**3GPP TSG SA WG4#109-e meeting *S4-200970***

**20th May – 3rd June 2020**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.0* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **26.346** | **CR** | **0634** | **rev** | **-** | **Current version:** | **16.4.1** |  |
|  | | | | | | | | |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
|  | | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network |  | Core Network | **X** |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | | | | | |
| ***Title:*** | Removing H.263 from MBMS | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Qualcomm Incorporated | | | | | | | | | |
| ***Source to TSG:*** | SA4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | RM\_H263\_MP4V | | | | |  | ***Date:*** | | | 2020-06-11 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **C** |  | | | | | ***Release:*** | | | Rel-16 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *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:*** | | H.263 was a state-of-the art codec in the last millennium and made mobile video possible and an actual reality. Many 3GPP specs adopted H.263 and H.263 was the format of choice for the first mobile video deployments.  However, more than 20 years later, this format has done its duty and 3GPP should feel good about sending this codec to retirement as part of their Rel-16 specs. Actually, several specifications already removed any status around H.263 from their specifications, but have some leftover H.263 related statements.  Why is it relevant to retire older codecs? Supporting codecs on hardware is a significant amount effort and cost, including area size, design and testing. Even if the codec is supported in SW only (which may well be ok for H.263), it still requires a significant amount of unnecessary and costly testing efforts. Supporting such codecs on newly shipping 5G device will just reduce space for new codecs and technologies to be potentially added. One important reason is, that despite on Android there is SW codec for these formats, there are more and more devices such as watches which which do not use Android and hence would require custom H.263 integration.  Also a wrong implementation of some references was identified. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Remove recommendation for H.263  Fix references | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Unnecessary costs for testing and implementation  Confusing references | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 2, 8.3.1.10, 11.9, L2.3, L2.5, L.3 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

**===== CHANGE =====**

# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non‑specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 22.146: "Multimedia Broadcast/Multicast Service; Stage 1".

[3] 3GPP TS 22.246: "Multimedia Broadcast/Multicast Service (MBMS) user services; Stage 1".

[4] 3GPP TS 23.246: "Multimedia Broadcast/Multicast Service (MBMS); Architecture and functional description".

[5] 3GPP TS 25.346: "Introduction of Multimedia Broadcast/Multicast Service (MBMS) in the Radio Access Network (RAN); Stage 2".

[6] IETF STD 0064/RFC 3550 (July 2003): "RTP: A Transport Protocol for Real-Time Applications", H. Schulzrinne, S. Casner, R. Frederick, V. Jacobson.

[7] IETF STD 0006/RFC 0768 (August 1980): "User Datagram Protocol", J. Postel.

[8] IETF STD 0005/RFC 0791 (September 1981): "Internet Protocol", J. Postel.

[9] IETF RFC 3926 (October 2004): "FLUTE - File Delivery over Unidirectional Transport", T. Paila, M. Luby, R. Lehtonen, V. Roca, R. Walsh.

[10] IETF RFC 3450 (December 2002): "Asynchronous Layered Coding (ALC) Protocol Instantiation", M. Luby, J. Gemmell, L. Vicisano, L. Rizzo, J. Crowcroft.

[11] IETF RFC 3451 (December 2002): "Layered Coding Transport (LCT) Building Block", M. Luby, J. Gemmell, L. Vicisano, L. Rizzo, M. Handley, J. Crowcroft.

[12] IETF RFC 5052 (August 2007): "Forward Error Correction (FEC) Building Block", M. Luby, M. Watson, L. Vicisano.

[13] IETF RFC 3695 (February 2004): "Compact Forward Error Correction (FEC) Schemes", M. Luby, L. Vicisano.

[14] IETF RFC 4566 (July 2006): "SDP: Session Description Protocol", M. Handley, V. Jacobson and C. Perkins.

[15] IETF RFC 4570 (July 2006): "Session Description Protocol (SDP) Source Filters", B. Quinn, R. Finlayson.

[16] Void.

[17] IETF RFC 3048 (January 2001): "Reliable Multicast Transport Building Blocks for One-to-Many Bulk-Data Transfer", B. Whetten, L. Vicisano, R. Kermode, M. Handley, S. Floyd, M. Luby.

[18] IETF RFC 2616 (June 1999): "Hypertext Transfer Protocol -- HTTP/1.1".

[19] IETF STD 0066/RFC 3986 (January 2005): "Uniform Resource Identifier (URI)".

[20] 3GPP TS 33.246: "3G Security; Security of Multimedia Broadcast/Multicast Service (MBMS)".

[21] OMG: "Unified Modeling Language (UML), version 1.5" (formal/03-03-01).

