**3GPP TSG-CT3 Meeting #135 *C3-243xxx***

**Hyderabad, India, 27th May 2024 - 31st May 2024 *(Revision of C3-243048)***

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **29.163** | **CR** | **1079** | **rev** | **1** | **Current version:** | **18.0.0** |  |
|  | | | | | | | | |
| *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)*.* | | | | | | | | |
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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network |  | Core Network | **X** |

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|  | | | | | | | | | | |
| ***Title:*** | Adding support for IVAS codec | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Nokia, Ericsson, Qualcomm Incorporated | | | | | | | | | |
| ***Source to TSG:*** | CT3 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | IVAS\_Codec | | | | |  | ***Date:*** | | | 2024-05-25 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***Release:*** | | | Rel-18 |
|  | *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-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)  Rel-20 (Release 20)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | IVAS codec parameter handling is unspecified at the MGCF and IM-MGW. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | MGCF and IM-MGW procedures to handle IVAS codec parameters are being specified. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Missing IVAS codec support at MGCF and IM-MGW prevents transcoding of the IVAS codec. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 2, 3.2, 8.1.1.3.1, 8.1.1.3.x (new), 9.2.13.x (new) | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | | **X** |  | Other core specifications | | | | TS 26.253 CR 0002  TS 26.114 CR 0561  TS 23.334 CR 0185 | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | | Rev 1: the definition of the ivas-mode-switch parameter has been clarified by SA4. It defines the mode at the start or update of the session for the send and the receive directions, but the mode initially used in the session may later be modified. Setting the ivas-mode-switch parameter to the value 1 does not preclude the remote party from switching to IVAS immersive mode later on. Accordingly, an MGCF and IM-MGW supporting transcoding to/from IVAS shall support transcoding from IVAS immersive mode (decoding to mono-format codec) and may support transcoding to IVAS immersive mode (if the latter is not supported, the IM-MGW only sends IVAS packets using EVS Primary or WB-AMR IO mode). If transcoding to/from IVAS is not supported, the use of the EVS codec payload type can be negotiated. Corresponding alignments are done in clause 9.2.13.x and the IVAS related tables.  The handling of the cf, cf-send and cf-recv parameters is corrected in Table 5.13.x.1 when the IVAS payload type is supplied in the SDP answer. | | | | | | | | |

\* \* \* First 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] ITU-T Recommendation G.711 (11/88): "Pulse Code Modulation (PCM) of voice frequencies".

[2] ITU-T Recommendation H.248.1 (05/02): "Gateway control protocol: Version 2".

[3] ITU-T Recommendation Q.701 (03/93), Q.702 (11/88), Q.703 (07/96), Q.704 (07/96), Q.705 (03/93), Q.706 (03/93), Q.707 (11/88), Q.708 (03/99), Q.709 (03/93): "Functional description of the message transfer part (MTP) of Signalling System No. 7".

[4] ITU-T Recommendations Q.761to Q.764 (12/99): "Specifications of Signalling System No.7 ISDN User Part (ISUP)".

[5] Void.

[6] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[7] Void.

[8] 3GPP TS 24.228: "Signalling flows for the IP multimedia call control based on SIP and SDP".

[9] 3GPP TS 24.229: "IP Multimedia Call Control Protocol based on SIP and SDP".

[10] 3GPP TS 23.002: "Network Architecture".

[11] 3GPP TS 22.228: "Service requirements for the IP Multimedia Core Network Subsystem".

[12] 3GPP TS 23.228: "IP Multimedia subsystem (IMS)".

[13] Void.

[14] 3GPP TS 29.205: "Application of Q.1900 series to Bearer Independent CS Network architecture; Stage 3".

[15] 3GPP TS 29.332: "Media Gateway Control Function (MGCF) - IM-Media Gateway (IM-MGW) interface, Stage 3".

[16] IETF RFC 791: "Internet Protocol".

[17] IETF RFC 768: "User Datagram Protocol".

[18] IETF RFC 2960: "Stream Control Transmission Protocol".

[19] IETF RFC 3261: "SIP: Session Initiation Protocol".

[20] 3GPP TS 29.202: "Signalling System No. 7 (SS7) signalling transport in core network; Stage 3".

[21] IETF RFC 2474: "Definition of the Differentiated Services Field (DS Field) in the Ipv4 and Ipv6 Headers".

[22] IETF RFC 2475: "An Architecture for Differentiated Services".

[23] IETF RFC 4867 : "RTP Payload Format and File Storage Format for the Adaptive Multi-Rate (AMR) and Adaptive Multi-Rate Wideband (AMR-WB) Audio Codecs".

[24] IETF RFC 793: "Transmission Control Protocol".

[25] 3GPP TS 29.414: "Core network Nb data transport and transport signalling".

[26] 3GPP TS 29.415: "Core network Nb interface user plane protocols".

[27] 3GPP TS 23.205: "Bearer-independent circuit-switched core network; Stage 2".

[28] Void.

[29] ITU-T Recommendation Q.2150.1: "Signalling transport converter on MTP3 and MTP3b".

[30] ITU-T Recommendations Q.1902.1 to Q.1902.6 (07/01): "Bearer Independent Call Control".

[31] Void.

[32] Void.

[33] Void.

[34] Void.

[35] ITU-T Recommendation Q.765.5: "Signalling system No. 7 - Application transport mechanism: Bearer Independent Call Control (BICC)".

[36] IETF RFC 3264: "An Offer/Answer Model with the Session Description Protocol (SDP)".

[37] IETF RFC 3312: "Integration of Resource Management and Session Initiation Protocol (SIP)".

[38] ITU-T Recommendation Q.850 (05/1998) including Amendment 1 (07/2001): "Usage of cause and location in the Digital Subscriber Signalling System No. 1 and the Signalling System No. 7 ISDN User Part".

[39] IETF RFC 2460: "Internet Protocol, Version 6 (Ipv6) Specification".

[40] IETF RFC 3323: "A Privacy Mechanism for the Session Initiation Protocol (SIP)".

[41] IETF RFC 3325: "Private Extensions to the Session Initiation Protocol (SIP) for Asserted Identity within Trusted Networks".

[42] ITU-T Recommendation Q.730 (12/99), Q.731.1 (07/96), Q.731.3 (03/93), Q.731.4 (03/93), Q.731.5 (03/93), Q.731.6 (03/93), Q.731.7 (06/97), Q.731.8 (02/92), Q.732.2-5 (12/99), Q.732.7 (07/96), Q.733.1 (02/92), Q.733.2 (03/93), Q.733.3 (06/97), Q.733.4 (03/93), Q.733.5 (12/99), Q.734.1 (03/93), Q.734.2 (07/96), Q.735.1 (03/93), Q.735.3 (03/93), Q.735.6 (07/93), Q.736.1 (10/95), Q.736.3 (10/95), Q.737.1 (06/97): "ISDN user part supplementary services".

[43] ITU-T Recommendation I.363.5 (1996): "B-ISDN ATM Adaptation Layer specification: Type 5 AAL".

[44] ITU-T Recommendation Q.2110 (1994): "B-ISDN ATM adaptation layer - Service Specific Connection Oriented Protocol (SSCOP)".

[45] ITU-T Recommendation Q.2140 (1995): "B-ISDN ATM adaptation layer - Service specific coordination function for signalling at the network node interface (SSCF AT NNI)".

[46] ITU-T Recommendation Q.2210 (1996): "Message transfer part level 3 functions and messages using the services of ITU-T Recommendation Q.2140".

[47] 3GPP TS 23.221: "Architectural requirements".

[48] ITU-T Recommendation E.164 (05/1997): "The international public telecommunication numbering plan".

[49] ITU-T Recommendation Q.1912.5 (03/04): "Interworking between Session Initiation Protocol (SIP) and Bearer Independent Call Control Protocol or ISDN User Part".

[50] 3GPP TS 26.102: "Adaptive Multi-Rate (AMR) speech codec; Interface to Iu and Uu".

[51] IETF RFC 3550: "RTP: A Transport Protocol for Real-Time Applications".

[52] IETF RFC 3551: "RTP Profile for Audio and Video Conferences with Minimal Control".

