

**INTERNATIONAL INTERCONNECTION FORUM
FOR SERVICES OVER IP****(i3 FORUM)**

(www.i3forum.org)

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Date	Rel.	Subject/Comment
12 th May 2012	1	First release dedicated to interconnect scenarios
30 th May 2013	2.0	Second Release encompassing the scope also with the Roaming Scenario

EXECUTIVE SUMMARY

This i3 Forum Interconnection & Roaming IMS Signalling Profile specification defines a signalling profile for an Inter-IMS Network to Network Interface (II-NNI) as defined in 3GPP TS 29.165, with the exceptions noted in the document, and in compliance with the general framework given in the “i3 Forum Technical Interconnection Model for International Voice Services (Release 5) [160]”.

This document does not have to be considered as a new standard and/or recommendation but as an operational specification of the 3GPP TS 29.165 for the Inter-IMS Network to Network Interface.

Section 5 and Section 6 illustrate a detailed compliance to TS 29.165, v11.5.0 (2012-12). In this way, the i3 Forum Interconnection & Roaming IMS signalling profile can be directly compared to the 3GPP TS 29.165 NNI signalling profile document for negotiating agreements between two carriers. In addition, it allows for future extensibility for support of the GSMA IPX requirements.

This version of the Interconnection & Roaming Signalling Profile supports an NNI for basic voice services (i.e. Supplementary Services are not in the scope). Future versions will add IMS Supplementary Services, non-voice IMS Services (e.g., video).

It is recommended that this Interconnection Signalling Profile should be supported as the minimal profile on the Inter-IMS Network to Network Interface for basic voice services in both Interconnect and Roaming scenarios. It is recommended that bilateral agreements describe the support/transparency (or not) of optional elements.

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1 Scope of the document

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This document does not have to be considered as a new standard and/or recommendation but as an operational specification of the 3GPP TS 29.165 for the Inter-IMS Network to Network Interface.

Section 5 and Section 6 illustrate a detailed compliance to TS 29.165, v11.5.0 (2012-12). In this way, the i3 Forum signalling profile can be directly compared to the 3GPP TS 29.165 NNI signalling profile document for negotiating agreements between two carriers. In addition, it allows for future extensibility for support of the GSMA IPX requirements.

This version of the Interconnection & Roaming Signalling Profile supports an NNI for basic voice service for roaming and non-roaming scenarios. Future versions will add IMS Supplementary Services, non-voice IMS Services (e.g., video, SMS).

1.1 i3Forum approach and rationale

The i3 Forum II-NNI signalling profile:

1. starts with Section 5 of 3GPP TS 29.165 v11.5.0 (2012-12);
2. further determines the applicability of each item according to [160] and International voice service operation. This may result in an item’s deletion. (Note that the scope of this version is for basic voice);
3. gives an analysis of the “Notation” given an item (Mandatory, Conditional or Optional).

1.2 Document format details: how to read the document

The original text from 3GPP TS 29.165 v11.5.0 (2012-12) Section 5 and Section 6 is copied and included in this document. TS 29.165 clause numbers are referenced in the following sections. The “blank on purpose” are added to maintain section numbering continuity.

The text format assumed in this document follows the below rules:

- Original text from 3GPP TS 29.165 v11.5.0 (2012-12) is formatted in italic letters, in both plain text and Tables

Example 1: *Figure 5.1.1 illustrates the architecture diagram...*

Example 2: *The IBCF shall provide the capabilities*

- Text added as part of the i3 Forum II-NNI signalling profile is formatted in lighter blue and underlined text.

Example 1: [Figure 5.1.2 illustrates the i3 Forum Interconnection](#)

Example 2: [Services supporting the following SIP Methods](#)

- Text deleted as part of the i3 Forum II-NNI signalling profile is formatted in lighter blue and stroke text.

Example: ~~[As specified in 3GPP TS 24.229 \[5\], clause 4.4](#)~~

- Descriptive text of the i3 Forum II-NNI signalling profile is formatted in plain text format in black.

Example: For the purpose of the present document ...

2 Acronyms

3GPP	3rd Generation Partnership Project
ALG	Application Level Gateway
ATCF	Access Transfer Control Function
B2BUA	Back to Back user agent
BGCF	Border Gateway Control Function
CSCF	Call Session Control Function
IBCF	Interconnection Border Control Function
I-BGF	Interconnection Border Gateway Function
I-CSCF	Interrogating-Call Session Control Function
ICSS	IMS Centralized Services
II-NNI	Inter-IMS Network to Network Interface
IM-CN	IP Multimedia Core Networks
IMS	IP Multimedia Subsystem
IMS-ALG	Multimedia Subsystem Application Level Gateway
IP	Internet Protocol
IPSec	IP Security
IPv4	Internet Protocol Version 4
IPv6	Internet Protocol Version 6
MGCF	Media Gateway Control Function
MGF	Media Gateway Function
MIME	Multipurpose Internet Mail Extensions
MSC	Mobile Switching Center
NAT	Network Address Translation
NAT-PT	Network Address Translation—Protocol Translation
NNI	Network to Network Interface
P-CSCF	Proxy Call Session Control Function
RTP	Real-Time Protocol
SBC	Session Border Controller
S-CSCF	Serving-Call Session Control Function
SCTP	Stream Control Transmission Protocol
SDP	Session Description Protocol
SGF	Signalling Gateway Function
SIP	Session Initiation Protocol
SIP URI	SIP protocol Uniform Resource Identifier
SIP-I	SIP with encapsulated ISUP
SIP-T	SIP for Telephones
SLA	Service Level Agreement
SRVCC	Single Radio Voice Call Continuity
TCP	Transmission Control Protocol
tel-URI	Telephone Uniform Resource Identifier
TRF	Transit and Roaming Function
TrGw	Transition Gateway
TLS	Transport Layer Security
UA	User Agent
UDP	User Datagram Protocol
URI	Uniform Resource Identifier
VoIP	Voice over IP

3 References

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- [160] [i3 Forum "Technical Interconnection Model for International Voice Services" Release 5.0, May 2012"](#)

