahead of the meeting, and delegates prepare their contributions which they should deliver as T-docs before the deadline set by the WG chairman, which is often one week prior to the meeting. The available T-docs are uploaded to the FTP server before the meeting and are also made available on a local meeting server which is also used during the week to make available revised and new documents.

81. At the end of a meeting each T-doc will have a status value assigned e.g. “agreed”, “noted”, “revised”, or “postponed”. “[A]greed” means the document was accepted and will be presented to the TSG for final approval. “[N]oted” means the document was presented without any resulting specific action. “[R]evised” means a modified version of the document with a new T-doc number will be created

addressing comments and feedback from the WG. “[P]ostponed” means the document was presented and no final decision could be reached, or, the document was not presented due to lack of time. There are several more T-doc status values defined and described in the 3GPP Working Methods, TR 21.900.³³

82. Most delegates prepare for the meeting also by reading other delegates documents. For this purpose, the whole meeting folder may be downloaded from the FTP server at once. The week after the meeting at the latest, the meeting folder of the public FTP server is updated with the documents (revisions and new documents) created during the meeting, and quite often an early draft meeting report, if distributed at the end of a meeting, is also uploaded, followed by a cleaned-up draft the week after the meeting.

V. PUBLIC AVAILABILITY OF SPECIFIC DOCUMENTS

83. As explained above, 3GPP employs a set of documented business practices to make documents and information available to 3GPP delegates and interested members of the public, such as POSITAs. Below I address the availability of R1-01-1014, R1-01-1081, R1-01-1047, TS 25.212 V5.1.0, TS 25.212 V3.5.0, and TS 25.222 V3.8.0 based on my personal knowledge and experience with ETSI’s and 3GPP’s standard business practices.

³³ Available from <https://www.3gpp.org/delegates-corner/3gpp-working-procedures> and from the 3GPP FTP server.

A. T-doc R1-01-1014 (Ex. 1006) and T-doc R1-01-1081 (Ex. 1087)

1. Authentication

84. Ex. 1006 is a true and correct copy of 3GPP T-doc R1-01-1014, titled “A New Hybrid-ARQ Scheme Using Incremental Redundancy,” except that each page includes an exhibit label and page numbers on the bottom right corner added by counsel. I obtained Ex. 1006 from 3GPP’s FTP server at the following location:

https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_AH/HSDPA_Ad_Hoc/Docs/Zips/. *See* Ex. 1073.

85. The authenticity of Ex. 1006 (R1-01-1014) is further confirmed by the identical “R1-01-1014.zip” file³⁴ attached to Mr. Ghosh’s email sent via the 3GPP_TSG_RAN_WG1 email reflector.³⁵ Ex. 1074 is identical to and has the same October 23, 2001 last modified date as Ex. 1006 (R1-01-1014). *See* paragraph 91.

³⁴

https://list.etsi.org/scripts/wa.exe?A3=ind0110&L=3GPP_TSG_RAN_WG1&E=b ase64&P=2072790&B=----- %3D_NextPart_000_01C15C16.5D43E0D0&T=application%2Foctet- stream;%20name=%22R1-01-1014.zip%22&N=R1-01- 1014.zip&attachment=q&X=6DEE3DFAFC65AFF81C&Y=friedhelm.rodermund %40iotecc.com (Ex. 1074).

³⁵ https://list.etsi.org/scripts/wa.exe?A2=3GPP_TSG_RAN_WG1;84332eeb.0110 &S= (Ex. 1075).

2. Distribution Via 3GPP TSG RAN WG1 Reflector

86. R1-01-1014 was distributed to subscribers of the 3GPP_TSG_RAN_WG1 email reflector on October 23, 2001 in an email from Amitava Ghosh of Motorola, which states "Enclosed please find the following two contributions from Motorola for your comments" and mentions "R1-01-1014 - A new HARQ scheme using IR" as one of the contributions.³⁶ The "R1-01-1014.zip" file attached to Mr. Ghosh's email³⁷ is identical to and has the same last modified date as Ex. 1006 (R1-01-1014). When Mr. Ghosh sent the above email to the 3GPP_TSG_RAN_WG1 reflector, the email reflector had at least 900 subscribers.³⁸ Therefore, those at least 900 subscribers, including members of the public interested

³⁶ https://list.etsi.org/scripts/wa.exe?A2=3GPP_TSG_RAN_WG1;84332eeb.0110&S= (Ex. 1075).

³⁷

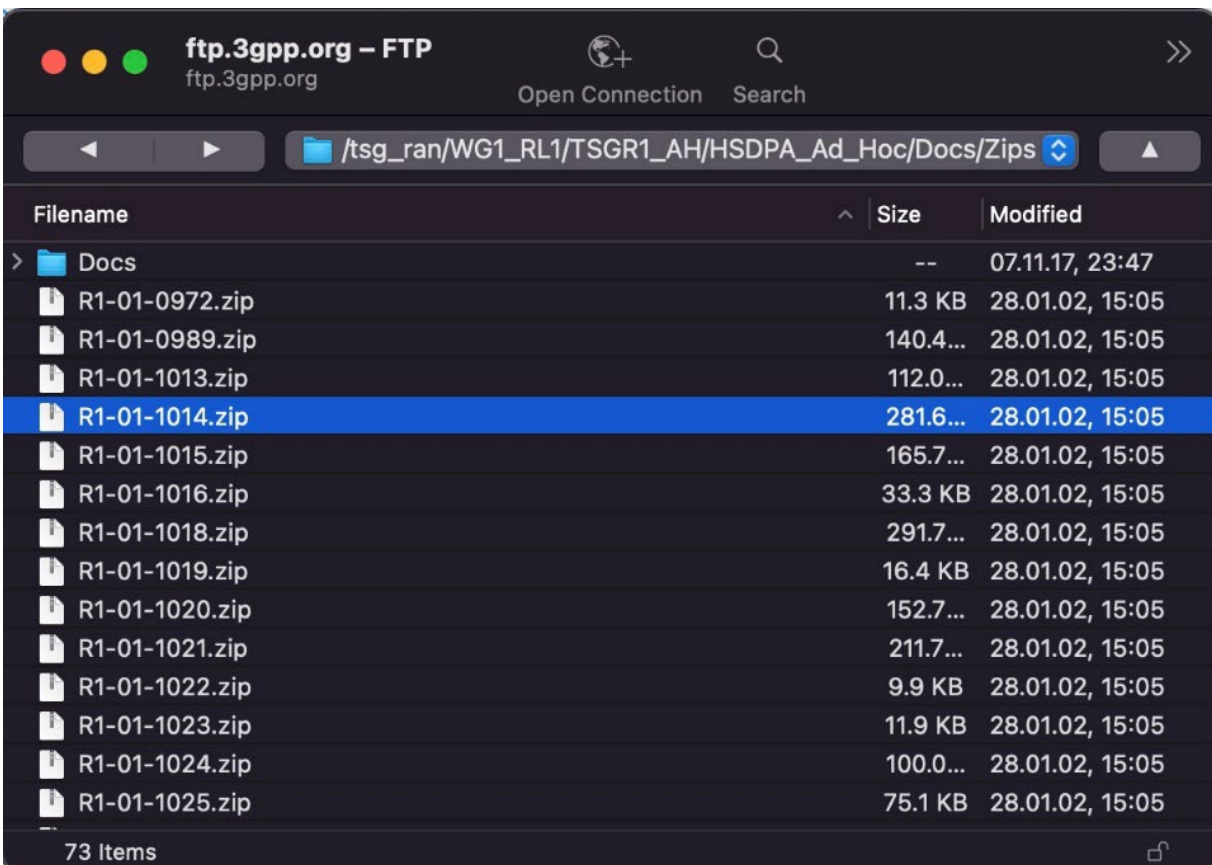
https://list.etsi.org/scripts/wa.exe?A3=ind0110&L=3GPP_TSG_RAN_WG1&E=b ase64&P=2072790&B=----- %3D_NextPart_000_01C15C16.5D43E0D0&T=application%2Foctet-stream;%20name=%22R1-01-1014.zip%22&N=R1-01-1014.zip&attachment=q&X=6DEE3DFAFC65AFF81C&Y=friedhelm.rodermund %40iotecc.com (Ex. 1074).

³⁸ Compare <https://web.archive.org/web/20010518052528/http://list.etsi.org/> (1,154 subscribers on May 18, 2001) (Ex. 1076 at 2), with <https://web.archive.org/web/20020604215730/http://list.etsi.org:80/> (951 subscribers on June 4, 2002) (Ex. 1077 at 2). Experts in the field of determining the public availability of 3GPP documents would reasonably rely upon the number of subscribers listed on the list.etsi.org webpage, as archived by the Internet Archive, as a reliable indicator of the number of individuals to which an email was disseminated.

in the cellular telecommunications industry, including POSITAs, would have received a copy of R1-01-1014 on October 23, 2001. 3GPP placed no restriction on how recipients were permitted to share R1-01-1014 with others after receiving it.

3. Available On 3GPP Public FTP Server

87. Ex. 1006 (R1-01-1014) was uploaded to the 3GPP FTP server on January 28, 2002, based on the upload date stamp on the 3GPP FTP server, as shown in the screenshot below:³⁹



³⁹ https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_AH/HSDPA_Ad_Hoc/Docs/Zips/ (Ex. 1073).

88. R1-01-1014 was submitted in connection with a RAN WG1 ad hoc meeting on HSDPA. However, after August 2005,⁴⁰ RAN WG1 moved the location of the existing ad hoc meeting materials from the “R1_Ad_Hocs/”⁴¹ subfolder to the current “TSGR1_AH”⁴² subfolder. The former “R1_Ad_Hocs/” storage location for RAN1 ad hoc meeting documents existed prior and subsequent to the upload of R1-01-1014, as can be seen by the Internet Archive records from December 2001⁴³ and June 19, 2002.⁴⁴

89. Prior to December 2002, members of the public would have been able to download the R1-01-1014 from the “R1_Ad_Hocs/” subfolder. This is confirmed by the Internet Archive, including e.g. the June 19, 2002 capture of the

⁴⁰ *Compare*

https://web.archive.org/web/20050824015238/http://www.3gpp.org:80/ftp/tsg_ran/WG1_RL1/ (Ex. 1078), *with*

https://web.archive.org/web/20051123162134/http://www.3gpp.org:80/ftp/tsg_ran/WG1_RL1/ (Ex. 1079).

⁴¹ http://www.3gpp.org/ftp/tsg_ran/WG1_RL1/R1_Ad_Hocs/HSDPA_Ad_Hoc/Docs/Zips/ (no longer active link; moved to https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_AH/HSDPA_Ad_Hoc/Docs/Zips/ (Ex. 1073)).

⁴² https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_AH/HSDPA_Ad_Hoc/Docs/Zips/ (Ex. 1073).

⁴³ https://web.archive.org/web/20011223090820/http://www.3gpp.org/ftp/tsg_ran/WG1_RL1/R1_Ad_Hocs/ (Ex. 1080).

⁴⁴ https://web.archive.org/web/20020619173234/http://www.3gpp.org/ftp/tsg_ran/WG1_RL1/R1_Ad_Hocs/ (Ex. 1081).

“R1_Ad_Hocs/” subfolder,⁴⁵ the April 3, 2002 Internet Archive capture of the “R1_Ad_Hocs/HSDPA_Ad_Hoc/” subfolder,⁴⁶ the April 15, 2002 Internet Archive capture of the “R1_Ad_Hocs/HSDPA_Ad_Hoc/Docs/” subfolder,⁴⁷ and the May 19, 2004 capture of “R1_Ad_Hocs/HSDPA_Ad_Hoc/Docs/Zips/”.⁴⁸ Thus, the relocation of the ad hoc meeting materials on the 3GPP FTP server does not have any impact on the availability of the ad hoc materials to members of the public, and members of the public, including POSITAs, would have been able to locate the ad hoc materials from the “R1_Ad_Hocs” folder prior to December 2002.

90. Experts in the field of determining the public availability of 3GPP documents would reasonably rely upon the FTP server upload date on the 3GPP FTP server as the date the document became available to the public and would consider the archived version of the directory structure maintained by the Internet Archive as further confirmation of public availability.

⁴⁵ https://web.archive.org/web/20020619173234/http://www.3gpp.org/ftp/tsg_ran/WG1_RL1/R1_Ad_Hocs/ (Ex. 1081).

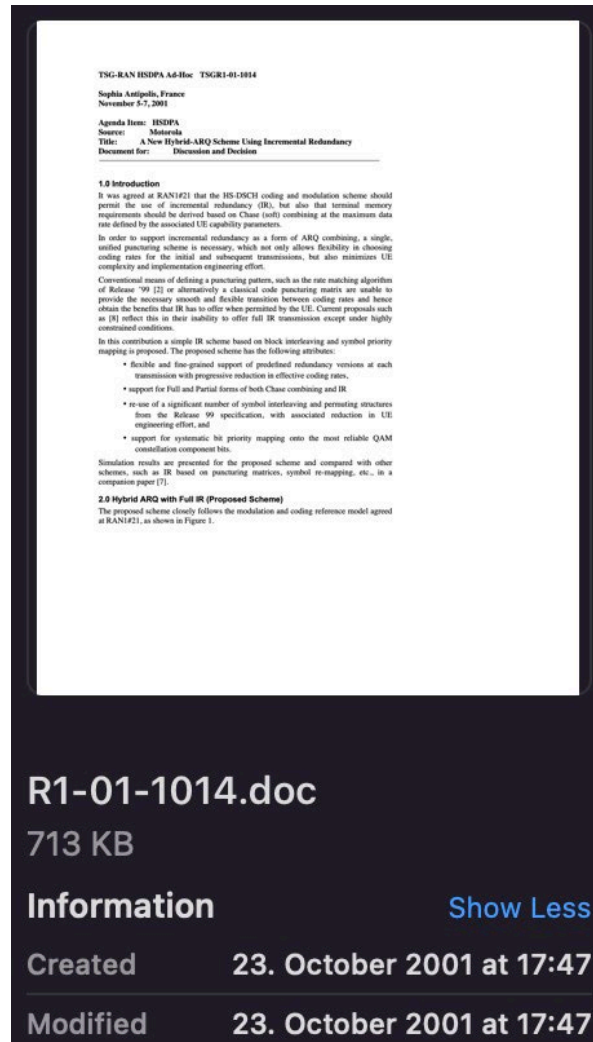
⁴⁶ https://web.archive.org/web/20020403145941/http://www.3gpp.org:80/ftp/tsg_ran/WG1_RL1/R1_Ad_Hocs/HSDPA_Ad_Hoc/ (Ex. 1056).

⁴⁷ https://web.archive.org/web/20020415205129/http://www.3gpp.org/ftp/tsg_ran/WG1_RL1/R1_Ad_Hocs/HSDPA_Ad_Hoc/Docs/ (Ex. 1082).

⁴⁸ https://web.archive.org/web/20040519152539/http://www.3gpp.org/ftp/tsg_ran/WG1_RL1/R1_Ad_Hocs/HSDPA_Ad_Hoc/Docs/Zips/ (Ex. 1083).