[53] IETF RFC 3555: "MIME Type Registration of RTP Payload Formats".

[54] IETF RFC 3262: "Reliability of provisional responses".

[55] IETF RFC 3311: "SIP UPDATE method".

[56] IETF RFC 4566: "SDP: Session Description Protocol".

[57] 3GPP TS 26.103: "Speech Codec List for GSM and UMTS".

[58] 3GPP TS 28.062: "Inband Tandem Free Operation (TFO) of speech codecs".

[59] IETF RFC 3556: "Session Description Protocol (SDP) Bandwidth Modifiers for RTP Control Protocol (RTCP) bandwidth".

[60] 3GPP TS 24.604: "Communication Diversion (CDIV) using IP Multimedia (IM) Core Network (CN) subsystem; Protocol specification".

[61] 3GPP TS 24.605: "Conference (CONF) using IP Multimedia (IM) Core Network (CN) subsystem; Protocol specification".

[62] 3GPP TS 24.606: "Message Waiting Indication (MWI) using IP Multimedia (IM) Core Network (CN) subsystem; Protocol specification".

[63] 3GPP TS 24.607: "Originating Identification Presentation (OIP) and Originating Identification Restriction (OIR) using IP Multimedia (IM) Core Network (CN) subsystem; Protocol specification".

[64] 3GPP TS 24.608: "Terminating Identification Presentation (TIP) and Terminating Identification Restriction (TIR) using IP Multimedia (IM) Core Network (CN) subsystem; Protocol specification".

[65] 3GPP TS 24.610: "Communication HOLD (HOLD) using IP Multimedia (IM) Core Network (CN) subsystem; Protocol specification".

[66] Void.

[67] 3GPP TS 24.611: "Anonymous Communication Rejection (ACR) and Communication Barring (CB) using IP Multimedia (IM) Core Network (CN) subsystem; Protocol specification".

[68] Void.

[69] IETF RFC 4040: "RTP Payload Format for a 64 kbit/s Transparent Call".

[70] ETSI EN 300 356-1 (V4.2.1): "Integrated Services Digital Network (ISDN); Signalling System No.7 (SS7); ISDN User Part (ISUP) version 4 for the international interface; Part 1: Basic services [ITU-T Recommendations Q.761 to Q.764 (1999) modified]".

[71] ETSI EN 300 356-21 (V4.2.1): "Integrated Services Digital Network (ISDN); Signalling System No.7 (SS7); ISDN User Part (ISUP) version 4 for the international interface; Part 21: Anonymous Call Rejection (ACR) supplementary service".

[72] ITU-T Recommendation T.38 (09/2010): "Procedures for real-time Group 3 facsimile communication over IP networks".

[73] IETF RFC 3362: "Real-time Facsimile (T.38) - image/t38 MIME Sub-type Registration".

[74] 3GPP TS 23.003: "Numbering, addressing and identification".

[75] IETF RFC 3515: "The Session Initiation Protocol (SIP) REFER method".

[76] Void.

[77] IETF RFC 5079: "Rejecting Anonymous Requests in the Session Initiation Protocol (SIP)".

[78] 3GPP TS 26.110: "Codec for circuit switched multimedia telephony service; General description".

[79] 3GPP TS 26.111: "Codec for Circuit switched Multimedia Telephony Service; Modifications to H.324".

[80] Void.

[81] ITU-T Recommendation H.324 (04/09): "Terminal for low bitrate multimedia communication".

[82] ITU-T Recommendation H.245: "Control protocol for multimedia communication".

[83] ITU-T Recommendation H.261 (03/93): "Video codec for audiovisual services at p x 64 kbit/s".

[84] ITU-T Recommendation H.263 (01/05): "Video coding for low bitrate communication".

[85] Void.

[86] Void.

[87] Void.

[88] 3GPP TS 24.173: "IMS Multimedia Telephony Communication Service and Supplementary Services, stage 3".

[89] IETF RFC 5009: "Private Header (P-Header) Extension to the Session Initiation Protocol (SIP) for Authorization of Early Media".

[90] IETF RFC 2663: "IP Network Address Translator (NAT) Terminology and Considerations".

[91] IETF RFC 7044: "An extension to the Session Initiation Protocol (SIP) for Request History Information".

[92] ITU-T Recommendation Q.769.1 (12/99): "Signalling system No. 7 - ISDN user part enhancements for the support of number portability".

[93] IETF RFC 4694: "Number portability parameters for the "tel" URI".

[94] Void.

[95] Void.

[96] ETSI EN 300 403‑1 (V1.3.2): "Integrated Services Digital Network (ISDN); Digital Subscriber Signalling System No. one (DSS1) protocol; Signalling network layer for circuit-mode basic call control; Part 1: Protocol specification [ITU-T Recommendation Q.931 (1993), modified]".

[97] IETF RFC 3966: "The tel URI for Telephone Numbers".

[98] Void.

[99] IETF RFC 7433: "A Mechanism for Transporting User-to-User Call Control Information in SIP".

[99A] IETF RFC 7434: "Interworking ISDN Call Control User Information with SIP".

[100] IETF RFC 4575: "A Session Initiation Protocol (SIP) Event Package for Conference State".

[101] 3GPP TS 24.654: "Closed User Group (CUG) using IP Multimedia (IM) Core Network (CN) subsystem, Protocol Specification".

[102] 3GPP TS 24.616: "Malicious Communication Identification (MCID) using IP Multimedia (IM) Core Network (CN) subsystem; Protocol specification".

[103] 3GPP TS 23.014: "Technical Specification Group Core Network; Support of Dual Tone Multi-Frequency (DTMF) signalling".

[104] 3GPP TS 26.114: "IP Multimedia Subsystem (IMS); Multimedia Telephony; Media handling and interaction".

[105] IETF RFC 4733: "RTP Payload for DTMF Digits, Telephony Tones and Telephony Signals".

[106] IETF RFC 6910: "Completion of Calls for the Session Initiation Protocol (SIP)".

[107] IETF RFC 7462: "URNs for the Alert-Info Header Field of the Session Initiation Protocol (SIP)".

[108] IETF RFC 4715: "The Integrated Services Digital Network (ISDN) Subaddress Encoding Type for tel URI".

[109] IETF RFC 4585: "Extended RTP Profile for Real-time Transport Control Protocol (RTCP)-Based Feedback (RTP/AVPF)".

[110] IETF RFC 5104: "Codec Control Messages in the RTP Audio-Visual Profile with Feedback (AVPF)".

[111] 3GPP TS 24.615: "Communication Waiting (CW) using IP Multimedia (IM) Core Network (CN) subsystem, Protocol Specification".

[112] 3GPP TS 24.642: "Completion of Communications to Busy Subscriber (CCBS) Completion of Communications by No Reply (CCNR) using IP Multimedia (IM) Core Network (CN) subsystem; Protocol specification".

[113] IETF RFC 4458: "Session Initiation Protocol (SIP) URIs for Applications such as Voicemail and Interactive Voice Response (IVR)".

[114] IETF RFC 5993: "RTP Payload format for Global System for Mobile Communications Half Rate (GSM-HR)".

[115] IETF RFC 6432: "Carrying Q.850 Codes in Reason Header Fields in SIP (Session Initiation Protocol) Responses".

[116] IETF RFC 3326: "The Reason Header Field for the Session Initiation Protocol (SIP)".

[117] ANSI Standard ATIS-1000113.2005(R2010) (07/2005): "Signalling System No. 7 (SS7) - Integrated Services Digital Network (ISDN) User Part".

[118] 3GPP TS 23.237: "IP Multimedia subsystem (IMS) Service Continuity; Stage 2".

[119] IETF RFC 5626: "Managing Client Initiated Connections in the Session Initiation Protocol (SIP)".

[120] IETF RFC 7254: "A Uniform Resource Name Namespace for the Global System for Mobile Communications Association (GSMA) and the International Mobile station Equipment Identity (IMEI)".

[121] 3GPP TS 23.172: "Technical realization of Circuit Switched (CS) multimedia service UDI/RDI fallback and service modification; Stage 2".

[122] 3GPP TS 23.226: "Global Text Telephony (GTT); stage 2".

[123] ITU‑T Recommendation T.140 (02/98): "Text conversation presentation protocol".

