**Source: MBS SWG Chairman[[1]](#footnote-1)**

**Title: Report of SA4 Rel-18 Workshop (17th August 2021)**

**Document for: Information**

**Agenda Item: 20**

### SA4 Rel-18 Workshop

The following is a meeting report prepared by Mr. Thomas Stockhammer (Qualcomm) and only slightly edited by the SA4 chair.

# 1 Opening of the meeting

Mr. Frédéric Gabin (Dolby, SA4 Chair) opens the workshop on August 17th, 2021 at 15:00 CEST and welcomed the delegates.

Thomas Stockhammer is assigned as scribe.

The minutes are shared online: [SA4-3GPP SA4 Rel-18 e-Workshop](https://docs.google.com/document/d/1y_d0VAora33YT1456U2ZYaYnp-PJhp7YNesBqUWDM_c/edit?usp=sharing).

# 2 Opening Remarks by the SA4 Chair

1. This workshop is adhoc in nature and will be held in electronic mode on 17th August,Tuesday from 15:00 hrs to 18:00 hrs CEST via GotoMeeting (GTM) sessions only.

(Note: Participation in this workshop does not count for voting rights in SA4 elections.)

1. Registration before **Friday August 13, 12:00 hrs (noon) CEST** is mandatory for participation in any part of the meeting. Else, you might not receive the GTM link for participation in the workshop.
2. The deadline for request and submission of contributions is **Friday August 13, 12:00 hrs (noon) CEST**. Contributions uploaded after this time will be regarded as **“late”** and will only be presented after all on-time contributions are treated during the meeting.
3. An IM of 3GPP can contribute **only** **one** contribution on their own, but can co-sign several multi-company contributions.
4. MRPs / Vertical Organizations can be named as contributors, but in those cases it is required that at least one 3GPP IM (Individual Member) company co-signs such contributions.
5. Contribution’s presentation & Q&As time will be a maximum of 10 minutes. This might change if we see that the amount of contributions exceeds the available time.
6. **This ad hoc workshop has no decision power**.
7. Recording of the GoToMeeting session is discouraged. No individual or entity - including the speakers and/or the authors -may electronically record any portion of the meeting without prior written consent of the Chair and all the meeting participants.

# 3 Reminders for usage of IT resources, IPR declaration and antitrust compliance

The chair read the IPR declaration and antitrust compliance statements.

Available in <https://www.3gpp.org/ftp/tsg_sa/WG4_CODEC/TSGS4_115-e/Docs/S4-211044.zip>

# 4 Approval of Agenda

The following documents were registered:

|  |  |  |
| --- | --- | --- |
| TDoc | Title | Source |
| [S4WS-210001](https://www.3gpp.org/ftp/TSG_SA/WG4_CODEC/SA4_Workshops/Rel18_WS_Aug2021/Docs/S4WS-210001.zip) | Agenda for the SA4 Rel-18 Workshop on August 17, 2021 | Dolby Laboratories Inc. |
| [S4WS-210002](https://www.3gpp.org/ftp/TSG_SA/WG4_CODEC/SA4_Workshops/Rel18_WS_Aug2021/Docs/S4WS-210002.zip) | ITT4RT and possible next steps for RL18 | KPN N.V., Nokia Corporation |
| [S4WS-210003](https://www.3gpp.org/ftp/TSG_SA/WG4_CODEC/SA4_Workshops/Rel18_WS_Aug2021/Docs/S4WS-210003.zip) | On media delivery in Rel-18 | BBC |
| [S4WS-210004](https://www.3gpp.org/ftp/TSG_SA/WG4_CODEC/SA4_Workshops/Rel18_WS_Aug2021/Docs/S4WS-210004.zip) | Views on Rel-18 | Dolby Laboratories Inc. |
| [S4WS-210005](https://www.3gpp.org/ftp/TSG_SA/WG4_CODEC/SA4_Workshops/Rel18_WS_Aug2021/Docs/S4WS-210005.zip) | Quality Metric for XR in R18 | HUAWEI Technologies Japan K.K. |
| [S4WS-210006](https://www.3gpp.org/ftp/TSG_SA/WG4_CODEC/SA4_Workshops/Rel18_WS_Aug2021/Docs/S4WS-210006.zip) | Tencent Vision on Release 18 priorities | Tencent |
| [S4WS-210007](https://www.3gpp.org/ftp/TSG_SA/WG4_CODEC/SA4_Workshops/Rel18_WS_Aug2021/Docs/S4WS-210007.zip) | 5G-MAG Proposals for 3GPP SA/SA4 Rel-18 | 5G MAG, ESA, Qualcomm, Saankhya Labs, ONE Media 3.0, EBU, BBC |
| [S4WS-210008](https://www.3gpp.org/ftp/TSG_SA/WG4_CODEC/SA4_Workshops/Rel18_WS_Aug2021/Docs/S4WS-210008.zip) | Samsung view on SA4 Rel-18 roadmap | Samsung R&D Institute UK |
| [S4WS-210009](https://www.3gpp.org/ftp/TSG_SA/WG4_CODEC/SA4_Workshops/Rel18_WS_Aug2021/Docs/S4WS-210009.zip) | 3GPP SA4 Rel-18 Priorities | QUALCOMM Europe Inc. - Spain |