Declaration of Friedhelm Rodermund

91. In addition, metadata information for the downloaded and extracted T-doc file⁴⁹ states a last Modified date of “23. October 2001,” as shown in the screenshot below:



92. This last modified date confirms that the R1-01-1014 document had not been modified after October 23, 2001, which is prior to the January 28, 2002 upload

⁴⁹ https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_AH/HSDPA_Ad_Hoc/Docs/Zips/R1-01-1014.zip (Ex. 1084).

date. It is standard practice in 3GPP to upload submissions shortly after completing them and the evidence demonstrates that this was also the case with R1-01-1014. However, given the upload dates of all T-docs from this Ad Hoc meeting are identical, and given that January 28, 2002 date is 2.5 months after the meeting took place on November 5-7, 2001, this is a clear indication for me – given my experience as a custodian of 3GPP documents and records – that the whole folder with all documents got re-uploaded and the original timestamps were overwritten. As I explained in paragraph 34, the FTP server timestamp reflects the latest upload date. The date of availability is further confirmed by the citation of R1-01-1014 in R1-01-1047. *See* paragraphs 94-96.

93. Moreover, the relocation of the ad hoc materials from the “R1_Ad_Hocs/” subfolder⁵⁰ to the current “TSGR1_AH”⁵¹ subfolder after August 2005, had no impact on the content of R1-01-1014, as confirmed by the upload date to the 3GPP FTP server on January 28, 2002 and the metadata associated with the downloaded file indicating the document was last modified on October 23, 2001.

⁵⁰ http://www.3gpp.org/ftp/tsg_ran/WG1_RL1/R1_Ad_Hocs/HSDPA_Ad_Hoc/Docs/Zips/ (no longer active; moved to https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_AH/HSDPA_Ad_Hoc/Docs/Zips/ (Ex. 1073)).

⁵¹ https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_AH/HSDPA_Ad_Hoc/Docs/Zips/ (Ex. 1073).

94. As explained in Section IV, members of the public, such as a POSITA, would have been able to locate R1-01-1014 by identifying the RAN WG1 as the responsible 3GPP working group for the radio layer, followed by reviewing one or several meeting reports. For example, page 10 of the meeting report for the RAN WG1 HSDPA Ad-Hoc held on November 5-7, 2001, which was uploaded to the 3GPP FTP server on January 28, 2002,⁵² shows T-doc R1-01-1081 (which is a nearly identical revised version of R1-01-1014, as discussed below) including the T-doc number and the title, which describes the subject matter of R1-01-1081 and R1-01-1014.⁵³

6. HARQ issues.						
Following documents were briefly reviewed.						
						
No.	Category	T-doc	Title	Source	Conclusion	Notes
26		R1-01-1081	A New Hybrid-ARQ Scheme Using Incremental Redundancy	Motorola	Noted	

95. Therefore, at the latest after January 28, 2002,⁵⁴ members of the public, such as a POSITA, would have had access to a subject matter index of submissions to RAN WG1 HSDPA Ad-Hoc, including R1-01-1081.

⁵² https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_AH/HSDPA_Ad_Hoc/Report (Ex. 1085).

⁵³ https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_AH/HSDPA_Ad_Hoc/Report/R1-01-1105.zip (Ex. 1086).

⁵⁴ https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_AH/HSDPA_Ad_Hoc/Report (Ex. 1085).

96. A member of the public who was reviewing the meeting minutes would not have encountered any difficulty locating R1-01-1081 on the FTP server in the “Zips” folder for RAN WG1 HSDPA Ad-Hoc by using the R1-01-1081 T-doc number.⁵⁵

97. R1-01-1081,⁵⁶ which contains nearly identical disclosures as R1-01-1014,⁵⁷ was uploaded to the 3GPP FTP server on January 28, 2002.⁵⁸ R1-01-1081 in turn includes a specific reference to R1-01-1014:⁵⁹

[9] Motorola, “A new HARQ scheme using IR-Rev0,” R1-01-1014

98. Thus, a member of the public, such as a POSITA, would have further become aware of R1-01-1014 no later than January 28, 2002 based on the identification of the submission in the list of references in R1-01-1081, including R1-01-1081’s identification of the subject matter in R1-01-1014 as “A new HARQ scheme using IR-Rev0.” A member of the public who was reviewing the meeting

⁵⁵ https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_AH/HSDPA_Ad_Hoc/Docs/Zips/ (Ex. 1073).

⁵⁶ https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_AH/HSDPA_Ad_Hoc/Docs/Zips/R1-01-1081.zip (Ex. 1087).

⁵⁷ Ex. 1088 (redline comparing disclosures of R1-01-1014 and R1-01-1081)

⁵⁸ https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_AH/HSDPA_Ad_Hoc/Docs/Zips/ (Ex. 1073 at 2).

⁵⁹ https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_AH/HSDPA_Ad_Hoc/Docs/Zips/R1-01-1081.zip (Ex. 1087 at 11).

minutes or R1-01-1081 would not have encountered any difficulty locating R1-01-1014 on the FTP server in the “Zips” folder for RAN WG1 HSDPA Ad-Hoc by no later than January 28, 2002 by using the R1-01-1014 T-doc number.⁶⁰

99. At least after January 28, 2002, members of the public interested in cellular communications and the development of wireless communication standards, including POSITAs, would have been aware of 3GPP’s standard business practices for the organization of documents on the FTP server, including the location of materials for the RAN WG1 (or would have learned of 3GPP’s standard business practices, the responsibilities of RAN WG1, and the location of RAN WG1’s materials on the FTP server (*see* Section IV), and would have been able to locate R1-01-1081 after exercising reasonable diligence, including by using the T-doc titles in the meeting minutes as a subject matter index to locate relevant T-docs as well as the reference to R1-01-1014 in R1-01-1081 as a further subject matter index to locate other documents, such as R1-01-1014.

4. Distribution at RAN WG1 HSDPA Ad-Hoc

100. R1-01-1014 was submitted for the RAN WG1 HSDPA Ad-Hoc held on November 5-7, 2001, in Sophia Antipolis, France. Thus, based on my personal knowledge and experience with ETSI’s and 3GPP’s standard business practices, R1-

⁶⁰ https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_AH/HSDPA_Ad_Hoc/Docs/Zips/ (Ex. 1073).

Declaration of Friedhelm Rodermund

01-1014 would have been made available to all attending 3GPP members in electronic form no later than November 7, 2001, which was the last day of the Sophia Antipolis meeting. 3GPP places no restrictions on documents made available at meetings, and attendees were free to share R1-01-1014 without restriction or obligation of confidentiality.

101. The meeting report of the RAN WG1 HSDPA Ad-Hoc held on November 5-7, 2001 states that the meeting was attended by 60 individuals.⁶¹ The meeting report on page 10 identifies T-doc R1-01-1081, which is a revised version of R1-01-1014, as “Noted” after a “brief[] review[]”:⁶²

6. HARQ issues.							
Following documents were briefly reviewed.							
⊕							
No.	Category	T-doc	Title	Source	Conclusion	Notes	
26		R1-01-1081	A New Hybrid-ARQ Scheme Using Incremental Redundancy	Motorola	Noted		

102. R1-01-1081 (a revised version of R1-01-1014) was therefore made available to all 60 attendees of RAN WG1 HSDPA Ad-Hoc held on November 5-7, 2001, which includes members of the cellular telecommunications industry interested in the development and implementation of cellular standards, by no later than November 7, 2001, and meeting participants would have learned of the

⁶¹ https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_AH/HSDPA_Ad_Hoc/Report/R1-01-1105.zip (Ex. 1086 at 16-17).

⁶² https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_AH/HSDPA_Ad_Hoc/Report/R1-01-1105.zip (Ex. 1086 at 10).

document's existence during the meeting, which is confirmed by the "Noted" designation, which is a standard term used by 3GPP to indicate that the content of R1-01-1081 was considered by the meeting participants on Day 2 (November 6, 2001), which is further confirmed by the meeting notes stating that the document was "briefly reviewed."⁶³

5. Contemporaneous Citation to R1-01-1014

103. The citation to R1-01-1014 in U.S. Patent No. 7,210,089, which was filed on July 12, 2002,⁶⁴ provides further evidence of the accessibility of R1-01-1014 to POSITAs, including that R1-01-1014 would have been able to be located by a POSITA exercising reasonable diligence, prior to July 12, 2002.

6. Conclusion

104. Thus, based on my personal knowledge and experience with ETSI's and 3GPP's standard business practices, Ex. 1006 is an authentic copy of 3GPP T-doc R1-01-1014 that was disseminated on October 23, 2001 via email to at least 900 interested members of the public subscribed to the 3GPP_TSG_RAN_WG1 email reflector, including delegates of the 3GPP member companies; uploaded and made

⁶³ https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_AH/HSDPA_Ad_Hoc/Report/R1-01-1105.zip (Ex. 1086 at 10).

⁶⁴ U.S. Patent No. 7,210,089 (Ex. 1089); U.S. Patent App. No. 10/193,144 (Ex. 1090 at 20) ("A New Hybrid-ARQ Scheme Using Incremental Redundancy: Motorola, R1-01-1014, 3GPP TSG RAN1 Ad Hoc on HSDPA, France, November 2001").

available via the 3GPP FTP server to the general public where interested members of the public, such as POSITAs, would have been able to locate the reference exercising reasonable diligence by January 28, 2002; discussed at the RAN WG1 HSDPA Ad-Hoc meeting on November 6, 2001 (at least as part of R1-01-1081); and made available to at least 60 attendees of the RAN WG1 HSDPA Ad-Hoc meeting by no later than November 7, 2001.

105. Based on my personal knowledge and experience with ETSI's and 3GPP's standard business practices, Ex. 1087 is an authentic copy of 3GPP T-doc R1-01-1081 that was uploaded and made available via the 3GPP FTP server to the general public where interested members of the public, such as POSITAs, would have been able to locate the reference exercising reasonable diligence by January 28, 2002; discussed at the RAN WG1 HSDPA Ad-Hoc meeting on November 6, 2001; and made available to 60 attendees of the RAN WG1 HSDPA Ad-Hoc, by no later than November 6, 2001.

B. T-doc R1-01-1047 (Ex. 1007)

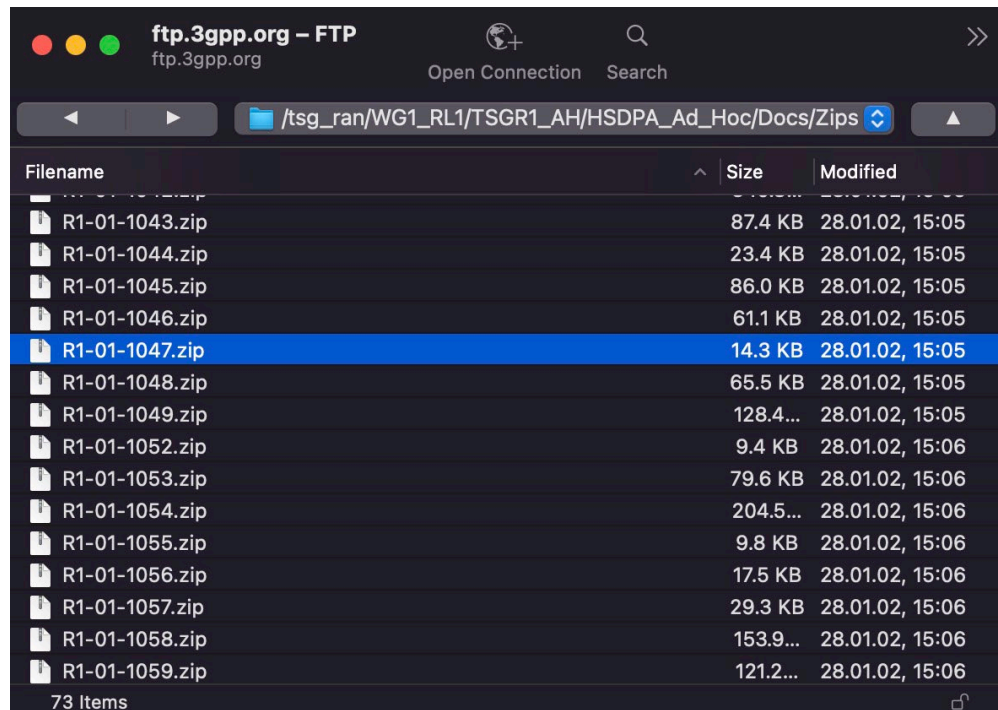
1. Authentication

106. Ex. 1007 is a true and correct copy of 3GPP T-doc R1-01-1047, titled "Overview of Proposed Schemes for Incremental Redundancy," except that each page includes an exhibit label and page numbers on the bottom right corner added by counsel. I obtained Ex. 1007 (R1-01-1047) from 3GPP's FTP server at the

following location: https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_AH/HSDPA_Ad_Hoc/Docs/Zips/. See Ex. 1073 at 2.

2. Available On 3GPP Public FTP Server

107. Ex. 1007 (R1-01-1047) was uploaded to the 3GPP FTP server on January 28, 2002, based on the upload date stamp on the 3GPP FTP server, as shown in the screenshot below:⁶⁵



The screenshot shows the 'ftp.3gpp.org - FTP' window. The address bar displays the path '/tsg_ran/WG1_RL1/TSGR1_AH/HSDPA_Ad_Hoc/Docs/Zips'. A table of files is listed with columns for 'Filename', 'Size', and 'Modified'. The file 'R1-01-1047.zip' is highlighted in blue. Below the table, it indicates '73 Items'.

Filename	Size	Modified
R1-01-1043.zip	87.4 KB	28.01.02, 15:05
R1-01-1044.zip	23.4 KB	28.01.02, 15:05
R1-01-1045.zip	86.0 KB	28.01.02, 15:05
R1-01-1046.zip	61.1 KB	28.01.02, 15:05
R1-01-1047.zip	14.3 KB	28.01.02, 15:05
R1-01-1048.zip	65.5 KB	28.01.02, 15:05
R1-01-1049.zip	128.4...	28.01.02, 15:05
R1-01-1052.zip	9.4 KB	28.01.02, 15:06
R1-01-1053.zip	79.6 KB	28.01.02, 15:06
R1-01-1054.zip	204.5...	28.01.02, 15:06
R1-01-1055.zip	9.8 KB	28.01.02, 15:06
R1-01-1056.zip	17.5 KB	28.01.02, 15:06
R1-01-1057.zip	29.3 KB	28.01.02, 15:06
R1-01-1058.zip	153.9...	28.01.02, 15:06
R1-01-1059.zip	121.2...	28.01.02, 15:06

Like R1-01-1014, R1-01-1047 was submitted in connection with the RAN WG1 ad hoc meeting on HSDPA. As discussed above, in Section V.A.3, RAN WG1 moved the location of the existing ad hoc meeting materials. Like R1-01-1014,

⁶⁵ https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_AH/HSDPA_Ad_Hoc/Docs/Zips/ (Ex. 1073 at 2)

members of the public would have been able to download the R1-01-1047 from the “R1_Ad_Hocs/” subfolder prior to December 2002. *See* Section V.A.3.

