Technical Specification of the interfaces between User Equipment and the NGN Platforms of NetCologne

NetCologne

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History

Version:	Date:	Editor:	Comments:
0.3	22.07.2016	F. Ewen, S. Förster	Initial version
0.4	15.03.2021	S. Förster	Table 1+2: supplemented with G.Fast + GPON

Content

Tables

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1 The scope of this document

The intention of this document is to provide a specification with a functional description of the interfaces at the passive Network Termination Points in NetCologne's xDSL and fibre networks.

It reflects the changes forced into law as of August 1st 2016.

The document contains the description for the Access functionalities, which are required to connect to the NetCologne network properly, as well as the required functionalities for Voice and Data Services.

If there is any misleading information or a requirement for additional information or clarification, the reader of this document is kindly required to execute a formal request to NetCologne in order to be able to provide the required information.

The figure below visualizes the scope of the descriptions.

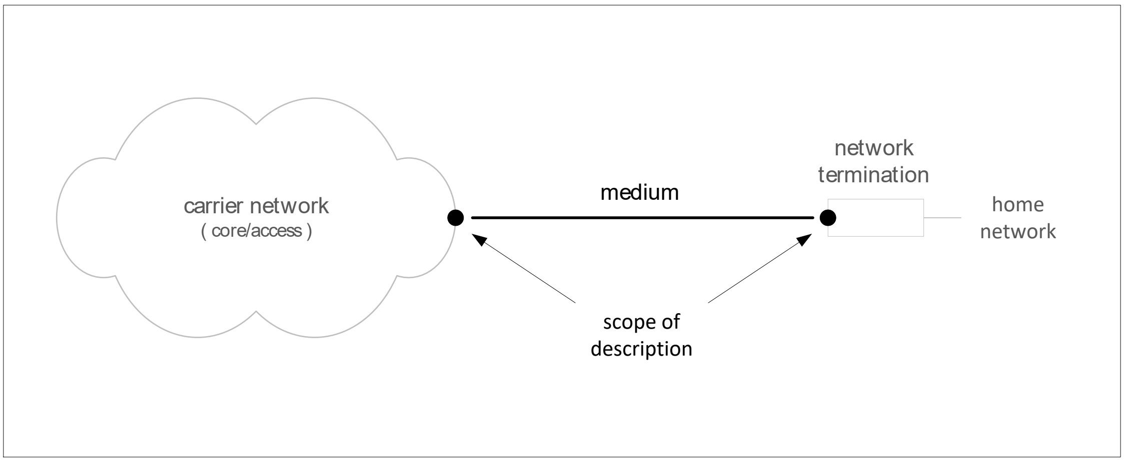

Figure 1 - Scope of description

2 Description of the Access

Line Port Description

In order to provide the various services to NetCologne's customers by using copper and fiber access infrastructures, the following transmission standards and interfaces are used.

Medium: twisted pair

Transmission type	Standards	Special characteristics
ADSL 2+	G.992.5	• Annex B • Annex J
G.SHDSL.bis	G.991.2	• IEEE 802.3ah • TCPAM (16/32)
VDSL2	G.993.2 G.993.5 (vector) G.999.1 (bonding) G.998.4 (G.INP)	• Depending on the type of network (FTTB / FTTC) different profiles are used: ADE17 and ADE30 • In addition the PSD mask can be shaped individually between 2.2 and 17.6 MHz
G.Fast	G.9700	• G.9700 + G.9701 • Bandplans 106MHz + 212MHz • Compatible with BCM-Chipset

Table 1 Transmission standards for twisted pair

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Medium: Fibre

Transmission type	Standards	Special characteristics
1000Base-X	IEEE 802.3z (LX/ZX/BX10 …80)	• LX, ZX, BX10 …80 • IEEE 802.3AX (LAG) • IEEE 802.1p/Q/ad (QoS, tagging, QinQ) • IEEE 802.1D/w (STP/RSTP) • G.8032 (ring protection) • Jumbo frames
10GBase-X	IEEE 802.3ae (LR/ER/ZR)	• LR, ER, ZR • IEEE 802.3AX (LAG) • IEEE 802.1p/Q (QoS, tagging, QinQ) • IEEE 802.1w (RSTP) • Jumbo frames
40/100GBase-X	IEEE 802.3ba (LR/ER)	• LR4, ER4 • IEEE 802.3AX (LAG) • IEEE 802.1p/Q (QoS, tagging, QinQ) • Jumbo frames
GPON	G.984.1	• G.984.1-5 • G.988 (OMCI) • AES 128 (downstream) • Additional wavelengths can be present: - 1550nm (CATV) - 1577/1270nm (XGSPON) • Wall plug: SC/APC or LC/APC

Table 2 Transmission standards for fibre

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3 Description of Voice Services

This chapter describes the SIP interface between an User Equipment (UE) and the NGN Voice platform of NetCologne. It is based on 1TR114, regarding structure and content, but can be read without knowledge of 1TR114.

Chapter 3.1 incorporates a delta specification to TS 24.229.

This specification can be used to implement a SIP-client on an IAD.

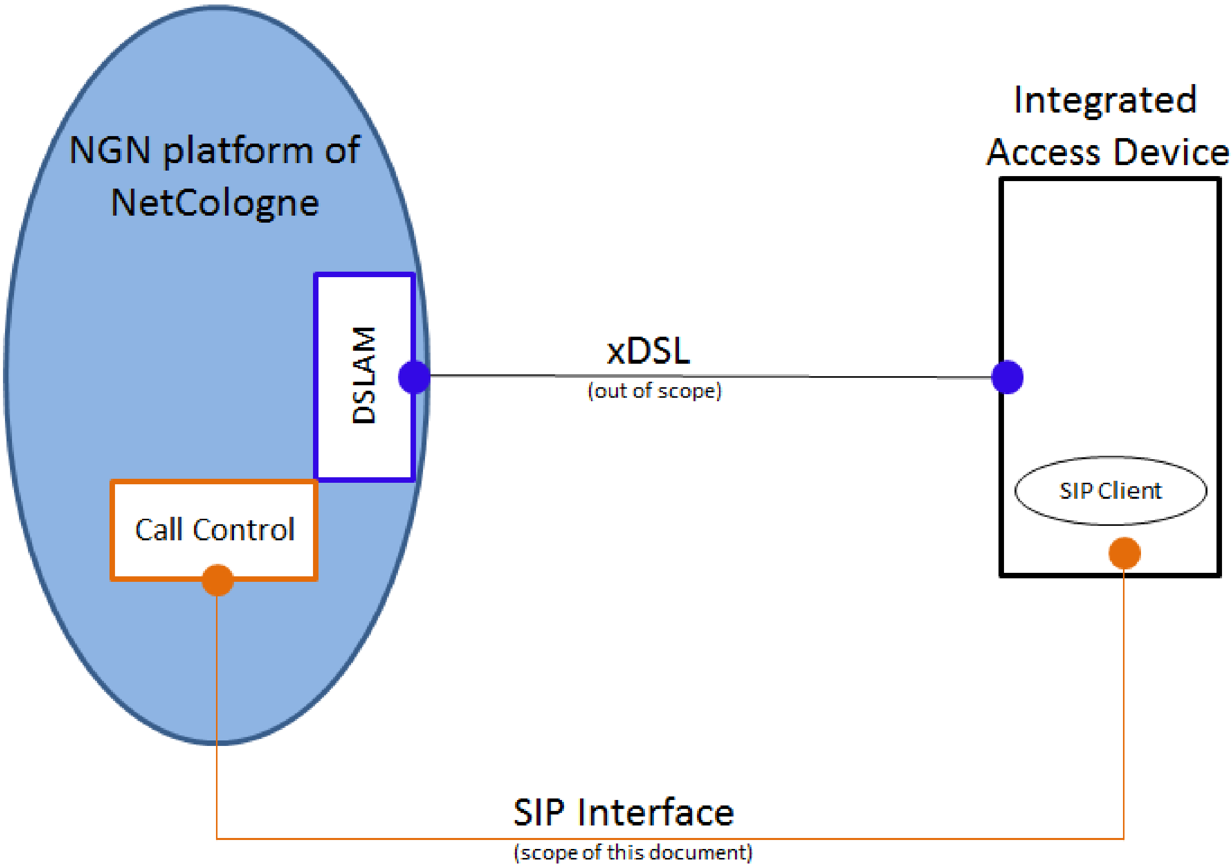

Figure 2 - Scope of Voice service description

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3.1 References

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[28] ITU-T H.261 (03/93): LINE TRANSMISSION OF NON-TELEPHONE SIGNALS; VIDEO CODEC OR AUDIOVISUAL SERVICES AT p x 64 kbits

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[36] IETF RFC 0792: INTERNET CONTROL MESSAGE PROTOCOL; September 1981

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3.2 Capabilities

3.2.1 SIP capabilities

The request of Preconditions (indication of SUPPORT/REQUIRED within an initial INVITE) are not part of this specification. Only passive support is required.

