

Oracle® Communications Convergent Charging Controller

Diameter Control Agent Protocol Implementation Conformance Statement



Release 15.2

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Oracle Communications Convergent Charging Controller Diameter Control Agent Protocol Implementation
Conformance Statement, Release 15.2

G47594-01

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About This Content

The purpose of this document is to describe the Oracle implementation of the Diameter protocol for the purposes of real-time charging, from a Diameter Credit-Control Server perspective.

Audience

This guide is intended for use by software engineers and testers that need a description of the SLC Credit-Control messages used by the DCA.

It is in addition to the functional details provided by the Diameter Control Agent Technical Guide. It is assumed that readers are familiar with Prepaid Charging and the Diameter RFCs.

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Related Resources

The following documents are related to this document:

- Internet Engineering Task Force (IETF) specifications:
 - RFC 6733 Diameter Base Protocol
 - RFC 4006 Diameter Credit Control Application
- Diameter Control Agent Technical Guide
- Diameter and Diameter Control Agent SRS
- 3GPP TS 32.299 V11.3.0 (2012-03) - 3rd Generation Partnership Project; Technical Specification Group Service and System Aspects; Telecommunication management; Charging management; Diameter charging applications (Release 11)

Conventions

The following text conventions are used in this document.

| Convention | Meaning |
|-----------------|--|
| boldface | Boldface type indicates graphical user interface elements associated with an action, or terms defined in text or the glossary. |
| <i>italic</i> | Italic type indicates book titles, emphasis, or placeholder variables for which you supply particular values. |

| Convention | Meaning |
|-------------------|--|
| monospace | Monospace type indicates commands within a paragraph, URLs, code in examples, text that appears on the screen, or text that you enter. |

1

Compliance Statement

Overview

Introduction

This chapter introduces the Diameter Control Agent (DCA) compliance limitations.

DCA Overview

Introduction

The Diameter Control Agent (DCA) is an interface used by Prepaid Charging to allow processing of Diameter based billing requests utilizing existing Oracle SLC and Charging infrastructure.

The Diameter base protocol is defined by RFC 6733, and extended to include real-time credit-control messages by RFC 4006.

In addition, the Diameter protocol defined by RFC 4006 is further extended by GPP TS 32.299 V11.3.0 Diameter charging applications.

DCA Coverage

The DCA (and thus this document) only covers the use of Prepaid Charging as a Diameter Credit Control server. For information about Prepaid Charging acting as a Diameter Credit Control Client, see the Diameter Charging Driver (DCD) documentation.

DCA Server

The DCA server runs on the SLC SLEE, taking inbound requests from Diameter Credit-Control clients and passing them to Prepaid Charging for further processing. This may involve passing the request on to an existing billing engine using a different protocol such as FOX, OSA or Diameter.

The DCA server maintains the connections to the Diameter Credit-Control client (or, if configured, intermediate Diameter peer, such as a proxy).

General restrictions

Specific adherence to the RFCs is described in a later section, but there are some general properties of Diameter that are not handled by the DCA.

These are:

- TLS (RFC 2246) is not supported.

- Authentication and Authorization messages are not supported
- Dynamic peer discovery is not performed.
- SNMP client alarm generation (SMS alarm mechanism is used instead)
- There is no expectation to provide Network Access Services (NAS) server functionality as part of the Oracle Diameter implementation. Note that this does not prohibit existing Diameter based NAS servers acting as Diameter Credit Control clients, for the purposes of billing a service.

2

Diameter Message Encoding

Overview

Introduction

This chapter details the Diameter Control Agent (DCA) compliances.

Diameter Message Encoding

Introduction

The DCA client will send (and expect to receive) Diameter messages that have a basic encoding in compliance with RFC 6733.

Diameter Headers

The header of Diameter messages sent by DCA are fully compliant with RFC 6733.

The individual parameters are:

| Field | Type/Length | Comment |
|-----------------------|---------------------|---|
| Version | 1 byte | Always set to 1. |
| Message Length | 3 bytes | Length includes header fields. |
| Command Flags | 1 byte | Format: <i>RPETrrrr</i> All set as per RFC 6733. |
| Command Code | 3 bytes | Will be one of: <ul style="list-style-type: none">• 257 (CER/A)• 258 (RAR/A)• 280 (DWR/A)• 282 (DPR/A)• 272 (CCR/A) |
| Application ID | 4 bytes | Set to 4 for CCRs, 0 for all other message types. |
| Hop-by-hop identifier | Unsigned32; 4 bytes | Set as per RFC 6733. |
| End-to-end identifier | Unsigned32; 4 bytes | Set as per RFC 6733. |

Attribute-Value Pairs (AVPs)

The header on an AVP consists of the following fields:

| Field | Type/Length | Comment |
|------------|-------------|--|
| AVP Code | 4 bytes | |
| AVP Flags | 1 byte | Format: <i>VMPrrrrr</i> . <i>V</i> is vendor bit. Will be set only if a vendor-ID is used. <i>M</i> is mandatory bit: If the AVP Code is from RFC 6733 or 4006, the bit is set. Otherwise (for example, a vendor specific AVP code), the bit is not set. <i>P</i> is an encryption indicator. Set to 0. |
| AVP Length | 3 bytes | AVP length in bytes, including these header fields. |
| Vendor-ID | 4 bytes | Will be 0 for RFC 6733 and 4006 AVPs, or 111 for Oracle specific AVPs. |
| Data | | As specified by the AVP code and length. |

AVP Data Types

The DCA can send and receive all the basic and derived data types mentioned in RFC 6733, except Float32 and Float64. Where the data types are used, they are encoded in complete compliance with RFC 6733 and RFC 2279.

INAP extensions

The following may be mapped to or from INAP extensions:

- OctetString
- Integer32
- Integer64
- Unsigned32
- Unsigned64
- Address
- Time
- UTF8String
- DiameterIdentity
- DiameterURI
- Enumerated

Note: The OctetString type can have number values as an array of either ASCII characters or integers.

Extension formats

Supported INAP extension formats are:

- inapnumber
- asn1integer
- octets
- encoded (as ACS Profile Block)

INAP fields

As an alternative to extension formats, DCA also support mapping of AVPs to (Inbound) or from (Outbound) INAP Fields. Supported INAP Fields are:

| INAP Field | Direction |
|---------------------------|-------------------|
| AdditionalCallingPartyID | Inbound only |
| CalledPartyBCDNumber | Inbound only |
| CalledParty | Inbound only |
| CallingParty | Inbound, Outbound |
| Cause | Outbound only |
| DestinationRoutingAddress | Outbound only |
| IMSI | Inbound only |
| LocationInformation | Inbound only |
| LocationNumber | Outbound only |
| MaxCallDuration | Outbound only |
| MscAddress | Inbound only |
| OriginalCalledParty | Inbound, Outbound |
| RedirectingPartyID | Inbound, Outbound |

Note:

Inbound direction (Diameter AVP to INAP Field)

Outbound direction (INAP Field to Diameter AVP)

3

Connection Management

Overview

Introduction

This chapter covers the connection management compliances.

Introduction

Introduction

The DCA server will accept inbound connections initiated by Diameter Credit-Control clients as per RFC 3588. However, the DCA will only allow connections from peers that are in its configured list. CERs from unknown peers will have a CEA message sent before the client closes the connection. DCA will not initiate connections to unconnected peers. Connections can be over either TCP or SCTP.

To manage the connections, the following messages from RFC 3588 are used:

- Capabilities Exchange Request (CER)
- Capabilities Exchange Answer (CEA)
- Device Watchdog Request (DWR)
- Device Watchdog Answer (DWA)
- Disconnect Peer Request (DPR)
- Disconnect Peer Answer (DPA)

Capabilities Exchange Messages

Capabilities Exchange Messages

The DCA will receive CER messages and respond with CEA messages, as per formats specified in RFC 6733. The content of the individual fields is as follows:

| Field | AVP Code | Data Type | Comment |
|-----------------|----------|------------------|--|
| Origin-Host | 264 | DiameterIdentity | Set from configuration. Default is hostname. |
| Origin-Realm | 296 | DiameterIdentity | Set from configuration. Default is hostname. |
| Host-IP-Address | 257 | Address | Set from configuration. Default is INADDR_ANY. |

| Field | AVP Code | Data Type | Comment |
|--------------------------------|----------|------------|--|
| Vendor-ID | 266 | Unsigned32 | Set from configuration (Oracle vendor ID is 111). |
| Product-Name | 269 | UTF8String | Set from configuration. |
| Origin-State-Id | 278 | Unsigned32 | Used to detect a re-booting peer and wipe sessions for the host if it has rebooted. |
| Supported-Vendor-Id | 265 | Unsigned32 | Set from configuration. |
| Auth-Application-Id | 258 | Unsigned32 | Must be as specified in configuration. Default is 4 (Credit-Control). Inbound CER messages will be rejected. |
| Inband-Security-Id | 299 | Unsigned32 | Set to 0 (NO_INBAND_SECURITY). |
| Acct-Application-Id | 259 | Unsigned32 | Not included. |
| Vendor-Specific-Application-Id | 260 | Grouped | Not included. |
| Firmware-Revision | 267 | Unsigned32 | Not included. |
| Result-Code | 268 | Unsigned32 | Set as per RFC 6733. |
| Error-Message | 281 | UTF8String | Human-readable string, as per RFC 6733. |
| Failed-AVP | 279 | Grouped | Set as per RFC 6733. |

Disconnect Peer Messages

Disconnect Peer Messages

A literal interpretation of RFC 6733 could assume that after either side sends a DPR message, the receiving peer should never again attempt to reconnect the connection. On shutdown, DCA will send a DPR message. The client might take this literal interpretation and never try to reconnect. In this case, the client may need to be reinitialized or restarted.

The possible fields are as follows:

| Field | AVP Code | Data Type | Comment |
|------------------|----------|------------------|--|
| Origin-Host | 264 | DiameterIdentity | Set from configuration. Default is hostname. |
| Origin-Realm | 296 | DiameterIdentity | Set from configuration. Default is hostname. |
| Disconnect-Cause | 273 | Enumerated | The only cause sent by the DCA is 2, DO_NOT_WANT_TO_TALK_TO_YOU. |
| Result-Code | 268 | Unsigned32 | Set as per RFC 6733. |
| Error-Message | 281 | UTF8String | Human-readable string, as per RFC 6733. |
| Failed-AVP | 279 | Grouped | Set as per RFC 6733. |

Device Watchdog Messages

Device Watchdog Messages

Provision is to be made for determining if there has been a transport failure by supporting the Device Watchdog Request (DWR) and Device Watchdog Answer (DWA) messages. This necessitates the ability to receive DWR messages and send an appropriate DWA message as a response. The purpose of this is that if a client detects a connection failure to the server, the client should make a periodic attempt to reconnect.

The length of the silent interval that must precede a DWR message is configurable. The possible fields are as follows:

| Field | AVP Code | Data Type | Comment |
|-----------------|----------|------------------|---|
| Origin-Host | 264 | DiameterIdentity | Set from configuration. Default is hostname |
| Origin-Realm | 296 | DiameterIdentity | Set from configuration. Default is hostname. |
| Origin-State-Id | 278 | Unsigned32 | Used to detect a re-booting peer and wipe sessions for the host if it has rebooted. |
| Result-Code | 268 | Unsigned32 | Set as per RFC 6733. |
| Error-Message | 281 | UTF8String | Human-readable string, as per RFC 6733. |
| Failed-AVP | 279 | Grouped | Set as per RFC 6733. |

Message Retransmission and Duplicate Detection

RFC 6733 and Event Based Credit-Control Duplicate Detection

In Diameter clients (and agents) may retransmit messages, where an unexpected failure has occurred. This may occur when a client has sent a request, but has not received a reply, within a specified period. This retransmission behavior can potentially lead to duplicates being sent. In such cases clients which send messages, which may be duplicates, may indicate the possibility that a subsequent message is a duplicate by setting the T command flag / bit (refer to Chapter 3 Diameter Header of RFC 6733).

Note: The T-flag not being set is not necessarily a definitive indicator that no duplicate is present.

End to end identifier

The DCA uses the End-to-End Identifier for detecting duplicate messages (in conjunction with the Origin-Host AVP). The DCA also ensures that answers must have the same identifier as in the original request. In addition duplicate requests result in essentially the same response, but should not affect state (that is, in Credit-Control duplicate billing must not occur).

Non-volatile storage

Non-volatile storage of End-to-End identifier or recently sent responses is not supported, due to the significant processing overhead this can introduce.

Duplicate message

The case where a duplicate arrives at a different SLC is also not supported. For real-life deployments each SLC should be treated as a separate realm in order to avoid double processing of duplicates. This means that the realm name and hostname may effectively be the same for each DCA SLC.

Note: Duplicate detection is not applied to Device Watchdog messages.

General duplicate detection

The following generalized approach is utilized for the detection of duplicates.

When the server receives a message which is a candidate for duplicate detection:

1. The code searches a map of recently received messages for a matching End-to-End Identifier.
2. If a duplicate message was encountered:

Resend the original response (which should have been remembered).

1. If NO duplicates were detected in either backwards time frame or the original message was late:

Process the message like normal (that is, assume the message was never dealt with in the first place).

Session-Based Credit-Control Duplicate Detection

For session-based CCR messages (that is, those with Requested-Action AVP of INITIAL_REQUEST, TERMINATION_REQUEST, or UPDATE_REQUEST), duplicate detection is based on the mechanism described in RFC 4006. That is, duplicate detection for session-based messages is performed using the Session-Id AVP and CC-Request-Number AVP, in conjunction with the Credit-Control servers own internal state, for non Multiple-Services-Credit-Control cases.

CC-Request-Number detects out-of-sequence messages, and is expected to be sequential (as suggested by RFC 4006).

However, this does not hold for Multiple-Services-Credit-Control, because that CC-Request-Number will not necessarily be sequential. Clients are not required to wait for a CCA before sending a new Credit-Control-Request (CCR) message. This might happen if a client sends a new CCR for a different service (than those currently pending response), when that service requires further authorization to use more units.

For Multiple-Services-Credit-Control, a lookup is performed based on the inbound CC-Request-Number. If one is found, it can be assumed to be a duplicate and the same answer returned.

4

Credit Control Requests

Overview

Introduction

This chapter describes the mappings between INAP parameters and Diameter AVPs.

Credit Control Request and Response AVPs

AVP List descriptions

This table describes the function of each AVP.

| AVP Name | Action |
|-----------------------|--|
| Session-Id | Used to identify the relevant session. |
| Origin-Host | Used to identify sender. |
| Origin-Realm | Used to identify sender. |
| Destination-Realm | Used to identify the realm of the target Credit Control Server (normally expected to be the machine DCA is running on) |
| Auth-Application-Id | Disregarded if not 4 (Diameter Credit-Control) |
| Service-Context-Id | Used as part of the key to look up the service. |
| CC-Request-Type | Used as part of the key to look up the service. Also used to determine the next state. |
| CC-Request-Number | Used in duplicate detection. |
| Destination-Host | Used to identify the host of the target Credit Control Server (normally expected to be the machine DCA is running on). |
| User-Name | Ignored unless mapped to an IDP extension by the AVP mappings in eserv.config . |
| CC-Sub-Session-Id | Ignored. We do not support multiple session IDs but some clients may set this anyway. If so this will be ignored. |
| Acct-Multi-Session-Id | Ignored. We do not support multiple session IDs but some clients may set this anyway. If so this will be ignored. |
| Origin-State-Id | Used to detect a client re-booting and wipe sessions for the host if it has rebooted. |
| Event-Timestamp | For EVENT_REQUEST messages, this gets copied into IDP extension type 504. |
| Subscription-Id | Gets copied to IDP extension type 505. If this is an E 164 number, it also gets copied to CallingPartyNumber, after applying the configured normalization rules. |

| AVP Name | Action |
|----------------------------------|---|
| Service-Identifier | Used as part of the key to look up the service. |
| Termination-Cause | May be traced if tracing is enabled. Otherwise, ignored. |
| Requested-Service-Unit | The type of the service unit (derived from which sub-AVP is contained within this one) is placed in IDP extension type 502. The value of the sub-AVP is placed in IDP extension type 501. DCA supports the use of multiple unit-types within a single Requested-Service-Unit AVP for both Basic Credit Control and Multiple Services Credit Control (MSCC) upon service initiation. A single Requested-Service-Unit AVP (containing more than 1 unit type) will result in DCA triggering multiple <code>slee_acs</code> calls (1 for each unit type). |
| Requested-Action | Used as part of the key to look up the service. Also used to determine the next state. |
| Used-Service-Unit | The cumulative total of all the Used-Service-Unit AVPs is multiplied by 10 (to create deci-seconds) and used to identify the total used units for the call. |
| Multiple-Services-Indicator | DCA fully supports Multiple-Services-Credit Control. The DCA mechanism for supporting multiple service credit-control allows multiple charging sessions with ACS to be associated with one DIAMETER session. So if the received Multiple-Services-Indicator is set to <code>MULTIPLE_SERVICES_SUPPORTED</code> , DCA will accept the incoming message and subsequent Multiple-Services-Credit-Control AVPs if received in CCR/CCA update and CCR/CCA final request messages. All incoming diameter messages and associated MSCC AVPs will be processed and dispatched as separate calls/sessions to ACS. An association will be maintained between these multiple ACS calls/sessions and the single diameter session with responses from ACS aggregated before a single CCA response containing an MSCC AVP is returned. The segregation of the single MSCC session into separate ACS calls is internally managed by DCA and is transparent to the Diameter Client. |
| Multiple-Services-Credit-Control | Requires that Multiple-Services-Indicator AVP has been received, with value set to <code>MULTIPLE_SERVICES_SUPPORTED</code> . DCA supports the use of multiple unit-types within a single Requested-Service-Unit AVP for both multiple services credit-control (MSCC) and basic credit control. As described above, the mechanism for multiple service credit-control allows multiple ACS charging sessions to be dispatched and associated with one DIAMETER session. If more than one unit type is received within the MSCC AVP, a similar mechanism of segregation and dispatch to ACS will be used (that is, one ACS session/call for each unit type) |
| Service-Parameter-Info | Ignored unless mapped to an IDP extension by the AVP mappings in eserv.config . |
| CC-Correlation-Id | Ignored unless mapped to an IDP extension by the AVP mappings in eserv.config . |
| User-Equipment-Info | Ignored unless mapped to an IDP extension by the AVP mappings in eserv.config . |
| Proxy-Info | Returned unmodified in CCA. |
| Route-Record | Ignored at present, unless mapped to an IDP extension by the AVP mappings in eserv.config . |

AVP Data source

This table describes how each AVP content is set.

Some of these AVPs are for both Credit Control Requests and Credit Control Responses. Some are for one only.

| AVP Name | Set From |
|----------------------------------|---|
| Session-Id | The Session-Id AVP of the first message in this transaction. |
| Result-Code | Set to DIAMETER_SUCCESS unless otherwise stated. Note: If quiescing and this is an INITIAL_REQUEST or an EVENT_REQUEST then return CCA(Result-Code=DIAMETER_TOO_BUSY). |
| Origin-Host | Set according to configuration. Normally defaults to host name. |
| Origin-Realm | Set according to configuration. Normally defaults to host name. |
| Auth-Application-Id | Always set to 4 (Diameter Credit-Control) |
| CC-Request-Type | The value of CC-Request-Type from the corresponding request. |
| CC-Request-Number | The value of CC-Request-Number from the corresponding request. |
| User-Name | Set if configured. |
| CC-Session-Failover | Set if configured (which should be treated as FAILOVER-NOT-SUPPORTED according to RFC 4006). |
| CC-Sub-Session-Id | Set to the value from the corresponding request message. |
| Acct-Multi-Session-Id | Set to the value from the corresponding request message, if present. |
| Origin-State-Id | Set to current system time, at time of last DCA restart. |
| Event-Timestamp | Set to the value of the Event-Timestamp AVP from the corresponding request. |
| Granted-Service-Unit | For session based services, this is ApplyCharging.maxDuration (divided by 10 if the unit type is Time). For Requested-Action type DIRECT_DEBIT, in the success case, this is the same as the Requested-Service-Unit AVP in the corresponding request. Otherwise, not present. |
| Multiple-Services-Credit-Control | For each incoming MSCC AVP containing a Requested-Service-Unit, DCA will dispatch an individual ACS call. DCA starts the calls by sending an InitialDP (IDP) to ACS and expects a subsequent ApplyCharging (AC) response. DCA aggregates the AC responses and maps the appropriate data into the MSCC AVP in the CCA message that DCA then returns to the Diameter client. DCA will populate the MSCC AVPs in CCA messages with the following sub-AVPs where applicable: <ul style="list-style-type: none"> • Granted-Service-Units (See Granted-Service-Unit above that is, from ApplyCharging.maxDuration) • Rating-Group or Service-Identifier (Set by DCA in accordance with what was sent by the Diameter Client in the initial request) • Result-Code (See Result-Code above. For an MSCC request, the individual result codes are also combined to produce an overall result code). Any partial failure will result in an overall failure. • Time-Quota-Threshold (if applicable) • Volume-Quota-Threshold (if applicable) • Validity-Time (if applicable) • Final-Unit-Indication (if applicable) |
| Cost-Information | For Request-Action type PRICE_ENQUIRY, success case, this comes from the value of extension 603 in the INAP Connect. Otherwise, not set. |
| Final-Unit-Indication | Final-Unit-Action is set to REDIRECT or TERMINATE depending on the INAP operations received (from ACS/Prepaid Charging). Redirect-Server is set to the number matched in the redirectNumbers config list or TEL:<Connect destinationRoutingAddress>@<Configured SIP host>. |

| AVP Name | Set From |
|----------------------------------|--|
| Check-Balance-Result | This is derived from the type of INAP operation received: Continue ENOUGH_CREDIT ReleaseCall (Reason = 31) NO_CREDIT |
| Credit-Control-Failure-Handling | Set to TERMINATE |
| Direct-Debiting-Failure-Handling | Set if configured. (According to RFC 4006, it will default to TERMINATE_OR_BUFFER). |
| Validity-Time | Set to the configured validity-time for the service in the graceful termination scenarios only. If Dynamic Quota is enabled, then Validity-Time is taken from the appropriate Dynamic Quota set configuration. For more informaton, see Dynamic Quota Config section in <i>Charging Control Services User's Guide</i> . Validity-Time may get modified if TTC is enabled and an adverse rating boundary is detected. For more information on TTC rating boundary details, see TTC based Rating and Charging section in <i>Charging Control Services User's Guide</i> . |
| Redirect-Host | Set if configured. |
| Redirect-Host-Usage | Set if configured. |
| Redirect-Max-Cache-Time | Set if configured. |
| Proxy-Info | Returned as per CCR. |
| Route-Record | Set if configured. |
| Failed-AVP | Set in some cases when Result-Code != success, that is: If the incoming message contains unsupported AVPs then return CCA(Result-Code=DIAMETER_AVP_UNSUPPORTED, Failed-AVPs) |
| Custom AVPs | Determined by DCA mapping configuration: <ul style="list-style-type: none"> For Outbound Diameter messages, data sources may be INAP Fields, INAP Extensions or literal values. For Inbound Diameter messages, the incoming Custom AVPs may be mapped to target INAP Fields or INAP Extensions. |

In addition to the functionality described in the table above:

- For AVPs marked "Set if configured", refer to *Considerations* .
- Outbound AVPs such as Result-Code may have the default data source or value changed by DCA mapping configuration as per "Custom AVPs" above.
- Any inbound AVPs may be mapped to additional target data field(s) by DCA mapping configuration as per "Custom AVPs" above.

