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E M P F E H L U N G

Technische Basisanforderungen für die IP-basierte nationale Netzzusammenschaltung für Voice-Dienste

Anhang B: IMS-IMS Interconnection

Zuordnung: AG IP-IC

Ausgabenübersicht

Ausgabe Nr.	1	2			
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AK-TK Geschäftsstelle	Helmut Malleck	Florian Pauli			

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1. Allgemeines

1.1. Einleitung

Dieses Dokument ist ein Anhang zur bestehenden Empfehlung des AK-TK EP022, *„technische Basisanforderungen an die nationale Zusammenschaltung für Voice-Dienste*" und behandelt die erforderlichen Funktionen und Parameter, die bei der Zusammenschaltung von Netzen über ein II-NNI Interface insbesondere für IMS-Services zur Verfügung zu stellen sind. Die Empfehlung AK-TK EP022 ist daher in ihrer Gesamtheit auch für die IMS-IMS Zusammenschaltung gültig. Ausnahmen oder Abweichungen davon sind extra angeführt.

Die Empfehlung AK-TK EP022 Anhang B beschreibt die technischen Einzelheiten der Zusammenschaltung basierend auf der Empfehlung (Non-binding Permanent Reference Document – PRD) GSMA IR.95 – *„SIP-SDP Inter-IMS NNI Profile*". Inhalt der Empfehlung ist die gesamte GSMA IR.95 V 5.0 mit Ausnahme der explizit angeführten Korrekturen und Klarstellungen. Es ist nicht intendiert, durch die gegenständliche Empfehlung andere AK-TK Empfehlungen in ihren Grundlagen zu ändern.

Diese Empfehlung wird vom Arbeitskreis für Technische Koordination in der Telekommunikation (AK-TK) herausgegeben und von der Arbeitsgruppe IP-Interconnection (AG IP-IC) erstellt.

Die Empfehlung EP 022 Anhang B - Ausg. 2 wurde in der 81. Sitzung des AK-TKneu am 25.11.2025 von den anwesenden stimmberechtigten Mitgliedern abgestimmt.

Die Veröffentlichung dieser Empfehlung erfolgt gemäß AK-TK Geschäftsordnung § 7, Absatz 5:

Auf Antrag eines stimmberechtigten Mitglieds entscheidet der Arbeitskreis über die Veröffentlichung der Beschlüsse. Um die Veröffentlichung zu beschließen, ist die Einstimmigkeit aller anwesenden Mitglieder gemäß § 3 Abs. 2 lit. a und c erforderlich, wobei allen anderen Mitgliedern ein Einspruchsrecht innerhalb von 10 Tagen nach Aussendung des Protokolls zu gewähren ist. Geschäfts– und Betriebsgeheimnisse sind jedenfalls zu wahren. Die Veröffentlichung erfolgt über die RTR.

1.2. Mandat der Arbeitsgruppe

Der AG IP-IC wurde in der 76. Sitzung des AK-TK folgendes Mandat erteilt:

„Evaluierung und Berücksichtigung von Real Time Text in der EP022 Anhang B."

Zusätzlich wurden auch erforderliche Ergänzungen im Zusammenhang mit Notrufen gem. AK-TK EP022 Anhang C durchgeführt

1.3. Teilnehmer der Arbeitsgruppe

A1 Telekom Austria AG
Colt Technology Services GmbH
fonira Telekom GmbH
Hutchison Drei Austria GmbH
INNONET ICT-Services GmbH
IP Austria Communication GmbH
Magenta Telekom
MASS Response Service GmbH
NeoTel Telefonservice GmbH & Co KG
NETPLANET GmbH
Rundfunk und Telekom Regulierungs-GmbH
WNT Telecommunication GmbH
yuutel GmbH

2. Modifikationen zu GSMA IR.95, Version 5.0 (19 July 2018)

Die angeführten Kapitelnummern sind dem Originaltext entnommen und stellen keine Überschriften im Dokument dar.

General assumptions

AK-TK:

For this recommendation (EP022 Anhang B), AK-TK EP022 with all defined basics for IP-based interconnection in Austria is valid in total with explicit stated exceptions and comments on specific clauses.

For this recommendation (EP022 Anhang B), the GSMA IR.95, V 5.0, is applicable in total with the following major exceptions and the comments on specific clauses:

- The EP022 recommends interface specifications only for national interconnection. Roaming NNI is therefore out of scope of the document.
- The EP022 Anhang B is only relevant for voice-services. All other services are out of scope of this document and will therefore not be deemed mandatory (e.g. video call).
- The services 'RCS' and 'Video share' can be supported network internally. Nevertheless, support of 'Video Share Interoperability' according to GSMA IR.74 and 'RCS' according to GSMA RCC.71 across the interconnection interface are out of scope of this document

All direct and indirect references to the above mentioned 'out of scope' services in the GSMA IR.95, V 5.0, are not relevant for the EP022 Anhang B and should be ignored, irrespective, if obligations for the functionality of the services are commented in this document or not.