Sending of preconditions supported or required with the initial INVITE SHALL NOT be done. Reliable Provisional Responses are mandatory.

SIP URLs shall be supported in SIP header fields.

3.2.2 Telephony

Voice over IP (VoIP) is performed in accordance with the SIP-Protocol. The specifications to be fulfilled for control of a communication are presented in section 3.7.

For the Media-Stream the Codecs G.711a [26] (A-Law) and G.722 [27] shall be used. For IAD supporting ISDN accesses RFC 4040 [62] (Clearmode) shall be supported.

3.2.3 Fax and Modem

For Fax and Modem transmission over IP, ITU-T Rec. V.152 [33] (based on G.711a [26]) shall be used. If the adjacent endpoint does not support ITU-T Rec. V.152 [33], Fax- and Modem connections shall be set up using G.711a (ITU-T Rec. T.30 [31]).

Currently, ITU-T Rec. T.38 [32] is not supported by the NGN platform of NetCologne.

3.2.4 DTMF

For DTMF events RFC 4733 [65] and RFC 5244 [67] shall be supported.

Note: In cases where the remote Endpoint does not support RFC4733 it shall be possible to send DTMF inband.

3.2.5 Early Media

For early media RFC 5009 MUST be supported. Due to the fact that not all functionalities will support RFC5009 for early media further procedures for identifying early media need to be supported. In addition not in each case where an SDP is received within a provisional response early media apply.
Therefore the following procedures to identify if early media is received shall apply in the following sequence:
1. If a provisional response includes a P-Early-Media Header with "sendonly" and a require header with 100rel. The procedures shall apply with 3GPP TS 24.628 [17].
2. If a provisional response contains SDP and preconditions are not used.
3. Identifying if an RTP stream is received by the UE.

3.2.6 Locating of Proxy in case of (re-) Registration and change of P-CSCF priority due to Maintenance

For proxy discovery and Registration Procedures the Specifications TS 24.229 [21], RFC3261 [71], RFC 2782 [47] and RFC 3263 [50] are valid.

The following procedures shall give a hint for End device vendors how to implement these procedures to fulfil the requirements of NetCologne.

Due to maintenance and failure situations the prioritization of P-CSCF can change. Therefore the destination must be determined by applying the DNS procedures described within RFC3261 [71], RFC 2782 [47], RFC 3263 [50] and ANNEX B of this document.

A DNS query to request the actual SRV record set shall be done before sending a REGISTER or re-REGISTER request.

NOTE: This is valid in cases where the registration timer expires, or a network initiated deregister was sent or in cases where final responses where received pointing to a failure situation where the target cannot be reached (e.g. 503 Response) or a redirect (305 response) was received.

As described within RFC 2782 [47] a client MUST attempt to contact the target host (P-CSCF) with the lowest numbered priority it can reach; target hosts with the same priority SHOULD be tried in an order defined by the weight field. Within NetCologne network normally only the priority field is used.

TTL expiry shall be taken into consideration when starting Register and re-Register procedures.

3.2.7 Auto configuration

Out of scope

3.3 SIP Service functionality requirements

3.3.1 General

The Sip service functionality requirements are defined in [21].

Further specific service requirements are described in the following.
CONF (Section C.2.2) shall be implemented as an End Client Service feature and as described within this specification.
The network centric feature logic for HOLD, CW, TOGGEL and CONF are not available, therefore these features must be additionally implemented locally on the SIP Client. This must be configured as default.
Based on the IAD configuration it must be possible to activate a local/terminal based CW on a busy line if an INVITE without a CW indication is received by the VGW.

3.3.2 Direct Dial In (DDI)

Out of scope

3.3.3 Codecs

Codecs listed in the following Table 3 are supported by the NGN platform of NetCologne.
NOTE: If no transcoding rules or other restrictions (e.g. RACS) contradict, any audio and video codecs will be transparently conveyed through the NGN platform of NetCologne.

Specification	Title	Reference
G.711	Pulse code modulation (PCM) of voice frequencies	[26]
G.722	7 kHz Audio – Coding within 64 kBit/s	[27]

Table 3 Audio Codecs

3.4 Protocol (Profiles)

This section profiles the Gm interface for SIP UE intended to be connected to the NGN platform of NetCologne based on 3GPP TS 24.229 Release 11 [21] (endorsements).

Markings general used within the TEXT:

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Text modified due to NetCologne requirements that is added or deleted compared to 3GPP TS 24.229 Release 11 [21] is shown as *cursive and underlined* (example for added text).

For information: As usual within 3GPP Standards notes in Tables are mandatory and have to be implemented

3.4.1 Modifications to 3GPP TS 24.229

The relevant modifications to 3GPP TS 24.229 [21] for SIP UE (Gm interface) intended to be connected to the NGN platform of NetCologne are provided in Annex B of the present document.

3.4.1.1 Global modifications to 3GPP TS 24.229 Release 11

- *procedures with the relevant Service Command Codes (SCC) (e.g. *21#). These service procedures (incl.SCC) are described in section 3.7 of this document. Either the SCC can be directly dialled via the key pad on the SIP Phone or via specific service menu buttons, which initiates the regarding SCC. The SCC shall be sent in the format of a SIP URI: SCC@hostportion within an initial INVITE. If SIP equivalent procedures are available and supported by the network these shall be preferred.*

- *Particular services provided by the NGN platform of NetColgne require specific procedures using Switching Order Commands (SOC). A SIP UE supporting these services shall use the procedures (incl. SOC) which are described in section 3.7 of this document and 1TR126 [3].*

- *The Hook-Flash handling and the invocation of services are described in 1TR126 [3]. The implementation of the procedures for the Hook-Flash handling, if it is a real Hook-Flash or only a menu button to invoke the service; is a matter of the vendor and out of the scope of this document.*

- *Request URI = SIP URI with user=phone.*

- *For future network improvements the capabilities of registering and sending SIP URI as defined for Public User Identities in 3GPP TS 23.003 [75] SHOULD exist. Currently the only Format used is SIP URI's representing a E.164 Number in the host portion. Default is SIP URI with user=phone*

- *Header fields received my contain tel URI or alias URI as defined in 3GPP TS 23.003 [75]*

- *All URI (Request, From etc.) should be presented within global number format.*

- *Request URI = SIP URI with user=phone is used for SCC like *21%23@hostportion.*

- *# (hash) in URIs must be escaped*

- *The Re-Ringing procedure for the SIP UE shall apply according to 1TR126 [3].*
- *The Protocol stacks shall work with IPv4 and IPv6.*
- *Neither UICC nor ISIM is applicable for this document.*
- *ICSI and IARI are currently not used, but nevertheless elements included within SIP messages shall be passed on in compliance with the current specification.*
- *The Call-Id shall not include the own IP-address of the UA.*
- *Network initiated De-Registration is part of this specification and must be supported.*
- *Authentication shall be possible via HTTP Digest and without HTTP Digest (NASS bundled) based on the line/IP-Address.*
- *Support of session timers regarding RFC 4028 [61] is mandatory.*
- *For tones and announcements the procedures described in 3GPP TS 2. 628, Annex D [17] shall apply. The bidirectional early media shall be used.*
- *Any final response either 200 OK or final error response (e.g. 4xx) shall close all existing early dialogs for the regarding Call-ID.*
- *To avoid problems with a wide spread of existing clients 3PCC procedures shall only send INVITE without SDP and with 100rel supported so that the UAS can decide in sending reliable or unreliable provisional responses.*
- *The AS shall send a 199 for the release of early dialogs. A further 18x response (e.g. 180 in case of CCNR activation rejection) may be sent afterwards. For UE 199 is mandatory to understand.*
- *The challenge mechanism shall be supported.*
- *To avoid too many challenge cycles the nonce shall be included within each request during its validity.*
- *DNS SRV capabilities (including TTL) shall be supported*
- *HEX digits as defined within RFC 3966 [58] to be sent or received on the Gm interface in SIP URI user=phone are not allowed.*

- *UE shall minimise or avoid REGISTER procedures for identifying fetch binding's. The avoidance of this procedure is preferred to minimise the network load.*

- *The restoration procedures as described in [21] shall be supported.*

De-Registration
In cases where UE's are booting, there is no knowledge if the UE is already registered or not. Therefore De-Register with "*" in the contact header field is forbidden.

General procedure for REGISTER Message answered with a 403

General a 403 is an Indication that the user is not provisioned within the HSS. Nevertheless if 403 (Forbidden) has been received as a response to a REGISTER request, a further registration attempts shall be done after 15 sec. In case further 403 responses received with the same URI in the Contact header field REGISTER requests are allowed with a random delay of 30- 60 minutes.