Also note that:

- INAP Fields are determined by the INAP Standards (for example, Calling Party Number, Destination Routing Address)
- INAP Extensions when encoded into an ACS Profile Block may be used to carry Grouped AVPs and other more complex structures.
- Literal values are simple data types (for example, a literal string or integer constant)

For a full listing of AVPs and compliance to the standards document, please see the section titled "Compliance to 3GPP TS 32.299" *Section 7* .

INAP Extension Mappings

Introduction

As INAP is not designed to contain Diameter AVPs, these will be carried, where necessary, in INAP fields and extensions in the INAP operations.

For a specific Diameter interface, there will be differences in which AVPs will be relevant for rating or which vendor specific AVPs will be used. So, for each service, the configuration allows:

- In the inbound direction, a mapping of AVPs to INAP fields or INAP extensions
- In the outbound direction, a mapping of INAP fields or INAP extensions to AVPs

The extensions that arrive through inbound mapping are available to ACS in the control plan in the incoming extensions block. These are available for manipulation such as in control plan nodes and branching decisions such as to implement tariff override if applicable.

The ACS control plan may also choose to set outgoing extensions that are sent in INAP operations and subsequently mapped into AVPs in the outbound Diameter responses.

The AVP to pass is identified according to AVP code. Multiple AVPs may be identified and passed to:

- Target profile tags, available within the inbound extensions block
- INAP Fields, available within ACS Context fields

Likewise the INAP Fields or Profile Blocks to pass is identified by name or tag code respectively.

Multiple fields may be identified and passed to target AVPs.

In addition it is possible to selectively apply the same or different mapping schemes for specific Diameter request and response messages.

INAP Extensions are possible in the following INAP Operations:

- Initial DP
- Apply Charging Report
- Continue With Argument
- Release Call (See *Note*)
- Connect
- ApplyCharging

Note: The Release Call does not use INAP Extensions, but instead encodes the extension data within the Cause Diagnostics field of the Cause parameter. This mechanism is transparent to the end-user from a functional viewpoint.

Extensions in the IDP

501 = Requested-Service-Units

502 = Requested service unit type

1 = CC-Time 2 = CC-Money3 = CC-Total-Octets4 = CC-Input-Octets5 = CC-Output-Octets6 = CC-Service-Specific-Units

503 = Requested-action

DIRECT_DEBITING 0REFUND_ACCOUNT 1CHECK_BALANCE 2PRICE_ENQUIRY 3

504 = Event-Timestamp (passed as seconds since the Unix Epoch)

505 = Subscription-Id (E.164 based number representing subscriber)

506 = CC-Money.Currency-Code (if Requested-Service-Unit is type CC-Money)

507 = CC-Money.Unit-Value.Exponent (if Requested-Service-Unit is type CC-Money)

701 = Multiple Encoded AVPs, mapped to Inbound Extension profile block (as per configuration)

Extensions in the Connect operation

601 = Granted service units

602 = Granted service unit type

1 = CC-Time 2 = CC-Money3 = CC-Total-Octets4 = CC-Input-Octets5 = CC-Output-Octets6 = CC-Service-Specific-Units

603 = Cost information (in system currency)

701 = Multiple Encoded AVPs, mapped from the Outbound Extension profile block (as per configuration)

Extensions in the ApplyChargingReport

701 = Multiple Encoded AVPs, mapped from the Inbound Extension profile block (as per configuration)

Extensions in the ApplyCharging operation

701 = Multiple Encoded AVPs, mapped from the Outbound Extension profile block (as per configuration)

Extensions in the Continue WithArgument operation

701 = Multiple Encoded AVPs, mapped from the Outbound Extension profile block (as per configuration)

Cause Diagnostics in ReleaseCall operation

The "extensions" are carried in the Cause Diagnostics sub-field within the Cause parameter in the ReleaseCall.

Cause Diagnostics = Multiple Encoded AVPs, mapped from the Outbound Extension profile block (as per configuration).

INAP Field Mappings

Introduction

Instead of mapping AVPs to or from INAP Extensions, DCA also allows AVPs to be mapped to or from INAP fields.

The supported INAP Fields are:

| INAP Field | Direction (INAP Operation) |
|---------------------------|-----------------------------------|
| AdditionalCallingPartyID | Inbound only (IDP) |
| CalledPartyBCDNumber | Inbound only (IDP) |
| CalledParty | Inbound only (IDP) |
| CallingParty | Inbound (IDP), Outbound (Connect) |
| Cause | Outbound only (ReleaseCall) |
| DestinationRoutingAddress | Outbound only (Connect) |
| IMSI | Inbound only (IDP) |
| LocationInformation | Inbound only (IDP) |
| LocationNumber | Outbound only (Connect) |
| MaxCallDuration | Outbound only (ApplyCharging) |
| MscAddress | Inbound only (IDP) |
| OriginalCalledParty | Inbound, Outbound (IDP) |
| RedirectingPartyID | Inbound, Outbound (IDP, Connect) |

Notes:

Unlike INAP Extensions which, depending on configuration, can be typically applied in one or both directions, some INAP Fields can only be applied in a single direction (see table above).

"Direction" is relative to DCA for Diameter messages (that is, "Inbound" refers to an incoming Diameter message)

Abort Session Request (ASR)

Abort Session Request

DCA can be configured to send an Abort-Session-Request (ASR) to the diameter client when the Session Supervision Timer (Tcc timer) expires while waiting for the diameter client to send a request to DCA. If a timeout occurs while waiting for a server process (for example, ACS, VWS) an ASR will not be sent. In this scenario, we are processing a CCR, so we manage the error condition in the CCA response.

DCA supports Multiple Services Credit Control, which means that the diameter client can request charging for many services in a single session, which results in DCA managing many charging sessions with ACS per single session with the client.

The ASR message (defined in RFC 6733) does not support the notion of services in MSCC (defined in RFC 4006), so when the Tcc timer expires for any service for a given GGSN session, all ACS charging sessions associated with the GGSN session must be terminated.

Note: Diameter provides the client with the capacity to decline aborting a session, by returning `DIAMETER_UNABLE_TO_COMPLY`, however DCA does not attempt to keep a session open in this case: it acts the same in all cases, simply logging the response.

The possible fields are as follows:

| Field | AVP Code | Data Type | Comment |
|---------------------|----------|------------------|--|
| Session-Id | 263 | UTF8String | The Session-Id AVP of the first message in this transaction. |
| Origin-Host | 264 | DiameterIdentity | Set according to configuration. Normally defaults to host name. |
| Origin-Realm | 296 | DiameterIdentity | Set according to configuration. Normally defaults to host name. |
| Destination-Host | 293 | DiameterIdentity | The Origin-Host of the first message in this transaction. |
| Destination-Realm | 283 | DiameterIdentity | The Origin-Realm of the first message in this transaction. |
| Auth-Application-Id | 258 | Unsigned32 | Set to the Auth-Application-Id received earlier in the session (in a CCR) from the Diameter credit-control client. |

Re-Auth Request (RAR)

Re-authorization Request

DCA can request session re-authorization to a client.

In the table below, "CC session" refers to an ongoing Credit Control session. In this scenario, DCA acts as a client, initiating the RAR to the network-side.

The possible fields are as follows:

| Field | AVP Code | Data Type | Comment |
|-------------------|----------|------------------|---------------------------------|
| Session-Id | 263 | UTF8String | Session-Id of CC session |
| Origin-Host | 264 | DiameterIdentity | Destination-Host of CC session |
| Origin-Realm | 296 | DiameterIdentity | Destination-Realm of CC Session |
| Destination-Host | 293 | DiameterIdentity | Origin-Host of CC session |
| Destination-Realm | 283 | DiameterIdentity | Origin-Realm of CC session |

Example Control Plans

Introduction

Seven example control plans are shipped with the DCA packages. These are sufficient to run simple Diameter services.

There are three control plans for session based services:

- No redirect to top-up-server functionality

- Redirect to top-up-server functionality
- Redirect to top-up server with re-authorization

There are four control plans for event based services:

- DIRECT_DEBITING
- REFUND_ACCOUNT
- CHECK_BALANCE
- PRICE_ENQUIRY
- SCREENING

No redirect to top-up server functionality

The Session No Redirect control plan is a session based plan with no redirect to a top-up server.

This consists of a Start node connected to a UATB node. The exits of the UATB node are connected to an End node (Success cases) and to the Disconnect nodes with various release causes. The release causes in the Disconnect nodes are such as to cause diameterControlAgent to use the appropriate Result-Code.

Redirect to top-up server functionality

This will be the same as the no redirect to top-up server functionality control plan with the following differences.

- The NSF (Disconnected) branch of the UATB node will be connected to an unconditional termination node which will contain a number mapped to the address of the top-up-server.
- The following must be set in the CCS and acsCharging sections of the **eserv.config** file if this is to be used:

```
CCS = {oracleUserAndPassword="xxxx/xxxx"CCSMacroNodes =
{UseDisconnectLeg = true}...}acsCharging = {switchConfiguration
= [{switchType = "internal"addDisconnectOrRelease = true}]}
```

Redirect to top-up server with re-authorization

The following DAP template must be configured in SMS screens:

```
<RAR> <instance></instance>
<session></session>
<origin_host></origin_host></RAR>
```

The following must be set in the CCS, DIAMETER, and acsCharging sections of the

```
SLC eserv.config:acsCharging = { switchConfiguration = [ {
switchType = "internal" addDisconnectOrRelease = true extended = {
# extended IDP appContext {1,3,6,1,4,1,3512,10,100,2} oid = 2
allowZeroSecondsApplyCharge = true } } ]}CCS = { ccsMacroNodes = {
holdReservationOpen = true macronodeLoopbackBranch1 = true
macronodeLoopbackBranch15 = true }}DIAMETER = { DCAInstances = [ {
```

```
Services = [ { redirectOnZeroGrant = true redirectNumber =
"12345678" appContextExt = 2 } ] }
```

Additionally, a number of AVP mappings must be configured for the DCA service. See DCA Technical Guide for more details.

The following must be set in the CCS and BE sections of the VWS eserv.config:

```
CCS = { dcaResPlugin = { dapOperationSet = "RAR" } } BE = {
plugins = [ # Final plugin: "dcaResPlugin.so" ] }
```

DIRECT_DEBITING

This control plan starts with two profile branching nodes to determine if this is a time-based direct debit (through INAP extension 502) with an Event-Timestamp AVP (INAP extension 504).

- If it is, a DUCR node is used with the `Debit` option selected to debit the account.
- If it is not, a Named Event node is used with the

```
Direct
Event
```

option selected to debit the account. The Named Event node reads its number of events from INAP extension 501 (Requested-Service-Units).

Failure branches are connected to Disconnect nodes with appropriate cause values to produce the correct Diameter Result-Code values.

REFUND_ACCOUNT

This control plan determines if this is a time or volume based account refund (through extension 502) with an Event-Timestamp AVP (extension 504).

- If it is, a DUCR node is used to credit the account.
- If it is not, a Named Event node with the

```
Direct
Event
```

option selected is used to credit the account. The cost of the selected event is negative. The Named Event node reads its number of events from extension 501 (Requested-Service-Units).

Failure branches are connected to disconnect nodes with appropriate cause values to produce the correct Diameter Result-Code values.

CHECK_BALANCE

The Check Balance control plan determines if the user is able to reserve a specified number of units. It returns either a success or failure only; it does not return the number of units in the balance.

This control plan consists of a start node followed by two Named Event nodes and a terminate unchanged node, with Disconnect nodes as appropriate. The first Named Event node reserves an event type (the `Reserve Event` option selected), appropriate for this service. If the first Named Event node:

- Fails to reserve the event, it goes to a Disconnect node with the reason set to the configured no funds cause.
- Successfully reserves the event, the second Named Event node cancels the reservation (the `Revoke Event` option selected). Then, a Terminate Unchanged node sends an INAP Continue, which signals to `diameterControlAgent` that the balance check succeeded.

PRICE_ENQUIRY

This control plan has a Named Event node connected to:

- Disconnect nodes (for failures)
- An unconditional terminate node (for successes)

The Named Event node has the `Cost of event` option selected and is configured to store the cost of the event under a tag in the ACS temporary storage area. Then, the DCA service loader plug-in picks up this tag and puts it in INAP extension 603 in the Connect. The `diameterControlAgent` copies this into the Cost-information AVP.

SCREENING

The Screening control plan denies service for voice but allows service for data, based on the bearer type received from DCA.

This consists of a Start node connected to a Transmission Type Branch node. The Transmission Type Branch node exits for voice (Exits 1 and 4) are connected to a Disconnect node with a release cause of 50. The exits for non-voice are connected to a Terminate Uncharged node.

Scenarios

Introduction

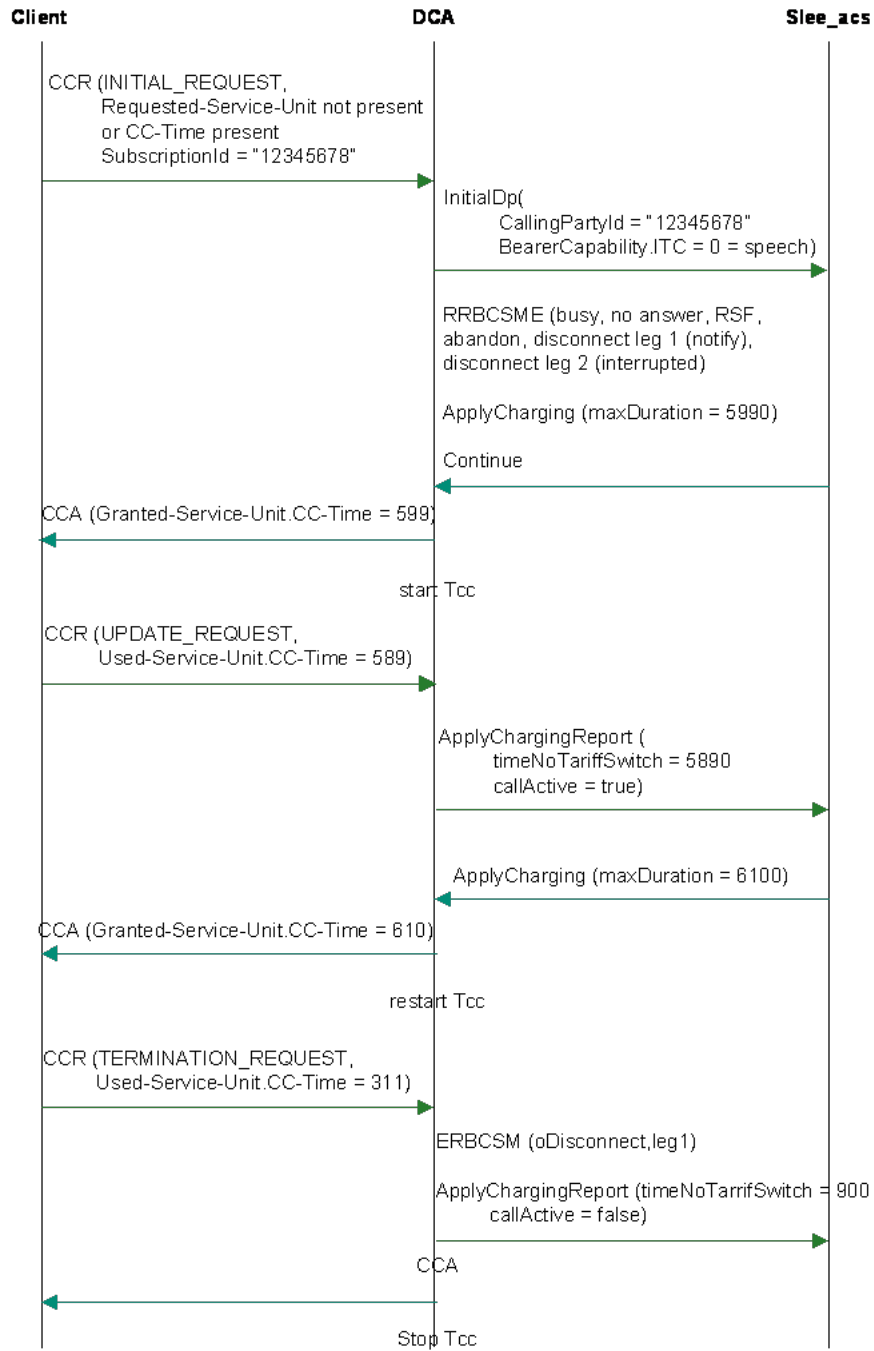
This topic explains how the flow through the software achieves Diameter server services and also gives more details on the mapping between INAP operations/parameters and Diameter messages/AVPs.

The following scenarios are based on (and named after) the relevant appendixes in *RFC 4006*.

For each scenario, a message sequence chart is given.

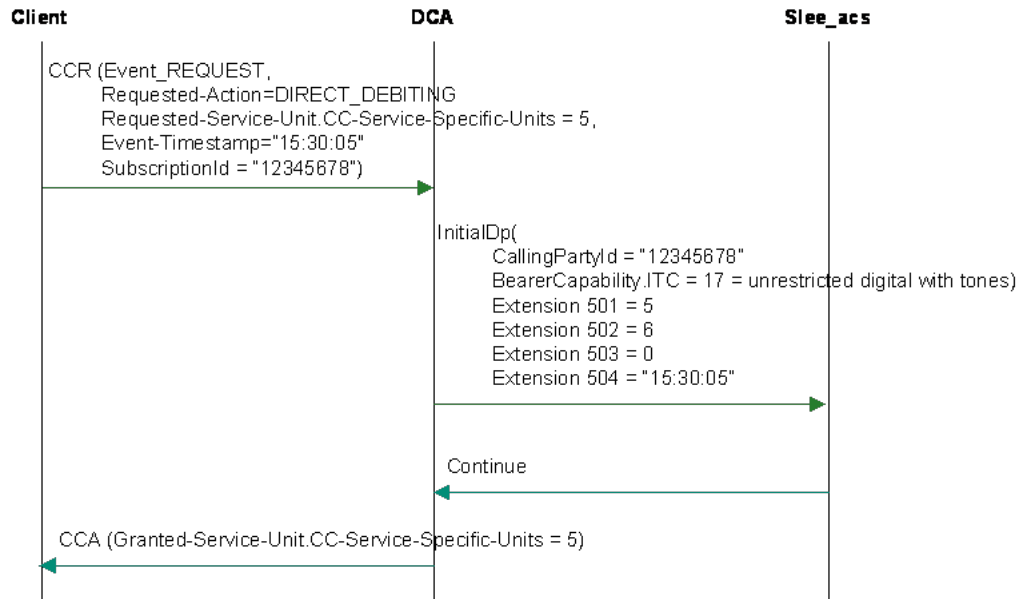
Successful session-based charging, client terminates session

Here is an example successful session-based charging, client terminates session.



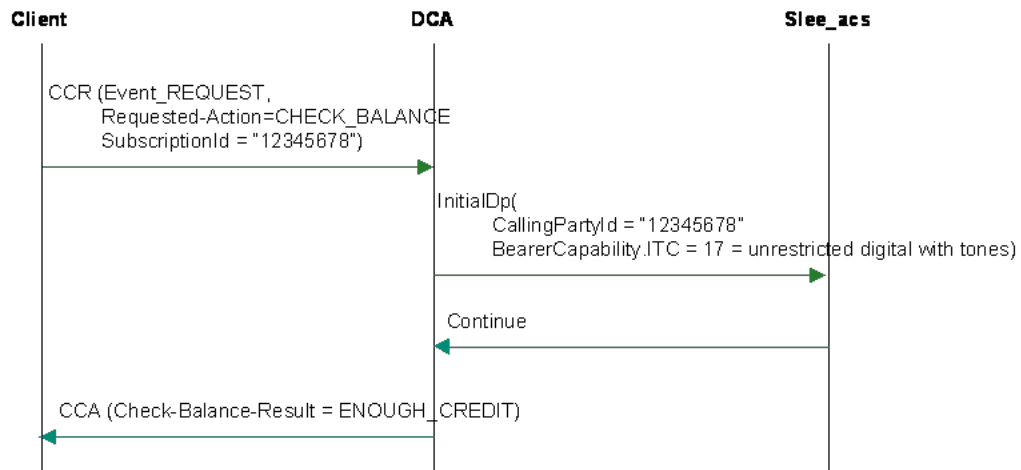
Multimedia messaging direct debit scenario

Here is an example multimedia messaging direct debit scenario.



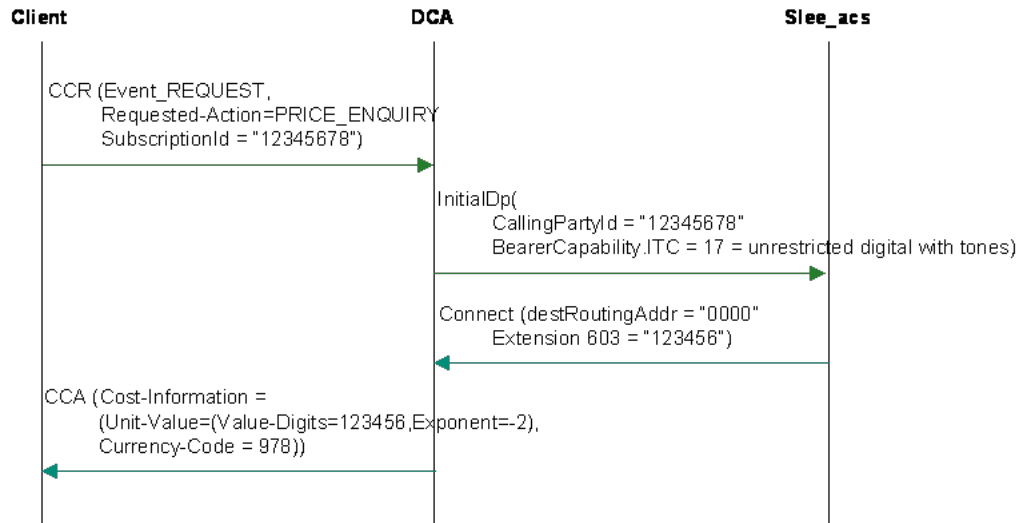
Check balance, with a result of enough credit

Here is an example check balance, with a result of enough credit.