4 NNI Signalling Profile

4.1 Profile Overview

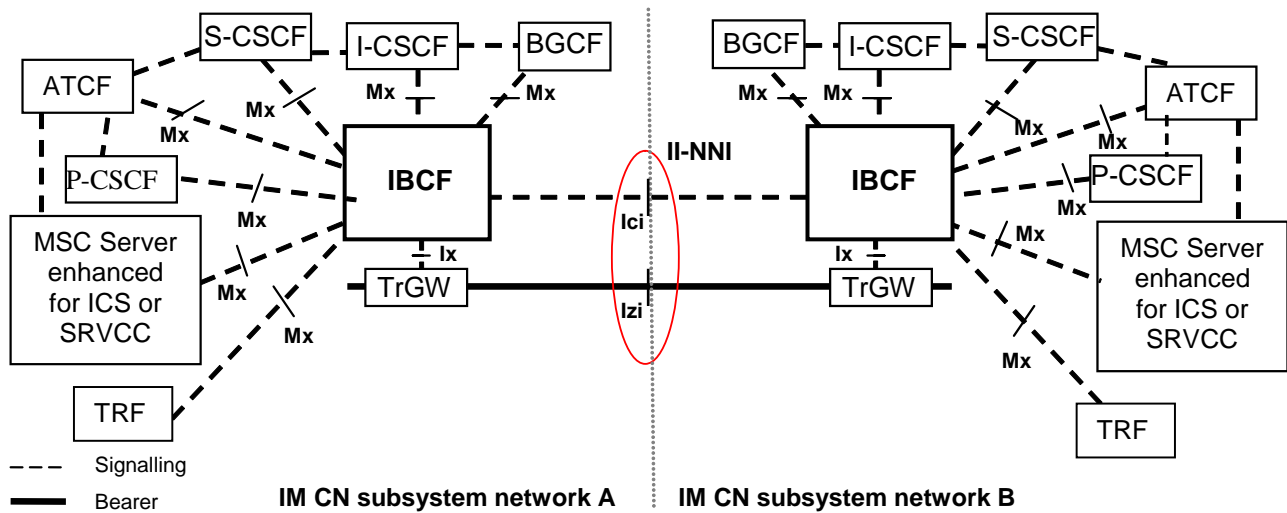
The i3 Forum II-NNI signalling profile is a subset of the 3GPP TS 29.165 signalling profile.

5 Reference Model for Interconnection

5.1 General

For the purpose of the present document clause 5.1 TS 29.165 v11.5.0 (2012-12) with the following additions applies as follows:

Figure 5.1.1 illustrates the architecture diagram given in 3GPP TS 23.228 [4] showing the Inter-IMS Network to Network Interface (II-NNI) between two IM CN subsystem networks



NOTE: The TRF can reside in a stand-alone entity or can be combined with another functional entity.

Figure 5.1.1: Inter-IMS Network to Network Interface between two IM CN subsystem networks

Figure 5.1.2 illustrates the i3 Forum Interconnection & Roaming IMS Network to Network Interface, where there are IBCF/TrGw's on either side of the interface. The internal carrier's network environment is out of scope.

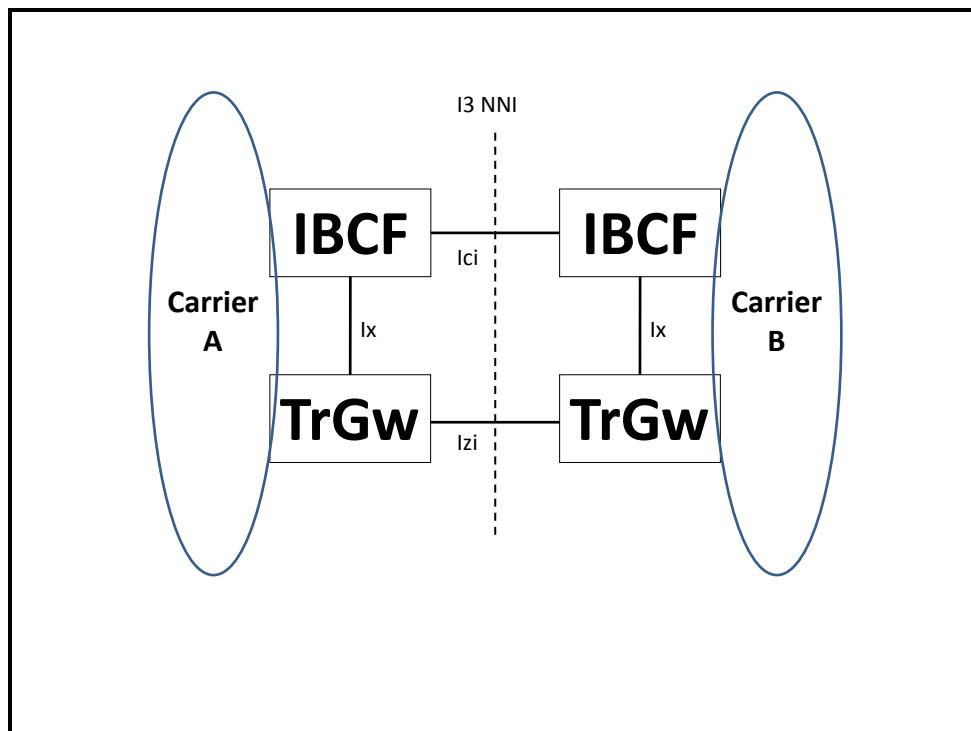


Figure 5.1.2: i3 Forum Interconnection & Roaming IMS Network to Network Interface

The protocols over the two reference points Ici and Izi make up the Inter-IMS Network to Network Interface.

The Ici reference point allows IBCFs to communicate with each other in order to provide the communication and forwarding of SIP signalling messaging between IM CN subsystem networks. The Izi reference point allows TrGWs to forward media streams between IM CN subsystem networks.

IMS roaming performed by using I1-NNI is considered, when the IBCFs are inserted at the network borders. The applicability of roaming scenario by using I1-NNI is based on agreement between the operators.

Whenever the Inter-IMS Network to Network Interface is used to interconnect two IM CN subsystem networks belonging to different security domains, security procedures apply as described in 3GPP TS 33.210 [10].

When advanced IP interconnection of services (IPXS) is provided by a transit network interconnecting two IM CN subsystem networks, interfaces on both sides of the transit network are within the scope of this document.

5.2 Functionalities performed by entities at the edge of the network

5.2.1 Interconnection Border Control Function (IBCF)

For the purpose of the present document clause 5.2.1 of [161] TS 29.165 v11.5.0 (2012-12) applies as follows:

An IBCF provides application specific functions at the SIP/SDP protocol layer in order to perform interconnection between IM CN subsystem networks by using Ici reference point. According to 3GPP TS 23.228 [4], IBCF can act both as an entry point and as an exit point for a network.

The functionalities of IBCF are indicated in the 3GPP TS 23.228 [4] and specified in 3GPP TS 24.229 [5]. They include:

- network topology hiding;
- application level gateway (for instance enabling communication between IPv6 and IPv4 SIP applications, or between a SIP application in a private IP address space and a SIP application outside this address space);
- controlling transport plane functions;
- controlling media plane adaptations;
- screening of SIP signalling information;
- selecting the appropriate signalling interconnect;
- generation of charging data records;
- privacy protection; and
- inclusion of a transit IOI when acting as an entry point for a transit network.

Based on local configuration, the IBCF performs transit routing functions as specified in 3GPP TS 24.229 [5].

The IBCF acts as a B2BUA when it performs IMS-ALG functionality.