[124] IETF RFC 4103: "RTP Payload for Text Conversation".

[125] ITU‑T Recommendation V.18 (11/00): "Operational and interworking requirements for DCEs operating in the text telephone mode" including V.18 (2000) Ammendment 1 (11/02): "Harmonization with ANSI TIA/EIA-825 (2000) text phones".

[126] 3GPP TS 26.226: "Cellular text telephone modem; General description".

[127] Void.

[128] Void.

[129] IETF RFC 3168: "The Addition of Explicit Congestion Notification (ECN) to IP".

[130] IETF RFC 6679: "Explicit Congestion Notification (ECN) for RTP over UDP".

[131] IETF RFC 3959: "The Early Session Disposition Type for the Session Initiation Protocol (SIP)".

[132] 3GPP TS 24.182: "IP Multimedia Subsystem (IMS) Customized Alerting Tones (CAT); Protocol specification".

[133] IETF RFC 6086: "Session Initiation Protocol (SIP) INFO Method and Package Framework".

[134] 3GPP TS 23.088: "Call Barring (CB) Supplementary Services; Stage 2".

[135] IETF RFC 3840: "Indicating User Agent Capabilities in the Session Initiation Protocol (SIP)".

[136] 3GPP TS 22.153: "Multimedia Priority Service".

[137] IETF RFC 3023: "XML Media Types".

[138] IETF RFC 6665: "SIP-Specific Event Notification".

[139] IETF RFC 7090: "Public Safety Answering Point (PSAP) Callback".

[141] 3GPP TS 24.292: "IP Multimedia (IM) Core Network (CN) subsystem Centralized Services (ICS); Stage 3".

[142] IETF RFC 6809: "Mechanism to Indicate Support of Features and Capabilities in the Session Initiation Protocol (SIP)".

[143] Void.

[144] Void.

[145] 3GPP TS 23.334: "IMS Application Level Gateway (IMS-ALG) - IMS Access Gateway (IMS-AGW) interface: Procedures Descriptions".

[146] 3GPP TS 26.441: "Codec for Enhanced Voice Services (EVS); General Overview".

[147] 3GPP TS 26.445: "Codec for Enhanced Voice Services (EVS); Detailed Algorithmic Description".

[148] IETF RFC 8119: "SIP "cause" URI Parameter for Service Number Translation".

[149] ITU-T Recommendation Q.931 (05/98): "ISDN user-network interface layer 3 specification for basic call control".

[150] IETF RFC 5939: "Session Description Protocol (SDP) Capability Negotiation".

[151] 3GPP TS 23.333: "Multimedia Resource Function Controller (MRFC) - Multimedia Resource Function Processor (MRFP) Mp interface: Procedures Descriptions".

[152] 3GPP TS 26.453: "Codec for Enhanced Voice Services (EVS); Speech codec frame structure".

[153] IETF RFC 8224: "Authenticated Identity Management in the Session Initiation Protocol (SIP)".

[154] IETF RFC 8197: "A SIP Response Code for Unwanted Calls".

[155] IETF RFC 8606: "ISDN User Part (ISUP) Cause Location Parameter for the SIP Reason Header Field".

[156] IETF RFC 8445: "Interactive Connectivity Establishment (ICE): A Protocol for Network Address Translator (NAT) Traversal".

[157] IETF RFC 8839: "Session Description Protocol (SDP) Offer/Answer Procedures for Interactive Connectivity Establishment (ICE)".

[158] IETF RFC 8489: "Session Traversal Utilities for NAT (STUN)".

[159] 3GPP TS 26.250: "Codec for Immersive Voice and Audio Services – General Overview".

[160] 3GPP TS 26.253: "Codec for Immersive Voice and Audio Services – Detailed Algorithmic Description incl. RTP payload format and SDP parameter definitions".

\* \* \* Next Change \* \* \* \*

## 3.2 Abbreviations

For the purposes of the present document, the abbreviations as defined in TR 21.905 [6] and the following apply:

18x A SIP status-code in the range 180 through 189

2xx A SIP status-code in the range 200 through 299

3PTY Three Party

3xx A SIP status-code in the range 300 through 399

4xx A SIP status-code in the range 400 through 499

5xx A SIP status-code in the range 500 through 599

6xx A SIP status-code in the range 600 through 699

AAL1 ATM Adaptation Layer type 1

ACR Anonymous Call Rejection

AMR Adaptive Multi-Rate

AMR-WB Adaptive Multi-Rate - WideBand

AMR-WB IO Adaptive Multi-Rate - WideBand Inter-operable Mode, included in the EVS and IVAS codecs

ANM Answer Message

APM Application Transport Message

APP APPlication-defined RTCP packet

APRI Address Presentation Restriction Indicator

ATP Access Transport Parameter

BC Bearer Capability

BCI Backward Call Indicators

BGCF Breakout Gateway Control Function

BICC Bearer Independent Call Control

CAT Customized Alerting Tones

CB Communication Barring

CCNR Call Completion on No Reply

CCSS Call Completion Service Set-up

Cda Call Deflection Alerting

Cdi Call Deflection Immediate

CDIV Communication Diversion

CdPN Called Party Number

CFB Call Forwarding Busy

CFNR Call Forwarding No Reply

CGB Circuit Group Blocking

CgPN Calling Party Number

CIC Carrier Identification Code

CMR Codec Mode Request

CON Connect

CONF Conference

COT Continuity

CPC Calling Party's Category

CPG Call ProGress message

CSI Carrier Selection Information

DSCP DiffServ Code Point

DTX Discontinuous Transmission

ECN Explicit Congestion Notification

ECN-CE ECN Congestion Experienced

EVS Enhanced Voice Services

EVS-CMR Codec Mode Request for EVS

FAC Facility

FQC Frame Quality Classification

GN Generic Number

GRS Group Reset

GVNS Global Virtual Network Service

H/W Hardware

ICE Interactive Connectivity Establishment

ICS IMS Centralized Services

IDR Identification Request

IEPS International Emergency Preference Scheme

I-MGCF Incoming MGCF

IM-MGW IP Multimedia Media Gateway Function

INF Information

INR Information Request

IRS Identification Response

ITCC International Telecommunication Charge Card

ITU-T International Telecommunication Union - Telecommunication Standardization Sector

IVAS Immersive Voice and Audio Services

MCID Malicious Communication Identification

M3UA MTP-L3 User Adaptation layer

MLPP Multi-Level Precedence and Pre-emption

MONA Media Orientation Negotiation Acceleration

MPC Media Preconfigured Channel

MPS Multimedia Priority Service

MRFP Media Resource Function Processor

MSN Multiple Subscriber Number

MSU Message Signalling Unit

MWI Message Waiting Indication

NOA Nature Of Address indicator

NPDI Number Portability Database Dip Indicator

OIP Originating Identification Presentation

OIR Originating Identification Restriction

OLI Originating Line Information

O-MGCF Outgoing MGCF

PI Processing Information

Progress Indicator

PIDF Presence Information Data Format

PSAP Public Safety Answering Point

REV Reverse Charging

RLC Release Complete

RSC Reset Circuit

RTCP RTP Control Protocol

RTP Real-time Transport Protocol

SAM Subsequent Address Message

SCTP Stream Control Transmission Protocol

SDPCapNeg SDP Capability Negotiation

SGW Signalling Gateway

SPC Signalling Preconfigured Channel

ST Sending Terminated

STUN Session Traversal Utilities for NAT

TCAP Transaction Capabilities Application Part

TDM Time Division Multiplex

TIP Terminating Identification Presentation

TIR Terminating Identification Restriction

TMR Transmission Medium Requirement

TMU Transmission Medium Used

TNL Transport Network Layer

TNS Transit Network Selection

TP Terminal Portability

UA User Agent

UAC User Agent Client

UDI Unrestricted Digital Information

UDI-TA Unrestricted Digital Information with Tones/Announcements

UID User Interactive Dialog

URI Uniform Resource Identifier

USI User Service Information

UUS User-to-User Signalling

XML eXtensible Markup Language

\* \* \* Next Change \* \* \* \*

##### 8.1.1.3.1 General

The rate control procedure signals to the peer entity the maximum rate among the currently allowed rates at which it can receive codec frames. Rate control only applies to AMR, AMR-WB, EVS and IVAS codec configurations with multiple active modes. For the EVS and the IVAS codecs, the rate control procedure also signals to the peer entity the maximum mode among the currently allowed modes at which it can receive codec frames.