[22] W3C Recommendation 28 October 2004: "XML Schema Part 2: Datatypes Second Edition".

[23] IETF RFC 5234 (January 2008): "Augmented BNF for Syntax Specifications: ABNF", D. Crocker and P. Overell.

[24] 3GPP TS 26.290: "Audio codec processing functions; Extended Adaptive Multi-Rate - Wideband (AMR-WB+) codec; Transcoding functions".

[25] 3GPP TS 26.304: "Floating-point ANSI-C code for the Extended Adaptive Multi-Rate - Wideband (AMR-WB+) codec".

[26] 3GPP TS 26.273: "Speech codec speech processing functions; Extended Adaptive Multi-Rate - Wideband (AMR-WB+) speech codec; Fixed-point ANSI-C code".

[27] Void.

[28] 3GPP TS 26.401: "General audio codec audio processing functions; Enhanced aacPlus general audio codec; General description".

[29] 3GPP TS 26.410: "General audio codec audio processing functions; Enhanced aacPlus general audio codec; Floating-point ANSI-C code".

[30] 3GPP TS 26.411: "General audio codec audio processing functions; Enhanced aacPlus general audio codec; Fixed-point ANSI-C code".

[31] W3C Recommendation 04 February 2004: "Extensible Markup Language (XML) 1.1", T. Bray, J. Paoli, C. Sperberg-McQueen, E. Maler, F. Yergeau and J. Cowan.

[32] 3GPP TS 26.244: "Transparent end-to-end streaming service; 3GPP file format (3GP)".

[33] IETF RFC 4867 (April 2007): "RTP Payload Format and File Storage Format for the Adaptive Multi-Rate (AMR) and Adaptive Multi-Rate Wideband (AMR-WB) Audio Codecs", J. Sjoberg, M. Westerlund, A. Lakaniemi, Q. Xie.

[34] IETF RFC 4352 (January 2006): "RTP Payload Format for the Extended Adaptive Multi-Rate Wideband (AMR-WB+) Audio Codec", Sjoberg J. et al.

[35] IETF RFC 6184 (2011): "RTP Payload Format for H.264 Video", Y.-K. Wang, R. Even, T. Kristensen, R. Jesup.

[36] Void.

[37] IETF RFC 2557 (March 1999): "MIME Encapsulation of Aggregate Documents, such as HTML (MHTML)", J. Palme, A. Hopmann, N. Shelness.

[38] IETF RFC 3890 (September 2004): "A Transport Independent Bandwidth Modifier for the Session Description Protocol (SDP)", M. Westerlund.

[39] IETF RFC 3556 (July 2003): "Session Description Protocol (SDP) Bandwidth Modifiers for RTP Control Protocol (RTCP) Bandwidth", S. Casner.

[40] 3GPP TS 24.008: "Mobile radio interface Layer 3 specification; Core network protocols; Stage 3".

[41] IETF RFC 3640 (November 2003): "RTP Payload Format for Transport of MPEG-4 Elementary Streams", J. van der Meer, D. Mackie, V. Swaminathan, D. Singer, P. Gentric.

[42] IETF RFC 1952 (May 1996): "GZIP file format specification version 4.3", P. Deutsch.

[43] ITU-T Recommendation H.264 (04/2013): "Advanced video coding for generic audiovisual services".

[44] Void.

[45] Void.

[46] Void.

[47] 3GPP TS 26.234: "Transparent end-to-end streaming service; Protocols and codecs".

[48] 3GPP TS 26.071: "AMR speech codec; General description".

[49] 3GPP TS 26.090: "AMR speech codec; Transcoding functions".

[50] 3GPP TS 26.073: "AMR speech Codec; C-source code".

[51] 3GPP TS 26.104: "ANSI-C code for the floating-point Adaptive Multi-Rate (AMR) speech codec".

[52] 3GPP TS 26.171: "AMR speech codec, wideband; General description".

[53] 3GPP TS 26.190: "Mandatory Speech Codec speech processing functions AMR Wideband speech codec; Transcoding functions".

[54] 3GPP TS 26.173: "ANCI-C code for the Adaptive Multi Rate - Wideband (AMR-WB) speech codec".

[55] 3GPP TS 26.204: "ANSI-C code for the floating-point Adaptive Multi-Rate Wideband (AMR‑WB) speech codec".

[56] Scalable Polyphony MIDI Specification Version 1.0, RP-34, MIDI Manufacturers Association, Los Angeles, CA, February 2002.

[57] Scalable Polyphony MIDI Device 5-to-24 Note Profile for 3GPP Version 1.0, RP-35, MIDI Manufacturers Association, Los Angeles, CA, February 2002.