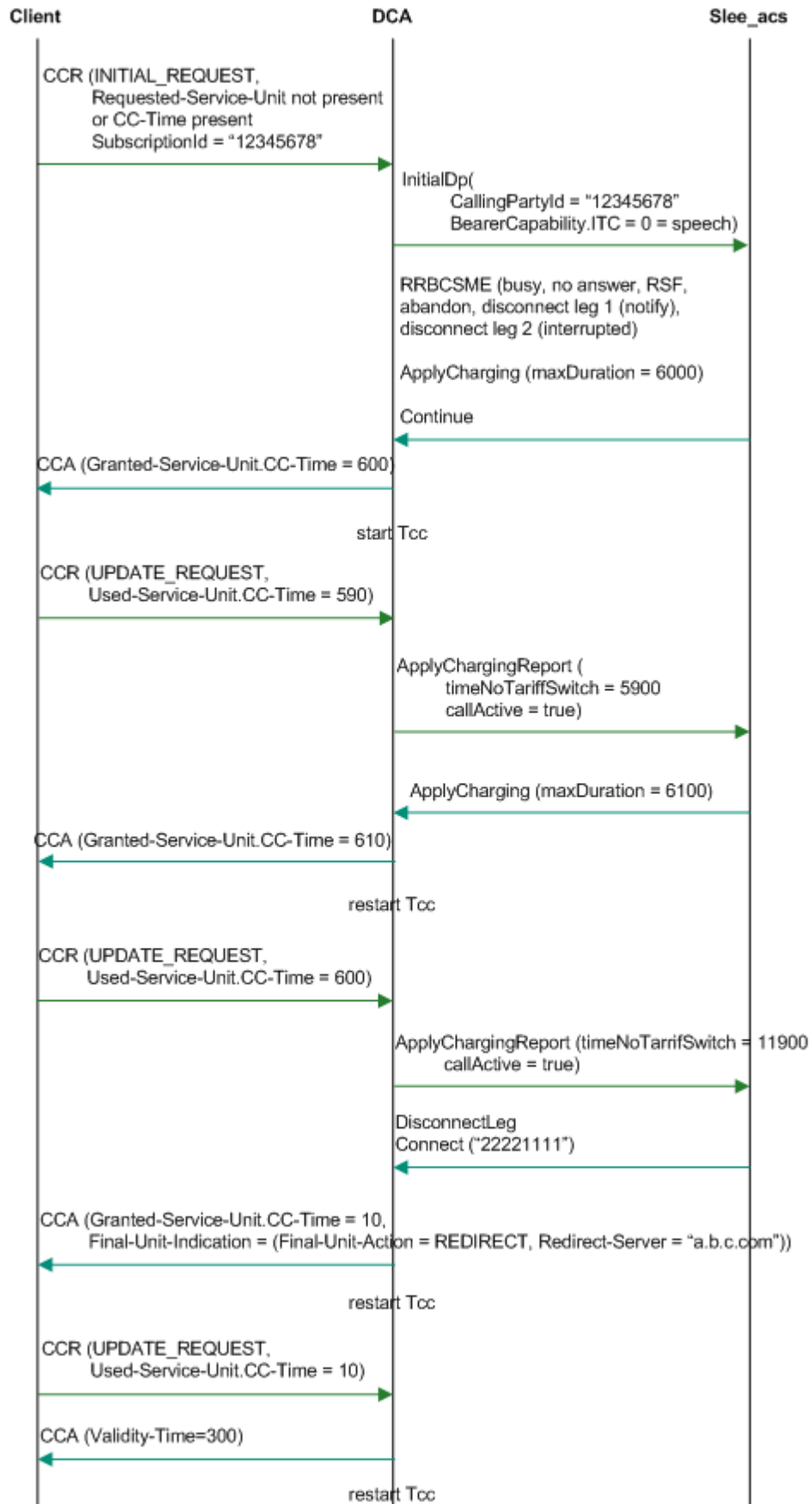
Price enquiry

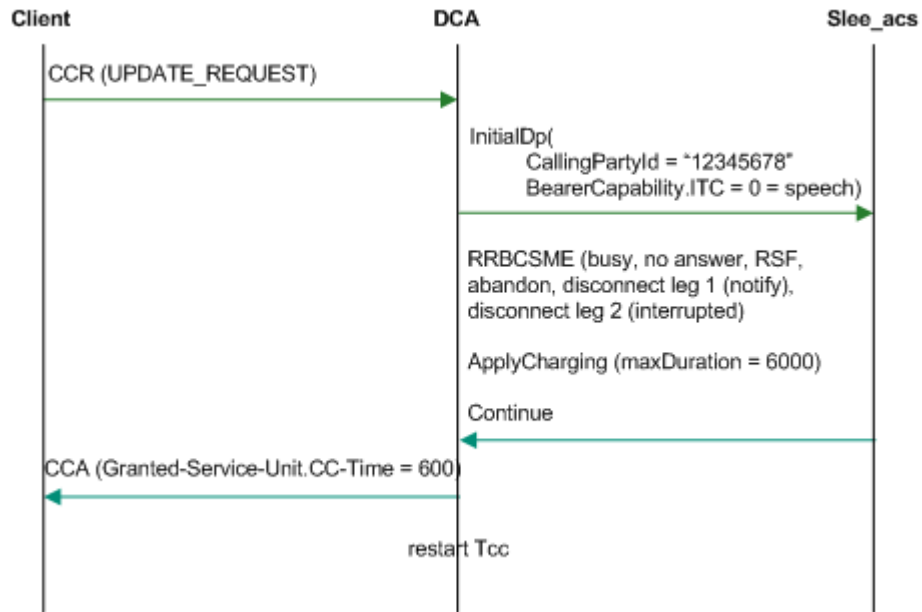
Here is an example price enquiry.



Funds expiry, redirect, top-up and reconnect

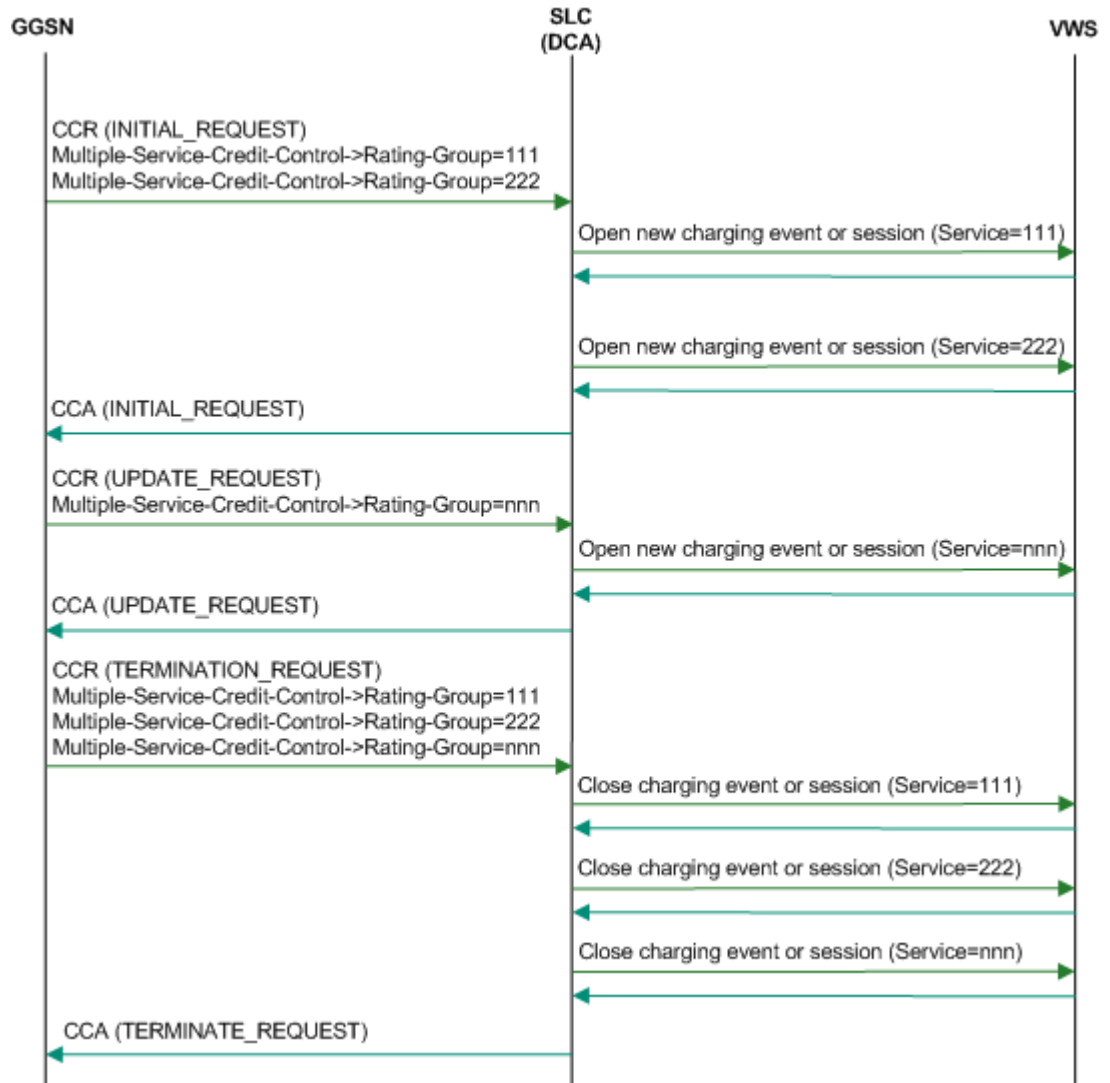
Here is an example funds expiry, redirect, top-up and reconnect.





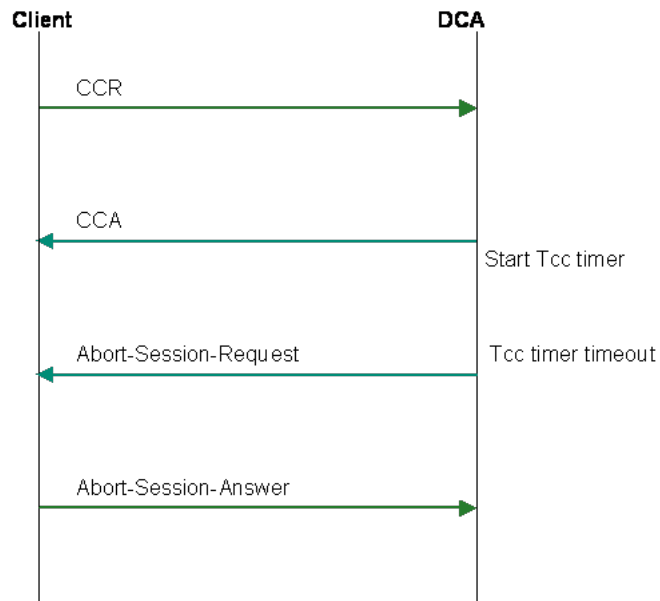
Multiple services credit control scenario

Here is an example multiple services credit control scenario.



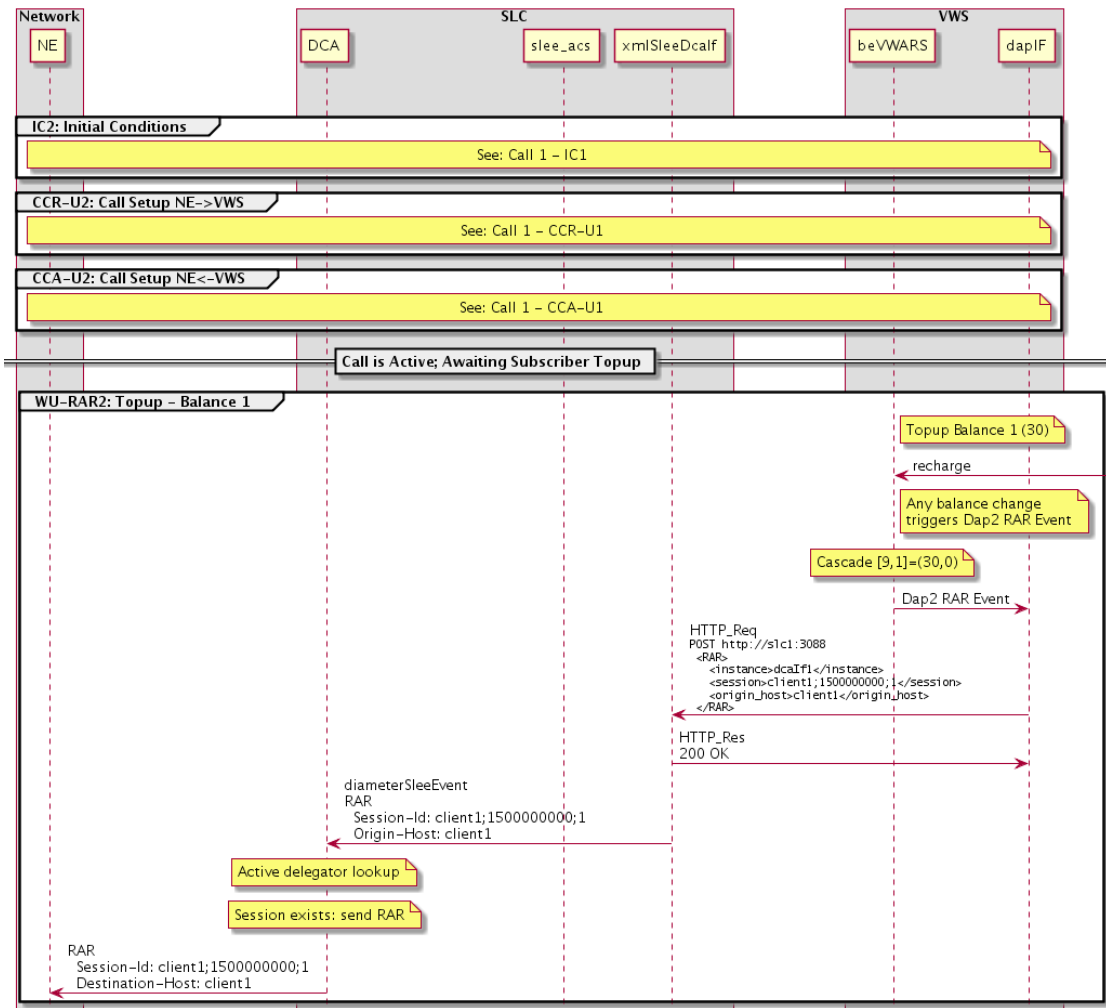
Abort Session Request Scenario

Here is an example of an abort session request scenario.



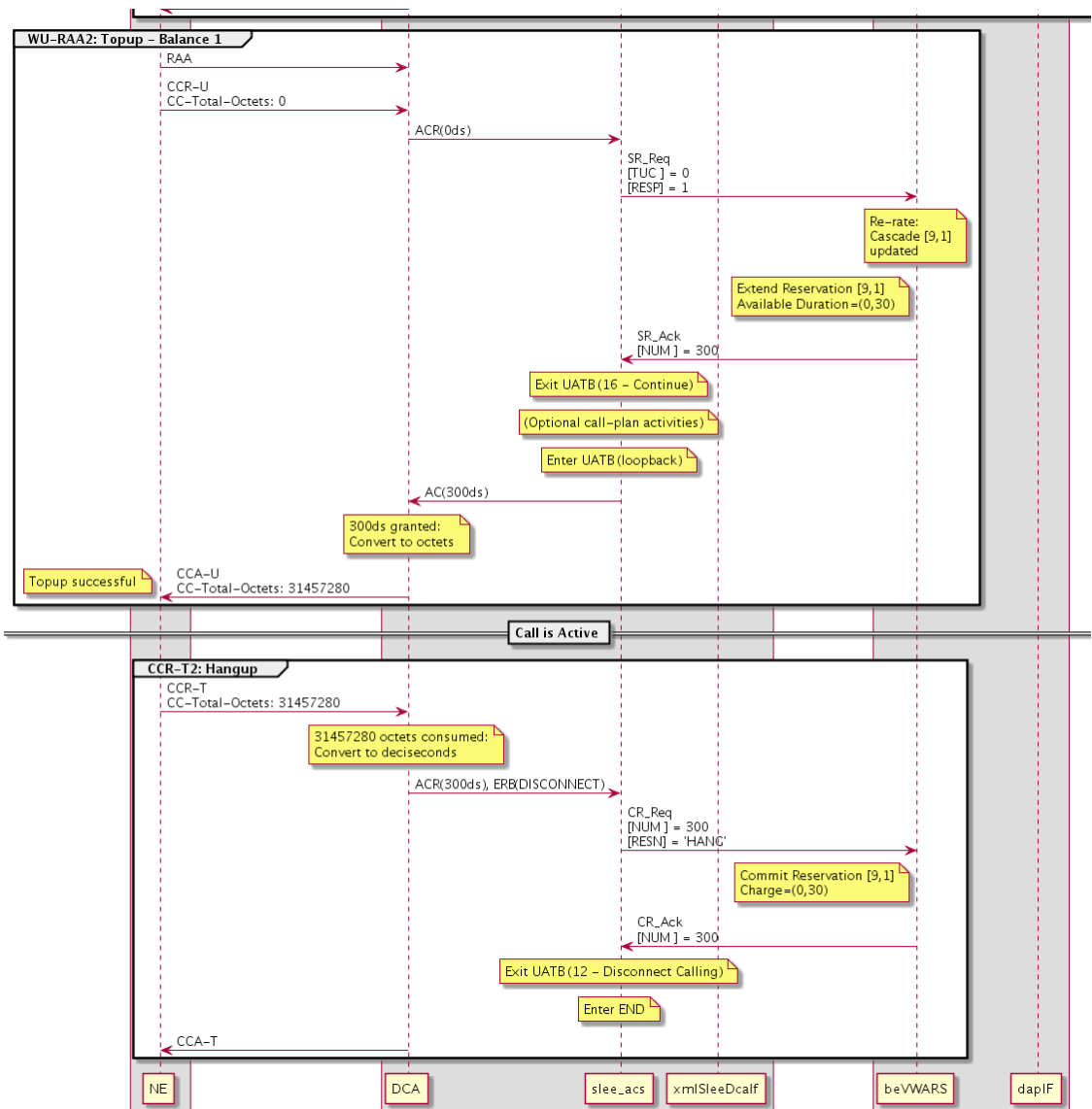
Call initiation on no funds; successful top-up

Here is an example of a call initiation on no funds - successful top-up scenario:



Call initiation on no funds; successful top-up (continued)

Here is an example of a call initiation on no funds - successful top-up scenario (continued):



5

Compliance Tables

Overview

Introduction

This chapter identifies the level of compliance of DCA to Internet Engineering Task Force (IETF) specifications RFC 6733 and RFC 4006, and 3GPP TS 32.299 V10.4.

Compliance to RFC 6733

Introduction

This topic details the compliance of DCA with RFC 6733.

For more information about the compliance levels and notes referred to in the compliance tables, see *Compliance Levels and Considerations* .

Introduction - Section 1

This table lists the compliances for section 1.

| Section | Section Heading | Compliance Level | Comment |
|---------|-----------------|------------------|---------|
| 1 | Introduction | N/A | |

Protocol Overview - Section 2

This table lists the compliances for section 2.

| Section | Section Heading | Compliance Level | Comment |
|---------|----------------------------|--|----------------------------|
| 2 | Protocol Overview | N/A | |
| 2.1 | Transport | Fully compliant TCP + SCTP supported | TCP is selected by default |
| 2.2 | Security | Partially compliant IPsec through g/w function | |
| 2.3 | Application Compliance | Fully compliant | |
| 2.4 | Application Identification | Fully compliant | |

| Section | Section Heading | Compliance Level | Comment |
|---------|-----------------------|---------------------|--|
| 2.5 | Connection Management | Partially compliant | Credit-Control clients (or next hop peers) must establish connection to DCA. DCA does not establish outbound connections. Inbound connections are established and added to pool for use by Diameter sessions. Number of connections per realm is configurable. |
| 2.6 | Peers | N/A | A static list of permissible peers is configurable. |
| 2.7 | Realm Based Routing | Fully compliant | Responses will be returned to the same realm through the Peer from which the request was received. |
| 2.8 | Role of agents | N/A | |
| 2.9 | Path Authentication | N/A | |

Headers - Section 3

This table lists the compliances for section 3.

| Section | Section Heading | Compliance Level | Comment |
|---------|--------------------|---------------------|---|
| 3 | Headers | N/A | |
| 3.1 | Command Codes | Partially compliant | CER, CEA, DWR, DWA, DPR, DPA, ASR, ASA, RAA, RAR supported. |
| 3.2 | ABNF Specification | Fully compliant | |
| 3.3 | Naming Conventions | Fully compliant | |

Diameter AVPs - Section 4

This table lists the compliances for section 4.

| Section | Section Heading | Compliance Level | Comment |
|---------|-----------------------------|---|---|
| 4 | Diameter AVPs | N/A | |
| 4.1 | AVP Header | Fully compliant | |
| 4.2 | Basic AVP Data Formats | Fully compliant for all basic types except float32 and float64. Partially compliant for float32 and float64. Float32 and Float64 treated as OctetString. | |
| 4.3 | Derived AVP Data Formats | Fully compliant | No specific AVPs are defined by default. |
| 4.4 | Grouped AVP Values | Fully compliant | |
| 4.5 | Diameter Base Protocol AVPs | Fully compliant | Support for all AVPs needed for compliance to section 3.1 |

Diameter AVPs - Section 4

This table lists the compliances for section 5.

| Section | Section Heading | Compliance Level | Comment |
|---------|--------------------------------|---------------------|---------|
| 5 | Diameter Peers | N/A | |
| 5.1 | Peer Connections | Fully compliant | |
| 5.2 | Peer discovery | Non compliant | |
| 5.3 | Capability Exchange | Fully compliant | |
| 5.4 | Disconnecting Peer Connections | Fully compliant | |
| 5.5 | Transport Failure | Fully compliant | |
| 5.6 | Peer State Machine | Partially compliant | |

Diameter Message Processing - Section 6

This table lists the compliances for section 6.

| Section | Section Heading | Compliance Level | Comment |
|---------|------------------------------------|------------------|--|
| 6 | Diameter Message Processing | | |
| 6.1 | Request Routing | Fully compliant | Please note that proxy and forward are not supported |
| 6.2 | Diameter Answer Processing | Fully compliant | |
| 6.3 | Origin-Host AVP | Fully compliant | |
| 6.4 | Origin- Realm AVP | Fully compliant | |
| 6.5 | Destination-Host AVP | Fully compliant | |
| 6.6 | Destination- Realm AVP | Fully compliant | |
| 6.7 | Routing AVPs | Fully compliant | |
| 6.8 | Auth-Application-Id AVP | Fully compliant | Will be 4 for Credit-Control |
| 6.9 | Acct-Application-Id AVP | Fully compliant | Not used for Credit-Control |
| 6.10 | Inband-Security ID AVP | Fully compliant | |
| 6.11 | Vendor Specific Application-Id AVP | Fully compliant | No variable specific AVPs are defined today. See Section 9 for additional details. |
| 6.12 | Redirect-Host AVP | Non compliant | No explicit routing supported. |
| 6.13 | Redirect-Host-Usage AVP | Non compliant | |
| 6.14 | Redirect-Max-Cache-Time AVP | Non compliant | |

Error Handling - Section 7

This table lists the compliances for section 7.