3.4.2 UE (Gm) interface, Profile tables based on 3GPP TS 24.229

In the following section the actual numbering of the endorsement document is kept with a leading "§" sign, if applicable. If not explicit noted, the references mentioned within the following tables apply to [21 Annex B] i.e the numbering of reference [xyz] is the same as used within TS 24.229. T

3.4.2.1 Table description

Item	PDU or Header	Sending			Receiving		
		Ref.	Profile status UE	UNI (Gm)	Ref.	Profile status UE	UNI (Gm)
1	2	3	4	5	6	7	8

Legend:
Column 1: Item numbering
Column 2: Identification of PDU (Method) or SIP Header
Column 3/4/5: Sending = from UE to P-CSCF
Column 6/7/8: Receiving = from P-CSCF to UE
Column 3/6: Reference the numbering of reference [xyz] is the same as used within TS 24.229.
Column 4/7: Profile Status of capabilities the UE has to support

Column 5/8: Profile Status of the IMS Gm Interface

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3.4.2.2 PDUs (SIP Methods)

The following methods shall be supported on the Gm Interface and the UE.

NOTE: A Method Request (e.g. INVITE request) is the Method itself.

NOTE: A Method Response is the Response (e.g. 1xx) sent as a result of a Request.

Item	PDU	Sending			Receiving		
		Ref.	Profile status UE	UNI (Gm)	Ref.	Profile status UE	UNI (Gm)
1	ACK request	[26] 13	m	m	[26] 13	m	m
2	BYE request	[26] 15.1	m	m	[26] 15.1	m	m
3	BYE response	[26] 15.1	m	m	[26] 15.1	m	m
4	CANCEL request	[26] 9	m	m	[26] 9	m	m
5	CANCEL response	[26] 9	m	m	[26] 9	m	m
6	INFO request	[26] 13	c6	m	[26] 13	c5	m
7	INFO response	[26] 13	c6	m	[26] 13	c6	m
8	INVITE request	[26] 13	m	m	[26] 13	m	m
9	INVITE response	[26] 13	m	m	[26] 13	m	m
9A	MESSAGE request	[50] 4	c11	m	[50] 7	c10	m
9B	MESSAGE response	[50] 4	c11	m	[50] 7	c11	m
10	NOTIFY request	[28] 8.1.2	c8	m	[28] 8.1.2	c9	m
11	NOTIFY response	[28] 8.1.2	c8	m	[28] 8.1.2	c8	m

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12	OPTIONS request	[26] 11	o	m	[26] 11	m (Note 1)	m
13	OPTIONS response	[26] 11	o	m	[26] 11	o	m
14	PRACK request	[27] 6	c7	m	[27] 6	c7	m
15	PRACK response	[27] 6	c7	m	[27] 6	c7	m
15A	PUBLISH request	[70] 3	c15	c15	[70] 3	c14	c14
15B	PUBLISH response	[70] 3	c15	c15	[70] 3	c15	c15
16	REFER request	[36] 3	c13	m	[36] 3	c12	m
17	REFER response	[36] 3	c13	m	[36] 3	c13	m
18	REGISTER request	[26] 10	c16	c16	[26] 10	n/a	n/a
19	REGISTER response	[26] 10	n/a	n/a	[26] 10	c16	c16
20	SUBSCRIBE request	[28] 8.1.1	m	m	[28] 8.1.1	o	m
21	SUBSCRIBE response	[28] 8.1.1	m	m	[28] 8.1.1	o	m
22	UPDATE request	[30] 6.1	c17	c17	[30] 6.2	c17	c17
23	UPDATE response	[30] 6.2	c17	c17	[30] 6.1	c17	c17
24	other requests		n/a	n/a		n/a	c3
25	other response		n/a	c2		n/a	n/a

Table 4 Supported Methods

Conditions for Table 4.2-1:
c1: IF received reject with 405.
c2: IF received then response shall be ignored.

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c3: IF received reject with 501.
c4: Void.
c5: IF NetCologne applications using INFO Then m ELSE c1.
c6: IF NetCologne applications using INFO Then m ELSE n/a.
c7: IF preconditions or Tones and Announcements (early media) with 18x THEN m ELSE o.
c8: IF NetCologne applications using NOTIFY THEN m ELSE n/a.
c9: IF NetColonge applications using NOTIFY THEN m ELSE c1.
c10: needed for future services
c11: needed for future services
c12: IF ECT or other application using REFER message THEN m Else c1.
c13: IF ECT or other application using REFER message THEN m Else n/a.
c14: IF Presence or other application using Publish THEN m ELSE c1.
c15: IF Presence or other application using Publish THEN m ELSE n/a.
c16: IF [22] TABLE A.4 /1 in [21 Annex B] THEN m ELSE n/a - - client behaviour for registration.
c17 IF [22] TABLE A.4 /17 in [21 Annex B] THEN m ELSE n/a - - the SIP UPDATE method?

NOTE 1: The OPTION method is used to check reliability between UE and P-CSCF.

3.4.2.3 Supported status-codes on the Gm –Interface

The following status-codes shall be supported on the Gm-Interface:

Item	PDU	Sending			Receiving		
		Ref.	Profile status UE	UNI (Gm)	Ref.	Profile status UE	UNI (Gm)
1	100(Trying)	[26] 21.1.1	c21	m[26] 21.1.1	c11	m	
101	1xx response	[26] 21.1	p21	m	[26] 21.1	p21	m
101 A	18x response	[26] 21.1	p21	m	[26] 21.1	p21	m
2	180 (Ringing)	[26] 21.1.2	c2	m	[26] 21.1.2	c1	m
3	181 (Call Is Being Forwarded)	[26] 21.1.3	c2	m	[26] 21.1.3	c1	m
4	182 (Queued)	[26] 21.1.4	c2	m	[26] 21.1.4	c1	m
5	183 (Session Progress)	[26] 21.1.5	c1	m	[26] 21.1.5	c1	m

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5A	199 (Early Dialog Terminated)	[142] 8	c32	m	[142] 8	c32	m
102	2xx response	[26] 21.2	p22	m	[26] 21.1	p22	m
6	200 (OK)	[26] 21.2.1	m	m	[26] 21.2.1	m	m
7	202 (Accepted) Depending on the use of the SUBSCRIB/NOTIFY,REFER.	[28] 8.3.1	c3	o	[28] 8.3.1	c3	o
103	3xx response	[26] 21.3	p23	[26] 21.1	p23		
8	300 (Multiple Choices)	[26] 21.3.1	o	n/a (Note 3)	[26] 21.3.1	o	n/a (Note 4)
9	301 (Moved Permanently)	[26] 21.3.2	o	n/a (Note 3)	[26] 21.3.2	o	n/a (Note 4)
10	302 (Moved Temporarily)	[26] 21.3.3	o	c33	[26] 21.3.3	o	n/a (Note 4)
11	305 (Use Proxy)	[26] 21.3.4	o	n/a	[26] 21.3.4	o	m
12	380 (Alternative Service)	[26] 21.3.5	o	n/a	[26] 21.3.5o	n/a (Note 4)	
104	4xx response	[26] 21.4	[26] 21.4				
13	400 (Bad Request)	[26] 21.4.1	m	m	[26] 21.4.1	m	m
14	401 (Unauthorized) OPEN due to the registration mechanism used.	[26] 21.4.2	o	n/a	[26] 21.4.2	m	m (Note 2)
15	402 (Payment Required)	[26] 21.4.3	n/a	n/a	[26] 21.4.3	n/a	n/a
16	403 (Forbidden)	[26] 21.4.4	m	m	[26] 21.4.4	m	m (Note 5)
17	404 (NotFound)	[26] 21.4.5	m	m	[26] 21.4.5	m	m

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18	405 (Method Not Allowed)	[26] 21.4.6	m	m	[26] 21.4.6	m	m
19	406 (Not Acceptable)	[26] 21.4.7	m	m	[26] 21.4.7	m	m
20	407 (Proxy Authentication Required)	[26] 21.4.8	o	n/a	[26] 21.4.8	m	o
21	408 (Request Timeout)	[26] 21.4.9	c2	m	[26] 21.4.9	m	m
22	410 (Gone)	[26] 21.4.10	m	o	[26] 21.4.10	m	m
22A	412 (Conditional Request Failed)	[70] 11.2.1	c20	o	[70] 11.2.1	c20	m
23	413 (Request Entity Too Large)	[26] 21.4.11	m	o	[26] 21.4.11	m	m
24	414 (Request-URI Too Large)	[26] 21.4.12	m	m	[26] 21.4.12	m	m
25	415 (Unsupported Media Type)	[26] 21.4.13	m	m	[26] 21.4.13	m	m
26	416 (Unsupported URI Scheme)	[26] 21.4.14	m	m	[26] 21.4.14	m	m
26A	417 (Unknown Resource Priority)	[116] 4.6.2	n/a	n/a	[116] 4.6.2	c24	c24
27	420 (Bad Extension)	[26] 21.4.15	m	m	[26] 21.4.15	m	m
28	421 (Extension Required)	[26] 21.4.16	o		[26] 21.4.16	i	
28A	422 (Session Interval Too Small)	[58] 6	c7	m	[58] 6	c7	m
29	423 (Interval Too Brief)	[26] 21.4.17	c4	m	[26] 21.4.17	m	m
29A	424 (Bad Location Information)	[89] 3.3	n/a	n/a	[89] 3.3	c22	c22
29B	429 (Provide Referrer Identity)	[59] 5	c8	n/a	[59] 5	c9	n/a

