MSF Implementation Agreement for the Location Information Interface LOC-1

MSF-IA-DIAMETER.008-FINAL

MultiService Forum
Implementation Agreement

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Abstract:

The MultiService Forum (MSF) is responsible for developing Implementation Agreements or Architectural Frameworks which can be used by developers and network operators to ensure interoperability between components from different vendors. MSF Implementation Agreements are formally ratified via a Straw Ballot and then a Principal Member Ballot.

Draft MSF Implementation Agreements or Architectural Framework may be published before formal ratification via Straw or Principal Member Ballot. In order for this to take place, the MSF Technical Committee must formally agree that a draft Implementation Agreement or Architectural Framework should be progressed through the balloting process. A Draft MSF Implementation Agreement or Architectural Framework is given a document number in the same manner as an Implementation Agreement.

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The use of capitalization of the key words “MUST”, “SHALL”, “REQUIRED”, “MUST NOT”, “SHOULD NOT”, “SHOULD”, “RECOMMENDED”, “NOT RECOMMENDED”, “MAY” or “OPTIONAL” is as described in section V-B of the MSF Technical Committee Operating Procedures.

The goal of the MSF is to promote multi-vendor interoperability as part of a drive to accelerate the deployment of next generation networks. To this end the MSF looks to

adopt pragmatic solutions in order to maximize the chances for early deployment in real world networks.

To date the MSF has defined a number of detailed Implementation Agreements and detailed Test Plans for the signaling protocols between network components and is developing additional Implementation Agreements and Test Plans addressing some of the other technical issues such as QoS and Security to assist vendors and operators in deploying interoperable solutions.

The MSF welcomes feedback and comment and would encourage interested parties to get involved in this work program. Information about the MSF and membership options can be found on the MSF website http://www.msforum.org/

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I. The MultiService Forum

The MultiService Forum (MSF) is a global association of service providers, system suppliers and other organizations committed to developing and promoting open-architecture, multiservice communication systems. Founded in 1998, the MSF is an open-membership organization comprised of the world's leading telecommunications companies.

The MSF's activities include developing implementation agreements, promoting worldwide compatibility and interoperability, and encouraging input to appropriate national and international standards bodies.

As part of MSF's effort to drive and promote interoperability, the MSF has created a number of programs geared toward accelerating real world network deployments:

1. Global MSF Interoperability (GMI) events. GMI events provide a real-world setting for vendors to test their solutions and provide evidence that vendor products meet the interoperability standards set forth by MSF Implementation Agreements. Each MSF GMI event is built around a set of capabilities defined for a given release of the MSF Architecture.

2. Next Generation Network (NGN) Test Bed. The NGN test bed provides a facility to enable carriers and vendors to perform in-depth testing of a specific interface as defined in a given release of the MSF architecture.

3. Certification Programs. For more mature technologies the MSF can provide Certification of compliance to a given Implementation Agreement where MSF members believe that it is of value to the industry to do so.

II. An introduction to MSF documentation and GMI 2008

This document is part of the MSF Release 4 set of architectural, protocol and test documentation.

The MSF Release 4 Architecture is a physical implementation of the functional architectures that have been proposed by the key Standards Development Organizations. As such the MSF Release 4 Architecture represents the current state of the industry and it identifies current open interfaces between physically separate network elements.

MSF Implementation Agreements define the protocols to be used over specific open interfaces. Where possible MSF Implementation Agreements are based on industry standard protocols augmented with additional information so as to ensure interoperability between communicating network elements. This level of interoperability is achieved by closing any gaps and tightening any optional capabilities in those industry standards to

remove the danger of mutually incompatible selections by vendors. An MSF Implementation Agreement is targeted at a given release of the MSF architecture but can be used in any circumstance where an operator wishes to deploy the open interface and its functionality within their own network.

The MSF Release 4 architecture and its associated implementation agreements are used as the basis for GMI 2008. GMI 2008 is a global test event executed to demonstrate multi-vendor, multi-service interoperability based around IMS and includes IPTV and web based services.

As part of GMI 2008 a number of detailed test scenarios have been developed and a number of test plans defined. Test plans contain the set of test cases required to demonstrate a given MSF Release 4 capability and serve to exercise and validate the set of Implementation Agreements required to realize the capability.

Following the completion of GMI 2008 the MSF Release 4 architecture and individual implementation agreements will be updated if the testing identifies any deficiencies in the documents.

