

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE, INC.,
Petitioner

v.

APEX BEAM TECHNOLOGIES LLC,
Patent Owner.

U.S. Patent No. 11,139,944

Case No. IPR2025-00907

DECLARATION OF FRIEDHELM RODERMUND
IN SUPPORT OF A PETITION FOR *INTER PARTES* REVIEW OF
U.S. PATENT NO. 11,139,944

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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”).

2. I have been asked to provide my opinions regarding the authenticity and dates of public accessibility of the following 3GPP documents:

- 3GPP CR 38.213 from Samsung with the title “Introduction of Industrial IoT” (hereinafter “Samsung”) (APPLE-1006)
- 3GPP CR 38.213 from Huawei with the title “Introduction of Physical Layer Enhancements for NR URLLC” (hereinafter “Huawei”) (APPLE-1007)
- Version 15.7.0 of technical specification 3GPP TS 38.213 (“Technical Specification Group Radio Access Network; NR; Physical layer procedures for control (Release 15)”) (hereinafter “TS 38.213 v15.7.0”) (APPLE-1005)

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3. 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.

4. I am being compensated for my time spent on this matter at my usual rate of €500 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.

5. I have been informed that Apex Beam Technologies, LLC ("Apex Beam Technologies" or "Patent Owner") is the current assignee of U.S. Patent No. 11,139,944 ("the '944 Patent") (APPLE-1001). I have no financial interest in the Patent Owner or the '944 patent.

6. 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.

II. BACKGROUND AND QUALIFICATIONS

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7. 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.

8. 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.

9. 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).

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10. 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 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”).

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

12. 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.

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

14. 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.

15. 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

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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 accessibility. 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.

16. 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 accessibility.

17. 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.

18. 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.

19. 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

20. It is my opinion that APPLE-1006 is an authentic copy of “Samsung” that was uploaded and made available via the 3GPP email exploder and email archive to 3GPP delegates and the general public by November 3, 2019, at the latest.

21. It is my opinion that APPLE-1007 is an authentic copy of “Huawei” that was uploaded and made available via the 3GPP email exploder and email archive to 3GPP delegates and the general public by November 1, 2019, at the latest.

22. It is my opinion that APPLE-1005 is an authentic copy of technical specification TS 38.213 V15.7.0 published by 3GPP and would have been publicly accessible through ftp.3gpp.org as of September 28, 2019.

IV. **PUBLICATION OF 3GPP SPECIFICATIONS AND RELATED DOCUMENTS**

A. **General Practices**

23. Unless otherwise noted, the foregoing and following is an accurate description of 3GPP general practices from 1998 to the present, including in 2019, regardless of whether I use the present or past tense to describe those practices.

24. 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 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.

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25. 3GPP is the world's leading organization for developing and maintaining cellular telecommunications standards, which it has done since its foundation in 1998. 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.

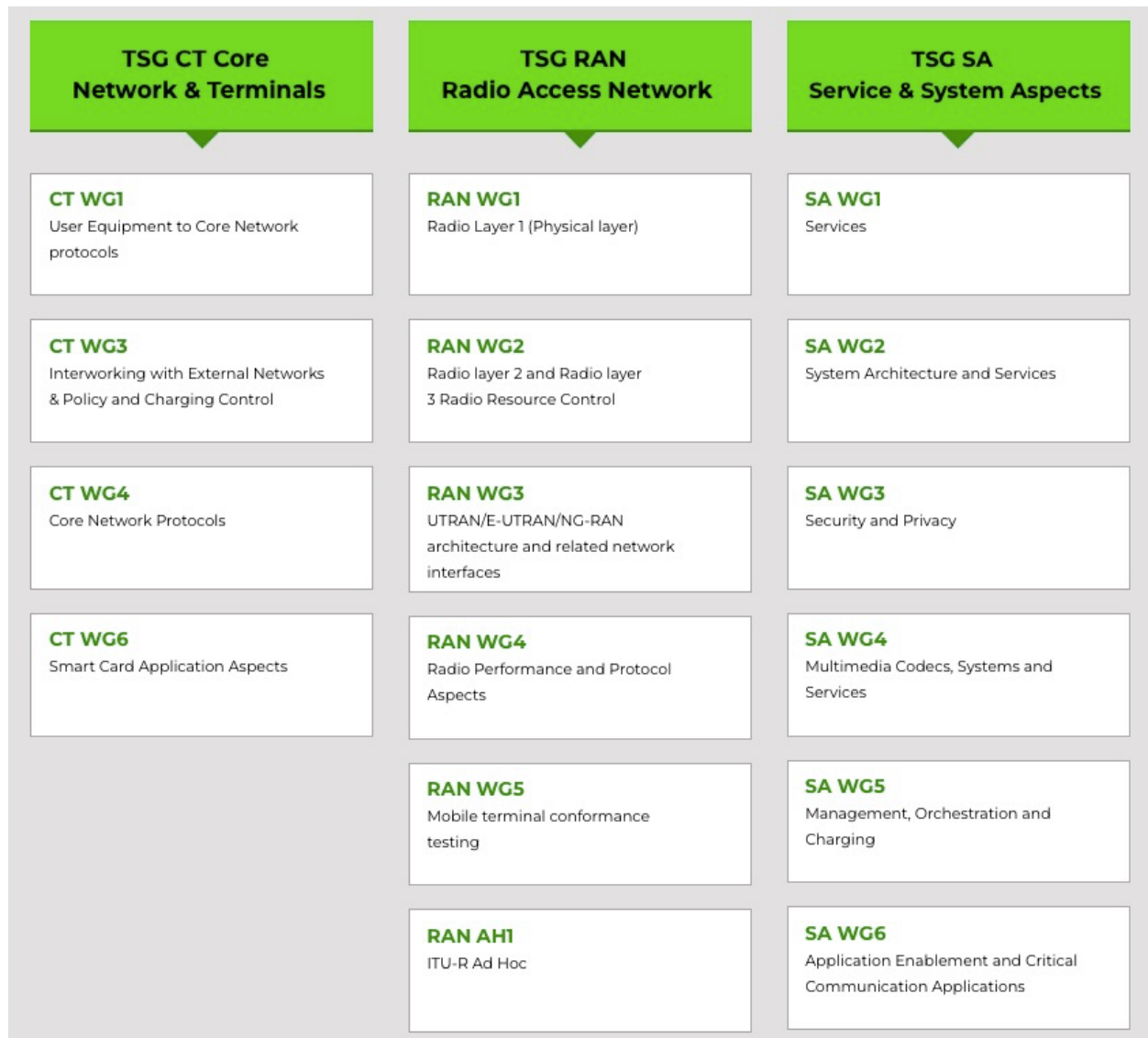
26. In the ordinary course of its regularly conducted business activities, and pursuant to its standard business practices, 3GPP publishes technical specifications, proposals, reports, and other documents related to the development of cellular telecommunications standards. Such documents are published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

27. 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, including on the FTP server associated with the 3GPP website, currently residing at [ftp.3gpp.org](ftp://ftp.3gpp.org). Such documents are referred to as "TDocs." Final versions of the

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technical specifications also were, and continue to be, publicly available from that same FTP server.

28. The names and the structure of 3GPP working groups, as of today, can be found at <https://www.3gpp.org/3gpp-groups> (reproduced below):



29. Each Technical Specification Group (TSG) or Working Group adopts a structured numbering system for the documents associated with their meetings,

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and those systems typically follow a consistent numbering system as shown in the following example: xminnzzzz. The numbering system normally comprises five logical elements: (1) x: a single letter corresponding to the TSG; wherein in 2019 x was one of R (Radio Access Network), C (Core and Terminals), or S (Service and System Aspects); (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: normally the 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).

30. In the ordinary course of 3GPP’s regularly conducted business activities, and pursuant to its standard business practices, from December 1998 onwards, 3GPP published all of its TDocs and all final versions of its technical specifications on its FTP server, which has always been easily and publicly accessible from its website and currently resides at [ftp.3gpp.org](ftp://ftp.3gpp.org).

31. As early as December 1998, including in 2019, 3GPP’s FTP server was freely accessible to the general public with no login, password, or membership requirement.

32. By 1999, at least 100 companies were members of 3GPP (719 companies by December 2020), ranging from Bosch to Ericsson to Nokia to Samsung and generally including those interested in the discussion, creation, and

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adoption of cellular telecommunications standards, including UMTS. Each of these companies typically delegated multiple individuals to regularly participate in 3GPP meetings. Further, pursuant to 3GPP's standard business practices, 3GPP working groups sent emails notifying these individuals 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 some of the most interested members of the public—those working to develop standards for cellular telecommunication or working to implement the standards—were personally informed of their availability by email.

33. Based on my experience with 3GPP and the telecommunications industry, I would expect any person implementing a cellular network or device, e.g., an LTE or 5G network, to consult the corresponding specifications on the 3GPP FTP server, as well as other related documents. The whole purpose of 3GPP creating and making these specifications available was so that engineers and other individuals would have ready access to them when developing and implementing cellular networks and devices.

34. By June 1999, 3GPP's FTP server was well-known to persons in the cellular telecommunications industry as a source of public information regarding industry standards and technological advances.

35. 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. The subjects of the individual specification series are explained on 3GPP's website at <https://www.3gpp.org/specifications-technologies/specifications-by-series>, and reproduced below.

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Subject of specification series	3G and beyond / GSM (R99 and later)	GSM only (Rel-4 and later)	GSM only (before Rel-4)
Requirements	21 series	41 series	01 series
Service aspects ("stage 1")	22 series	42 series	02 series
Technical realization ("stage 2")	23 series	43 series	03 series
Signalling protocols ("stage 3") - 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 (none exists)	07 series
Signalling protocols ("stage 3") -(RSS-CN) and OAM&P and Charging (overflow from 32- range)	28 series	48 series	08 series
Signalling protocols ("stage 3") - intra-fixed- network	29 series	49 series	09 series
Programme management	30 series	50 series	10 series
Subscriber Identity Module (SIM / USIM), IC Cards. Test specs.	31 series	51 series	11 series
OAM&P and Charging	32 series	52 series	12 series
Access requirements and test specifications		13 series ⁽¹⁾	13 series ⁽¹⁾
Security aspects	33 series	(2)	(2)
UE and (U)SIM test specifications	34 series	(2)	11 series
Security algorithms ⁽³⁾	35 series	55 series	(4)
LTE (Evolved UTRA), LTE-Advanced, LTE- Advanced Pro radio technology	36 series		
Multiple radio access technology aspects	37 series		
Radio technology beyond LTE	38 series		

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36. Following a link for a series (e.g., “23 series” link) leads to a 3GPP web page providing access to all specifications in a series, as shown by the screenshot below:

The screenshot displays the 3GPP Portal interface. At the top, there is a navigation bar with links for Home, Directory, Browse FTP, and Help. Below this, a search bar is visible. The main content area shows a list of specifications for Series 23. The table includes columns for Specification number, Type, Title, Status, and Primary Responsible Group. The specifications listed range from TS 23.000 to TS 23.072. The status of each specification is indicated by a color-coded icon and text, such as 'Under change control' or 'Withdrawn under change control'. The Primary Responsible Group is also listed for each specification.