IR.95: 1.2 Relationship to Existing Standards

The VoLTE, Video Call, SMSoIP, VoWiFi, and RCS services are described in the following GSMA PRDs:

- IR.92 – IMS Profile for Voice and SMS [2]
- ~~IR.94 – IMS Profile for Conversational Video Service [3]~~
- ~~IR.74 – Video Share Interoperability Specification [7]~~
- ~~RCC.07 – RCS Advanced Communications Services & Client Specification [44]~~
- IR.51 – IMS Profile for Voice, Video, and SMS over WiFi [91]

The NNI aspects are described in the following GSMA PRDs:

- IR.65 – IMS Roaming NNI and Interworking Guidelines [4]
- ~~IR.88 – LTE Roaming NNI Guidelines [6]~~
- ~~IR.90 – RCS Interworking Guidelines [5]~~

AK-TK:	Roaming NNI, Video Share and RCS are out of scope of the document. For the IR.65 only the interworking related topics are relevant. IMS-Profiles in IR.51 for non-Voice Services (Video, SMS) are out of scope of the document.

IR.95: 1.3 Scope

This document specifies a SIP/SDP profile across the inter-IMS NNI in support of VoLTE, ~~Video Call, SMSoIP,~~ VoWiFi, ~~and RCS services~~.

AK-TK:	Only voice services are relevant. All other services are out of scope of the document.

There are two aspects for the NNI profiled within this document, namely the Interconnect NNI and the Roaming NNI which are defined as below:

- Interconnect-NNI – This term applies when the NNI is used to exchange traffic between the serving network (home or visited network) of the originating device, and the home network of the called party.
- ~~Roaming NNI – This term applies when the NNI is used to exchange traffic between the home and visited networks of a roaming device, i.e. when using Local Break-Out (LBO) where the P-CSCF is in the Visited Network. It is also inclusive of a scenario whereby the IMS core network is under different administrative control to the home Operator's access network (i.e. hosted solution).~~

Note: The use of the specification in support of fixed line access is not precluded.

AK-TK:	Roaming NNI is out of scope of the document.

IR.95: 2 Applicable Services

As stated previously, this profile supports VoLTE, ~~Video Call, SMSoIP,~~ VoWiFi, ~~and RCS services. The RCS Services, as defined in GSMA PRD RCC.71 [95] include all of the following:~~

- ~~Capability Exchange based on SIP OPTIONS (Note 1)~~
- ~~Capability Exchange via Presence (Note 1)~~
- ~~1:1 Chat/Group Chat~~
- ~~Standalone messaging~~
- ~~File Transfer based on HTTP (Hypertext Transfer Protocol)~~
- ~~Video Share~~

- ~~Enriched Calling (Call Composer, Call Unanswered, Shared Map, Shared Sketch)~~
- ~~Image Share based on GSMA PRD IR.79 [8]~~
- ~~Geo-location Push~~
- ~~Chatbot Sessions for MaaP~~
- ~~Extension to Extension services~~

The relevant feature tags that are applicable to the above service set are as listed in Section 5 of GSMA PRD IR.92 [2].

AK-TK: Video call, SMS and RCS are out of scope of the document.

IR.95: 3 IP Interconnection

~~As stated in 3GPP TS 29.165 [4], IMS roaming may be performed across the II-NNI (Inter- IMS Network to Network Interface) subject to agreements between the operators. Such use of the NNI (the roaming NNI) is in scope for this profile.~~

AK-TK: Roaming NNI is out of scope of the document.

IR.95: 4 SIP Methods & Headers

Method	Status	Additional Information
INVITE	Mandatory	Includes both the initial INVITE and any subsequent re- INVITE
ACK	Mandatory	
BYE	Mandatory	
CANCEL	Mandatory	
OPTIONS	Mandatory	~~May be used for RCS Capability Exchange.~~ May ~~also~~ be used as a heartbeat mechanism on the NNI.
INFO	Optional	~~May be used across the Roaming NNI for USSI (USSD over IMS).~~ May ~~also~~ be used for MMTel (Multimedia Telephony) features not included in GSMA PRD IR.92 [2] if bilaterally agreed (e.g. AOC, MCID (Malicious Call Identification (MMTel Service) etc. - see section 12 of 3GPP TS 29.165 [1]) Older implementations (pre-IETF RFC 4028 [16]) may use INFO as a session heartbeat via bilateral agreement. In this case, a 200 OK response must be sent in reply to an INFO request that is syntactically correct and well structured, as defined in IETF RFC 6086 [82]. **AK-TK:** if NG eCall according to ETSI EN 17184 is supported, INFO is mandatory
~~MESSAGE~~	~~Mandatory~~	~~Used for SMS over IP.~~

		~~Also used for RCS messaging (pager mode and IMDN, Instant Message Delivery Notification)~~
Method	**Status**	**Additional Information**
NOTIFY	~~Mandatory~~ ***AK-TK:*** *Optional*	~~Used for roaming NNI for "regevent" notification.~~ Used at the interconnect NNI for MMTel services (e.g. CONF status), ~~RCS Social Presence, Group Chat and Capability Exchange via Social Presence.~~
PRACK	Mandatory	PRACK shall be generated in response to any non-100 provisional responses to an INVITE message specifying the '100rel' option tag in a Require header. PRACK may be generated in response to any non-100 provisional responses to an INVITE message specifying the '100rel' option tag in a Supported header. Note that this may only be specified in the provisional response if the corresponding INVITE message indicated support of reliable provisional responses via inclusion of a '100rel' option tag in either a Supported or Require header.
~~PUBLISH~~	~~Mandatory~~	~~Used for RCS Social Presence and applicable at the roaming NNI only.~~
REFER	~~Mandatory~~ ***AK-TK:*** *Optional*	Used for MMTel services (e.g. CONF, ECT) ~~and RCS Group Chat.~~
~~REGISTER~~	~~Mandatory~~	~~Applicable for roaming NNI only.~~
SUBSCRIBE	~~Mandatory~~ ***AK-TK:*** *Optional*	~~Applicable for roaming NNI for "regevent"~~ ~~Also~~ used at the interconnect NNI for ~~RCS Social Presence~~, MMTel services (e.g. CONF status), ~~RCS Group Chat and Capability Exchange via Social Presence.~~
UPDATE	Mandatory	Used for offer/answer exchange, session timer refresh etc.