| Section | Section Heading | Compliance Level | Comment |
|---------|-----------------|------------------|---------|
| 7 | Error Handling | | |

| Section | Section Heading | Compliance Level | Comment |
|---------|------------------------------|------------------|---------|
| 7.1 | Result-Code AVP | Fully compliant | |
| 7.2 | Error Bit | Fully compliant | |
| 7.3 | Error-Message ACP | Fully compliant | |
| 7.4 | Error-Reporting-Host AVP | Fully compliant | |
| 7.5 | Failed-AVP AVP | Fully compliant | |
| 7.6 | Experimental Result ACP | Fully compliant | |
| 7.7 | Experimental Result Code AVP | Fully compliant | |

Diameter User Sessions - Section 8

This table lists the compliances for section 8.

| Section | Section Heading | Compliance Level | Comment |
|---------|--|---------------------|--|
| 8 | Diameter User Sessions | | |
| 8.1 | Authorization Session State Machine | Non Complaint | |
| 8.2 | Accounting Session State Machine | Partially compliant | Implements only the server side of the state machine |
| 8.3 | Server-Initiated Re-Auth | Fully compliant | |
| 8.4 | Session Termination | Not applicable | Not used by DCA for server-side Credit-Control |
| 8.5 | Abort Session | Fully compliant | |
| 8.6 | Inferring Session Termination from Origin-State-Id | Non compliant | |
| 8.7 | Auth-Request-Type AVP | Non compliant | |
| 8.8 | Session-Id AVP | Fully compliant | |
| 8.9 | Authorization-Lifetime AVP | Non compliant | |
| 8.10 | Auth-Grace-Period AVP | Non compliant | |
| 8.11 | Auth-Session-State AVP | Non compliant | |
| 8.12 | Re-Auth-Request-Type AVP | Non compliant | |
| 8.13 | Session Timeout AVP | Fully compliant | |
| 8.14 | User Name AVP | Fully compliant | |
| 8.15 | Termination Cause | Fully compliant | |
| 8.16 | Origin State ID AVP | Fully compliant | |
| 8.17 | Session Binding AVP | Non compliant | |
| 8.18 | Session-Server-Failover AVP | Non compliant | |
| 8.19 | Multi-Round-Time-Out AVP | Non compliant | |
| 8.20 | Class AVP | Non compliant | |

| Section | Section Heading | Compliance Level | Comment |
|---------|---------------------|------------------|---------|
| 8.21 | Event Timestamp AVP | Fully compliant | |

Accounting - Section 9

This table lists the compliances for section 9.

| Section | Section Heading | Compliance Level | Comment |
|---------|-----------------------------------|------------------|---|
| 9 | Accounting | | |
| 9.1 | Server Directed Model | N/A - Offline. | See Note NC-1. Not applicable to DCA for offline charging. For online charging. |
| 9.2 | Protocol Messages | N/A - Offline. | See Note NC-1. Not applicable to DCA for offline charging. For online charging. No IP compression is supported at this time. Support for negotiation is however provided. |
| 9.3 | Application document requirements | N/A - Offline. | See Note NC-1. Not applicable to DCA for offline charging. For online charging. See Credit Control Application defined in RFC 4006. |
| 9.4 | Fault Resilience | N/A - Offline. | See Note NC-1. Not applicable to DCA for offline charging. For online charging. Please note that only the server side is implemented. |
| 9.5 | Accounting Records | N/A - Offline | See Note NC-1. Not applicable for Credit-Control or online charging. |
| 9.6 | Correlation of Accounting Records | N/A - Offline. | See Note NC-1. Not applicable for Credit-Control or online charging. |
| 9.7 | Accounting Command-Codes | N/A - Offline. | See Note NC-1. Not applicable for Credit-Control or online charging. |
| 9.8 | Accounting AVPs | N/A - Offline. | See Note NC-1. Not applicable for Credit-Control or online charging. |

AVP Occurrence Table - Section 10

This table lists the compliances for section 10.

| Section | Section Heading | Compliance Level | Comment |
|---------|----------------------|-------------------|--|
| 10 | AVP Occurrence Table | Partial compliant | As detailed elsewhere in this document and as needed for CER, CEA, DWR, DWA, DPR, DPA, RAR, RAA. |

IANA Considerations - Section 11

This table lists the compliances for section 11.

| Section | Section Heading | Compliance Level | Comment |
|---------|-----------------------------------|------------------|--|
| 11 | IANA Considerations | | |
| 11.1 | AVP Header | Fully compliant | |
| 11.2 | Diameter Header | Fully compliant | |
| 11.3 | AVP Values | Fully compliant | As detailed elsewhere in this document and as needed for CER, CEA, DWR, DWA, DPR, DPA, RAR, RAA. Please note that unused AVPs are ignored by the client implementation. |
| 11.4 | Diameter TCP/SCTP Port Numbers | Fully compliant | |
| 11.5 | SCTP Payload Protocol Identifiers | Fully compliant | |
| 11.6 | NAPR Service Fields | Fully compliant | This information is updated when the client package is installed |

Diameter Protocol Related Configurable Parameters - Section 12

This table lists the compliances for section 12.

| Section | Section Heading | Compliance Level | Comment |
|---------|---|-------------------|--|
| 12 | Diameter Protocol Related Configurable Parameters | Partial compliant | Statically configured peers are supported. |

Security Considerations - Section 13

This table lists the compliances for section 13.

| Section | Section Heading | Compliance Level | Comment |
|---------|-------------------------|---------------------|---|
| 13 | Security Considerations | Partially compliant | Note: Use of network provided IPsec may be used in deployments. TLS is not supported. End-to-End security is not supported. |

Compliance to RFC 4006

Introduction

This topic details the compliance of DCA with RFC 4006.

For more information about the compliance levels and notes referred to in the compliance tables, see *Compliance Levels and Considerations* .

Introduction - Section 1

This table lists the compliances for sections 4.2 and 4.3 of the "Programmer's Guide - Service Charging Based on Diameter Charging Control Node 5.

| Section | Section Heading | Compliance Level | Comment |
|---------|---|---------------------|---|
| 4.2.1 | Messages | Fully compliant | |
| 4.2.2 | Diameter Base Protocol AVPs | Partially compliant | Refer to Draft 8 compliance above. |
| 4.2.3 | Defined Application Specific AVPs | Fully compliant | Values may be set according to configuration. |
| 4.2.4 | Description of Application Specific AVPs | Fully compliant | Values may be set according to configuration. |
| 4.3.1 | Service Charging Types | Fully compliant | |
| 4.3.2 | Service Charging Methods | Fully compliant | |
| 4.3.3 | List of Service Operations with Scenarios | Fully compliant | |

Architecture Model - Section 2

This table lists the compliances for section 2.

| Section | Section Heading | Compliance Level | Comment |
|---------|--------------------|-------------------|---|
| 2 | Architecture Model | Partial compliant | Authentication and Authorization messages are not used. |

Credit-Control Messages - Section 3

This table lists the compliances for section 3.

| Section | Section Heading | Compliance Level | Comment |
|---------|-------------------------|------------------|---------|
| 3 | Credit-Control Messages | Fully compliant | |

Credit-Control Application Overview - Section 4

This table lists the compliances for section 4.

| Section | Section Heading | Compliance Level | Comment |
|---------|--|------------------|---|
| 4 | Credit-Control Application Overview | | |
| 4.1 | Service-Specific Rating Input and Interoperability | Fully compliant | Details of specific AVP implementation is given later in this document. |

Session Based Credit-Control - Section 5

This table lists the compliances for section 5.

| Section | Section Heading | Compliance Level | Comment |
|---------|---|--|--|
| 5 | Session Based Credit-Control | | |
| 5.1.1 | Basic Tariff-Time Change Support | Non compliant | |
| 5.1.2 | Credit Control for Multiple Services within a Sub Session | Partially compliant | G-S-U-Pool-Reference is not supported. See also notes on Service-Identifier AVP. |
| 5.2 | First Interrogation | Fully compliant | |
| 5.3 | Intermediate Interrogation | Fully compliant | |
| 5.4 | Final Interrogation | Fully compliant | |
| 5.5 | Server-Initiated Credit Re-Authorization | Partially Compliant. DCA supports RAR at all (sub)sessions granularity | |
| 5.6 | Graceful Service Termination | Partially compliant | Graceful service termination with "Redirect Action" is supported. |
| 5.7 | Failure Procedures | Fully compliant | Managed through BFT in control plans. |

One Time Event - Section 6

This table lists the compliances for section 6.

| Section | Section Heading | Compliance Level | Comment |
|---------|-----------------------|------------------|---------|
| 6 | One Time Event | | |
| 6.1 | Service Price Enquiry | Fully compliant | |
| 6.2 | Balance Check | Fully compliant | |
| 6.3 | Direct Debit | Fully compliant | |
| 6.4 | Refund | Fully compliant | |
| 6.5 | Failure Procedure | Fully compliant | |

Credit-Control State Machine - Section 7

This table lists the compliances for section 7.

| Section | Section Heading | Compliance Level | Comment |
|---------|------------------------------|------------------|----------------------------------|
| 7 | Credit-Control State Machine | Fully compliant | Server side only is implemented. |

Credit-Control AVPs - Section 8

This table lists the compliances for section 8.

Note In the table below, where an AVP is labeled as "Non compliant", DCA has the ability to utilize the DCA AvpMapping Configuration and ACS to possibly enable partial or limited compliance. The DCA AvpMapping Configuration combined with the features provided by ACS and the ACS Control Plan together make up a powerful toolset for service design and permit further customization beyond the default capabilities provided by DCA.

| Section | Section Heading | Compliance Level | Comment |
|---------|--------------------------------------|---------------------|--|
| 8 | Credit-Control AVPs | | |
| 8.1 | CC-Correlation-ID AVP | Fully compliant | Ignored unless mapped to an IDP extension by the AVP mappings in eserv.config . |
| 8.2 | CC-Request-Number AVP | Fully compliant | Implemented as per suggestion in RFC 4006 |
| 8.3 | CC-Request-Type AVP | Fully compliant | |
| 8.4 | CC-Session-Failover AVP | Fully compliant | Not set, which according to RFC is equivalent to AVP set to FAILOVER-NOT-SUPPORTED |
| 8.5 | CC-Sub-Session-Id AVP | Non compliant | |
| 8.6 | Check-Balance-Result AVP | Fully compliant | |
| 8.7 | Cost-Information AVP | Fully compliant | For Request-Action type PRICE_ENQUIRY, success case, this comes from the value of extension 603 in the INAP Connect. Otherwise, not set. |
| 8.8 | Unit Value | Fully compliant | |
| 8.9 | Exponent AVP | Fully compliant | |
| 8.10 | Value Digits AVP | Fully compliant | |
| 8.11 | Currency-Code AVP | Fully compliant | |
| 8.12 | Cost-Unit AVP | Fully compliant | |
| 8.13 | Credit-Control AVP | Fully compliant | |
| 8.14 | Credit-Control-Failure-Handling AVP | Fully compliant | |
| 8.15 | Direct-Debit-Failure-Handling | Fully compliant | |
| 8.16 | Multiple-Services-Credit-Control AVP | Partially compliant | G-S-U-Pool-Reference is not supported. |
| 8.17 | Granted-Service-Unit AVP | Fully compliant | Multiple unit types are fully supported, for Basic Credit Control as well as Multiple Services Credit Control. In the case of Multiple Services Credit Control, one or more unit types are permitted per Multiple-Services-Credit-Control AVP. |

| Section | Section Heading | Compliance Level | Comment |
|---------|-------------------------------|------------------|---|
| 8.18 | Requested-Service-Unit AVP | Fully compliant | Multiple unit types are fully supported, for Basic Credit Control as well as Multiple Services Credit Control. In the case of Multiple Services Credit Control, one or more unit types are permitted per Multiple-Services-Credit-Control AVP. |
| 8.19 | Used-Service-Unit AVP | Fully compliant | Multiple unit types are fully supported, for Basic Credit Control as well as Multiple Services Credit Control. In the case of Multiple Services Credit Control, one or more unit types are permitted per Multiple-Services-Credit-Control AVP. |
| 8.20 | Tariff-Time-Change AVP | Fully compliant | |
| 8.21 | CC-Time AVP | Fully compliant | |
| 8.22 | CC-Money AVP | Fully compliant | |
| 8.23 | CC-Total-Octets AVP | Fully compliant | |
| 8.24 | CC-Input-Octets ACP | Fully compliant | |
| 8.25 | CC-Output-Octets ACP | Fully compliant | |
| 8.26 | CC-Service-Specific-Units AVP | Fully compliant | |
| 8.27 | Tariff-Change-Usage AVP | Fully compliant | |
| 8.28 | Service-Identifier AVP | Fully compliant | <p>For multiple services, DCA allows for one or more service-identifier per Multiple-Services-Credit-Control (MSCC) AVP.</p> <p>Where both Service-Identifier and Rating-Group have been specified within the same MSCC AVP, the Service-Identifier will take precedence.</p> <p>If multiple Service-Identifier AVPs are provided per Multiple-Services-Credit-Control AVP, then DCA may be configured to either:</p> <ul style="list-style-type: none"> • Only charge for the first Service-Identifier encountered. <p>This is based on the following statement in RFC 4006: "Note that each instance of this AVP carries units related to one or more services or related to a single rating group."</p> <ul style="list-style-type: none"> • Or create a separate charging sub-session, for each session identifier supplied. In this case each charging sub-session will be reported back in a separate Multiple-Services-Credit-Control AVP. |

| Section | Section Heading | Compliance Level | Comment |
|---------|---------------------------------|----------------------------|---|
| 8.29 | Rating-Group AVP | Fully compliant | For multiple services, DCA allows for multiple MSCC AVPs with each MSCC containing a different RatingGroup. If more than one Multiple-Services-Credit-Control AVP are received (each containing a distinct Rating Group), then DCA will create a separate charging sub-session, for each Rating Group supplied. In this case each charging sub-session will be reported back in a separate Multiple-Services-Credit-Control AVP. |
| 8.30 | G-S-U Pool Reference AVP | Non compliant | |
| 8.31 | G-S-U Pool Identifier AVP | Non compliant | |
| 8.32 | CC-Unit-Type AVP | Fully compliant | |
| 8.33 | Validity-Time AVP | Fully compliant | |
| 8.34 | Final-Unit-Indication AVP | Fully compliant | |
| 8.35 | Final-Unit-Action AVP | Fully compliant | |
| 8.36 | Restriction-Filter-Rule AVP | Non compliant | These rules are defined using the Oracle Control Plan Editor. |
| 8.37 | Redirect-Server AVP | Fully compliant | Please note that SIP E.164 addresses must be used for voice and SMS sessions |
| 8.38 | Redirect-Address-Type AVP | Fully compliant | |
| 8.39 | Redirect-Server-Address AVP | Fully compliant | |
| 8.40 | Multiple-Services-Indicator AVP | Fully compliant | |
| 8.41 | Requested-Action AVP | Fully compliant | |
| 8.42 | Service-Context-Id AVP | Fully compliant | |
| 8.43 | Service-Parameter-Info AVP | Fully compliant | May be mapped in configuration to indicate supplementary rating information. |
| 8.44 | Service-Parameter-Type AVP | Fully compliant | May be mapped in configuration to indicate supplementary rating information. |
| 8.45 | Service-Parameter-Value AVP | Fully compliant | May be mapped in configuration to indicate supplementary rating information. |
| 8.46 | Subscription-Id AVP | Fully compliant | |
| 8.47 | Subscription-Id-Type AVP | Fully compliant | E164 and SIP URI are used today. |
| 8.48 | Subscription-Id-Data AVP | Fully compliant | |
| 8.49 | User-Equipment-Info AVP | Compliant by Configuration | See Note C-1. |
| 8.50 | User-Equipment-Info-Type AVP | Non compliant | Ignored unless mapped to an IDP extension by the AVP mappings in eserv.config . |
| 8.51 | User-Equipment-Info-Data AVP | Non compliant | |

Result Code AVP Values - Section 9

This table lists the compliances for section 9.

| Section | Section Heading | Compliance Level | Comment |
|---------|------------------------|------------------|---------|
| 9 | Result Code AVP Values | | |
| 9.1 | Transient Failures | Fully compliant | |
| 9.2 | Permanent Failures | Fully compliant | |

AVP Occurrence Table - Section 10

This table lists the compliances for section 10.

| Section | Section Heading | Compliance Level | Comment |
|---------|----------------------------------|--|---------|
| 10 | AVP Occurrence Table | | |
| 10.1 | Credit-Control AVP Table | Fully compliant | |
| 10.2 | Re-Auth-Request/Answer Table AVP | Non-compliant. These AVPs provide a greater RAR granularity than DCA currently supports. | |

RADIUS/Diameter Credit-Control Interworking Model - Section 11

This table lists the compliances for section 11.

| Section | Section Heading | Compliance Level | Comment |
|---------|---|------------------|---------|
| 11 | RADIUS/Diameter Credit-Control Interworking Model | Fully compliant | |

IANA Considerations - Section 12

This table lists the compliances for section 12.

| Section | Section Heading | Compliance Level | Comment |
|---------|---------------------|------------------|---------|
| 12 | IANA Considerations | Fully compliant | |

Credit-Control Application Related Parameters - Section 13

This table lists the compliances for section 13.

| Section | Section Heading | Compliance Level | Comment |
|---------|---|------------------|--|
| 13 | Credit-Control Application Related Parameters | Fully compliant | Tcc session supervision timer is supported timers are supported. |

Security Considerations - Section 14

This table lists the compliances for section 14.

| Section | Section Heading | Compliance Level | Comment |
|---------|---------------------------------|---------------------|---|
| 14 | Security Considerations | Partially compliant | Use of network provided IPSec may be used in deployments. |
| 14.1 | Direct Connection with Redirect | Non compliant | Statically configured peers are supported. |

Compliance to 3GPP TS 32.299 V10.4

Introduction

This topic details the compliance of DCA with 3GPP TS 32.299 V10.4.

For more information about the compliance levels and notes referred to in the compliance tables, see *Compliance Levels and Considerations* .

3GPP TS 32.299 V11.3.0 compliance

Compliance is specified for 3GPP TS 32.299 V10.4 specification with the following highlighted:

- **[V11.3]** - Where this mark appears, the specific section only applies to V11.3 of the specification.

Section 5

DCA is an on-line charging application. All references and text relating to off-line charging are not applicable and are marked as "N/A - Offline" in the tables below.

This table lists the compliances for Section 5.

| Section | Section Heading | Compliance Level | Comment |
|-----------|---|---|--|
| 5 | 3GPP charging applications requirements | Fully compliant for On-line Charging only | |
| 5.1 | Offline Charging Scenarios | N/A - Offline | Offline charging not applicable to DCA Note NC-1 |
| 5.2 | Online Charging scenarios | | |
| 5.2.1 | Basic principles | | |
| 5.2.2 | Charging Scenarios | | |
| 5.2.2.1 | Immediate Event Charging | | |
| 5.2.2.1.1 | Decentralized Unit Determination and Centralized Rating | Fully compliant | Debit Units Request will be implemented in Credit-Control-Request (CCR) and Debit Units Response in Credit-Control-Answer (CCA). |
| 5.2.2.1.2 | Centralized Unit Determination and Centralized Rating | Fully compliant | As above |

| Section | Section Heading | Compliance Level | Comment |
|-----------|---|--|--|
| 5.2.2.1.3 | Decentralized Unit Determination and Decentralized Rating | Fully compliant | As above |
| 5.2.2.1.4 | Further Options | N/A | Service delivery options are not determined by DCA. |
| 5.2.2.2 | Event charging with Reservation | | |
| 5.2.2.2.1 | Decentralized Unit Determination and Centralized Rating | Fully compliant | Debit Units Request will be implemented in Credit-Control-Request (CCR) and Debit Units Response in Credit-Control-Answer (CCA). |
| 5.2.2.2.2 | Centralized Unit Determination and Centralized Rating | Fully compliant | |
| 5.2.2.2.3 | Decentralized Unit Determination and Decentralized Rating | Fully compliant | |
| 5.2.2.3 | Session charging with Reservation | | |
| 5.2.2.3.1 | Decentralized Unit Determination and Centralized Rating | Fully compliant | Debit Units Request will be implemented in Credit-Control-Request (CCR) and Debit Units Response in Credit-Control-Answer (CCA). |
| 5.2.2.3.2 | Centralized Unit Determination and Centralized Rating | Fully compliant | |
| 5.2.2.3.3 | Decentralized Unit Determination and Decentralized Rating | Fully compliant | |
| 5.2.3 | Basic Operations | Compliant using CCR/CCR messages. See Section <i>Credit Control Request and Response AVPs</i> for details. | DCA messages for the Debit / Reserve Unit Request operation is Credit-Control-Request (CCR) and for the Debit / Reserve Unit Response operation is Credit-Control-Answer (CCA) as specified in RFC 4006. |
| 5.3 | Other requirements | | |
| 5.3.1 | Re-authorization | Compliant by Configuration | Compliant by Configuration with limitations. Mid-Session tariff changes may not be possible. See Note C-3 and Note C-1 for limitations. |
| 5.3.2 | Threshold based re-authorization triggers | Non compliant | |
| 5.3.3 | Termination action | Compliant | |
| 5.3.4 | Account Expiration | Compliant by Configuration | Compliant by Configuration with limitations. May require use of other Convergent Charging Controller products and additional set up and signaling or traffic handling requirements. Also see Note C-3 and Note C-1 for other limitations |

Section 6

This table lists the compliances for Section 6.

