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OF TELEVISION, SOUND PROGRAMME AND OTHER
MULTIMEDIA SIGNALS

IPCablecom

**Specification of the Cx and Dx interfaces based
on the Diameter protocol**

Recommendation ITU-T J.366.6



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Specification of the Cx and Dx interfaces based on the Diameter protocol

Summary

Recommendation ITU-T J.366.6 defines a transport protocol for use in the IP multimedia (IM) core network (CN) subsystem based on Diameter.

This Recommendation is applicable to:

- the Cx interface between the I-CSCF/S-CSCF and the HSS, and
- the Dx interface between the I-CSCF/S-CSCF and the SLF.

The Third Generation Partnership Project (3GPP) has developed the specification in a form optimized for the wireless environment. This Recommendation references the ETSI version of the 3GPP specification and specifies only the modifications necessary to optimize it for the cable environment.

History

Edition	Recommendation	Approval	Study Group
1.0	ITU-T J.366.6	2007-07-29	9

FOREWORD

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Recommendation ITU-T J.366.6

Specification of the Cx and Dx interfaces based on the Diameter protocol

1 Scope

This Recommendation defines a transport protocol for use in the IP multimedia (IM) core network (CN) subsystem based on Diameter.

This Recommendation is applicable to:

- the Cx interface between the I-CSCF/S-CSCF and the HSS, and
- the Dx interface between the I-CSCF/S-CSCF and the SLF.

Whenever it is possible, this Recommendation specifies the requirements for this protocol by reference to specifications produced by the IETF within the scope of Diameter. Where this is not possible, extensions to Diameter are defined within this Recommendation.

The Third Generation Partnership Project (3GPP) has developed the specification in a form optimized for the wireless environment. This Recommendation references the ETSI version of the 3GPP specification and specifies only the modifications necessary to optimize it for the cable environment.

It is an important objective of this work that interoperability between IPCablecom 2.0 and 3GPP IMS is provided. IPCablecom 2.0 is based upon 3GPP IMS, but includes additional functionality necessary to meet the requirements of cable operators. Recognizing developing converged solutions for wireless, wireline, and cable, it is expected that further development of IPCablecom 2.0 will continue to monitor and contribute to IMS developments in 3GPP, with the aim of alignment of 3GPP IMS and IPCablecom 2.0.

The modifications to ETSI TS 129.229 V6.7.0 (2005-12), the Cx and Dx interfaces based on the Diameter protocol specification, are shown in clause 6.

2 References

[ETSI TS 129 229] ETSI TS 129 229 V6.7.0 (2005), *Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Cx and Dx interfaces based on the Diameter protocol; Protocol details.*

3 Definitions

This Recommendation uses the terms defined in [ETSI TS 129 229].

4 Abbreviations and acronyms

This Recommendation uses the abbreviations provided in [ETSI TS 129 229].

5 Conventions

This Recommendation uses the conventions provided in [ETSI TS 129 229].

6 Modifications to [ETSI TS 129 229]

Modifications introduced by this Recommendation are shown in revision marks. Unchanged text is replaced by ellipsis (...). Some parts of unchanged text (section numbers, etc.) may be kept to indicate the correct insertion points.

1 Scope

The present document defines a transport protocol for use in the IP multimedia (IM) Core Network (CN) subsystem based on Diameter.

The present document is applicable to:

- The Cx interface between the I-CSCF/S-CSCF and the HSS.
- The Dx interface between the I-CSCF/S-CSCF and the SLF.

Whenever it is possible, this document specifies the requirements for this protocol by reference to specifications produced by the IETF within the scope of Diameter. Where this is not possible, extensions to Diameter are defined within this document.