Table 1: Applicable SIP Methods

AK-TK:	Roamig NNI, SMS and RCS are out of scope of the document. Most Supplementary services as described in EP 022 chapter 4.3.1 are optional, therefore, the corresponding MMTel services are also be seen as optional.

IR.95: 4.4 SIP Header Support (Summary)

This clause summarises the SIP headers that are supported across the NNI across all SIP methods and responses. The supported headers are as documented in Table A.1 of 3GPP TS 29.165 [1] ~~with additions as shown in Table 2 below. All the cited additional headers in Table 2 below are applicable only to RCS services using OMA CPM.~~

AK-TK:	In addition, the proprietary header 'P-Cellular-Network-Info' (PCNI) must be supported transparently across the NNI. The PCNI-information could be essential in case of emergency calls as defined in AK-TK EP022 Anhang C.

Method	Status	Additional Information
~~Contribution-ID~~	~~o~~	~~Defined in OMA CPM [34] – not included in 3GPP TS 29.165 [1]~~
~~Conversation-ID~~	~~o~~	~~Defined in OMA CPM [34] – not included in 3GPP TS 29.165 [1]~~
~~InReplyTo-Contribution-ID~~	~~o~~	~~Defined in OMA CPM [34] – not included in 3GPP TS 29.165 [1]~~
~~Message-Expires~~	~~o~~	~~Defined in OMA CPM [34] – not included in 3GPP TS 29.165 [1]~~
~~Message-UID~~	~~o~~	~~Defined in OMA CPM [34] – not included in 3GPP TS 29.165 [1]~~
~~Session-Replaces~~	~~o~~	~~Defined in OMA CPM [34] – not included in 3GPP TS 29.165 [1]~~
Note: Status meaning is as defined in Table A.2 of 3GPP TS 29.165 [1]		

Table 2: Supported SIP Headers (Overall)

AK-TK:	The use of RCS services is not supported.

IR.95: 4.4.1 Trust Relationships

AK-TK:	The 'Trust relationships' as defined in GSMA IR.95 are in line with the definitions in EP022 chapter 5.1.

IR.95: 4.5.1 Additional Headers

~~There are a number of headers that are applicable only to RCS services using CPM that are defined in OMA CPM [34] and are not present in 3GPP TS 29.165 [1]. Table 4 below lists these headers and the methods/responses in which they may occur.~~

~~Header~~	~~Related Methods / Responses~~
~~Contribution-ID~~	~~INVITE request OR MESSAGE request Both with status do~~
~~Conversation-ID~~	~~INVITE request OR MESSAGE request – both with status do~~
~~InReplyTo-Contribution-ID~~	~~INVITE request OR MESSAGE request – both with status do~~
~~Message-Expires~~	~~INVITE request – with status do~~
~~Message-UID~~	~~MESSAGE request OR 200 OK (MESSAGE) response OR~~

	~~BYE request – all with status do.~~
~~Session-Replaces~~	~~INVITE request – with status do~~
~~**Note**: Status meaning is as defined in Table B.2.1 of 3GPP TS 29.165 [1]~~	

~~**Table 4: Additional Headers**~~

AK-TK:	The use of RCS services is out of scope of the document.

IR.95: 5 SIP Message Transport

Both UDP (User Datagram Protocol) and TCP (Transmission Control Protocol) transport are mandatory. If UDP is the transport of choice, then TCP should be used for large messages to avoid fragmentation as described in clause 18.1.1 of IETF RFC 3261 [12]. As stated in clause 18.1.1 of IETF RFC 3261 [12], it is recommended that an existing TCP connection be reused if a request is destined to an IP address, port, and transport to which an existing connection is already open.

AK-TK:	TCP is recommended as default. SCTP is optional as defined in GSMA IR.95. IPSec may be used as defined in EP022 chapter 5.2.1.

IR.95: 7 Numbering & Addressing

The routing of SIP (Session Initiated Protocol) signaling over the IMS NNI requires use of SIP URIs or tel URIs routable at the NNI per clause 6.4 of GSMA PRD IR.65 [7]. Five scenarios are possible for outgoing SIP sessions:

- An identifier used for routing at the NNI may be formatted as a SIP URI whose user part is based on an E.164 format Public User Identity, and whose domain part is routable at the NNI. The “user=phone” parameter must be appended to such a URI.
- ~~An identifier used for routing at the NNI may be formatted as a SIP URI whose user part is alphanumeric and whose domain part is routable at the NNI.~~
- ~~An identifier used for routing at the NNI may by bilateral agreement be formatted as a SIP URI whose user part is based on a local telephone number (as defined in IETF RFC 3966 [46]), and whose domain part is routable at the NNI. In this case, the local number must be qualified via the phone-context parameter as defined in IETF RFC 3966 [46] which may be specified in terms of its global number (e.g. “+44”) or via a domain name. The format of the permitted phone-context is also subject to bi-lateral agreement. The “user=phone” URI parameter must also be appended in this case.~~
- An identifier used for routing at the NNI may be formatted as a tel URI containing E.164 format Public User Identity.
- ~~An identifier used for routing at the NNI may, if agreed bilaterally, be defined as a tel URI containing a local telephone number (as defined in IETF RFC 3966 [46]). In this case, the local number must be qualified via the phone-context parameter as defined in IETF RFC 3966 [46], which may be specified in terms of its global number (e.g., “+44”) or via a domain name. The format of the permitted phone-context is also subject to bilateral agreement.~~

AK-TK:	The formats of SIP URI or tel URI are defined in chapter 4.8 of AK-TK EP022. It is recommended to use domain names according to GSMA NG.105.