For more information about the scope of GMI2008 please go to http://www.msforum.org

III. Impact on previously published MSF documents

This is a new specification for MSF release 4 and GMI 2008. This document defines the implementation agreement for the interface LOC-1 in the MSF R4 Architecture. It is an endorsement and extension of ETSI TISPAN standard for the ‘Network Attachment Sub System (NASS); e2 interface based on the DIAMETER protocol’ as used for MSF location information.

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1. Introduction

1.1. Scope

This document defines the interface LOC-1 in the MSF Release 4 architecture [1] and subsequent releases. It is intended for use with access networks where either:

a) the end user does not have the capability to hand-over the session to different points on the same or a different access network. (e.g. PC soft client on a broadband or local wireless network)
b) a location request that is a snap shot of the current location is all that is required. (e.g. request for radio access network triangulation)

Future work will consider if and how event registration and notification can be used for access network location monitoring that allows full mobility or hand-over between access networks. Such scenarios are out of scope for MSF Release 4.

This document is a profile of the ETSI interface [2] defined in the TISPAN Architecture as the e2 reference point. The MSF location service architecture does not use all the message types that flow across this interface and consequently limits what can be requested. In order to allow generic interface implementation against the ETSI standard, response to other message requests are not prohibited.

1.2. References

[1] MSF Release 4 Architecture Overview (MSFR4-ARCH-OVERVIEW-FINAL)

[2] ETSI ES 283 035 V1.1.1 (2006-07), “Telecommunications and Internet Converged Services and Protocols for Advanced Networks (TISPAN); Network Attachment Sub System (NASS); e2 interface based on the DIAMETER protocol”

[3] ETSI RES/TISPAN-02045-NGN-R2 v0.0.5, “Telecommunications and Internet Converged Services and Protocols for Advanced Networks (TISPAN); NGN Functional Architecture; Network Attachment Sub-System (NASS)”

[4] MSF-IA-XML.001-FINAL “Implementation Agreement for Location Objects”

[5] IETF RFC 3588, “Diameter Base Protocol”, September 2003”

1.3. Definitions and Abbreviations

1.3.1. Definitions

Access Network Block	The part of the MSF overall architecture framework that generically represents an access network, independent of its technology
Access Network Tile	A specification of the architecture for a specific access network technology or a grouping of similar access technologies.
MSF Core Architecture Blocks	The functionality contained in the Transport, Session and Common Blocks defines in the MSF Architecture [1]

1.3.2. Abbreviations

AF	Application Function
ALS	Access Location Server
AVP	Application Value Pair
CLF	Connectivity session Location and repository Function
DNS	Domain Naming Service
FQDN	Fully Qualifies Domain Name
IA	Implementation Agreement
NASS	Network Attachment Sub-System
PIDF-LO	Presence Information Data Format – Location Object
P-CSC	Proxy – Call State Controller
Pres Svr	Presence Server (specialist instance of Application Server)
RACS	Resource and Admission Control Subsystem
RAN	Radio Access Network
SCTP	Stream Control Transmission Protocol
S-SBG-NE	Signalling Session Border Gateway at the Network Edge.
TCP	Transmission Control Protocol
XML	eXtensible Mark-up Language

2. Context for use of the LOC-1 Interface

The MSF Release 4 architecture [1] incorporates access networks into its architectural framework. The generic interface between the MSF core control plane and the access network for location requests and information is identified by LOC-1. Figure 1 shows the context of the LOC-1 interface between the MSF architectural components.