5.2.2 Transition Gateway (TrGW)

For the purpose of the present document clause 5.2.1 of [161] TS 29.165 v11.5.0 (2012-12) applies as follows:

According to 3GPP TS 23.002 [3], the TrGW is located at the network borders within the media path and is controlled by an IBCF. Forwarding of media streams between IM CN subsystem networks is applied over Izi reference point.

The TrGW provides within the media path functions like network address/port translation and IPv4/IPv6 protocol translation. NAT-PT binds addresses in IPv6 network with addresses in IPv4 network and vice versa to provide transparent routing between the two IP domains without requiring any changes to end points. NA(P)T-PT provides additional translation of transport identifier (TCP and UDP port numbers). The approach is similar to that one described also in 3GPP TS 29.162 [8].

Further details are described in 3GPP TS 23.228 [4].

6 Control Plane Interconnection

6.1 SIP methods and header fields

6.1.1 Blank on purpose

6.1.1.1 Notations of the codes

For the purpose of the present document clause 6.1.1.4 TS 29.165 v11.5.0 (2012-12) applies as follows:

In the table 6.3 the status codes "m", "o", "c" and "n/a" have the following meanings:

Table 6.3: Key to notation codes for SIP messages

Notation code	Notation name	Sending side	Receiving side
m	mandatory	The message shall be supported at II-NNI. Supporting sending a SIP message at the II-NNI means that this message shall be sent over the II-NNI if received from the serving network. It does not imply that network elements inside the serving network or user equipment connected to this network shall support this message.	Supporting receiving a SIP message at the II-NNI means that this message shall be forwarded to the serving network. It does not imply that network elements inside the served network or user equipment connected to this network are supporting this message.
o	optional	The message may or may not be supported at II-NNI. The support of the method is provided based on bilateral agreement between the operators.	Same as for sending side.
n/a	not applicable	It is impossible to use/support the message.	It is impossible to use/support the message. This message will be discarded by the IBCF.
c <integer>	conditional	The requirement on the message ("m", "o" or "n/a") depends on the support of other optional or conditional items. <integer> is the identifier of the conditional expression.	Same as for sending side.

6.1.1.2 SIP methods

For the purpose of the present document clause 6.1.1.2 TS 29.165 v11.5.0 (2012-12) with the following changes applies.

3GPP TS 24.229 [5] defines the methods allowing an IBCF to interconnect to an IBCF placed in another IM CN subsystem.

The following SIP methods are supported on the II-NNI as defined in table 6.1.

The following table is based on table A.5 and table A.163 of 3GPP TS 24.229 [5] and endorsed for this document:

Table 6.1: Supported SIP methods

Item	Method	Ref.	II-NNI		I3Forum II-NNI (non roaming)		I3Forum II-NNI (roaming)	
			Sendin g	Receivi ng	Sendin g	Receivi ng	Sendin g	Recei ving
1	ACK request	IETF RFC 3261 [13]	m	m	m	m	m	m
2	BYE request	IETF RFC 3261 [13]	m	m	m	m	m	m
3	BYE response	IETF RFC 3261 [13]	m	m	m	m	m	m
3	BYE response	IETF RFC 3261 [13]	m	m	m	m	m	m
4	CANCEL request	IETF RFC 3261 [13]	m	m	m	m	m	m
5	CANCEL response	IETF RFC 3261 [13]	m	m	m	m	m	m
5A	INFO request	IETF RFC 6086 [39]	o	o	o	o	o	o
5B	INFO response	IETF RFC 6086 [39]	o	o	o	o	o	o
8	INVITE request	IETF RFC 3261 [13]	m	m	m	m	m	m
9	INVITE response	IETF RFC 3261 [13]	m	m	m	m	m	m
9A	MESSAGE request	IETF RFC 3428 [19]	o	o	e1	e1	o	o
9B	MESSAGE response	IETF RFC 3428 [19]	o	o	e1	e1	o	o
10	NOTIFY request	IETF RFC 3265 [20]	c1	c1	e1	e1	e1 <u>m</u>	e1 <u>m</u>
11	NOTIFY response	IETF RFC 3265 [20]	c1	c1	e1	e1	e1 <u>m</u>	e1 <u>m</u>
12	OPTIONS request	IETF RFC 3261 [13]	m	m	m <u>x1</u>	m <u>x1</u>	m <u>x1</u>	m <u>x1</u>
13	OPTIONS response	IETF RFC 3261 [13]	m	m	m <u>x1</u>	m <u>x1</u>	m <u>x1</u>	m <u>x1</u>
14	PRACK request	IETF RFC 3262 [18]	m	m	m	m	m	m
15	PRACK response	IETF RFC 3262 [18]	m	m	m	m	m	m
15A	PUBLISH request	IETF RFC 3903 [21]	c1	c1	e1	e1	e1	e1
15B	PUBLISH response	IETF RFC 3903 [21]	c1	c1	e1	e1	e1	e1
16	REFER request	IETF RFC 3515 [22]	o	o	e	e	e <u>x2</u>	e <u>x2</u>
17	REFER response	IETF RFC 3515 [22]	o	o	e	e	e <u>x2</u>	e <u>x2</u>
18	REGISTER request	IETF RFC 3261 [13]	c2	c2	e2	e2	e2 <u>m</u>	e2 <u>m</u>
19	REGISTER response	IETF RFC 3261 [13]	c2	c2	e2	e2	e2 <u>m</u>	e2 <u>m</u>
20	SUBSCRIBE request	IETF RFC 3265 [20]	c1	c1	e1	e1	e1 <u>m</u>	e1 <u>m</u>
21	SUBSCRIBE response	IETF RFC 3265 [20]	c1	c1	e1	e1	e1 <u>m</u>	e1 <u>m</u>
22	UPDATE request	IETF RFC 3311 [23]	m	m	m	m	m	m
23	UPDATE response	IETF RFC 3311 [23]	m	m	m	m	m	m
<p>c1: In case of roaming scenario, the support of the method is m, else o. c2: In case of roaming scenario, the support of the method is m, else n/a. NOTE: In the above table, m, o and c and n/a have the meanings indicated in table 6.3 <u>x1</u>: Support of OPTIONS in a SIP dialog is mandatory, where support of OPTIONS out of a SIP dialog is optional. Use of OPTIONS outside the dialogue may be used as a keepalive mechanism only based on bilateral agreement. <u>x2</u>: Needed to support CONF service as specified within TS 24.147 [106] Section 5.3.1.5.3</p>								

Items stroke out in the table above are not in scope of this i3 Forum Release, and items underlined are modifications or additions

Services supporting the following SIP Methods via interconnection II-NNI are out of scope:

- [MESSAGE;](#)
- [NOTIFY;](#)
- [PUBLISH;](#)
- [REFER;](#)
- [REGISTER; and](#)

- [SUBSCRIBE.](#)

[Services supporting the following SIP Methods via Roaming II-NNI are out of scope:](#)

- [PUBLISH](#)

6.1.1.3 SIP header fields

6.1.1.3.0 General

For the purpose of the present document clause 6.1.1.3.0 of TS 29.165 v11.5.0 (2012-12) applies as follows:

The IBCF shall provide the capabilities to manage and modify SIP header fields according to subclause 5.10 and Annex A of 3GPP TS 24.229 [5] with modifications as described in the following subclauses.