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29C	430 (Flow Failed)	[92] 11	c14	C34	[92] 11	c14	m
29D	433 (Anonymity Disallowed)	[67] 4	c14	C34	[67] 4	c14	m
29E	439 (First Hop Lacks Outbound Support)	[92] 11	c28	n/a	[26] 21.4.18	c29	o
29F	440 (Max Breadth Exceeded)	[117] 5	n/a	n/a	[26] 21.4.18	c31	o
29G	469 (Bad INFO Package)	[25] 4.4	c33	n/a	[25] 4.4	c33	o
29H	470 (Consent Needed)	[125] 5.9.2	c26	n/a	[26] 21.4.18	c27	o
30	480 (Temporarily Unavailable)	[26] 21.4.18	m	m	[26] 21.4.18	m	m
31	481 (Call/Transaction Does Not exist)	[26] 21.4.19	m	m	[26] 21.4.19 m	m	
32	482 (Loop Detected)	[26] 21.4.20	m	m	[26] 21.4.20	m	m
33	483 (Too Many Hops)	[26] 21.4.21	m	m	[26] 21.4.21	m	m
34	484 (Address Incomplete)	[26] 21.4.22	o	m	[26] 21.4.22	m	m
35	485 (Ambiguous)	[26] 21.4.23	o	m	[26] 21.4.23	m	m
36	486 (Busy Here)	[26] 21.4.24	m	m	[26] 21.4.24	m	m
37	487 (Reques tTerminated)	[26] 21.4.25	m	m	[26] 21.4.25	m	m
38	488 (Not Acceptable Here)	[26] 21.4.26	m	m	[26] 21.4.26	m	m
39	489 (Bad Event)	[28] 7.3.2	c3	m	[28] 7.3.2	c3	m
40	491 (Request Pending)	[26] 21.4.27	m	m	[26] 21.4.27	m	m
41	493	[26]	m	m	[26]	m	

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	(Undecipherable)	21.4.28			21.4.28 m		
41A	494 (Security Agreement Required)	[48] 2	c5	n/a.	[48] 2	c6	c23
105	5xx response	[26] 21.5	p25		[26] 21.5	p25	
42	500 (Internal Server Error)	[26] 21.5.1	m	m	[26] 21.5.1	m	m
43	501 (Not Implemented)	[26] 21.5.2	m	m	[26] 21.5.2	m	m
44	502 (Bad Gateway)	[26] 21.5.3	o	n/a	[26] 21.5.3m	n/a	
45	503 (Service Unavailable)	[26] 21.5.4	m	m	[26] 21.5.4	m	m
46	504 (Server Time-out)	[26] 21.5.5	m	m	[26] 21.5.5	m	m
47	505 (Version not supported)	[26] 21.5.6	m	m	[26] 21.5.6	m	m
48	513 (Message Too Large)	[26] 21.5.7	m	m	[26] 21.5.7	m	m
49	580 (Precondition Failure)	[30] 8	C35	m	[30] 8	C35	m
106	6xx response	[26] 21.6	p26		[26] 21.6	p26	
50	600 (Busy Everywhere)	[26] 21.6.1	m	m	[26] 21.6.1	m	m
51	603 (Decline)	[26] 21.6.2	c10	m	[26] 21.6.2	m	m
52	604 (Does Not exist Anywhere)	[26] 21.6.3	m	m	[26] 21.6.3	m	m
53	606 (Not Acceptable)	[26] 21.6.4	m	m	[26] 21.6.4	m	m

Table 5 Supported status-codes

Conditions for Table 4.2-2:
c1: IF TABLE 4.2-1/9 THEN m ELSE n/a - - INVITE response.
c2: IF TABLE 4.2-1/9 THEN o ELSE n/a - - INVITE response.
c3: IF [22] TABLE A.4 /20 THEN m ELSE n/a - - SIP specific event notification extension.

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c4: IF TABLE 4.2-1/19 OR TABLE 4.2-1/21 THEN m ELSE n/a - - REGISTER response or SUBSCRIBE response.
c5: IF [22] TABLE A.4 /37 AND [22] TABLE A.4 /2 THEN m ELSE n/a - - security mechanism agreement for the session initiation protocol and registrar.
c6: IF [22] TABLE A.4 /37 THEN m ELSE n/a - - security mechanism agreement for the session initiation protocol.
c7: IF [22] TABLE A.4 /42 AND (TABLE 4.2-1/9 OR TABLE 4.2-1/23) THEN m ELSE n/a - - the SIP session timer AND (INVITE response OR UPDATE response).
c8: IF [22] TABLE A.4 /43 AND TABLE 4.2-1/17 THEN o ELSE n/a - - the SIP Referred-By mechanism and REFER response.
c9: IF [22] TABLE A.4 /43 AND TABLE 4.2-1/17 THEN m ELSE n/a - - the SIP Referred-By mechanism and REFER response.
c10: IF [22] TABLE A.4 /44 THEN m ELSE o - - the Session Initiation Protocol (SIP) "Replaces" header.
c11: IF TABLE 4.2-1/9 THE m ELSE n/a - - INVITE response.
c12: IF [22] TABLE A.3 /4 THEN m ELSE o - - S-CSCF.
c14: IF ACR THEN m ELSE o - - rejecting anonymous requests in the session initiation protocol.
c20: IF [22] TABLE A.4 /41 THEN m ELSE n/a - - an event state publication extension to the session initiation protocol.
c21: IF TABLE 4.2-1/9 OR TABLE 4.2-1/9B or TABLE 4.2-1/13 OR TABLE 4.2-1/15B OR TABLE 4.2-1/17 OR TABLE 4.2-1/19 OR TABLE 4.2-1/21 THEN o ELSE n/a - -
INVITE response or MESSAGE response or OPTIONS response or PUBLISH response or REFER response or REGISTER response or SUBSCRIBE response.
c22: IF [22] TABLE A.4 /57 THEN m ELSE n/a - - managing client initiated connections in SIP.
c23: IF [22] TABLE A.4 /60 THEN m ELSE n/a - - SIP location conveyance.
c24: IF CDIV THEN m ELSE n/a - -
c25: UE may use it if internal forwarding apply.
c26: IF [22] TABLE A.4 /75B THEN m ELSE n/a - - a recipient within the framework for consent-based communications in SIP.
c27: IF [22] TABLE A.4 /75A THEN m ELSE n/a - - a relay within the framework for consent-based communications in SIP.
c28: IF [22] TABLE A.4 /2 AND [22] TABLE A.4 /57 THEN m ELSE n/a - - registrar, managing client initiated connections in SIP.
c29: IF [22] TABLE A.4 /1 AND [22] TABLE A.4 /57 THEN m ELSE n/a - - client behaviour for registration, managing client initiated connections in SIP.
c30: IF [22] TABLE A.4 /71 AND ([22] TABLE A.3 /9B OR [22] TABLE A.3 /9C OR [22] TABLE A.3 /13B OR [22] TABLE A.3 /13C) THEN m ELSE n/a - - addressing an amplification vulnerability in session initiation protocol forking proxies, IBCF (IMS-ALG), IBCF (Screening of SIP signalling), ISC gateway function (IMS-ALG), ISC gateway function (Screening of SIP signalling).
c31: IF [22] TABLE A.4 /71 THEN m ELSE n/a - - addressing an amplification vulnerability in session initiation protocol forking proxies.
c32: IF TABLE 4.2-1/9 AND [22] TABLE A.4 /81 THEN m ELSE n/a - - INVITE response and 199 (Early Dialog Terminated) response.
c33: IF [22] TABLE A.4 /13 THEN m ELSE n/a - - SIP INFO method and package framework.