[58] "Standard MIDI Files 1.0", RP-001, in "The Complete MIDI 1.0 Detailed Specification, Document Version 96.1", The MIDI Manufacturers Association, Los Angeles, CA, USA, February 1996.

[59] Mobile DLS, MMA specification v1.0, RP-41 Los Angeles, CA, USA. 2004.

[60] Mobile XMF Content Format Specification, MMA specification v1.0, RP-42, Los Angeles, CA, USA. 2004.

[61] ITU-T Recommendation T.81 (1992) | ISO/IEC 10918-1:1993: "Information technology - Digital compression and coding of continuous-tone still images - Requirements and guidelines".

[62] C-Cube Microsystems (September 1992): "JPEG File Interchange Format", Version 1.02.

[63] CompuServe Incorporated (1987): "GIF Graphics Interchange Format: A Standard defining a mechanism for the storage and transmission of raster-based graphics information", Columbus, OH, USA. See at <http://www.dcs.ed.ac.uk/home/mxr/gfx/2d/GIF87a.txt>.

[64] CompuServe Incorporated (1990): "Graphics Interchange Format: Version 89a", Columbus, OH, USA.

[65] IETF RFC 2083 (March 1997): "PNG (Portable Networks Graphics) Specification Version 1.0", T. Boutell.

[66] W3C Working Draft 27 October 2004: "Scalable Vector Graphics (SVG) 1.2", <http://www.w3.org/TR/2004/WD-SVG12-20041027/>.

[67] W3C Working Draft 13 August 2004: "Mobile SVG Profile: SVG Tiny, Version 1.2", <http://www.w3.org/TR/2004/WD-SVGMobile12-20040813/>.

[68] Standard ECMA-327 (June 2001): "ECMAScript 3rd Edition Compact Profile".

[69] Void.

[70] ISO/IEC 10646-1 (2000): "Information technology - Universal Multiple-Octet Coded Character Set (UCS) - Part 1: Architecture and Basic Multilingual Plane".

[71] The Unicode Consortium: "The Unicode Standard", Version 3.0 Reading, MA, Addison-Wesley Developers Press, 2000, ISBN 0-201-61633-5.

[72] 3GPP TS 26.245: "Transparent end-to-end Packet switched Streaming Service (PSS); Timed text format".

[73] IETF RFC 4646: "Tags for the Identification of Languages".

[74] ISO 639: "Codes for the representation of names of languages".

[75] ISO 3166: "Codes for the representation of names of countries and their subdivisions".

[76] Void.

[77] 3GPP TS 23.003: "Numbering, addressing and identification".

[78] IETF RFC 5905, "Network Time Protocol Version 4: Protocol and Algorithms Specification", D. Mills, J. Martin, J. Burbank and W. Kasch, June 2010.

[79] OMA Push OTA Protocol (25-April-2001): WAP-235-PushOTA-20010425-a

<http://www.openmobilealliance.org/tech/affiliates/LicenseAgreement.asp?DocName=/wap/wap-235-pushota-20010425-a.pdf>

[80] IETF RFC 3711 (March 2004): "The Secure Real-time Transport Protocol (SRTP)", M. Baugher, D. McGrew, M. Naslund, E. Carrara, K. Norrman.

[81] Void.

[82] IETF RFC 4648: "The Base16, Base32, and Base64 Data Encodings", Josefsson S., Ed., October 2006.

[83] IETF RFC 3023: "XML Media Types", M. Murata, S. St.Laurent, D. Kohn, January 2001.

[84] IETF RFC 5905: "Network Time Protocol Version 4: Protocol and Algorithms Specification", D. Mills, June 2010.

[85] OMA OMNA Registered PUSH Application ID list

<http://www.openmobilealliance.org/tech/omna/omna-push-app-id.htm>

[86] 3GPP TR 26.936: "Performance characterization of 3GPP audio codecs".

[87] 3GPP TS 25.413: "UTRAN Iu interface Radio Access Network Application Part (RANAP) signalling".

[88] IETF RFC 2326: "Real Time Streaming Protocol (RTSP)", Schulzrinne H., Rao A. and Lanphier R., April 1998.

[89] Void.

[90] "Service Guide for Mobile Broadcast Services", Open Mobile Alliance, OMA-TS-BCAST\_ServiceGuide-V1\_1, Candidate Version 1.1 –14 Sep 2010.

[91] IETF RFC 5053 (October 2007): "Raptor Forward Error Correction Scheme for Object Delivery", M. Luby, A. Shokrollahi, M. Watson, T. Stockhammer.

[92] IETF RFC 5285: "A General Mechanism for RTP Header Extensions", D. Singer, H. Desineni, July 2008.