6.1.1.3.1 Trust and no trust relationship

For the purpose of the present document clause 6.1.1.3.1 of TS 29.165 v11.5.0 (2012-12) applies with the following changes of Table 6.2 as follows:

The IBCF acting as exit point applies the procedures described in clause 5.10.2 of 3GPP TS 24.229 [5] before forwarding the SIP signalling to the IBCF acting as entry point. The IBCF acting as entry point applies the procedures described in clause 5.10.3 of 3GPP TS 24.229 [5].

Additionally, in case there is no trust relationship between the two IM CN subsystems connected by II-NNI, the IBCF acting as exit point applies the procedures described in clause 4.4 of 3GPP TS 24.229 [5], before forwarding the SIP signalling.

These procedures may be utilized on a per header field basis to realize overall trust as well as per service level screening of header fields. Trust relationships and trust domains may be defined by inter-operator agreements for individual services and/or individual SIP header fields.

The management of the SIP header fields (if present) over II-NNI in case of a presence or not of a trust relationship between the two interconnected IM CN subsystems is wrapped up in the following table.

Table 6.2: Management of SIP header fields over II-NNI in presence or not of a trust relationship

Item	Header field	Reference	Trust relationship	Not trust relationship	i3F II-NNI Trust relationship	i3F II-NNI Not trust relationship
1	<i>P-Asserted-Identity</i>	IETF RFC 3325 [44]	As specified in 3GPP TS 24.229 [5], clause 4.4 (NOTE 5)	As specified in 3GPP TS 24.229 [5], clause 4.4 (NOTE 5)	As specified in 3GPP TS 24.229 [5], clause 4.4 (NOTE 5)	As specified in 3GPP TS 24.229 [5], clause 4.4 (NOTE 5)
2	<i>P-Access-Network-Info</i> (NOTE 2)	IETF RFC 3455 [24]	As specified in 3GPP TS 24.229 [5], clause 4.4	As specified in 3GPP TS 24.229 [5], clause 4.4	As specified in 3GPP TS 24.229 [5], clause 4.4	As specified in 3GPP TS 24.229 [5], clause 4.4
3	<i>Resource-Priority</i>	IETF RFC 4412 [78]	As specified in 3GPP TS 24.229 [5], clause 4.4	As specified in 3GPP TS 24.229 [5], clause 4.4	As specified in 3GPP TS 24.229 [5], clause 4.4	As specified in 3GPP TS 24.229 [5], clause 4.4
4	<i>History-Info</i> (NOTE 2)	IETF RFC 4244 [25]	As specified in 3GPP TS 24.229 [5], clause 4.4	As specified in clause 4.3.3 of RFC 4244 [25] and in 3GPP TS 24.229 [5], clause 4.4	As specified in 3GPP TS 24.229 [5], clause 4.4	As specified in clause 4.3.3 of RFC 4244 [25] and in 3GPP TS 24.229 [5], clause 4.4
5	<i>P-Asserted-Service</i> (NOTE 2)	IETF RFC 6050 [26]	As specified in 3GPP TS 24.229 [5], clause 4.4 (NOTE 3)	As specified in 3GPP TS 24.229 [5], clause 4.4 (NOTE 3)	As specified in 3GPP TS 24.229 [5], clause 4.4 (NOTE 3)	As specified in 3GPP TS 24.229 [5], clause 4.4 (NOTE 3)
6	<i>P-Charging-Vector</i>	IETF RFC 3455 [24]	As specified in 3GPP TS 24.229 [5], clause 5.10	As specified in 3GPP TS 24.229 [5], clause 5.10	As specified in 3GPP TS 24.229 [5], clause 5.10	As specified in 3GPP TS 24.229 [5], clause 5.10
7	<i>P-Charging-Function-Addresses</i> (NOTE 4)	IETF RFC 3455 [24]	As specified in 3GPP TS 24.229 [5], clause 5.10	As specified in 3GPP TS 24.229 [5], clause 5.10	As specified in 3GPP TS 24.229 [5], clause 5.10	As specified in 3GPP TS 24.229 [5], clause 5.10
8	<i>P-Profile-Key</i> (NOTE 2)	IETF RFC 5002 [64]	As specified in 3GPP TS 24.229 [5], clause 4.4	As specified in 3GPP TS 24.229 [5], clause 4.4	As specified in 3GPP TS 24.229 [5], clause 4.4	As specified in 3GPP TS 24.229 [5], clause 4.4
9	<i>P-Private-Network-Indication</i> (NOTE 1)	draft-vanelburg-dispatch-private-network-ind [84]	As specified in 3GPP TS 24.229 [5], clause 4.4	As specified in 3GPP TS 24.229 [5], clause 4.4	As specified in 3GPP TS 24.229 [5], clause 4.4	As specified in 3GPP TS 24.229 [5], clause 4.4
10	<i>P-Served-User</i> (NOTE 1, NOTE 2)	IETF RFC 5502 [85]	As specified in 3GPP TS 24.229 [5], clause 4.4	As specified in 3GPP TS 24.229 [5], clause 4.4	As specified in 3GPP TS 24.229 [5], clause 4.4	As specified in 3GPP TS 24.229 [5], clause 4.4
11	<i>Reason</i> (in a response)	IETF RFC 6432 [49]	As specified in 3GPP TS 24.229 [5], clause 4.4	As specified in 3GPP TS 24.229 [5], clause 4.4	As specified in 3GPP TS 24.229 [5], clause 4.4	As specified in 3GPP TS 24.229 [5], clause 4.4
12	<i>P-Early-Media</i>	IETF RFC 5009 [74]	As specified in 3GPP TS 24.229 [5], clause 4.4	As specified in 3GPP TS 24.229 [5], clause 4.4	As specified in 3GPP TS 24.229 [5], clause 4.4	As specified in 3GPP TS 24.229 [5], clause 4.4

NOTE 1: For a roaming II-NNI, a trust relationship with respect to this header field is required.

NOTE 2: This header field is only applicable on a roaming II-NNI whereas for the interconnect NNI it is left unspecified.

NOTE 3: In addition, value-dependent operator policies may be applied.

NOTE 4: This header field is not applicable at II-NNI.

NOTE 5: The handling of the URI parameters "cpc" and "oli", defined in 3GPP TS 24.229 [5] subclause 7.2A.12, is specified in 3GPP TS 24.229 [5], clause 4.4.

Items stroke out in the table above are not in scope of this i3 Forum Release, and items underlined are modifications or additions.