|  |  |  |
| --- | --- | --- |
| [S4WS-210001](https://www.3gpp.org/ftp/TSG_SA/WG4_CODEC/SA4_Workshops/Rel18_WS_Aug2021/Docs/S4WS-210001.zip) | Agenda for the SA4 Rel-18 Workshop on August 17, 2021 | Dolby Laboratories Inc. |

Agenda was **approved.**

# 5 Contributions/Reports if any, from SA4 SWG Chairpersons

none

# 6 Proposals for Release 18

|  |  |  |
| --- | --- | --- |
| [S4WS-210002](https://www.3gpp.org/ftp/TSG_SA/WG4_CODEC/SA4_Workshops/Rel18_WS_Aug2021/Docs/S4WS-210002.zip) | ITT4RT and possible next steps for RL18 | KPN N.V., Nokia Corporation |

**Presenter**: Simon Gunkel (KPN)

**Discussion**:

* Nikolai: Thank you for the presentation. Interesting work done in ITT4RT. Appreciated seeing work done on ITT4RT and ideas on extensions for XR and AR. We do not see any commercial pick up of ITT4RT as a commercial service. The extension MTSI is not really what we see is happening. It is more that third party services require integration into 5G environments. Should follow the 5GMSA approach. Much more collaboration that operator vertical services. Any commercial interest
  + Igor: Slide 3 mentions TS 26.114, but we do not see that we want to do this in TS 26.114 context. We are open to do it in other environments as long as the functionalities are available
* Thomas: Does this connect to STAR? There is only a single use case mentioned, but does not connect to the STAR developments and there is a detailed architecture in STAR with expected conclusions.
  + Igor: yes, this the case, we were just brief
  + Simon: Yes, we would like to connect STAR?
* Jaeyeon: Is there a specific reason why there is one work item proposed for ITT4XR?
  + Simon: we were slow, so we need to pick a subset of pieces.

|  |  |  |
| --- | --- | --- |
| [S4WS-210003](https://www.3gpp.org/ftp/TSG_SA/WG4_CODEC/SA4_Workshops/Rel18_WS_Aug2021/Docs/S4WS-210003.zip) | On media delivery in Rel-18 | BBC |

**Presenter**: Richard Bradbury (BBC)

**Discussion**:

* Thorsten: Have you found anything missing for radio services?
  + Richard: not sure yet, if there anything missing. Radio as a service is important. But there could be cases that things could be done differently.
* Thomas: Is there a set of service requirements for radio services? For example, public warning, or a full service layer such as DAB+?
  + Richard:
    - Unless there is a full service layer, it may not be useful. But maybe a gap analysis is needed. DAB+ would be interesting, or RadioDNS and so on
    - On public warning, it is likely more an SA1 requirement topic
* Ravi: We did a lot of work on MBMS. Offering TV services over precious operator spectrum has failed. What is the difference now? And what about linear TV services – they are no longer prevalent. On-demand much more
  + Richard: good questions. However, live events is still very popular. For radio, some analysis done as well, there are benefits. 80%+ of BBC TV services are still consumed via linear.
  + On the spectrum, there is some irony that this was owned by the broadcasters and now given to MNOs. We should just create the tools such that content providers have the ability to deploy
  + On MBMS failure what went wrong it is hard to judge, but having tools is good.
* Thomas: On Receive only and FTA, there is some ambiguity on the terminology. I refer to 5G-MAG presentation for discussion
* Thomas: On 5GMS and AV Production, we consider that 5GMS is more on contribution. Production is more stage-connection topics.
  + Richard: understand confusion. We are specifically interested here in enhancing uplink in studio or outside broadcast for uncompressed camera and microphone feeds.
  + But agree that contribution relates more to uplink 5GMS, and it would be good to enhance this too.