[The Third Generation Partnership Project \(3GPP\) has developed the specification in a form optimized for the wireless environment. This Recommendation references the ETSI version of the 3GPP specification and specifies only the modifications necessary to optimize it for the cable environment.](#)

[It is an important objective of this work that interoperability between IPCablecom 2.0 and 3GPP IMS is provided. IPCablecom 2.0 is based upon 3GPP IMS, but includes additional functionality necessary to meet the requirements of cable operators. Recognizing developing converged solutions for wireless, wireline, and cable, it is expected that further development of IPCablecom 2.0 will continue to monitor and contribute to IMS developments in 3GPP, with the aim of alignment of 3GPP IMS and IPCablecom 2.0.](#)

[The modifications to ETSI TS 129.229 V6.7.0 \(2005-12\), Cx and Dx interfaces based on the Diameter Protocol specification, are shown below.](#)

2 References

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

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.
- [IPCablecom2 defines several Recommendations which are based on 3GPP technical specifications. These IPCablecom2 Recommendations are commonly referred to as IPCablecom2 Delta Recommendations. For references within this Recommendation which have a corresponding IPCablecom2 Delta Recommendation, the IPCablecom2 Delta Recommendation must be used. The list of IPCablecom2 Delta Recommendations is:](#)

[ITU-T J.366.1 \(TS 23.008\)](#)

[ITU-T J.366.5 \(TS 29.228\)](#)

[ITU-T J.366.2 \(TS 23.218\)](#)

[ITU-T J.366.6 \(TS 29.229\)](#)

[ITU-T J.366.3 \(TS 23.228\)](#)

[ITU-T J.366.7 \(TS 33.203\)](#)

[ITU-T J.366.4 \(TS 24.229\)](#)

[ITU-T J.366.8 \(TS 33.210\)](#)

[ITU-T J.366.10 \(TS 29.109\)](#)

[ITU-T J.366.9 \(TS 33.220\)](#)

References which have corresponding delta specifications are highlighted with an *.

- [1] *3GPP TS 29.228 "IP Multimedia (IM) Subsystem Cx and Dx interface; signalling flows and message contents"
- [2] *3GPP TS 33.210 "3G Security; Network Domain Security; IP Network Layer Security"
- ...
- [11] *3GPP TS 29.329 "Sh Interface based on the Diameter protocol; protocol details"
- [12] IETF RFC 3589 "Diameter Command Codes for Third Generation Partnership Project (3GPP) Release 5"
- [13] IETF RFC 2617 "HTTP Authentication: Basic and Digest Access Authentication"

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5.6 Advertising Application Support

The HSS, S-CSCF and I-CSCF shall advertise support of the Diameter Multimedia Application by including the value of the application identifier (see chapter 6) in the Auth-Application-Id AVP within the Vendor-Specific-Application-Id grouped AVP of the Capabilities-Exchange-Request and Capabilities-Exchange-Answer commands.

The vendor identifier values of 3GPP (10415) and CableLabs (4491) shall be included in the Supported-Vendor-Id AVP of the Capabilities-Exchange-Request and Capabilities-Exchange-Answer commands, and in the Vendor-Id AVP within the Vendor-Specific-Application-Id grouped AVP of the Capabilities-Exchange-Request and Capabilities-Exchange-Answer commands.

NOTE – The Vendor-Id AVP included in Capabilities-Exchange-Request and Capabilities-Exchange-Answer commands that is not included in the Vendor-Specific-Application-Id AVPs as described above shall indicate the manufacturer of the Diameter node as per RFC 3588 [6].

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6.3 AVPs

The following tables describe the Diameter AVPs defined for the Cx interface protocol, their AVP Code values, types, possible flag values and whether or not the AVP may be encrypted. The Vendor-Id header of all AVPs defined in Table 6.3.1 shall be set to 3GPP (10415). The Vendor-Id header of all AVPs defined in Table 6.3.2 shall be set to CableLabs (4491).

Table 6.3.1 – Diameter Multimedia Application AVPs with 3GPP Vendor-Id

Attribute Name	AVP Code	Section defined	Value Type	AVP Flag rules				
				Must	May	Should not	Must not	May Encr.
...								

NOTE 1 – The AVP header bit denoted as 'M', indicates whether support of the AVP is required. The AVP header bit denoted as 'V', indicates whether the optional Vendor-ID field is present in the AVP header. For further details, see IETF RFC 3588 [6].

NOTE 2 – Depending on the concrete command.