6.1.1.3.2 Derivation of applicable SIP header fields from 3GPP TS 24.229 [5]

For the purpose of the present document clause 6.1.1.3.2 of TS 29.165 v11.5.0 (2012-12) applies as follows:

For any method in table 6.1, the SIP header fields applicable on the II-NNI are detailed in the corresponding method tables for the UA role and proxy role sending behavior in Annex A of 3GPP TS 24.229 [5]. Unless other information is specified in the normative part of the present specification, the applicability of header fields at the II-NNI can be derived for each method from the corresponding tables in annex A of 3GPP TS 24.229 [5] as follows:

- *All header fields not present in the corresponding tables in Annex A of 3GPP TS 24.229 or marked as "n/a" in both the "RFC status" and "profile status" columns for the UA role and proxy role sending behaviour of that tables are not applicable at the II-NNI.*

NOTE 1: Operators could choose to apply header fields for other SIP extensions on an II-NNI based on bilateral agreements, but this is outside the scope of the present specification.

- *All header fields which are marked as "o" in at least one of the "RFC status" or the "profile status" profile columns for the sending behaviour in the corresponding UA role and proxy role tables in annex A of 3GPP TS 24.229 [5] and as "n/a" or "o" in the other such columns are applicable at II-NNI based on bilateral agreement between operators.*
- *All header fields which are marked as "m" in at least one of the "RFC status" or the "profile status" columns for the sending behaviour in the corresponding UA role or proxy role table in annex A of 3GPP TS 24.229 [5] and as "n/a", "o", or "m" in the other such columns are applicable at the II-NNI.*
- *If conditions are specified, they are also applicable at the II-NNI and the above rules are applicable to the "n/a", "o" and "m" values within the conditions.*

NOTE 2: In the above rules, the RFC profile columns are taken into account in order to enable interworking with non-3GPP networks,

An informative summary of SIP header fields to be used over the II-NNI is proposed in annex A.

6.1.1.3.3 Applicability of SIP header fields on a roaming II-NNI

For the purpose of the present document clause 6.1.1.3.3 of TS 29.165 v11.5.0 (2012-12) applies as follows:

The following SIP header fields are only applicable on a roaming II-NNI:

- *Authentication-Info*
- *Authorization*
- *P-Associated-URI*
- *P-Called-Party-ID*
- *P-Preferred-Service*
- *P-Profile-Key*
- *P-Served-User*
- *P-Visited-Network-ID*
- *Path*
- *Proxy-Authenticate*
- *Proxy-Authorization*
- *Service-Route*
- *WWW-Authenticate*

6.1.1.3.4 Applicability of SIP header fields on a non-roaming II-NNI

For the purpose of the present document clause 6.1.1.5 of TS 29.165 v11.5.0 (2012-12) applies as follows:

The following SIP header fields are only applicable on a non-roaming II-NNI or for the loopback traversal scenario:

- *P-Refused-URI-List*

6.1.1.4 Notations of the codes

Moved to Section 6.1.1.1.

6.1.1.5 Modes of signalling

For the purpose of the present document clause 6.1.1.5 of TS 29.165 v11.5.0 (2012-12) applies as follows:

Overlap signalling may be used if agreement exists between operators to use overlap and which method to be used, otherwise enbloc shall be used at the II-NNI.

6.1.2 SDP protocol

6.1.2.1 General

For the purpose of the present document clause 6.1.2.1 of TS 29.165 v11.5.0 (2012-12) applies as follows:

The functional entity closest to the border of an II-NNI (see reference model in Clause 5) shall provide the capabilities specified for that network element in Annex A.3 of 3GPP TS 24.229 [5].

The SDP bodies shall be encoded as described in IETF RFC 3261 [13] and in IETF RFC 4566 [147]. The offer/answer model with the SDP as defined in IETF RFC 3264 [146] shall be applied.

6.1.3 Major capabilities

For the purpose of the present document clause 6.1.3 of TS 29.165 v11.5.0 (2012-12) applies with the following changes in Table 6.1.3.1 and Table 6.1.3.2. as follows:

This subclause contains the major capabilities to be supported over the II-NNI.

The table 6.1.3.1 specifies which capabilities are applicable for II-NNI. The profile status codes within table 6.1.3.1 are defined in table 6.1.3.2. For the "Basic SIP" capabilities part of table 6.1.3.1, the last column "Profile status over II-NNI" specifies the general status of applicability of the IETF RFC 3261 [13] main mechanisms described in the 2nd column "Capability over the Ici".

For the "Extensions to basic SIP" capabilities part, the last column "Profile status over II-NNI" specifies the general status of applicability of the RFC referenced in the 2nd column "Capability over the Ici". If necessary, the applicability of RFCs at the II-NNI level is further detailed in the present Technical Specification.

The columns "Reference item in 3GPP TS 24.229 [5] for the profile status" provide informative references for comparison purposes into the UA and Proxy role major capabilities tables in 3GPP TS 24.229 [5], where the capabilities are defined via additional references.

Table 6.1.3.1: Major capabilities over II-NNI

Item	Capability over the ICI	Reference item in 3GPP TS 24.229 [5] for the profile status		Profile status over II-NNI	I3Forum Profile status over II-NNI (non-roaming)	I3Forum Profile status over II-NNI (Roaming)
		UA Role (NOTE 1)	Proxy role (NOTE 2)			
	Basic SIP (IETF RFC 3261 [13])					
1	registrations	1, 2, 2A	-	c2	e2 n/a	e2 m
2	initiating a session	2B, 2C, 3, 4	-	m	m	m
3	terminating a session	5	3	m	m	m
4	General proxy behaviour	-	4, 5, 14, 15, 19F	n/a	n/a	n/a
5	Managing several responses due to forking	9,10	6	m	m	m
6	support of indication of TLS connections in the Record-Route header	-	7, 8	n/a	n/a	n/a
7	Support of authentication	7, 8, 8A	8A	c2	e2 n/a	e2 m
8	Timestamped requests (Timestamp header field)	6	-	m	m	m
9	Presence of date in requests and responses (Date header field)	11	9	m	# o NOTE i3F-2	# o NOTE i3F-2
10	Presence of alerting information data (Alert-info header field)	12	10	o	o	o
11	Support and handling of the Require header field for REGISTER and other requests or responses for methods other than REGISTER	-	11, 12, 13	m	m	m
12	Support and reading of the Supported and Unsupported header fields	-	16, 17, 18	m	m	m
13	Support of the Error-Info header field in 3xx - 6xx responses	-	19	o	o	o
14	Support and handling of the Organization header field	-	19A, 19B	m	m	m
15	Support and handling of the Call-Info header field	-	19C, 19D	m	m	m
16	Support of the Contact header field in 3xx response	-	19E	m	m	m
16A	Proxy reading the contents of a body or including a body in a request or response		19F	n/a	n/a	n/a
	Extensions to basic SIP					
16B	3GPP TS 24.237 [131]: proxy modifying the content of a body	n/a	19G	n/a	n/a	n/a
17	IETF RFC 6086[39]: SIP INFO method and package framework	13	20	o	o	o
17A	IETF RFC 6086 [39]: legacy INFO usage	13A	20A	o	o	o
18	IETF RFC 3262 [18]: reliability of provisional responses in SIP (PRACK method)	14	21	m	m	m
19	IETF RFC 3515 [22]: the SIP REFER method	15	22	o	e	o NOTE i3F-1