108. Experts in the field of determining the public availability of 3GPP documents would reasonably rely upon the FTP server upload date on the 3GPP FTP server as the date the document became available to the public and would consider the archived version of the directory structure maintained by the Internet Archive as further confirmation of public availability.

109. In addition, metadata information for the downloaded and extracted T-doc file⁶⁶ states a last Modified date of “5. November 2001,” as shown in the screenshot below:

⁶⁶ https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_AH/HSDPA_Ad_Hoc/Docs/Zips/R1-01-1047.zip (Ex. 1091).

Declaration of Friedhelm Rodermund

TSG-RAN Working Group 1 Ad Hoc on HSDPA **Tdoc R1-01-1047**

Sophia Antipolis, France
November 5-7, 2001

Source: Ericsson

Title: Overview of Proposed Schemes for Incremental Redundancy

Agenda Item: AHO2 (HSDPA)

Document for: Discussion and Decision

1. Introduction

Recently, there have been several proposals on the implementation of incremental redundancy for HSDPA [1][2][3][4][5][6]. There have also been some proposals on the mapping of the coded bits onto higher-order modulation symbols [7][8]. This contribution is an attempt to summarize the different proposals and to propose a way forward for a decision on the IR scheme to be used for HSDPA. In [7] and [8] it is stated that the proposed methods for mapping of coded bits onto higher-order modulation symbols are equally applicable to all different IR schemes. Therefore, the contribution compares the IR schemes and does not address the modulation aspects as these are covered by other contributions. The comparison focuses on the following aspects:

- Generation, properties and the number of different redundancy versions.
- Signaling of puncturing scheme used, i.e., whether the parameters necessary for a decoding attempt depends on previous transmission attempts or not.
- UE buffering requirements, i.e., if and how the schemes adjust to the buffering memory available.
- Support for a variable number of channel bits (N_{ch}). According to the current working assumptions, the modulation scheme and the number of spreading codes can change between retransmissions.

2. Proposals

2.1. Ericsson [1]

The basis for this proposal is the R99 rate matching scheme. Two different redundancy versions are proposed to be sufficient, although the scheme can be generalized to more versions. The first redundancy version contains the systematic bits and some parity bits, while the second one contains parity bits only. Different initial values of the parameter r_{ch} in the R99 rate matching algorithm are used to generate the redundancy versions. The redundancy versions are explicitly signaled, i.e., the coding scheme is determined solely by the signaling on the shared control channel and does not depend on the coding scheme used for previous transmissions. The number of coded bits carried on the HS-DSCH can vary between transmissions, e.g., if the number of spreading codes are changed. Two-stage rate matching is used to adapt to the buffering capability available in the UE.

2.2. Texas Instruments [2]

The proposal is based on R99 rate matching. Three redundancy versions are proposed, one with systematic and parity bits and two with (primarily) parity bits only. The second (third) redundancy version transmits all parity bits from the first (second) constituent encoder and punctures the systematic and the parity bits from the second (first) encoder, starting with puncturing the systematic bits. This will in essence create unequal puncturing between the two constituent encoders. Different parameters in the R99 rate matching algorithm are used to create the different redundancy versions. There is no discussion on signaling of the different redundancy versions, but there is no parameter dependence between the two alternatives. In principle, the shared control channel can therefore carry all the necessary information for decoding. The number of transmitted bits on the channel can vary between retransmissions although there is a lower bound (equal to the number of information bits) implied by the fact that at least all the parity bits from one encoder must be transmitted (this restriction can be removed). Two-stage rate matching is proposed for adaptation to the buffering available in the UE.

2.3. Siemens [3]

Rate matching is used as the basis in this proposal. Multiple redundancy versions are proposed, all of them including systematic bits (although this is easily changed according to the contribution). Different values of the parameter r_{ch} are used to create the different redundancy versions. The value of r_{ch} for a particular transmission depends on the value used in the previous transmission attempt, i.e., the information on the shared control channel alone

R1-01-1047.doc

73 KB

Information [Show Less](#)

Created **5. November 2001 at 08:54**

Modified **5. November 2001 at 08:54**

110. This last modified date confirms that the R1-01-1047 document had not been modified after November 5, 2001, which is prior to the January 28, 2002 upload date. It is standard practice in 3GPP to upload submissions shortly after completing them and the evidence demonstrates that this was also the case with R1-01-1047. However, as explained for R1-01-1014 above in Section V.A.3, given the upload dates of all T-docs from this Ad Hoc meeting are identical, and that January 28, 2002

date is 2.5 months after the meeting took place on November 5-7, 2001, this is a clear indication for me – given my experience as a custodian of 3GPP documents and records – that the whole folder with all documents was re-uploaded and the original timestamps were overwritten. As I explained in paragraph 34, the FTP server timestamp reflects the latest upload date.

111. Moreover, as explained above in Section V.A.3, the relocation of the ad hoc materials from the “R1_Ad_Hocs/”⁶⁷ subfolder to the current “TSGR1_AH”⁶⁸ subfolder after August 2005, had no impact on the content of R1-01-1047, as confirmed by the upload date to the 3GPP FTP server on January 28, 2002 and the metadata associated with the downloaded file indicating the document was last modified on November 5, 2001.

112. As explained in Section V.A.3, members of the public, such as a POSITA, would have been able to locate R1-01-1014 by identifying the RAN WG1 as the responsible 3GPP working group for the radio layer, followed by reviewing one or several meeting reports. For example, page 10 of the meeting report for the RAN WG1 HSDPA Ad-Hoc held on November 5-7, 2001, which was uploaded to

⁶⁷ http://www.3gpp.org/ftp/tsg_ran/WG1_RL1/R1_Ad_Hocs/HSDPA_Ad_Hoc/Docs/Zips/ (no longer active; moved to https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_AH/HSDPA_Ad_Hoc/Docs/Zips/ (Ex. 1073)).

⁶⁸ https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_AH/HSDPA_Ad_Hoc/Docs/Zips/ (Ex. 1073).

the 3GPP FTP server on January 28, 2002,⁶⁹ identifies T-doc R1-01-1047 including the T-doc number and the title, which describes the subject matter of R1-01-1047:⁷⁰

38	R1-01-1047	Overview of Proposed Schemes for Incremental Redundancy	Ericsson	Noted
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113. Therefore, at the latest after January 28, 2002, members of the public, such as a POSITA, would have had access to a subject matter index of submissions to RAN WG1 HSDPA Ad-Hoc, including R1-01-1047. A member of the public who was reviewing the meeting minutes would not have encountered any difficulty locating R1-01-1047 on the FTP server in the “Zips” folder for RAN WG1 HSDPA Ad-Hoc by using the R1-01-1047 T-doc number.⁷¹

114. At least after January 28, 2002, members of the public interested in cellular communications and the development of wireless communication standards, including POSITAs, would have been aware of 3GPP’s standard business practices for the organization of documents on the FTP server, including the location of materials for the RAN WG1 (or would have learned of 3GPP’s standard business practices, the responsibilities of RAN WG1, and the location of RAN WG1’s

⁶⁹ https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_AH/HSDPA_Ad_Hoc/Report (Ex. 1085).

⁷⁰ https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_AH/HSDPA_Ad_Hoc/Report (Ex. 1085).

⁷¹ https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_AH/HSDPA_Ad_Hoc/Docs/Zips/ (Ex. 1073).

materials on the FTP server (*see* Section IV), and would have been able to locate R1-01-1047 after exercising reasonable diligence, including by using the T-doc titles in the meeting minutes as a subject matter index to locate R1-01-1047.

3. Distribution at RAN WG1 HSDPA Ad-Hoc

115. R1-01-1047 was submitted for the RAN WG1 HSDPA Ad-Hoc held on November 5-7, 2001, in Sophia Antipolis, France. Thus, based on my personal knowledge and experience with ETSI's and 3GPP's standard business practices, R1-01-1047 would have been made available to all attending 3GPP members in electronic form no later than November 7, 2001, which was the last day of the Sophia Antipolis meeting.

116. The meeting report of the RAN WG1 HSDPA Ad-Hoc held on November 5-7, 2001 states that the meeting was attended by 60 individuals.⁷² The meeting report on page 10 identifies R1-01-1047 as "Noted" after a "brief[] review[]":⁷³

38	R1-01-1047	Overview of Proposed Schemes for Incremental Redundancy	Ericsson	Noted
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⁷² https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_AH/HSDPA_Ad_Hoc/Report/R1-01-1105.zip (Ex. 1086 at 16-17).

⁷³ https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_AH/HSDPA_Ad_Hoc/Report/R1-01-1105.zip (Ex. 1086 at 10).

117. R1-01-1047 was therefore made available to all 60 attendees of RAN WG1 HSDPA Ad-Hoc held on November 5-7, 2001, which includes members of the cellular telecommunications industry interested in the development and implementation of cellular standards, by no later than November 7, 2001, and meeting participants would have learned of the document's existence during the meeting, which is confirmed by the "Noted" designation, which is a standard term used by 3GPP to indicate that the content of R1-01-1047 was considered by the meeting participants on Day 2 (November 6, 2001), which is further confirmed by the meeting notes stating that the document was "briefly reviewed."⁷⁴

4. Conclusion

118. Thus, based on my personal knowledge and experience with ETSI's and 3GPP's standard business practices, Ex. 1007 is an authentic copy of 3GPP T-doc R1-01-1047 that was uploaded and made available via the 3GPP FTP server to the general public where interested members of the public, such as POSITAs, would have been able to locate the reference exercising reasonable diligence by January 28, 2002; discussed at the RAN WG1 HSDPA Ad-Hoc meeting on November 6, 2001; and made available to at least 60 attendees of the RAN WG1 HSDPA Ad-Hoc meeting by no later than November 7, 2001.

⁷⁴ https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_AH/HSDPA_Ad_Hoc/Report/R1-01-1105.zip (Ex. 1086 at 10).

C. TS 25.212 V5.1.0 (Ex. 1008)

1. Authentication

119. Ex. 1008 is a true and correct copy of 3GPP TS 25.212 V5.1.0, titled “Technical Specification Group Radio Access Network; Multiplexing and channel coding (FDD) (Release 5),” except that each page includes an exhibit label and page numbers on the bottom right corner added by counsel. I obtained Ex. 1008 (TS 25.212 V5.1.0) from 3GPP’s FTP server at the following location: https://www.3gpp.org/ftp/Specs/archive/25_series/25.212. Ex. 1092.

120. A substantively identical copy of Ex. 1008 (TS 25.212 V5.1.0), with the only differences appearing on the cover page and the added history page on the last page of the ETSI version, which identifies the document revision history, was published by ETSI.⁷⁵

2. Publication by 3GPP and ETSI

121. Ex. 1008 (TS 25.212 V5.1.0) shows on its cover page “2002-06” as the year (2002) and month (June) during which the document was released by 3GPP. This is aligned with the “Change history” on the document’s last page which shows “07/06/02” as the last “Date” entry, where the second set of digits (“06”) is the

⁷⁵ https://www.etsi.org/deliver/etsi_ts/125200_125299/125212/05.01.00_60/ (July 9, 2002 upload date) (Ex. 1093); https://www.etsi.org/deliver/etsi_ts/125200_125299/125212/05.01.00_60/ts_125212v050100p.pdf (ETSI TS 125.212) (Ex. 1094).

month, the first set of digits (“07”) is the day, and the third set of digits (“02”) is the year. Ex. 1008 (TS 25.212 V5.1.0) at 74.

122. This publication date is further confirmed by the publication history of TS 25.212 V5.1.0 in the ETSI copy of TS 25.212 named “ETSI TS 125 212”, which states that V5.1.0 was published in June 2002.⁷⁶

123. In 2001/2002, members of the public, such as POSITAs, including anyone with an interest in the development or implementation of cellular standards, would have been aware of 3GPP and ETSI as the publishers of 3GPP technical specifications. These members of the public would have also been aware of the subject matter covered by TS 25.212 and where to locate TS 25.212 on the 3GPP or ETSI websites. Alternatively, a member of the public would have learned about the subject matter of TS 25.212 using the 3GPP website as a resource (*see* Section IV) as well as the location of TS 25.212 on the 3GPP and ETSI websites. Thereafter, a member of the public would have encountered no difficulty obtaining a copy from either 3GPP or ETSI. For example, ETSI provided “A subscription service containing the full library of ETSI deliverables and offering[s]” on a CD or DVD.⁷⁷

⁷⁶ https://www.etsi.org/deliver/etsi_ts/125200_125299/125212/05.01.00_60/ (July 9, 2002 upload date) (Ex. 1093);
https://www.etsi.org/deliver/etsi_ts/125200_125299/125212/05.01.00_60/ts_125212v050100p.pdf (Ex. 1094).

⁷⁷ <https://web.archive.org/web/20020202222234/http://etsi.org/getastandard/home.htm> (Ex. 1095).

124. Moreover, because 3GPP and ETSI are well-known and respected publishers of technical specifications, experts in the field of determining the public availability of 3GPP documents would reasonably rely upon the publication dates printed on the technical specifications published by 3GPP and ETSI for the date when the technical specification became available to members of the public.

125. Based on this publication data and 3GPP's standard business practice to make 3GPP technical specifications available to the public shortly after they are approved at the Technical Specification Group meeting, TS 25.212 V5.1.0 was approved for publication in June 2002 and published and made available to members of the public by 3GPP no later than June 28, 2002⁷⁸ and by ETSI no later than July 9, 2002.⁷⁹

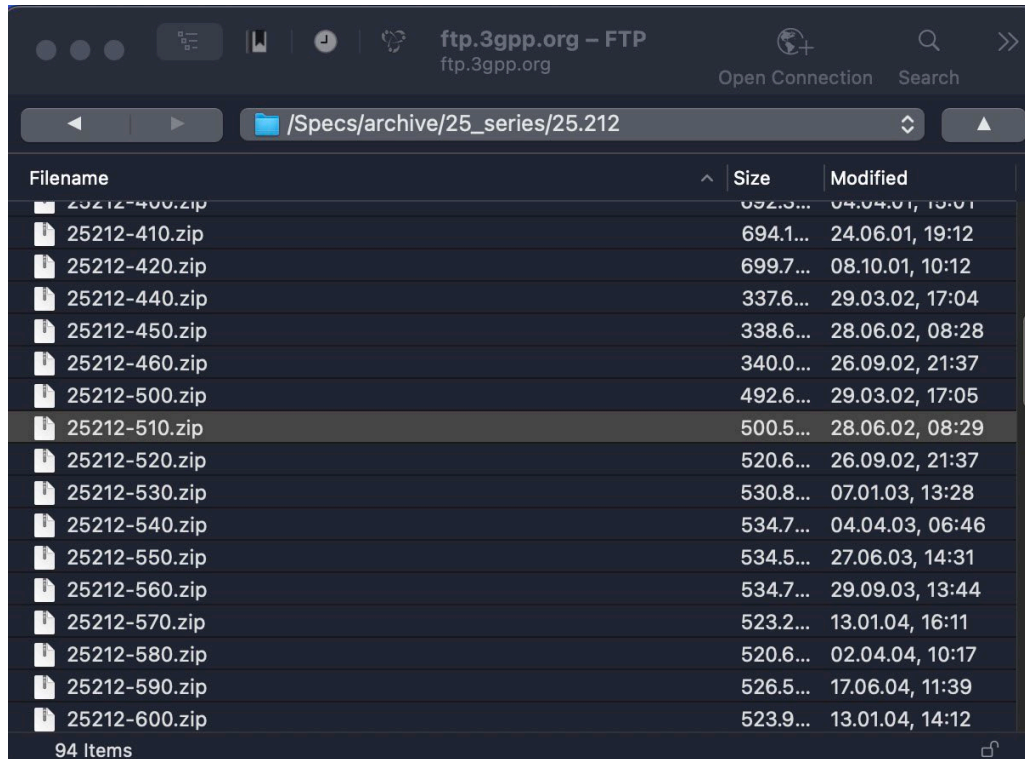
3. Available On 3GPP Public FTP Server and 3GPP Website

126. Ex. 1008 (TS 25.212 V5.1.0) was uploaded to the 3GPP FTP server on June 28, 2002, based on the upload date stamp shown in the "archive" folder on the 3GPP FTP server, as shown in the screenshot below for the corresponding downloadable file ("25212-510.zip"):⁸⁰

⁷⁸ https://www.3gpp.org/ftp/Specs/archive/25_series/25.212 (Ex. 1092).