\* \* \* Next Change \* \* \* \*

##### 8.1.1.3.x Interworking of rate control between compatible AMR-WB or EVS and IVAS codec configurations

The IVAS codec includes the EVS AMR-WB IO mode and is therefore TrFO-compatible to the AMR-WB codec, if the mode-set and mode-change-period parameters are TrFO-compatible. For example, AMR-WB on the IM-MGW termination on the Nb interface and IVAS on the IM-MGW termination on the Mb interface are TrFO-compatible codecs, if the mode-set parameters are TrFO-compatible and mode-change-period=2 on both sides.

The IVAS codec includes the EVS Primary mode and is therefore TrFO-compatible to the EVS codec, if the bit rates are TrFO-compatible.

On the Mb interface, IVAS-CMR as specified in 3GPP TS 26.253 [260] clause 10.2 provides for in-band rate and mode control via the Codec Mode Request (CMR) field of the IVAS RTP payload. Alternatively, RTCP-APP packets may be used with corresponding control commands as specified in 3GPP TS 26.114 [104]. The rate and mode control on the Mb interface depends on the SDP offer/answer procedure. It may also be disabled, in which case transcoding is mandatory.

If the IM-MGW bridges compatible IVAS codec configurations and compatible EVS codec configurations or AMR-WB codec configurations:

- If the codec of the incoming termination (on the Mb interface) is IVAS and the codec of the outgoing termination (on the Nb interface) is either AMR-WB or EVS, then the rate control procedure for AMR-WB or EVS shall apply at the outgoing termination, with the maximum rate equal to or lower than the maximum rate received in the IVAS-CMRs or RTCP-APP packets. The IM-MGW shall map received IVAS-CMRs or RTCP-APP packets to the selected bit rates or mode-set of the outgoing EVS or AMR-WB termination.

- The IM-MGW may filter and modify the CMR contents according to the following rules:

1) The IM-MGW shall not modify the IVAS-CMR to increase the maximum bit rate.

2) If the IM-MGW observes the incoming stream of speech frames or packets and determines that a lower IVAS mode is more appropriate, the IM-MGW may modify the IVAS-CMRs sent in the opposite direction of the observed speech flow.

If the IM-MGW bridges IVAS codec configurations and either EVS or AMR-WB codec configurations which are not compatible, the IM-MGW shall apply transcoding and shall handle the independent rate and mode control procedures towards the incoming and the outgoing networks.

\* \* \* Next Change \* \* \* \*

#### 9.2.13.x Handling of IVAS speech codec parameters when interworking with a different codec

The Immersive Voice and Audio Services (IVAS) speech and audio codec is defined in 3GPP TS 26.250 [159]. Its RTP payload type is defined in 3GPP TS 26.253 [160], and procedures for its usage as IMS Multimedia Telephony speech codec are defined in 3GPP TS 26.114 [104].

The MGCF and the IM-MGW may support transcoding the IVAS speech and audio codec to and from another (mono-format) codec (e.g. AMR-WB or EVS). If they do so, the MGCF and the IM-MGW shall support transcoding to and from the IVAS codec using EVS Primary or AMR-WB IO mode, shall support transcoding from the IVAS codec using the IVAS Immersive mode (i.e. decoding the IVAS codec using the IVAS Immersive mode) and they may support transcoding to the IVAS codec using the IVAS Immersive mode, and the procedures in the present clause apply.

The MGCF should not offer an IVAS codec payload type to the SDP offer it sends to avoid the need for transcoding between IVAS immersive mode and another codec in this scenario.

When receiving an SDP offer that contains an IVAS codec payload type, the MGCF shall handle the IVAS codec parameters as described in table 9.2.13.x.1 if the MGCF selects the IVAS payload type in the SDP answer. In addition, rules for the parameter handling in 3GPP TS 26.253 [160] shall apply.

Table 9.2.13.x.1: MGCF handling of IVAS related SDP parameters when the MGCF receives the IVAS payload type in an SDP offer and decides to select the IVAS payload in the SDP answer