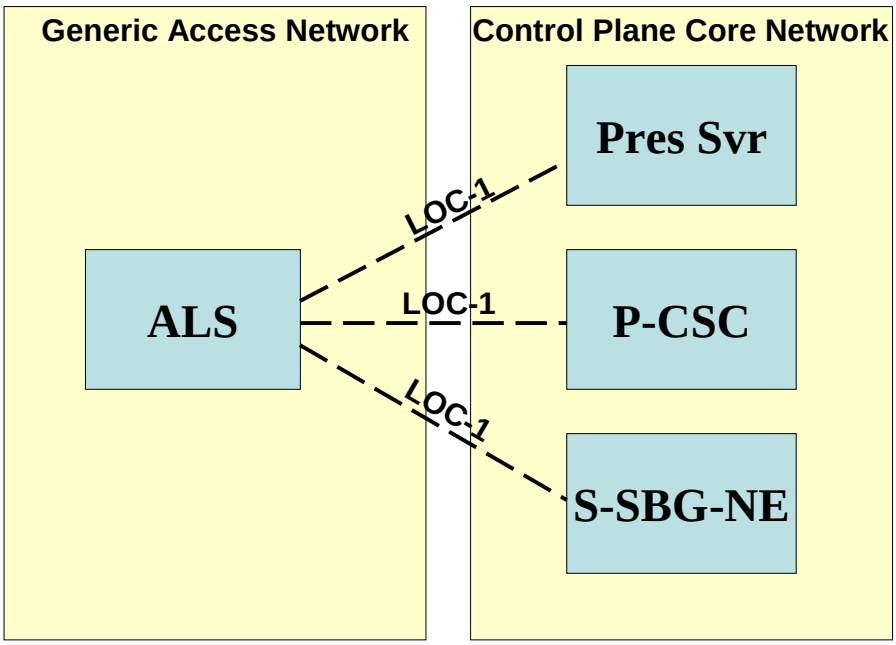

Figure 1: Context of the LOC-1 Interface Between an Access Block and the Control Plane Core Components

The S-SBG-NE, P-CSC and Presence Server can independently make location information requests from the core control plane to the Access Location Server (ALS). Note that in accordance with the MSF Architecture [1], the use of a LOC-1 interface on the S-SBG-NE and from the P-CSC is dependent on network configuration.

3. Overview of Location Information Retrieval over LOC-1

The S-SBG-NE, P-CSC and Presence Server communicate with the ALS via interface LOC-1 which is a subset of the e2 reference point defined by ETSI TISPAN between service control subsystems and applications and the NASS [3] and MUST be read in parallel with this IA. This interface uses the Diameter protocol but SHOULD NOT utilize or support Diameter redirection. The Location-Information AVP defined in [3] has been extended to include a Location-Object and a Location-Privacy AVP which are defined in this document.

The Diameter commands for the LOC-1 interface connection establishment and management and procedural support SHALL be as defined in the Diameter base document [5]. For the application layer information flow defined by ETSI for the e2 reference point [2], only the Diameter command 'User-Data-Request' / 'User-Data-Answer' SHALL be used on the LOC-1 interface; other Diameter commands SHOULD NOT be sent from the core control plane and any response that relates to these commands SHOULD be ignored by entities processing the LOC-1 interface.

Of the information types defined by [3] this IA only makes location information queries and receives location information responses. Information requests are referenced by the IP address of the end user as used in the access network and a Realm which is the FQDN that uniquely identifies the access network. In this IA the Realm SHALL be the FQDN name of the ALS with the left most label (ALS host name) removed.

For example, if an ALS has a DNS FQDN of:-

AccLocSvr10**.**AccessNW3**.**SPname**.**net

the Realm used will be:-

AccessNW3**.**SPname**.**net

Location Information Responses AVPs SHALL carry the location and associated privacy information encoded as XML in the PIDF-LO format with MSF privacy extensions as defined in [4]. Location information in [4] can be of two types:

a) geospatial co-ordinates
b) civic address

IF supported by the access network the location information SHOULD be in civic address form but MAY contain only sufficient address fields to identify the main location. Some Access Networks (e.g. RANs) MAY only return geospatial co-ordinates.

4. Profiling of ES 283 035 [2]

The following is a profiling of the ETSI TISPAN standard, ES 283 035 [2], for the LOC-1 interface showing the endorsements and changes to that document. Any references made in the following profiling table which are in square brackets e.g. [3] refer to the reference section within ES 282 035, not this document.

ES 282 035 Section	Profiling Information
4 Overview	Endorsed for background information
5 Procedure descriptions	
5.1 General	Endorsed
5.2 Procedures on the CLF-AF interface	Insert: For the LOC-1 references to CLF SHALL be interpreted as an MSF ALS and AF SHALL be interpreted as the core P-CSC, S-SBG-NE or Presence Server.
5.2.1 Information Query	

<table>
<tr><th>ES 282 035
Section</th><th>Profiling Information</th></tr>
<tr><td>5.2.1.1 Overview</td><td>Endorsed but with “Table 1: Information query” and “Table 2: Information query response” as replaced by Table 1 and 2 below.