It is recommended that Number Portability is handled as described in GSMA PRD IR.105 [96].

AK-TK:	Number Portability will be handled as described in chapter 0 of this document according to principles of GSMA PRD NG.105 V 1.1.

IR.95: 8 SIP Message Bodies

3GPP TS 29.165 [1] also lists a number of other MIME types may be supported over the NNI based on agreement between operators. A number of these additional MIME types are related to MMTel ~~or RCS services~~.

Table 6 below lists the MIME types that are recommended to be supported in this profile, based on the related services in scope across the NNI:

MIME Type	Additional Info
application/SDP	Mandatory. Used to carry SDP bodies to describe MMTel audio/video sessions ~~and RCS TCP/MSRP (Message Sending Relay Protocol) sessions.~~ The IBCF (in conjunction with information received from the TrGW) manipulates SDP message bodies.
multipart/mixed	Mandatory to align with 3GPP TS 29.165 [1]. ***AK-TK:*** *Used e.g. for support of ISDN features (e.g. CUG)* ~~Used in RCS messaging where multiple message bodies are included to send an initial message as well as negotiate a TCP/MSRP session. The IBCF manipulates the SDP to reflect the TCP/MSRP session traversing the TrGW.~~
~~multipart/related~~	~~Mandatory to align with 3GPP TS 29.165 [1].~~ ~~Used in RCS FT to enable multiple message bodies to be included to both negotiate a TCP/MSRP session and include a thumbnail file preview (see IETF RFC 5547 [39])~~
~~multipart/alternative~~	~~Despite being mandatory in 3GPP TS 29.165 [1], not specifically used for MMTel or RCS at the current time.~~ ~~Need not be manipulated by the IBCF. May be transited or removed by the IBCF based on operator preference.~~
~~message/external-body~~	~~Used in RCS messaging/FT to pass a reference to stored content, identified via a URI (see IETF RFC 4483 [40]).~~ ~~Conditionally supported in this profile of RCS messaging/FT is in scope across the NNI. Conveyed unchanged by the IBCF.~~

MIME Type	Additional Info
~~message/cpim~~	~~Used in RCS standalone (pager mode) messaging.~~ ~~Conditionally supported in this profile if RCS messaging is in scope across the NNI.~~ ~~Conveyed unchanged by the IBCF.~~
~~message/imdn+xml~~	~~Used in RCS messaging to inform the sender of message delivery/read (see IETF RFC 5438 [41]).~~ ~~Conditionally supported in this profile if RCS messaging is in scope across the NNI.~~ ~~Conveyed unchanged by the IBCF.~~
application/vnd.etsi.mcid+xml	Used in the MMTel MCID service (see 3GPP TS 24.616). This service is not mandated in GSMA PRD IR.92 [2] and this message body is thus optional in this profile and may be supported if bilaterally agreed.
application/vnd.3gpp.cw+xml	Used in n/w based Communication Waiting, which is not required in GSMA PRD IR.92 [2] and this message body is thus optional in this profile and may be supported if bilaterally agreed.
application/vnd.3gpp.comm-div-info+xml	Used in diversion notification, which is not required in GSMA PRD IR.92 [2] and this message body thus optional in this profile and may be supported if bilaterally agreed.
~~application/vnd.etsi.aoc+xml~~	~~Used for MMTel Advice of Charge Service, which is not required in GSMA PRD IR.92 [2] and this message body is thus optional in this profile and may be supported if bilaterally agreed.~~
application/vnd.etsi.cug+xml	Used for MMTel CUG Service, which is not required in GSMA PRD IR.92 [2] and this message body is thus optional in this profile and may be supported if bilaterally agreed.
~~application/vnd.etsi.sci+xml~~	~~Used for the transfer of real time charge information between the Charge Determination Point and Charge Recording Point (see 3GPP TS 29.658 [62]). Optional and may be supported if bilaterally agreed.~~
application/vnd.etsi.pstn+xml	Used to convey ISDN information (see 3GPP TS 29.163 [45]). This is conditionally supported where IMS is used as a transit network to connect CS-networks.
message/sipfrag	Used to convey SIP session progress. This is conditionally supported if MMTel Ad-Hoc Conference / ~~RCS Group Chat service~~ is used.
~~application/x-session-info~~	~~Used to convey additional digits in a SIP INFO for overlap sending. Not applicable to this profile.~~