Table 6.3.2 – Diameter Multimedia Application AVPs with CableLabs Vendor-Id

<u>Attribute Name</u>	<u>AVP Code</u>	<u>Section defined</u>	<u>Value Type</u>	<u>AVP Flag rules</u>				
				<u>Must</u>	<u>May</u>	<u>Should not</u>	<u>Must not</u>	<u>May Encr.</u>
SIP-Digest-Authenticate	228	6.3.34	Grouped	M,V				No
Digest-Realm	209	6.3.35	UTF8String	M,V				No
Digest-Domain	206	6.3.36	UTF8String	M,V				No
Digest-Algorithm	204	6.3.37	UTF8String	M,V				No
Digest-QoP	208	6.3.38	UTF8String	M,V				No
Digest-HA1	207	6.3.39	OctetString	M,V				No
Digest-Auth-Param	205	6.3.40	OctetString	M,V				No

NOTE – The AVP header bit denoted as 'M', indicates whether support of the AVP is required. The AVP header bit denoted as 'V', indicates whether the optional Vendor-ID field is present in the AVP header. For further details, see IETF RFC 3588 [6].

6.3.1 Visited-Network-Identifier AVP

...

6.3.13 SIP-Auth-Data-Item AVP

The SIP-Auth-Data-Item is of type Grouped, and contains the authentication and/or authorization information for the Diameter client.

AVP format

```
SIP-Auth-Data-Item ::= < AVP Header : 612 10415 >
    [ SIP-Item-Number ]
    [ SIP-Authentication-Scheme ]
    [ SIP-Authenticate ]
    [ SIP-Authorization ]
    [ SIP-Authentication-Context ]
    [Confidentiality-Key]
    [Integrity-Key]
    [SIP-Digest-Authenticate]
    * [AVP]
```

6.3.14 SIP-Item-Number AVP

...

6.3.34 SIP-Digest-Authenticate AVP

The SIP-Digest-Authenticate is of type Grouped and it contains a reconstruction of either the SIP WWW-Authenticate or Proxy-Authentication header fields specified in IETF RFC 2617 [13].

AVP format

SIP-Digest-Authenticate ::= < AVP Header: 228.4491 >
 [Digest-Realm]
 [Digest-Domain]
 [Digest-Algorithm]
 [Digest-QoP]
 [Digest-HA1]
 *[Digest-Auth-Param]
 *[AVP]

6.3.35 Digest-Realm AVP

The Digest-Realm AVP is of type UTF8String and it defines the protection domain for the authentication request, as specified in IETF RFC 3261 [3].

6.3.36 Digest-Domain AVP

The Digest-Domain AVP is of type UTF8String and it allows the UE to be informed of the set of URIs for which the same authentication information may be sent as defined in IETF RFC 2617 [13].

6.3.37 Digest-Algorithm AVP

The Digest-Algorithm AVP is of type UTF8String and it contains the algorithm used to compute the challenge-response. If this AVP is omitted, it is assumed that MD5 is the algorithm used. This AVP corresponds to the algorithm directive defined in IETF RFC 2617 [13].

6.3.38 Digest-QoP AVP

The Digest-QoP AVP is of type UTF8String and it indicates the quality-of-protection. When included, this AVP contains a quoted list of "quality-of-protection" values supported by the HSS. This AVP corresponds to the qop-options directive defined in IETF RFC 2617 [13].

6.3.39 Digest-HA1 AVP

The Digest-HA1 AVP is of type OctetString and it contains the hexadecimal value, pre-calculated at the HSS, of H(A1) as defined in IETF RFC 2617 [13].

6.3.40 Digest-Auth-Param AVP

The Digest-Auth-Param AVP is of type OctetString and it is the mechanism whereby the S-CSCF and HSS can exchange possible extension parameters contained in Digest headers that are not understood by the S-CSCF and for which there are no corresponding stand-alone AVPs.

Unlike the previously listed Digest-* AVPs, the Digest-Auth-Param contains not only the value, but also the parameter name, since it is unknown to the S-CSCF. This AVP corresponds to the "auth-param" parameter defined in Section 3.2.1 of IETF RFC 2617 [13].

6.4 Use of namespaces

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