Specification number	Type	Title	Status	Primary Responsible Group
23.000	TS	Network architecture	Under change control	SC
23.003	TS	Numbering, addressing and identification	Under change control	C4
23.007	TS	Restoration procedures	Under change control	C4
23.008	TS	Organization of subscriber data	Under change control	C4
23.009	TS	Handover procedures	Under change control	C4
23.010	TS	OSM Public Land Mobile Network (PLMN) Connection Types	Withdrawn under change control	-
23.011	TS	Technical realization of Supplementary Services	Under change control	C4
23.012	TS	Location management procedures	Under change control	C4
23.014	TS	Support of Dual-Tone Multi-Frequency (DTMF) signalling	Under change control	C1
23.015	TS	Technical realization of Operator Determined Barring (ODB)	Under change control	C4
23.016	TS	Subscriber data management, Stage 2	Under change control	C4
23.018	TS	Basic call handling, Technical realization	Under change control	C4
23.019	TS	General UITS architecture	Withdrawn under change control	S3012
23.022	TS	Functions related to Mobile Station (MS) in idle mode and group receive mode	Withdrawn under change control	-
23.031	TS	3G Security: Fraud Information Gathering System (FIGS): Technical realization, Stage 2	Under change control	S3
23.032	TS	Universal Geographical Area Description (GAD)	Under change control	S2
23.034	TS	High-Speed Circuit Switched Data (HSCSD), Stage 2	Under change control	C1
23.035	TS	Immediate Service Termination (IST), Stage 2	Under change control	S3
23.036	TS	Alphabets and language-specific information	Under change control	C1
23.039	TR	Interface Protocols for the connection of Short Message Service Centers (SMS-Cs) to Short Message Entities (SMEs)	Under change control	C1
23.040	TS	Technical realization of the Short Message Service (SMS)	Under change control	C1
23.041	TS	Technical realization of Cell Broadcast Service (CBS)	Under change control	C1
23.042	TS	Compression algorithm for text messaging services	Under change control	C1
23.043	TS	Support of Videotex	Withdrawn under change control	-
23.044	TS	Support of Video	Withdrawn under change control	-
23.045	TS	Technical Realization of Facsimile Group 3 Service - transparent	Withdrawn under change control	N3
23.046	TS	Technical realization of Facsimile Group 3 service - non-transparent	Withdrawn under change control	-
23.048	TS	Security mechanisms for the UGSM application toolkit, Stage 2	Under change control	C8
23.053	TS	Transfer Free Operation (TFO): Service description, Stage 2	Under change control	S4
23.054	TS	Shared Interworking Functions (SIF), Stage 2	Withdrawn under change control	N3
23.057	TS	Mobile Execution Environment (MEE): Functional description, Stage 2	Under change control	S2
23.059	TS	UMTS Network principles	Withdrawn under change control	-
23.060	TS	General Packet Radio Service (GPRS): Service description, Stage 2	Under change control	S2
23.066	TS	Support of Mobile Number Portability (MNP): Technical realization, Stage 2	Under change control	C4
23.067	TS	enhanced Multi-Level Precedence and Pre-emption Service (eMLPP), Stage 2	Under change control	C4
23.068	TS	Voice Broadcast service (VBS): Stage 2	Withdrawn under change control	N1
23.070	TS	Routing of calls to/from Public Data Networks (PDNs) and the GSM Public Land Mobile Network (PLMN)	Withdrawn under change control	-
23.071	TS	Location Services (LCS): Functional description, Stage 2	Withdrawn under change control	-
23.072	TS	Cell Deflection (CD) supplementary service, Stage 2	Under change control	C4

37. As another example of a series, the LTE radio standard is covered in the “36 series” and is further subdivided into separate sections or specifications. The LTE radio specification series starts at TS 36.101 and ends at TR 36.978. Excluding withdrawn specifications, the LTE standard consists of more than 250 specifications.

38. As another example of a series, the 5G New Radio (NR) standard is covered in the “38 series” and is further subdivided into separate sections or specifications. Selecting the “38 series” link on website shown in paragraph 33 leads to the 3GPP portal (portal.3gpp.org) page for all of the 38 series technical specifications.¹ These 5G NR specifications start at TS 38.101 and end at TR 38.922. Excluding withdrawn specifications, the 5G NR standard consists of more than 140 specifications.

39. Each LTE or 5G specification can span from a few pages to hundreds of pages. One full version of the LTE or 5G standard is massive, spanning tens of thousands of pages across the particular series of technical specifications.

40. In the ordinary course of 3GPP’s regularly conducted business activities, and pursuant to its standard business practices, TDocs are usually 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 normally uploaded at the latest during the week following the meeting (e.g., the meeting report of the meeting is usually published for review during the week following the meeting).

1

<https://portal.3gpp.org/Specifications.aspx?q=1&series=45&releases=all&draft=False&underCC=False&withACC=False&withBCC=False&numberNYA=False>

41. 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 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.

42. Since their creation in December 1998, all of 3GPP's email archives, including the dedicated email lists for TSG RAN WG1 and WG2, have been 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 WG2 email list on list.etsi.org² demonstrating that this webpage is publicly available and that only an email address and name had to be entered to join the email list. In 2006, the registration webpage looked as follows:³

² In the past there was also list.3gpp.org which did not represent a dedicated website but instead redirected to list.etsi.org.

³ https://web.archive.org/web/20060105222647/http://list.etsi.org/scripts/wa.exe?SUBED1=3gpp_tsg_ran_wg2&A=1

Subscription Settings

Subscriber's Corner
Server Archives
Help
Log off

Join or Leave the 3GPP_TSG_RAN_WG2 List

This screen allows you to join or leave the 3GPP_TSG_RAN_WG2 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

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

44. 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.

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45. Since their creation in December 1998, 3GPP's email archives have been 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.

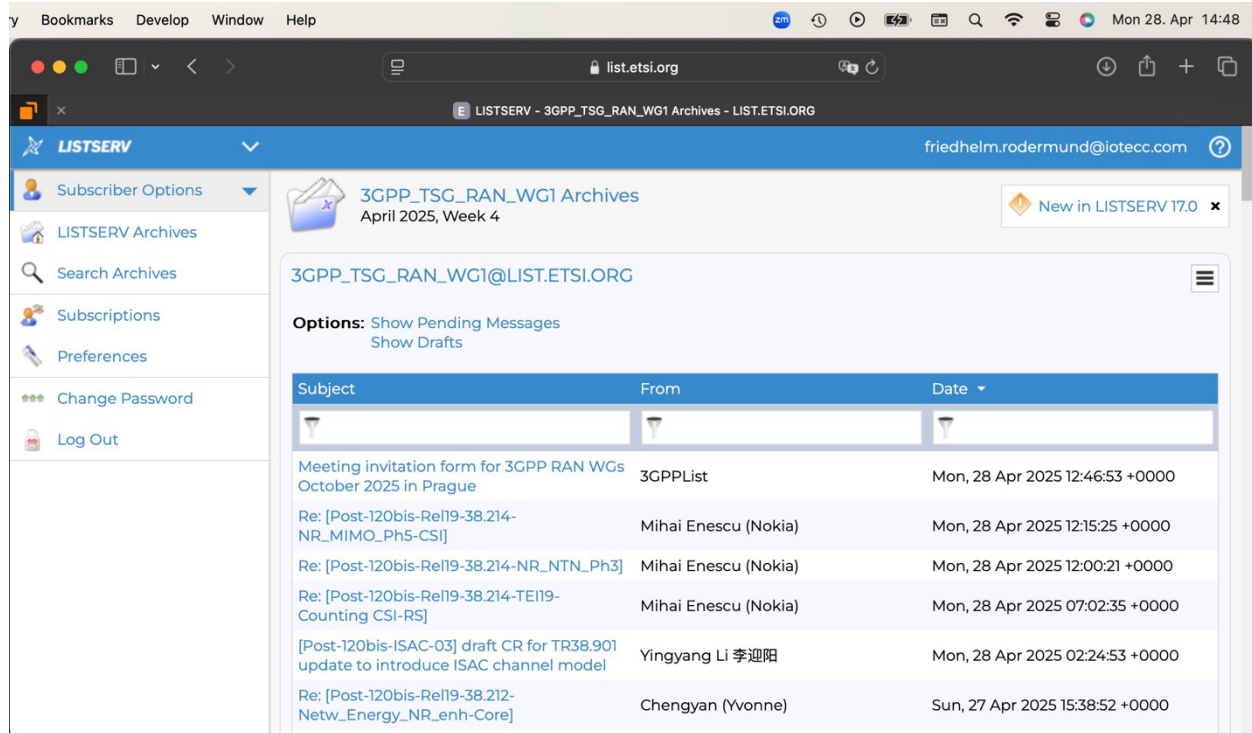
46. Since the creation of 3GPP in December 1998 until today, ETSI and 3GPP are using the same email list management software LISTSERV from L-Soft.

47. Based on my personal knowledge and experience, emails sent via the 3GPP email exploders are stored and indexed in the archive at the time the emails are initially sent. Thus, they are accessible within seconds or minutes (depending on system load) after the time the sender hit the "send" button. I have been using the 3GPP email exploder tool for many years, and during my time working for ETSI, I was "list owner" of several email exploders which means I was responsible for managing and administrating several ETSI and 3GPP email exploder lists.

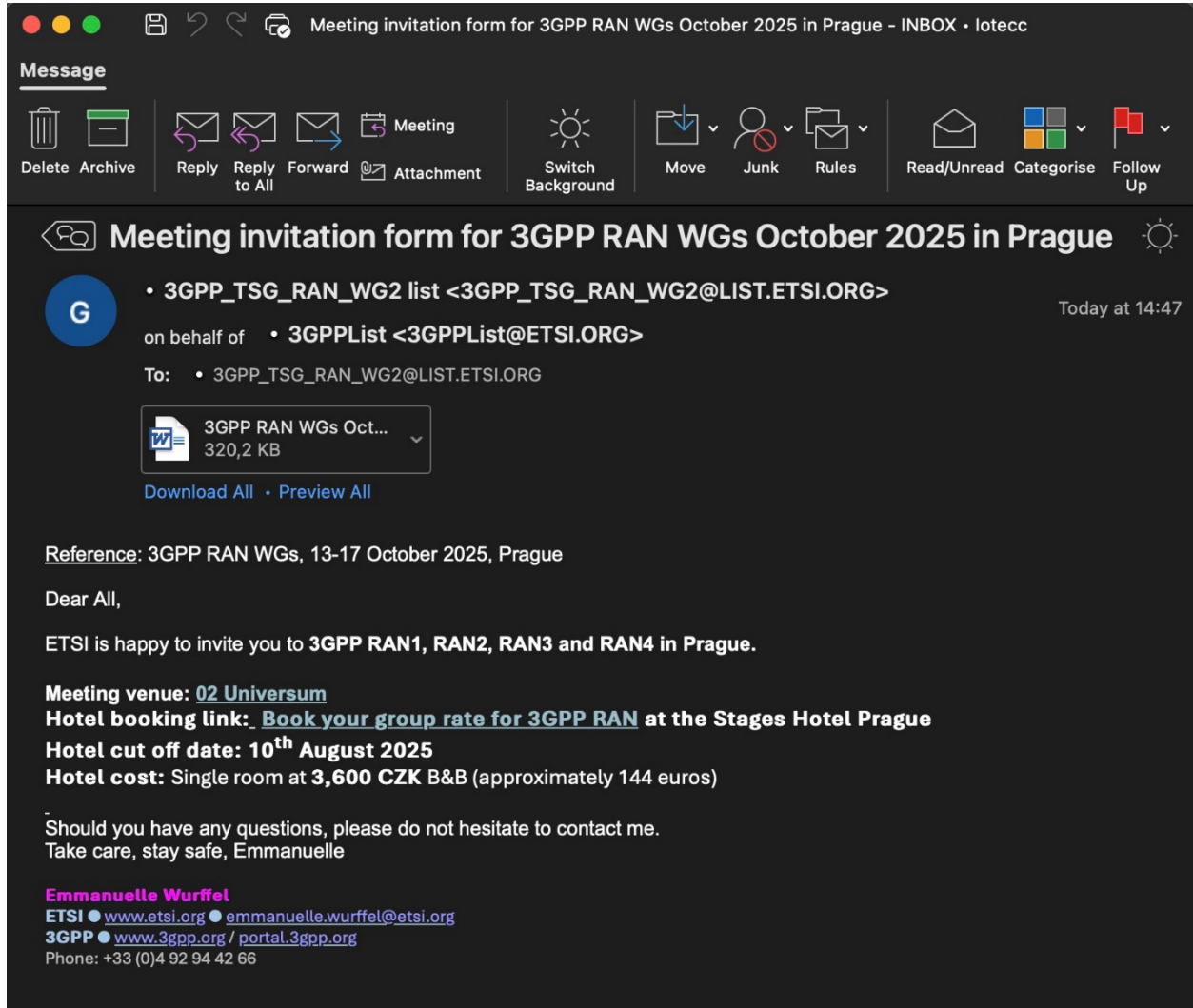
48. Furthermore, the example below shows an email which became available via the 3GPP email archive at list.etsi.org right after it was sent. The date and time shown on the newest (upper) email in this list shows Mon, 28 April 2025 12:46 (UTC time zone). This time is nearly identical with the date and time shown on my PC as 28 April 14:46 (CEST time zone which is 2 hours ahead of UTC). Thus, the time difference in this example between sent time and current time is only two

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minutes, in other words it took 2 minutes at most from sending until the email was accessible via the archive.



49. In comparison, the received time stamp shown on the same email in my inbox is shown as “14:47”, as can be seen with the screenshot below. This was even slightly later than the time the email appeared on the 3GPP email archive. According to my experience, it happens sometimes that email distribution may take several minutes after the entry in the archive already has appeared. This may be explained with system load as e.g. the 3GPP RAN WG1 and WG2 email exploders have more than 1000 subscribers, and the system needs some time to process such a number of emails.