|  |  |  |
| --- | --- | --- |
| Parameter | Handling of IVAS payload type parameter received in the SDP offer | IVAS payload type supplied in the SDP answer |
| ivas-mode-switch  (NOTE 6) | If the ivas-mode-switch parameter is contained in the SDP offer and the MGCF selects the IVAS payload type for transcoding, the MGCF shall forward this parameter to the IM-MGW for the termination towards the offerer in the remote descriptor. | If the ivas-mode-switch parameter is contained in the SDP offer, the MGCF shall include the ivas-mode-switch parameter with unmodified value in the SDP answer.  Otherwise, if the MGCF decides to interwork between AMR-WB or EVS and IVAS using EVS Primary or AMR-WB IO mode (e.g. because AMR-WB or EVS was selected in the received SDP answer), it shall include the ivas-mode-switch with value 1.  Otherwise, the MGCF shall not include the ivas-mode-switch.  If the MGCF supplies the ivas-mode-switch in the SDP answer, it shall also supply it to the IM-MGW in the local descriptor for the termination towards the offerer with the same value. |
| evs-mode-switch (NOTE 1) | If the evs-mode-switch parameter is contained in the SDP offer and the MGCF selects the IVAS payload type, the MGCF shall forward this parameter to the IM-MGW for the termination towards the offerer in the remote descriptor. | If the evs-mode-switch parameter is contained in the SDP offer, the MGCF shall include the evs-mode-switch parameter with unmodified value in the SDP answer.  Otherwise, if the MGCF decides to interwork between AMR-WB or EVS using AMR-WB IO mode and IVAS using AMR-WB IO mode, it shall include the evs-mode-switch with value 1.  Otherwise, the MGCF shall not include the evs-mode-switch.  If the MGCF supplies the evs-mode-switch in the SDP answer, it shall also supply it to the IM-MGW in the local descriptor for the termination towards the offerer with the same value. |
| hf-only (NOTE 1) | If the hf-only parameter is contained in the SDP offer and set to 1 and the MGCF selects the IVAS payload type, the MGCF shall forward this parameter to the IM-MGW for the termination towards the offerer in the remote descriptor. | If the hf-only parameter is contained in the SDP offer and set to 1, the MGCF shall include the hf-only parameter with unmodified value in the SDP answer.  If the MGCF supplies the hf-only parameter in the SDP answer, it shall also supply it to the IM-MGW in the local descriptor for the termination towards the offerer with the same value. |
| dtx (NOTE 1) | If the dtx parameter is contained in the SDP offer and the MGCF selects the IVAS payload type, the MGCF shall forward this parameter to the IM-MGW for the termination towards the offerer in the remote descriptor. | If the dtx parameter is contained in the SDP offer, the MGCF shall include the dtx parameter with unmodified value in the SDP answer.  If the dtx parameter is not contained in the SDP offer and if a dtx-recv parameter is contained in the SDP offer, the MGCF may include the dtx parameter in the SDP answer, and the value of the dtx parameter shall then be identical to that of the dtx-recv parameter in the SDP offer (e.g, if that value matches DTX capabilities of expected codecs to transcode with).  If the dtx parameter is not contained in the SDP offer and if the dtx-recv parameter is not contained in the SDP offer, and if the usage of DTX is not desired (e.g. due to DTX capabilities of expected codecs to transcode with), the MGCF shall include in the SDP answer the dtx parameter with a value 0.  If the MGCF supplies the dtx parameter in the SDP answer, it shall also supply it to the IM-MGW in the local descriptor for the termination towards the offerer with the same value. |
| dtx-recv (NOTE 1) | If the dtx-recv parameter is contained in the SDP offer and the MGCF selects the IVAS payload type, the MGCF shall forward this parameter to the IM-MGW for the termination towards the offerer in the remote descriptor. | If no dtx parameter is included in the SDP answer and if the reception of DTX is not desired, the MGCF shall include in the SDP answer the dtx-recv parameter with a value 0.  If both the dtx and dtx-recv parameters are included, those parameters shall have the same value; however, inclusion of the dtx-recv parameter is not required if the dtx parameter is included.  If the MGCF supplies the dtx-recv parameter in the SDP answer, it should also supply it to the IM-MGW in the local descriptor for the termination towards the offerer with the same value. |
| br (NOTE 1) | If the br parameter is contained in the SDP offer, the MGCF shall check if the IM-MGW supports the indicated bit rates, or a subset of them, in EVS primary mode in the send and receive direction. If the indicated bit rates, and even each subset of them, are not supported, the MGCF shall not select the IVAS payload type. If the MGCF selects the IVAS payload type, it shall forward this parameter to the IM-MGW for the termination towards the offerer in the remote descriptor. | If the br parameter is contained in the SDP offer, the MGCF shall select a bit rate value, which is either the received br value or a subset of it, based on IM-MGW capabilities and possible configured policies, and shall include the br parameter with the selected value that is also supplied towards the IM-MGW in the SDP answer.  Otherwise, if the MGCF desires the same bit rate range for the send and receive direction in IVAS primary mode, and wants to restrict the bit rate range to match IM-MGW capabilities and possible configured policies, the MGCF shall supply the br parameter in the SDP answer it sends.  Otherwise, the MGCF shall not include this parameter in the SDP answer.  If the MGCF also supplies the bw, bw-send or bw-recv parameter, the value of the br parameter shall be compatible with the values of those parameters.  If the MGCF supplies the br parameter in the SDP answer, it shall also supply to the IM-MGW the br parameter in the local descriptor for the termination towards the offerer with the same value. |
| br-send (NOTE 1) | If the br-send parameter is contained in the SDP offer, the MGCF shall check if the IM-MGW supports the indicated bit rates, or a subset of them, in EVS primary mode in the receive direction. If the indicated bit rates, and even each subset of them, are not supported, the MGCF shall not select the IVAS payload type. If the MGCF selects the IVAS payload type, it shall forward this parameter to the IM-MGW for the termination towards the offerer in the remote descriptor. | If the br-recv parameter is contained in the SDP offer, the MGCF shall select a bit rate value, which is either the received br-recv value or a subset of it, based on IM-MGW capabilities and possible configured policies, and the MGCF shall include the br-send parameter with the selected value that is also supplied towards the IM-MGW in the SDP answer.  Otherwise, if the MGCF desires a different bit rate (range) for the send and receive direction in IVAS primary mode, and wants to restrict the bit rate range for the send direction to match IM-MGW capabilities and possible configured policies, it shall supply the br-send parameter in the SDP answer it sends.  Otherwise, the MGCF shall not include the br-send parameter in the SDP answer.  If the MGCF also supplies the bw or bw-send parameter, the value of the br-send parameter shall be compatible with the values of those parameters.  If the MGCF supplies the br-send parameter in the SDP answer, it shall also supply to the IM-MGW the br-send parameter in the local descriptor for the termination towards the offerer with the same value. |
| br-recv (NOTE 1) | If the br-recv parameter is contained in the SDP offer, the MGCF shall check if the IM-MGW supports the indicated bit rates, or a subset of them, in EVS primary mode in the send direction. If the indicated bit rates, and even each subset of them, are not supported, the MGCF shall not select the IVAS payload type. If the MGCF selects the IVAS payload type, it shall forward this parameter to the IM-MGW for the termination towards the offerer in the remote descriptor. | If the br-send parameter is contained in the SDP offer, the MGCF shall select a bit rate value, which is either the received br-send value or a subset of it, based on IM-MGW capabilities and possible configured policies, and the MGCF shall include the br-recv parameter with the selected value that is also supplied towards the IM-MGW in the SDP answer.  Otherwise, if the MGCF desires a different bit rate (range) for the send and receive direction in IVAS primary mode, and wants to restrict the bit rate range for the receive direction to match IM-MGW capabilities and possible configured policies, it shall supply the br-recv parameter in the SDP answer it sends.  Otherwise, the MGCF shall not include the br-recv parameter in the answer.  If the MGCF also supplies the bw or bw-recv parameter, the value of the br-recv parameter shall be compatible with the values of those parameters.  If the MGCF supplies the br-recv parameter in the SDP answer, it shall also supply to the IM-MGW the br-recv parameter in the local descriptor for the termination towards the offerer with the same value. |
| bw (NOTE 1) | If the bw parameter is contained in the SDP offer, the MGCF shall check if the IM-MGW supports the indicated sampling bandwidth(s), or a subset of them, in EVS primary mode in the send and receive direction. If the indicated sampling bandwidth(s), and even each subset of them, are not supported, the MGCF shall not select the IVAS payload type. If the MGCF selects the IVAS payload type, it shall forward this parameter to the IM-MGW for the termination towards the offerer in the remote descriptor. | If a bw parameter is contained in the SDP offer, the MGCF shall select a sampling bandwidth value, which is either the received bw value or a subset of it, based on IM-MGW capabilities, possible configured policies, and the bw range of other codecs to transcode with, and the MGCF shall include the bw parameter with the selected value that is also supplied towards the IM-MGW in the SDP answer.  Otherwise, if the MGCF desires the same sampling bandwidth(s) for the send and receive direction in IVAS primary mode, and wants to restrict the sampling bandwidth(s) to match IM-MGW capabilities, possible configured policies, and the bw range of other codecs to transcode with, the MGCF shall supply the bw parameter in the SDP answer it sends.  Otherwise, the MGCF shall not include this parameter in the answer.  If the MGCF also supplies the br, br-send or br-recv parameter, the value of the bw parameter shall be compatible with the values of those parameters.  If the MGCF supplies the bw parameter in the SDP answer, it shall also supply to the IM-MGW the bw parameter in the local descriptor for the termination towards the offerer with the same value. |