c34: IF [22] TABLE A.4 /16 OR [22] TABLE A.3 /6 THEN m ELSE IF TABLE 4.2-1/9 THEN o ELSE n/a - - initiating a session which require local and/or remote resource reservation, MGCF, INVITE response.
c35: IF [22] TABLE A.4 /16 THEN m ELSE n/a - - integration of resource management and SIP.
p21: TABLE 4.2-2/2 OR TABLE 4.2-2/3 OR TABLE 4.2-2/4 OR TABLE 4.2-2/5 - - 1xx response.
p22: TABLE 4.2-2/6 OR TABLE 4.2-2/7 - - 2xx response.
p23: TABLE 4.2-2/8 OR TABLE 4.2-2/9 OR TABLE 4.2-2/10 OR TABLE 4.2-2/11 OR TABLE 4.2-2/12 OR TABLE 4.2-2/13 - - 3xx response.
p24: TABLE 4.2-2/14 OR TABLE 4.2-2/15 OR TABLE 4.2-2/16 OR TABLE 4.2-2/17 OR TABLE 4.2-2/18 OR TABLE 4.2-2/19 OR TABLE 4.2-2/20 OR TABLE 4.2-2/21 OR TABLE 4.2-2/22 OR TABLE 4.2-2/22A OR TABLE 4.2-2/23 OR TABLE 4.2-2/24 OR TABLE 4.2-2/25 OR TABLE 4.2-2/26 OR TABLE 4.2-2/27 OR TABLE 4.2-2/28 OR TABLE 4.2-2/28A OR TABLE 4.2-2/29 OR TABLE 4.2-2/29H OR A.629A OR TABLE 4.2-2/29B OR TABLE 4.2-2/30 OR TABLE 4.2-2/31 OR TABLE 4.2-2/32 OR TABLE 4.2-2/33 OR TABLE 4.2-2/34 OR TABLE 4.2-2/35 OR TABLE 4.2-2/36 OR TABLE 4.2-2/436 OR TABLE 4.2-2/38 OR TABLE 4.2-2/39 OR TABLE 4.2-2/40 OR TABLE 4.2-2/41 OR TABLE 4.2-2/41A. - 4xx response.
p25: TABLE 4.2-2/42 OR TABLE 4.2-2/43 OR TABLE 4.2-2/44 OR TABLE 4.2-2/45 OR TABLE 4.2-2/46 OR TABLE 4.2-2/47 OR TABLE 4.2-2/48 OR TABLE 4.2-2/49 - - 5xx response.
p26: TABLE 4.2-2/50 OR TABLE 4.2-2/51 OR TABLE 4.2-2/52 OR TABLE 4.2-2/53 - - 6xx response.

NOTE: Conditions c1-c21 and p21-p26 are taken over from [22].
Note 1: This Response is within SIP for future use defined.
Note 2: These Responses are sent in cases for Registration. Registration in another domain than the home domain is not allowed. Therefore a re INVITE can not be expected.
Note 3: IF send by an UE the NGN may ignore the Response.
Note 4: Normally not send by UE.
Note 5: General a 403 is a Indication that the user is not provisioned within the HSS. Nevertheless if 403 (Forbidden) has been received as a response to a REGISTER request, a further registration attempts shall be done after 15 sec. In case further 403 response received a with the same URI in the Contact header field Register requests are allowed with a random delay of 30- 60 minutes. . 1.

3.4.2.4 Support of SIP Headers on the UNI (GM) –Interface

Item	Header	Sending (UE to P-CSCF)			Receiving (P-CSCF to UE)		
		Ref.	Profile status	Profile status	Ref.	Profile status	Profile status

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			UNI (GM)	UE		UNI (GM)	UE
1	Accept	[26] 20.1	m	m	[26] 20.1	m	m
2	Accept-Contact	[56B] 9.2	o	o	[56B] 9.2	o	o
3	Accept-Encoding	[26] 20.2	o	o	[26] 20.2	o	o
4	Accept-Language	[26] 20.3	o	o	[26] 20.3	o	o
5	Alert-Info	[26] 20.4	o	m	[26] 20.4	o	m
6	Allow	[26] 20.5, [26] 5.1	m	m	[26] 20.5, [26] 5.1	m	m
7	Allow-Events	[28] 7.2.2	o	m	[28] 7.2.2	o	m
7b	Answer-Mode	[158]	o	o	[158]	o	o
8	Authentication-Info	[26] 20.6	o	m	[26] 20.6	o	m
9	Authorization	[26] 20.7	m	m	[26] 20.7	m	m
10	Call-ID	[26] 20.8	m	m	[26] 20.8	m	m
11	Call-Info	[26] 20.9	o	n/a	[26] 20.9	o	m
12	Contact	[26] 20.10	m	m	[26] 20.10	m	m
13	Content-Disposition	[26] 20.11	o	m	[26] 20.11	o	m
14	Content-Encoding	[26] 20.12	o	m	[26] 20.12	o	m
15	Content-Language	[26] 20.13	o	m	[26] 20.13	o	m
16	Content-Length	[26] 20.14	m	m	[26] 20.14	m	m
17	Content-Type	[26] 20.15	m	m	[26] 20.15	m	m
18	Cseq	[26] 20.16	m	m	[26] 20.16	m	m
19	Date	[26] 20.17	o	m	[26] 20.17	o	m

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20	Error-Info	[26] 20.18	o	o	[26] 20.18	o	m
21	Event	[28] 8.2.1	o	m	[28] 8.2.1	o	m
22	Expires	[26] 20.19	o	m	[26] 20.19	o	m
23	From	[26] 20.20	m	m	[26] 20.20	m	m
23A	Geolocation	[89] 3.2	n/a	n/a	[89] 3.2	n/a	n/a
23B	Geolocation-Routing	[89] 4.2	n/a	n/a	[89] 4.2	n/a	n/a
24	History-Info	[66] 4.1	n/a	n/a	[66] 4.1	o	m
25	In-Reply-To	[26] 20.21	o	o	[26] 20.21	o	o
26	Join	[61] 7.1	o	o	[61] 7.1	o	o
26b	Max-Breadth	[117]	o	o	[117]	n/a	n/a
27	Max-Forwards	[26] 20.22	m	m	[26] 20.22	m	m
28	MIME-Version	[26] 20.24	o	m	[26] 20.24	o	m
29	Min-Expires	[26] 20.23, [70] 5,6	o	m	[26] 20.23, [70] 5,6	o	m
30	Min-SE	[58] 5	o	o	[58] 5	m	m
31	Organization	[26] 20.25	o	o	[26] 20.25	o	o
32	P-Access-Network-Info	[52] 4.4	o	o	[52] 4.4	o	m
32a	P-Answer-State	[34] 9.1	n/a	n/a	[34] 9.1	n/a	n/a
33	P-Asserted-Identity	[34] 9.1	n/a	n/a	[34] 9.1	o	m
33a	P-Asserted-Service	[121]	n/a	n/a	[121]	n/a	c1
33b	P-Associated-URI	[52] 4.1	n/a	n/a	[52] 4.1	c9	m
34	P-Called-Party-ID	[52] 4.2	n/a	n/a	[52] 4.2	n/a	c1

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35	P-Charging-Function-Addresses	[52] 4.5	n/a	n/a	[52] 4.5	n/a	c1
36	P-Charging-Vector	[52] 4.6	n/a	n/a	[52] 4.6	n/a	c1
36b	P-Early-Media	[109] 8	o	m	[109] 8	o	m
38	P-Media-Authorization	[31] 6.1	o	o	[31] 6.1	o	o
39	P-Preferred-Identity	[34] 9.2	m	m	[34] 9.2	n/a	n/a
39a	P-Preferred-Service	[121] 4.2	n/a	n/a	[121] 4.2	n/a	c1
39b	P-Profile-Key	[97] 5	n/a	n/a	[97] 5	n/a	c1
39c	P-User-Database	[82] 4	n/a	n/a	[82] 4	n/a	c1
40	P-Visited-Network-ID	[52] 4.3	n/a	n/a	[52] 4.3	n/a	c1
40a	Path	[35] 4.2	o	o	[35] 4.2	m	m
41	Priority	[26] 20.26	n/a	n/a	[26] 20.26	n/a	c1
41a	Priv-Answer-Mode	[158]	o	o	[158]	o	o
42	Privacy	[33] 4.2	o	m	[33] 4.2	m	m
43	Proxy-Authenticate	[26] 20.27	n/a	n/a	[26] 20.27	m	m
44	Proxy-Authorization	[26] 20.28	m	m	[26] 20.28	n/a	c1
45	Proxy-Require	[26] 20.29	n/a	n/a	[26] 20.29	n/a	c1
46	Rack	[27] 7.2	m	m	[27] 7.2	m	m
47	Reason	[34A] 2	o	n/a	[34A] 2	m	m
48	Record-Route	[26] 20.30	m	m	[26] 20.30	m	m
48A	Recv-Info	[25] 9.2.3	o	o	[25] 5.2.3	o	o
49	Referred-By	[59] 3	o	m	[59] 3	o	m