⁷⁹ https://web.archive.org/web/20020820115542/http://webapp.etsi.org:80/key/key.asp?full_list=y (Ex. 1096 at 299); https://www.etsi.org/deliver/etsi_ts/125200_125299/125212/05.01.00_60/ (July 9, 2002 upload date) (Ex. 1093).

⁸⁰ https://www.3gpp.org/ftp/Specs/archive/25_series/25.212 (Ex. 1092).



The screenshot shows an FTP client window titled 'ftp.3gpp.org - FTP' with the address bar displaying '/Specs/archive/25_series/25.212'. The window contains a table of files with columns for 'Filename', 'Size', and 'Modified'. The file '25212-510.zip' is highlighted, showing a size of 500.5... and a modified date of 28.06.02, 08:29. The table lists 17 files in total, all with .zip extensions and names starting with '25212-'. The status bar at the bottom indicates '94 Items'.

Filename	Size	Modified
25212-400.zip	692.3...	04.04.01, 13:01
25212-410.zip	694.1...	24.06.01, 19:12
25212-420.zip	699.7...	08.10.01, 10:12
25212-440.zip	337.6...	29.03.02, 17:04
25212-450.zip	338.6...	28.06.02, 08:28
25212-460.zip	340.0...	26.09.02, 21:37
25212-500.zip	492.6...	29.03.02, 17:05
25212-510.zip	500.5...	28.06.02, 08:29
25212-520.zip	520.6...	26.09.02, 21:37
25212-530.zip	530.8...	07.01.03, 13:28
25212-540.zip	534.7...	04.04.03, 06:46
25212-550.zip	534.5...	27.06.03, 14:31
25212-560.zip	534.7...	29.09.03, 13:44
25212-570.zip	523.2...	13.01.04, 16:11
25212-580.zip	520.6...	02.04.04, 10:17
25212-590.zip	526.5...	17.06.04, 11:39
25212-600.zip	523.9...	13.01.04, 14:12

127. This June 28, 2002 date is confirmed by the Internet Archive’s September 12, 2002 capture of the 3GPP “archive” directory on the FTP server for the corresponding downloadable file (“25212-510.zip”).⁸¹

128. This June 28, 2002 date is further confirmed by the Internet Archive’s August 12, 2002 capture of the 3GPP “latest” directory on the FTP server for the corresponding downloadable file (“25212-510.zip”).⁸²

129. Experts in the field of determining the public availability of 3GPP documents would reasonably rely upon the FTP server upload dates on the 3GPP

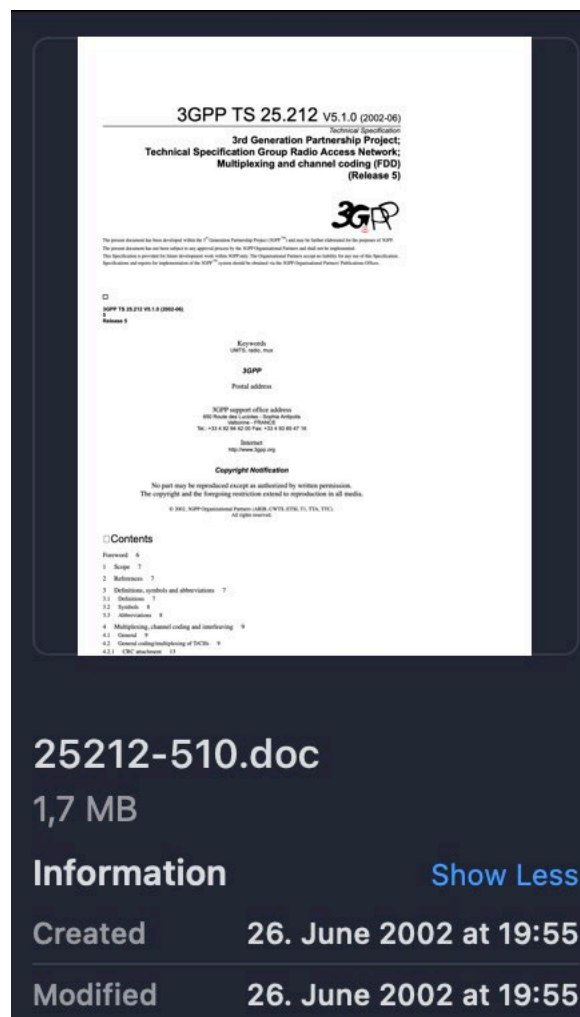
⁸¹ https://web.archive.org/web/20020912200940/http://www.3gpp.org/ftp/Specs/archive/25_series/25.212/ (Ex. 1097).

⁸² https://web.archive.org/web/20020812090150/http://www.3gpp.org:80/ftp/Specs/latest/Rel-5/25_series/ (Ex. 1071).

Declaration of Friedhelm Rodermund

FTP server as the date the document became available to the public and would consider the archived version of the directory structure maintained by the Internet Archive as further confirmation of the date of public availability.

130. In addition, metadata information for the downloaded and extracted TS file⁸³ states a last Modified date of “26. June 2002” as shown in the screenshot below:



⁸³ https://www.3gpp.org/ftp/Specs/archive/25_series/25.212/25212-510.zip (Ex. 1098).

This last modified date is consistent with the June 28, 2002 upload date of the document and 3GPP's standard business practice to upload technical specifications shortly after approval.

131. To the extent a member of the public was not already independently aware of TS 25.212, a member of the public would have been able to locate TS 25.212 V5.1.0 in a number of ways. As one example, and as explained in greater detail in Section IV, in 2002 a member of the public, such as a POSITA, would have identified the RAN WG1 as the responsible 3GPP working group for the radio layer and would have then reviewed the list of specifications for which RAN WG1 was responsible for.⁸⁴ For example, the RAN WG1 specifications page provided a subject matter description of TS 25.212 as concerning “Multiplexing and channel coding (FDD).” *Id.*

132. As a further example, and as explained in greater detail in Section IV, a member of the public, such as a POSITA, would have had access to the full index of specifications on 3GPP's website.⁸⁵ The entry for TS 25.212 in the full index of 3GPP specifications included: (1) a title of “Multiplexing and channel coding (FDD)” (which serves as a subject matter descriptor for the content of TS 25.212);

⁸⁴ <https://web.archive.org/web/20020626102256/http://www.3gpp.org/TB/ran/ran1/specs.htm> (Ex. 1099).

⁸⁵ <https://web.archive.org/web/20071101043800/http://www.3gpp.org/specs/3GPP-Spec-Titles.zip> (Ex. 1063 at 22).

(2) “R1” (which is “RAN WG1”) as the responsible working group; (3) R99, Rel-4, Rel-5, and Rel-6 as the relevant releases; and (4) that it is an active specification.⁸⁶

133. As a further example, and as explained in greater detail in Section IV, in 2002 a member of the public, such as a POSITA, would have considered the specification series page, which identified the 25 series as related to “Radio aspects,”⁸⁷ another subject matter descriptor for the content of 25.212, and would have been able to review each of the 26 specifications within that series on the FTP server.⁸⁸

134. The above examples illustrate that in 2002 it was straightforward for an interested member of the public without prior knowledge of the TS number to discover that TS 25.212 related to radio aspects of the 3G standard, specifically FDD multiplexing and channel coding.

135. Once the member of the public was aware of the 25.212 specification number, the member of the public, such as a POSITA, to the extent she was not already aware of the location of the technical specification on the 3GPP FTP server, would have then followed the instructions on the 3GPP webpages, as described in

⁸⁶ <https://web.archive.org/web/20071101043800/http://www.3gpp.org/specs/3GPP-Spec-Titles.zip> (Ex. 1063 at 22).

⁸⁷ <https://web.archive.org/web/20020806054349/http://www.3gpp.org/specs/numbering.htm> (Ex. 1061)

⁸⁸ <https://web.archive.org/web/20021022011153/http://www.3gpp.org/TB/RAN/RAN1/specs.htm> (Ex. 1065).

Section IV, to download the specification. For example, a member of the public would have reviewed the general specifications webpage link and been informed that “[t]he latest versions of the specifications can always be found here: <ftp://ftp.3gpp.org/specs/latest/>” or that “[a]ll older versions of specifications (where available) are stored in the archive subdirectory. All versions of all releases of a given specification are placed directly under the name of the specification. <ftp://ftp.3gpp.org/specs/archive/>.”⁸⁹ As another example, a member of the public would have been informed of the instruction on the 3GPP RAN WG1 specification webpage that “[t]he latest versions of these specifications can be found <http://www.3gpp.org/ftp/Specs/archive/>”⁹⁰ Once at the FTP server, the member of the public would have then selected the “archive” directory in the specification folder of the FTP server,⁹¹ “25_series,”⁹² then “25.212,”⁹³ and then “25212-510.zip”⁹⁴ to download TS 25.212 V5.1.0 from the 3GPP FTP server. Alternatively,

⁸⁹ <https://web.archive.org/web/20020802092436/http://www.3gpp.org/specs/specs.htm> (Ex. 1060).

⁹⁰ <https://web.archive.org/web/20020626102256/http://www.3gpp.org/TB/ran/ran1/specs.htm> (Ex. 1099).

⁹¹ <https://web.archive.org/web/20020802173135/http://www.3gpp.org/ftp/Specs/> (Ex. 1114).

⁹² <https://web.archive.org/web/20020806031707/http://www.3gpp.org/ftp/Specs/archive/> (Ex. 1115).

⁹³ https://web.archive.org/web/20020701091801/http://www.3gpp.org/ftp/specs/archive/25_series/ (Ex. 1116).

⁹⁴ https://web.archive.org/web/20020912200940/http://www.3gpp.org/ftp/Specs/archive/25_series/25.212/ (Ex. 1097).

the member of the public would have selected the “latest” directory,⁹⁵ “Rel-5,”⁹⁶ “25_series,”⁹⁷ and then “25212-510.zip”⁹⁸ to download TS 25.212 V5.1.0 from the 3GPP FTP server.

136. As discussed above, TS 25.212 V5.1.0 was uploaded to the 3GPP FTP server on June 28, 2002 and was thereafter available for download from both the “archive” and “latest” directories on the 3GPP FTP server.

137. Thus, in 2002, members of the public interested in cellular communications and the development of wireless communication standards, including POSITAs, would have been aware of 3GPP’s standard business practices for the organization of documents on the FTP server, including the location of the technical specifications, and would have been able to locate TS 25.212 V5.1.0

⁹⁵ <https://web.archive.org/web/20020802173135/http://www.3gpp.org/ftp/Specs/> (Ex. 1114).

⁹⁶ <https://web.archive.org/web/20020803112613/http://www.3gpp.org/ftp/Specs/latest/> (Ex. 1069). A POSITA interested in wireless communications in the 2002 timeframe would have known that Release 5 related to the current 3G release containing the latest technology.

https://web.archive.org/web/20020531003232/http://www.3gpp.org/ftp/specs/latest/Rel-6/25_series/ (Ex. 1117). The ftp server included a folder for Release 6, but did not populate it with documents until after the 2002 timeframe, which confirms that a POSITA would look to Release 5 during the 2002 timeframe.

⁹⁷ <https://web.archive.org/web/20020804015202/http://www.3gpp.org/ftp/Specs/latest/Rel-5/> (Ex. 1070).

⁹⁸ https://web.archive.org/web/20020812090150/http://www.3gpp.org/ftp/Specs/latest/Rel-5/25_series/ (Ex. 1118). After June 28, 2002, and until a new version of TS 25.212 was approved and uploaded to the 3GPP FTP server, 25.212 V5.1.0 would have been located within the 25212-510.zip in the latest subdirectory.

without difficulty. To the extent the member of the public required additional information regarding the specific subject matter of particular specifications, the 3GPP website included multiple subject matter indices of specification series and individual specifications (*see* Section IV).

4. Contemporaneous Citation to TS 25.212 V5.1.0

138. The citation to TS 25.212 V5.1.0 in “Development of a CDMA System with Rake Receiver for the Third Generation Wireless Communication Systems” published by IEEE,⁹⁹ which indicates that the reference was available prior to the beginning of the 2002 IEEE International Conference on Personal Wireless Communications on December 15-17, 2002,¹⁰⁰ provides further evidence of the accessibility of TS 25.212 V5.1.0 to interested researchers, such as POSITAs, including that TS 25.212 V5.1.0 would have been able to be located by an interested researcher exercising reasonable diligence prior to December 15, 2002.

⁹⁹ Kumar, Ratnam V. Raja, “Development of a CDMA system with RAKE receiver for the third generation wireless communication systems,” 2002 IEEE International Conference on Personal Wireless Communications, December 15-17, 2002 (Ex. 1100, at 313 (“Third Generation Partnership Project, Technical specification group radio access network; Multiplexing and channel coding (FDD); 3GPP TS 25.212 v5.1.0 (2002-06).”).

¹⁰⁰ <https://ieeexplore.ieee.org/abstract/document/1177299> (Ex. 1101).

5. Conclusion

139. Thus, based on my personal knowledge and experience with ETSI's and 3GPP's standard business practices, Ex. 1008 is an authentic copy of 3GPP TS 25.212 V5.1.0 that was published by 3GPP by no later than June 28, 2002; published by ETSI by no later than July 9, 2002; and uploaded and made available via the 3GPP FTP server to the general public where interested members of the public, such as POSITAs, would have been able to locate the reference exercising reasonable diligence by June 28, 2002.

D. TS 25.212 V3.5.0 (Ex. 1036)

1. Authentication

140. Ex. 1036 is a true and correct copy of 3GPP TS 25.212 V3.5.0, titled "Technical Specification Group Radio Access Network; Multiplexing and channel coding (FDD) (Release 5)," except that each page includes an exhibit label and page numbers on the bottom right corner added by counsel. I obtained Ex. 1036 (TS 25.212 V3.5.0) from 3GPP's FTP server at the following location: https://www.3gpp.org/ftp/Specs/archive/25_series/25.212. Ex. 1092.