Table 1: Information query
<table>
<tr><th>Information element name</th><th>Mapping to Diameter AVP</th><th>Cat</th><th>Description</th></tr>
<tr><td>Globally unique IP Address</td><td>Globally-Unique-Address</td><td>M</td><td>This information element contains:
• The IP address of the user equipment used by the subscriber for which location information is being requested.
• The addressing domain in which the IP address is significant. This shall be the FQDN of the ALS.</td></tr>
<tr><td>AF Identity</td><td>AF-Application-Identifier</td><td>M</td><td>Identifies the Presence Server, P-CSC or S-SBG-NE originating the request.</td></tr>
<tr><td>Requested-Items</td><td>Requested-Information</td><td>M</td><td>The Location request.</td></tr>
</table>
Table 2: Information response
<table>
<tr><th>Information element name</th><th>Mapping to Diameter AVP</th><th>Cat</th><th>Description</th></tr>
<tr><td>Result</td><td>Result-Code / Experimental_Result Code</td><td>M</td><td>Result of the request

Result-Code AVP SHALL be used for errors as defined in the Diameter Base Protocol [5].</td></tr>
<tr><td>Location Information</td><td>Location-Information</td><td>C</td><td>This field SHALL be mandatory CONDITIONAL on a successful Result-Code.</td></tr>
</table></td></tr>
</table>

ES 282 035 Section	Profiling Information
5.2.1.2 Procedure at the AF Side	Item 1) is replaced by the following text 1) Insert a Globally-Unique-Address AVP which SHALL contain a Frame-IP-Address or Frame-IPv6-Prefix AVP value, and an Address-Realm AVP. The address Realm AVP SHALL be the FQDN of the ALS.
5.2.1.3 Procedure at the CLF side.	This sub-section is endorsed as followed noting this IA's modifications to the procedures at the AF side whereby the ALS SHOULD NOT receive an information request referenced by user name. The procedures at the ALS are endorsed as follows:- 1) Endorsed 2) Replace with the following text:- If the Globally-Unique-Address AVP is absent but the User-Name AVP is present, use the latter information as a key to retrieve the requested session information. As the ALS is not required to understand User-Name AVP, IF it is unable to process the User-Name AVP it SHALL return an Information Query response with Result-Code set to DIAMETER_MISSING_AVP. 3) Endorsed 4) Endorsed 5) Endorsed
6. Use of the Diameter base protocol	Endorsed
6.1 Securing Diameter messages	Endorsed with the added option of TLS which MAY be used.
6.2 Accounting functionality	Endorsed
6.3 Use of sessions	Endorsed

ES 282 035 Section	Profiling Information
6.4 Transport Protocol	Replaced by the following: Diameter messages over the LOC-1 interface SHOULD make use of SCTP [9] and when doing so MUST utilize the new SCTP checksum method specified in [11]. Diameter messages over the LOC-1 interface MAY make use of TCP.
6.5 Routing considerations	Endorsed noting that where CLF is used read ALS.
6.6 Advertising application support	Replaced by the following: The ALS and S-SBG-NE/ P-CSC/ Presence Server SHALL advertise support for the LOC-1 (e2) specific application by including the value 16777231 of the application identifier in the Auth-Application-Id AVP within the Vendor-Specific-Application-Id group AVP of the Capabilities-Exchange-Request and Capabilities-Exchange-Answer commands. The vendor specific value of ETSI (13019) and MSF (24411) 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. Additionally support of the 3GPP AVPs shall be advertised by adding the vendor identifier value of 3GPP (10415) to the Supported-Vendor-Id AVP of the Capabilities-Exchange-Request and Capabilities-Exchange-Answer commands. NOTE: the Vendor-Id AVP included in the 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 [10].
7 DIAMETER Application	Endorsed.
7.1 Commands	Endorsed
7.1.1 User-Data-Request Command	Endorsed but with the exception of the following AVPs which SHALL NOT be used by the S-SBG-NE, P-CSC or Presence Server:- [User-Name]

<table>
<tr><th>ES 282 035
Section</th><th>Profiling Information</th></tr>
<tr><td>7.1.2 User-Data-Answer command</td><td>Endorsed but noting that, as the information SHOULD NOT be requested the following AVPs which SHOULD NOT be in the User-Data-Answer command:-
[User-Name]
[RACS-Contact-Point]
[Terminal-Type]</td></tr>
<tr><td>7.2 Result-Code AVP values</td><td>Endorsed</td></tr>
<tr><td>7.2.1 Success</td><td>Replaced by the following:-