| bw-send (NOTE 1) | If the bw-send parameter is contained in the SDP offer, the MGCF shall check if the IM-MGW supports the indicated sampling bandwidths, or a subset of them, in EVS primary mode in the receive direction. If the indicated sampling bandwidths, and even each subset of them, are not supported, the MGCF shall not select the IVAS payload type. If the MGCF selects the IVAS payload type, it shall forward this parameter to the IM-MGW for the termination towards the offerer in the remote descriptor. | If the bw-recv parameter is contained in the SDP offer, the MGCF shall select a sampling bandwidths value, which is either the received bw-recv value or a subset of it, based on IM-MGW capabilities, possible configured policies, and the bw range of other codecs to transcode with, and the MGCF shall include the bw-send parameter with the selected value in the SDP answer.  Otherwise, if the MGCF desires different sampling bandwidths for the send and receive direction in IVAS primary mode, and wants to restrict the sampling bandwidths for the send direction to match IM-MGW capabilities, possible configured policies, and the bw range of other codecs to transcode with, the MGCF shall supply the bw-send parameter in the SDP answer it sends.  Otherwise, the MGCF shall not include the bw-send parameter in the SDP answer.  If the MGCF also supplies the br or br-send parameter, the value of the bw-send parameter shall be compatible with the values of those parameters.  If the MGCF supplies the bw-send parameter in the SDP answer, it shall also supply to the IM-MGW the bw-send parameter in the local descriptor for the termination towards the offerer with the same value. |
| bw-recv (NOTE 1) | If the br-recv parameter is contained in the SDP offer, the MGCF shall check if the IM-MGW supports the indicated sampling bandwidths, or a subset of them, in EVS primary mode in the send direction. If the indicated sampling bandwidths, and even each subset of them, are not supported, the MGCF shall not select the IVAS payload type. If the MGCF selects the IVAS payload type, it shall forward the bw-recv parameter to the IM-MGW for the termination towards the offerer in the remote descriptor. | If the bw-send parameter is contained in the SDP offer, the MGCF shall select a sampling bandwidths value, which is either the received bw-send value or a subset of it, based on IM-MGW capabilities, possible configured policies, and the bw range of other codecs to transcode with, and the MGCF shall include the bw-recv parameter with the selected value in the SDP answer.  Otherwise, if the MGCF desires different sampling bandwidths for the send and receive direction in IVAS primary mode, and wants to restrict the sampling bandwidths for the receive direction to match IM-MGW capabilities, possible configured policies, and the bw range of other codecs to transcode with, the MGCF shall supply the bw-recv parameter in the SDP answer it sends.  Otherwise, the MGCF shall not include the bw-recv parameter in the SDP answer.  If the MGCF also supplies the br or br-recv parameter, the value of the bw-recv parameter shall be compatible with the values of those parameters.  If the MGCF supplies the bw-recv parameter in the SDP answer, it shall also supply it to the IM-MGW in the local descriptor for the termination towards the offerer with the same value. |
| cmr (NOTE 6) | If the cmr parameter is contained in the SDP offer and the MGCF selects the IVAS payload type, the MGCF shall forward this parameter to the IM-MGW for the termination towards the offerer in the remote descriptor. | If the cmr parameter is contained in the SDP offer, the MGCF shall include the cmr parameter with unmodified value in the SDP answer.  Otherwise, if the IM-MGW desires to disable codec mode requests within the RTP payload of the IVAS primary mode (due to the IM-MGW capabilities and possible configured policies), it shall include the cmr parameter with value -1 in the SDP answer it sends.  If the MGCF supplies the cmr parameter in the SDP answer, it shall also supply it to the IM-MGW in the local descriptor for the termination towards the offerer with the same value. |
| ch-aw-recv (NOTE 1) | If the ch-aw-recv parameter is contained in the SDP offer the MGCF shall check if the IM-MGW supports the indicated mode in the send direction. If the indicated mode is not supported, the MGCF shall not select the IVAS payload type. If the MGCF selects the IVAS payload type, the MGCF shall forward this parameter to the IM-MGW for the termination towards the offerer in the remote descriptor. | If the MGCF it desires to control the channel-aware mode of IVAS in the receive direction, e.g. to disable it with value -1, it shall include the ch-aw-recv parameter in the SDP answer and shall also supply the ch-aw-recv parameter to the IM-MGW in the local descriptor for the termination towards the offerer with the same value. The MGCF shall consider the capabilities of the IM-MGW when it chooses an appropriate value. |
| mode-set (NOTE 3) | If the mode-set parameter is contained in the SDP offer and the MGCF selects the IVAS payload type, the MGCF shall forward this parameter to the IM-MGW for the termination towards the offerer in the remote descriptor. | If the mode-set parameter is contained in the SDP offer, the MGCF shall include the mode-set parameter with unmodified value in the SDP answer.  Otherwise, if AMR-WB is used to interwork with, the MGCF should include the mode-set parameter with a value indicating the mode that was negotiated for AMR-WB (or omit it if no restrictions applied before).  If the MGCF supplies the mode-set parameter in the SDP answer, it shall also supply it to the IM-MGW in the local descriptor for the termination towards the offerer with the same value. |
| mode-change-period (NOTE 3) | If the mode-change-period parameter is contained in the SDP offer and the MGCF selects the IVAS payload type, the MGCF shall forward this parameter to the IM-MGW for the termination towards the offerer in the remote descriptor. | If AMR-WB is used to interwork with, the MGCF should include the mode-change-period parameter with a value indicating the mode that was negotiated for AMR-WB (or omit it if no restrictions applied before) in the SDP answer.  If the MGCF supplies the mode-change-period parameter in the SDP answer, it shall also supply it to the IM-MGW in the local descriptor for the termination towards the offerer with the same value. |
| mode-change-capability (NOTE 3) | If the mode-change-capability parameter is contained in the SDP offer and the MGCF selects the IVAS payload type, the MGCF may forward this parameter to the IM-MGW for the termination towards the offerer in the remote descriptor. | If the MGCF selects the IVAS payload type, the MGCF shall include the mode-change-capability parameter with value 2 or omit it in the SDP answer.  If the MGCF supplies the mode-change-capability parameter in the SDP answer, it may also supply it to the IM-MGW in the local descriptor for the termination towards the offerer with the same value. |
| mode-change-neighbor (NOTE 3) | If the mode-change-neighbor parameter is contained in the SDP offer and the MGCF selects the IVAS payload type, the MGCF shall forward this parameter to the IM-MGW for the termination towards the offerer in the remote descriptor. | If AMR-WB is used to interwork with, the MGCF should include the mode-change-neighbor parameter with a value indicating the mode that was negotiated for AMR-WB (or omit it if no restrictions applied before) in the SDP answer.  If the MGCF supplies the mode-change-neighbor parameter in the SDP answer, it shall also supply it to the IM-MGW in the local descriptor for the termination towards the offerer with the same value. |
| max-red (NOTE 5) | If the max-red parameter is contained in the SDP offer and the MGCF selects the IVAS payload type, the MGCF shall forward this parameter to the IM-MGW for the termination towards the offerer in the remote descriptor. | The MGCF shall only include the max-red parameter in the SDP answer if it desires to restrict the maximum redundancy of received packets. When selecting the value of the max-red parameter, the MGCF shall consider the capabilities of the IM-MGW.  If the MGCF supplies the max-red parameter in the SDP answer, it shall also supply it to the IM-MGW in the local descriptor for the termination towards the offerer with the same value. |
| 3gpp\_mtsi\_app\_adapt (NOTE 4) | If a 3gpp\_mtsi\_app\_adapt SDP attribute is contained in the SDP offer, and the MGCF selects the IVAS payload type, the MGCF shall forward this parameter to the IM-MGW in the remote descriptor. | If the IM-MGW supports RTCP APP based adaptation messages defined in TS 26.114 [104], and the MGCF has a policy to negotiate the usage of those messages, the MGCF shall include the 3gpp\_mtsi\_app\_adapt SDP attribute indicating the allowed APP messages in the SDP answer. |