|  |  |  |
| --- | --- | --- |
| [S4WS-210004](https://www.3gpp.org/ftp/TSG_SA/WG4_CODEC/SA4_Workshops/Rel18_WS_Aug2021/Docs/S4WS-210004.zip) | Views on Rel-18 | Dolby Laboratories Inc. |

**Presenter**: Brian Lee (Dolby)

**Discussion**:

* James: Overall item on list align with our priorities. For SA2 work items there are similar work and study items proposed. From marketing and commercial perspective, we would like to see a framework for certain capabilities to support XR to support a system framework. This applies on server side, core and RAN, but also on the UE. The last slides captures lot’s of this.

|  |  |  |
| --- | --- | --- |
| [S4WS-210005](https://www.3gpp.org/ftp/TSG_SA/WG4_CODEC/SA4_Workshops/Rel18_WS_Aug2021/Docs/S4WS-210005.zip) | Quality Metric for XR in R18 | HUAWEI Technologies Japan K.K. |

**Presenter**: Qi Pan (Huawei)

**Discussion**:

* Thorsten: On the XQI, I saw some related discussion with SA2. But B-frames and P-frames are not exposed. If you use TCP they are recovered. May also be secured for privacy reasons. Discarding may be counterproductive, more studies needed.
  + Qi: Security we think we will not use the exact frame content. We just need to know the type of the frame. TCP recovery is not the case. We only focus on real-time XR. Many use RTP, so there is no recovery.
  + Thorsten: may also use retransmission.
  + Spencer: I have been contributing in FS\_5GMS-EXT on the “new transports” key issue, but we are limited to what is available for the QUIC and HTTP/3 protocols in the Rel-17 timeframe. But in the Rel-18 timeframe, I expect that we will have Qlog schemas for at least the QUIC protocol - the QUIC working group has already adopted drafts on that, and the intention is to develop an HTTP/3 schema as well. If we only have the QUIC Qlog schema in Rel-18, that would still provide a huge amount of information on the network impact on performance that TCP-based endpoints have never been able to know, or to share. We can study this for Rel-18. (Pointer to Qlog presentation is here: <https://datatracker.ietf.org/meeting/111/materials/slides-111-quic-qlog-00.pdf>. Drafts are at <https://datatracker.ietf.org/wg/quic/documents/> (search for -qlog- in filenames).
* Imed: What I see here is not new. Did all the work for MTSI and RTP streaming. Regular 2D coding – we should first understand the media types before defining QoE. More a comment that a question
* Iraj: examples are applicable for 2D video. Why only for XR? Would it more extensions to QoE metrics?
  + Qi: 2D or 3D videos, we believe the parameters can both be useful for measuring the network transmission impact.
* Thomas: My question was discussed. We should not have the cart in front of the horse. Let's do the protocols and media first
* Ryan: I was almost overtaken by others too. It's okay

|  |  |  |
| --- | --- | --- |
| [S4WS-210006](https://www.3gpp.org/ftp/TSG_SA/WG4_CODEC/SA4_Workshops/Rel18_WS_Aug2021/Docs/S4WS-210006.zip) | Tencent Vision on Release 18 priorities | Tencent |

**Presenter**: Iraj Sodagar (Tencent)

**Discussion**:

* Thomas: low-latency needs to be carefully checked. We should not just throw numbers, but quantify clearly what this means
  + Iraj: Something like 1s, not necessarily 5 to 10ms.
  + Thomas: More questions, but defer to offline

|  |  |  |
| --- | --- | --- |
| [S4WS-210007](https://www.3gpp.org/ftp/TSG_SA/WG4_CODEC/SA4_Workshops/Rel18_WS_Aug2021/Docs/S4WS-210007.zip) | 5G-MAG Proposals for 3GPP SA/SA4 Rel-18 | 5G MAG, ESA, Qualcomm, Saankhya Labs, ONE Media 3.0, EBU, BBC |