20	IETF RFC 3312 [40] and RFC 4032 [41]: integration of resource management and SIP (Preconditions framework)	16	23	o	o	o
21	IETF RFC 3311 [23]: the SIP UPDATE method	17	24	m	m	m
22	IETF RFC 3313 [42]: SIP extensions for media authorization (P-Media-Authorization header field)	19	26	n/a	n/a	n/a
23	IETF RFC 3265 [20]: SIP specific event notification (SUBSCRIBE/NOTIFY methods)	20, 21, 22, 23	27, 28	c1	e1 o	e1 m
24	IETF RFC 3327 [43]: session initiation protocol extension header field for registering non-adjacent contacts (Path header field)	24	29	c2	e2 n/a	e2 m
25	IETF RFC 3325 [44]: private extensions to the Session Initiation Protocol (SIP) for network asserted identity within trusted networks	25	30	c4	c4	c4
26	IETF RFC 3325 [44]: the P-Preferred-Identity header field extension	-	-	n/a	n/a	n/a
27	IETF RFC 3325 [44]: the P-Asserted-Identity header field extension	-	-	c4	c4	c4
28	IETF RFC 3323 [34]: a privacy mechanism for the Session Initiation Protocol (SIP) (Privacy header field)	26, 26A, 26B, 26C, 26D, 26E, 26F, 26G, 26H	31, 31A, 31B, 31C, 31D, 31E, 31F, 31G, 31H	m	m	m
29	IETF RFC 3428 [19]: a messaging mechanism for the Session Initiation Protocol (SIP) (MESSAGE method)	27	33	o	e	o
30	IETF RFC 3608 [45]: session initiation protocol extension header field for service route discovery during registration (Service-Route header field)	28	32	c2	e2 n/a	m
31	IETF RFC 3486 [46]: compressing the session initiation protocol	29	34	n/a	n/a	n/a
32	IETF RFC 3455 [24]: private header extensions to the session initiation protocol for the 3rd-Generation Partnership Project (3GPP)	30	35	o	o	o
32A	IETF RFC 3325 [44]: act as first entity within the trust domain for asserted identity	30A	30A	n/a	n/a	n/a
32B	IETF RFC 3325 [44]: act as entity within trust network that can route outside the trust network	30B	30B	n/a	n/a	n/a
32C	IETF RFC 3325: act as entity passing on identity transparently independent of trust domain	30C	30C	n/a	n/a	n/a
33	IETF RFC 3455 [24]: the P-Associated-URI header field extension	31	36	c2	e2 n/a	e2 m
34	IETF RFC 3455 [24]: the P-Called-Party-ID header field extension	32	37	c2	e2 n/a	e2 m
35	IETF RFC 3455 [24]: the P-Visited-	33	38, 39	c2	e2 n/a	e2 m

	<i>Network-ID header field extension</i>					
36	<i>IETF RFC 3455 [24]: the P-Access-Network-Info header field extension</i>	34	41, 42, 43	c4	e4 n/a	e4 o NOTE i3F-2
37	<i>IETF RFC 3455 [24]: the P-Charging-Function-Addresses header field extension</i>	35	44, 44A	n/a	n/a	n/a
38	<i>IETF RFC 3455 [24]: the P-Charging-Vector header field extension</i>	36	45, 46	c1	e1 o	e1 m
39	<i>IETF RFC 3329 [47]: security mechanism agreement for the session initiation protocol</i>	37	47	n/a	n/a	n/a
39A	<i>draft-dawes-dispatch-mediasec-parameter-03 [137]: Capability Exchange for Media Plane Security</i>	37A	47A	n/a	n/a	n/a
40	<i>IETF RFC 3326 [48]: the Reason header field for the session initiation protocol</i>	38	48	o	o	o
41	<i>IETF RFC 6432 [49]: carrying Q.850 codes in reason header fields in SIP (Session Initiation Protocol) responses</i>	38A	48A	c4	c4	c4
42	<i>IETF RFC 3581 [50]: an extension to the session initiation protocol for symmetric response routing</i>	39	49	o	o	o
43	<i>IETF RFC 3841 [51]: caller preferences for the session initiation protocol (Accept-Contact, Reject-Contact and Request-Disposition header fields)</i>	40, 40A, 40B, 40C, 40D, 40E, 40F	50, 50A, 50B, 50C, 50D, 50E, 50F	m	m	m
44	<i>IETF RFC 3903 [21]: an event state publication extension to the session initiation protocol (PUBLISH method)</i>	41	51	c1	e1	o NOTE i3F-2
45	<i>IETF RFC 4028 [52]: SIP session timer (Session-Expires and Min-SE headers)</i>	42	52	m	m o NOTE i3F-2	m o NOTE i3F-2
46	<i>IETF RFC 3892 [53]: the SIP Referred-By mechanism</i>	43	53	m	m	m NOTE i3F-1
47	<i>IETF RFC 3891 [54]: the Session Initiation Protocol (SIP) "Replaces" header</i>	44	54	o	e	o NOTE i3F-1
48	<i>IETF RFC 3911 [55]: the Session Initiation Protocol (SIP) "Join" header</i>	45	55	o	e	o NOTE i3F-1
49	<i>IETF RFC 3840 [56]: the callee capabilities</i>	46	56	o	e	e
50	<i>IETF RFC 4244 [25]: an extension to the session initiation protocol for request history information (History-Info header field)</i>	47	57	o	o	o
51	<i>IETF RFC 5079 [57]: Rejecting anonymous requests in the session initiation protocol</i>	48	58	o	o	o
52	<i>IETF RFC 4458 [58]: session initiation protocol URIs for applications such as voicemail and interactive voice response (NOTE 3)</i>	49	59	o	o	o
53	<i>IETF RFC 4320 [59]: Session Initiation Protocol's (SIP) non-INVITE transactions</i>	50	61	m	m	m