[93] IETF RFC 4396: "RTP Payload Format for 3rd Generation Partnership Project (3GPP) Timed Text", Rey J. and Matsui Y., February 2006.

[94] OMA-ERELD-DM-V1\_2-20070209-A: "Enabler Release Definition for OMA Device Management, Approved Version 1.2".

[95] 3GPP TS 26.430: "Timed Graphics".

[96] 3GPP TS 36.300: "Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Universal Terrestrial Radio Access Network (E-UTRAN); Overall description; Stage 2".

[97] 3GPP TS 36.331: "Evolved Universal Terrestrial Radio Access (E-UTRA); Radio Resource Control (RRC); Protocol specification".

[98] 3GPP TS 26.247: "Transparent end-to-end Packet-switched Streaming Service (PSS); Progressive Download and Dynamic Adaptive Streaming over HTTP (3GP-DASH)".

[99] 3GPP TS 29.061: "Interworking between the Public Land Mobile Network (PLMN) supporting packet based services and Packet Data Networks (PDN)".

[100] IETF RFC 6064: "SDP and RTSP Extensions Defined for 3GPP Packet-Switched Streaming Service and Multimedia Broadcast/Multicast Service", M. Westerlund, P. Frojdh, January 2011.

[101] Void.

[102] Void.

[103] Void.

[104] 3GPP TS 36.443: "Evolved Universal Terrestrial Radio Access Network (E-UTRAN); M2 Application Protocol (M2AP)".

[105] 3GPP TS 36.101: "Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception".

[106] IETF RFC6681, "Raptor FEC Schemes for FECFRAME," M. Watson, T. Stockhammer and M. Luby, August 2012.

[107] IETF RFC6363, "Forward Error Correction (FEC) Framework," M. Watson, A. Begen and V. Roca, October 2011.

[108] 3GPP TS 36.304: "User Equipment (UE) procedures in idle mode".

[109] "Mobile Location Protocol (MLP) ", Open Mobile Alliance, OMA-LIF-MLP-V3\_1, Approved Version 3.1 – 20 Sep 2011.

[110] 3GPP TR 26.946: "Multimedia Broadcast/Multicast Service (MBMS); User service guidelines".

[111] Void.

[112] ITU-T Recommendation H.265 (04/2013): "High efficiency video coding".

[113] IETF RFC 7798 (2016): "RTP Payload Format for High Efficiency Video Coding (HEVC)", Y.-K. Wang, Y. Sanchez, T. Schierl, S. Wenger, M. M. Hannuksela.

[114] IETF RFC 1035 (November 1987): "Domain Names – Implementation and Specification", P. Mockapetris.

[115] 3GPP TR 26.906 Evaluation of HEVC for 3GPP Services (Release 12).

[116] ISO/IEC 23009-1:: 2019/Amd.1:2020: Information technology -- Dynamic adaptive streaming over HTTP (DASH) -- Part 1: Media presentation description and segment formats.

[117] 3GPP TS 29.214 "Policy and charging control over Rx reference point".

[118] 3GPP TS 23.271 "Functional stage 2 description of Location Services (LCS)".

[119] IETF RFC 5651: "Layered Coding Transport (LCT) Building Block", M. Luby, M. Watson, L. Vicisano.

[120] 3GPP TS 23.468, "Group Communication System Enablers for LTE (GCSE\_LTE); Stage 2".

[121] 3GPP TS 29.468, "Group Communication System Enablers for LTE (GCSE\_LTE); MB2 Reference Point; Stage 3".

[122] 3GPP TS 23.179. "Functional architecture and information flows for mission critical communication, services; Stage 2".

[123] 3GPP TS 24.379, "Mission Critical Push to Talk (MCPTT) call control Protocol specification".

[124] 3GPP TS 26.307, "Presentation Layer for 3GPP Services".

[125] 3GPP TS 26.116, "Television (TV) over 3GPP Services; Video Profiles".

[126] Standard ECMA-262, 5.1 Edition / June 2011, ECMAScript Language Specification.

[127] IETF RFC 6347 (January 2012): "Datagram Transport Layer Security Version 1.2".

[128] 3GPP TS 33.310, Network Domain Security (NDS); Authentication Framework (AF)

[129] 3GPP TS 29.116, "Representational state transfer over xMB reference point between Content Provider and BM-SC".

[130] IETF Internet-Draft, "JSON Schema: A Media Type for Describing JSON Documents", draft-wright-json-schema-01, April 15, 2017.

[131] 3GPP TS 24.116, "Stage 3 aspects of system architecture enhancements for TV services".

[132] 3GPP TS 24.117, "TV service configuration Management Object (MO)".