**Presenter**: Jordi J. Gimenez (5G-MAG)

**Discussion**:

* James: Are there any details on system enhancements for XR?
  + Jordi: We do not have any particular requirements, but we want this in general for production.
* Thomas: thank you, we support this as we are contributors. I want to specifically highlight the definition of Universal Access, which is interesting and good, but importantly it is technology agnostic.

|  |  |  |
| --- | --- | --- |
| [S4WS-210008](https://www.3gpp.org/ftp/TSG_SA/WG4_CODEC/SA4_Workshops/Rel18_WS_Aug2021/Docs/S4WS-210008.zip) | Samsung view on SA4 Rel-18 roadmap | Samsung R&D Institute UK |

**Presenter**: Jaeyeon Song (Samsung)

**Discussion**:

* Fred: Jaeyeon, you used all your time ;) (no time for Q&As unfortunately)

|  |  |  |
| --- | --- | --- |
| [S4WS-210009](https://www.3gpp.org/ftp/TSG_SA/WG4_CODEC/SA4_Workshops/Rel18_WS_Aug2021/Docs/S4WS-210009.zip) | 3GPP SA4 Rel-18 Priorities | QUALCOMM Europe Inc. - Spain |

**Presenter**: Nikolai Leung (Qualcomm)

**Discussion**:

* James: two aspects that are very important is the service framework. To enable certain components and the media service enablers are really great. Hard for standards people to think like this - good.
* Tomas: Are you concerned from QC that IVAS slips or a general concern?
  + Nik: We just mention this to be realistic. No special concerns.

# 7 Way Forward - a short summary of this proceeding

Verbal summary from chair

* Media Distribution enhancements
  + - Universal Access / FTA
    - Hybrid/Unicast/Broadcast/Multicast improvements as appropriate
    - Enhancing quality of traditional media (i.e. 2D video)
* Uplink enhancements
  + - A/V Production
    - Media Contribution
* Immersive media types definition
  + - IVAS (including MTSI/System support and ATIAS)
    - Volumetric video
    - Haptics
    - AI-based media enhancements
    - Metrics for these new media types
* XR (AR/VR/MR and Cloud Gaming) Services
  + - Should not be limited to MTSI managed/Vertical services.
    - Should enable collaboration between MNOs and SPs, support OTT services in 5G, follow 5G Media streaming example
    - Desire for a unique framework to support all such new services.
    - Unique framework proposed: 5G-RTC architecture
* New approaches for SA4
  + - Make sure we focus on commercially relevant features
    - Tooling/Software support, for example 5G-MAG
* Invitation for offline coordination
* Will create offline summary for meeting starting tomorrow. Will also form the baseline for SA Rel-18 Workshop presentation

# 8 Any Other Business

Fred:

* Many thanks to Jaeyeon for preparing and having such a great idea of the workshop
* Many thanks to all submitters and presenters and commentors

Jaeyeon:

* thank you as well
* We hope to repeat, please see suggestions on our slides for working procedures

Thomas:

* Thanks to Jaeyeon for kicking off this idea
* This type of discussion is exactly what we are missing by the lack of meeting f2f. I would like to go out a beer with you guys now and discuss the details and come up with next steps and plans. Unfortunately, this is not possible, but if we go back f2f, I would much prefer this type of exchange of information being done in f2f than regular day to day business. We should repeat this, preferably on f2f.