54	IETF RFC 4457 [60]: the P-User-Database private header field extension	51	60	n/a	n/a	n/a
55	IETF RFC 5031 [61]: a uniform resource name for services	52	62	n/a	n/a	n/a
56	IETF RFC 5627 [62]: obtaining and using GRUUs in the Session Initiation Protocol (SIP)	53	63	c1	e4o	e4 m
	Void					
58	IETF RFC 4168 [27]: the Stream Control Transmission Protocol (SCTP) as a Transport for the Session Initiation Protocol (SIP)	55	65	o	o	o
59	IETF RFC 5002 [64]: the SIP P-Profile-Key private header field extension	56	66, 66A, 66B	c3	e3-n/a	e3 o
60	IETF RFC 5626 [65]: managing client initiated connections in SIP	57	67	c1	e4o	e4 m
61	IETF RFC 5768 [66]: indicating support for interactive connectivity establishment in SIP	58	68	n/a	n/a	n/a
62	IETF RFC 5365 [67]: multiple-recipient MESSAGE requests in the session initiation protocol	59	69	o if 29, else n/a	o if 29, else n/a	o if 29, else n/a
63	draft-ietf-sipcore-location-conveyance-08 [68]: SIP location conveyance (Geolocation header)	60	70, 70A, 70B	m	m	m
64	IETF RFC 5368 [69]: referring to multiple resources in the session initiation protocol	61	71	o if 19, else n/a	o if 19, else n/a	o if 19, else n/a
65	IETF RFC 5366 [70]: conference establishment using request-contained lists in the session initiation protocol	62	72	o	o	o
66	IETF RFC 5367 [71]: subscriptions to request-contained resource lists in the session initiation protocol	63	73	o if 23, else n/a	o if 23, else n/a	o if 23, else n/a
67	IETF RFC 4967 [72]: dialstring parameter for the session initiation protocol uniform resource identifier	64	74	c2	e2 n/a	e2 m
68	IETF RFC 4964 [73]: the P-Answer-State header extension to the session initiation protocol for the open mobile alliance push to talk over cellular	65	75	o	o	o
69	IETF RFC 5009 [74]: the SIP P-Early-Media private header field extension for authorization of early media	66	76	c4	c4	c4
70	IETF RFC 4694 [75]: number portability parameters for the 'tel' URI	67, 67A, 67B	77, 77A, 77B	o	o	o
72	IETF RFC 4411 [77]: extending the session initiation protocol Reason header for preemption events	69	79	o	e	e
73	IETF RFC 4412 [78]: communications resource priority for the session initiation protocol? (Resource-Priority header field)	70, 70A, 70B	80, 80A, 80B	o	e	e
74	IETF RFC 5393 [79]: addressing an amplification vulnerability in session initiation protocol forking proxies	71	81	m	m	m
75	IETF RFC 5049 [80]: the remote application identification of applying	72	82	n/a	n/a	n/a

	<i>signalling compression to SIP</i>					
76	<i>IETF RFC 5688 [81]: a session initiation protocol media feature tag for MIME application sub-types</i>	73	83	c1	e4 o	e4 m
77	<i>IETF RFC 6050 [26]: Identification of communication services in the session initiation protocol</i>	74	84, 84A	o	e	e
78	<i>IETF RFC 5360 [82]: a framework for consent-based communications in SIP?</i>	75, 75A, 75B	85	o	e	e
79	<i>draft-johnston-sipping-cc-uu-09 [83]: transporting user to user information for call centers using SIP?</i>	76	86	c1	e4 o	e4 m
79A	<i>draft-ietf-cuss-sip-uu-isdn [83A]: Interworking ISDN Call Control User Information with SIP</i>	76A	n/a	c1	e4 o	e4 m
80	<i>draft-vanelburg-dispatch-private-network-ind-01 [84]: The SIP P-Private-Network-Indication private-header (P-Header)</i>	77	87	c1	e4	e4
81	<i>IETF RFC 5502 [85]: the SIP P-Served-User private header</i>	78	88	c2	e2 n/a	e2 m
83	<i>draft-dawes-sipping-debug-04 [87]: the P-Debug-ID header extension</i>	80	90	o	e	e
84	<i>IETF RFC 6228 [88]: the 199 (Early Dialog Terminated) response code</i>	81	91	m	m	m
85	<i>IETF RFC 5621 [89]: message body handling in SIP</i>	82	92	m	m	m
86	<i>IETF RFC 6223 [90]: indication of support for keep-alive</i>	83	93	o	e	e
87	<i>IETF RFC 5552 [91]: SIP Interface to VoiceXML Media Services</i>	84	94	n/a	n/a	n/a
88	<i>IETF RFC 3862 [92]: common presence and instant messaging (CPIM): message format</i>	85	95	o	e	o
89	<i>IETF RFC 5438 [93]: instant message disposition notification</i>	86	96	o	e	o
90	<i>IETF RFC 5373 [94]: requesting answering modes for SIP (Answer-Mode and Priv-Answer-Mode header fields)</i>	87	97, 97A	o	e	e
	Void					
92	<i>IETF RFC 3959 [96]: the early session disposition type for SIP</i>	89	99	o	e	o
93	<i>IETF RFC 4244 [97]: delivery of Request-URI targets to user agents</i>	90	100	n/a	n/a	n/a
94	<i>draft-kaplan-dispatch-session-id-00 [124]: The Session-ID header</i>	91	101	o	o	o
95	<i>IETF RFC 6026 [125]: correct transaction handling for 200 responses to Session Initiation Protocol INVITE requests</i>	92	102	m	m	m
96	<i>IETF RFC 5658 [126]: addressing Record-Route issues in the Session Initiation Protocol (SIP)</i>	93	103	o	o	o
97	<i>IETF RFC 5954 [127]: essential correction for IPv6 ABNF and URI comparison in IETF RFC 3261 [13]</i>	94	104	m	m	m
98	<i>IETF RFC 4488 [135]: suppression of session initiation protocol REFER method implicit subscription</i>	95	105	m if 19, else n/a	m if 19, else n/a	m if 19, else n/a
99	<i>draft-ietf-salud-alert-info-urns [136]: Alert-Info URNs for the Session Initiation</i>	96	106	o	e	o

	Protocol					
100	Subclause 3.1 of 3GPP TS 24.229: multiple registrations	97	107	c2	e2 n/a	e2 m
101	IETF RFC 5318 [141]: the SIP P-Refused-URI-List private-header	98	108	c5	c5	e5 -n/a
102	IETF RFC 4538 [140]: request authorization through dialog Identification in the session initiation protocol (Target-Dialog header field)	99	109	o	o	o
103	draft-holmberg-sipcore-proxy-feature [143]: indication of features supported by proxy	100	110	o	o	o
104	IETF RFC 6140: registration of bulk number contacts	101	111	c2	e2 n/a	e2 m
105	IETF RFC 6230: media control channel framework	102	112	o	o	o
105A	3GPP TS 24.229 [5]: S-CSCF restoration procedures	103	113	c3	e3 n/a	e3 o
106	RFC 6357 [164] SIP overload control	104	114	o	o	o
107	draft-ietf-soc-overload-control [165] feedback control	104A	114A	o	o	o

c1: m in case of roaming II-NNI, else o

c2: m in case of roaming II-NNI, else n/a

c3: o in case of roaming II-NNI, else n/a

c4: m in case of trust relationship between the interconnected networks, else n/a

c5: o in case of non-roaming II-NNI and loopback traversal scenario, else n/a

NOTE 1: The item numbering corresponds to the one provided in table A.4 in [5].