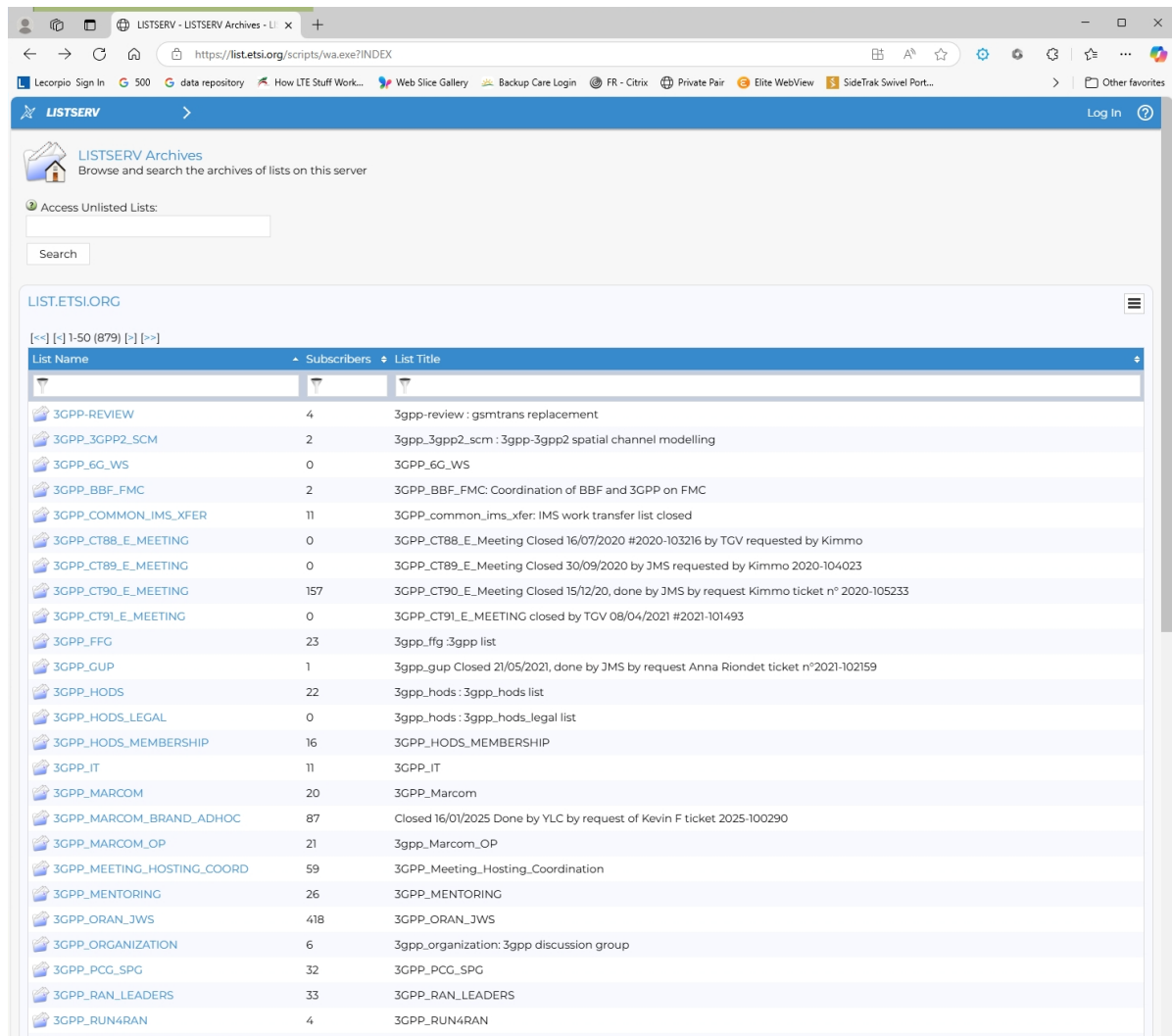
50. While this is an example of near contemporaneous publication of emails in the 3GPP email archive shortly after they are sent in 2025, it is my experience that this how the 3GPP email archive operated prior to November 2019 as well.

51. Emails in the 3GPP archive can be indexed by List Name, chronologically indexed (date-based), and organized into folders (webpages) by month or week over the years. Furthermore, there is subject-line indexing allowing

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to group messages by threads. Full-text indexing allows search of the emails in the 3GPP email archive by keywords and author indexing allows search of emails in the 3GPP email archive by author.

52. An example of indexed emails in the 3GPP archive have been indexed by List Name at <https://list.etsi.org/scripts/wa.exe?INDEX> is shown in the screenshot below:

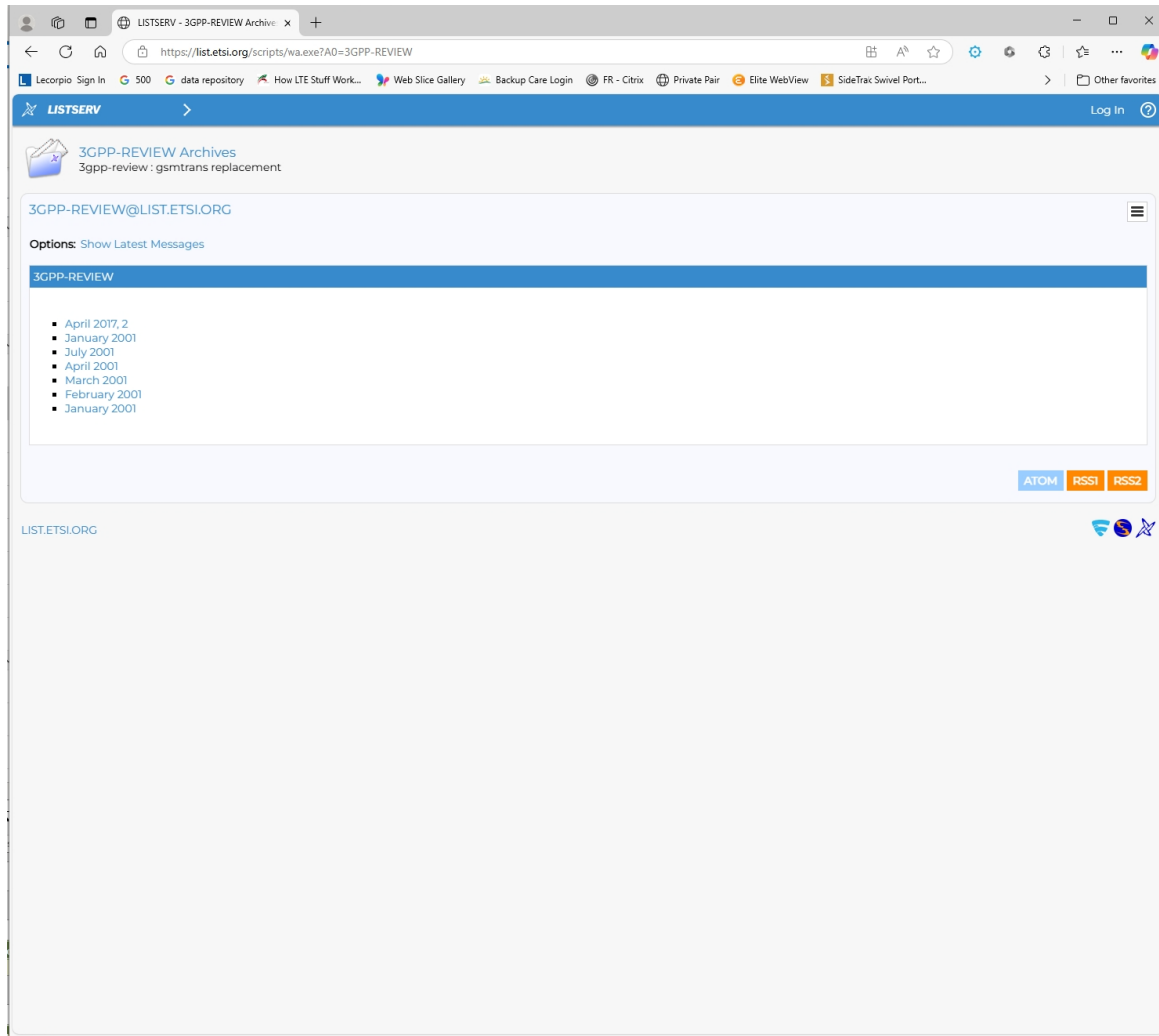


The screenshot shows a web browser window displaying the LISTSERV Archives page. The page title is "LISTSERV Archives" and the URL is "https://list.etsi.org/scripts/wa.exe?INDEX". The page contains a search bar and a table of email lists. The table has three columns: "List Name", "Subscribers", and "List Title". The table lists various 3GPP-related email lists, including 3GPP-REVIEW, 3GPP_3GPP2_SCM, 3GPP_6G_WS, 3GPP_BBF_FMC, 3GPP_COMMON_IMS_XFER, 3GPP_CT88_E_MEETING, 3GPP_CT89_E_MEETING, 3GPP_CT90_E_MEETING, 3GPP_CT91_E_MEETING, 3GPP_FFG, 3GPP_GUP, 3GPP_HODS, 3GPP_HODS_LEGAL, 3GPP_HODS_MEMBERSHIP, 3GPP_IT, 3GPP_MARCOM, 3GPP_MARCOM_BRAND_ADHOC, 3GPP_MARCOM_OP, 3GPP_MEETING_HOSTING_COORD, 3GPP_MENTORING, 3GPP_ORAN_3WS, 3GPP_ORGANIZATION, 3GPP_PCG_SPG, 3GPP_RAN_LEADERS, and 3GPP_RUN4RAN.

List Name	Subscribers	List Title
3GPP-REVIEW	4	3gpp-review : gsmtrans replacement
3GPP_3GPP2_SCM	2	3gpp_3gpp2_scm : 3gpp-3gpp2 spatial channel modelling
3GPP_6G_WS	0	3GPP_6G_WS
3GPP_BBF_FMC	2	3GPP_BBF_FMC: Coordination of BBF and 3GPP on FMC
3GPP_COMMON_IMS_XFER	11	3GPP_common_ims_xfer: IMS work transfer list closed
3GPP_CT88_E_MEETING	0	3GPP_CT88_E_Meeting Closed 16/07/2020 #2020-103216 by TGV requested by Kimmo
3GPP_CT89_E_MEETING	0	3GPP_CT89_E_Meeting Closed 30/09/2020 by JMS requested by Kimmo 2020-104023
3GPP_CT90_E_MEETING	157	3GPP_CT90_E_Meeting Closed 15/12/20, done by JMS by request Kimmo ticket n° 2020-105233
3GPP_CT91_E_MEETING	0	3GPP_CT91_E_MEETING closed by TGV 08/04/2021 #2021-101493
3GPP_FFG	23	3gpp_ffg :3gpp list
3GPP_GUP	1	3gpp_gup Closed 21/05/2021, done by JMS by request Anna Riondet ticket n°2021-102159
3GPP_HODS	22	3gpp_hods : 3gpp_hods list
3GPP_HODS_LEGAL	0	3gpp_hods : 3gpp_hods_legal list
3GPP_HODS_MEMBERSHIP	16	3GPP_HODS_MEMBERSHIP
3GPP_IT	11	3GPP_IT
3GPP_MARCOM	20	3GPP_Marcom
3GPP_MARCOM_BRAND_ADHOC	87	Closed 16/01/2025 Done by YLC by request of Kevin F ticket 2025-100290
3GPP_MARCOM_OP	21	3gpp_Marcom_OP
3GPP_MEETING_HOSTING_COORD	59	3GPP_Meeting_Hosting_Coordination
3GPP_MENTORING	26	3GPP_MENTORING
3GPP_ORAN_3WS	418	3GPP_ORAN_3WS
3GPP_ORGANIZATION	6	3gpp_organization: 3gpp discussion group
3GPP_PCG_SPG	32	3GPP_PCG_SPG
3GPP_RAN_LEADERS	33	3GPP_RAN_LEADERS
3GPP_RUN4RAN	4	3GPP_RUN4RAN

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53. Selection of the first indexed List Name (i.e., 3GPP-Review) returns the webpage <https://list.etsi.org/scripts/wa.exe?A0=3GPP-REVIEW>, which includes chronologically indexed emails from 3GPP List Name 3GPP-Review, which is shown in the screenshot below:

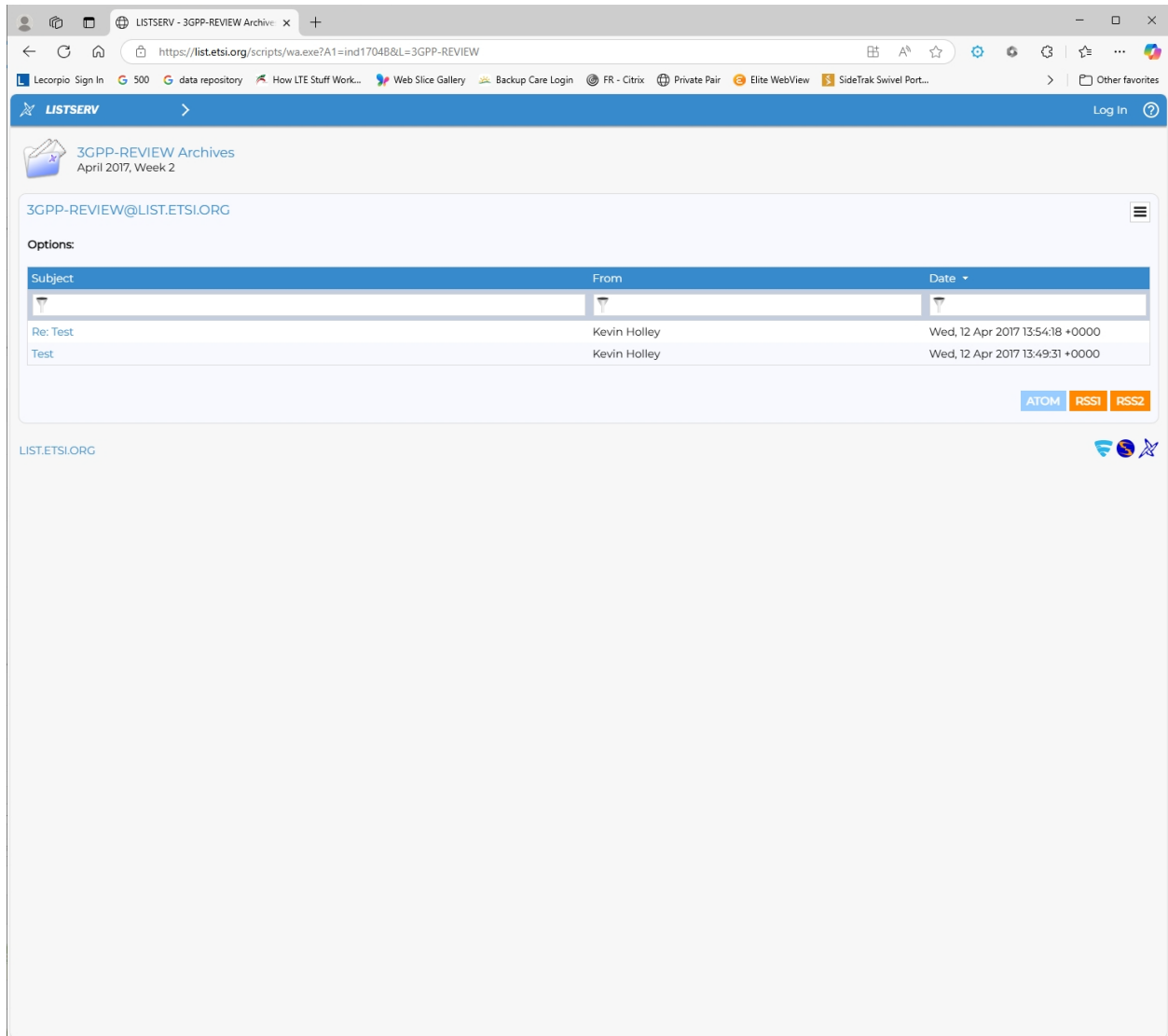


54. Selection of a date from the webpage above such as, e.g., April 2017 returns a webpage showing the emails sent to the 3GPP List Name “3GPP-Review” that have been indexed chronologically as being communicated in April

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2017. A screenshot of the webpage that results from the selection of the link April 2017 shown in the webpage in the above screenshot returns the webpage

<https://list.etsi.org/scripts/wa.exe?A1=ind1704B&L=3GPP-REVIEW> that includes emails indexed as being communicated in April 2017, which is shown below:



55. As shown in the screenshot of the webpage

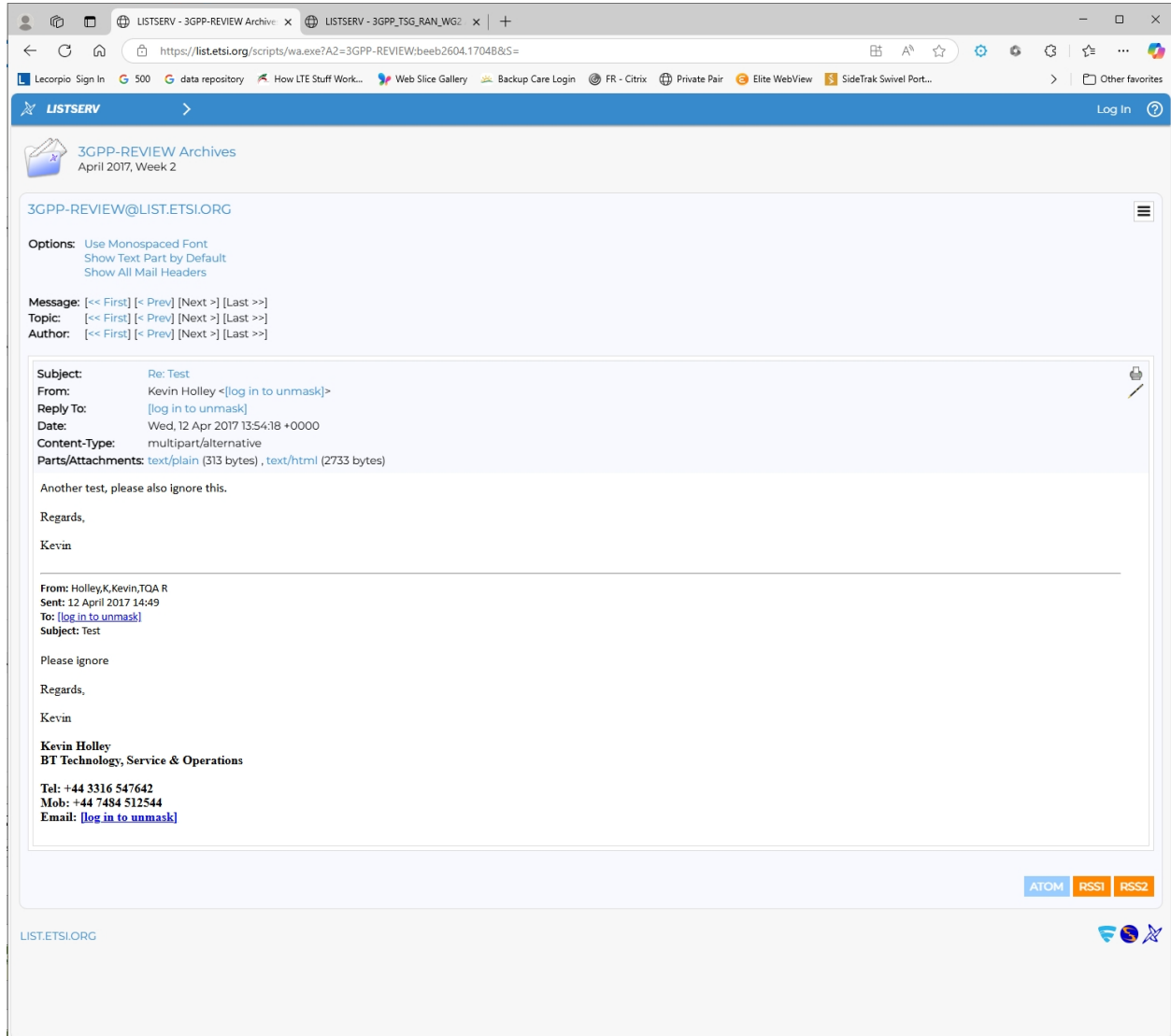
<https://list.etsi.org/scripts/wa.exe?A1=ind1704B&L=3GPP-REVIEW> above, the

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emails in the 3GPP archive for List Name 3GPP-Review have been indexed under the List Name 3GPP-Review, further indexed chronologically as being communicated on April 2017, and then further indexed by email subject name, and author (“From”).

56. Email messages in the 3GPP email archive are also indexed internally, as they are assigned a unique identifier which is also included in the URL. For example, selection of the first email having subject line RE:Test shown in the screenshot of <https://list.etsi.org/scripts/wa.exe?A1=ind1704B&L=3GPP-REVIEW> above returns the webpage <https://list.etsi.org/scripts/wa.exe?A2=3GPP-REVIEW;beeb2604.1704B&S=> shown below:

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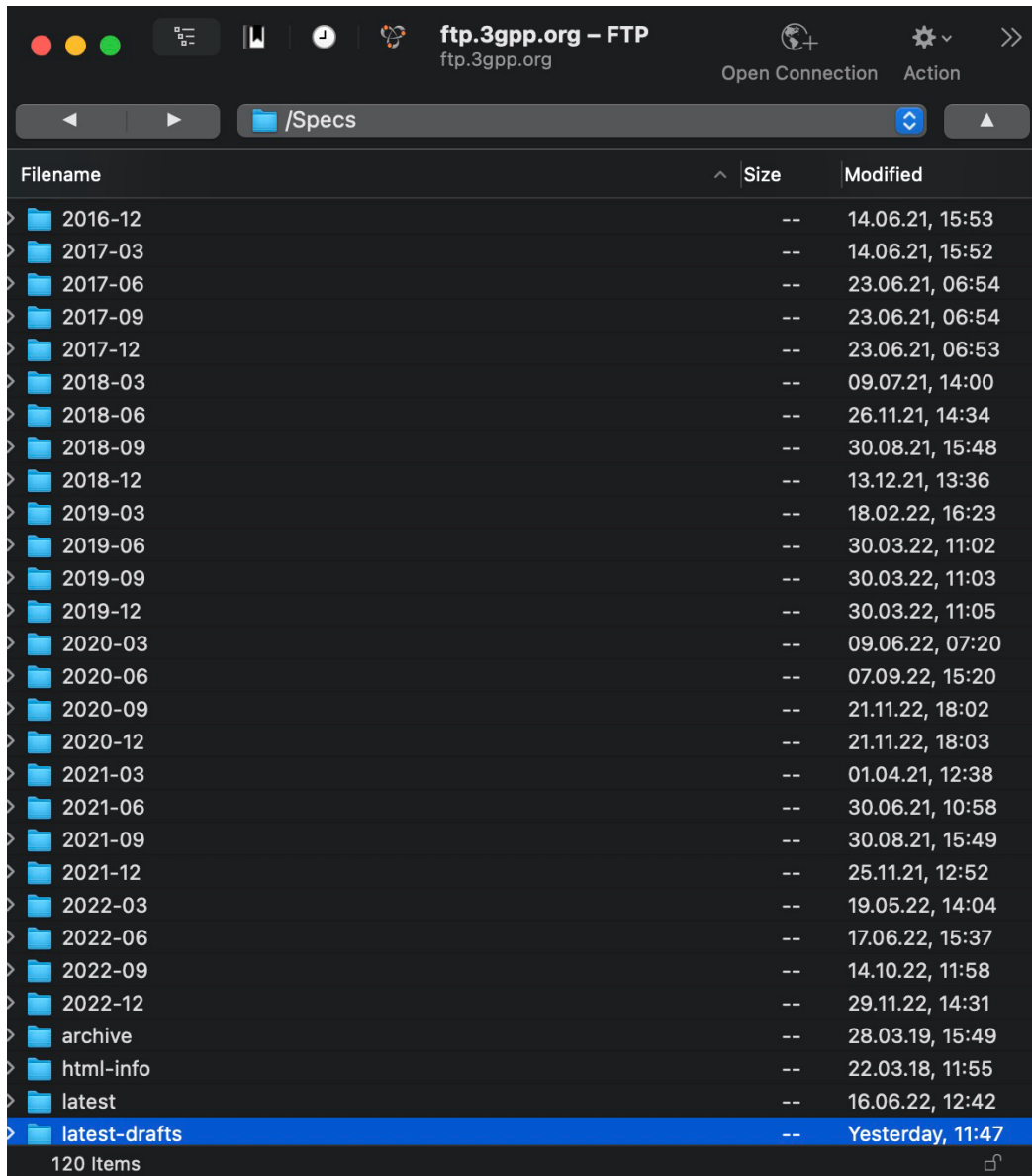
57. In the example of the email archived at the webpage <https://list.etsi.org/scripts/wa.exe?A2=3GPP-REVIEW;beeb2604.1704B&S=>, beeb2604.1704B is used as a unique identifier that is to index the email shown in the screenshot above.

58. While this is an example of indexing of emails in the 3GPP email illustrated using present-day websites of a 3GPP mail archive, it is my experience

that this how the emails in the 3GPP email archive were indexed prior to November 2019 as well.