[133] IANA Multicast IPv4 Address Space Registry, https://www.iana.org/assignments/multicast-addresses/multicast-addresses.xhtml.

[134] IANA Multicast IPv6 Address Space Registry, https://www.iana.org/assignments/ipv6-multicast-addresses/ipv6-multicast-addresses.xhtml.

[135] IANA Service Name and Transport Protocol Port Number Registry, https://www.iana.org/assignments/service-names-port-numbers/service-names-port-numbers.xhtml.

[136] 3GPP TS 26.347, "Multimedia Broadcast/Multicast Service (MBMS); Application Programming Interface and URL".

[137] IETF RFC 5795, "The Robust Header Compression (ROHC) Framework".

[138] IETF RFC 3095, "RObust Header Compression (ROHC): Framework and four profiles: RTP, UDP, ESP, and uncompressed".

[139] IETF RFC 5225, RObust Header Compression Version 2 (ROHCv2): Profiles for RTP, UDP, IP, ESP and UDP-Lite

[140] 3GPP TS 26.118, "3GPP Virtual reality profiles for streaming applications".

[141] 3GPP TS 23.180, "Common functional architecture to support mission critical services; Stage 2".

[142] 3GPP TS 23.379, "Functional architecture and information flows to support Mission Critical Push To Talk (MCPTT); Stage 2".

[143] 3GPP TS 26.348, "Northbound Application Programming Interface (API) for Multimedia Broadcast/Multicast Service (MBMS) at the xMB reference point".

[144] IETF RFC 8216: "HTTP Live Streaming"

[145]  ISO/IEC 23000-19:2019 "Information Technology Multimedia Application Format (MPEG-A) – Part 19: Common Media Application Format (CMAF) for segmented media".

**===== CHANGE =====**

#### 8.3.1.10 Buffer Requirement Signaling

Due to the variable bitrate nature of some media streams (especially video streams), initial buffering at the receiver becomes necessary to smooth out those variations. The initial buffering delay SHOULD be signaled to the receiver in the SDP using the following media level attribute:

- "a=X-initpredecbufperiod:<initial pre-decoder buffering period>"

For H.264 video streams, the "X-initpredecbufperiod" [47] indicates the nominal removal time of the first access unit from the coded picture buffer (CPB).

For H.265 (HEVC) video streams, the "X-initpredecbufperiod" [47] indicates the nominal removal time of the first decoding unit from the coded picture buffer (CPB).

Note that X-initpredecbufperiod is expressed as clock ticks of a 90-kHz clock. Hence, conversion may be required if the RTP timestamp clock frequency is not 90 kHz.

**===== CHANGE =====**

## 11.9 MBMS Feature Requirements

MBMS features enable the BM-SC to signal to the UE the set of capabilities that are required for the consumption of the MBMS user service. The required capability list is indicated in the MBMS User Service Description of the corresponding MBMS user service as defined in section 11.2.1.

The MBMS UE shall not attempt to receive the service if it detects that at least one required capability, indicated in the USD, is not supported or not understood. The introduction of new features is possible and assumes that unidentified features shall be interpreted by the UE as a requirement that cannot be fulfilled.

The following list of features is currently identified:

Table 2 - MBMS Feature Requirement List

|  |  |  |
| --- | --- | --- |
| Service Capability | References | Recognized Feature Values (Integer) |
| Speech | as defined in clause 10.2 | 0 |
| AMR-WB | as defined in clause 10.2 | 1 |
| Enhanced aacPlus | as defined in clause 10.3 | 2 |
| Extended AMR-WB | as defined in clause 10.3 | 3 |
| Synthetic audio | as defined in clause 10.4 | 4 |
| H.263 | as mentioned in clause 10.5 (of Release 10) | 5 |
| H.264 Constrained Baseline Profile Level 1b | as defined in clause 10.5 (of Release 6) | 6 |
| Still images | as defined in clause 10.6 | 7 |
| Bitmap graphics | as defined in clause 10.7 | 8 |
| Vector graphics | as defined in clause 10.8 | 9 |
| Text | as defined in clause 10.9 | 10 |
| Timed text | as defined in clause 10.10 | 11 |
| 3GPP file format | as defined in clause 10.11 | 12 |
| H.264 Constrained Baseline Profile Level 1.2 | as defined in clause 10.5 (of Release 7) | 13 |
| Scene Description | as defined in clause 10.12 | 14 |
| MBSFN mode in UTRAN | as defined in 3GPP TS 25.346 (of Release 7) | 15 |
| H.264 Constrained Baseline Profile Level 1.3 | as defined in clause 10.5 (of Release 9) | 16 |
| AHS | as defined in clause 5.6 (of Release 9) | 17 |
| 3GP-DASH | as defined in clause 5.6 (of Release 10) | 18 |
| H.264 Progressive High Profile Level 3.1 | as defined in clause 10.5 (of Release 11) | 19 |
| Frame-packed stereoscopic 3D video | as defined in clause 10.5 (of Release 11) | 20 |
| H.265 (HEVC) Main Profile, Main Tier, Level 3.1 | as defined in clause 10.5 (of Release 12) | 21 |
| MBMS User Service Discovery / Announcement Profile 1a | Service capabilities as defined in Annex L.2 | 22 |
| MBMS User Service Discovery / Announcement Profile 1b | Service capabilities as defined in Annex L.3 | 23 |
| MBMS User Service Discovery / Announcement Profile for Transparent delivery | Service capabilities as defined in Annex L.5 | 24 |
| Virtual reality | Service capabilities as defined in clause 10.13 | 25 |
| Profile 1c | Service capabilities as defined in Annex L.3A | 26 |