Lot’s of reactions on chat:

* Apple — Dave Singer to Everyone: Many thanks to all the presenters. Lots to think about, much appreciated
* Ericsson - Harald Pobloth to Everyone: Thanks very useful and informative
* Dolby - Brian Lee to Everyone: Same here. Thank you all.
* 5G-MAG - Jordi Gimenez to Everyone: Thank you very much. Very useful and comprehensive.
* HUAWEI--Qi Pan to Everyone: many thanks.
* Nokia - Igor Curcio to Everyone: Thanks for all inputs presented.
* AT&T - James Hu to Everyone: very useful inputs and discussions. Thank you all!
* Apple — Dave Singer to Everyone: we could/should look at ways to improve both work-modes (email is not a good tool, we miss an online calendar) and discussion tools for this kind of social conversation
* Qualcomm - Nikolai Leung to Everyone: Thank you all for the input and for the chance to share our perspectives. We look forward to any offline discussions to identify ways to collaborate on many common goals/objectives.
* Tencent - Spencer Dawkins to Everyone: I think that so many people have access to (even free) conferencing tools that we could also be holding video bar sessions ....

# 9 Closing of the Meeting

# The meeting was closed on Tuesday August 17 at 17:57 hrs CEST.

# 10 Attendees

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| TITLE | Family Name | Given Name | Role | Email | Employer Organization | Employer Category Code |
| Ms. | Ahsan | Saba | Delegate | saba.ahsan@nokia.com | Nokia Corporation | ETSI |
| Dr. | Aoki | Shuichi | Delegate | aoki.s-ha@nhk.or.jp | NHK | ARIB |
| Mr. | Aracena | Mauricio | Delegate | Mauricio.Aracena@ericsson.com | Ericsson LM | ETSI |
| Dr. | Bouazizi | Imed | Delegate | bouazizi@qti.qualcomm.com | Qualcomm Incorporated | ATIS |
| Dr. | Bradbury | Richard | Delegate | richard.bradbury@rd.bbc.co.uk | BBC | ETSI |
| Dr. | Bruhn | Stefan | Vice Chair | stefan.bruhn@dolby.com | Dolby Laboratories Inc. | ETSI |
| Dr. | Budagavi | Madhukar | Delegate | m.budagavi@samsung.com | Samsung Research America | ATIS |
| Mr. | Burdinat | Christophe | Delegate | c.burdinat@ateme.com | ATEME | ETSI |
| Mr. | Burman | Bo | Delegate | bo.burman@ericsson.com | Ericsson LM | ETSI |
| Dr. | Chan | Yee Sin | Delegate | yeesinchan@fb.com | Facebook | ETSI |
| Dr. | Chen | Lulin | Delegate | lulin.chen@mediatek.com | MediaTek Inc. | ETSI |
| Dr. | Curcio | Igor | Delegate | igor.curcio@nokia.com | Nokia Corporation | ETSI |
| Mr. | Dadas | Mohammed | Delegate | mohammed.dadas@orange.com | Orange | ETSI |
| Mr. | Dawkins | Spencer | Delegate | sdawkins@tencent.com | Tencent | CCSA |
| Mr. | De Bont | Frans | Delegate | frans.de.bont@philips.com | Philips International B.V. | ETSI |
| Mr. | Edwards | Robert | Delegate | rob.edwards@matrixx.com | Matrixx | ETSI |
| Dr. | Ehara | Hiroyuki | Delegate | ehara.hiroyuki@jp.panasonic.com | Panasonic Corporation | ARIB |
| Dr. | FOURDEUX | Henri | Delegate | henri.fourdeux@interdigital.com | InterDigital France R&D, SAS | ETSI |
| Mr. | Gabin | Frederic | Chair | Frederic.Gabin@dolby.com | Dolby Laboratories Inc. | ETSI |