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49b	Refer-Sub	[95]	n/a	n/a	[95]	n/a	C1
49c	Refer-to	[36] 3	c8	c8	[36] 3	c8	c8
50	Reject-Contact	[56B] 9.2	n/a	n/a	[56B] 9.2	n/a	c1
51	Replaces	[60] 6.1	o	o	[60] 6.1	o	o
52	Reply-To	[26] 20.31	o	o	[26] 20.31	o	m
53	Request-Disposition	[56B] 9.1	o	o	[56B] 9.1	o	o
54	Require	[26] 20.32	o	m	[26] 20.32	o	m
55	Retry-After	[26] 20.33	o	o	[26] 20.33	o	m
56	Route	[26] 20.34	m	m	[26] 20.34	n/a	n/a
57	Rseq	[27] 7.1	m	m	[27] 7.1	m	m
58	Security-Client	[48] 2.3.1	n/a	n/a	[48] 2.3.1	n/a	c1
59	Security-Verify	[48] 2.3.1	n/a	n/a	[48] 2.3.1	n/a	c1
60	Server	[26] 20.35	o	o	[26] 20.35	o	o
60b	Service-Route	[38] 5	n/a	n/a	[58] 4	o	m
61	Session-Expires	[58] 4	o	m	[58] 4	o	m
61b	Session-ID	See [Ref_dt1] ,Note 5	c5	c5	See [Ref_dt1] , Note5	c5	c5
62	SIP-Etag	[70] 11.3.1	o	n/a	[70] 11.3.1	o	o
63	SIP-If-Match	[70] 11.3.2	o	n/a	[70] 11.3.2	o	o
64	Subject	[26] 20.36	o	o	[26] 20.36	o	m
65	Subscription-State	[28] 8.2.3	o	m	[28] 8.2.3	o	m
66	Supported	[26]	o	m	[26]	o	m

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		20.37			20.37		
67	Timestamp	[26] 20.38	o	m	[26] 20.38	o	m
68	To	[26] 20.39	m	m	[26] 20.39	m	m
69	Unsupported	[26] 20.40	o	o	[26] 20.40	o	m
70	User-Agent	[26] 20.41	m	m	[26] 20.41	o	m
70a	User-to-User	[126]	o	o	[126]	o	o
71	Via	[26] 20.42	m	m	[26] 20.42	m	m
72	Warning	[26] 20.43	o	o	[26] 20.43	o	m
73	WWW-Authenticate	[26] 20.44	n/a	n/a	[26] 20.44	o	m

Table 6 Supported Headers

Conditions for Table 4.2-3:
c1: IF received discard Header.
c2: Void.
c3: This Header is only received within a SUBSCRIBE; see table 4.2-1.
c4: IF CCBS THEN m ELSE o.
c5: IF 3PTY (INVITE) OR ECT (REFER) THEN m OR IF end to end correlation (all succeeding SIP messages following Initial Request within the Dialog) THEN o ; Session ID must contain the hashed call id value.
c6: void.
c7: void.
c8: IF REFER THEN m ELSE n/a.
c9: If Registration THEN m.
Note 1: The use is only foreseen for NetCologne domain.
Note 2: void.
Note 3: P-Answer-State header extension to the session initiation protocol for the open mobile alliance push to talk over cellular.
Note 4: Void.
Note 5: This Reference is shown within Section 2 of this document, because this is a requirement of NetCologne to align Calls all over the network.

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3.4.2.5 MIME Types

The following MIME Types shall be supported:

Item	Header	Sending (UE to P-CSCF)			Receiving (P-CSCF to UE)		
		Ref.	Profile status UNI (GM)	Profile status UE	Ref.	Profile status UNI (GM)	Profile status UE
1	application/vnd.etsi.pstn+xml	Note 1	c1	o	Note 1	c1	o
2	application/x-session-info	3GPP TS29.163 [24]	o	o	3GPP TS29.163 [24]	o	o
3	application/vnd.etsi.aoc+xml	3GPP TS24.647 [10]	m	o	3GPP TS24.647 [10]	m	o
4	application/simservs+xml	1TR126 [3]	m	o	1TR126 [3]	m	o
5	application/vnd.3gpp.cw+xml	3GPP TS24.610 [8]	m	o	3GPP TS24.610 [8]	m	o
6	application/sdp	RFC 2327 [43]	m	m	RFC 2327 [43]	m	m
7	application/pidf+xml	RFC 3863 [57]	n/a	n/a	RFC 3863 [57]	n/a	n/a
8	multipart/mixed		m	m		m	m
9	application/rlmi+xml		o	o		o	o
10	application/watcherinfo+xml	RFC 3858 [56]	n/a	n/a	RFC 3858 [56]	n/a	n/a
11	text/plain	RFC 2046 [40]	n/a	n/a	RFC 2046 [40]	n/a	n/a
12	image/t.38	RFC	o	o	RFC	o	o

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		3362 [52]			3362 [52]		
13	application/simple-messagesummary	RFC 3842 [55]	c2	o	RFC 3842 [55]	c2	o
14	other MIME types (Note 2)		n/a	n/a		n/a	n/a
15	encrypted MIME TYPE		n/a	n/a		n/a	n/a

Table 7 Supported MIME Tyes

NOTE: The references in this table are listed in the present document.
Conditions:
c1: IF ISDN is supported THEN m ELSE n/a.
c2: IF MWI is supported THEN m ELSE n/a.
Note 1: 3GPP the definition is within 3GPP TS 29.163 [24].
Note 2: Other MIME Types can be received and must be discarded in case where no content disposition header is present the MIME is not known.

3.4.2.6 SDP Types

Item	Type	Sending			Receiving		
		Ref.	RFC status	Profile status	Ref.	RFC status	Profile status
	Session level description						
1	v= (protocol version)	[39] 5.1	m	m	[39] 5.1	m	m
2	o= owner/creator and session identifier)	[39] 5.2	m	m	[39] 5.2	m	m
3	s= (session name)	[39] 5.3	m	m	[39] 5.3	m	m
4	i= (session information)	[39] 5.4	o	c2	[39] 5.4	m	c3
5	u= (URI of description)	[39] 5.5	o	c4	[39]5.5	o	n/a

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6	e= (email address)	[39] 5.6	o	c4	[39] 5.6	o	n/a
7	p= (phone number)	[39] 5.6	o	c4	[39] 5.6	o	n/a
8	c= (connection information)	[39] 5.7	c5	c5	[39] 5.7	m	m
9	b= (bandwidth information)	[39] 5.8	o	o (NOTE 1)	[39] 5.8	m	m
	Time description (one or more per description)						
10	t= (time the session is active)	[39] 5.9	m	m	[39] 5.9	m	m
11	r= (zero or more repeat times)	[39] 5.10	o	c4	[39] 5.10	o	n/a
	Session level description (continued)						
12	z= (time zone adjustments)	[39] 5.11	o	n/a	[39] 5.11	o	n/a
13	k= (encryption key)	[39] 5.12	x	x	[39] 5.12	n/a	n/a
14	a= (zero or more session attribute lines)	[39] 5.13	o	o	[39] 5.13	m	m
	Media description (zero or more per description)						
15	m= (media name and transport address)	[39] 5.14	o	o	[39] 5.14	m	m
16	i= (media title)	[39] 5.4	o	c2	[39] 5.4	o	c3
17	c= (connection information)	[39] 5.7	c1	c1	[39] 5.7	c1	c1
18	b= (bandwidth information)	[39] 5.8	o	o (NOTE 1)	[39] 5.8		
19	k= (encryption key)	[39] 5.12	x	x	[39] 5.12	n/a	n/a
20	a= (zero or more media attribute lines)	[39] 5.13	o	o	[39] 5.13	m	m

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Table 8 SDP Types

Conditions for Table 4.2-5:
c1: IF (Table 4.2-5/15 AND NOT Table 4.2-5/8) THEN m ELSE (IF (Table 4.2-5/15 AND Table 4.2-5/8) THEN o ELSE n/a - - “c=” contained in session level description and SDP contains media descriptions.
c2: IF [22] Table A.3A/6 THEN x ELSE o - - MGCF.
c3: IF [22] Table A.3A/6 THEN n/a ELSE m - - MGCF.
c4: IF [22] Table A.3A/6 THEN x ELSE n/a - - MGCF.
c5: IF A. Table 4.2-5/17 THEN o ELSE m - - "c=" contained in all media description.
NOTE 1: The UE may use b=TIAS and b=AS as described in RFC 3890 [152]. For "video" and "audio" media types that utilize RTP/RTCP, and if the UE is configured to request an RTCP bandwidth level different than the default RTCP bandwidth as specified in RFC 3556 [56], then the UE shall include the “b=” media descriptors with the bandwidth modifiers “RS” and “RR”. For other media types, the UE may include the “b=” media descriptor with the bandwidth modifiers “RS” and “RR”.