| ibr (NOTE 6) | If the ibr parameter is contained in the SDP offer, the MGCF shall check if the IM-MGW supports the indicated bitrates, or a subset of them, for IVAS immersive operation in the send and receive direction. If the indicated bitrates, and even each subset of them, are not supported, the MGCF shall not select transcoding with IVAS.  If the MGCF selects transcoding with IVAS, it shall forward this parameter to the IM-MGW for the termination towards the offerer in the remote descriptor. | If the ibr parameter is contained in the SDP offer, the MGCF shall select a bitrate value, which is either the received ibr value or a subset of it, based on IM-MGW capabilities and possible configured policies, and shall include the ibr parameter with the selected value that is also supplied towards the IM-MGW in the SDP answer.  Otherwise, if the MGCF desires the same bit rate range for the send and receive direction for IVAS immersive operation, and wants to restrict the bit rate range to match IM-MGW capabilities and possible configured policies, it shall supply the ibr parameter in the SDP answer it sends.  Otherwise, the MGCF shall not include this parameter in the SDP answer.  If the MGCF also supplies the ibw, ibw-send or ibw-recv parameter, the value of the ibr parameter shall be compatible with the values of those parameters.  If the MGCF supplies the ibr parameter in the SDP answer, it shall also supply to the IM-MGW the ibr parameter in the local descriptor for the termination towards the offerer with the same value. |
| ibr-send  (NOTE 6) | If the ibr-send parameter is contained in the SDP offer, the MGCF shall check if the IM-MGW supports the indicated bitrates, or a subset of them, for IVAS immersive operation in the receive direction. If the indicated bitrates, and even each subset of them, are not supported, the MGCF shall not select transcoding with IVAS.  If the MGCF selects transcoding with IVAS, it shall forward this parameter to the IM-MGW for the termination towards the offerer in the remote descriptor. | If the ibr-recv parameter is contained in the SDP offer, the MGCF shall select a bitrate value, which is either the received ibr-recv value or a subset of it, based on IM-MGW capabilities and possible configured policies, and shall include the ibr-send parameter with the selected value that is also supplied towards the IM-MGW in the SDP answer.  Otherwise, if the MGCF desires a different bit rate (range) for the send and receive direction for IVAS immersive operation, and wants to restrict the bit rate range for the send direction to match IM-MGW capabilities and possible configured policies, it shall supply the ibr-send parameter in the SDP answer it sends.  Otherwise, the MGCF shall not include the ibr-send parameter in the SDP answer.  If the MGCF also supplies the ibw or ibw-send parameter, the value of the ibr-send parameter shall be compatible with the values of those parameters.  If the MGCF supplies the ibr-send parameter in the SDP answer, it shall also supply to the IM-MGW the ibr-send parameter in the local descriptor for the termination towards the offerer with the same value. |
| ibr-recv (NOTE 6) | If the ibr-recv parameter is contained in the SDP offer, the MGCF shall check if the IM-MGW supports the indicated bitrates, or a subset of them, for IVAS immersive operation in the send direction. If the indicated bitrates, and even each subset of them, are not supported, the MGCF shall not select transcoding with IVAS.  If the MGCF selects transcoding with IVAS, it shall forward this parameter to the IM-MGW for the termination towards the offerer in the remote descriptor. | If the ibr-send parameter is contained in the SDP offer, the MGCF shall select a bitrate value, which is either the received ibr-send value or a subset of it, based on IM-MGW capabilities and possible configured policies, and shall include the ibr-recv parameter with the selected value that is also supplied towards the IM-MGW in the SDP answer.  Otherwise, if the MGCF desires a different bit rate (range) for the send and receive direction for IVAS immersive operation, and wants to restrict the bit rate range for the receive direction to match IM-MGW capabilities and possible configured policies, it shall supply the ibr-recv parameter in the SDP answer it sends.  Otherwise, the MGCF shall not include the ibr-recv parameter in the SDP answer.  If the MGCF also supplies the ibw or ibw-recv parameter, the value of the ibr-recv parameter shall be compatible with the values of those parameters.  If the MGCF supplies the ibr-recv parameter in the SDP answer, it shall also supply to the IM-MGW the ibr-recv parameter in the local descriptor for the termination towards the offerer with the same value. |
| ibw (NOTE 6) | If the ibw parameter is contained in the SDP offer, the MGCF shall check if the IM-MGW supports the indicated bandwidth(s), or a subset of them, for IVAS immersive operation in the send and receive direction. If the indicated sampling bandwidth(s), and even each subset of them, are not supported, the MGCF shall not select transcoding with IVAS.  If the MGCF selects transcoding with IVAS, it shall forward this parameter to the IM-MGW for the termination towards the offerer in the remote descriptor. | If the ibw parameter is contained in the SDP offer, the MGCF shall select a sampling bandwidth value, which is either the received ibw value or a subset of it, based on IM-MGW capabilities and possible configured policies, and shall include the ibw parameter with the selected value that is also supplied towards the IM-MGW in the SDP answer.  Otherwise, if the MGCF desires the same sampling bandwidth(s) for the send and receive direction for IVAS immersive operation, and wants to restrict the sampling bandwidth(s) to match IM-MGW capabilities and possible configured policies, it shall supply the bw parameter in the SDP answer it sends.  Otherwise, the MGCF shall not include this parameter in the SDP answer.  If the MGCF also supplies the ibr, ibr-send or ibr-recv parameter, the value of the ibw parameter shall be compatible with the values of those parameters.  If the MGCF supplies the ibw parameter in the SDP answer, it shall also supply to the IM-MGW the ibw parameter in the local descriptor for the termination towards the offerer with the same value. |
| ibw-send (NOTE 6) | If the ibw-send parameter is contained in the SDP offer, the MGCF shall check if the IM-MGW supports the indicated bandwidths, or a subset of them, for IVAS immersive operation in the receive direction. If the indicated sampling bandwidths, and even each subset of them, are not supported, the MGCF shall not select transcoding with IVAS.  If the MGCF selects transcoding with IVAS, it shall forward this parameter to the IM-MGW for the termination towards the offerer in the remote descriptor. | If the ibw-recv parameter is contained in the SDP offer, the MGCF shall select a sampling bandwidths value, which is either the received ibw-recv value or a subset of it, based on IM-MGW capabilities and possible configured policies, and shall include the ibw-send parameter with the selected value in the SDP answer.  Otherwise, if the MGCF desires different sampling bandwidths for the send and receive direction for IVAS immersive operation, and wants to restrict the sampling bandwidths for the send direction to match IM-MGW capabilities and possible configured policies, it shall supply the ibw-send parameter in the SDP answer it sends.  Otherwise, the MGCF shall not include the ibw-send parameter in the SDP answer.  If the MGCF also supplies the ibr or ibr-send parameter, the value of the ibw-send parameter shall be compatible with the values of those parameters.  If the MGCF supplies the ibw-send parameter in the SDP answer, it shall also supply to the IM-MGW the ibw-send parameter in the local descriptor for the termination towards the offerer with the same value. |
| ibw-recv (NOTE 6) | If the ibr-recv parameter is contained in the SDP offer, the MGCF shall check if the IM-MGW supports the indicated bandwidths, or a subset of them, for IVAS immersive operation in the send direction. If the indicated sampling bandwidths, and even each subset of them, are not supported, the MGCF shall not select transcoding with IVAS.  If the MGCF selects transcoding with IVAS, it shall forward this parameter to the IM-MGW for the termination towards the offerer in the remote descriptor. | If the ibw-send parameter is contained in the SDP offer, the MGCF shall select a sampling bandwidths value, which is either the received ibw-send value or a subset of it, based on IM-MGW capabilities and possible configured policies, and shall include the ibw-recv parameter with the selected value in the SDP answer.  Otherwise, if the MGCF desires different sampling bandwidths for the send and receive direction for IVAS immersive operation, and wants to restrict the sampling bandwidths for the receive direction to match IM-MGW capabilities and possible configured policies, it shall supply the ibw-recv parameter in the SDP answer it sends.  Otherwise, the MGCF shall not include the ibw-recv parameter in the SDP answer.  If the MGCF also supplies the ibr or ibr-recv parameter, the value of the ibw-recv parameter shall be compatible with the values of those parameters.  If the MGCF supplies the ibw-recv parameter in the SDP answer, it shall also supply it to the IM-MGW in the local descriptor for the termination towards the offerer with the same value. |
| cf (NOTE 6) | If the cf parameter is contained in the SDP offer, the MGCF shall check if the IM-MGW supports the indicated IVAS coded-formats, or a subset of them, for IVAS immersive operation in the send and receive direction. The MGCF shall remove from the received list the coded-formats not supported by the IM-MGW.  If none of the indicated IVAS coded-formats are supported, the MGCF shall not select transcoding with IVAS.  If the MGCF selects transcoding with IVAS, it shall forward this parameter to the IM-MGW for the termination towards the offerer in the remote descriptor. | If the cf parameter is contained in the SDP offer, the MGCF shall select the list of IVAS coded-format, based on the received list, IM-MGW capabilities and possible configured policies, and shall include the cf parameter with the resulting list in the SDP answer.  If the MGCF supplies the cf parameter in the SDP answer, the MGCF shall also supply it to the IM-MGW in the local descriptor for the termination towards the offerer with the same value. |