59. 3GPP specifications almost always are duplicated in at least two and sometime more locations on the FTP server. One location corresponds to a “snapshot” of the specifications corresponding to a particular plenary meeting cycle—for instance, the 2018-12 snapshot contains a snapshot of numerous specifications after the December 2018 3GPP plenary meetings. The second location is an “archive” that contains all versions over time for a given specification. The screenshot below shows an excerpt of the “Spec” folder at <ftp.3gpp.org>:

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Filename	Size	Modified
> 2016-12	--	14.06.21, 15:53
> 2017-03	--	14.06.21, 15:52
> 2017-06	--	23.06.21, 06:54
> 2017-09	--	23.06.21, 06:54
> 2017-12	--	23.06.21, 06:53
> 2018-03	--	09.07.21, 14:00
> 2018-06	--	26.11.21, 14:34
> 2018-09	--	30.08.21, 15:48
> 2018-12	--	13.12.21, 13:36
> 2019-03	--	18.02.22, 16:23
> 2019-06	--	30.03.22, 11:02
> 2019-09	--	30.03.22, 11:03
> 2019-12	--	30.03.22, 11:05
> 2020-03	--	09.06.22, 07:20
> 2020-06	--	07.09.22, 15:20
> 2020-09	--	21.11.22, 18:02
> 2020-12	--	21.11.22, 18:03
> 2021-03	--	01.04.21, 12:38
> 2021-06	--	30.06.21, 10:58
> 2021-09	--	30.08.21, 15:49
> 2021-12	--	25.11.21, 12:52
> 2022-03	--	19.05.22, 14:04
> 2022-06	--	17.06.22, 15:37
> 2022-09	--	14.10.22, 11:58
> 2022-12	--	29.11.22, 14:31
> archive	--	28.03.19, 15:49
> html-info	--	22.03.18, 11:55
> latest	--	16.06.22, 12:42
> latest-drafts	--	Yesterday, 11:47

120 Items

60. While 3GPP aims to upload the updated specifications to both 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 two locations. Additionally, specifications which are not yet approved (so called “draft” specifications) are presented as TDocs at working group and at plenary meetings (as

soon as the working group decides to submit the specification to the plenary meeting for information or approval). In many cases, the TDocs are also distributed on the email exploder of the working group prior to the meeting, making the TDocs available to all those subscribed to the email distribution list.

61. 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.

62. An additional means of accessing 3GPP documents including TDocs and specifications is the 3GPP portal. *See* <https://portal.3gpp.org/Specifications.aspx>. 3GPP preserves the posted document indefinitely on its server for future reference. *Id.* As detailed below, the 3GPP website provides the date that a particular version of a technical specification was uploaded, using the date convention YYYY-MM-DD. The 3GPP portal also provides a login function to unlock full features, however, login is not required for searching and downloading technical specifications. Based on my personal

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experience, throughout the 2019 timeframe, anyone interested in a particular 3GPP specification could search the 3GPP portal to find and download the latest version of a technical specification using the 3GPP portal in substantially the same manner as they would today:

The screenshot shows the 3GPP Portal website. The browser address bar displays 'portal.3gpp.org'. The page features the 3GPP logo and a 'Portal' label. A login section prompts users to log in with their EOL account, providing fields for Username, Password, and a 'Remember login' checkbox. A 'Login' button is present, along with links for 'Sign Up' and 'Forgot your password?'. A green navigation bar contains links for 'Home', 'Directory', 'Browse FTP', and 'Help'. Below this, a message states: 'This site is 3GPP working area. Log in to access full features. For general information go to the public site www.3gpp.org'. The main search area is titled 'Search form (23.008, Releases(26))' and includes filters for 'Title/Specification number' (set to 23.008), 'Series', 'Type' (with checkboxes for 'Technical Specification (TS)' and 'Technical Report (TR)'), 'Release' (set to 'All Releases'), 'Publication' (with checkboxes for 'Internal' and 'For Publication'), 'Technology' (with checkboxes for '2G', '3G', 'LTE', and '5G'), and 'Status' (with checkboxes for 'Draft', 'Under change control', 'Withdrawn before change control', and 'Withdrawn under change control'). A 'Search' button is located at the bottom right of the search form. Below the search form, a 'Data pager' section shows '0 specifications found, displaying 0 to 0'. A table with the following columns is displayed: 'Specification Number', 'Type', 'Title', 'Status', and 'Primary Responsible Group'. The table is currently empty, with a note 'No records to display.'

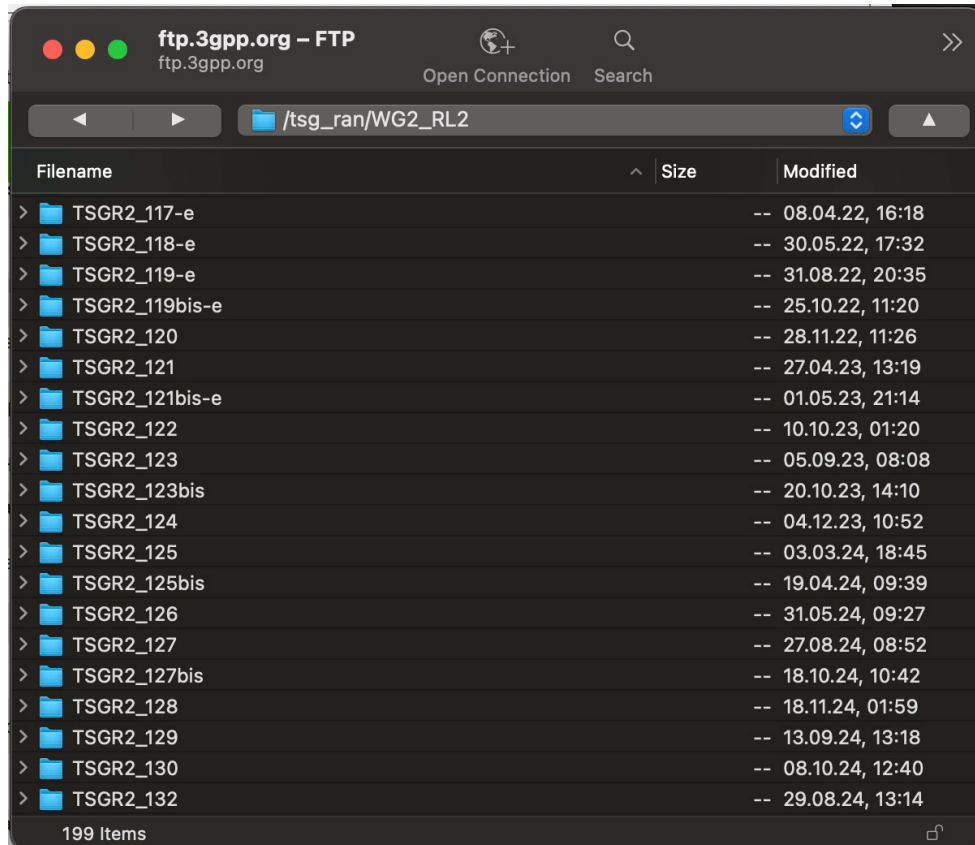
<https://portal.3gpp.org/Specifications.aspx>; see, e.g., 2015 internet archive

<https://web.archive.org/web/20150924200802/https://portal.3gpp.org/>.

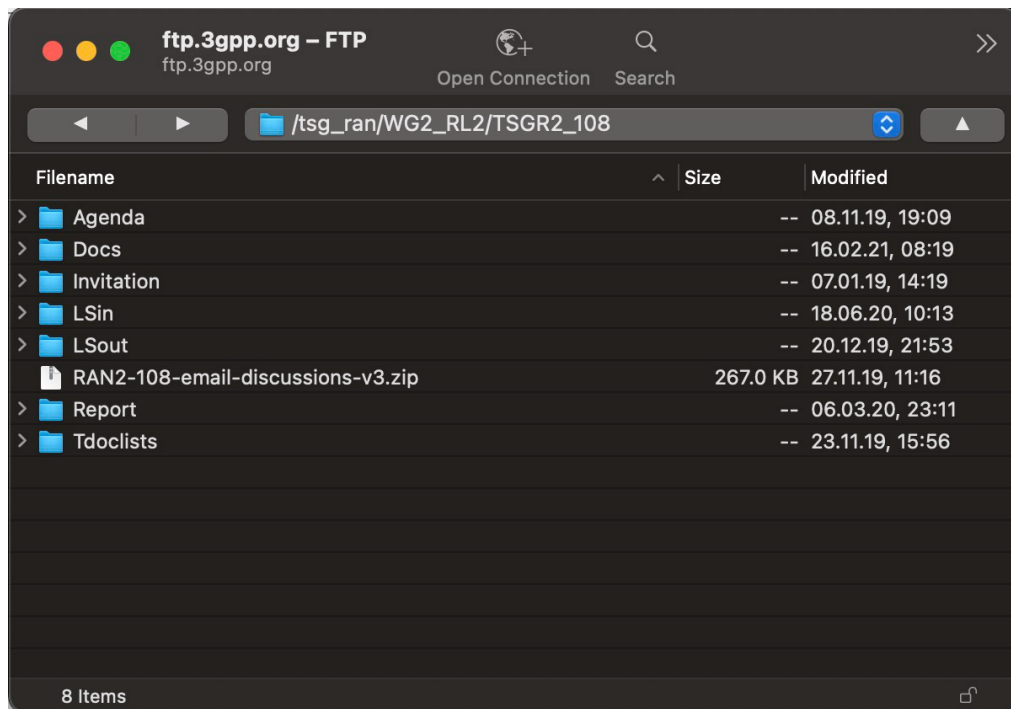
63. 3GPP's working practice to store their documents on its FTP server, as described above, has not changed over time. Starting from the first 3GPP meetings in 1998 until present, all WGs and plenary meetings are represented by dedicated meeting folders on the FTP server. These meeting folders include 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

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added. As an example, the screenshot below shows an extract of the RAN WG2 folder named “WG2_RL2” showing that every meeting has a dedicated number:



64. As an example, the screenshot below shows the typical structure of a meeting folder including the most important folders “Agenda”, “Docs” (includes all meeting contributions), and “Report” (includes the meeting report):



65. 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 the aforementioned “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.

66. 3GPP maintains a set of publicly accessible documents⁴ providing further details on its way of working:

⁴ All available from <https://www.3gpp.org/delegates-corner/3gpp-working-procedures>

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

B. Specific Documents

1. 3GPP CR 38.213 “Samsung”

67. Based on my personal knowledge and my review of 3GPP’s business records, I recognize APPLE-1006 as a true and correct copy of a 3GPP Change Request (CR) with the title “Introduction of Industrial IoT”, named “Samsung” hereafter. The document was authored by Samsung and proposed specification text including aspects of DL SPS and UL grant Type 2. The CR was aimed at Version 15.7.0. of 3GPP TS 38.213 which is the 5G NR (New Radio) technical specification covering physical layer procedures for control.

68. On its face, “Samsung” refers to the RAN WG1 meeting #98bis held on October 14-20, 2019, in Chongqing, China. Based on my experience, the text on the face of “Samsung” referring to “RAN WG1 meeting #98bis” identifies a 3GPP working group meeting and the text referring to “October 14-20, 2019, in Chongqing, China” identifies the date and location of that working group meeting. Thus, based on my personal knowledge and experience with ETSI’s and 3GPP’s

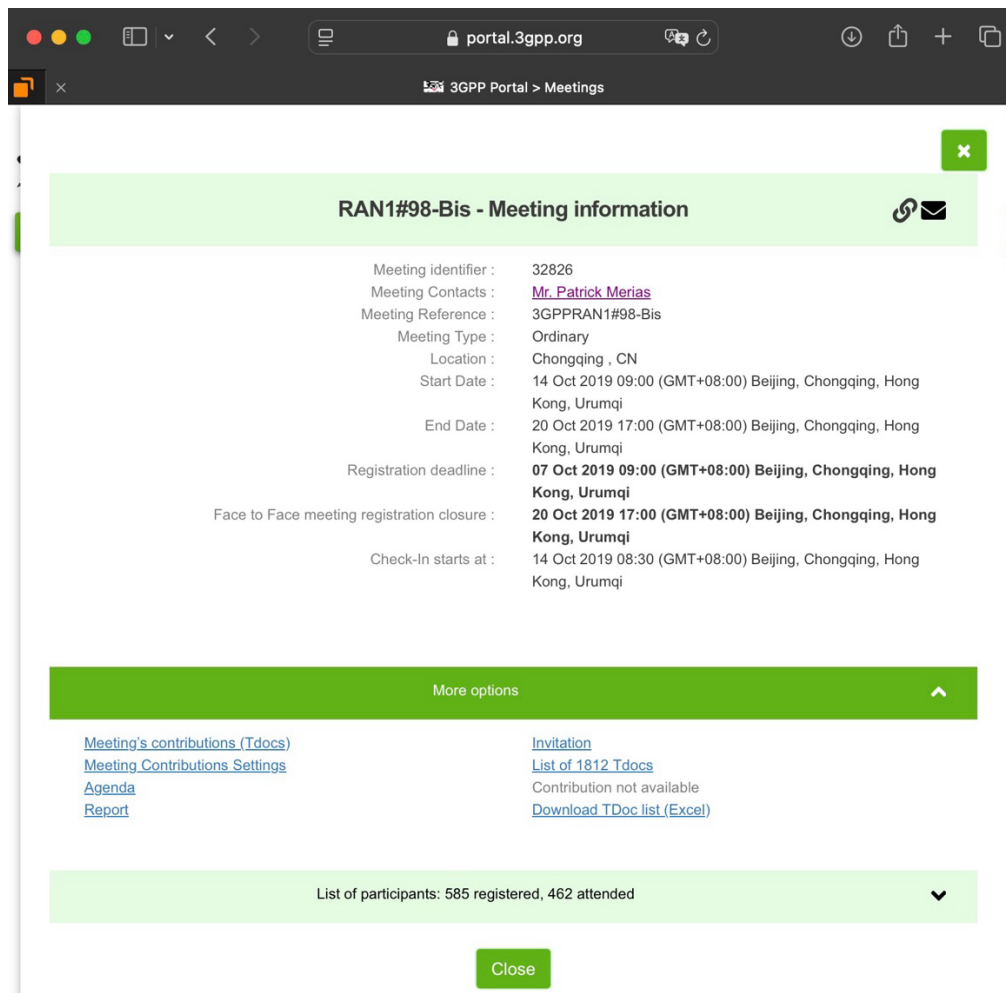
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standard business practices, this information tells me that “Samsung” was available either prior to or during or shortly after that meeting to 3GPP members, and to the general public.