Prerequisite Table 4.2-5/14 OR Table 4.2-5/20 - - a= (zero or more session/media attribute lines)

Item	Type	Sending			Receiving		
		Ref.	RFC status	Profile status	Ref.	RFC status	Profile status
1	category (a=cat)	[39] 6	c8	c8	[39] 6	c9	c9
2	keywords (a=keywds)	[39] 6	c8	c8	[39] 6	c9	c9
3	name and version of tool (a=tool)	[39] 6	c8	c8	[39] 6	c9	c9
4	packet time (a=ptime)	[39] 6	c10	c10	[39] 6	c11	c11
5	maximum packet time (a=maxptime)	[39] 6 (NOTE 1)	c10	c10	[39] 6 (NOTE 1)	c11	c11
6	receive-only mode (a=recvonly)	[39] 6	o	o	[39] 6	m	m
7	send and receive mode (a=sendrecv)	[39] 6	o	o	[39] 6	m	m

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8	send-only mode (a=sendonly)	[39] 6	o	o	[39] 6	m	m
8A	Inactive mode (a=inactive)	[39] 6	o	o	[39] 6	m	m
9	whiteboard orientation (a=orient)	[39] 6	c10	c10	[39] 6	c11	c11
10	conference type (a=type)	[39] 6	c8	c8	[39] 6	c9	c9
11	character set (a=charset)	[39] 6	c8	c8	[39] 6	c9	c9
12	language tag (a=sdplang)	[39] 6	o	o	[39] 6	m	m
13	language tag (a=lang)	[39] 6	o	o	[39] 6	m	m
14	frame rate (a=framerate)	[39] 6	c10	c10	[39] 6	c11	c11
15	quality (a=quality)	[39] 6	c10	c10	[39] 6	c11	c11
16	format specifi cparameters (a=fmtp)	[39] 6	c10	c10	[39] 6	c11	c11
17	rtp map attribute (a=rtpmap)	[39] 6	c10	c10	[39] 6	c11	c11
18	current-status attribute (a=curr)	[30] 5	c1	c1	[30] 5	c2	c2
19	desired-status attribute (a=des)	[30] 5	c1	c1	[30] 5	c2	c2
20	confirm-status attribute (a=conf)	[30] 5	c1	c1	[30] 5	c2	c2
21	media stream identification attribute (a=mid)	[53] 3	c3	c3	[53] 3	c4	c4
22	group attribute (a=group)	[53] 4	c5	c5	[53] 3	c6	c6
23	setup attribute (a=setup)	[83] 4	c7	c7	[83] 4	c7	c7

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24	connection attribute (a=connection)	[83] 5	c7	c7	[83] 5	c7	c7
25	candidate I Paddresses (a=candidate)	[99]	c12	c12	[99]	c13	c13
26	floor control server determination (a=floorctrl)	[108] 4	c14	c14	[108] 4	c14	c14
27	conference id (a=confid)	[108] 5	c14	c14	[108] 5	c14	c14
28	user id (a=userid)	[108] 5	c14	c14	[108] 5	c14	c14
29	association between stream sandfloors (a=floorid)	[108] 6	c14	c14	[108] 6	c14	c14
30	RTCP feedback capability attribute (a=rtcp-fb)	[135] 4.2	c15	c15	[135] 4.2	c15	c15
31	extension of the rtcp-fb attribute (a=rtcp-fb)	[136] 7.1	c15	c15	[136] 7.1	c15	c15
32	supported capability negotiation extensions (a=csup)	[137] 6.1	c16	c16	[137] 6.1	c16	c16
33	required capability negotiation extensions (a=creq)	[137] 6.1	c16	c16	[137] 6.1	c16	c16
34	attribute capability (a=acap)	[137] 6.1	c16	c16	[137] 6.1	c16	c16
35	transport protocol capability	[137] 6.1	c16	c16	[137] 6.1	c16	c16

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	(a=tcap)						
36	potential configuration (a=pcfg)	[137] 6.1	c16	c16	[137] 6.1	c16	c16
37	actual configuration (a=acfg)	[137] 6.1	c16	c16	[137] 6.1	c16	c16
38	connection data capability (a=ccap)	[156] 5.1	c17	c17	[156] 5.1	c18	c18

Tabelle 9 zero or more session / media attribute lines (a=)

Conditions for Table 4.2-6:
c1: IF [22] Table A.317/22 AND Table 4.2-5/20 THEN o ELSE n/a - - integration of resource management and SIP, media level attribute name "a=".
c2: IF [22] Table A.317/22 AND Table 4.2-5/20 THEN m ELSE n/a - - integration of resource management and SIP, media level attribute name "a=".
c3: IF [22] Table A.317/23 AND Table 4.2-5/20 THEN o ELSE n/a - - grouping of media lines, media level attribute name "a=".
c4: IF [22] Table A.317/23 AND Table 4.2-5/20 THEN m ELSE n/a - - grouping of media lines, media level attribute name "a=".
c5: IF [22] Table A.317/23 AND Table 4.2-5/14 THEN o ELSE n/a - - grouping of media lines, session level attribute name "a=".
c6: IF [22] Table A.317/23 AND Table 4.2-5/14 THEN m ELSE n/a - - grouping of media lines, session level attribute name "a=".
c7: IF [22] Table A.317/26 AND Table 4.2-5/20 THEN m ELSE n/a - - TCP-based media transport in the dession description protocol, media level attribute name "a=".
c8: IF Table 4.2-5/14 THEN o ELSE x - - session level attribute name "a=".
c9: IF A.318/14 THEN m ELSE n/a - - session level attribute name "a=".
c10: IF Table 4.2-5/20 THEN o ELSE x - - media level attribute name "a=".
c11: IF Table 4.2-5/20 THEN m ELSE n/a - - media level attribute name "a=".
c12: IF [22] Table A.317/27 AND Table 4.2-5/20 THEN o ELSE n/a - - candidate IP addresses, media level attribute name "a=".
c13: IF [22] Table [22] Table A.317/27 AND Table 4.2-5/20 THEN m ELSE n/a - - candidate IP addresses, media level attribute name "a=".
c14: IF [22] Table [22] Table A.317/28 AND Table 4.2-5/20 THEN m ELSE n/a - - session description protocol format for binary floor control protocol streams, media level attribute name "a=".
c15: IF ([22] Table A.317/29 AND Table 4.2-5/20) THEN m ELSE n/a - - extended RTP profile for real-time transport control protocol (RTCP)-based feedback (RTP/AVPF), media level attribute name "a=".
c16: IF [22] Table A.317/30 AND Table 4.2-5/20 THEN m ELSE n/a - - SDP capability negotiation, media level attribute name "a=".

c17: IF A. [22] Table 317/32 AND Table 4.2-5/20 THEN o ELSE n/a - - miscellaneous capabilities negotiation in the Session Description Protocol (SDP), media level attribute name "a=".
c18: IF [22] Table A.317/32 AND Table 4.2-5/20 THEN m ELSE n/a - - miscellaneous capabilities negotiation in the Session Description Protocol (SDP), media level attribute name "a=".

NOTE 1: Further specification of the usage of this attribute is defined by specifications relating to individual codecs.

3.4.3 SIP User Agent (UA)

NOTE: The references in this table are listed in the present document.

3.4.3.1 Supported SIP Signalling Transport Protocols in UA

The following SIP Signalling Transport Protocols shall be supported:

Protocol (NOTE)	Specification	Ref.	Support
UDP	RFC 0768/STD006	[34]	m
TCP	RFC 0793/STD007	[37]	m
TLS	RFC 2246	[42]	o
SCTP	ETSI TS 102 144	[5]	o
IPSec	RFC 2411	[44]	o
Note: The following conbinations shall be possible to configure • SIP over UDP • SIP over TCP without TLS • SIP over TCP with TLS			

Table 10 Supported Signaling Transport Protocols in UA

3.4.3.2 Support of IPv4 and IPv6

Currently IPv6 for Voice is not supported.

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Specification	Title	Ref.	Support
RFC 0791	Internet Protocol, Version 4	[35]	m
RFC 0792	Internet Control Message Protocol	[36]	m
RFC 1035	Domain names implementation and specification	[38]	m
RFC 2460	Internet Protocol, Version 6	[46]	n/a
RFC 2782	A DNS RR for specifying the location of services (DNS SRV)	[47]	m
RFC 2915	The Naming Authority Pointer (NAPTR) DNS Resource Record	[48]	o
RFC 3596	DNS Extensions to Support IP Version 6	[54]	n/a
RFC 4443	Internet Control Message Protocol (ICMPv6) for the Internet Protocol Version 6 (IPv6) Specification; March 2006	[64]	n/a
RFC 4884	Extended ICMP to Support Multi-Part Messages, April 2007	[70]	m

Table 11 RFC for support of IPv4 and IPv6

Procedure	Specification	Ref.	Support
DNS SRV-record	RFC 3263	[50]	m
DNS NAPTR-record	RFC 3263	[50]	o

Table 12 DNS Record

Protocol	Remarks	Support
Static Routing	Preconfigured SIP server ip address in UA	m
DNS A-record	Preconfigured SIP server fully qualified domain name in UA	m
DNS AAAA-record	Preconfigured SIP server fully qualified domain name in UA	m

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Table 13 Procedures for SIP-Server Localisation

3.4.3.3 Video Codec Transport Procedures

Video is not supported yet

3.4.3.4 Real Time Transport Procedures

Specification	Title	Ref.	Support
RFC 3550	RTP: A Transport Protocol for Real-Time Applications; July 2003	[53]	m
RFC 4040	RTP Payload Format for a 64kbit/s Transparent Call; April 2005 (see Note)	[62]	c1
Conditions: c1: If ISDN interworking then m else o. NOTE1: This protocol is applicable to carry 64 kbit/s channel data transparently in RTP packets, using a pseudo-codec called "Clearmode" and is used in case of ISDN accesses via IADs, only. NOTE2: Fragmented IP packets are not supported by the NGN platform of NetCologne. If the UA chooses to send RTCP/SDES packets it shall not send the UA's public IP address			

Table 14 Specification Real-time Transport Procedures

3.5 IAD- requirements

SIP terminal can only be connected to NetCologne NGN via IAD's (see scope of document). IAD communicates with NC NG via a private IP address (DHCP) in the Voice network. Private IP addresses are IPv4 addresses.