141. A substantively identical copy of Ex. 1036 (TS 25.212 V3.5.0), with the only differences appearing on the cover page and the added history page on the

last page of the ETSI version, which identifies the document revision history, was published by ETSI.¹⁰¹

2. Publication by 3GPP and ETSI

142. Ex. 1036 (TS 25.212 V3.5.0) shows on its cover page “2000-12” as the year (2000) and month (December) during which the document was released by 3GPP. This is aligned with the “Change history” on the document’s last page which shows “15/12/00” as the last “Date” entry, where the second set of digits (“12”) is the month, the first set of digits (“15”) is the day, and the third set of digits (“00”) is the year. Ex. 1036 (TS 25.212 V3.5.0) at 62.

143. This publication date is further confirmed by the publication history of TS 25.212 V3.5.0 in the ETSI copy of TS 25.212 named “ETSI TS 125 212”, which states that V3.5.0 was published in December 2000.¹⁰²

144. In 2000/2001, members of the public, such as POSITAs, including anyone with an interest in the development or implementation of cellular standards, would have been aware of 3GPP and ETSI as the publishers of 3GPP technical

¹⁰¹ https://www.etsi.org/deliver/etsi_ts/125200_125299/125212/03.05.00_60/ (February 12, 2001 upload date) (Ex. 1108);
https://www.etsi.org/deliver/etsi_ts/125200_125299/125212/03.05.00_60/ts_125212v030500p.pdf (ETSI TS 125.212) (Ex. 1109).

¹⁰² https://www.etsi.org/deliver/etsi_ts/125200_125299/125212/03.05.00_60/ (February 12, 2001 upload date) (Ex. 1108);
https://www.etsi.org/deliver/etsi_ts/125200_125299/125212/03.05.00_60/ts_125212v030500p.pdf (Ex. 1109).

specifications. These members of the public would have also been aware of the subject matter covered by TS 25.212 and where to locate TS 25.212 on the 3GPP or ETSI websites. Alternatively, a member of the public would have learned about the subject matter of TS 25.212 using the 3GPP website as a resource (*see* Section IV) as well as the location of TS 25.212 on the 3GPP and ETSI websites. Thereafter, a member of the public would have encountered no difficulty obtaining a copy from either 3GPP or ETSI. For example, ETSI provided “A subscription service containing the full library of ETSI deliverables and offering[s]” on a CD or DVD.¹⁰³

145. Moreover, because 3GPP and ETSI are well-known and respected publishers of technical specifications, experts in the field of determining the public availability of 3GPP documents would reasonably rely upon the publication dates printed on the technical specifications published by 3GPP and ETSI for the date when the technical specification became available to members of the public.

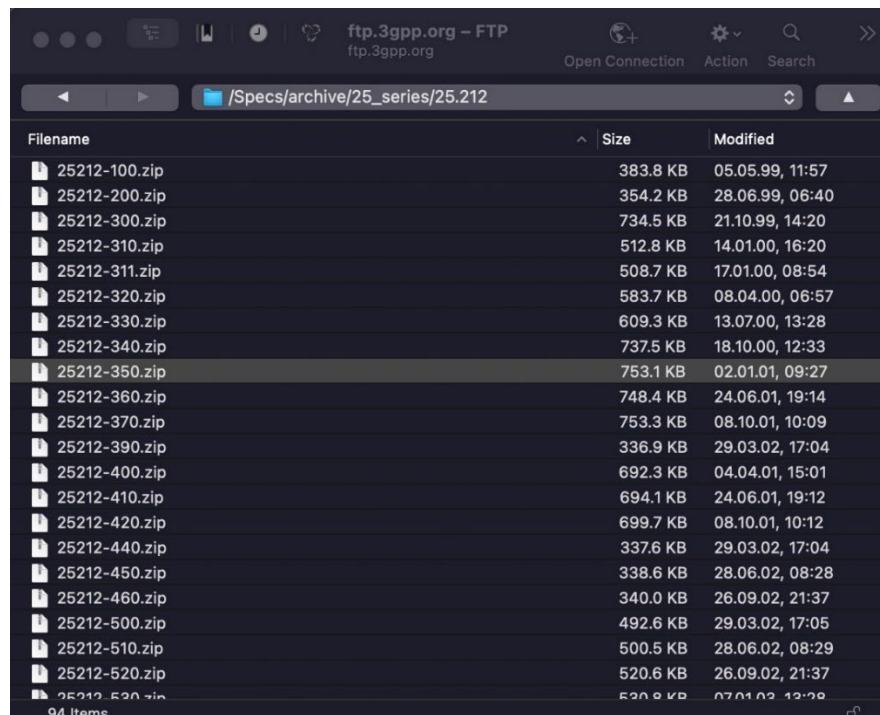
146. Based on this publication data and 3GPP’s standard business practice to make 3GPP technical specifications available to the public shortly after they are approved at the Technical Specification Group meeting, TS 25.212 V3.5.0 was approved for publication in December 2000 and published and made available to

¹⁰³ <https://web.archive.org/web/20011020025720/http://etsi.org/getastandard/home.htm> (Ex. 1110).

members of the public by 3GPP no later than January 2, 2001¹⁰⁴ and by ETSI no later than February 12, 2001.¹⁰⁵

3. Available On 3GPP Public FTP Server and 3GPP Website

147. Ex. 1036 (TS 25.212 V3.5.0) was uploaded to the 3GPP FTP server on January 2, 2001, based on the upload date stamp shown in the “archive” folder on the 3GPP FTP server, as shown in the screenshot below for the corresponding downloadable file (“25212-350.zip”):¹⁰⁶



Filename	Size	Modified
25212-100.zip	383.8 KB	05.05.99, 11:57
25212-200.zip	354.2 KB	28.06.99, 06:40
25212-300.zip	734.5 KB	21.10.99, 14:20
25212-310.zip	512.8 KB	14.01.00, 16:20
25212-311.zip	508.7 KB	17.01.00, 08:54
25212-320.zip	583.7 KB	08.04.00, 06:57
25212-330.zip	609.3 KB	13.07.00, 13:28
25212-340.zip	737.5 KB	18.10.00, 12:33
25212-350.zip	753.1 KB	02.01.01, 09:27
25212-360.zip	748.4 KB	24.06.01, 19:14
25212-370.zip	753.3 KB	08.10.01, 10:09
25212-390.zip	336.9 KB	29.03.02, 17:04
25212-400.zip	692.3 KB	04.04.01, 15:01
25212-410.zip	694.1 KB	24.06.01, 19:12
25212-420.zip	699.7 KB	08.10.01, 10:12
25212-440.zip	337.6 KB	29.03.02, 17:04
25212-450.zip	338.6 KB	28.06.02, 08:28
25212-460.zip	340.0 KB	26.09.02, 21:37
25212-500.zip	492.6 KB	29.03.02, 17:05
25212-510.zip	500.5 KB	28.06.02, 08:29
25212-520.zip	520.6 KB	26.09.02, 21:37
25212-530.zip	520.6 KB	07.01.03, 12:28

¹⁰⁴ https://web.archive.org/web/20011124215727/http://www.3gpp.org/ftp/Specs/archive/25_series/25.212/ (Ex. 1111).

¹⁰⁵ https://web.archive.org/web/20020820115542/http://webapp.etsi.org:80/key/key.asp?full_list=y (Ex. 1096);
https://www.etsi.org/deliver/etsi_ts/125200_125299/125212/03.05.00_60/ (February 12, 2001 upload date) (Ex. 1108).

¹⁰⁶ https://www.3gpp.org/ftp/Specs/archive/25_series/25.212 (Ex. 1092).

148. This January 2, 2001 date is confirmed by the Internet Archive's November 24, 2001 capture of the 3GPP "archive" directory on the FTP server for the corresponding downloadable file ("25212-350.zip").¹⁰⁷

149. This January 2, 2001 date is further confirmed by the Internet Archive's January 11, 2002 capture of the 3GPP "latest" directory on the FTP server for the corresponding downloadable file ("25212-350.zip").¹⁰⁸

150. Experts in the field of determining the public availability of 3GPP documents would reasonably rely upon the FTP server upload dates on the 3GPP FTP server as the date the document became available to the public and would consider the archived version of the directory structure maintained by the Internet Archive as further confirmation of the date of public availability.

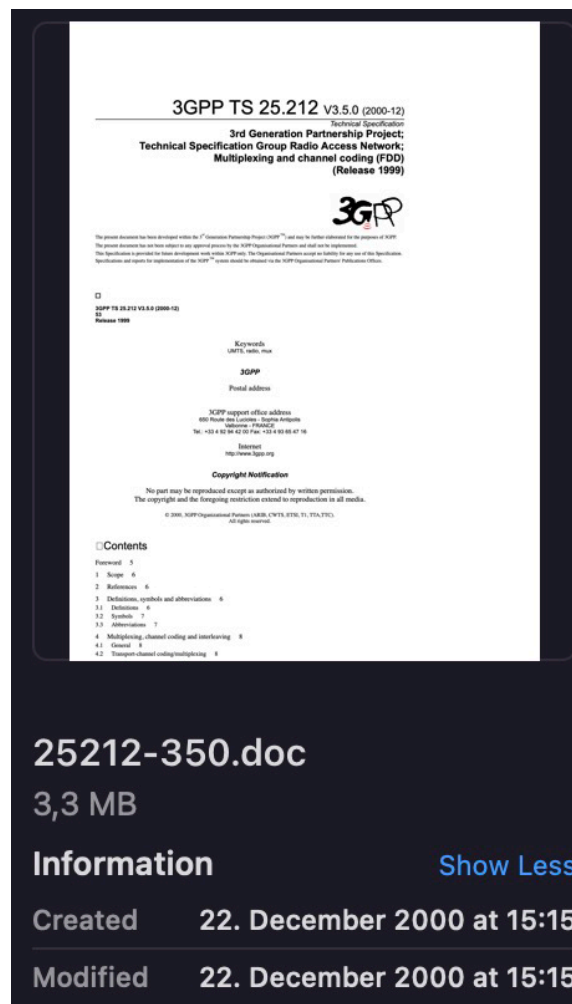
151. In addition, metadata information for the downloaded and extracted TS file¹⁰⁹ states a last Modified date of "22. December 2000" as shown in the screenshot below:

¹⁰⁷ https://web.archive.org/web/20011124215727/http://www.3gpp.org/ftp/Specs/archive/25_series/25.212/ (Ex. 1111).

¹⁰⁸ https://web.archive.org/web/20020111012800/http://www.3gpp.org:80/ftp/Specs/archive/25_series/25.212/ (Ex. 1112).

¹⁰⁹ https://www.3gpp.org/ftp/Specs/archive/25_series/25.212/25212-350.zip (Ex. 1113).

Declaration of Friedhelm Rodermund



152. This last modified date is consistent with the January 2, 2001 upload date of the document and 3GPP's standard business practice to upload technical specifications shortly after approval. In this case the upload took several days due to Christmas break.

153. To the extent a member of the public was not already independently aware of TS 25.212, a member of the public would have been able to locate TS 25.212 V3.5.0 in a number of ways. As one example, and as explained in greater detail in Section IV, in 2001/2002 a member of the public, such as a POSITA, would

have identified the RAN WG1 as the responsible 3GPP working group for the radio layer and would have then reviewed the list of specifications for which RAN WG1 was responsible for.¹¹⁰ For example, the RAN WG1 specifications page provided a subject matter description of TS 25.212 as concerning “Multiplexing and channel coding (FDD).” *Id.*

154. As a further example, and as explained in greater detail in Section IV, a member of the public, such as a POSITA, would have had access to the full index of specifications on 3GPP’s website.¹¹¹ The entry for TS 25.212 in the full index of 3GPP specifications included: (1) a title of “Multiplexing and channel coding (FDD)” (which serves as a subject matter descriptor for the content of TS 25.212); (2) “R1” (which is “RAN WG1”) as the responsible working group; (3) R99, Rel-4, Rel-5, and Rel-6 as the relevant releases; and (4) that it is an active specification.¹¹²

155. As a further example, and as explained in greater detail in Section IV, in 2002 a member of the public, such as a POSITA, would have considered the specification series page, which identified the 25 series as related to “Radio

¹¹⁰ <https://web.archive.org/web/20020626102256/http://www.3gpp.org/TB/ran/ran1/specs.htm> (Ex. 1099).

¹¹¹ <https://web.archive.org/web/20071101043800/http://www.3gpp.org/specs/3GPP-Spec-Titles.zip> (Ex. 1063 at 22).

¹¹² <https://web.archive.org/web/20071101043800/http://www.3gpp.org/specs/3GPP-Spec-Titles.zip> (Ex. 1063 at 22).

aspects,”¹¹³ another subject matter descriptor for the content of 25.212, and would have been able to review each of the 26 specifications within that series on the FTP server.¹¹⁴

156. The above examples illustrate that in 2001/2002 it was straightforward for an interested member of the public without prior knowledge of the TS number to discover that TS 25.212 related to radio aspects of the 3G standard, specifically FDD multiplexing and channel coding.

157. Once the member of the public was aware of the 25.212 specification number, the member of the public, such as a POSITA, to the extent she was not already aware of the location of the technical specification on the 3GPP FTP server, would have then followed the instructions on the 3GPP webpages, as described in Section IV, to download the specification. For example, a member of the public would have reviewed the general specifications webpage link and been informed that “[t]he latest versions of the specifications can always be found here: <ftp://ftp.3gpp.org/specs/latest/>” or that “[a]ll older versions of specifications (where available) are stored in the archive subdirectory. All versions of all releases of a given specification are placed directly under the name of the specification.

¹¹³ <https://web.archive.org/web/20020806054349/http://www.3gpp.org/specs/numbering.htm> (Ex. 1061)

¹¹⁴ <https://web.archive.org/web/20021022011153/http://www.3gpp.org/TB/RAN/RAN1/specs.htm> (Ex. 1065).

<ftp://ftp.3gpp.org/specs/archive/>.”¹¹⁵ As another example, a member of the public would have been informed of the instruction on the 3GPP RAN WG1 specification webpage that “[t]he latest versions of these specifications can be found <http://www.3gpp.org/ftp/Specs/archive/>”¹¹⁶ Once at the FTP server, the member of the public would have then selected the “archive” directory in the specification folder of the FTP server,¹¹⁷ “25_series,”¹¹⁸ then “25.212,”¹¹⁹ and then “25212-350.zip”¹²⁰ to download TS 25.212 V3.5.0 from the 3GPP FTP server.

158. As discussed above, TS 25.212 V3.5.0 was uploaded to the 3GPP FTP server on January 2, 2001 and was thereafter available for download from both the “archive” and “latest” directories on the 3GPP FTP server.

159. Thus, in 2001/2002, members of the public interested in cellular communications and the development of wireless communication standards, including POSITAs, would have been aware of 3GPP’s standard business practices

¹¹⁵ <https://web.archive.org/web/20020802092436/http://www.3gpp.org/specs/specs.htm> (Ex. 1060 at 2).

¹¹⁶ <https://web.archive.org/web/20020626102256/http://www.3gpp.org/TB/ran/ran1/specs.htm> (Ex. 1099).

¹¹⁷ <https://web.archive.org/web/20020802173135/http://www.3gpp.org/ftp/Specs/> (Ex. 1114).