MIME Type	Additional Info
application/pidf+xml, ~~application/pidf-diff+xml,~~ ~~application/watcherinfo+xml,~~ ~~application/xcap-diff+xml,~~ ~~application/vnd.oma.suppnot+xml,~~ ~~application/simple-filter+xml~~	***AK-TK:*** *pidf+xml is used to transmit location objects in emergency calls (see 3GPP TS 24.229). See details in AK-TK EP022 Anhang C* ~~Conditionally supported in RCS Social Presence is applicable at the NNI.~~
application/resource-lists+xml, application/rlmi+xml	Used to convey a list of target users for MMTel Ad-Hoc Conference ~~& RCS Group Chat~~. ***AK-TK:*** *Optional and may be supported if bilaterally agreed.*
application/load-control+xml	Used to exchange overload control information. The related internet draft is not yet agreed. Therefore, this is optional for this profile and may be supported if bilaterally agreed.
~~application/im-iscomposing+xml~~	~~Used to convey SIMPLE IM. Conditionally supported for RCS messaging services for interworking between SIMPLE IM and CPIM.~~
~~application/simple-message-summary+xml~~	~~Conditionally supported at the roaming NNI if the MMTel Message Waiting service is used. This service is included in GSMA PRD PRD IR.92 [2].~~
~~application/vnd.3gpp.sms~~	~~Conditionally supported at the NNI if the SMS over IP service is in scope – see 3GPP TS 24.341 [47].~~
~~application/vnd.3gpp.ussd~~	~~Used for MMI at the roaming NNI. Optional to this profile and may be supported if bilaterally agreed.~~
~~application/vnd.3gpp.iut+xml~~ ~~application/vnd.3gpp.replication+xml~~	~~Used for inter-UE transfer. Optional in this profile and may be supported if bilaterally agreed. See 3GPP TS 24.337 [63].~~
~~application/vnd.3gpp.access-transfer-events+xml,~~ ~~application/vnd.3gpp.mid-call+xml,~~ ~~application/vnd.3gpp.srvcc-ext+xml,~~ ~~application/vnd.3gpp.srvcc-info+xml,~~ ~~application/vnd.3gpp.state-and-event-info+xml~~	~~Applicable to the roaming NNI and used for SRVCC (Single Radio Voice Call Continuity). Optional in this profile and may be supported if bilaterally agreed. See 3GPP TS 24.237 [64].~~
~~application/3gpp-ims+xml~~	~~Generic 3GPP XML body. This is optional in this profile and may be passed unaltered by the IBCF subject to bilateral agreement at the NNI.~~
~~application/reginfo+xml~~	~~Conditionally supported for the roaming NNI.~~
application/conference-info+xml	Conditionally supported if conference services are supported across the NNI (e.g. MMTel Ad-Hoc Conference, ~~RCS Group Chat~~).

Table 6: SIP Message Bodies

AK-TK:	Roaming NNI and RCS are out of scope of the document.

AK-TK: For NG eCall, the following MIME types must be supported in addition:

MIME Type	Additional Info
application/EmergencyCallData.Control+xml	eCall type for emergency services according to 3gpp ts 24.229 and IETF rfc 8147
application/EmergencyCallData.eCall.MSD	Used for the transport of vehicle and incident-related data (MSD – minimum set of data) during an emergency call(eCall).

According to rfc 8147 chapter 6 "*An MSD or a metadata/control block is always enclosed in a multipart body part (even if it would otherwise be the only body part in the SIP message).*"

If media transcoding is provided, then it shall be done as described in Section 10.3 of this GSMA PRD.

All other permitted message bodies are transited unchanged. The permitted MIME type of message bodies are selected based on local operator policy and/or bi-lateral agreement at the NNI dependent on the services supported at the NNI.

The IBCF may limit the size of SIP message bodies and take remedial action should that size be exceeded. The limit is agreed on a bilateral basis. The remedial action as specified in clause 5.10.6.3 of 3GPP TS 24.229 [68].

Other (unrecognised) message bodies may be removed or transited based on local operator policy and/or bi-lateral agreement at the NNI. The default action in this profile would be to remove such a message body.

AK-TK: A message body size of at least 1500 octets must be supported.

IR.95: 10 Media Control

~~If the RCS Video Share service is used, video flows shall be negotiated. If any other RCS service is used (with the exception of pager-mode messaging, which has no user plane), TCP/MSRP sessions shall be negotiated to support the required media plane flows.~~

AK-TK: RCS is out of scope of the document.

IR.95: 10.3.1 Audio Codecs

For this profile, the following audio codecs are mandatory, to be supported over the II-NNI, in line with GSMA PRD IR.92 [2]:

- Adaptive Multi-Rate (AMR) codec (described in 3GPP TS 26.114 [9], 3GPP TS 26.071 [70], 3GPP TS 26.090 [71], 3GPP TS 26.073 [72], and 3GPP TS 26.104 [73]).
- Adaptive Multi-Rate Wideband (AMR-WB) codec (described in 3GPP TS 26.114 [9], 3GPP TS 26.171 [75], 3GPP TS 26.190 [77], 3GPP TS 26.173 [76], 3GPP TS 26.193 [78] and 3GPP TS 26.204 [79]).
- If super-wideband or fullband speech communications are supported over the II-NNI, then the EVS codec is also mandatory as described in 3GPP Release 12 TS 26.114 [9], 3GPP Release 12 TS 26.441 [883], 3GPP Release 12 TS 26.445 [86], 3GPP Release 12 TS 26.442 [84], 3GPP Release 12 TS 26.443 [85], 3GPP Release 12 TS 26.447 [87], 3GPP Release 12 TS 26.449 [88], 3GPP Release 12 TS 26.450 [489] and 3GPP Release 12 TS 26.451 [90].
- The telephone-event codec according to IETF RFC 4733 [22], further refined in 3GPP TS 26.114 [9], with all relevant RTP clock rates.

AK-TK:	The requirements about AMR, AMR-WB and EVS-codecs are only mandatory for mobile originated calls.