The list of features may be extended in the future.

**===== CHANGE =====**

## L.2.3 Service Announcement (SA) File structure

Service announcement metadata shall be transported via MBMS Download Delivery. A Service Announcement file (SA file) shall be formatted as an aggregated Multipart MIME file of multipart/related type as defined in clause 5.2.6. All metadata fragments of one MBMS User Server shall be contained within the same SA file. The SA file may contain metadata fragments of more than one MBMS User Service.

An SA file shall be uniquely identified by its URL, and provided as the value of the Content-Location field in FDT Instances. Its MIME type is provided as value of the Content-Type field in FDT Instances. When a USBD or any other metadata fragment of an MBMS User Service is updated, an updated SA file shall be transmitted with a new Content-MD5 value in the FLUTE FDT Instance describing the file with the same URL. The UE shall use the Content-MD5 to identify new SA File versions.

The SA file shall contain exactly one *metadata envelope,* and for each service, at least an USBD (with one *userServiceDescription* element), one Session Decription, and one Schedule Description fragment. Optionally, the SA file may contain Associated Delivery Procedure Description (ADPD). For DASH services, the SA file may further contain the Media Presentation Description (MPD) , the Application Service Description (ASD) whose content is the unified MPD, and all Initialization Segment Description (ISD) metadata fragments of the MBMS User Service. For HLS services, the SA file may further contain the Application Service Description (ASD) whose content is the Master Playlist [144] and all Initialization Segment Description (ISD) metadata fragments [144].

Some metadata fragments may be added and / or updated in-band with the content as defined in clause L.2.8. When metadata fragments are referenced, but not delivered within the SA file, such as the case of the Associated Delivery Procedure Description, the metadata fragments shall be provided as in-band fragments as defined in clause L.2.8. The SA file might not include Associated Delivery Procedure Description (ADPD) fragments in multiple BMSC deployments where different serviceURLs are used to direct file repair and reception reporting to different services on each BM-SC.

The *metadata envelope* shall be included as the root body part on the SA file and shall include a list of *item* child elements, with one *item* instance for every included metadata fragment. The *metadataURI* attribute of a given *item* element shall represent a unique and absolute HTTP URL referencing the metadata fragment associated with that *item*. The *metadata envelope* in the SA file shall not include the *metadataFragment* element, i.e., the *metadata envelope* does not embed a metadata fragment, as described in section 11.1.4. This is shown in the example in clause L.2.10.

The SA file should contain all DASH Initialization Segment Description metadata fragments, which are referenced by all broadcast Representations on any Media Presentation Description fragment, referenced by *r9:mediaPresentationDescription* element, included in the SA file. Any Initialization Segment Description fragment in the SA file shall be base64 encoded. The URL in the *metadataURI* in the *metadata envelope* and the Content-Location field in the Multipart MIME boundary header shall contain the same Initialization Segment Description URL, which is included in the MPD to reference the ISD.

The SA file should contain all HLS Initialization Segment Description fragments, each of which contains a Media Initialization Section [144], which are referenced by the broadcasted HLS Media Playlists. Any HLS Initialization Segment Description fragment in the SA file shall be base64 encoded. The URL in the *metadataURI* in the *metadata envelope* and the Content-Location field in the Multipart MIME boundary header shall contain the same Media Initialization Section URL, as given in the HLS Media Playlists with the EXT-X-MAP tag [144].

The SA file shall be compressed using the RFC 1952 [42] content/transport encoding for transmission and shall have a .gzip file extension. The multipart MIME file shall be carried as a compressed (gzipped) file and uncompressed by the MBMS client, i.e., FLUTE level compression is not to be used.

As allowed in RFC1952, the gzip file format shall include the original file name and the FLG.FNAME flag shall be set to true. This allows for the uncompressed file name to be signaled in gzip files.