¹¹⁸ <https://web.archive.org/web/20020806031707/http://www.3gpp.org/ftp/Specs/archive/> (Ex. 1115).

¹¹⁹ https://web.archive.org/web/20020701091801/http://www.3gpp.org/ftp/specs/archive/25_series/ (Ex. 1116).

¹²⁰ https://web.archive.org/web/20020912200940/http://www.3gpp.org/ftp/Specs/archive/25_series/25.212/ (Ex. 1097).

for the organization of documents on the FTP server, including the location of the technical specifications, and would have been able to locate TS 25.212 V3.5.0 without difficulty. To the extent the member of the public required additional information regarding the specific subject matter of particular specifications, the 3GPP website included multiple subject matter indices of specification series and individual specifications (*see* Section IV).

4. Conclusion

160. Thus, based on my personal knowledge and experience with ETSI's and 3GPP's standard business practices, Ex. 1036 is an authentic copy of 3GPP TS 25.212 V3.5.0 that was published by 3GPP by no later than January 2, 2001; published by ETSI by no later than February 12, 2001; and uploaded and made available via the 3GPP FTP server to the general public where interested members of the public, such as POSITAs, would have been able to locate the reference exercising reasonable diligence by January 2, 2001.

E. TS 25.222 V3.8.0 (Ex. 1011)

1. Authentication

161. Ex. 1011 is a true and correct copy of 3GPP TS 25.222 V3.8.0, titled "Technical Specification Group Radio Access Network; Multiplexing and channel coding (TDD) (Release 1999)," except that each page includes an exhibit label and page numbers on the bottom right corner added by counsel. I obtained Ex. 1011 (TS

25.222 V3.8.0) from 3GPP's FTP server at the following location:

https://www.3gpp.org/ftp/Specs/archive/25_series/25.222. See Ex. 1102.

162. A substantively identical copy of Ex. 1011 (TS 25.222 V3.8.0), with the only differences appearing on the cover page and the added history page on the last page of the ETSI version, which identifies the document revision history, was published by ETSI.¹²¹

2. Publication by 3GPP and ETSI

163. Ex. 1011 (TS 25.222 V3.8.0) shows on its cover page “2002-03” as the year (2002) and month (March) during which the document was released by 3GPP. This is aligned with the “Change history” on the document’s last page which shows “08/03/02” as the last “Date” entry, where the second set of digits (“03”) is the month, the first set of digits (“08”) is the day, and the third set of digits (“02”) is the year. Ex. 1011 (TS 25.222 V3.8.0) at 39.

164. This publication date is further confirmed by the publication history of TS 25.222 V3.8.0 in the ETSI copy of TS 25.222 named “ETSI TS 125 222”, which states that V3.8.0 was published in March 2002.¹²²

¹²¹ https://www.etsi.org/deliver/etsi_ts/125200_125299/125222/03.08.00_60/ (April 22, 2002 upload date) (Ex. 1103);
https://www.etsi.org/deliver/etsi_ts/125200_125299/125222/03.08.00_60/ts_125222v030800p.pdf (ETSI TS 125.222) (Ex. 1104).

¹²² https://www.etsi.org/deliver/etsi_ts/125200_125299/125222/03.08.00_60/ts_125222v030800p.pdf (Ex. 1104);

165. In 2001/2002, members of the public, such as POSITAs, including anyone with an interest in the development or implementation of cellular standards, would have been aware of 3GPP and ETSI as the publishers of 3GPP technical specifications. These members of the public would have also been aware of the subject matter covered by TS 25.222 and where to locate TS 25.222 on the 3GPP or ETSI websites. Alternatively, a member of the public would have learned about the subject matter of TS 25.222 using the 3GPP website as a resource (*see* Section IV) as well as the location of TS 25.222 on the 3GPP and ETSI websites. Thereafter, a member of the public would have encountered no difficulty obtaining a copy from either 3GPP or ETSI. For example, ETSI provided “A subscription service containing the full library of ETSI deliverables and offering[s]” on a CD or DVD.¹²³

166. Moreover, because 3GPP and ETSI are well-known and respected publishers of technical specifications, experts in the field of determining the public availability of 3GPP documents would reasonably rely upon the publication dates printed on the technical specifications published by 3GPP and ETSI for the date when the technical specification became available to members of the public.

https://www.etsi.org/deliver/etsi_ts/125200_125299/125212/05.01.00_60/ts_125212v050100p.pdf (Ex. 1094).

¹²³ <https://web.archive.org/web/20020202222234/http://etsi.org/getastandard/home.htm> (Ex. 1095).

167. Based on this publication data and 3GPP's standard business practice to make 3GPP technical specifications available to the public shortly after they are approved at the Technical Specification Group meeting, TS 25.222 V3.8.0 was approved for publication in March 2002 and published and made available to members of the public by 3GPP no later than March 29, 2002¹²⁴ and by ETSI no later than April 23, 2002.¹²⁵

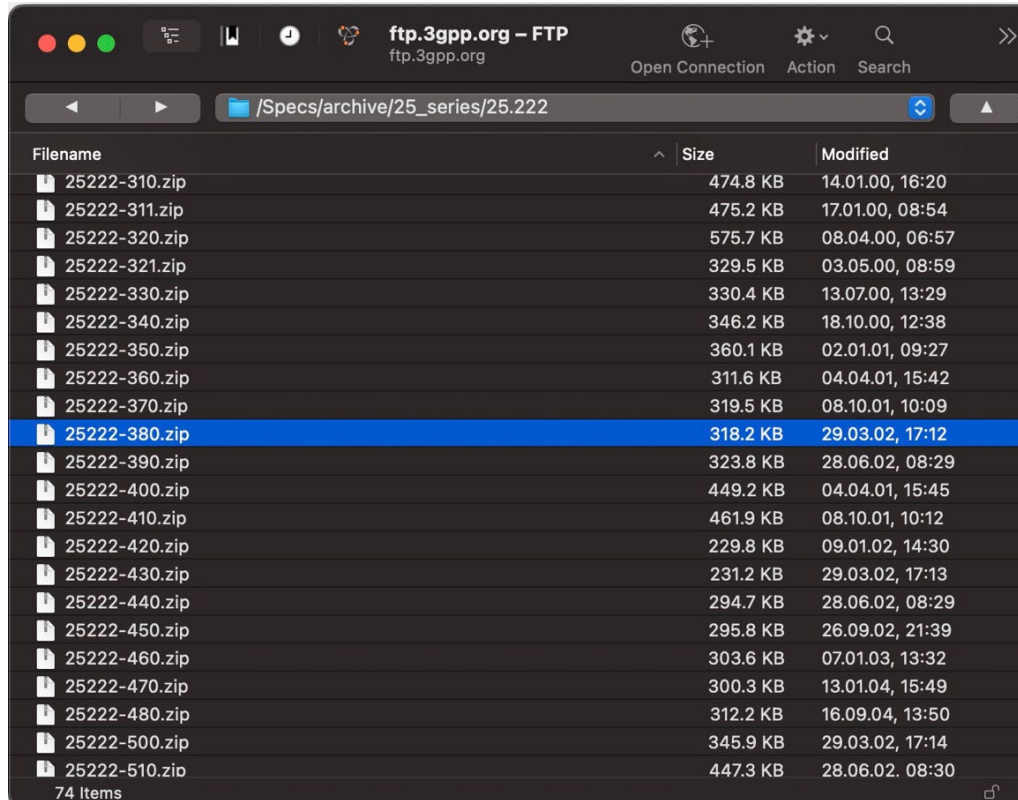
3. Available On 3GPP Public FTP Server and 3GPP Website

168. Ex. 1011 (TS 25.222 V3.8.0) was uploaded to the 3GPP FTP server on March 29, 2002, based on the upload date stamp shown in the "archive" folder on the 3GPP FTP server, as shown in the screenshot below for the corresponding downloadable file ("25222-380.zip"):¹²⁶

¹²⁴ https://www.3gpp.org/ftp/Specs/archive/25_series/25.222 (Ex. 1102).

¹²⁵ https://web.archive.org/web/20020613173206/http://webapp.etsi.org:80/key/key.asp?full_list=y (Ex. 1105 at 273).

¹²⁶ https://www.3gpp.org/ftp/Specs/archive/25_series/25.222 (Ex. 1102).



The screenshot shows an FTP client window titled "ftp.3gpp.org - FTP" with the address bar set to "/Specs/archive/25_series/25.222". The window displays a list of files with columns for "Filename", "Size", and "Modified". The file "25222-380.zip" is highlighted in blue, indicating it is the selected item. The list shows files from "25222-310.zip" to "25222-510.zip".

Filename	Size	Modified
25222-310.zip	474.8 KB	14.01.00, 16:20
25222-311.zip	475.2 KB	17.01.00, 08:54
25222-320.zip	575.7 KB	08.04.00, 06:57
25222-321.zip	329.5 KB	03.05.00, 08:59
25222-330.zip	330.4 KB	13.07.00, 13:29
25222-340.zip	346.2 KB	18.10.00, 12:38
25222-350.zip	360.1 KB	02.01.01, 09:27
25222-360.zip	311.6 KB	04.04.01, 15:42
25222-370.zip	319.5 KB	08.10.01, 10:09
25222-380.zip	318.2 KB	29.03.02, 17:12
25222-390.zip	323.8 KB	28.06.02, 08:29
25222-400.zip	449.2 KB	04.04.01, 15:45
25222-410.zip	461.9 KB	08.10.01, 10:12
25222-420.zip	229.8 KB	09.01.02, 14:30
25222-430.zip	231.2 KB	29.03.02, 17:13
25222-440.zip	294.7 KB	28.06.02, 08:29
25222-450.zip	295.8 KB	26.09.02, 21:39
25222-460.zip	303.6 KB	07.01.03, 13:32
25222-470.zip	300.3 KB	13.01.04, 15:49
25222-480.zip	312.2 KB	16.09.04, 13:50
25222-500.zip	345.9 KB	29.03.02, 17:14
25222-510.zip	447.3 KB	28.06.02, 08:30

169. This March 29, 2002 date is confirmed by the Internet Archive’s May 31, 2002 capture of the 3GPP “archive” directory on the FTP server for the corresponding downloadable file (“25222-380.zip”).¹²⁷

170. Experts in the field of determining the public availability of 3GPP documents would reasonably rely upon the FTP server upload dates on the 3GPP FTP server as the date the document became available to the public and would consider the archived version of the directory structure maintained by the Internet Archive as further confirmation of the date of public availability.

¹²⁷ https://web.archive.org/web/20020531000359/http://www.3gpp.org:80/ftp/specs/archive/25_series/25.222/ (Ex. 1106).

Declaration of Friedhelm Rodermund

171. In addition, metadata information for the downloaded and extracted TS file¹²⁸ states a last Modified date of “29. March 2002” as shown in the screenshot below:



This last modified date is consistent with the March 29, 2002 upload date of the document and 3GPP’s standard business practice to upload technical specifications shortly after approval.

172. To the extent a member of the public was not already independently aware of TS 25.222, a member of the public would have been able to locate TS

¹²⁸ https://www.3gpp.org/ftp/Specs/archive/25_series/25.222/25222-380.zip (Ex. 1119).

25.222 V3.8.0 in a number of ways. As one example, and as explained in greater detail in Section IV, in 2002 a member of the public, such as a POSITA, would have identified the RAN WG1 as the responsible 3GPP working group for the radio layer and would have then reviewed the list of specifications for which RAN WG1 was responsible for.¹²⁹ For example, the RAN WG1 specifications page provided a subject matter description of TS 25.222 as concerning “Multiplexing and channel coding (TDD).” *Id.*

173. As a further example, and as explained in greater detail in Section IV, a member of the public, such as a POSITA, would have had access to the full index of specifications on 3GPP’s website.¹³⁰ The entry for TS 25.222 in the full index of 3GPP specifications included: (1) a title of “Multiplexing and channel coding (TDD)” (which serves as a subject matter descriptor for the content of TS 25.222); (2) “R1” (which is “RAN WG1”) as the responsible working group; (3) R99, Rel-4, and Rel-5 as the relevant releases; and (4) that it is an active specification.¹³¹

174. As a further example, and as explained in greater detail in Section IV, in 2002 a member of the public, such as a POSITA, would have considered the

¹²⁹ <https://web.archive.org/web/20020225110409/http://www.3gpp.org:80/TB/ran/ran1/specs.htm> (Ex. 1107).

¹³⁰ <https://web.archive.org/web/20071101043800/http://www.3gpp.org/specs/3GPP-Spec-Titles.zip> (Ex. 1063 at 22).

¹³¹ <https://web.archive.org/web/20071101043800/http://www.3gpp.org/specs/3GPP-Spec-Titles.zip> (Ex. 1063 at 22).

specification series page, which identified the 25 series as related to “Radio aspects,”¹³² another subject matter descriptor for the content of 25.222, and would have been able to review each of the 26 specifications within that series on the FTP server.¹³³

175. The above examples illustrate that in 2002 it was straightforward for an interested member of the public without prior knowledge of the TS number to discover that TS 25.222 related to radio aspects of the 3G standard, specifically TDD multiplexing and channel coding.

176. Once the member of the public was aware of the 25.222 specification number, the member of the public, such as a POSITA, to the extent she was not already aware of the location of the technical specification on the 3GPP FTP server, would have then followed the instructions on the 3GPP webpages, as described in Section IV, to download the specification. For example, a member of the public would have reviewed the general specifications webpage link and been informed that “[t]he latest versions of the specifications can always be found here: <ftp://ftp.3gpp.org/specs/latest/>” or that “[a]ll older versions of specifications (where available) are stored in the archive subdirectory. All versions of all releases of a

¹³² <https://web.archive.org/web/20020806054349/http://www.3gpp.org/specs/numbering.htm> (Ex. 1061)

¹³³ <https://web.archive.org/web/20021022011153/http://www.3gpp.org/TB/RAN/RAN1/specs.htm> (Ex. 1065).

given specification are placed directly under the name of the specification. <ftp://ftp.3gpp.org/specs/archive/>.”¹³⁴ As another example, a member of the public would have been informed of the instruction on the 3GPP RAN WG1 specification webpage that “[t]he latest versions of these specifications can be found <http://www.3gpp.org/ftp/Specs/archive/>”¹³⁵ Once at the FTP server, the member of the public would have then selected the “archive” directory in the specification folder of the FTP server,¹³⁶ “25_series,”¹³⁷ then “25.222,”¹³⁸ and then “25222-380.zip”¹³⁹ to download TS 25.222 V3.8.0 from the 3GPP FTP server.

177. As discussed above, TS 25.222 V3.8.0 was uploaded to the 3GPP FTP server on March 29, 2002 and was thereafter available for download from both the “archive” and “latest”¹⁴⁰ directories on the 3GPP FTP server.

¹³⁴ <https://web.archive.org/web/20020802092436/http://www.3gpp.org/specs/specs.htm> (Ex. 1060).

¹³⁵ <https://web.archive.org/web/20020626102256/http://www.3gpp.org/TB/ran/ran1/specs.htm> (Ex. 1099).

¹³⁶ <https://web.archive.org/web/20020802173135/http://www.3gpp.org/ftp/Specs/> (Ex. 1114).