| Mr. | Gibellino | Diego | Delegate | diego.gibellino@telecomitalia.it | TELECOM ITALIA S.p.A. | ETSI |
| Dr. | Gimenez | Jordi J. | Delegate | gimenez@ebu.ch | EBU | ETSI |
| Mr. | Gu | Xiaojun | Delegate | guxiaojun1@huawei.com | HUAWEI TECHNOLOGIES Co. Ltd. | ETSI |
| Mr. | Gunkel | Simon | Delegate | simon.gunkel@tno.nl | TNO | ETSI |
| Dr. | Han | Jae-Shin | Delegate | jaeshin.han@lge.com | LG Electronics Inc. | TTA |
| Mr. | Heikkilä | Gunnar | Delegate | gunnar.heikkila@ericsson.com | Ericsson LM | ETSI |
| Dr. | Hellge | Cornelius | Delegate | cornelius.hellge@hhi.fraunhofer.de | Fraunhofer HHI | ETSI |
| Dr. | Hu | James | Delegate | qh8316@att.com | AT&T GNS Belgium SPRL | ETSI |
| Mr. | Jansson Toftgård | Tomas | Delegate | tomas.toftgard@ericsson.com | Ericsson LM | ETSI |
| Dr. | Jelinek | Milan | Delegate | Milan.Jelinek@USherbrooke.ca | VoiceAge Corporation | ETSI |
| Dr. | Joshi | Rajan | Delegate | r.joshi@samsung.com | Samsung Research America | ATIS |
| Dr. | Jung | Kyunghun | Delegate | kyunghun@fb.com | Facebook | ETSI |
| Dr. | Kim | Hyunsook | Delegate | hyuns.kim@lge.com | LG Electronics Inc. | TTA |
| Dr. | Kim | Wuk | Delegate | wuk.kim@samsung.com | Samsung R&D Institute UK | ETSI |
| Dr. | Kolan | Prakash | Delegate | p.kolan@samsung.com | Samsung Research America | ATIS |
| Mr. | Kwon | WooSuk | Delegate | woosuk.kwon@lge.com | LG Electronics Inc. | TTA |
| Mr. | Laaksonen | Lasse | Delegate | lasse.j.laaksonen@nokia.com | Nokia Corporation | ETSI |
| Mr. | Lair | Yannick | Delegate | yannick.lair@nokia.com | Nokia France | ETSI |
| Dr. | Lee | Brian | Delegate | brian.lee@dolby.com | Dolby Laboratories Inc. | ETSI |
| Dr. | Lee | Hakju Ryan | Delegate | hakju00.lee@samsung.com | Samsung R&D Institute UK | ETSI |
| Mr. | Lemotheux | Julien | Delegate | julien.lemotheux@orange.com | Orange | ETSI |
| Mr. | Leung | Nikolai | Subgroup chair | nleung@qti.qualcomm.com | Qualcomm CDMA Technologies | ETSI |
| Miss | LI | QIUTING | Delegate | li.qiuting@zte.com.cn | ZTE Corporation | ETSI |
| Mr. | Libunao | Gerardo | Delegate | gerry.libunao@verizon.com | Verizon UK Ltd | ETSI |
| Mrs. | Liu | Yan | Delegate | scarlett.liuyan@huawei.com | HUAWEI TECHNOLOGIES Co. Ltd. | ETSI |
| Mr. | Lo | Charles | Delegate | clo@qti.qualcomm.com | Qualcomm CDMA Technologies | ETSI |
| Dr. | Lohmar | Thorsten | Delegate | Thorsten.Lohmar@ericsson.com | Ericsson LM | ETSI |
| Mr. | Ma | Liangping | Delegate | lpma@qti.qualcomm.com | QUALCOMM Europe Inc. - Italy | ETSI |
| Mrs. | Martin-Cocher | Gaelle | Delegate | gaelle.martin-cocher@interdigital.com | InterDigital, Europe, Ltd. | ETSI |
| Mr. | Mayer | Georg | Delegate | georg.mayer@huawei.com | HuaWei Technologies Co., Ltd | CCSA |
| Mr. | Morita | Naotaka | Delegate | naotaka.morita@ntt-at.co.jp | NTT | TTC |
| Dr. | Moriya | Takehiro | Delegate | takehiro.moriya.vn@hco.ntt.co.jp | NTT | TTC |
| Mr. | Multrus | Markus | Delegate | markus.multrus@iis.fraunhofer.de | Fraunhofer IIS | ETSI |
| Mr. | Niang | Mamadou M. | Delegate | mamadou.niang@verizonwireless.com | Verizon UK Ltd | ETSI |