If the IAD has to register several subscribers each of them is identified via its own contact.

Fragmentation should not be used.

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3.5.1 Network access

In general Quality of Service is assured by using different VLAN's for Voice and data and prioritization. To guarantee best service packetization size should be 20ms and codec G711a must be used.

The IAD is responsible foir Prioritisation & marking of traffic:

- Voice Control Class 6 (DSCP 110 000)
- Voice Bearer Class 5 (DSCP 101 110)
- PPP/PPPoE Control Traffic Class 6
- Best Effort Class 0 (DSCP 000 000)

3.5.2 Number Handling by the UE

Numbers should be sent "as dialed" by the user. No modification is necessary!

3.5.3 Support of NAT traversal

is not supported (and not necessary in the environment in scope)

3.6 Interworking requirements for SIP user equipment (UE)

The interworking requirements for SIP user equipment (e.g. IAD) are specified in separate documents. The referenced documents can be interpreted as recommendations for SIP terminal developers and vendors.

3.6.1 Analogue (POTS – SIP basic interworking requirements

The Analogue /(POTS) – SIP basic interworking requirements are contained in the technical specification 1 TR 126 [3].

3.6.2 DSS1 – SIP basic interworking requirements

The DSS1 – SIP basic interworking requirements are contained in the technical specification 1 TR 127 [4].

3.7 Service functionality requirements

This chapter describes the service functionality requirements as a recommendation for the behavior of SIP user equipments connected to NGN Voice platform of NetCologne.

The relevant service code commands (SCC) for provision/withdrawal, registration/erasure, activation/de-activation, interrogation and invocation are provided in 3.7.1. Most of the services can also be administered via Web interface.

3.7.1 Calling Line Identification Restriction / Originating Identification Restriction (CLIR/OIR)

3.7.1.1 Description

CLIR can be implemented in several flavors. NetCologne implemented the following:

CLIR 2: While calling line identification presentation is set to permanent mode, the subscriber can activate the calling line identification restriction on per communication basis. If this service is activated for an outgoing communication, the calling line identification is restricted for this communication; after this communication the CLIR is automatically deactivated, again.

CLIR 3: Permanent calling line identification restriction: This service does NOT allow the subscriber to activate or deactivate the CLIR service permanently.

3.7.1.2 Procedures

3.7.1.3 Activation

3.7.1.3.1 CLIR2/OIR2

(wait for dial tone) *31*<DN>

3.7.1.4 Deactivation

3.7.1.4.1 CLIR2/OIR2

Automatically

3.7.1.5 Interrogation

Not applicable

3.7.2 Connected Line Identification Presentation / Terminating Indication Presentation (COLP/TIP)

Not supported

3.7.3 Connected Line Identification Restriction / Terminating Indication Restriction (COLR/TIR)

Not supported

3.7.4 Call Waiting /Communication Waiting (CW)

All of the following procedures for Activation, Deactivation, Interrogation and Invocation must be handled as described internally by the VGW/UE to process the service. The service codes should not be sent to the network. For an IAD it is recommended to implement those functions as follows.

3.7.4.1 Activation

<pick up> (wait for dial tone) *43# (wait for ack.) <hang up>
<pick up> (wait for dial tone) *43*0# (wait for ack.) <hang up> (for all VoIP lines)

3.7.4.2 Deactivation

<pick up> (wait for dial tone) #43# (wait for ack.) <hang up>
<pick up> (wait for dial tone) #43*0# (wait for ack.) <hang up> (for all VoIP lines)

3.7.4.3 Interrogation

<pick up> (wait for dial tone) *#43# (wait for ack.) <hang up>

3.7.4.4 Invocation

3.7.4.5 Acceptance of an incoming communication (with or without authorisation of 3PTY service)

<hang up> (hang-up and wait for ringing signal) <pick up>

3.7.4.6 Acceptance of an incoming communication (with authorisation of 3PTY service)

a) <hook-flash> (wait for special dial tone) 1 (the current communication will be released)
b) <hook-flash> (wait for special dial tone) 2 (the current communication is put on HOLD)

3.7.4.7 Rejection of an incoming communication

<hook-flash> (wait for special dial tone) 0 (the incoming communication will be rejected)

3.7.5 Hold / Toggle

All following described procedures for Activation, Deactivation, Interrogation and Invocation must be handled internally by the IAD/UE to process the service. The service codes should not be sent to the network. For a IAD it is recommended to implement thos functions as follows.

3.7.5.1 Invocation (….)

<hook-flash> (wait for special dial tone and dial third party number) <DN> (0…9)

3.7.5.2 Worst case (communication could not be established)

a) <hook-flash> (wait for special dial tone) 1
b) <hang up> (hang-up and wait for ringing signal) <pick up>

3.7.5.3 Invocation (change to the party on HOLD – TOGGLE)

<hook-flash> (wait for special dial tone) 2 (the current communication is put on HOLD)

3.7.5.4 Invocation (release a communication during HOLD)

3.7.5.5 Invocation (release the current communication)

<hook-flash> (wait for special dial tone) 1 (the communication on HOLD becomes active)

3.7.5.6 Invocation (release the communication on HOLD)

<hook-flash> (wait for special dial tone) 0 (the communication on HOLD will be released)

3.7.5.7 Invocation (Release initiated by the current party)

Congestion tone provided
<hook-flash> (wait for special dial tone) 1 or 2
or
<pick up> (wait for ringing tone) <hang up>

3.7.6 Three Party Conference/Conference (3PTY/CONF)

All of the following procedures for Activation, Deactivation, Interrogation and Invocation must be handled as described internally by the IAD/UE to process the service. The service codes should not be sent to the network. For an IAD it is recommended to implement those functions as follows.

3.7.6.1 Invocation (3PTY/CONF initiation)

Prerequisite: Initiator has one communication in an active stat and as second communication on hold.
<hook-flash> (wait for special dial tone) 3

3.7.6.2 Invocation (change from 3PTY/CONF to HOLD/TOGGLE)

<hook-flash> (wait for special dial tone) 2

3.7.7 Communication Diversion: Call Forwarding Unconditional / Communication Forwarding Unconditional (CDIV:CFU)

3.7.7.1 Activation

While CFU is activated the special dial tone shall be played after picking up the receiver instead of normal dial tone to remember the user that no incoming calls will be received.

<pick up> (wait for dial tone) *21*<CFN># (wait for ack.) <hang up>

3.7.7.2 Deactivation

<pick up> (wait for dial tone) #21# (wait for ack.) <hang up>

3.7.7.3 Interrogation

<pick up> (wait for dial tone) *#21# (wait for ack.) <hang up>

3.7.8 Communication Diversion: Call Forwarding Busy / Communication Forwarding Busy (CDIV:CFB)

3.7.8.1 Activation

<pick up> (wait for dial tone) *67*<CFN># (wait for ack.) <hang up>

3.7.8.2 Deactivation

<pick up> (wait for dial tone) #67# (wait for ack.) <hang up>

3.7.8.3 Interrogation

<pick up> (wait for dial tone) *#67# (wait for ack.) <hang up>

3.7.9 Communication Diversion: Call Forwarding No Reply / Communication Forwarding No Reply (CDIV:CFNR)

The default timer for CFNR is 20 seconds and can be changed via Web Interface.

3.7.9.1 Activation

<pick up> (wait for dial tone) *61*<CFN># (wait for ack.) <hang up>

3.7.9.2 Deactivation
<pick up> (wait for dial tone) #61# (wait for ack.) <hang up>

3.7.9.3 Interrogation
<pick up> (wait for dial tone) *#61# (wait for ack.) <hang up>

3.7.10 Malicious Communication Identification

3.7.10.1 Activation
<pick up> (wait for dial tone) 08# <hang up>

3.7.10.2 Deactivation
Not applicable

3.7.10.3 Interrogation
Not applicable

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