In addition, to support interoperability with non-3GPP access inter-connect, the following audio codecs are also recommended to be supported for this profile over the II-NNI:

- G.711 (see IETF RFC 3551 [32]), using payload type 8 (A-law) and/or 0 (Mu-Law) dependent on market considerations.
- Comfort Noise codec as specified in IETF RFC 3389 [95], for use with audio codecs lacking built-in comfort noise support, such as e.g. G.711.

AK-TK:	The NNI must also support interoperability with non-3GPP networks and therefore at least G.711 A-law / 20ms as described in chapter 4.3 of AK-TK EP022.

IR.95: 10.3.2 Video Codecs

AK-TK:	Video service is out of scope of the document. Nevertheless, video codecs as defined in GSMA IR.95 may be supported if bilaterally agreed.

IR.95: 10.3.4 Global Text Telephony (GTT)

If supported, Global Text Telephony (GTT) messages must use ITU-T Recommendation T.140 [24] real-time text according to the rules and procedures specified in 3GPP TS 26.114 [9] and with clarifications in Annex B.2 in GSMA PRD IR.92 [2].

AK-TK:	Real-time-text must be supported according to national law (BaFG) at latest from 28.06.2025 on. As usage of real-time-text is always related to and in combination with a voice service, functionality is then mandatory at NNI. According to GSMA IR.92 Annex B.2, GTT is always related to an audio call: *"The call with GTT-IP component must contain both "text" and "audio" media RTP streams negotiated using existing SDP offer/answer procedures.* ***Note 2**: The implementation of calls with single "text" media is not supported"*

IR.95: 10.3.5 DTMF

DTMF (Dual Tone Multi Frequency) events shall be conveyed across the II-NNI via the "Named Telephone Event" payload format defined in IETF RFC 4733 [22], as specified in Annex G of 3GPP TS 26.114 [9], using the relevant telephone-event codec.

See 3GPP TS 26.114 [9] and clause 3.2 of GSMA PRD IR.92 [2] for further guidance on the encoding and transport of DTMF events.

AK-TK:	The NNI must also support interoperability with non-3GPP networks and therefore at least DTMF inband via ITU G.711 A-law as described in chapter 4.3 of AK-TK EP022. It is not intended to use SIP INFO for DTMF or overlap dialing in the context of IMS-IMS Interconnection. SIP INFO is therefore out of scope of this document. In the informative Annex C, "*The List of Selected Option Items for the NNI*" of GSMA IR.95, V5.0, the item SIP INFO is also mentioned as "not applicable" for this profile.

IR.95: 10.5 SDP Contents

NAPT may be performed at the NNI in the user plane via the TrGW under the control of the IBCF via the Ix reference point as defined in 3GPP TS 29.238 [17].

If NA(P)T is applied at the NNI, then the IP address and port in the c=line and m=line respectively must be modified.

~~For handling MSRP media, Border Elements shall follow GSMA PRD IR.90 [5]. In the case of SIMPLE IM, if NA(P)T is perfomed, then the IP address and port must also be modified in the a=path attribute, whilst leaving the session identity unchanged. For a summary of the different procedures for MSRP handling, see also section 5.19 of 3GPP TS 23.334 [92].~~

AK-TK:	In AK-TK EP022 chapter 2 it is recommended to use only public IP-addresses for the IBCF (SBC). SIMPLE IM and MSRP are out of scope of the document.

IR.95: 12 Inter-Operator Accounting

Inter-operator accounting shall be performed as described in section 11.2 of 3GPP TS 29.165 [1].

AK-TK: For the use of ioi (Inter-Operator-Identifier) parameters in the national inter-operator accounting, every operator has to use only unique identifiers according to the given rules (either as "orig-ioi", "transit-ioi" or "term-ioi") and distribute it to all other interconnect partner based on bilaterally agreements.

The standalone use of ioi-parameters in the national interconnection cannot guarantee the national operator accounting according to AK-TK EP010 in total. The ioi-parameter primarily gives information about the recipient of the invoice. For a correct call rating additional information (e.g. based on trunk-separation, SLA's or A-number screening) are needed in most scenarios.

Principle definitions of the ioi can be found in 3GPP TS 24.229, chapter 4.5.4, and the recommended formats in GSMA IN.25 and IR.67.

Definitions from 3GPP TS 29.165 (R11), chapter 11.2:

For the II-NNI between IMS home networks:

- the P-Charging-Vector header field in the SIP requests containing the type 2 "orig-ioi" with the entry which identifies the home originating network; and
- the P-Charging-Vector header field in the SIP responses containing the type 2 "orig-ioi" and type 2 "term-ioi" header field parameters with the entries which identify the home originating network and the home terminating network respectively;

may be supported based on inter-operator agreements.

NOTE 3: Operator network identifiers populated in the type 2 "orig-ioi" and type 2 "term-ioi" header field parameters need to be exchanged by inter-operator agreements in advance.

Definitions from 3GPP TS 24.229 (R15), chapter 4.5.4:

The Inter Operator Identifier (IOI) is a globally unique identifier to share between sending and receiving networks, service providers or content providers.