¹³⁷ <https://web.archive.org/web/20020806031707/http://www.3gpp.org/ftp/Specs/archive/> (Ex. 1115).

¹³⁸ https://web.archive.org/web/20020701091801/http://www.3gpp.org/ftp/specs/archive/25_series/ (Ex. 1116).

¹³⁹ https://web.archive.org/web/20020531000359/http://www.3gpp.org/ftp/specs/archive/25_series/25.222/ (Ex. 1106).

¹⁴⁰ The Internet Archive did not capture the “latest” folder showing TS 25.222 V3.8.0 but it was nevertheless available after publication given the common practice of making 3GPP specifications available to the public via the different folders.

178. Thus, in 2002, members of the public interested in cellular communications and the development of wireless communication standards, including POSITAs, would have been aware of 3GPP's standard business practices for the organization of documents on the FTP server, including the location of the technical specifications, and would have been able to locate TS 25.222 V3.8.0 without difficulty. To the extent the member of the public required additional information regarding the specific subject matter of particular specifications, the 3GPP website included multiple subject matter indices of specification series and individual specifications (*see* Section IV).

4. Conclusion

179. Thus, based on my personal knowledge and experience with ETSI's and 3GPP's standard business practices, Ex. 1011 is an authentic copy of 3GPP TS 25.222 V3.8.0 that was published by 3GPP by no later than March 29, 2002; published by ETSI by no later than April 23, 2002; and uploaded and made available via the 3GPP FTP server to the general public where interested members of the public, such as POSITAs, would have been able to locate the reference exercising reasonable diligence by March 29, 2002.

VI. AVAILABILITY FOR CROSS-EXAMINATION

180. In signing this declaration, I recognize that the declaration may be filed as evidence in a contested case before the Patent Trial and Appeal Board of the United States Patent and Trademark Office. I also recognize that I may be subject to cross examination in the case and that cross examination will take place within the United States. If cross examination is required of me, I will cooperate to the best of my ability to appear for cross examination within the United States during the time allotted for cross examination.

VII. RIGHT TO SUPPLEMENT

181. I reserve the right to supplement my opinions in the future to respond to any arguments that the Patent Owner raises and to take into account new information as it becomes available to me.

VIII. SIGNATURE

182. I declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Declaration of Friedhelm Rodermund

I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.

Dated: August 9, 2023

A handwritten signature in black ink, appearing to read 'F. Rodermund', written over a horizontal line.

Friedhelm Rodermund

Appendix A

CURRICULUM VITAE

I. PERSONAL DATA

Name: **Friedhelm RODERMUND**

Mailing address: Am Steiner Graben 18
56077 Koblenz, Germany

Phone: +49 172 2606489

Email: fred@iotecc.com

II. PROFESSIONAL EXPERIENCE

Summary

Senior expert in telecommunications and Internet of Things (IoT) technology. 25 years of experience within the mobile communications industry, and several years in the IoT domain in various roles such as project management, technology innovation and evolution, standards development, technology strategy, patent creation and patent litigations, and development/introduction of new services.

Recognized standards expert who was actively involved in leading roles in the development of key standards for mobile telephony/data and service enablers across standards development organizations such as 3GPP, ETSI, GSMA, IETF, OMA, and oneM2M. Currently focussing on standards for the Internet of Things.

Founder and director of IOTECC GmbH which provides consulting services around technologies and standards enabling the Internet of Things, and consulting and expert services related to patents for mobile telecommunications and IoT.

01/2015 – present IOTECC GmbH Koblenz, Germany

Founder and CEO

- Mobile telecommunications, Internet of Things (IoT) technology and standards consulting
- Telecommunications and IoT patent consulting
 - Consulting services around telecommunications and IoT patents in particular related to 3GPP, ETSI and OMA standards
 - State of the art/prior art research services related to patent creation e.g. for new 5G patents
 - Prior art research, essentiality assessment, patent infringement analysis related to litigations and validity actions
 - Advising on IP strategy
 - Advising on Standards Development Organisations (SDO) working processes and IPR policy
 - Experienced expert witness (please see section III for a list of supported actions)

11/2014 – 12/2014 Friedhelm Rodermund Consulting Koblenz, Germany

Internet of Things (IoT) Consultant

- IoT standards development and introduction of new IoT services

- Representing Vodafone in various standardisation bodies
- Creating technical standards for the Internet of Things
- Work item lead, technical editor and key contributor of Open Mobile Alliance (OMA) “Lightweight M2M (LwM2M)” – the new standard for the Internet of Things
- Advising and supporting various IoT/M2M projects related to e.g. automotive, smart metering, health, industry
- Advising on the introduction of new IoT/M2M technologies and services
- Leading Proof of Concepts of emerging technologies
- Involved in innovation projects
- Supporting the creation and protection of Intellectual Property

- Responsible for Vodafone's Device Management standardisation
- As OMA DM Vice Chairman, co-leading the group, chairing committee meetings and web conferences, steering the technical direction, management of the different work items
- Editor of several specifications, rapporteur of various work items
- Support of projects for the introduction of device management
- Delegate to 3GPP SA1 with responsibility for the introduction of MTC (machine type communications) related service/network requirements

- Responsible for Mobile Broadcast standardisation across different broadcast systems/standards bodies and across all Vodafone local operations
- Responsible for Mobile Broadcast standardisation strategy development and implementation
- Delegation Lead for the Open Mobile Alliance (OMA) BCASST working group
- Initiated and managed the BCASST device profile development in the BMCO Forum
- Leading the "Service Protection" (pay-TV) stream of the German DVB-H Consortium
- Filed several patents
- Supporting patent litigations and patent portfolio evaluation (various technical areas)

- Verification of the MMS operator interworking framework
- Supporting the definition and specification of the MMS functional evolution
- Acting as a “link” between 3GPP and GSMA in the area of MMS

CURRICULUM VITAE

06/1998 – 03/1999: Secretary ETSI SMG4 “Data Services” and SMG8 “Base Station Testing”

- Supported the establishment of 3GPP (3rd Generation Partnership Project) as the leading standards organization for mobile telecommunications
- Project manager and secretary of TSG “Terminals” responsible for Terminal Conformance Testing, Terminal Services and Capabilities, Universal Subscriber Identity Module (USIM)
- Project manager and secretary of Terminals Working Group 2 “Terminal Services and Capabilities” that was responsible for Terminal Execution Environments, Messaging including Short Message Service (SMS), Cell Broadcast Service (CBS), Enhanced Messaging Service (EMS), Multimedia Messaging Service (MMS), Terminal Interfaces incl. AT-commands, Generic User Profile, Data Synchronization and others
- Establishment and management of the Work Plan and follow-up and report on the progress of the related work items
- Advising the chairmen and the standards groups on technical, procedural and political issues
- Editorship of various GSM and UMTS technical specifications
- Responsible for presenting the technical results of the working groups to the parent body
- Responsible for the communication with other standards bodies inside and outside 3GPP
- PR activities (articles, interviews)

12/1993 – 06/1998 Mannesmann Mobilfunk GmbH

Düsseldorf, Germany

System Engineer and Project Manager in Quality Assurance and Technical Standards

- Leadership and management of acceptance test projects in the area of GSM Base Station Controller (BSC) and GSM Base Station (BTS) hardware and software.
- Leading project teams of around 15 people
- Responsible for the clearance of releasing new software/hardware into the network
- Supported Request for Quotations, supplier evaluation and pre-selection, project manager of System Verification as a central part of the supplier selection process.
- Representation of Mannesmann Mobilfunk to the ETSI standardization group “Standardization Technical Committee SMG3 System Architecture”
- Conduction of product and hardware development quality audits
- Representative of Mannesmann Mobilfunk in A-interface interoperability testing activities
- Member of BSS product planning group which was defining operator requirements for future BSS releases
- Development of process improvements for type acceptance

CURRICULUM VITAE

III. LIST OF SUPPORTED PATENT LITIGATIONS AND VALIDITY ACTIONS

2023

Apple Computer Trading (Shanghai) Co., Ltd, Apple Electronics Products Commerce (Beijing) Co., Ltd. v. Optis Cellular Technology LLC
Shenzhen, China, Intermediate People's Court
On behalf of Apple
Counsel: WilmerHale
Role: Expert witness and consulting services

2023

Apex Beam Technologies LLC v. Samsung
Inter Partes Review matters
On behalf of Samsung
Counsel: Finnegan, Henderson, Farabow, Garrett & Dunner, L.L.P.
Role: Expert witness and consulting services

2022

Constellation Designs LLC v. LG Electronics, Inc.
Inter Partes Review matters
On behalf of LG Electronics
Counsel: Fish&Richardson P.C.
Role: Expert witness and consulting services

2022

Unified Patents, LLC v. Togail Technologies LTD.
Inter Partes Review matters
On behalf of Unified Patents
Counsel: Duane Morris LLP
Role: Expert witness and consulting services

2022

Ericsson v. Apple
Certain Mobile Telephones, Tablet Computers With Cellular Connectivity, And Smart Watches With Cellular Connectivity, Components Thereof, And Products Containing Same, Inv. No. 337-TA-1299 (U.S.I.T.C.)
On behalf of Apple
Counsel: WilmerHale
Role: Expert and consulting services

2022

Ericsson v. Apple
Civil Action No. 2:21-cv-376 (E.D. Tex.)
On behalf of Apple
Counsel: WilmerHale
Role: Expert and consulting services

2022

Intellectual Ventures II LLC v. Toyota Motor Cooperation.
Inter Partes Review matters
On behalf of Toyota
Counsel: Finnegan, Henderson, Farabow, Garrett & Dunner, L.L.P.
Role: Expert witness and consulting services

2022

Ericsson v. Apple
2nd Business Court, Rio de Janeiro, Brazil
On behalf of Apple
Counsel: WilmerHale

CURRICULUM VITAE

Role: Expert and consulting services

2022

Ericsson v. Apple
Civil Court, Bogotá, Columbia
On behalf of Apple
Counsel: WilmerHale
Role: Expert and consulting services

2022

Proven Networks LLC. v. NetApp Inc.
Inter Partes Review matters
On behalf of NetApp
Counsel: Finnegan, Henderson, Farabow, Garrett & Dunner, L.L.P., Ropes & Gray LLP
Role: Expert witness and consulting services

2022

Ericsson v. Apple
Inter Partes Review matters
On behalf of Apple
Counsel: Fish&Richardson, Erise IP
Role: Expert witness and consulting services

2021

AEGIS 11 LLC v. Hisense Company, Ltd. and Hisense USA Corporation
Inter Partes Review matters
On behalf of Hisense
Counsel: Orrik Herrington & Sutcliffe LLP
Role: Expert witness and consulting services

2021

Nokia v. Lenovo
Certain Electronic Devices, Including Computers, Tablet Computers, and Components and Modules Thereof, Inv. No. 337-TA-1208 (U.S.I.T.C.)
On behalf of Lenovo
Counsel: WilmerHale
Role: Expert witness and consulting services

2021

Optis Cellular Technology LLC et al. v. Apple
Claim No. HP-2019-000006 (High Court of Justice, Business and Property Courts of England and Wales)
On behalf of Apple
Counsel: WilmerHale
Role: Expert witness and consulting services

2021

Ericsson v. Samsung
Inter Partes Review matters
On behalf of Samsung
Counsel: Kirkland&Ellis LLP, Fish&Richardson
Role: Expert witness and consulting services

2020

Panoptis Patent Management LLC et al. v. Apple Inc.
Civil Action No. 2:19-cv-66 (E.D. Tex.)
On behalf of Apple
Counsel: WilmerHale
Role: Expert witness at bench trial

2020

Sol IP, LLC v. AT&T Mobility, LLC et al.

CURRICULUM VITAE

Civil Action No. 2:18-cv-526 (E.D. Tex.)
On behalf of AT&T, Verizon, Sprint
Counsel: Gibson Dunn
Role: Expert witness and consulting services

2020

Bell Northern Research LLC v. LG Electronics Inc. et al.
Civil Action No. 18-CV-2864-CAB-BLM (S.D. Cal.)
On behalf of LG Electronics Inc.
Counsel: Fish&Richardson
Role: Expert witness and consulting services

2019

Conversant Wireless Licensing S.a.r.l. v. LG Electronics Deutschland GmbH
Civil Action No. 7 O 3277/18 (Landgericht Munich, Germany)
On behalf of LG Electronics Deutschland GmbH
Counsel: Wildanger Kehrwald Graf von Schwerin & Partner mbB
Role: Expert witness and consulting services

2019

Bell Northern Research, LLC v. Huawei Device Co., Ltd, et al.
Civil Action No. 3:18-cv-01784-CAB-BLM
On behalf of Huawei
Counsel: Fish&Richardson
Role: Expert witness and consulting services

2019

Uniloc USA, Inc., et al. v. Samsung Electronics America, Inc. and Samsung Electronics Co. Ltd.
Civil Action Nos. 2:18-cv-00040-JRG, 2:18-cv-00041-JRG, 2:18-cv-00042-JRG and 2:18-cv-00044-JRG (United States District Court for the Eastern District of Texas)
On behalf of Samsung
Counsel: Greenberg Traurig
Role: Expert witness and consulting services

2019

Uniloc USA, Inc., et al. v. Huawei Device USA, Inc. et al.
Civil Action No. 2:18-cv- 00072-JRG-RSP (E.D. Tex.)
On behalf of Huawei
Counsel: McGuireWoods
Role: Expert witness and consulting services

2019

Microsoft Corporation v. Uniloc 2017 LLC
Inter Partes Review of U.S. Pat. No. 7,167,487
Inter Partes Review of U.S. Pat. No. 7,075,917
On behalf of Microsoft and on behalf of Apple as joinder petitioner
Counsel: Klarquist Sparkman (Microsoft), Erise IP (Apple)
Role: Expert witness and consulting services

2019

Qualcomm v. KFTC
South Korean Case, Seoul High Court
On behalf of intervenor Apple supporting the KFTC
Counsel: Boies Schiller Flexner
Role: Expert witness

2018/19

Evolved Wireless, LLC v. Apple, Inc.
Civil Action No. 1:15-cv-00542-JFB-SRF
On behalf of Apple
Counsel: DLA Piper

CURRICULUM VITAE

Role: Expert witness and consulting services

2018/19

Cisco Systems Inc. v. Traxcell Technologies

Inter Partes Review of Traxcell Technologies patents

On behalf of Cisco

Counsel: King&Spalding

Role: Expert witness and consulting services

2018/19

Qualcomm Inc. v. Apple Inc.

Civil Action No. 3:17- cv-02398-DMS-MDD (United States District Court for the Southern District of California)

Civil Action No. 3:17-cv-02402-WQH-MDD

Certain Mobile Electronic Devices and Radio Frequency and Processing Components Thereof (II), Inv. No. 337-TA-1093

Inter Partes Review of U.S. PATENT NO. 9,154,356

Cases IPR2019-00047, IPR2019-00048, IPR2019-00049, IPR2019-00128, IPR2019-00129

On behalf of Apple and Intel

Counsel: WilmerHale

Role: Expert witness and consulting services

2018/19

Apple Inc. v. Qualcomm Inc.