| cf-send (NOTE 6) | If the cf-send parameter is contained in the SDP offer, the MGCF shall check if the IM-MGW supports the indicated IVAS coded-formats, or a subset of them, for IVAS immersive operation in the receive direction. The MGCF shall remove from the received list the coded-formats not supported by the IM-MGW.  If none of the indicated IVAS coded-formats are supported, the MGCF shall not select transcoding with IVAS.  If the MGCF selects transcoding with IVAS, it shall forward this parameter to the IM-MGW for the termination towards the offerer in the remote descriptor. | If the cf-recv parameter is contained in the SDP offer, the MGCF shall select the list of IVAS coded-format, based on the received list, IM-MGW capabilities and possible configured policies, and shall include the cf-send parameter with the resulting list in the SDP answer.  If the MGCF supplies the cf-send parameter in the SDP answer, the MGCF shall also supply to the IM-MGW the cf-send parameter in the local descriptor for the termination towards the offerer with the same value. |
| cf-recv (NOTE 6) | If the cf-recv parameter is contained in the SDP offer, the MGCF shall check if the IM-MGW supports the indicated IVAS coded-formats, or a subset of them, for IVAS immersive operation in the send direction. The MGCF shall remove from the received list the coded-formats not supported by the IM-MGW.  If none of the indicated IVAS coded-formats are supported, the MGCF shall not select transcoding with IVAS.  If the MGCF selects transcoding with IVAS, it shall forward this parameter to the IM-MGW for the termination towards the offerer in the remote descriptor. | If the cf-send parameter is contained in the SDP offer, the MGCF shall select the list of IVAS coded-format, based on the received list, IM-MGW capabilities and possible configured policies, and shall include the cf-recv parameter with the resulting list in the SDP answer.  If the MGCF supplies the cf-recv parameter in the SDP answer, the MGCF shall also supply to the IM-MGW the cf-recv parameter in the local descriptor for the termination towards the offerer with the same value. |
| pi-types (NOTE 6) | If the pi-types parameter is contained in the SDP offer, the MGCF shall check if the IM-MGW supports the received PI data types, for IVAS immersive operation in the send and receive direction.  The MGCF shall set the pi-types parameter based on the received value and the IM-MGW capabilities.  If the MGCF selects transcoding with IVAS, it shall forward the resulting parameter to the IM-MGW for the termination towards the offerer in the remote descriptor. | If the pi-types parameter is contained in the SDP offer, the MGCF shall set the pi-types parameter based on the received value and the IM-MGW capabilities, and shall include the resulting pi-types parameter in the SDP answer.  If none of the received PI data types are supported, the MGCF shall not include the pi-types parameter in the SDP answer.  If the MGCF supplies the pi-types parameter in the SDP answer, it shall also supply to the IM-MGW the pi-types parameter in the local descriptor for the termination towards the offerer with the same value. |
| pi-types-send (NOTE 6) | If the pi-types-send parameter is contained in the SDP offer, the MGCF shall check if the IM-MGW supports the received PI data types, for IVAS immersive operation in the receive direction.  The MGCF shall set the pi-types-send parameter based on the received value and the IM-MGW capabilities.  If the MGCF selects transcoding with IVAS, it shall forward the resulting parameter to the IM-MGW for the termination towards the offerer in the remote descriptor. | If the pi-types-recv parameter is contained in the SDP offer, the MGCF shall set the pi-types-send parameter based on the received value and the IM-MGW capabilities, and shall include the resulting pi-types-send parameter in the SDP answer.  If none of the received PI data types are supported, the MGCF shall not include the pi-types-send parameter in the SDP answer.  If the MGCF supplies the pi-types-send parameter in the SDP answer, it shall also supply to the IM-MGW the pi-types-send parameter in the local descriptor for the termination towards the offerer with the same value. |
| pi-types-recv (NOTE 6) | If the pi-types-recv parameter is contained in the SDP offer, the MGCF shall check if the IM-MGW supports the received PI data types, for IVAS immersive operation in the send direction.  The MGCF shall set the pi-types-recv parameter based on the received value and the IM-MGW capabilities.  If the MGCF selects transcoding with IVAS, it shall forward the resulting parameter to the IM-MGW for the termination towards the offerer in the remote descriptor. | If the pi-types-send parameter is contained in the SDP offer, the MGCF shall set the pi-types-recv parameter based on the received value and the IM-MGW capabilities, and shall include the resulting pi-types-recv parameter in the SDP answer.  If none of the received PI data types are supported, the MGCF shall not include the pi-types-recv parameter in the SDP answer.  If the MGCF supplies the pi-types-recv parameter in the SDP answer, it shall also supply to the IM-MGW the pi-types-recv parameter in the local descriptor for the termination towards the offerer with the same value. |
| pi-br (NOTE 6) | If the pi-br parameter is contained in the SDP offer, the MGCF shall check if the IM-MGW supports the indicated maximum bitrate, for IVAS immersive operation in the send and receive direction. If the indicated maximum bitrate is not supported, the MGCF shall return the pi-br parameter with the maximum bit rate supported by the IM-MGW for PI data.  If the MGCF selects transcoding with IVAS, the MGCF shall forward the resulting pi-br parameter to the IM-MGW for the termination towards the offerer in the remote descriptor. | If the pi-br parameter is not contained in the SDP offer, the MGCF shall not include this parameter in the SDP answer.  Otherwise, the MGCF shall select the maximum bit rate value for PI data, based on the received value, IM-MGW capabilities and possible configured policies, and shall include the pi-ibr parameter with the selected value that is also supplied towards the IM-MGW in the SDP answer.  If the MGCF supplies the pi-br parameter in the SDP answer, it shall also supply to the IM-MGW the pi-br parameter in the local descriptor for the termination towards the offerer with the same value. |
| pi-br-send (NOTE 6) | If the pi-br-send parameter is contained in the SDP offer, the MGCF shall check if the IM-MGW supports the indicated maximum bitrate, for IVAS immersive operation in the receive direction. If the indicated maximum bitrate is not supported, the MGCF shall return the pi-br-recv parameter in the SDP answer with the maximum bit rate supported by the IM-MGW for PI data.  If the MGCF selects transcoding with IVAS, the MGCF shall forward the pi-br-send parameter (possibly modified to the maximum bit rate supported by the IM-MGW for PI data) to the IM-MGW for the termination towards the offerer in the remote descriptor. | If the pi-br-recv parameter is contained in the SDP offer, the MGCF shall select the maximum bit rate value for PI data, based on the received value, IM-MGW capabilities and possible configured policies, and shall include the pi-ibr-send parameter with the selected value that is also supplied towards the IM-MGW in the SDP answer.  Otherwise, the MGCF shall not include this parameter in the SDP answer.  If the MGCF supplies the pi-br-send parameter in the SDP answer, it shall also supply to the IM-MGW the pi-br-send parameter in the local descriptor for the termination towards the offerer with the same value. |
| pi-br-recv (NOTE 6) | If the pi-br-recv parameter is contained in the SDP offer, the MGCF shall check if the IM-MGW supports the indicated maximum bitrate, for IVAS immersive operation in the send direction. If the indicated maximum bitrate is not supported, the MGCF shall return the pi-br-send parameter in the SDP answer with the maximum bit rate supported by the IM-MGW for PI data.  If the MGCF selects transcoding with IVAS, the MGCF shall forward the pi-br-recv parameter (possibly modified to the maximum bit rate supported by the IM-MGW for PI data) to the IM-MGW for the termination towards the offerer in the remote descriptor. | If the pi-br-send parameter is contained in the SDP offer, the MGCF shall select the maximum bit rate value for PI data, based on the received value, IM-MGW capabilities and possible configured policies, and shall include the pi-ibr-recv parameter with the selected value that is also supplied towards the IM-MGW in the SDP answer.  Otherwise, the MGCF shall not include this parameter in the SDP answer.  If the MGCF supplies the pi-br-recv parameter in the SDP answer, it shall also supply to the IM-MGW the pi-br-recv parameter in the local descriptor for the termination towards the offerer with the same value. |
| NOTE 1: This MIME parameter of the IVAS RTP payload type is defined in TS 26.445 [147]. It is encapsulated within the SDP "a=fmtp" attribute defined IETF RFC 4566 [56].  NOTE 2: This number of channels are encoded as "encoding parameters" of the SDP "a=rtpmap" attribute defined in IETF RFC 4566 [56].  NOTE 3 This MIME parameter of the IVAS RTP payload type relates to AMR-WB IO mode and is defined in IETF RFC 4867 [23]. It is encapsulated within the SDP "a=fmtp" attribute defined IETF RFC 4566 [56].  NOTE 4: This SDP attribute is defined in TS 26.114 [104]. It applies to all codecs offered in an SDP media line. However, some values are specific to EVS.  NOTE 5: This MIME parameter of the IVAS RTP payload type is defined in IETF RFC 4867 [23]. It is encapsulated within the SDP "a=fmtp" attribute defined IETF RFC 4566 [56].  NOTE 6: This MIME parameter of the IVAS RTP payload type is defined in 3GPP TS 26.253 [160]. It is encapsulated within the SDP "a=fmtp" attribute defined IETF RFC 4566 [56]. | | |

IM-MGW handling of IVAS codec parameters shall follow table 5.13.x.2 in 3GPP TS 23.334 [145]. The IM-MGW should support transcoding of IVAS with bandwidths (sampling rates) which are supported by codec the IM-MGW is capable to transcode IVAS to/from (e.g. EVS or AMR-WB).

\* \* \* End of Changes \* \* \* \*