Table 4-2B: Summary of IOI insertion in the IM CN subsystem

Inserted in	For initial, standalone or subsequent SIP message
Any request	The IM CN subsystem entity in the sending network: 1) removes any received "orig-ioi" header field parameter, if present; 2) inserts the "orig-ioi" header field parameter to a value that identifies the sending network of the request; and 3) does not insert the "term-ioi" header field parameter.
Any response to the request	The IM CN subsystem entity in the receiving network: 1) removes any received "orig-ioi" and "term-ioi" header field parameters, if present; 2) inserts the "orig-ioi" header field parameter set to the previously received value of "orig-ioi" header field parameter, if received in the request; and 3) inserts the "term-ioi" header field parameter to a value that identifies the receiving network from which the response is sent.

b) Type 2 IOI, between originating network and the terminating network. This includes the following cases:

- between the S-CSCF of the home originating network and the S-CSCF of the home terminating network or between the S-CSCF of the home originating network and the MGCF when a call/session is terminated at the PSTN/PLMN;
- between the MGCF and the S-CSCF of the home terminating network when a call/session is originated from the PSTN/PLMN or with a PSI AS when accessed across I-CSCF; and
- when using Roaming Architecture for Voice over IMS with Local Breakout and loopback routeing occurs, between the TRF of the visited network and the S-CSCF of the home terminating network.

This is exchanged in all session-related and session-unrelated requests and responses.

Additionally, for emergency transactions, a type 2 IOI is exchanged between the E-CSCF and the MGCF or IBCF where the request is routed to a PSAP. In scenarios where the E-CSCF receives emergency requests from an S-CSCF, a type 2 IOI is exchanged. This can also occur where the E-CSCF receives emergency requests from an IBCF.

Definitions from GSMA IN.25 (V10.0), chapter 4 (point 6)

6	As domain name for the <orig-ioi> and <term-ioi> fields of the P-Charging-Vector, the RCS Interworking partners must use the domain name specified in GSMA PRD IR.67 [3] section “SIP/IMS URI format” (“ims.mnc<MNC>.mcc<MCC>.3gppnetwork.org” with <MNC>/<MCC> being the MNC/MCC allocated to such interworking partner). **NOTE:** Equivalent creation rules for the <orig-ioi> and <term-ioi> of fixed operator’s need to be defined in the future.	Relevant for Interworking agreement

Definitions from GSMA IR.67 (V15.0), chapter 2.6

“ims.mnc<MNC>.mcc<MCC>.3gppnetwork.org” must be used as <SP Domain Name> for IMS Nodes that are individually addressable over the IPX network by SIP or any other protocol, and where those Node Names need to be resolved over the IPX DNS system.

AK-TK: For mobile operators, the GSMA obliged format

"ims.mnc<MNC>.mcc<MCC>.3gppnetwork.org"

is recommended in the "orig-ioi" and "term-ioi" fields. For all other national operators in Austria the format

"id<OperatorID>.imsnetwork.at"

should be used in the "orig-ioi" and "term-ioi" fields if applicable and bilaterally agreed. The "OperatorID" (ger. "BetreiberID") is a unique 4-digits ID, assigned by RTR GmbH in the course of general authorisation (cf. https://www.rtr.at/en/tk/Allgemeingenehmigung and https://www.rtr.at/en/tk/ListeAGGTK) and published as Open Data under https://www.rtr.at/en/inf/odTKAGG.

According to RFC 7315, all "transit-ioi" parameters in a call setup message are combined and indexed in a 'transit-ioi-list' with special meaning of "." within the list. Therefore only an alphanumeric string without "." should be used in the "transit-ioi" field to avoid protocol errors.

For "transit-ioi" parameters, the format for a national Austrian operator without "."

"id<OperatorID>imsnetworkat"

should be used. This format allows to identify all transit operators in a multiple transit call although there is no direct interconnection.

Examples for ioi-parameters used in Austria:

orig-ioi/term-ioi

mobile network:	ims.mnc001.mcc232.3gppnetwork.org
fixed network:	id1522.imsnetwork.at

transit-ioi

single info:	id1522imsnetworkat
transit-ioi-list:	id1123imsnetworkat.1,id1522imsnetworkat.2,…

(in the response message, the transit-ioi are indexed in reverse order)

General Rules for using ioi-Information in the P-charging-vector:

AK-TK: All procedures for the initial INVITE requests are behaviour compliant to 3GPP standards. An IMS-IMS Interconnection must be bilaterally agreed in advance.

According to the international standards, MGCF normally does not send/receive P-Charging Vector to/from external non-IMS networks. Depending on vendor implementation, other configurations may be also possible.

	originating home-network		**terminating home-network**
Request	generates orig-ioi	II-NNI	receives orig-ioi
Response	receives orig-ioi receives term-ioi	II-NNI	generates term-ioi keeps received orig-ioi

	originating home-network		**transit network**		**terminating home-network**
Request	generates orig-ioi	II-NNI	keeps orig-ioi generates transit-ioi	II-NNI	receives orig-ioi receives transit-ioi
Request	---	SIP-I	generates orig-ioi generates transit-ioi	II-NNI	receives orig-ioi receives transit-ioi
Request	generates orig-ioi	II-NNI	keeps orig ioi generates transit-ioi	SIP-I	---

	originating home-network		**transit network**		**terminating home-network**
Response	receives orig-ioi receives term-ioi receives transit-ioi	II-NNI	keeps orig-ioi keeps term-ioi generates transit-ioi	II-NNI	generates term-ioi keeps received orig-ioi
Response	---	SIP-I	keeps orig-ioi keeps term-ioi generates transit-ioi	II-NNI	generates term-ioi keeps received orig-ioi
Response	receives term-ioi receives transit-ioi	II-NNI	generates term-ioi generates transit-ioi	SIP-I	---

AK-TK: If an IP-Interconnection without IMS-IMS agreement based on SIP-I will also use the P-charging–vector (depending on vendor implementation and bilaterally agreed) than the following procedures for initial INVITE requests apply.