Civil Action No. 3:17-CV-00108-GPC-MDD (United States District Court for the Southern District of California)

On behalf of Apple

Counsel: Fish&Richardson, Boies Schiller Flexner

Role: Expert witness and consulting services

2018

3G Licensing, S.A. et al. v. LG Electronics Inc. et al

Inter Partes Review of U.S. Patent No. 7,995,091

On behalf of LG Electronics

Counsel: Fish&Richardson

Role: Expert witness

2017

Huawei Technologies Co. LTD. v. T-Mobile US, Inc. & T-Mobile USA, Inc.

E.D. Tex. Case Nos. 2:16-cv-00052-JRG-RSP; 2:16-cv-00055-JRG-RSP; 2:16-cv-00056-JRG-RSP; and 2:16-cv-00057-JRG-RSP

On behalf of T-Mobile

Counsel: Gibson Dunn

Role: Expert witness and consulting services

2016

Koninklijke KPN N.V. v. Samsung Electronics America, Inc. et al.

Civil Action No. 14-cv-1165

On behalf of Samsung Electronics

Counsel: Baker Botts

Role: Expert witness and consulting services

2016

SSH v. Sony

OLG Düsseldorf, Germany

On behalf of SSH

Counsel: Cohausz&Florack

Role: Technical expert support

2015/16

LG Electronics v. Core Wireless Licensing S.A.R.L.

Inter Partes Review of U.S. Patent No. 8,165,049

CURRICULUM VITAE

On behalf of LG Electronics
Counsel: Greenberg Traurig
Role: Expert witness

2015/16

Core Wireless Licensing S.A.R.L. v. LG Electronics Inc. and LG Electronics MobileComm U.S.A., Inc
Civil Action No. 2:14-cv-911 (lead case) and Civil Action No. 2:14-cv-912 (consolidated)
On behalf of LG Electronics
Counsel: Greenberg Traurig, Sidley Austin
Role: Expert witness

2015

Intellectual Ventures I LLC v. T-Mobile USA, Inc. & T-Mobile US, Inc.
D. Del. Case No. 1:13-cv-01632
Intellectual Ventures II LLC v. T-Mobile USA, Inc. & T-Mobile US, Inc.
D. Del. Case No. 1:13-cv-01633
On behalf of T-Mobile
Counsel: Gibson Dunn
Role: Technical expert support

IV. EDUCATION

- | | | |
|--------------------------|--|--------------------------|
| 10/1984 – 10/1993 | University of Technology Aachen | Aachen, Germany |
| | <u>Graduate of Electrical Engineering with a focus on telecommunications technologies (Dipl.-Ing. TH)</u> | |
| 10/1992 – 04/1993 | University of Technology Trondheim | Trondheim, Norway |
| | <u>Diploma Thesis "Design of a dual processor computer for digital signal processing in power electronics"</u> | |

V. LANGUAGES

German, English, French

VI. RECENT PUBLICATIONS

- "Unlocking the internet of things and driving the need for interoperability", Global Telecoms Business, December 2013
- "The need for standardisation in the M2M services layer", Global Telecoms Business, February 2014
- Co-authored white paper "Lightweight M2M: Enabling device management and applications for the internet of things", Open Mobile Alliance, March 2014
- "Objects are a new way to create M2M applications", Global Telecoms Business, April 2014
- "The need for standardisation in the M2M services layer", M2M Now, July 2015

Appendix B

List of Materials Considered

Exhibit	Description
1006	R1-01-1014, "A New Hybrid-ARQ Scheme Using Incremental Redundancy," submitted by Motorola for 3GPP Meeting R1-ah-22010 (Nov 5-7, 2001)
1007	R1-01-1047, "Overview of Proposed Schemes for Incremental Redundancy," submitted by Ericsson for 3GPP Meeting R1-ah-22010 (Nov 5-7, 2001)
1008	3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Multiplexing and channel coding (FDD) (Release 5) (3GPP TS 25.212 version 5.1.0)
1011	3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Multiplexing and channel coding (TDD) (Release 1999) (3GPP TS 25.222 version 3.8.0)
1036	3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Multiplexing and channel coding (FDD) (3GPP TS 25.212 version 3.5.0 Release 1999)
1051	Webpage, available at https://archive.org/legal/affidavit.php
1052	Internet Archive Capture, available at https://web.archive.org/web/20020126155238/http://www.3gpp.org:80/TB/home.htm
1053	Internet Archive Capture, available at https://web.archive.org/web/20020926134824/http://www.3gpp.org:80/
1054	Internet Archive Capture, available at https://web.archive.org/web/20021015011140/http://www.3gpp.org:80/TB/RAN/RAN1/RAN1.htm

Exhibit	Description
1055	Internet Archive Capture, available at https://web.archive.org/web/20020806041024/http://www.3gpp.org/ftp/tsg_ran/WG1_RL1/
1056	Internet Archive Capture, available at https://web.archive.org/web/20020403145941/http://www.3gpp.org:80/ftp/tsg_ran/WG1_RL1/R1_Ad_Hocs/HSDPA_Ad_Hoc/
1057	Excel file “work_plan_3gpp_020926.xls,” retrieved from https://web.archive.org/web/20060625054352/http://www.3gpp.org/ftp/Information/WORK_PLAN/older_versions/work_plan_3gpp_020926.zip (work_plan_3gpp_020926.xls in work_plan_3gpp_020926.zip)
1058	Webpage, available at ftp.3gpp.org/Specs
1059	Internet Archive Capture, available at https://web.archive.org/web/20020806115924/http://www.3gpp.org/Default.htm
1060	Internet Archive Capture, available at https://web.archive.org/web/20020802092436/http://www.3gpp.org/specs/specs.htm
1061	Internet Archive Capture, available at https://web.archive.org/web/20020806054349/http://www.3gpp.org/specs/numbering.htm
1062	Internet Archive Capture, available at https://web.archive.org/web/20020806092102/http://www.3gpp.org/specs/titles-numbers.htm
1063	Word file entitled “3GPP specifications - List of all specification numbers and titles,” retrieved from https://web.archive.org/web/20071101043800/http://www.3gpp.org/specs/3GPP-Spec-Titles.zip (3GPP-Spec-Titles.doc in 3GPP-Spec-Titles.zip)

Exhibit	Description
1064	Internet Archive Capture, available at https://web.archive.org/web/20021015011140/http://www.3gpp.org/TB/RAN/RAN1/RAN1.htm
1065	Internet Archive Capture, available at https://web.archive.org/web/20021022011153/http://www.3gpp.org/TB/RAN/RAN1/specs.htm
1066	Internet Archive Capture, available at https://web.archive.org/web/20020628215611/http://www.3gpp.org/ftp/specs/archive/
1067	Internet Archive Capture, available at https://web.archive.org/web/20020701091801/http://www.3gpp.org:80/ftp/specs/archive/25_series/
1068	Internet Archive Capture, available at https://web.archive.org/web/20020912200940/http://www.3gpp.org:80/ftp/Specs/archive/25_series/25.212/
1069	Internet Archive Capture, available at https://web.archive.org/web/20020803112613/http://www.3gpp.org/ftp/Specs/latest/
1070	Internet Archive Capture, available at https://web.archive.org/web/20020804015202/http://www.3gpp.org/ftp/Specs/latest/Rel-5/
1071	Internet Archive Capture, available at https://web.archive.org/web/20020812090150/http://www.3gpp.org:80/ftp/Specs/latest/Rel-5/25_series/
1072	Internet Archive Capture, available at https://web.archive.org/web/20051103081215/http://list.3gpp.org/scripts/wa.exe?SUBED1=3gpp_tsg_ran_wg1&A=1

Exhibit	Description
1073	Webpage, available at https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_AH/HSDPA_Ad_Hoc/Docs/Zips/
1074	R1-01-1014, retrieved from https://list.etsi.org/scripts/wa.exe?A3=ind0110&L=3GPP_TSG_RAN_WG1&E=base64&P=2072790&B=-----%3D_NextPart_000_01C15C16.5D43E0D0&T=application%2Foctet-stream;%20name=%22R1-01-1014.zip%22&N=R1-01-1014.zip&attachment=q&X=6DEE3DFAFC65AFF81C&Y=friedhelm.rodermund%40iotecc.com (R1-01-1014.doc in R1-01-1014.zip)
1075	Webpage, available at https://list.etsi.org/scripts/wa.exe?A2=3GPP_TSG_RAN_WG1;84332eeb.0110&S=
1076	Webpage, available at https://web.archive.org/web/20010518052528/http://list.etsi.org/
1077	Internet Archive Capture, available at https://web.archive.org/web/20020604215730/http://list.etsi.org:80/
1078	Internet Archive Capture, available at https://web.archive.org/web/20050824015238/http://www.3gpp.org:80/ftp/tsg_ran/WG1_RL1/
1079	Internet Archive Capture, available at https://web.archive.org/web/20051123162134/http://www.3gpp.org:80/ftp/tsg_ran/WG1_RL1/
1080	Internet Archive Capture, available at https://web.archive.org/web/20011223090820/http://www.3gpp.org/ftp/tsg_ran/WG1_RL1/R1_Ad_Hocs/
1081	Internet Archive Capture, available at https://web.archive.org/web/20020619173234/http://www.3gpp.org/ftp/tsg_ran/WG1_RL1/R1_Ad_Hocs/

Exhibit	Description
1082	Internet Archive Capture, available at https://web.archive.org/web/20020415205129/http://www.3gpp.org/ftp/tsg_ran/WG1_RL1/R1_Ad_Hocs/HSDPA_Ad_Hoc/Docs/
1083	Internet Archive Capture, available at https://web.archive.org/web/20040519152539/http://www.3gpp.org/ftp/tsg_ran/WG1_RL1/R1_Ad_Hocs/HSDPA_Ad_Hoc/Docs/Zips/
1084	R1-01-1014, retrieved from https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_AH/HSDPA_Ad_Hoc/Docs/Zips/R1-01-1014.zip (R1-01-1014.doc in R1-01-1014.zip)
1085	Webpage, available at https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_AH/HSDPA_Ad_Hoc/Report
1086	TSG R1-01-1105, retrieved from https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_AH/HSDPA_Ad_Hoc/Report/R1-01-1105.zip (Draft minutes of RAN WG1 AH on HSDPA.doc in R1-01-1105.zip)
1087	R1-01-1081, retrieved from https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_AH/HSDPA_Ad_Hoc/Docs/Zips/R1-01-1081.zip (R1-01-1081.doc in R1-01-1081.zip)
1088	Redline comparing disclosures of R1-01-1014 and R1-01-1081
1089	U.S. Patent No. 7,210,089
1090	U.S. Patent App. No. 10/193,144
1091	R1-01-1047, retrieved from https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_AH/HSDPA_Ad_Hoc/Docs/Zips/R1-01-1047.zip (R1-01-1047.doc in R1-01-1047.zip)

Exhibit	Description
1092	Webpage, available at https://www.3gpp.org/ftp/Specs/archive/25_series/25.212
1093	Webpage, available at https://www.etsi.org/deliver/etsi_ts/125200_125299/125212/05.01.00_60/
1094	ETSI TS 125 212 V5.1.0 (2002-06), retrieved from https://www.etsi.org/deliver/etsi_ts/125200_125299/125212/05.01.00_60/ts_125212v050100p.pdf
1095	Internet Archive Capture, available at https://web.archive.org/web/20020202222234/http://etsi.org/getastandard/home.htm
1096	Internet Archive Capture, available at https://web.archive.org/web/20020202222234/http://etsi.org/getastandard/home.htm
1097	Internet Archive Capture, available at https://web.archive.org/web/20020912200940/http://www.3gpp.org/ftp/Specs/archive/25_series/25.212/
1098	3GPP TS 25.212 V5.1.0 (2002-06), retrieved from https://www.3gpp.org/ftp/Specs/archive/25_series/25.212/25212-510.zip (25212-510.doc in 25212-510.zip)
1099	Internet Archive Capture, available at https://web.archive.org/web/20020626102256/http://www.3gpp.org/TB/ran/ran1/specs.htm
1100	Kumar, Ratnam V. Raja, “Development of a CDMA system with RAKE receiver for the third generation wireless communication systems,” 2002 IEEE International Conference on Personal Wireless Communications, December 15-17, 2002
1101	Webpage, available at https://ieeexplore.ieee.org/abstract/document/1177299

Exhibit	Description
1102	Webpage, available at https://www.3gpp.org/ftp/Specs/archive/25_series/25.222
1103	Webpage, available at https://www.etsi.org/deliver/etsi_ts/125200_125299/125222/03.08.00_60/
1104	ETSI TS 125 222 V3.8.0 (2002-03), retrieved from https://www.etsi.org/deliver/etsi_ts/125200_125299/125222/03.08.00_60/ts_125222v030800p.pdf
1105	Internet Archive Capture, available at https://web.archive.org/web/20020613173206/http://webapp.etsi.org:80/key/key.asp?full_list=y
1106	Internet Archive Capture, available at https://web.archive.org/web/20020531000359/http://www.3gpp.org:80/ftp/specs/archive/25_series/25.222/
1107	Internet Archive Capture, available at https://web.archive.org/web/20020225110409/http://www.3gpp.org:80/TB/ran/ran1/specs.htm
1108	Webpage, available at https://www.etsi.org/deliver/etsi_ts/125200_125299/125212/03.05.00_60/
1109	ETSI TS 125.212 V3.5.0 (2000-12), retrieved from https://www.etsi.org/deliver/etsi_ts/125200_125299/125212/03.05.00_60/ts_125212v030500p.pdf
1110	Internet Archive Capture, available at https://web.archive.org/web/20011020025720/http://etsi.org/getastandard/home.htm
1111	Internet Archive Capture, available at https://web.archive.org/web/20011124215727/http://www.3gpp.org/ftp/Specs/archive/25_series/25.212/

Exhibit	Description
1112	Internet Archive Capture, available at https://web.archive.org/web/20020111012800/http://www.3gpp.org:80/ftp/Specs/archive/25_series/25.212/
1113	3GPP TS 25.212 V3.5.0 (2000-12), retrieved from https://www.3gpp.org/ftp/Specs/archive/25_series/25.212/25212-350.zip (25212-350.doc in 25212-350.zip)
1114	Internet Archive Capture, available at https://web.archive.org/web/20020802173135/http://www.3gpp.org/ftp/Specs/
1115	Internet Archive Capture, available at https://web.archive.org/web/20020806031707/http://www.3gpp.org/ftp/Specs/archive/
1116	Internet Archive Capture, available at https://web.archive.org/web/20020701091801/http://www.3gpp.org/ftp/specs/archive/25_series/
1117	Internet Archive Capture, available at https://web.archive.org/web/20020531003232/http://www.3gpp.org/ftp/specs/latest/Rel-6/25_series/
1118	Internet Archive Capture, available at https://web.archive.org/web/20020812090150/http://www.3gpp.org/ftp/Specs/latest/Rel-5/25_series/
1119	TS 25.222 V3.8.0 (2002-03), retrieved from https://www.3gpp.org/ftp/Specs/archive/25_series/25.222/25222-380.zip (25222-380.doc in 25222-380.zip)