When the Access network can provide the location information, even if only in part, to location request for a specified Globally-Unique-Address the Result AVP SHALL be set to :-
DIAMETER_SUCCESS 2001
The Request was successfully completed.</td></tr>
<tr><td>7.2.2 Permanent Failures</td><td>Endorsed
Note: Specifically the AVP-Result-Code value of
DIAMETER_ERROR_USER_UNKOWN (5001)
SHALL be sent by the ALS if the Globally-Unique-Address AVP contains an IP address outside the range used on the access network and/or if the ALS does not recognize the Realm field as valid for the access network.</td></tr>
<tr><td>7.2.3 Transient failures</td><td>Endorsed
Note: If the ALS has no record for the Globally-Unique-Address for which the location request is made it SHALL return this AVP-Result-Code:-
DIAMETER_USER_DATA_NOT_AVAILABLE (4100)</td></tr>
<tr><td>7.3 AVPs</td><td>Endorsed; but the following AVPs defined in this clause SHOULD NOT be sent on the LOC-1 interface and SHOULD be ignored if received.

<table>
<tr><th>Attribute Name</th><th>AVP Code</th><th>Clause defined</th><th>Value Type</th><th>Must</th><th>May</th><th>Should not</th><th>Must not</th><th>May Encrypt</th></tr>
<tr><td>RACS-Contact-Point</td><td>351</td><td>7.3.2</td><td>DiameterIdentity</td><td>V</td><td>M</td><td></td><td></td><td>Yes</td></tr>
<tr><td>Terminal-Type</td><td>352</td><td>7.3.3</td><td>OctetString</td><td>V</td><td>M</td><td></td><td></td><td>Yes</td></tr>
<tr><td>Logical-Access-Id</td><td>302</td><td>See ES 283 034 [5]</td><td>OctetString</td><td>V</td><td>M</td><td></td><td></td><td>Yes</td></tr>
</table></td></tr>
</table>

<table>
<tr><th>ES 282 035
Section</th><th>Profiling Information</th></tr>
<tr><td>7.3 AVPs [Contd]</td><td>The following additional AVPs SHALL be supported:-

The following table describes the Diameter AVPs defined specifically for the MSF LOC-1interface with the Code values, types, possible flag values and whether the AVP may or not be encrypted.

The Vendor-Id header for these AVPs SHALL be set to MSF (24411).

Table 8: Diameter AVPs Defined for MSF LOC-1 inetrface
<table>
<tr><th>Attribute Name</th><th>AVP Code</th><th>Clause defined</th><th>Value Type</th><th>Must</th><th>May</th><th>Should not</th><th>Must not</th><th>May Encrypt</th></tr>
<tr><td>Location-Object</td><td>001</td><td>7.3.6</td><td>OctetString</td><td>V</td><td>M</td><td></td><td></td><td>Yes</td></tr>
<tr><td>Location-Privacy</td><td>002</td><td>7.3.7</td><td>OctetString</td><td>V</td><td>M</td><td></td><td></td><td>Yes</td></tr>
</table></td></tr>
<tr><td>7.3.1 Location-Information AVP</td><td>Replaced by the following:

The Location-Information AVP (AVP code 350 13019) is of type Grouped.
AVP Format:
<pre>Location-Information ::= < AVP Header: 350 13019 >
    [Line-Identifier]
    [Location-Object]
    [Location-Privicy]
    *[AVP]</pre></td></tr>
<tr><td>7.3.2 RACS Contact Point AVP</td><td>Note that this is not used on the LOC-1 interface.</td></tr>
<tr><td>7.3.3 Terminal Type AVP</td><td>Note that this is not used on the LOC-1 interface.</td></tr>
</table>

<table>
<tr><th>ES 282 035
Section</th><th>Profiling Information</th></tr>
<tr><td>7.3.4 Requested Information AVP</td><td>
Endorsed but the S-SBG-NE, P-CFC or Presence Server SHALL only send LOCATION-INFORMATION (1) and SHOULD NOT send the other enumerated types.

The ALS action as to the Request-Information AVP SHOULD be as defined in the following table but IF the ALS is realized with other functionality in line with the CLF definition within ETSI TISPAN it MAY respond according to the original tabele in [2].