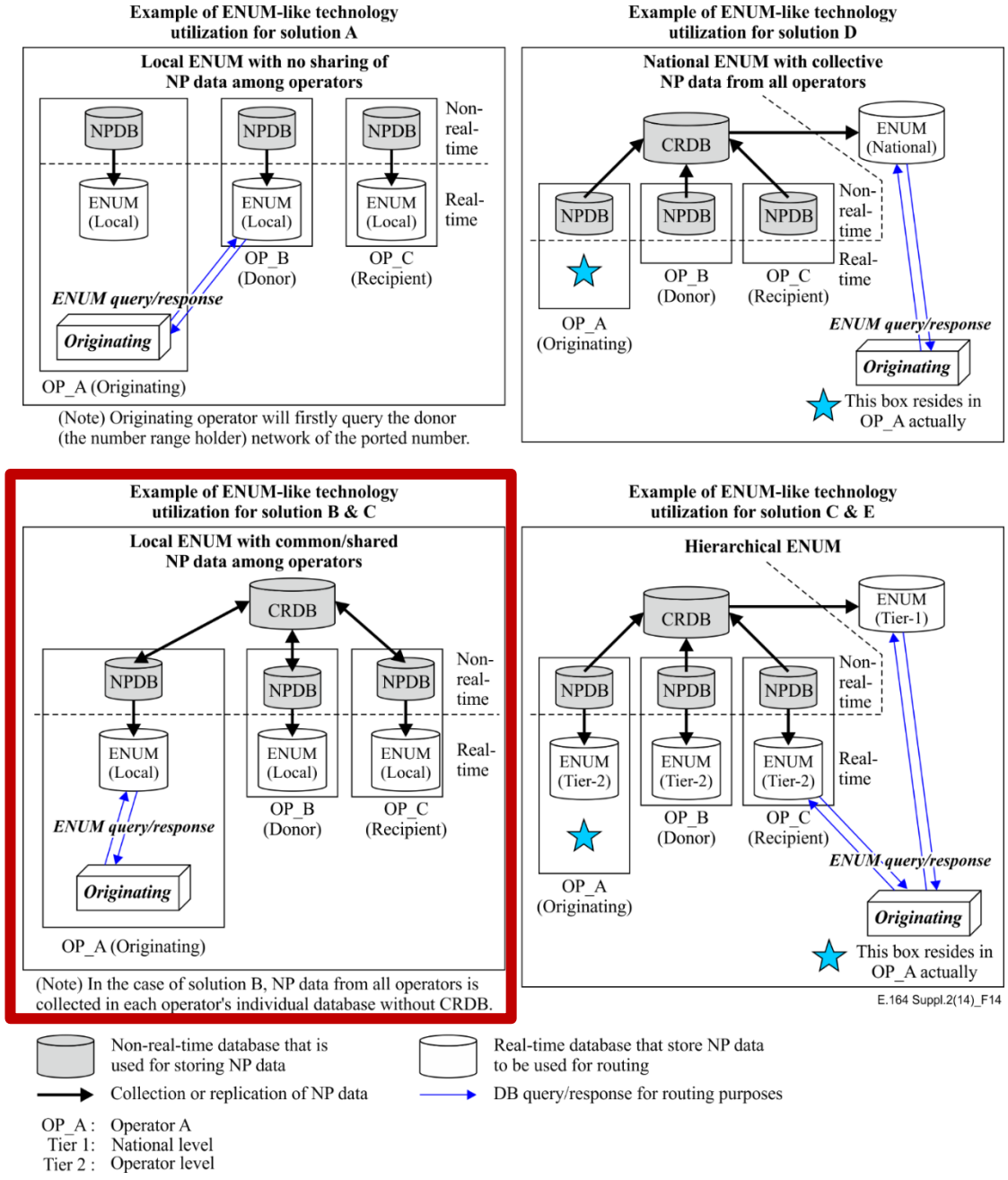
	originating home-network		**terminating home-network**
Request	generates orig-ioi	II-NNI or SIP-I	receives orig-ioi
Response	receives orig-ioi receives term-ioi	II-NNI or SIP-I	generates term-ioi keeps received orig-ioi

	originating home-network		**transit network**		**terminating home-network**
Request	generates orig-ioi	II-NNI or SIP-I	keeps orig-ioi generates transit-ioi	II-NNI or SIP-I	receives orig-ioi receives transit-ioi
Response	receives orig-ioi receives term-ioi receives transit-ioi	II-NNI or SIP-I	keeps orig-ioi keeps term-ioi generates transit-ioi	II-NNI or SIP-I	generates term-ioi keeps received orig-ioi

3. Number Portability

Routing for Number portability depends in Austria on operator individual databases. In the future, this will be supported additionally from a CRDB, hosted by RTR GmbH. This corresponds to 'Solution C' according to ITU Rec. E.164 Supplement 2.

According to the '*Examples of ENUM-like technology utilization'*, the scenario '*Local ENUM with common/shared NP data among operators*' from ITU Rec. E.164 Supplement 2 is therefore relevant for potential considerations.



AK-TK:	Every operator has to decide if he will use a local ENUM-like solution or other technology for his internal number portability routing database. If an operator use local ENUM-like solution, then he has to support necessary Tier 1 and Tier 2 functionalities by himself. The Tier 1 and/or Tier 2 function can optionally also be supported by other operators via bilateral agreements. This is out of scope of this document. Evolution of the CRDB towards a scenario 'Hierarchical ENUM' with a centralized/national Tier 1 in the future may be possible but is out of scope of this document.