| Dr. | Oh | Sejin | Delegate | sejin.oh@dolby.com | Dolby Laboratories Inc. | ETSI |
| Dr. | Pan | Qi | Delegate | panqi8@huawei.com | HUAWEI Technologies Japan K.K. | ARIB |
| Mr. | Patry | Frank | Delegate | fpatry@omnispace.com | Omnispace | ATIS |
| Mr. | Plante | Fabrice | Delegate | fplante@apple.com | Apple Italia S.R.L. | ETSI |
| Mr. | Ragot | Stephane | Subgroup chair | stephane.ragot@orange.com | Orange | ETSI |
| Mr. | Rämö | Anssi | Delegate | anssi.ramo@nokia.com | Nokia Corporation | ETSI |
| Mr. | Ratkaj | Darko | Delegate | ratkaj@ebu.ch | EBU | ETSI |
| Mr. | Reimes | Jan | Delegate | Jan.Reimes@head-acoustics.com | HEAD acoustics GmbH | ETSI |
| Mr. | Rhyu | Sungryeul | Delegate | suzz.rhyu@samsung.com | Samsung Electronics Co., Ltd | TTA |
| Mr. | Rossbach | Ralf | Delegate | rrossbach@apple.com | Apple GmbH | ETSI |
| Dr. | Rusanovskyy | Dmytro | Delegate | dmytror@qti.qualcomm.com | Qualcomm Incorporated | ATIS |
| Ms. | Saha | Jayeeta | Secretary | Jayeeta.Saha@3gpp.org | TSDSI | TSDSI |
| Mr. | Sanchez de la Fuente | Yago | Delegate | yago.sanchez@hhi.fraunhofer.de | Fraunhofer HHI | ETSI |
| Mr. | Sanders | Peter | Delegate | peter.sanders@everbridge.com | one2many B.V. | ETSI |
| Mr. | Satou | Akihiko | Delegate | satou.a-cg@nhk.or.jp | NHK | ARIB |
| Dr. | Schierl | Thomas | Delegate | thomas.schierl@hhi.fraunhofer.de | Fraunhofer HHI | ETSI |
| Mr. | Simha | Sesh | Delegate | ssimha@sbgtv.com | ONE Media 3.0 LLC | ATIS |
| Mr. | Singer | David | Delegate | singer@apple.com | Apple (UK) Limited | ETSI |
| Dr. | Sodagar | Iraj | Delegate | irajsodagar@tencent.com | Tencent | CCSA |
| Dr. | Song | Jaeyeon | Delegate | jyeon.song@gmail.com | Samsung Electronics Co., Ltd | TTA |
| Mr. | Steck | Chris | Delegate | csteck@cisco.com | Cisco Systems France | ETSI |
| Dr. | Stockhammer | Thomas | Rapporteur | tsto@qti.qualcomm.com | Qualcomm CDMA Technologies | ETSI |
| Dr. | Szczerba | Marek | Delegate | marek.szczerba@philips.com | Philips International B.V. | ETSI |
| Dr. | TAN | PENG | Delegate | peng.tan@telus.com | TELUS | ATIS |
| Mr. | Teniou | Gilles | Vice Chair | teniou@tencent.com | Tencent | CCSA |
| Mr. | Thomas | Emmanuel | Delegate | thomase@xiaomi.com | Beijing Xiaomi Mobile Software | CCSA |
| Mrs. | Vasilache | Adriana | Delegate | adriana.vasilache@nokia.com | Nokia Corporation | ETSI |
| Mr. | Wang | Dong | Delegate | wangdong7@oppo.com | Guangdong OPPO Mobile Telecom. | CCSA |
| Mr. | Wang | Jiansong | Delegate | jw0203@fb.com | Facebook | ETSI |
| Dr. | Wang | Xin | Delegate | xinwang.mediatek@mediatek.com | MediaTek Inc. | ETSI |
| Dr. | Wey | Jun Shan | Delegate | jun.shan.wey@verizon.com | Verizon UK Ltd | ETSI |
| Dr. | Yang | Hyun-Koo | Delegate | hyunkoo.yang@samsung.com | Samsung Electronics Co., Ltd | TTA |
| Mr. | Yip | Eric | Delegate | eric.yip@samsung.com | Samsung Electronics Co., Ltd | TTA |
| Mr. | Zhu | Chunhui | Delegate | tom.zhu@unisoc.com | Spreadtrum Communications | CCSA |

1. M. Frédéric Gabin

   [frederic.gabin@dolby.com](mailto:frederic.gabin@dolby.com)

   +33 6 78 44 85 75 [↑](#footnote-ref-1)