69. According to the 3GPP website at <https://portal.3gpp.org/Meetings.aspx#/> which is shown by the screenshot below, the RAN WG1 meeting #98bis meeting held on October 14-20, 2019, in Chongqing, China was attended by 462 individuals (out of 585 registered participants)⁵:

⁵ The participant list of the RAN WG1 meeting #98bis meeting can be found in Appendix C.

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70. The document was distributed via the 3GPP_TSG_RAN_WG1 email exploder on November 3, 2019, as an attachment to an email from Aris Papasakellariou from Samsung as shown in APPLE-1009. As of today, this email exploder has around 1497 subscribers, as can be seen by <https://list.etsi.org/scripts/wa.exe?INDEX>. I would expect a similar, or, only slightly lower, number of subscribers around November 2019.

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71. Representatives of Samsung, Huawei, and Nokia will have received this email via the 3GPP_TSG_RAN_WG1 email exploder given that all companies active in 3GPP WGs are subscribed to the respective email exploders. E.g. the email shown in APPLE-1009 shows Aris Papasakellariou from Samsung, Sigen Ye from Nokia, and Yamping Xing from CATT as participants of this email thread.

72. An archived version of the email shown in APPLE-1009 from Aris Papasakellariou is accessible at https://list.etsi.org/scripts/wa.exe?A2=3GPP_TSG_RAN_WG1;f8c17069.1911A&S=. The archived email shown in APPLE-1009 includes an attachment named “R1-19xxxxx_CR_38.213_IIoT-Core_v1.zip”. I accessed the archived version of the email shown in APPLE-1009 at the link above and downloaded the attachment named “R1-19xxxxx_CR_38.213_IIoT-Core_v1.zip” and the downloaded file had a size of 106 KB. A comparison of the size of the downloaded zip file to the attachment shown in APPLE-1009 reveals that the downloaded file has the same size as the file attached to the email shown in APPLE-1009. However, the size of a file is measured by the operating system that is used to store the file and it is common that identical files stored on different operating systems can have a different file size, as the file size is a function of the mathematical formula used by an operating system to calculate the file size in accordance with the file system used to organize files and the properties of the hard drive used to store the file. As a result, there may be some

operating systems that result in a downloaded file having a similar, but different, file size than others.

73. I unzipped the downloaded file “R1-19xxxxx_CR_38.213_IIoT-Core_v1.zip” to access a TDoc file named “R1-19xxxxx_CR_38.213_IIoT-Core_v1.docx.” Based on my review of “R1-19xxxxx_CR_38.213_IIoT-Core_v1.docx,” I can confirm that the file named “R1-19xxxxx_CR_38.213_IIoT-Core_v1.docx” is a true and authentic copy of APPLE-1006.

74. The metadata for the file named “R1-19xxxxx_CR_38.213_IIoT-Core_v1.docx” confirms that the file is named “R1-19xxxxx_CR_38.213_IIoT-Core_v1.docx,” that the file named “R1-19xxxxx_CR_38.213_IIoT-Core_v1.docx” was created on “2. November 2019,” that the file named “R1-19xxxxx_CR_38.213_IIoT-Core_v1.docx” was last modified on “2. November 2019,” and that the unzipped file size of the file named “R1-19xxxxx_CR_38.213_IIoT-Core_v1.docx” was “129 KB.” A screenshot of the metadata for the file named “R1-19xxxxx_CR_38.213_IIoT-Core_v1.docx” is shown below.

3GPP TSG-RAN WG1 Meeting #98bis R1-19xxxxx
Chongqing, China, October 14 – 20, 2019

DRAFT CHANGE REQUEST
38.213 CR xxxx rev - Current version: 15.7.0
For [HELP](#) on using this form: comprehensive instructions can be found at <http://www.3gpp.org/Change-Requests>

Proposed change affects:

UICC app

ME

MS

Radio Access Network

Core Network

Title: Introduction of Industrial IoT
Source to WG: Samsung
Source to TSG:
Work item code: NR_IOT- Core | Date: <Req_date>
Category: 1 | Release: Rel-16
Use one of the following categories:
1 (Correction)
2 (Improvement corresponding to a change in an earlier release)
3 (Addition of feature)
4 (Functional modification of feature)
5 (Editorial modification)
Detailed explanations of the above categories can be found in 3GPP TS 1.1.200

Use one of the following releases:
Rel-8 (Release 8)
Rel-9 (Release 9)
Rel-10 (Release 10)
Rel-11 (Release 11)
Rel-12 (Release 12)
Rel-13 (Release 13)
Rel-14 (Release 14)
Rel-15 (Release 15)
Rel-16 (Release 16)

Reason for change:
Summary of change:
Consequences if not approved:

Clauses affected:

	Y	N		
Other specs			Other core specifications	TS/TR ... CR ...
affected:			Test specifications	TS/TR ... CR ...
(show related CRs)			O&M Specifications	TS/TR ... CR ...

Other comments:
This CR's revision history:

R1-19xxxxx_CR_38.213_IIoT
-Core_v1.docx
129 KB
Information [Show Less](#)
Created 2. November 2019 at 22:32
Modified 2. November 2019 at 22:32

75. As explained in paragraph 42, any member of the public would have been able to receive 3GPP emails via the 3GPP email exploders as of the date and

time the email was sent. Furthermore, in addition to receiving such emails, any member of the public would have been able to access all emails via the 3GPP email archive at list.etsi.org. As mentioned in paragraph 47, it is my opinion that emails were accessible via the archive immediately after they have been sent.

76. In my opinion, an attachment to an email sent via the 3GPP email exploder would have been available to the public as of at least the date shown in the header of an email sent via the 3GPP email exploder and displayed in the 3GPP archive at list.etsi.org.

77. The last modified date is consistent with the November 3, 2019, date of the email distribution, and the standard business practice among 3GPP participants to make documents available shortly after completing them.

78. Thus, based on my personal knowledge and experience with ETSI's and 3GPP's standard business practices, APPLE-1006 is an authentic copy of "Samsung" that was shared via the public 3GPP email exploder, and made accessible via the 3GPP email archive to the general public by November 3, 2019, at the latest.

2. 3GPP CR 38.212 "Huawei"

79. Based on my personal knowledge and my review of 3GPP's business records, I recognize APPLE-1007 as a true and correct copy of a 3GPP Change Request (CR) with the title "Introduction of Physical Layer Enhancements for NR

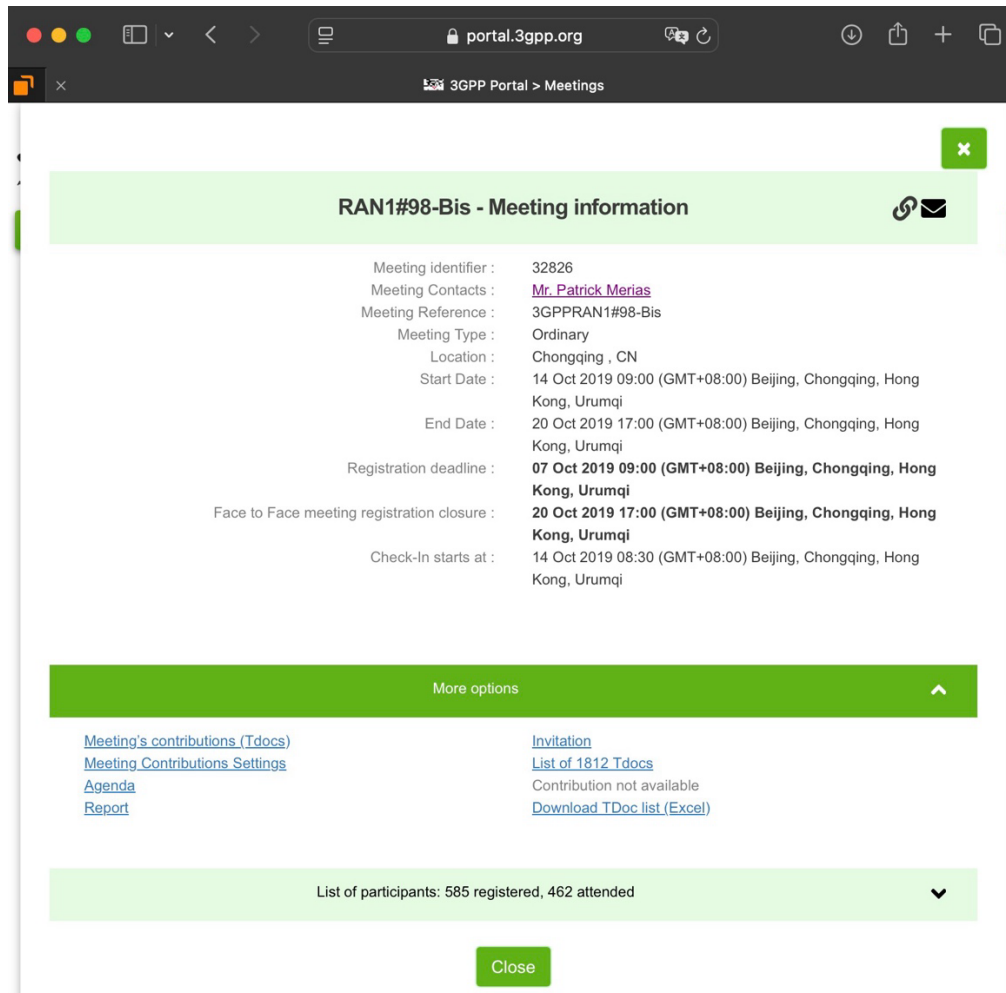
URLLC”, named “Huawei” hereafter. The document was authored by Huawei and proposed DCI format enhancements including several new DCI formats. The CR was aimed at Version 15.7.0. of 3GPP TS 38.212 which is the 5G NR (New Radio) technical specification named “Multiplexing and channel coding”.

80. On its face, “Huawei” refers to the RAN WG1 meeting #98bis held on October 14-20, 2019, in Chongqing, China. Based on my experience, the text on the face of “Huawei” referring to “RAN WG1 meeting #98bis” identifies a 3GPP working group meeting and the text referring to “October 14-20, 2019, in Chongqing, China” identifies the date and location of that working group meeting. Thus, based on my personal knowledge and experience with ETSI’s and 3GPP’s standard business practices, this information tells me that “Huawei” was available either prior to or during or shortly after that meeting to 3GPP members, and to the general public.

81. According to the 3GPP website at <https://portal.3gpp.org/Meetings.aspx#/> which is shown by the screenshot below, the RAN WG1 meeting #98bis meeting held on October 14-20, 2019, in Chongqing, China was attended by 462 individuals (out of 585 registered participants)⁶:

⁶ The participant list of the RAN WG1 meeting #98bis meeting can be found in Appendix C.

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82. The document was distributed via the 3GPP_TSG_RAN_WG1 email exploder on November 1, 2019, as an attachment to an email from Zukang Shen from Huawei as shown in APPLE-1010. As of today, this email exploder has around 1497 subscribers, as can be seen by <https://list.etsi.org/scripts/wa.exe?INDEX>. I would expect a similar, or, only slightly lower, number of subscribers around November 2019.

83. Representatives of Samsung, Huawei, and Nokia will have received this email via the 3GPP_TSG_RAN_WG1 email exploder given that all companies active in 3GPP WGs are subscribed to the respective email exploders. E.g. the email shown in APPLE-1009 shows Aris Papasakellariou from Samsung, Sigen Ye from Nokia, and Yamping Xing from CATT as participants of this email thread, thus, they have been subscribed to the 3GPP_TSG_RAN_WG1 email exploder that time.