NOTE 2: The item numbering corresponds to the one provided in table A.162 in [5].

NOTE 3: A common URI namespace is required to apply this feature on the II-NNI.

[NOTE i3F-1: Needed to support CONF service as specified within TS 24.147 \[106\] Section 5.3.1.5.3](#)

[NOTE i3F-2:](#)

[Item 9: Date header is of no use for basic voice service, which is the scope of the document, as it is globally considered less reliable with regards to locally registered timestamp. Furthermore it's not commonly used for any post-processing \(charging, reporting, ...\) so it's more appropriate to leave it as an optional item.](#)

[Item 36; this capability is optional due to possible unsecure relationship via public Internet,](#)

[Item: 44: as shown is Sec. 6.1.1.2.the PUBLISH method is out-of-scope at Interconnection II-NNI](#)

[Item 45: SIP Session Timer as specified in RFC 4028 is meant to be an end-to-end per-session keepalive mechanism which can result meaningless if there is any node \(B2BUA, ASs,...\) in the chain, re-generating SIP signalling so interrupting the signalling transparency, as it is common in real environments. It's more appropriate not to mandate it.](#)

[Items stroke out in the table above are not in scope of this i3 Forum Release, and items underlined are modifications or additions.](#)

Table 6.1.3.2: Key to notation codes for major capabilities

Notation code	Notation name	Explanation
<i>M</i>	<i>mandatory</i>	<i>The capability shall be supported at II-NNI. SIP message relating to this capability shall be sent over the II-NNI if received from the serving network, unless they also make use of other unsupported capabilities. SIP headers or other information elements relating to this capability shall be passed over the II-NNI if received from the sending side. This does not imply that network elements inside the serving network or served network or user equipment connected to these networks shall support this capability.</i>
<i>O</i>	<i>optional</i>	<i>The capability may or may not be supported at II-NNI. The support of the capability is provided based on bilateral agreement between the operators (i.e. Service Provider and/or carriers according to i3Forum terminology).</i>
<i>n/a</i>	<i>not applicable</i>	<i>It is impossible to use/support the capability at the II-NNI.</i>
<i>c</i> <i><integer></i>	<i>conditional</i>	<i>The support of the capability ("m", "o" or "n/a") depends on the support of other optional or conditional items. <integer> is the identifier of the conditional expression.</i>

6.2 Control Plane Transport

6.2.1 General

For the purpose of the present document clause 6.2.1 of TS 29.165 v11.5.0 (2012-12) applies as follows:

The control plane transport of the II-NNI shall comply with clause 4.2A of 3GPP TS 24.229 [5]. Support of SCTP as specified in IETF RFC 4168 [27] is optional for an IBCF connected by II-NNI. Nevertheless this option is favourable if the operators would like to improve reliability over the ICI.

6.3 SIP timers

For the purpose of the present document clause 6.3 of TS 29.165 v11.5.0 (2012-12) applies as follows:

Table 6.3.1 shows values of SIP timers that should be supported at II-NNI. It contains the following items:

- *the first column, titled "SIP Timer", shows the timer names as defined in IETF RFC 3261 [13];*
- *the second column reflects the timer meaning as defined in IETF RFC 3261 [13];*
- *the third column reflects the reference to the proper section in the IETF RFC 3261 [13] and in 3GPP TS 24.229 [5] and*
- *the final column lists the values recommended for the functional entities closest to the border of an II-NNI (see reference model in clause 5).*

Table 6.3.1 reports information from 3GPP TS 24.229 [5], table 7.7.1. Values between IM CN subsystem elements shown in the second column in 3GPP TS 24.229 [5], table 7.7.1 are applicable for the II-NNI and are reported in the fourth column of table 6.3.1. If there are any differences between table 6.3.1 and 3GPP TS 24.229 [5], table 7.7.1, the information within 3GPP TS 24.229 [5], table 7.7.1 is applicable.

Table 6.3.1: SIP timers at II-NNI

SIP Timer	Meaning	Reference	Recommended values
T1	RTT estimate	[13] subclause 17.1.1.1 [5] table 7.7.1	500ms default (see NOTE)
T2	The maximum retransmit interval for non-INVITE requests and INVITE responses	[13] subclause 17.1.2.2 [5] table 7.7.1	4s (see NOTE)
T4	Maximum duration a message will remain in the network	[13] subclause 17.1.2.2 [5] table 7.7.1	5s (see NOTE)
Timer A	INVITE request retransmit interval, for UDP only	[13] subclause 17.1.1.2 [5] table 7.7.1	initially T1
Timer B	INVITE transaction timeout timer	[13] subclause 17.1.1.2 [5] table 7.7.1	64*T1
Timer C	proxy INVITE transaction timeout	[13] subclause 16.6 [5] table 7.7.1	> 3min
Timer D	Wait time for response retransmits	[13] subclause 17.1.1.2 [5] table 7.7.1	> 32s for UDP
		[13] subclause 17.1.1.2 [5] table 7.7.1	0s for TCP/SCTP
Timer E	non-INVITE request retransmit interval, UDP only	[13] subclause 17.1.2.2 [5] table 7.7.1	initially T1
Timer F	non-INVITE transaction timeout timer	[13] subclause 17.1.2.2 [5] table 7.7.1	64*T1
Timer G	INVITE response retransmit interval	[13] subclause 17.2.1 [5] table 7.7.1	initially T1
Timer H	Wait time for ACK receipt.	[13] subclause 17.2.1 [5] table 7.7.1	64*T1
Timer I	Wait time for ACK retransmits	[13] subclause 17.2.1 [5] table 7.7.1	T4 for UDP
		[13] subclause 17.2.1 [5] table 7.7.1	0s for TCP/SCTP
Timer J	Wait time for non-INVITE request retransmits	[13] subclause 17.2.2 [5] table 7.7.1	64*T1 for UDP
		[13] subclause 17.2.2 [5] table 7.7.1	0s for TCP/SCTP
Timer K	Wait time for response retransmits	[13] subclause 17.1.2.2 [5] table 7.7.1	T4 for UDP
		[13] subclause 17.1.2.2 [5] table 7.7.1	0s for TCP/SCTP
NOTE:	As a network option, SIP T1 Timer's value can be extended, along with the necessary modifications of T2 and T4 Timers' values, to take into account the specificities of the supported services when the MRFC and the controlling AS are under the control of the same operator and the controlling AS knows, based on local configuration, that the MRFC implements a longer value of SIP T1 Timer.		

7 i3 Forum Recommendations

It is recommended that this Interconnection Signalling Profile should be supported as the minimal profile on the II-NNI for basic voice services in both Interconnect and Roaming scenarios. It is recommended that bilateral agreements describe the support/transparency (or not) of optional elements.