**===== CHANGE =====**

## L.2.5 User Service Bundle Description Fragment

The MBMS User Service Bundle Description (USBD) describes only a single user service in the Multipart MIME file. There shall be one *userServiceDescription* element per USBD. To announce multiple MBMS User Services, there shall be separate USBD instances for each MBMS User Service within the Multipart MIME file.

Each MBMS User Service instance is described through the following metadata fragments. For each MBMS User Service instance, exactly one *bundleDescription* element shall be present, which shall contain exactly one *userServiceDescription* element. The *userServiceDescription* element shall contain exactly one *deliveryMethod* element and exactly one *r9:schedule* element. The *deliveryMethod* element references a Session Description in the form of an SDP file, which shall describe one MBMS Download Delivery Session.

The USBD shall contain the *requiredCapabilities* element with its *feature* child element. The *feature* element value shall be set to "22", which identifies the "MBMS User Service Discovery / Announcement Profile 1a", as defined in clause 11.9.

In the case of Live DASH services, the *userServiceDescription* element shall also contain exactly one *r9:mediaPresentationDescription* element, which references a DASH Media Presentation Description (MPD).

In the case of Live DASH services, the *userServiceDescription* element may also contain one *r12:appService* element, with a MIME type containing "application/dash+xml", which references an Application Service Description whose content is a unified MPD (see subclause 7.6).

In the case of Live DASH services based on a CMAF profile [116][145], the *userServiceDescription* element may also contain one *r12:appService* element, with a MIME type containing "application/dash+xml profiles=' urn:mpeg:dash:profile:cmaf:2019'" or a compatible signaling as documented in clause 5.6.

In the case of Live HLS services, the *userServiceDescription* element shall also contain exactly one *r12:appService* element with the *mimeType* attribute set to "application/vnd.apple.mpegurl", which references an Application Service Description whose content is an HLS Master Playlist [144].

In the case of hybrid Live DASH/HLS services, the *userServiceDescription* element:

- shall contain exactly one *r9:mediaPresentationDescription* element, which references a DASH Media Presentation Description (MPD);

- should contain one *r12:appService* element, with a MIME type containing "application/dash+xml profiles=' urn:mpeg:dash:profile:cmaf:2019", which references an Application Service Description whose content is a unified MPD (see subclause 7.6); and

- shall contain exactly one r12:appService element with the mimeType attribute set to "application/vnd.apple.mpegurl", which references an Application Service Description whose content is an HLS Master Playlist [144].

The USBD fragment may contain an *r9:availabilityInfo* element, with one or more *infoBinding* elements. The *infoBinding* element shall contain the child elements *radioFrequency* and *serviceArea.* If the *r9:availabilityInfo* element is absent, then the device shall assume that the corresponding MBMS User Service offering is not geographically constrained within the service area footprint of the MBMS service operator.

For this service announcement profile and for E-UTRAN, the UE shall ignore the *radioFrequency* child element. Instead, the UE shall read and use the radio frequency from the E-UTRAN System Information Block 15 (SIB), which provides the binding between the frequency agnostic Service Area ID (SAI) and the radio frequency.

This is the list of supported attributes and elements:

- Mandatory

- bundleDescription.sv:schemaVersion

- set as specified for the schema version in use

- bundleDescription.userServiceDescription

- bundleDescription.userServiceDescription.serviceId

- bundleDescription.userServiceDescription.r7:serviceClass

- bundleDescription.userServiceDescription.deliveryMethod

- bundleDescription.userServiceDescription.deliveryMethod@sessionDescriptionURI

- bundleDescription.userServiceDescription.deliveryMethod.sv:delimiter

- set to 0 and positioned as specified by the schema version in use

- bundleDescription.userServiceDescription.requiredCapabilities

- bundleDescription.userServiceDescription.requiredCapabilities.feature

- bundleDescription.userServiceDescription.r9:schedule

- bundleDescription.userServiceDescription.sv:delimiter

- set to 0 and positioned as specified by the schema version in use

- Mandatory for DASH services

- bundleDescription.userServiceDescription.r9:mediaPresentationDescription

Optional for DASH services

- bundleDescription.userServiceDescription.r12:appService

- Mandatory for HLS services

- bundleDescription.userServiceDescription. r12:appService

- Optional

- bundleDescription.userServiceDescription.name

- bundleDescription.userServiceDescription.serviceLanguage

- bundleDescription.userServiceDescription.r9:availabilityInfo

- bundleDescription.userServiceDescription.r9:availabilityInfo.infoBinding.serviceArea

- A list of serviceArea advertises SAIs where the service is available – requires SIB15 support

- bundleDescription.userServiceDescription.r9:availabilityInfo.infoBinding.radioFrequency

- Includes at least one radioFrequency

- bundleDescription.userServiceDescription.deliveryMethod

- bundleDescription.userServiceDescription.deliveryMethod@associatedProcedureDescriptionURI

- bundleDescription.userServiceDescription.deliveryMethod@accessPointName

- accessPointName – may be set to the same value for all services

bundleDescription.userServiceDescription.deliveryMethod.r12:broadcastAppService

This is the list of not supported attributes and elements:

- bundleDescription@fecDescriptionURI.