| Section | Section Heading | Compliance Level | Comment |
|---------|---|------------------|--|
| 6 | 3GPP Charging Applications – Protocol Aspects | - | |
| 6.1 | Basic Principles for Diameter Offline Charging | N/A - Offline | Offline charging not applicable for DCA Note NC-1 |
| 6.1.1 | Event based charging | N/A - Offline | Not Applicable, For Offline Charging |
| 6.1.2 | Session based charging | N/A - Offline | Not Applicable, For Offline Charging |
| 6.1.3 | Offline charging error cases - Diameter procedures | N/A - Offline | Not Applicable, For Offline Charging |
| 6.1.3.1 | CDF connection failure | N/A - Offline | Not Applicable, For Offline Charging |
| 6.1.3.2 | No reply from CDF | N/A - Offline | Not Applicable, For Offline Charging |
| 6.1.3.3 | Duplicate detection | N/A - Offline | Not Applicable, For Offline Charging |
| 6.1.3.4 | CDF detected failure | | |
| 6.2 | Message Contents for Offline Charging | - | |
| 6.2.1 | Summary of Offline Charging Message Formats | N/A - Offline | Not Applicable, For Offline Charging |
| 6.2.1.1 | General | N/A - Offline | Not Applicable, For Offline Charging |
| 6.2.1.2 | Structure for the Accounting Message Formats | N/A - Offline | Not Applicable, For Offline Charging |
| 6.2.2 | Accounting-Request Message | N/A - Offline | Not Applicable, For Offline Charging |
| 6.2.3 | Accounting-Answer Message | N/A - Offline | Not Applicable, For Offline Charging |
| 6.3 | Basic Principles for Diameter Online charging | - | |
| 6.3.1 | Online Specific Credit Control Application Requirements | Fully compliant | |
| 6.3.2 | Diameter Description on the Ro reference point | - | |
| 6.3.2.1 | Basic Principles | N/A | |
| 6.3.3 | Immediate Event Charging (IEC) | Fully compliant | DCA supports Event Request with DirectDebit requested action. DCA also supports the Refund Account, Check Balance, Price Enquiry requested actions (RFC 4006). |
| 6.3.4 | Event Charging with Unit Reservation (ECUR) | Fully compliant | DCA supports Initial Request followed by Terminate Request CCR/CCA messages. |
| 6.3.5 | Session Charging with Unit Reservation (SCUR) | Fully compliant | DCA supports Initial Request followed by one or more Update Requests CCR/CCA and a Terminate Request CCR/CCA. |

| Section | Section Heading | Compliance Level | Comment |
|---------|---|--|---|
| 6.3.6 | Error Cases and Scenarios | Fully compliant | DCA always sends TERMINATE Credit-Control-Failure-Handling AVP to the network element. |
| 6.3.6.1 | Duplicate Detection | Fully compliant | |
| 6.3.6.2 | Reserve Units and Debit Units Operation Failure | Fully compliant. For compliance to RFC 6733 and RFC 4006, see sections above titled: <ul style="list-style-type: none"> • <i>Compliance to RFC 6733</i> • <i>Compliance to RFC 4006</i> | |
| 6.3.7 | Support of Tariff Changes during an Active User Session | | |
| 6.3.7.1 | Support of Tariff Changes using the Tariff Switch Mechanism | Non compliant | |
| 6.3.7.2 | Support of Tariff Changes using Validity Time AVP | Partially compliant | When the validity-time is up (as indicated by the AVP), the client must come back to ask for more. At this point the rating engine (VWS) can choose to grant more quota which is charged at a different new rate. |
| 6.3.8 | Support of Re-authorization | Fully compliant | |
| 6.3.9 | Support of Failure Handling | Partially compliant | CTF aspects are not applicable. DCA is fully compliant for the OCF aspects for the TERMINATE Credit Control Failure Handling AVP; DCA always send the TERMINATE Credit Control Failure Handling AVP in the CCA. Other Credit Control Failure Handling AVP values are not used. |
| 6.3.10 | Support of Failover | Non compliant | DCA does not support mid-session failover within a realm, as described in RFC 4006, including the use of the CC-Session-Failover AVP. Failover of newly commenced Credit Control sessions to different SLCs is permitted. |
| 6.3.11 | Credit Pooling | Non compliant | |
| 6.4 | Message formats for Online Charging | - | |
| 6.4.1 | Summary of Online Charging Message Formats | - | |
| 6.4.1.1 | General | N/A | |
| 6.4.1.2 | Structure for the Credit Control Message Formats | N/A | |

| Section | Section Heading | Compliance Level | Comment |
|---------|---------------------------------------|------------------|---|
| 6.4.2 | Credit-Control-Request Message | Fully compliant | DCA fully complies to the CCR message format structure. However, not all optional AVPs may be supported. See section titled <i>Credit Control Request and Response AVPs</i> . |
| 6.4.3 | Credit-Control-Answer Message | Fully compliant | DCA fully complies to the CCA message format structure. However, not all optional AVPs may be supported. See section titled <i>Credit Control Request and Response AVPs</i> . |
| 6.4.4 | Re-Auth-Request Message | Non compliant | DCA fully complies to the RAR message format structure. However, not all optional AVPs may be supported. See section titled Re-Auth Request and Response AVPs in Chapter 4. |
| 6.4.5 | Re-Auth-Answer Message | Non compliant | DCA fully complies to the RAA message format structure. However, not all optional AVPs may be supported. See section titled Re-Auth Request and Response AVPs in Chapter 4. |
| 6.4.6 | Capabilities-Exchange-Request Message | Fully compliant | DCA fully complies with the CER message format structure. See section titled <i>Capabilities Exchange Messages</i> for further details. |
| 6.4.7 | Capabilities-Exchange-Answer Message | Fully compliant | DCA fully complies with the CEA message format structure. See section titled <i>Capabilities Exchange Messages</i> for further details. |
| 6.4.8 | Device-Watchdog-Request Message | Fully compliant | DCA fully complies with the message format structure. See section titled <i>Device Watchdog Messages</i> for further details. |
| 6.4.9 | Device-Watchdog-Answer Message | Fully compliant | DCA fully complies with the message format structure. See section titled <i>Device Watchdog Messages</i> for further details. |
| 6.4.10 | Disconnect-Peer-Request Message | Fully compliant | DCA fully complies with the message format structure. See section titled <i>Disconnect Peer Messages</i> for further details. |
| 6.4.11 | Disconnect-Peer-Answer Message | Fully compliant | DCA fully complies with the message format structure. See section titled <i>Disconnect Peer Messages</i> for further details. |
| 6.4.12 | Abort-Session-Request Message | Fully compliant | DCA fully complies with the message format structure. See section titled <i>Abort Session Request (ASR)</i> for further details. |
| 6.4.13 | Abort-Session -Answer Message | Fully compliant | DCA fully complies with the message format structure. See section titled <i>Abort Session Request (ASR)</i> for further details. |

| Section | Section Heading | Compliance Level | Comment |
|---------|--|----------------------------|---|
| 6.5 | Other procedural description of the 3GPP charging applications | - | |
| 6.5.1 | Re-authorization | - | |
| 6.5.1.1 | Idle timeout | Compliant by Configuration | Fully compliant without additional configuration, that is, if this AVP is not present, a locally configurable default value in the client shall be used. If DCA is configured with a Quota-Holding-Time value of zero, this indicates that this mechanism shall not be used. For non-zero configured times, compliant with Limitations. See Note C-3. If configured for a specific service, Quota-Holding-Time AVP can be statically set or mapped from ACS through a field set by the Control Plan. The timer is run on the client and DCA still relies on Requested/Granted/Used-Service-Units AVPs. |
| 6.5.1.2 | Change of charging conditions | Non compliant | |
| 6.5.1.3 | Reporting quota usage | Non compliant | |
| 6.5.2 | Threshold based re-authorization triggers | Fully compliant | DCA has Quota Threshold configurations which are used in MSCC. |
| 6.5.3 | Termination action | Fully compliant | DCA support "REDIRECT" Final-Units-Action AVP and redirect to a Redirect Server. |
| 6.5.4 | Quota consumption time | Non compliant | The 3GPP specification states "The server may optionally indicate...". This is optional functionality which is not implemented. |
| 6.5.5 | Service Termination | Fully compliant | The CCA Result Code is configurable. Also see section titled <i>Abort Session Request (ASR)</i> . |
| 6.5.6 | Envelope reporting | Non compliant | |
| 6.5.7 | Combinational quota | Non compliant | |
| 6.5.8 | Online control of offline charging information | Non compliant | |
| 6.6 | Bindings of the operation to protocol application | | |
| 6.6.1 | Bindings of Charging Data Transfer to Accounting | N/A - Offline | |
| 6.6.2 | Bindings of Debit / Reserve Units to Credit-Control | Fully compliant | DCA uses the DCCA shown in the table. See " <i>Credit Control Requests</i> " for details. |

Section 7

This table lists the compliances for section 7.

| Section | Section Heading | Compliance Level | Comment |
|---------|---------------------------------|-------------------------------------|---------------------|
| 7 | Summary of used Attribute Value | | |
| 7.1 | Diameter AVPs | See 7.1 - Use Of IETF Diameter AVPs | |
| 7.2 | 3GPP specific AVPs | See 7.2 - 3GPP specific AVPs | |
| 7.3 | 3GPP2 Accesses specific AVPs | Compliant by Configuration | Note C-3, Note NC-4 |

7.1 - Use Of IETF Diameter AVPs

This table lists the compliances for section 7.1

| AVP Name | AVP Code | ACR | ACA | CCR | CCA | Value Type | Compliance Level | Comment | Reference |
|------------------------------|----------|-----|-----|-----|-----|-------------|----------------------------|---|-----------|
| Accounting-Input-Octets | 363 | OC | - | - | - | Unsigned64 | N/A - Offline | Note NC-1 | 7.1.1 |
| Accounting-Output-Octets | 364 | OC | - | - | - | Unsigned64 | N/A - Offline | Note NC-1 | 7.1.3 |
| Accounting-Realtime-Required | 483 | - | - | - | - | Enumerated | N/A - Offline | Note NC-1 | |
| Accounting-Record-Number | 485 | M | M | - | - | Unsigned32 | N/A - Offline | Note NC-1 | |
| Accounting-Record-Type | 480 | M | M | - | - | Enumerated | N/A - Offline | Note NC-1 | |
| Accounting-Sub-Session-Id | 287 | - | - | - | - | Unsigned64 | N/A - Offline | Note NC-1 | |
| Acct-Application-Id | 259 | OC | OC | - | - | Unsigned32 | Compliant by Configuration | Fully compliant when used in Capabilities Negotiation. Compliant by Configuration when used as statically mapped AVP or mapped from ACS field through Control Plan. | 7.1.5 |
| Acct-Interim-Interval | 85 | OC | OC | - | - | Unsigned32 | N/A - Offline | Note NC-1 | |
| Acct-Multi-Session-Id | 50 | - | - | - | - | Unsigned32 | Partially compliant | Not sent but will be returned in CCA if received in CCR. | |
| Acct-Session-Id | 44 | - | - | - | - | OctetString | Non compliant | | |

| AVP Name | AVP Code | ACR | ACA | CCR | CCA | Value Type | Compliance Level | Comment | Reference |
|---------------------------|----------|-----|-----|-----|-----|-------------|----------------------------|---|-----------|
| Auth-Application-Id | 258 | - | - | M | M | Unsigned32 | Fully compliant | | 7.1.6 |
| AVP | * | - | - | - | - | Grouped | - | | |
| Called-Station-Id | 30 | OC | - | OC | - | UTF8String | Compliant by Configuration | Note C-1 | 7.1.7 |
| CC-Correlation-Id | 411 | - | - | OC | - | OctetString | Compliant by Configuration | Note C-1, Note NC-4 | |
| CC-Input-Octets | 412 | - | - | OC | OC | Unsigned64 | Fully compliant | Basic Credit Control and MSCC | |
| CC-Money | 413 | - | - | - | - | Grouped | Fully compliant | Basic Credit Control and MSCC | |
| CC-Output-Octets | 414 | - | - | OC | OC | Unsigned64 | Fully compliant | Basic Credit Control and MSCC | |
| CC-Request-Number | 415 | - | - | M | M | Unsigned32 | Fully compliant | | |
| CC-Request-Type | 416 | - | - | M | M | Enumerated | Fully compliant | | |
| CC-Service-Specific-Units | 417 | - | - | OC | OC | Unsigned64 | Fully compliant | Basic Credit Control and MSCC | |
| CC-Session-Failover | 418 | - | - | - | OC | Enumerated | Non compliant | | |
| CC-Sub-Session-Id | 419 | - | - | - | - | Unsigned64 | Fully compliant | Will be returned in CCA if received in CCR. | |
| CC-Time | 420 | - | - | OC | OC | Unsigned32 | Fully compliant | Basic Credit Control and MSCC | |
| CC-Total-Octets | 421 | - | - | OC | OC | Unsigned64 | Fully compliant | Basic Credit Control and MSCC | |
| CC-Unit-Type | 454 | - | - | - | M | Enumerated | Compliant by configuration | Note C-1 | |
| Check-Balance-Result | 422 | - | - | - | - | Enumerated | Fully compliant | For Check Balance | |
| Cost-Information | 423 | - | - | - | OC | Grouped | Fully compliant | For Price Enquiry | |
| Cost-Unit | 424 | - | - | - | OC | UTF8String | Fully compliant | For Price Enquiry | |

| AVP Name | AVP Code | ACR | ACA | CCR | CCA | Value Type | Compliance Level | Comment | Reference |
|----------------------------------|----------|-----|-----|-----|-----|------------|----------------------------|------------------------------------|-----------|
| Credit-Control | 426 | - | - | - | - | Enumerated | - | | |
| Credit-Control-Failure-Handling | 427 | - | - | - | OC | Enumerated | Fully compliant | Always set to TERMINATE | |
| Currency-Code | 425 | - | - | - | M | Unsigned32 | Fully compliant | Basic Credit Control and MSCC | |
| Destination-Host | 293 | - | - | OC | - | DiamIdent | Fully compliant | | |
| Destination-Realm | 283 | M | - | M | - | DiamIdent | Fully compliant | | |
| Direct-Debiting-Failure-Handling | 428 | - | - | - | OC | Enumerated | Compliant by Configuration | Note C-3 | |
| Error-Message | 281 | - | - | - | - | UTF8String | Compliant by Configuration | Note C-3 | |
| Error-Reporting-Host | 294 | - | OC | - | - | DiamIdent | N/A - Offline | Note NC-1 | |
| Event-Timestamp | 55 | OC | OC | OC | - | Time | Fully compliant | | 7.1.8 |
| Exponent | 429 | - | - | - | OC | Integer32 | Fully compliant | | |
| Failed-AVP | 279 | - | - | - | OC | Grouped | Fully compliant | | |
| Filter-Id | 11 | - | - | - | OC | UTF8String | Non compliant | | |
| Final-Unit-Action | 449 | - | - | - | OC | Enumerated | Fully compliant | Set to TERMINATE or REDIRECT | |
| Final-Unit-Indication | 430 | - | - | - | OC | Grouped | Fully compliant | Set for Final Unit Action REDIRECT | |
| Granted-Service-Unit | 431 | - | - | - | OC | Grouped | Fully compliant | Basic Credit Control and MSCC | |
| G-S-U-Pool-Identifier | 453 | - | - | - | OC | Unsigned32 | Non compliant | Note NC-5 | |
| G-S-U-Pool-Reference | 457 | - | - | - | OC | Grouped | Non compliant | Note NC-5 | |

| AVP Name | AVP Code | ACR | ACA | CCR | CCA | Value Type | Compliance Level | Comment | Reference |
|----------------------------------|----------|-----|-----|-----|-----|------------|---------------------|---|-----------|
| Multiple-Services-Credit-Control | 456 | - | - | OC | OC | Grouped | Partially compliant | Fully compliant with the supported sub-AVPs shown below: Granted-Service-Unit Requested-Service-Unit Used-Service-Unit Service-Identifier Rating-Group Validity-Time Result-Code Time-Quota-Threshold Volume-Quota-Threshold Final-Unit-Indication Tariff-Change-Usage Quota-Holding-Time | 7.1.9 |

| AVP Name | AVP Code | ACR | ACA | CCR | CCA | Value Type | Compliance Level | Comment | Reference |
|-----------------------------|----------|-----|-----|-----|-----|------------|----------------------------|--|-----------|
| | | | | | | | | Non compliant or Partially compliant by configuration if the following AVPs can be statically set or mapped from ACS fields through the Control Plan: Unit-Quota-Threshold Quota-Consumption-Time Reporting-Reason Trigger PS-Furnish-Charging-Information Refund-Information AF-Correlation-Information Envelope Envelope-Reporting Time-Quota-Mechanism Service-Specific-Info QoS-Information AVP | |
| Multiple-Services-Indicator | 455 | - | - | OM | - | Enumerated | Fully compliant | | |
| Origin-Host | 264 | M | M | M | M | DiamIdent | Fully compliant | | |
| Origin-Realm | 296 | M | M | M | M | DiamIdent | Fully compliant | | |
| Origin-State-Id | 278 | OC | OC | OC | - | Unsigned32 | Fully compliant | | |
| Proxy-Info | 284 | OC | OC | OC | OC | Grouped | Compliant by Configuration | Note C-1, Note C-3 | |

| AVP Name | AVP Code | AC R | AC A | CC R | CC A | Value Type | Compliance Level | Comment | Reference |
|-------------------------|----------|------|------|------|------|--------------|----------------------------|--|-----------|
| Proxy-Host | 280 | M | M | M | M | DiamIdent | Compliant by Configuration | Note C-1, Note C-3 | |
| Proxy-State | 33 | M | M | M | M | OctetString | Compliant by Configuration | Note C-1, Note C-3 | |
| Rating-Group | 432 | OC | - | OC | OC | Unsigned32 | Fully compliant | | 7.1.10 |
| Redirect-Address-Type | 433 | - | - | M | M | Enumerated | Fully compliant | | |
| Redirect-Host | 292 | - | - | - | OC | DiamURI | Non compliant | Note NC-5 | |
| Redirect-Host-Usage | 261 | - | - | - | OC | Enumerated | Non compliant | Note NC-5 | |
| Redirect-Max-Cache-Time | 262 | - | - | - | OC | Unsigned32 | Non compliant | Note NC-5 | |
| Redirect-Server | 434 | - | - | - | OC | Grouped | Fully compliant | | |
| Redirect-Server-Address | 435 | - | - | - | M | UTF8String | Fully compliant | | |
| Requested-Action | 436 | - | - | OC | - | Enumerated | Fully compliant | | |
| Requested-Service-Unit | 437 | - | - | OC | - | Grouped | Fully compliant | Basic Credit Control and MSCC | |
| Restriction-Filter-Rule | 438 | - | - | - | OC | IPFilterRule | Non compliant | | |
| Result-Code | 268 | - | M | - | M | Unsigned32 | Fully compliant | Basic Credit Control and MSCC Additional mapping flexibility available through DCA AvpMapping Configuration | 7.1.11 |
| Route-Record | 282 | OC | - | OC | OC | DiamIdent | Compliant by Configuration | Note C-1, Note C-3 ACS Control Plan Modify Node | |
| Service-Context-Id | 461 | OM | - | M | - | UTF8String | Fully compliant | | 7.1.12 |
| Service-Identifier | 439 | OC | - | OC | OC | Unsigned32 | Fully compliant | Basic Credit Control and MSCC | 7.1.13 |

| AVP Name | AVP Code | AC R | AC A | CC R | CC A | Value Type | Compliance Level | Comment | Reference |
|---------------------------|----------|------|------|------|------|-------------|--|--|-----------|
| Service-Parameter-Info | 440 | - | - | - | - | Grouped | Compliant by configuration and dependent on sub-AVPs | Note C-1 See sub-AVPs: Service-Parameter-Type Service-Parameter-Value | |
| Service-Parameter-Type | 441 | - | - | - | - | Unsigned32 | Compliant by Configuration | Note C-1 | |
| Service-Parameter-Value | 442 | - | - | - | - | OctetString | Compliant by Configuration | Note C-1 | |
| Session-Id | 263 | M | M | M | M | UTF8String | Fully compliant | | |
| Subscription-Id | 443 | OC | - | OM | - | Grouped | Fully compliant | | |
| Subscription-Id-Data | 444 | M | - | M | - | UTF8String | Fully compliant | | |
| Subscription-Id-Type | 450 | M | - | M | - | Enumerated | Fully compliant | | |
| Tariff-Change-Usage | 452 | - | - | OC | - | Enumerated | Fully compliant | | |
| Tariff-Time-Change | 451 | - | - | - | OC | Time | Fully compliant | | |
| Termination-Cause | 295 | OC | - | - | - | Enumerated | N/A - Offline | Note NC-1 | |
| Unit-Value | 445 | - | - | - | M | Grouped | Fully compliant | | |
| Used-Service-Unit | 446 | - | - | OC | - | Grouped | Fully compliant | Basic Credit Control and MSCC | 7.1.14 |
| User-Equipment-Info | 458 | OC | - | OC | - | Grouped | Compliant by configuration | Note C-1 | |
| User-Equipment-Info-Type | 459 | OM | - | M | - | Enumerated | Compliant by Configuration | Note C-1 | |
| User-Equipment-Info-Value | 460 | OM | - | M | - | OctetString | Compliant by Configuration | Note C-1 | |

| AVP Name | AVP Code | ACR | ACA | CCR | CCA | Value Type | Compliance Level | Comment | Reference |
|--------------------------------|----------|-----|-----|-----|-----|------------|----------------------------|--|-----------|
| User-Name | 1 | OC | OC | OC | - | UTF8String | Compliant by Configuration | Note C-1 | 7.1.15 |
| Value-Digits | 447 | - | - | - | M | Integer64 | Fully compliant | | |
| Validity-Time | 448 | - | - | - | OC | Unsigned32 | Fully compliant | | |
| Vendor-Id | 266 | - | - | - | - | Unsigned32 | Fully compliant | | 7.1.16 |
| Vendor-Specific-Application-Id | 260 | - | - | - | - | Grouped | Compliant by Configuration | Inbuilt support if configured. See sub-AVPs: Vendor-Id, Auth-Application-Id, Acct-Application-Id | |

7.2 - 3GPP specific AVPs

DCA is an on-line charging application; off-line charging is not applicable.

The table below specifies the compliance level for on-line charging only.

For example:

- Where an AVP is marked as both off-line and on-line, the compliance level stated is for on-line charging only.
- Where an AVP is marked as only for off-line use, the AVP is marked as Non-compliant.