84. An archived version of the email shown in APPLE-1010 from shenzukang is accessible at https://list.etsi.org/scripts/wa.exe?A2=3GPP_TSG_RAN_WG1;21230e19.1911A&S=. The archived email shown in APPLE-1010 includes an attachment named “R1-19xxxxx R16 URLLC 212 v1.zip”. I accessed the archived version of the email shown in APPLE-1010 at the link above and downloaded the attachment named “R1-19xxxxx R16 URLLC 212 v1.zip” and the downloaded file had a size of 141 KB. A comparison of the size of the downloaded zip file to the attachment shown in APPLE-1010 reveals that the downloaded file has the same size as the file attached to the email shown in APPLE-1010. However, the size of a file is measured by the operating system that is used to store the file and it is common that identical files stored on different operating systems can have a different file size, as the file size is a function of the mathematical formula used by an operating system to calculate the file size in accordance with the file system used to organize

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files and the properties of the hard drive used to store the file. As a result, there may be some operating systems that result in a downloaded file having a similar, but different, file size than others.

85. I unzipped the downloaded file “R1-19xxxxxx R16 URLLC 212 v1.zip” to access a TDoc file named “R1-19xxxxxx R16 URLLC 212 v1.docx.” Based on my review of “R1-19xxxxxx R16 URLLC 212 v1.docx,” I can confirm that the file named “R1-19xxxxxx R16 URLLC 212 v1.docx” is a true and authentic copy of APPLE-1007.

86. The metadata for “R1-19xxxxxx R16 URLLC 212 v1.docx” confirms that the file is named “R1-19xxxxxx R16 URLLC 212 v1.docx,” that the file named “R1-19xxxxxx R16 URLLC 212 v1.docx” was created on “1. November 2019,” that the file named “R1-19xxxxxx R16 URLLC 212 v1.docx” was last modified on “1. November 2019,” and that the unzipped file size of the file named “R1-19xxxxxx R16 URLLC 212 v1.docx” was 160 KB. A screenshot of the metadata for the file named “R1-19xxxxxx R16 URLLC 212 v1.docx” is shown below.

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3GPP TSG-RAN WG1 Meeting #86bis - R1-19xxxxx
Chongqing, China, October 14-25, 2019

DRAFT CHANGE REQUEST

38.212 CR xxxx rev - Current version: 15.7.0

For **MSL2** on using this form, comprehensive instructions can be found at <http://www.3gpp.org/ChangeRequests>

Proposed change affects: UICC app ☐ ME ☒ Radio Access Network ☒ Core Network ☐

Title: Introduction of Physical Layer Enhancements for NR URLLC

Source to WG: Huawei

Source to TSG: R1

Work Item code: NR_L1enh_URLLC-Core | **Date:** 2019-10-28

Category: B | **Release:** Rel-16

Use one of the following categories:
A: Feature corresponding to a change in an earlier release.
B: Addition of feature.
C: Substantial modification of feature.
D: Informal modification.
Detailed explanations of the above categories can be found in 3GPP TR 38.300.

Use one of the following releases:
Rel-8 (Release 8)
Rel-9 (Release 9)
Rel-10 (Release 10)
Rel-11 (Release 11)
Rel-12 (Release 12)
Rel-13 (Release 13)
Rel-14 (Release 14)
Rel-15 (Release 15)
Rel-16 (Release 16)

Reason for change: Inclusion of Physical Layer Enhancements for NR URLLC

Summary of change: Support of Physical Layer Enhancements for NR URLLC

Consequences if not approved: Physical Layer Enhancements for NR URLLC will be incomplete

Clauses affected: 7.3.1, 7.3.1.1.2, 7.3.1.1.3 (new), 7.3.1.2.3 (new), 7.3.1.3.5 (new)

	Y	N
Other specs	X	
affected:	X	
(show related CRs)	X	

Other comments:

This CR's revision history:

< Unchanged parts are omitted >

7.3.1 DCI formats
The DCI formats defined in table 7.3.1-1 are supported.
Table 7.3.1-1: DCI formats

R1-19xxxxx R16 URLLC 212

v1.docx

160 KB

Information

Created 1. November 2019 at 18:02

Modified 1. November 2019 at 18:02

87. As explained in paragraph 42 above, any member of the public would have been able to receive 3GPP emails via the 3GPP email exploders as of the date and time the email was sent. Furthermore, in addition to receiving such emails any member of the public would have been able to access all emails via the 3GPP

email archive at list.etsi.org. As mentioned in paragraph 47, it is my opinion that emails were accessible via the archive immediately after they have been sent.

88. In my opinion, an attachment to an email sent via the 3GPP email exploder would have been available to the public as of at least the date shown in the header of an email sent via the 3GPP email exploder and displayed in the 3GPP archive at list.etsi.org.

89. The last modified date is consistent with the November 1, 2019, date of the email distribution, and the standard business practice among 3GPP participants to make documents available shortly after completing them.

90. Thus, based on my personal knowledge and experience with ETSI's and 3GPP's standard business practices, APPLE-1007 is an authentic copy of "Huawei" that was shared via the public 3GPP email exploder, and made accessible via the 3GPP email archive to the general public by November 1, 2019, at the latest.

3. 3GPP TS 38.213 V15.7.0

91. Based on my personal knowledge and my review of 3GPP's business records, I recognize APPLE-1005 as a true and correct copy of version 15.7.0 of technical specification 3GPP TS 38.213 ("Technical Specification Group Radio Access Network; NR; Physical layer procedures for control (Release 15)"), which

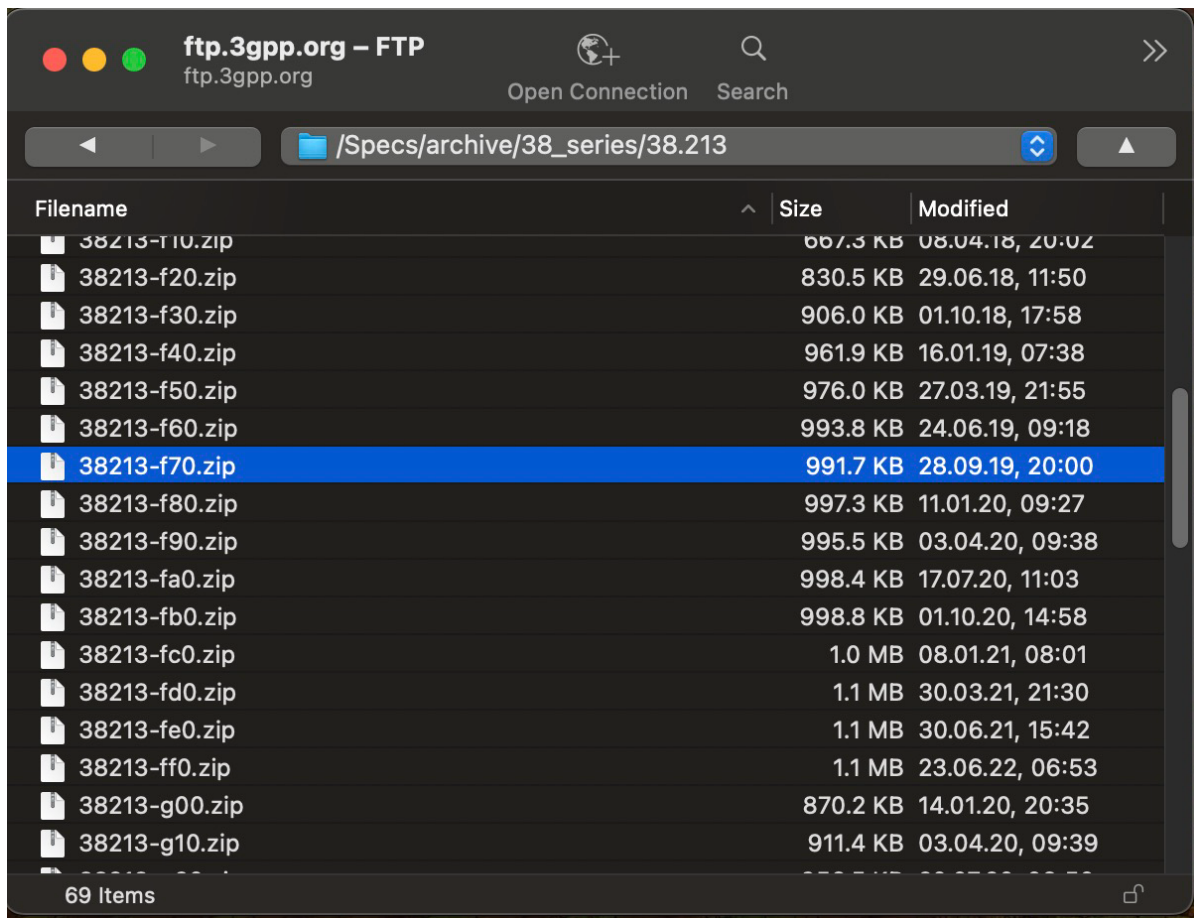
Declaration of Friedhelm Rodermund

shows on its cover page “2019-09” as the year (2019) and month (September) during which this document was released by 3GPP.

92. The document was published and freely available on 3GPP’s ftp server by September 28, 2019. This is confirmed by the date stamp shown on the historic 3GPP ftp server for the corresponding downloadable file (“38213-f70.zip”), as maintained by the Internet Archive at

http://web.archive.org/web/20200315043318/https://www.3gpp.org/ftp/Specs/archive/38_series/38.213/. This information is also shown on the date stamp for the present-day listing of the same document on the 3GPP ftp server at

https://www.3gpp.org/ftp/Specs/archive/38_series/38.213, as shown by the screen shot below:

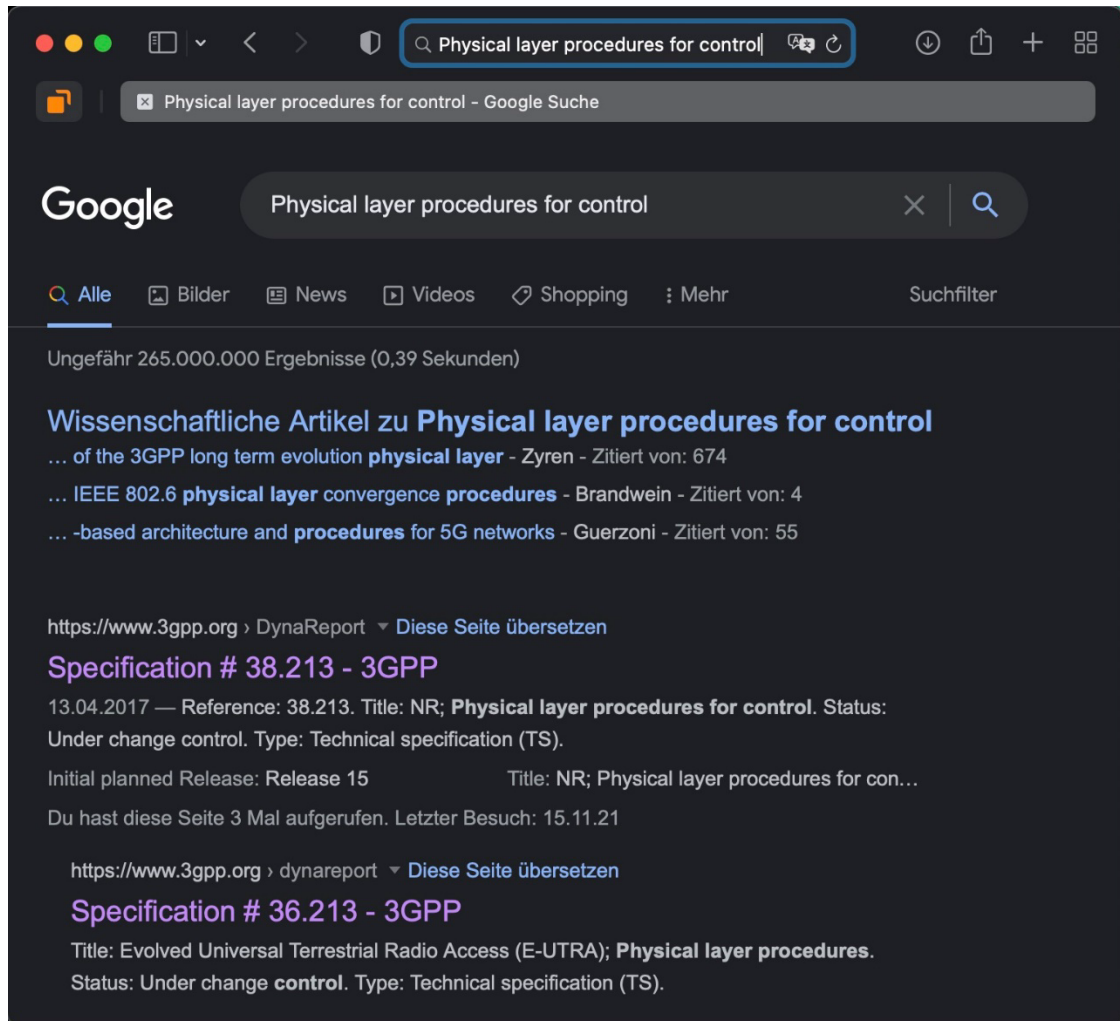


93. In addition, metadata information for the downloaded and extracted specification file states a last Modified date of “25. September 2019”, as shown in the screenshot below:

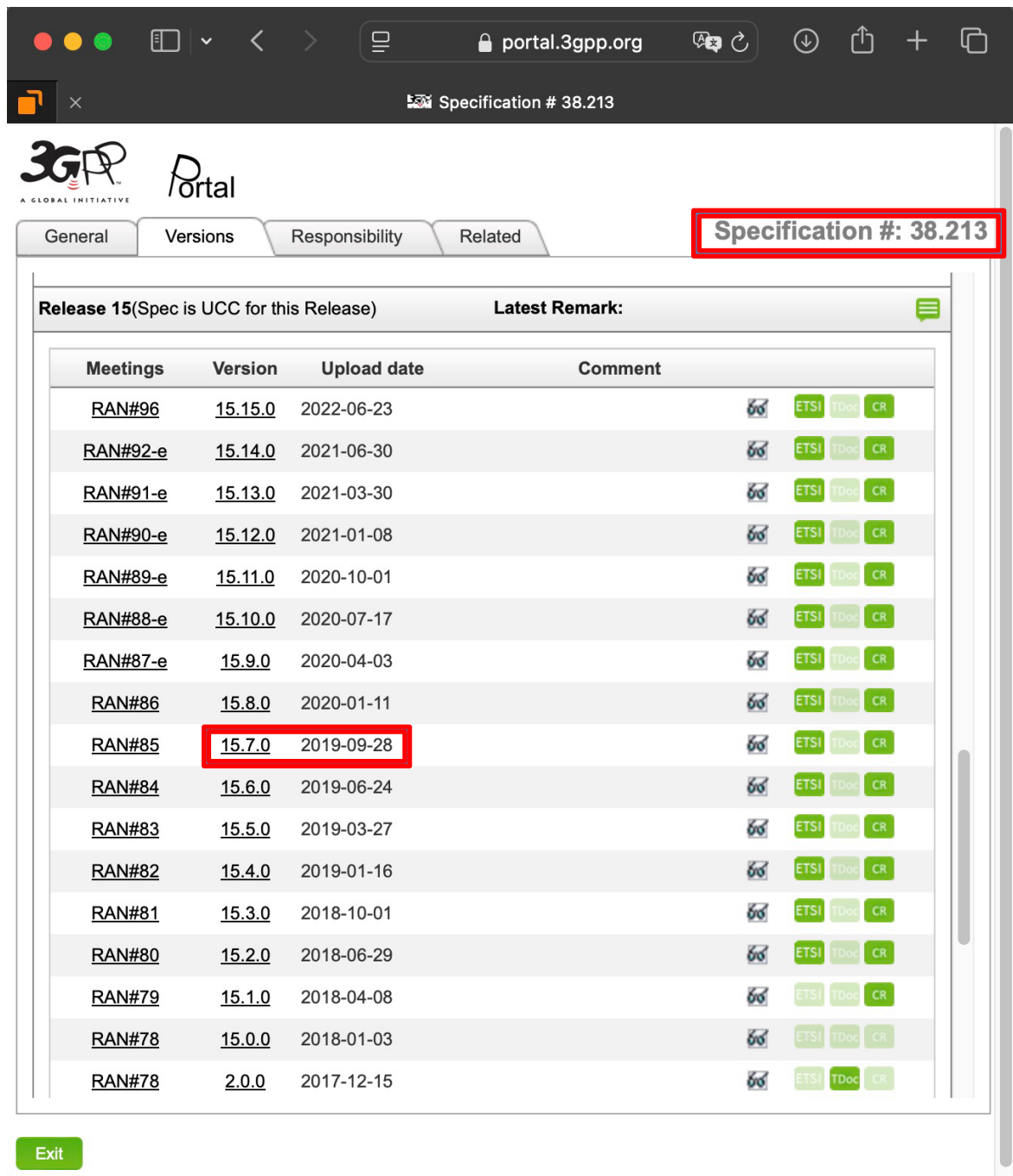
Declaration of Friedhelm Rodermund

94. This last modified date well aligned with the September 28, 2019, upload date of the document, and the standard business practice among 3GPP participants to upload submissions shortly after completing them.

95. I believe that a person without prior knowledge of 3GPP and/or the technical specification (TS) number would have been able to easily find the TS for download via internet search. For instance, a Google search for “Physical layer procedures for control” provides the TS number “38.213” as one of the top results as can be seen in the screenshot below:



96. Following the provided search result link “Specification # 38.213” leads to a 3GPP web page offering under the tab “Versions” download links to all versions of TS 38.213 including version 15.7.0, as shown by the screenshot below:



portal.3gpp.org

Specification # 38.213

3GPP Portal

General Versions Responsibility Related

Specification #: 38.213

Release 15(Spec is UCC for this Release) Latest Remark:

Meetings	Version	Upload date	Comment
RAN#96	15.15.0	2022-06-23	
RAN#92-e	15.14.0	2021-06-30	
RAN#91-e	15.13.0	2021-03-30	
RAN#90-e	15.12.0	2021-01-08	
RAN#89-e	15.11.0	2020-10-01	
RAN#88-e	15.10.0	2020-07-17	
RAN#87-e	15.9.0	2020-04-03	
RAN#86	15.8.0	2020-01-11	
RAN#85	15.7.0	2019-09-28	
RAN#84	15.6.0	2019-06-24	
RAN#83	15.5.0	2019-03-27	
RAN#82	15.4.0	2019-01-16	
RAN#81	15.3.0	2018-10-01	
RAN#80	15.2.0	2018-06-29	
RAN#79	15.1.0	2018-04-08	
RAN#78	15.0.0	2018-01-03	
RAN#78	2.0.0	2017-12-15	

Exit

97. The above example search illustrates that it is very easy for an interested member of the public without prior knowledge of the TS number and even without prior knowledge of 3GPP to locate any version of TS 38.213, including version 15.7.0, for download.

98. The above search was performed at the time of writing this report. According to my personal experience, in September 2019 or around that timeframe it would have been similarly straightforward to locate a path to download version 15.7.0 of TS 38.213.

99. Thus, based on my personal knowledge and experience with ETSI's and 3GPP's standard business practices, this information tells me that this document was available to all 3GPP members and the general public by September 28, 2019, at the latest.

V. AVAILABILITY FOR CROSS-EXAMINATION

100. 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.

Declaration of Friedhelm Rodermund

A. Right To Supplement

101. 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.

B. Signature

102. 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.

103. I declare under penalty of perjury that the foregoing is true and correct.

Dated: April 29, 2025



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 including ETSI and 3GPP standards such as 5G and 6G, and OMA Lightweight M2M (LwM2M).

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 filing e.g. for 5G and 6G
 - Prior art research, essentiality assessment, patent infringement analysis related to litigations and validity actions
 - Advising on IP strategy
 - Advising on Standards Development Organisations (SDO) e.g. ETSI and 3GPP working processes and IPR policy
 - Conducting seminar on Standards Essential Patents (SEPs) for the Internet of Things at the Technical University of Ilmenau, Germany
 - 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

CURRICULUM VITAE

- 01/2011 – 10/2014 Vodafone Germany / Vodafone Group R&D Düsseldorf, Germany**
- Senior Standards Strategist
- 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. smart metering
 - 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
- 01/2009 – 12/2010 Vodafone Germany Düsseldorf, Germany**
- Vice Chairman Open Mobile Alliance (OMA) Device Management (DM)
- 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
- 01/2005 – 12/2008 Vodafone Germany Düsseldorf, Germany**
- Project Manager Mobile Broadcast Standards
- 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) BCAST working group
 - Initiated and managed the BCAST 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)
- 04/2003 – 12/2003 GSM Association London, United Kingdom**
- Member of the MMS Task Force
- 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
- 06/1998 – 12/2004 European Telecommunications Standards Institute (ETSI) Sophia Antipolis, France**
- 01/2002 – 12/2004: Secretary 3GPP Technical Specifications Group "Terminals" and Terminals Working Group 2 "Terminal Services and Capabilities"

CURRICULUM VITAE

01/1999 – 12/2001: Secretary 3GPP Terminals Working Group 2 “Terminal Services and Capabilities” and GERAN 3 “Base Station Testing”

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

- 2024
Pantech Corporation v. Oppo Mobile Telecommunications Corp., Ltd.
Inter Partes Review matters
On behalf of Oppo
Counsel: Bayes PLLC
Role: Expert witness and consulting services
- 2024
Pantech Corp. et al. v. LG Electronics Inc. et al.
Civil Action No. 5:22-cv-00113-RWS-JBB (E.D.Tx.)
On behalf of LG Electronics
Counsel: Ropes & Gray LLP
Role: Expert witness and consulting services
- 2024
Ericsson v. Lenovo
Inter Partes Review matters
On behalf of Lenovo
Counsel: Kirkland & Ellis LLP
Role: Expert witness and consulting services
- 2024
Pantech Corp. et al. v. OnePlus Technology Co., Ltd.
Civil Action No. 5:22-cv-00069-RWS (E.D.Tx.)
On behalf of OnePlus
Counsel: Leydig, Voit & Mayer, Ltd.
Role: Expert witness and consulting services
- 2024
G+ Communications, LLC, v. Samsung Electronics Co., Ltd.
Civil Action No. 2:22-CV-78 (E.D.Tx.)
On behalf of Samsung
Counsel: Fish&Richardson P.C.
Role: Expert witness and consulting services
- 2023
Unified Patents, LLC v. Helios Streaming LLC
Inter Partes Review matters
On behalf of Unified Patents
Counsel: Akin
Role: Expert witness and consulting services
- 2023
Unified Patents, LLC v. SLS Manager Technologies
Inter Partes Review matters
On behalf of Unified Patents
Counsel: Unified Patents
Role: Expert witness and consulting services
- 2023
Headwater Research LLC v. Samsung Electronics Co., Ltd.
Inter Partes Review matters
On behalf of Samsung
Counsel: Fish&Richardson P.C.
Role: Expert witness and consulting services
- 2023

CURRICULUM VITAE

- Pantech Corp. et al. v. LG Electronics Inc. et al.
Inter Partes Review matters
On behalf of LG Electronics
Counsel: Ropes & Gray LLP
Role: Expert witness and consulting services
- 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
Huawei Technologies Co., Ltd. v. MediaTek Inc.
Inter Partes Review matters
On behalf of MediaTek
Counsel: Finnegan, Henderson, Farabow, Garrett & Dunner, L.L.P.
Role: Expert witness and consulting service
- 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

CURRICULUM VITAE

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
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

CURRICULUM VITAE

- 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.
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

CURRICULUM VITAE

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
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

CURRICULUM VITAE

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
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. PUBLICATIONS (selection)

- "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

Declaration of Friedhelm Rodermund

Appendix	Description
A	Curriculum Vitae of Friedhelm Rodermund
B	List of Appendices
C	Participant list of the RAN WG1 meeting #98bis meeting

Appendix C

TTITLE	Family Name	Given Name	Role	Email	Employer Organization	Employer Co	Employer Sts Organization	Represented	Organization	Attended
Mr.	Abdelghaffar	Muhammad	Delegate	mabdelgh@qti.qualcomm.com	Qualcomm Incorporated	ATIS	3GPPMEMBE QUALCOMM Europe Inc. - Italy	3GPPMEMBE Y	ETSI	3GPPMEMBE Y
Mr.	Adhikari	Shubhodeep	Delegate	shubhodeep.adhikari@broadcom.com	BROADCOM CORPORATION	ETSI	3GPPMEMBE BROADCOM CORPORATION	3GPPMEMBE Y	ETSI	3GPPMEMBE Y
Dr.	Ahmedi	Sasan	Delegate	sasana@xilinx.com	XILINX Ireland	ETSI	3GPPMEMBE Xilinx Ireland	3GPPMEMBE Y	ETSI	3GPPMEMBE Y
Mr.	Ahmadzadeh	Arnan	Delegate	arnan.ahmadzadeh@lis.fraunhofer.de	Fraunhofer IIS	ETSI	3GPPMEMBE Fraunhofer IIS	3GPPMEMBE Y	ETSI	3GPPMEMBE Y
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