<table>
<tr><th>Request Name</th><th>Enumerated Value</th><th>ALS Response</th></tr>
<tr><td>SUBSCRIBER-ID</td><td>0</td><td>DIAMETER_ERROR_USER_UNKOWN (5001)</td></tr>
<tr><td>LOCATION-INFORMATION</td><td>1</td><td>• DIAMETER_SUCCESS (2001) + Location-Information AVP
• DIAMETER_USER_DATA_NOT_AVAILABLE (4100) if Location information is unavailable
• DIAMETER_ERROR_USER_UNKOWN (5001) if the IP Address or Realm are in permanent error.</td></tr>
<tr><td>RACS-CONTACT-POINT</td><td>2</td><td>DIAMETER_ERROR_USER_UNKOWN (5001)</td></tr>
<tr><td>ACCESS-NETWORK-TYPE</td><td>3</td><td>DIAMETER_ERROR_USER_UNKOWN (5001)</td></tr>
<tr><td>TERMINAL-TYPE</td><td>4</td><td>DIAMETER_ERROR_USER_UNKOWN (5001)</td></tr>
<tr><td>LOGICAL-ACCESS-ID</td><td>5</td><td>DIAMETER_ERROR_USER_UNKOWN (5001)</td></tr>
<tr><td>PHYSICAL-ACCESS-ID</td><td>6</td><td>DIAMETER_ERROR_USER_UNKOWN (5001)</td></tr>
<tr><td>ACCESS-NETWORK-TYPE</td><td>7</td><td>DIAMETER_ERROR_USER_UNKOWN (5001)</td></tr>
<tr><td>INITIAL-GATE-SETTING</td><td>8</td><td>DIAMETER_ERROR_USER_UNKOWN (5001)</td></tr>
<tr><td>QOS-PROFILE</td><td>9</td><td>DIAMETER_ERROR_USER_UNKOWN (5001)</td></tr>
<tr><td>IP-CONNECTIVITY-STATUS</td><td>10</td><td>DIAMETER_ERROR_USER_UNKOWN (5001)</td></tr>
</table>
</td></tr>
</table>

ES 282 035 Section	Profiling Information
7.3.5 Line Identifier AVP	Endorsed but appended by the following additional text:- Where the Line Identifier is not used or defined between the Access Network and the MSF Core Network, the octet string within the AVP SHALL be set to 'NULL' and this SHALL be the default condition.

7.3.6 Location-Object	This clause shall be inserted into the 'supported AVPs' section 7.3.
	
	The Location-Information AVP (AVP code 001 24411) is of type OctetString.
	AVP Format:
	`Location-Object ::= < AVP Header: 001 24411 >`
	`[UTF8String]`
	
	Where the Location-Object [UTF8String] contains the XML definition for location objects as defined in [4].

7.3.7 Location-Privacy	This clause shall be inserted into the 'supported AVPs' section 7.3.
	
	The Location-Information AVP (AVP code 002 24411) is of type OctetString.
	AVP Format:
	`Location-Privacy ::= < AVP Header: 002 24411 >`
	`[UTF8String]`
	
	Where the Location-Privacy [UTF8String] contains the XML definition for location privacy rules as defined in [4].

7.4 Use of namespaces	Endorsed
7.4.1 AVP codes	Replaced by the following: The ETSI document assigns the AVP values in the 350 to 399 range from the AVP Code namespace managed by ETSI for its Diameter vendor-specific applications. See clause 7.3 for the list of AVP values assigned in the present document. The AVP values in the 001 to 019 range from the AVP Code namespace managed by the MSF for its Diameter vendor-specific applications are assigned for future use with the LOC-1 interface. For the list of AVP values assigned by this MSF Implementation Agreement see clause 7.3 as amended by this profiling IA.

<table>
<tr><th>ES 282 035 Section</th><th>Profiling Information</th></tr>
<tr><td>7.4.2 Experimental Result Code AVP values</td><td>Endorsed</td></tr>
<tr><td>7.4.3 Command Code values</td><td>Endorsed</td></tr>
<tr><td>7.4.4 Application ID value</td><td>Endorsed</td></tr>
<tr><td>Annex A (informative):</td><td>Replaced by the following:

Mapping of LOC-1 (e2) operations and terminology to Diameter

The following table defines the mapping between information elements defined in ES 282 004 [2] and Diameter commands.

Table A.1: LOC-1 (e2) message to Diameter command mapping

<table>
<tr><th>LOC-1 (e2) message</th><th>Source</th><th>Destination</th><th>Command-Name</th><th>Abbreviation</th></tr>
<tr><td>Location Information Query</td><td>S-SBG-NE (Core), P-CSC or Pres Svr</td><td>ALS</td><td>User-Data-Request</td><td>UDR</td></tr>
<tr><td>Location Information Response</td><td>ALS</td><td>S-SBG-NE (Core) P-CSC or Pres Svr</td><td>User-Data-Answer</td><td>UDA</td></tr>
</table>
</td></tr>
</table>

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End of Document