This table lists the compliances for section 7.2.

| AVP Name | AVP Code | ACR | ACA | CCR | CCA | Value Type | Compliance Level | Comment | Reference |
|-------------------------------|----------|-----|-----|-----|-----|-------------|----------------------------|---------------------|---------------------------|
| 3GPP-Charging-Characteristics | 13 | X | - | X | - | refer [207] | Compliant by configuration | Note NC-5 | 3GPP TS 29.061 (PLMN PDN) |
| 3GPP-Charging-Id | 2 | X | - | X | - | refer [207] | Compliant by configuration | Note C-1, Note NC-4 | 3GPP TS 29.061 (PLMN PDN) |
| 3GPP-GGSN-MCC-MNC | 9 | X | - | X | - | refer [207] | Compliant by configuration | Note G-2, Note C-2 | 3GPP TS 29.061 (PLMN PDN) |

| AVP Name | AVP Code | ACR | ACA | CCR | CCA | Value Type | Compliance Level | Comment | Reference |
|-----------------------------|----------|-----|-----|-----|-----|-------------|----------------------------|---------------------|--|
| 3GPP-IMSI | 1 | - | - | X | - | refer [207] | Compliant by configuration | Note G-2, Note C-2 | 3GPP TS 29.061 (PLMN PDN) 3GPP TS 32.271 (LCS) |
| 3GPP-IMSI-MCC-MNC | 8 | X | - | X | - | refer [207] | Compliant by configuration | Note G-2, Note C-2 | 3GPP TS 29.061 (PLMN PDN) |
| 3GPP-MS-TimeZone | 23 | X | - | X | - | refer [207] | Compliant by configuration | Note C-1, Note G-2 | 3GPP TS 29.061 (PLMN PDN) |
| 3GPP-NSAPI | 10 | X | - | X | - | refer [207] | Compliant by configuration | Note C-1, Note G-2 | 3GPP TS 29.061 (PLMN PDN) |
| 3GPP-PDP-Type | 3 | X | - | X | - | refer [207] | Compliant by configuration | Note C-1, Note G-2 | 3GPP TS 29.061 (PLMN PDN) |
| 3GPP-RAT-Type | 21 | X | - | X | - | refer [207] | Compliant by configuration | Note C-1, Note G-2 | 3GPP TS 29.061 (PLMN PDN) 3GPP TS 32.251 (PS) - Sec 6.3.2.1 3GPP TS 32.270 (MMS) |
| 3GPP-Selection-Mode | 12 | X | - | X | - | refer [207] | Compliant by configuration | Note C-1, Note G-2 | 3GPP TS 29.061 (PLMN PDN) |
| 3GPP-Session-Stop-Indicator | 11 | - | - | X | - | refer [207] | Compliant by configuration | Note C-1 | 3GPP TS 29.061 (PLMN PDN) |
| 3GPP-SGSN-MCC-MNC | 18 | X | - | X | - | refer [207] | Compliant by configuration | Note G-2,- Note C-2 | 3GPP TS 29.061 (PLMN PDN) |
| 3GPP-User-Location-Info | 22 | X | - | X | - | refer [207] | Compliant by configuration | Note G-2, Note C-1 | 3GPP TS 29.061 (PLMN PDN) 3GPP TS 32.251 (PS) - Sec 6.3.2.1 3GPP TS 32.270 (MMS) |

| AVP Name | AVP Code | ACR | ACA | CCR | CCA | Value Type | Compliance Level | Comment | Reference |
|--|----------|-----|-----|-----|-----|-------------|--|---|-------------------------------|
| Access-Network-Charging-Identifier-Value | 503 | X | - | X | - | refer [214] | N/A - Non-Ro | Note NC-2 | 3GPP TS 29.214 (Policy Rx) |
| Access-Network-Information | 1263 | X | - | X | - | OctetString | Compliant by configuration | Note C-1 | 7.2.1 3GPP TS 32.260 (IMS) |
| Account-Expiration | 2309 | - | - | - | X | Time | Compliant by configuration | Note C-1 | 7.2.2 3GPP TS 32.260 (IMS) |
| Accumulated-Cost | 2052 | - | - | - | X | Grouped | Compliant by configuration and dependent on sub-AVPs and external system | Note NC-3 | 7.2.3 |
| Adaptations | 1217 | - | - | X | - | Enumerated | Compliant by configuration | Note C-1 | 7.2.4 3GPP TS 32.270 (MMS) |
| Additional-Content-Information | 1207 | - | - | X | - | Grouped | Compliant by configuration and dependent on sub-AVPs | Note C-1 See sub-AVPs: Type-Number Additional-Type-Information Content-Size | 7.2.5 |
| Additional-Type-Information | 1205 | - | - | X | - | UTF8 String | Compliant by configuration | Note C-1 | 7.2.6 |
| Address-Data | 897 | - | - | X | - | UTF8 String | Compliant by configuration | Note C-2 | 7.2.7 |
| Address-Domain | 898 | - | - | X | - | Grouped | Compliant by configuration and dependent on sub-AVPs | Note C-1 See sub-AVPs: Domain-Name 3GPP-IMSI-MCC-MNC | 7.2.8 |
| Addressee-Type | 1208 | - | - | X | - | Enumerated | Compliant by configuration | Note C-1 | 7.2.10 |

| AVP Name | AVP Code | ACR | ACA | CCR | CCA | Value Type | Compliance Level | Comment | Reference |
|---------------------------------|----------|-----|-----|-----|-----|-------------|--|--|--|
| Address-Type | 899 | - | - | X | - | Enumerated | Compliant by configuration | Note C-1 | 7.2.9 |
| AF-Charging-Identifier | 505 | - | - | X | - | refer [214] | N/A - Non-Ro | Note NC-2 | 3GPP TS 29.214 (Policy Rx) |
| AF-Correlation-Information | 1276 | X | - | X | - | Grouped | N/A - Non-Ro | Note NC-2 Rx/Gx Interface See sub-AVPs: AF-Charging-Identifier Flows | 7.2.11 3GPP TS 29.214 (Policy-Rx) and TS 29.212 (Policy-Gx) |
| Allocation-Retention-Priority | 1034 | X | - | X | - | refer [215] | N/A - Non-Ro | Note NC-2 | 3GPP TS 29.212 (Policy-Gx) |
| Alternate-Charged-Party-Address | 1280 | X | - | - | - | UTF8string | N/A - Offline | Note NC-1 | 7.2.12 3GPP TS 32.260 (IMS) |
| AoC-Cost-Information | 2053 | - | - | X | X | Grouped | Compliant by configuration and dependent on external system | Note NC-3 | 7.2.13 3GPP TS 32.280 (AoC) |
| AoC-Format | 2310 | - | - | X | - | Enumerated | Compliant by configuration and dependent on external system | Note NC-3 | 7.2.14 3GPP TS 32.280 (AoC) |
| AoC-Information | 2054 | - | - | - | X | Grouped | Compliant by configuration and dependent on sub-AVPs and external system | Note NC-3 | 7.2.15 3GPP TS 32.280 (AoC) |
| AoC-Request-Type | 2055 | - | - | X | - | Enumerated | Compliant by configuration and dependent on external system | Note NC-3 | 7.2.16 3GPP TS 32.280 (AoC) |

| AVP Name | AVP Code | ACR | ACA | CCR | CCA | Value Type | Compliance Level | Comment | Reference |
|---|----------|-----|-----|-----|-----|-------------|--|------------------------|--------------------------------|
| AoC-Service | 2311 | - | - | X | - | Grouped | Compliant by configuration and dependent on sub-AVPs and external system | Note NC-3 | 7.2.17 3GPP TS 32.280 (AoC) |
| AoC-Service-Obligatory-Type | 2312 | - | - | X | - | Enumerated | Compliant by configuration and dependent on external system | Note NC-3 | 7.2.18 3GPP TS 32.280 (AoC) |
| AoC-Service-Type | 2313 | - | - | X | - | Enumerated | Compliant by configuration and dependent on external system | Note NC-3 | 7.2.19 3GPP TS 32.280 (AoC) |
| AoC-Subscription-Information | 2314 | - | - | X | - | Grouped | Compliant by configuration and dependent on external system | Note NC-3 | 7.2.20 3GPP TS 32.280 (AoC) |
| Application-Provided-Called-Party-Address | 837 | X | - | X | - | UTF8 String | Compliant by configuration | Note C-1 | 7.2.22 |
| Application-Server | 836 | X | - | X | - | UTF8 String | Compliant by configuration | Note C-1 | 7.2.23 |
| Application-Server-ID | 2101 | X | - | X | - | refer[23] | Compliant by configuration | Note C-1, Note NC-4 | |
| Application-Service-Provider-Identity | 532 | X | - | - | - | refer[214] | N/A - Offline | Note NC-1 Note NC-2 | 3GPP TS 29.214 (Policy Rx) |

| AVP Name | AVP Code | ACR | ACA | CCR | CCA | Value Type | Compliance Level | Comment | Reference |
|--------------------------------|----------|-----|-----|-----|-----|-------------|--|--|--|
| Application-Server-Information | 850 | X | - | X | - | Grouped | Compliant by configuration and Dependent on sub-AVPs | Note C-1 See sub-AVPs: Application-Server Application-Provided-Called-Party-Address | 7.2.24 3GPP TS 32.260 (IMS) |
| Application-Service-Type | 2102 | X | - | X | - | refer[23] | Compliant by configuration | Note C-1 | |
| Application-Session-ID | 2103 | X | - | X | - | refer[23] | Compliant by configuration | Note C-1, Note NC-4 | |
| Applic-ID | 1218 | - | - | X | - | UTF8 String | Compliant by configuration | Note C-1, Note NC-4 | 7.2.21 3GPP TS 32.270 (MMS) |
| Associated-Party-Address | 2035 | X | - | X | - | UTF8 String | Compliant by configuration | Note C-2 | 7.2.25 |
| Associated-URI | 856 | X | - | X | - | UTF8 String | Compliant by configuration | Note C-2 | 7.2.26 3GPP TS 29.061 3GPP TS 32.260 (IMS) |
| Authorised-QoS | 849 | X | - | - | - | UTF8 String | N/A - Offline | Note NC-1 | 7.2.27 |
| Aux-Applic-Info | 1219 | - | - | X | - | UTF8 String | Compliant by configuration | Note C-1, Note NC-4 | 7.2.28 3GPP TS 32.270 (MMS) |
| Base-Time-Interval | 1265 | - | - | - | X | Unsigned32 | Compliant by configuration | Note C-3 | 7.2.29 |
| Bearer-Service | 854 | X | - | - | - | OctetString | N/A - Offline | Note NC-1 | 7.2.30 3GPP TS 32.260 (IMS) |
| Called-Asserted-Identity | 1250 | X | - | X | - | UTF8 String | Compliant by configuration | Note C-2 | 7.2.31 |

| AVP Name | AVP Code | ACR | ACA | CCR | CCA | Value Type | Compliance Level | Comment | Reference |
|---|----------|-----|-----|-----|-----|-------------|----------------------------|-----------------------------------|---|
| Called-Party-Address | 832 | X | - | X | - | UTF8 String | Compliant by configuration | Note C-2 | 7.2.32 3GPP TS 32.260 (IMS) 3GPP TS 32.272: (PoC) |
| Calling-Party-Address | 831 | X | - | X | - | UTF8 String | Compliant by configuration | Note C-2 | 7.2.33 3GPP TS 32.260 (IMS) |
| Carrier-Select-Routing-Information | 2023 | X | - | X | - | UTF8 String | Compliant by configuration | Note C-1 | 7.2.34 3GPP TS 32.260 (IMS) / SIP |
| Cause-Code | 861 | X | - | X | - | Integer32 | Compliant by configuration | Note C-1 | 7.2.35 3GPP TS 32.260 (IMS) 3GPP TS 32.272: (PoC) |
| CG-Address | 846 | X | - | X | - | Address | Compliant by configuration | Note C-2 | 7.2.36 3GPP TS 32.251 (PS) - Sec 6.3.2.1 |
| Change-Condition | 2037 | X | - | - | - | Integer32 | N/A - Offline | Note NC-1 | 7.2.37 3GPP TS 32.251 (PS) - Sec 6.3.2.1 |
| Change-Time | 2038 | X | - | - | - | Time | N/A - Offline | Note NC-1 | 7.2.38 |
| Charged-Party | 857 | X | - | - | - | UTF8 String | N/A - Offline | Note NC-1 | 7.2.39 |
| Charging-Characteristics-Selection-Mode | 2066 | X | - | X | - | Enumerated | Compliant by configuration | Note C-1 | 7.2.39A |
| Charging-Rule-Base-Name | 1004 | X | - | X | - | refer [215] | N/A - Non-Ro | Note NC-2 (S9 or Gx/Sd Interface) | 3GPP TS 32.251 (PS) - Sec 6.3.2.1 3GPP TS 29.212 (Policy-Gx) |
| Class-Identifier | 1214 | - | - | X | - | Enumerated | Compliant by configuration | Note C-1 | 7.2.40 |
| Client-Address | 2018 | - | - | X | - | Address | Compliant by configuration | Note C-2 | 7.2.41 |

| AVP Name | AVP Code | ACR | ACA | CCR | CCA | Value Type | Compliance Level | Comment | Reference |
|------------------------------|----------|-----|-----|-----|-----|-------------|----------------------------|---------------------|---|
| CN-IP-Multicast-Distribution | 921 | X | - | - | - | refer [207] | N/A - Offline | Note NC-1 | |
| Content-Class | 1220 | - | - | X | - | Enumerated | Compliant by configuration | Note C-1 | 7.2.42 3GPP TS 32.270 (MMS) |
| Content-Disposition | 828 | X | - | X | - | UTF8 String | Compliant by configuration | Note C-1 | 7.2.43 RFC 3261 3GPP TS 32.272: (PoC) |
| Content-ID | 2116 | X | - | X | - | refer[223] | Compliant by configuration | Note C-1, Note NC-4 | |
| Content-Provider-ID | 2117 | X | - | X | - | refer[223] | Compliant by configuration | Note C-1, Note NC-4 | |
| Content-Length | 827 | X | - | X | - | Unsigned32 | Compliant by configuration | Note C-1 | 7.2.44 RFC 3261 |
| Content-Size | 1206 | - | - | X | - | Unsigned32 | Compliant by configuration | Note C-1 | 7.2.45 RFC 3261 |
| CSG-Access-Mode | 2317 | X | - | X | - | Enumerated | Compliant by configuration | Note C-1 | 7.2.46A |
| CSG-Id | 1437 | X | - | X | - | refer[219] | Compliant by configuration | Note C-1 | |
| CSG-Membership-Indication | 2318 | X | - | X | - | Enumerated | Compliant by configuration | Note C-1 | 7.2.46B |
| Content-Type | 826 | X | - | X | - | UTF8 String | Compliant by configuration | Note C-1 | 7.2.46 RFC 3261 3GPP TS 32.272: (PoC) |

| AVP Name | AVP Code | ACR | ACA | CCR | CCA | Value Type | Compliance Level | Comment | Reference |
|------------------------------|----------|-----|-----|-----|-----|-------------|--|---|---|
| Current-Tariff | 2056 | - | - | X | X | Grouped | Compliant by configuration and dependent on sub-AVPs | Note C-1, Note C-3, Note NC-5, Note NC-7 See: Currency-Code Scale-Factor Rate-Element | 7.2.47 |
| CUG-Information | 2304 | X | - | X | - | OctetString | Compliant by configuration | Note C-1 | 7.2.48 |
| Data-Coding-Scheme | 2001 | - | - | X | - | Integer32 | Compliant by configuration | Note C-1 | 7.2.49 |
| DCD-Information | 2115 | X | - | X | - | refer[23] | Compliant by configuration and dependent on sub-AVPs | Note C-1 See sub-AVPs: Content-ID Content-provider-ID | 7.2.50 OMA-DDS-Charging |
| Deferred-Location-Event-Type | 1230 | - | - | X | - | UTF8 String | Compliant by configuration | Note C-1 | 7.2.51 3GPP TS 32.271 (LCS) |
| Delivery-Report-Requested | 1216 | - | - | X | - | Enumerated | Compliant by configuration | Note C-1 | 7.2.52 3GPP TS 32.270 (MMS) |
| Delivery-Status | 2104 | X | - | X | - | refer[23] | Compliant by configuration | Note C-1 | OMA-DDS-Charging |
| Destination-Interface | 2002 | - | - | X | - | Grouped | Compliant by configuration and dependent on sub-AVPs | Note C-1 See sub-AVPs: Interface-Id Interface-Text Interface-Port Interface-Type | 7.2.53 |
| Diagnostics | 2039 | X | - | X | - | Integer32 | Compliant by configuration | Note C-1 | 7.2.54 3GPP TS 32.251 (PS) - Sec 6.3.2.1 |

| AVP Name | AVP Code | ACR | ACA | CCR | CCA | Value Type | Compliance Level | Comment | Reference |
|--------------------------------|----------|-----|-----|-----|-----|-------------|----------------------------|----------------|---|
| Domain-Name | 1200 | - | - | X | - | UTF8 String | Compliant by configuration | Note C-1 | 7.2.55 |
| DRM-Content | 1221 | - | - | X | - | Enumerated | Compliant by configuration | Note C-1 | 7.2.56 3GPP TS 32.270 (MMS) |
| Dynamic-Address-Flag | 2051 | X | - | X | - | Enumerated | Compliant by configuration | Note C-1 | 7.2.57 3GPP TS 32.251 (PS) - Sec 6.3.2.1 |
| Dynamic-Address-Flag-Extension | 2068 | X | - | X | - | Enumerated | Compliant by configuration | Note C-1 | 3GPP TS 32.251 (PS) - Sec 6.3.2.1 |
| Early-Media-Description | 1272 | X | - | - | - | Grouped | N/A - Offline | Note NC-1 | 7.2.58 3GPP TS 32.260 (IMS) |
| Envelope | 1266 | - | - | X | - | Grouped | Compliant by configuration | Note C-4 | 7.2.59 |
| Envelope-End-Time | 1267 | - | - | X | - | Time | Compliant by configuration | Note C-4 | 7.2.60 |
| Envelope-Reporting | 1268 | - | - | - | X | Enumerated | Compliant by configuration | Note C-4 | 7.2.61 |
| Envelope-Start-Time | 1269 | - | - | X | - | Time | Compliant by configuration | Note C-4 | 7.2.62 |
| Event | 825 | X | - | X | - | UTF8 String | Compliant by configuration | Note C-1 | 7.2.63 3GPP TS 32.260 (IMS) |
| Event-Charging-TimeStamp | 1258 | - | - | X | - | Time | Compliant by configuration | Note C-1 | 7.2.64 |
| Event-Type | 823 | X | - | X | - | Grouped | Compliant by configuration | Note C-1 (SIP) | 7.2.65 3GPP TS 32.260 (IMS) |
| Expires | 888 | X | - | X | - | Unsigned32 | Compliant by configuration | Note C-1 (SIP) | 7.2.66 3GPP TS 32.260 (IMS) |

| AVP Name | AVP Code | ACR | ACA | CCR | CCA | Value Type | Compliance Level | Comment | Reference |
|--------------------------------------|----------|-----|-----|-----|-----|-------------|--|---|--|
| File-Repair-Supported | 1224 | X | - | X | - | Enumerated | Compliant by configuration | Note C-1 | 7.2.67 3GPP TS 32.273 (MBMS) |
| Flows | 510 | - | - | X | - | refer [214] | N/A - Non-Ro | Note NC-2 | 3GPP TS 29.214 (Policy Rx) |
| GGSN-Address | 847 | X | - | X | - | Address | Compliant by configuration | Note C-2 | 7.2.68 3GPP TS 32.273 (MBMS) 3GPP TS 32.272: (PoC) |
| Guaranteed-Bitrate-UL | 1026 | X | - | X | - | refer[215] | N/A - Non-Ro | Note NC-2 | 3GPP TS 29.212 (Policy-Gx) |
| IM-Information | 2110 | X | - | X | - | refer[223] | Compliant by configuration and dependent on sub-AVPs | Note C-1 See sub-AVPs: Total-Number-Of-Messages-Sent Total-Number-Of-Messages-Exploded Number-Of-Messages-Successfully-Sent Number-Of-Messages-Successfully-Exploded | 7.2.69 OMA-DDS-Charging |
| IMS-Application-Reference-Identifier | 2601 | X | - | - | - | UTF8 String | N/A - Offline | Note NC-1 | 7.2.74A 3GPP TS 32.260 (IMS) |
| IMS-Charging-Identifier | 841 | X | - | X | - | UTF8 String | Compliant by configuration | Note C-1 | 7.2.75 3GPP TS 32.260 (IMS) |
| IMS-Communication-Service-Identifier | 1281 | X | - | X | - | UTF8 String | Compliant by configuration | Note C-1 | 7.2.76 3GPP TS 32.260 (IMS) |
| IMS-Information | 876 | X | - | X | - | Grouped | Compliant by configuration | Note C-1 | 7.2.77 3GPP TS 32.260 (IMS) 3GPP TS 32.272: (PoC) |

| AVP Name | AVP Code | ACR | ACA | CCR | CCA | Value Type | Compliance Level | Comment | Reference |
|---------------------------------|----------|-----|-----|-----|-----|-------------|---|--|---|
| IMSI-Unauthenticated-Flag | 2308 | X | - | X | - | Enumerated | Compliant by configuration | Note C-1 | 7.2.78 3GPP TS 32.251 (PS) - Sec 6.3.2.1 |
| Incoming-Trunk-Group-Id | 852 | X | - | - | - | UTF8 String | N/A - Offline | Note NC-1 | 7.2.79 |
| Incremental-Cost | 2062 | - | - | X | X | Grouped | Compliant by configuration and dependent on external system | Note NC-3 | 7.2.70 3GPP TS 32.280 (AoC) |
| Initial-IMS-Charging-Identifier | 2321 | X | - | X | - | UTF8 String | Compliant by configuration | Note C-1, Note NC-4 | 7.2.79A 3GPP TS 32.260: IMS |
| Interface-Id | 2003 | - | - | X | - | UTF8 String | Compliant by configuration | Note C-1, Note NC-4 | 7.2.71 |
| Interface-Port | 2004 | - | - | X | - | UTF8 String | Compliant by configuration | Note C-1, Note NC-4 | 7.2.72 |
| Interface-Text | 2005 | - | - | X | - | UTF8 String | Compliant by configuration | Note C-1, Note NC-4 | 7.2.73 |
| Interface-Type | 2006 | - | - | X | - | Enumerated | Compliant by configuration | Note C-1, Note NC-4 | 7.2.74 |
| Inter-Operator-Identifier | 838 | X | - | X | - | Grouped | Compliant by configuration and dependent on sub-AVPs | Note C-1 See: Originating-IOI Terminating-IOI | 7.2.80 3GPP TS 32.260 (IMS) IETF RFC 3455 (SIP) |
| IP-Realm-Default-Indication | 2603 | X | - | - | - | Enumerated | N/A - Offline | Note NC-1 | 7.2.80A |
| LCS-Client-Dialed-By-MS | 1233 | - | - | X | - | UTF8 String | Compliant by configuration | Note C-1 | 7.2.82 3GPP TS 32.271 (LCS) |
| LCS-Client-External-ID | 1234 | - | - | X | - | UTF8 String | Compliant by configuration | Note C-1, Note NC-4 | 7.2.83 3GPP TS 32.271 (LCS) |

| AVP Name | AVP Code | ACR | ACA | CCR | CCA | Value Type | Compliance Level | Comment | Reference |
|------------------------|----------|-----|-----|-----|-----|-------------|--|--|--------------------------------|
| LCS-Client-Id | 1232 | - | - | X | - | Grouped | Compliant by configuration and dependent on sub-AVPs | Note C-1, Note NC-4 See sub-AVPs: LCS-Client-Type LCS-Client-External-ID LCS-Client-Dialed-By-MS LCS-Client-Name LCS-APN LCS-Requestor-ID | 7.2.84 3GPP TS 32.271 (LCS) |
| LCS-APN | 1231 | - | - | X | - | UTF8 String | Compliant by configuration | Note C-1 | 7.2.81 3GPP TS 32.271 (LCS) |
| LCS-Client-Name | 1235 | - | - | X | - | Grouped | Compliant by configuration and dependent on sub-AVPs | Note C-1 See sub-AVPs: LCS-Data-Coding-Scheme LCS-Name-String LCS-Format-Indicator | 7.2.85 3GPP TS 32.271 (LCS) |
| LCS-Client-Type | 1241 | - | - | X | - | Enumerated | Compliant by configuration | Note C-1 | 7.2.86 3GPP TS 32.271 (LCS) |
| LCS-Data-Coding-Scheme | 1236 | - | - | X | - | UTF8 String | Compliant by configuration | Note C-1 | 7.2.87 3GPP TS 32.271 (LCS) |
| LCS-Format-Indicator | 1237 | - | - | X | - | Enumerated | Compliant by configuration | Note C-1 | 7.2.88 3GPP TS 32.271 (LCS) |