- bundleDescription.userServiceDescription@accessGroup

- bundleDescription.userServiceDescription.serviceGroup

- bundleDescription.initializationRandomization

- bundleDescription.terminationRandomization

- bundleDescription.userServiceDescription.initializationRandomization

- bundleDescription.userServiceDescription.terminationRandomization

- bundleDescription.userServiceDescription.r8:Registration

- bundleDescription.userServiceDescription.deliveryMethod@accessGroupID

- bundleDescription.userServiceDescription.deliveryMethod@protectionDescriptionURI

- bundleDescription.userServiceDescription.deliveryMethod.r8:alternativeAccessDelivery

bundleDescription.userServiceDescription.deliveryMethod.r12: broadcastAppService.serviceArea

-

- bundleDescription.userServiceDescription.deliveryMethod.r12:unicastAppService

- bundleDescription.userServiceDescription.deliveryMethod.r12:appComponent

- bundleDescription.userServiceDescription.deliveryMethod.r12:serviceArea

- bundleDescription.userServiceDescription.deliveryMethod@r12:inbandMetadata

- bundleDescription.userServiceDescription.r12:appService.identicalContent

- bundleDescription.userServiceDescription.r12:appService.alternativeContent

- bundleDescription.userServiceDescription.r12:KeepUpdatedService

**===== CHANGE =====**

# L.3 MBMS User Service Discovery / Announcement Profile 1b

The function of Service Discovery is to allow UEs to find the available MBMS User Services defined on the MBMS enabled network and the associated service access information (e.g. FLUTE session parameters, TMGI, file repair servers, etc.) for MBMS User Services of interest. The UE needs the service access information to initiate the reception of a particular MBMS User Service, and to find the data associated with the MBMS User Service on the radio interface.

The Service Announcement Profile defined in this clause follows the principles of the Service Announcement Profile 1a as defined in clause L.2 with the following constraints:

- Service Announcement metadata fragments shall be delivered as one SA file.

- In the case of Live DASH Services, the SA file shall contain the Media Presentation Description (MPD) fragment for the MBMS User Service, referenced by the *r9:mediaPresentationDescription* element in the USBD. If the USBD also references an Application Service Description fragment with the *r12:appService* element, the SA file shall also contain the Application Service Description fragment whose content is the unified MPD fragment.

- In the case of Live HLS Services, the SA file shall contain the Application Service Description fragment whose content is a Master Playlist as defined in [144] for the MBMS User Service, referenced by the *r12:appService* element in the USBD.

- In the case of Live hybrid DASH/HLS Services, the SA file shall contain:

- the Media Presentation Description (MPD) fragment for the MBMS User Service, referenced by the *r9:mediaPresentationDescription* element;

- the Application Service Description (ASD) fragment whose content is the unified MPD, if the USBD also references an ASD fragment with the *r12:appService* element whose MIME type contains "application/dash+xml"; and

- the Application Service Description (ASD) fragment whose content is the HLS master playlist fragment for the MBMS User Service, referenced by the *r12:appService* element in the USBD, with the *mimeType* attribute set to "application/dash+xml profiles=' urn:mpeg:dash:profile:cmaf:2019".

- In the case of Live DASH Services, the SA file shall contain (all) needed Initialization Segment Description (ISD) fragments for the MBMS User Service.

In the case of Live HLS Services, the SA file shall contain (all) needed Initialization Segment Description (ISD) fragments whose content is a Media Initialization Section ([144]) for the MBMS User Service.-

In the case of Live hybrid DASH/HLS Services, the SA file shall contain (all) needed Initialization Segment Description (ISD) fragments for the MBMS user service, used as Initialization Segment by the DASH clients, and used as Media Initialization Section by the HLS clients.

- Each In-Band Fragment shall be embedded in one Metadata Envelope as defined in clause 11.1.4. Each metadata envelope shall contain exactly one metadata fragment.

- The *feature* child element of the *requiredCapabilities* element shall have the value "23", corresponding to the "MBMS User Service Discovery / Announcement Profile 1b", as defined in clause 11.9.