| AVP Name | AVP Code | ACR | ACA | CCR | CCA | Value Type | Compliance Level | Comment | Reference |
|------------------------------|----------|-----|-----|-----|-----|-------------|----------------------------|---|--------------------------------|
| LCS-Information | 878 | - | - | X | - | Grouped | Compliant by configuration | Note 1 See sub-AVPs: LCS-Client-ID Location-Type Location-Estimate Positioning-Data 3GPP-IMSI MSISDN | 7.2.89 3GPP TS 32.271 (LCS) |
| LCS-Name-String | 1238 | - | - | X | - | UTF8 String | Compliant by configuration | Note C-1 | 7.2.90 3GPP TS 32.271 (LCS) |
| LCS-Requestor-Id | 1239 | - | - | X | - | Grouped | Compliant by configuration | Note C-1, Note NC-4 See sub-AVPs: LCS-Data-Coding-Scheme LCS-Requestor-ID-String (MSISDN or Logical Name) | 7.2.91 3GPP TS 32.271 (LCS) |
| LCS-Requestor-Id-String | 1240 | - | - | X | - | UTF8 String | Compliant by configuration | Note C-1 | 7.2.92 3GPP TS 32.271 (LCS) |
| Local-GW-Inserted-Indication | 2604 | X | - | - | - | Enumerated | N/A - Offline | Note NC-1 | 7.2.92A (SDP) |
| Local-Sequence-Number | 2063 | X | - | - | - | Unsigned32 | N/A - Offline | Note NC-1 | 7.2.93 |
| Location-Estimate | 1242 | - | - | X | - | OctetString | Compliant by configuration | Note C-1 and using Raw Data (Note G-2) | 7.2.94 3GPP TS 32.271 (LCS) |
| Location-Estimate-Type | 1243 | - | - | X | - | Enumerated | Compliant by configuration | Note C-1 | 7.2.95 3GPP TS 32.271 (LCS) |

| AVP Name | AVP Code | ACR | ACA | CCR | CCA | Value Type | Compliance Level | Comment | Reference |
|----------------------------|----------|-----|-----|-----|-----|-------------|----------------------------|---|--|
| Location-Type | 1244 | - | - | X | - | Grouped | Compliant by configuration | Note C-1 See sub-AVPs: Location- Estimate-Type Deferred- Location- Event-Type | 7.2.96 3GPP TS 32.271 (LCS) |
| Low-Balance-Indication | 2020 | - | - | - | X | Enumerated | Compliant by configuration | Note C-3 | 7.2.97 |
| Low-Priority-Indicator | 2602 | X | - | - | - | Enumerated | N/A - Offline | Note NC-1 | 7.2.97A 3GPP TS 32.251 (PS) - Sec 6.3.2.1 |
| Mandatory-Capability | 604 | X | - | - | - | refer [204] | N/A - Offline | Note NC-1 | |
| Max-Requested-Bandwidth-DL | 515 | X | - | X | - | refer [214] | N/A - Non-Ro | Note NC-2 | 3GPP TS 29.214 (Policy Rx) |
| Max-Requested-Bandwidth-UL | 516 | X | - | X | - | refer [214] | N/A - Non-Ro | Note NC-2 | 3GPP TS 29.214 (Policy Rx) |
| MBMS-2G-3G-Indicator | 907 | X | - | X | - | refer [207] | Compliant by configuration | Note C-1 | 3GPP TS 29.061 (PLMN«PDN) 3GPP TS 32.273 (MBMS) |
| MBMS GW-Address | 2307 | X | - | - | - | Address | N/A - Offline | Note NC-1 | 7.2.98 |

| AVP Name | AVP Code | ACR | ACA | CCR | CCA | Value Type | Compliance Level | Comment | Reference |
|------------------------|----------|-----|-----|-----|-----|-------------------------|--|--|--|
| MBMS-Information | 880 | X | - | X | - | Grouped | Compliant by configuration and dependent on sub-AVPs | Note C-1 See sub-AVPs: TMGI MBMS-Service-Type MBMS-User-Service-Type File-Repair-Supported Required-MBMS-Bearer-Capabilities MBMS-2G-3G-Indicator RAI MBMS-Service-Area MBMS-Session-Identity CN-IP-Multicast-Distribution MBMS GW-Address | 7.2.99 3GPP TS 32.273 (MBMS) |
| MBMS-Service-Area | 903 | X | - | X | - | refer [207] OctetString | Compliant by configuration | Note C-1, Note NC-6 | 3GPP TS 29.061 (PLMN«PDN) 3GPP TS 32.273 (MBMS) |
| MBMS-Service-Type | 906 | X | - | X | - | refer [207] Enumerated | Compliant by configuration | Note C-1 | 3GPP TS 29.061 (PLMN«PDN) 3GPP TS 32.273 (MBMS) |
| MBMS-Session-Identity | 908 | X | - | X | - | refer [207] OctetString | Compliant by configuration | Note C-1, Note NC-6 | 3GPP TS 29.061 (PLMN«PDN) 3GPP TS 32.273 (MBMS) |
| MBMS-User-Service-Type | 1225 | X | - | X | - | Enumerated | Compliant by configuration | Note C-1 | 7.2.100 3GPP TS 32.273 (MBMS) |

| AVP Name | AVP Code | ACR | ACA | CCR | CCA | Value Type | Compliance Level | Comment | Reference |
|------------------------|----------|-----|-----|-----|-----|-------------|--|--|---|
| Media-Initiator-Flag | 882 | X | - | X | - | Enumerated | Compliant by configuration | Note C-1 | 7.2.101 3GPP TS 32.272: (PoC) 3GPP TS 32.260: (IMS) |
| Media-Initiator-Party | 1288 | X | - | X | - | UTF8 String | Compliant by configuration | Note C-1 | 7.2.102 3GPP TS 32.272: (PoC) |
| Message-Body | 889 | X | - | X | - | Grouped | Compliant by configuration and dependent on sub-AVPs | Note C-1 See sub-AVPs: Content-Type Content-Length Content-Disposition Originator | 7.2.103 3GPP TS 32.260 (IMS) |
| Message-Class | 1213 | - | - | X | - | Grouped | Compliant by configuration and dependent on sub-AVPs | Note C-1 See sub-AVPs: Class-Identifier Token-Text | 7.2.104 3GPP TS 32.270 (MMS) |
| Message-ID | 1210 | - | - | X | - | UTF8 String | Compliant by configuration | Note C-1, Note NC-4 | 7.2.105 |
| Message-Size | 1212 | - | - | X | - | Unsigned32 | Compliant by configuration | Note C-1 | 7.2.106 3GPP TS 32.270 (MMS) |
| Message-Type | 1211 | - | - | X | - | Enumerated | Compliant by configuration | Note C-1 | 7.2.107 3GPP TS 32.270 (MMS) |
| MBox-Storage-Requested | 1248 | - | - | X | - | Enumerated | Compliant by configuration | Note C-1 | 7.2.109 3GPP TS 32.270 (MMS) |

| AVP Name | AVP Code | ACR | ACA | CCR | CCA | Value Type | Compliance Level | Comment | Reference |
|-----------------|----------|-----|-----|-----|-----|------------|--|--|---------------------------------|
| MM-Content-Type | 1203 | - | - | X | - | Grouped | Compliant by configuration and dependent on sub-AVPs | Note C-1 See sub-AVPs: Type-Number Additional-Type-Information Content-Size Additional-Content-Information | 7.2.108 3GPP TS 32.270 (MMS) |
| MMS-Information | 877 | - | - | X | - | Grouped | Compliant by configuration and dependent on sub-AVPs | Note C-1 See sub-AVPs: Originator-Address Recipient-Address Submission-Time MM-Content-Type Priority Message-ID Message-Type Message-Size Message-Class Delivery-Report-Requested Read-Reply-Report-Requested MMBox-Storage-Requested Applic-ID Reply-Applic-ID Aux-Applic-Info Content-Class DRM-Content Adaptations VASP-Id VAS-Id | 7.2.110 3GPP TS 32.270 (MMS) |

| AVP Name | AVP Code | ACR | ACA | CCR | CCA | Value Type | Compliance Level | Comment | Reference |
|--|----------|-----|-----|-----|-----|-------------|--|---|---|
| MMTel-Information | 2030 | X | - | X | - | Grouped | Compliant by configuration and dependent on sub-AVPs | Note C-1 See sub-AVPs: Supplementary-Service | 7.2.111 |
| MSISDN | 701 | - | - | X | - | refer [221] | Complaint by configuration | Note C-2 | 3GPP TS 29.329 (Sh I/F) 3GPP TS 32.271 (LCS) |
| Next-Tariff | 2057 | | | X | X | Grouped | Compliant by configuration and dependent on sub-AVPs | Note C-1, Note NC-5, Note NC-7 See: Currency-Code Scale-Factor Rate-Element | 7.2.112 |
| Node-Functionality | 862 | X | - | X | - | Enumerated | Complaint by configuration | Note C-1 | 7.2.113 |
| Node-Id | 2064 | X | - | X | - | UTF8 String | Complaint by configuration | Note C-1 | 7.2.114 3GPP TS 32.251 (PS) - Sec 6.3.2.1 |
| Number-Of-Diversions | 2034 | X | - | X | - | Unsigned32 | Complaint by configuration | Note C-1 | 7.2.115 |
| Number-Of-Messages-Sent | 2019 | X | - | X | - | Unsigned32 | Complaint by configuration | Note C-1 | 7.2.116 |
| Number-Of-Messages-Successfully-Exploded | 2111 | X | - | X | - | refer[223] | Compliant by configuration | Note C-1 | OMA-DDS-Charging |
| Number-Of-Messages-Successfully-Sent | 2112 | X | - | X | - | refer[223] | Compliant by configuration | Note C-1 | OMA-DDS-Charging |
| Number-Of-Participants | 885 | X | - | X | - | Unsigned32 | Compliant by configuration | Note C-1 | 7.2.117 3GPP TS 32.272: (PoC) |
| Number-Of-Received-Talk-Bursts | 1282 | X | - | - | - | Unsigned32 | N/A - Offline | Note NC-1 | 7.2.118 |

| AVP Name | AVP Code | ACR | ACA | CCR | CCA | Value Type | Compliance Level | Comment | Reference |
|--|----------|-----|-----|-----|-----|-------------|--|---|--|
| Number-Of-Talk-Bursts | 1283 | X | - | - | - | Unsigned32 | N/A - Offline | Note NC-1 | 7.2.119 |
| Number-Portability-Routing-Information | 2024 | X | - | X | - | UTF8 String | Compliant by configuration | Note C-1 | 7.2.120 3GPP TS 32.260 (IMS) |
| Offline-Charging | 1278 | - | - | - | X | Grouped | Compliant by configuration and dependent on sub-AVPs | Note C-1, Note NC-1 See sub-AVPs: Quota-Consumption-Time Time-Quota-Mechanism Envelope-Reporting Multiple-Services-Credit-Control | 7.2.121 |
| Online-Charging-Flag | 2303 | X | - | - | - | Enumerated | N/A - Offline | Note NC-1 | 7.2.122 3GPP TS 32.260 (IMS) |
| Optional-Capability | 605 | X | - | - | - | refer [204] | N/A - Offline | Off-line Charging | |
| Originating-IOI | 839 | X | - | X | - | UTF8 String | Compliant by configuration | Note C-1, Note NC-4 (SIP) | 7.2.123 IETF RFC 3455 (SIP) 3GPP TS 32.260 (IMS) |
| Originator-SCCP-Address | 2008 | - | - | X | - | Address | Compliant by configuration | Note C-2 | 7.2.128 |
| Originator | 864 | X | - | X | - | Enumerated | Compliant by configuration | Note C-1 | 7.2.124 |
| Originator-Address | 886 | - | - | X | - | Grouped | Compliant by configuration and dependent on sub-AVPs | Note C-1 See sub-AVPs: Address-Type Address-Data Address-Domain | 7.2.125 3GPP TS 32.270 (MMS) |

| AVP Name | AVP Code | ACR | ACA | CCR | CCA | Value Type | Compliance Level | Comment | Reference |
|-----------------------------|----------|-----|-----|-----|-----|-------------|--|---|-------------------------------------|
| Originator-Received-Address | 2027 | - | - | X | - | Grouped | Compliant by configuration and dependent on sub-AVPs | Note C-1 See sub-AVPs: Address-Type Address-Data Address-Domain | 7.2.127 |
| Originator-Interface | 2009 | - | - | X | - | Grouped | Compliant by configuration and dependent on sub-AVPs | Note C-1 See sub-AVPs: Interface-Id Interface-Text Interface-Port Interface-Type | 7.2.126 |
| Outgoing-Session-Id | 2320 | X | - | X | - | UTF8 String | Compliant by configuration | Note C-1, Note NC-4 | 7.2.128A 3GPP TS 32.260 (IMS) |
| Outgoing-Trunk-Group-Id | 853 | X | - | - | - | UTF8 String | N/A - Offline | Off-line Charging | 7.2.129 |
| Participant-Access-Priority | 1259 | X | - | X | - | Enumerated | Compliant by configuration | Note C-1 | 7.2.132 3GPP TS 32.272: (PoC) |
| Participant-Action-Type | 2049 | X | - | X | - | Enumerated | Compliant by configuration | Note C-1 | 7.2.133 |
| Participant-Group | 1260 | X | - | X | - | Grouped | Compliant by configuration and dependent on sub-AVPs | Note C-1 See sub-AVPs: Called-Party-Address Participant-Access-Priority User-Participating-Type | 7.2.131 3GPP TS 32.272: (PoC) |
| Participants-Involved | 887 | X | - | X | - | UTF8 String | Compliant by configuration | Note C-2 | 7.2.130 3GPP TS 32.272: (PoC) |
| PDG-Address | 895 | X | - | X | - | Address | Compliant by configuration | Note C-1 | 7.2.134 |

| AVP Name | AVP Code | ACR | ACA | CCR | CCA | Value Type | Compliance Level | Comment | Reference |
|----------------------------|----------|-----|-----|-----|-----|-------------|----------------------------|--|--|
| PDG-Charging-Id | 896 | X | - | X | - | Unsigned32 | Compliant by configuration | Note C-1, Note NC-4 | 7.2.135 |
| PDN-Connection-Charging-ID | 2050 | X | - | X | - | Unsigned32 | Compliant by configuration | Note C-1, Note NC-4 | 7.2.136 3GPP TS 32.251 (PS) - Sec 6.3.2.1 |
| PDP-Address | 1227 | X | - | X | - | Address | Compliant by configuration | Note C-1 | 7.2.137 3GPP TS 32.270 (MMS) |
| PDP-Context-Type | 1247 | X | - | X | - | Enumerated | Compliant by configuration | Note C-1, Note NC-4 Note NC-2 for Gn/Gp | 7.2.138 3GPP TS 32.251 (PS) - Sec 6.3.2.1 |
| PDP-Address-Prefix-Length | 2606 | X | - | X | - | Unsigned32 | Compliant by configuration | Note C-1, Note NC-2 | |
| PoC-Change-Condition | 1261 | X | - | - | - | Enumerated | N/A - Offline | Note NC-1 | 7.2.139 |
| PoC-Change-Time | 1262 | X | - | - | - | Time | N/A - Offline | Note NC-1 | 7.2.140 |
| PoC-Controlling-Address | 858 | X | - | X | - | UTF8 String | Compliant by configuration | Note C-1 | 7.2.141 3GPP TS 32.272: (PoC) |
| PoC-Event-Type | 2025 | X | - | X | - | Enumerated | Compliant by configuration | Note C-1 | 7.2.142 3GPP TS 32.272: (PoC) |
| PoC-Group-Name | 859 | X | - | X | - | UTF8 String | Compliant by configuration | Note C-1 | 7.2.143 3GPP TS 32.272: (PoC) |

| AVP Name | AVP Code | ACR | ACA | CCR | CCA | Value Type | Compliance Level | Comment | Reference |
|-----------------------------|----------|-----|-----|-----|-----|-------------|--|---|----------------------------------|
| PoC-Information | 879 | X | - | X | - | Grouped | Compliant by configuration and dependent on sub-AVPs | Note C-1 See sub-AVPs: PoC-Server-Role PoC-Session-Type PoC-User-Role PoC-Session-Initiation-type PoC-Event-Type Number-Of-Participants Participants-Involved Participant-Group Talk-Burst-Exchange PoC-Controlling-Address PoC-Group-Name PoC-Session-Id Charged-Party | 7.2.144 3GPP TS 32.272: (PoC) |
| PoC-Server-Role | 883 | X | - | X | - | Enumerated | Compliant by configuration | Note C-1 | 7.2.145 3GPP TS 32.272: (PoC) |
| PoC-Session-Id | 1229 | X | - | X | - | UTF8 String | Compliant by configuration | Note C-1, Note NC-4 | 7.2.146 3GPP TS 32.272: (PoC) |
| PoC-Session-Initiation-type | 1277 | X | - | X | - | Enumerated | Compliant by configuration | Note C-1 | 7.2.147 3GPP TS 32.272: (PoC) |
| PoC-Session-Type | 884 | X | - | X | - | Enumerated | Compliant by configuration | Note C-1 | 7.2.148 3GPP TS 32.272: (PoC) |

| AVP Name | AVP Code | ACR | ACA | CCR | CCA | Value Type | Compliance Level | Comment | Reference |
|----------------------------|----------|-----|-----|-----|-----|-------------|---|---|---|
| PoC-User-Role | 1252 | X | - | X | - | Grouped | Compliant by configuration and dependent on sub-AVPs | Note C-1 See sub-AVPs: PoC-User-Role-Ids PoC-User-Role-info-Units | 7.2.149 3GPP TS 32.272: (PoC) |
| PoC-User-Role-IDs | 1253 | X | - | X | - | UTF8 String | Compliant by configuration | Note C-1 | 7.2.150 3GPP TS 32.272: (PoC) |
| PoC-User-Role-info-Units | 1254 | X | - | X | - | Enumerated | Compliant by configuration | Note C-1 Possible values: 1. Moderator 2. Dispatcher 3. Session-Owner 4. Session-Participant | 7.2.151 3GPP TS 32.272: (PoC) |
| Positioning-Data | 1245 | - | - | X | - | UTF8 String | Compliant by configuration | Note C-1 | 7.2.152 3GPP TS 32.271 (LCS) 3GPP TS 25.305 3GPP TS 43.059 |
| Preferred-AoC-Currency | 2315 | - | - | X | - | Unsigned32 | Compliant by configuration and Dependent on External System | Note NC-3 | 7.2.153 3GPP TS 32.280 (AoC) RFC 4006 |
| Priority | 1209 | - | - | X | - | Enumerated | Compliant by configuration | Note C-1 | 7.2.154 |
| Priority-Level | 1046 | X | - | X | - | refer [215] | N/A - Non-Ro | Note NC-2 | 3GPP TS 29.212 (Policy-Gx) |
| PS-Append-Free-Format-Data | 867 | X | - | - | X | Enumerated | Compliant by configuration | Note C-3 | 7.2.155 |
| PS-Free-Format-Data | 866 | X | - | - | X | OctetString | Compliant by configuration | Note C-3 | 7.2.156 |

| AVP Name | AVP Code | ACR | ACA | CCR | CCA | Value Type | Compliance Level | Comment | Reference |
|---------------------------------|----------|-----|-----|-----|-----|-------------|--|--|--|
| PS-Furnish-Charging-Information | 865 | X | - | - | X | Grouped | Compliant by configuration and dependent on sub-AVPs | Note C-3 | 7.2.157 3GPP TS 32.251 (PS) - Sec 5.3.2.3, 6.3.2.1 |
| PS-Information | 874 | X | - | X | X | Grouped | Compliant by configuration and dependent on sub-AVPs | Note 1, Note 5 (TS 32.251) See sub-AVPs: User Location Info (PoC) GGSN Address (PoC) | 7.2.158 3GPP TS 32.251 (PS) - Sec 6.3.2.1 3GPP TS 32.270 (MMS) 3GPP TS 32.272: (PoC) 3GPP TS 32.273 (MBMS) |
| QoS-Information | 1016 | X | - | X | - | refer [215] | N/A - Non-Ro | Note NC-2 | 3GPP TS 29.212 (Policy-Gx) |
| QoS-Class-Identifier | 1028 | X | - | X | - | refer [215] | N/A - Non-Ro | Note NC-2 | 3GPP TS 29.212 (Policy-Gx) |
| Quota-Consumption-Time | 881 | - | - | - | X | Unsigned32 | Compliant by configuration if configured. If not configured, compliant (as AVP is optional and not required) | Note C-3 | 7.2.159 |

| AVP Name | AVP Code | ACR | ACA | CCR | CCA | Value Type | Compliance Level | Comment | Reference |
|--------------------|----------|-----|-----|-----|-----|-------------------------|--|---|----------------------------|
| Quota-Holding-Time | 871 | - | - | - | X | Unsigned32 | Compliant by configuration | A Quota-Holding-Time value of zero indicates that this mechanism shall not be used. If the Quota-Holding-Time AVP is not present, then a locally configurable default value in the client shall be used. Note C-3 If Dynamic Quota is enabled, then Quota-Holding-Time is taken from the appropriate Dynamic Quota set configuration. For more information, see Dynamic Quota Config section in <i>Charging Control Services User's Guide</i> . | 7.2.160 |
| RAI | 909 | X | - | X | - | refer [207] UTF8 String | Compliant by configuration | Note C-1, Note NC-6 | 3GPP TS 29.061 (PLMN «PDN) |
| Rate-Element | 2058 | - | - | X | X | Grouped | Compliant by configuration and dependent on sub-AVPs | Note C-1, Note NC-3 See sub-AVPs: CC-Unit-Type Reason-Code Unit-Value Unit-Cost Unit-Quota-Threshold | |

| AVP Name | AVP Code | ACR | ACA | CCR | CCA | Value Type | Compliance Level | Comment | Reference |
|------------------------------|----------|-----|-----|-----|-----|------------|--|---|---------------------------------|
| Read-Reply-Report-Requested | 1222 | - | - | X | - | Enumerated | Compliant by configuration | Note C-1 | 7.2.162 3GPP TS 32.270 (MMS) |
| Real-Time-Tariff-Information | 2305 | X | - | - | - | Grouped | N/A - Offline | Note NC-1 | 7.2.164 3GPP TS 32.260 (IMS) |
| Received-Talk-Burst-Time | 1284 | X | - | - | - | Unsigned32 | N/A - Offline | Note NC-1 | 7.2.165 |
| Received-Talk-Burst-Volume | 1285 | X | - | - | - | Unsigned32 | N/A - Offline | Note NC-1 | 7.2.166 |
| Recipient-Address | 1201 | - | - | X | - | Grouped | Compliant by configuration and dependent on sub-AVPs | Note C-1 See sub-AVPs: Address-Type Address-Data Address-Domain Addressee-Type | 7.2.167 3GPP TS 32.270 (MMS) |
| Recipient-Info | 2026 | - | - | X | - | Grouped | Compliant by configuration and dependent on sub-AVPs | Note C-1 See sub-AVPs: Destination-Interface Recipient-Address Recipient-Received-Address Recipient-SCCP-Address SM-Protocol-ID | 7.2.168 |
| Recipient-Received-Address | 2028 | - | - | X | - | Grouped | Compliant by configuration and dependent on sub-AVPs | Note C-1 See sub-AVPs: Address-Type Address-Data Address-Domain | 7.2.169 |
| Recipient-SCCP-Address | 2010 | - | - | X | - | Address | Compliant by configuration | Note C-2 | 7.2.170 |

| AVP Name | AVP Code | ACR | ACA | CCR | CCA | Value Type | Compliance Level | Comment | Reference |
|-----------------------------------|----------|-----|-----|-----|-----|-------------------------|--|---|---------------------------------|
| Refund-Information | 2022 | - | - | X | X | OctetString | Compliant by configuration | Note C-1, Note C-3, Note G-2. | 7.2.171 |
| Remaining-Balance | 2021 | - | - | - | X | Grouped | Compliant by configuration and dependent on sub-AVPs | Note C-1 See sub-AVPs: Unit-Value Currency-Code | 7.2.172 |
| Reply-Applic-ID | 1223 | - | - | X | - | UTF8 String | Compliant by configuration | Note C-1 | 7.2.173 3GPP TS 32.270 (MMS) |
| Reply-Path-Requested | 2011 | - | - | X | - | Enumerated | Compliant by configuration | Note C-1 | 7.2.174 |
| Reporting-Reason | 872 | - | - | X | - | Enumerated | Compliant by configuration | Note C-1 | 7.2.175 |
| Requested-Party-Address | 1251 | X | - | X | - | UTF8 String | Compliant by configuration | Note C-2 | 7.2.176 3GPP TS 32.260 (IMS) |
| Required-MBMS-Bearer-Capabilities | 901 | X | - | X | - | refer [207] UTF8 String | Compliant by configuration | Note C-1 | 3GPP TS 29.061 (PLMN«PDN) |
| Role-Of-Node | 829 | X | - | X | - | Enumerated | Compliant by configuration | Note C-1 | 7.2.177 3GPP TS 32.260 (IMS) |
| Scale-Factor | 2059 | - | - | X | X | Grouped | Compliant by configuration and dependent on sub-AVPs | Note C-1, Note C-3 See sub-AVPs: Value-Digits Exponent | 7.2.178 |
| SDP-Answer-Timestamp | 1275 | X | - | - | - | Time | N/A - Offline | Note NC-2 | 7.2.179 |

| AVP Name | AVP Code | ACR | ACA | CCR | CCA | Value Type | Compliance Level | Comment | Reference |
|-------------------------|----------|-----|-----|-----|-----|-------------|--|--|--|
| SDP-Media-Component | 843 | X | - | X | - | Grouped | Compliant by configuration and dependent on sub-AVPs | Note C-1 See sub-AVPs: SDP-Media-Name SDP-Media-Description Local-GW-Inserted-Indication IP-Realm-Default-Indication Transcoder-Inserted-Indication Media-Initiator-Flag Media-Initiator-Party Authorised-QoS 3GPP-Charging-Id Access-Network-Charging-Identifier-Value SDP-Type | 7.2.180 3GPP TS 32.260 (IMS) 3GPP TS 32.272: (PoC) |
| SDP-Media-Description | 845 | X | - | X | - | UTF8 String | Compliant by configuration | Note C-1 | 7.2.181 |
| SDP-Media-Name | 844 | X | - | X | - | UTF8 String | Compliant by configuration | Note C-1 | 7.2.182 |
| SDP-Offer-Timestamp | 1274 | X | - | - | - | Time | N/A - Offline | Note NC-1 | 7.2.183 |
| SDP-Session-Description | 842 | X | - | X | - | UTF8 String | Compliant by configuration | Note C-1 | 7.2.184 3GPP TS 32.260 (IMS) 3GPP TS 32.272: (PoC) |
| SDP-TimeStamps | 1273 | X | - | - | - | Grouped | N/A - Offline | Note NC-1 | 7.2.185 3GPP TS 32.260 (IMS) |

| AVP Name | AVP Code | ACR | ACA | CCR | CCA | Value Type | Compliance Level | Comment | Reference |
|-----------------------------|----------|-----|-----|-----|-----|--------------------|--|---|--|
| SDP-Type | 2036 | X | - | X | - | Enumerated | Compliant by configuration | Note C-1 | 7.2.186 |
| Served-Party-IP-Address | 848 | X | - | - | - | Address | N/A - Offline | Note NC-1 | 7.2.187 3GPP TS 32.260 (IMS) 3GPP TS 32.272: (PoC) |
| Server-Capabilities | 603 | X | - | - | - | refer [204] | N/A - Offline | Note NC-1 | 3GPP TS 32.260 (IMS) |
| Server-Name | 602 | X | - | - | - | refer [204] | N/A - Offline | Note NC-1 | |
| Service-Data-Container | 2040 | X | - | - | - | Grouped | N/A - Offline | Note NC-1 | 7.2.189 3GPP TS 32.251 (PS) - Sec 6.3.2.1 |
| Service-Generic-Information | 1256 | X | - | X | - | Refer[223] Grouped | Compliant by configuration and dependent on sub-AVPs | Note C-1 See sub-AVPs: Application-Server-ID Application-Service-Type Application-Session-ID Delivery-Status | 7.2.191 |
| Service-Id | 855 | X | - | X | - | UTF8 String | Compliant by configuration | Note C-1, Note NC-7 | 7.2.190 3GPP TS 32.260 (IMS) 3GPP TS 32.271 (LCS) |

| AVP Name | AVP Code | ACR | ACA | CCR | CCA | Value Type | Compliance Level | Comment | Reference |
|-----------------------|----------|-----|-----|-----|-----|-------------|--|--|---|
| Service-Information | 873 | X | - | X | X | Grouped | Compliant by configuration and dependent on sub-AVPs | Note C-1, Note L-Note C-3, Note NC-7 See sub-AVPs: Subscription-Id AoC-Information PS-Information WLAN-Information IMS-Information MMS-Information LCS-Information PoC-Information BMS-Information SMS-Information MMTel-Information Service-Generic-Information IM-Information DCD-Information | 7.2.192 3GPP TS 32.270 (MMS) 3GPP TS 32.272: (PoC) 3GPP TS 32.273 (MBMS) |
| Service-Mode | 2032 | X | - | X | - | Unsigned32 | Compliant by configuration | Note C-1 | 7.2.193 |
| Service-Specific-Data | 863 | X | - | - | - | UTF8 String | N/A - Offline | Off-line Charging | 7.2.194 3GPP TS 32.272: (PoC) |
| Service-Specific-Info | 1249 | X | - | - | - | Grouped | N/A - Offline | Off-line Charging | 7.2.195 3GPP TS 32.260 (IMS) |
| Service-Specific-Type | 1257 | X | - | - | - | Unsigned32 | N/A - Offline | Off-line Charging | 7.2.196 |

| AVP Name | AVP Code | ACR | ACA | CCR | CCA | Value Type | Compliance Level | Comment | Reference |
|---------------------------------|----------|-----|-----|-----|-----|-------------|----------------------------|-----------|---|
| Serving-Node-Type | 2047 | X | - | X | - | Enumerated | Compliant by configuration | Note C-1 | 7.2.198 3GPP TS 32.251 (PS) - Sec 6.3.2.1 |
| Session-Priority | 650 | X | - | X | - | Refer [204] | N/A - Non-Ro | Note NC-2 | |
| SGSN-Address | 1228 | X | - | X | - | Address | Compliant by configuration | Note C-1 | 7.2.199 |
| SGW-Address | 2067 | X | - | - | - | Address | N/A - Offline | Note NC-1 | 7.2.199A 3GPP TS 32.251 (PS) - Sec 6.3.2.1 |
| SGW-Change | 2065 | X | - | - | - | Enumerated | N/A - Offline | Note NC-1 | 7.2.200 3GPP TS 32.251 (PS) - Sec 6.3.2.1 |
| SIP-Method | 824 | X | - | X | - | UTF8 String | Compliant by configuration | Note C-1 | 7.2.201 (IMS/SIP) |
| SIP-Request-Timestamp-Fraction | 2301 | X | - | X | - | Unsigned32 | Compliant by configuration | Note C-1 | 7.2.203 |
| SIP-Request-Timestamp | 834 | X | - | X | - | Time | Compliant by configuration | Note C-1 | 7.2.202 |
| SIP-Response-Timestamp-Fraction | 2302 | X | - | X | - | Unsigned32 | Compliant by configuration | Note C-1 | 7.2.205 |
| SIP-Response-Timestamp | 835 | X | - | X | - | Time | Compliant by configuration | Note C-1 | 7.2.204 |
| SM-Discharge-Time | 2012 | - | - | X | - | Time | Compliant by configuration | Note C-1 | 7.2.206 |
| SM-Message-Type | 2007 | - | - | X | - | Enumerated | Compliant by configuration | Note C-1 | 7.2.207 |
| SM-Protocol-ID | 2013 | - | - | X | - | OctetString | Compliant by configuration | Note C-1 | 7.2.208 |

| AVP Name | AVP Code | ACR | ACA | CCR | CCA | Value Type | Compliance Level | Comment | Reference |
|-----------------|----------|-----|-----|-----|-----|------------|--|---|-----------|
| SMSC-Address | 2017 | - | - | X | - | Address | Compliant by configuration | Note C-1 | 7.2.214 |
| SMS-Information | 2000 | - | - | X | - | Grouped | Compliant by configuration and dependent on sub-AVPs | Note C-1 See sub-AVPs: SMS-Node Client-Address Originator-SCCP-Address SMSC-Address Data-Coding-Scheme SM-Discharge-Time SM-Message-Type Originator-Interface SM-Protocol-ID Reply-Path-Requested SM-Status SM-User-Data-Header Number-Of-Messages-Sent Recipient-Info Originator-Received-Address SM-Service-Type | 7.2.211 |
| SMS-Node | 2016 | - | - | X | - | Enumerated | Compliant by configuration | Note C-1 | 7.2.212 |
| SM-Service-Type | 2029 | - | - | X | - | Enumerated | Compliant by configuration | Note C-1 | 7.2.213 |

| AVP Name | AVP Code | ACR | ACA | CCR | CCA | Value Type | Compliance Level | Comment | Reference |
|-----------------------|----------|-----|-----|-----|-----|-------------|--|---|--|
| SM-Status | 2014 | - | - | X | - | OctetString | Compliant by configuration | Note C-1, Note G-2 | 7.2.209 |
| SM-User-Data-Header | 2015 | - | - | X | - | OctetString | Compliant by configuration | Note C-1, Note G-2 | 7.2.210 |
| Sponsor-Identify | 531 | X | - | - | - | refer[214] | N/A - Offline | Note NC-1 | |
| Start-Time | 2041 | X | - | - | - | Time | N/A - Offline | Note NC-1 | 7.2.215 3GPP TS 32.251 (PS) - Sec 6.3.2.1 |
| Status | 2702 | X | - | - | - | Enumerated | N/A - Offline | Note NC-1 | 7.2.215A [V11.3] |
| Stop-Time | 2042 | X | - | - | - | Time | N/A - Offline | Note NC-1 | 7.2.216 3GPP TS 32.251 (PS) - Sec 6.3.2.1 |
| Submission-Time | 1202 | - | - | X | - | Time | Compliant by configuration | Note C-1 | 7.2.217 3GPP TS 32.270 (MMS) |
| Subscriber-Role | 2033 | X | - | X | - | Enumerated | Compliant by configuration | Note C-1 | 7.2.218 |
| Supplementary-Service | 2048 | X | - | X | - | Grouped | Compliant by configuration and dependent on sub-AVPs | Note C-1 See sub-AVPs: Service-Type Service-Mode Number-Of-Diversions Associated-Party-Address Service-ID Change-Time Number-Of-Participants Participant-Action-Type CUG-Information AoC-Information | 7.2.219 |

| AVP Name | AVP Code | ACR | ACA | CCR | CCA | Value Type | Compliance Level | Comment | Reference |
|----------------------|----------|-----|-----|-----|-----|-------------|--|--|--|
| Talk-Burst-Exchange | 1255 | X | - | - | - | Grouped | N/A - Offline | Note NC-1 | 7.2.220 |
| Talk-Burst-Time | 1286 | X | - | - | - | Unsigned32 | N/A - Offline | Note NC-1 | 7.2.221 |
| Talk-Burst-Volume | 1287 | X | - | - | - | Unsigned32 | N/A - Offline | Note NC-1 | 7.2.222 |
| Tariff-Information | 2060 | X | - | X | X | Grouped | Compliant by configuration and dependent on sub-AVPs | Note C-1, Note NC-5, Note NC-7 See sub-AVPs: Current-Tariff Tariff-Time-Change Next-Tariff | 7.2.223 |
| Tariff-XML | 2306 | X | - | - | - | UTF8 String | N/A - Offline | Note NC-1 | 7.2.224 |
| Terminal-Information | 1401 | X | - | X | - | refer [219] | N/A - Offline | Note C-1, Note NC-1 Offline charging (Online charging uses User-Equipment Info) Note NC-1 | 3GPP TS 29.272 (MME&SGSN) 3GPP TS 32.251 (PS) - Sec 6.3.2.1 |
| Terminating-IOI | 840 | X | - | X | - | UTF8 String | Compliant by configuration | Note C-1 | 7.2.225 IETF RFC 3455 (SIP) 3GPP TS 32.260 (IMS) |
| Time-First-Usage | 2043 | X | - | - | - | Time | N/A - Offline | Note NC-1 | 7.2.226 |
| Time-Last-Usage | 2044 | X | - | - | - | Time | N/A - Offline | Note NC-1 | 7.2.227 |
| Time-Quota-Mechanism | 1270 | - | - | - | X | Grouped | Compliant by configuration and dependent on sub-AVPs | Note C-3 See sub-AVPs: Time-Quota-Type Base-Time-Interval | 7.2.228 |
| Time-Quota-Threshold | 868 | - | - | - | X | Unsigned32 | Fully compliant | | 7.2.229 |

| AVP Name | AVP Code | ACR | ACA | CCR | CCA | Value Type | Compliance Level | Comment | Reference |
|-----------------------------------|----------|-----|-----|-----|-----|-------------------------|--|---|--|
| Time-Quota-Type | 1271 | - | - | - | X | Enumerated | Compliant by configuration | Note C-3 | 7.2.230 |
| Time-Stamps | 833 | X | - | X | - | Grouped | Compliant by configuration and dependent on sub-AVPs | Note C-1 See sub-AVPs: SIP-Request-Timestamp SIP-Response-Timestamp SIP-Request-Timestamp-Fraction SIP-Response-Timestamp-Fraction | 7.2.231 3GPP TS 32.260 (IMS) |
| Time-Usage | 2045 | X | - | - | - | Unsigned32 | N/A - Offline | Note NC-1 | 7.2.232 |
| TMGI | 900 | X | - | X | - | refer [207] OctetString | Compliant by configuration | Note C-1, Note G-2, Note NC-4 | |
| Token-Text | 1215 | - | - | X | - | UTF8 String | Compliant by configuration | Note C-1 | 7.2.234 |
| Total-Number-Of-Messages-Exploded | 2113 | X | - | X | - | refer[223] | Compliant by configuration | Note C-1 | OMA-DDS-Charging |
| Total-Number-Of-Messages-Sent | 2114 | X | - | X | - | refer[223] | Compliant by configuration | Note C-1 | OMA-DDS-Charging |
| Traffic-Data-Volumes | 2046 | X | - | - | - | Grouped | N/A - Offline | Note NC-1 | 7.2.233 3GPP TS 32.251 (PS) - Sec 6.3.2.1 |
| Transcoder-Inserted-Indication | 2605 | X | - | - | - | Enumerated | N/A - Offline | Note NC-1 | 7.2.233A |
| Transit-IOI-List | 2701 | X | - | - | - | UTF8 String | N/A - Offline | Note NC-1 | 7.2.233B [V11.3] 3GPP TS 32.260 (IMS) |

| AVP Name | AVP Code | ACR | ACA | CCR | CCA | Value Type | Compliance Level | Comment | Reference |
|-------------------------|----------|-----|-----|-----|-----|-------------|--|---|---|
| Trigger | 1264 | - | - | X | X | Grouped | Compliant by configuration and dependent on sub-AVPs | Note C-1, Note L-Note C-3 See sub-AVP: Trigger-Type | 7.2.235 3GPP TS 32.272: (PoC) |
| Trigger-Type | 870 | - | - | X | X | Enumerated | Compliant by configuration | Note C-1 | 7.2.236 |
| Trunk-Group-Id | 851 | X | - | - | - | Grouped | N/A - Offline | Note NC-1 | 7.2.237 3GPP TS 32.260 (IMS) |
| Type-Number | 1204 | - | - | X | - | Enumerated | Compliant by configuration | Note C-1 | 7.2.238 |
| Unit-Cost | 2061 | - | - | X | X | Grouped | Compliant by configuration and dependent on sub-AVPs | Note C-1, Note C-3 See sub-AVPs: Value-Digits Exponent | 7.2.239 |
| Unit-Quota-Threshold | 1226 | - | - | - | X | Unsigned32 | Compliant by configuration | Note C-3, Note C-5 | 7.2.240 |
| User-CSG-Information | 2319 | X | - | X | X | Grouped | Compliant by configuration and dependent on sub-AVPs | Note L-1, Note C-3, Note NC-4 See sub-AVPs: CSG-Id CSG-Access-Mode CSG-Membership-Indication | 7.2.240A 3GPP TS 32.251 (PS) - Sec 6.3.2.1 |
| User-Data | 606 | X | - | - | - | refer [204] | N/A - Offline | Note NC-1 | |
| User-Participating-Type | 1279 | X | - | X | - | Enumerated | Compliant by configuration | Note C-1 | 7.2.241 3GPP TS 32.272: (PoC) |
| User-Session-Id | 830 | X | - | X | - | UTF8 String | Compliant by configuration | Note C-1, Note NC-4 | 7.2.242 3GPP TS 32.260 (IMS) |

| AVP Name | AVP Code | ACR | ACA | CCR | CCA | Value Type | Compliance Level | Comment | Reference |
|------------------------|----------|-----|-----|-----|-----|-------------|------------------|---|---|
| VAS-Id | 1102 | - | - | X | - | refer [213] | N/A - Non-Ro | Note C-1, Note NC-4 | 3GPP TS 29.140 (MM10) 3GPP TS 32.270 (MMS) |
| VASP-Id | 1101 | - | - | X | - | refer [213] | N/A - Non-Ro | Note C-1, Note NC-4 | 3GPP TS 29.140 (MM10) 3GPP TS 32.270 (MMS) |
| Volume-Quota-Threshold | 869 | - | - | - | X | Unsigned32 | Fully compliant | If Dynamic Quota is enabled, then Volume-Quota-Threshold is taken from the appropriate range in Dynamic Quota configuration. For more informaton, see <i>Dynamic Quota Config section in Charging Control Services User's Guide</i> . | 7.2.243 |

7.2 - 3GPP specific AVPs as per TS 32.299 v14.5.0

This table lists the compliances for section 7.2 as per TS 32.299 v14.5.0.

Compliance Levels:

- CBC = Compliant By Configuration
- CBCDS = Compliant By Configuration and dependent on sub-AVPS
- NONRO = N/A - Non-Ro

| AVP Name | Compliance Level | Comment | Reference |
|-----------------------------------|------------------|-----------|-----------------------|
| 3GPP-PS-Data-Off-Status | CBC | Note C-1 | TS 32.299 |
| Access-Availability-Change-Reason | NONRO | Note NC-2 | TS 29.212 (Policy Gx) |
| Access-Network-Info-Change | CBC | Note C-1 | TS 32.260 (IMS) |
| Access-Transfer-Information | CBCDS | Note C-1 | TS 32.260 (IMS) |
| Access-Transfer-Type | CBC | Note C-1 | TS 32.260 (IMS) |
| Accuracy | NONRO | Note NC-2 | TS 29.336 (HSS) |

| AVP Name | Compliance Level | Comment | Reference |
|---------------------------------------|------------------|------------------------------|-----------------------|
| ADC-Rule-Base-Name | NONRO | Note NC-2 | TS 29.212 (Policy Gx) |
| Additional-Exception-Reports | CBC | Note C-1, Note G-2 | |
| Alternate-Charged-Party-Address | CBC | Note C-1 | TS 32.260 (IMS) |
| Announcement-Identifier | CBC | Note C-1 | TS 32.299 |
| Announcement-Information | CBCDS | Note C-1 | TS 32.299 |
| Announcement-Order | CBC | Note C-1, Note G-2 | TS 32.299 |
| Announcing-PLMN-ID | CBC | Note C-1 | TS 32.277 (ProSe) |
| Announcing-UE-HPLMN-Identifier | CBC | Note C-1 | TS 32.277 (ProSe) |
| Announcing-UE-VPLMN-Identifier | CBC | Note C-1 | TS 32.277 (ProSe) |
| APN-Rate-Control | CBC | Note C-1 | TS 32.251 (PS) |
| APN-Rate-Control-Downlink | CBC | Note C-1 | TS 32.251 (PS) |
| APN-Rate-Control-Uplink | CBC | Note C-1 | TS 32.251 (PS) |
| Application-Port-Identifier | CBC | Note C-1 | TS 32.299 |
| Application-Specific-Data | CBC | Note C-1 | TS 32.277 (ProSe) |
| Basic-Service-Code | CBC | Note C-1 | TS 32.276 (VCS) |
| Bearer-Capability | CBC | Note C-1 | TS 32.276 (VCS) |
| BSSID | CBC | Note C-1 | TS 32.251 (PS) |
| Called-Identity | CBC | Note C-1 | TS 32.260 (IMS) |
| Called-Identity-Change | CBCDS | Note C-1 | TS 32.260 (IMS) |
| Cellular-Network-Information | CBC | Note C-1 | TS 32.260 (IMS) |
| Charging-Per-IP-CAN-Session-Indicator | CBC | Note C-1 | TS 32.251 (PS) |
| CN-Operator-Selection-Entity | NONRO | Note NC-1 | |
| Communication-Failure-Information | NONRO | Note NC-2 TS 32.278 (MEC) | |
| Coverage-Info | CBC | Note C-1 | TS 32.277 (ProSe) |
| Coverage-Status | CBC | Note C-1 | TS 32.277 (ProSe) |
| CP-CIoT-EPS-Optimisation-Indicator | NONRO | Note NC-2 TS 32.251 (PS) | |
| CPDT-Information | NONRO | Note NC-2 | TS 32.299 |
| Discoveree-UE-HPLMN-Identifier | CBC | Note C-1 | TS 32.277 (ProSe) |
| Discoveree-UE-vPLMN-Identifier | CBC | Note C-1 | TS 32.277 (ProSe) |
| Discoverer-UE-HPLMN-Identifier | CBC | Note C-1 | TS 32.277 (ProSe) |
| Discoverer-UE-vPLMN-Identifier | CBC | Note C-1 | TS 32.277 (ProSe) |
| EPDG-Address | NONRO | Note NC-2 | TS 32.299 |
| EPS-Location-Information | NONRO | Note NC-2 | TS 29.272 (MME) |
| External-Identifier | CBC | Note C-1 | TS 32.299 |
| FE-Identifier-List | NONRO | Note NC-2 | TS 24.229 (SIP) |
| Fixed-User-Location-Info | NONRO | Note NC-2 | TS 29.212 (Policy Gx) |
| Forwarding-Pending | CBC | Note C-1 | TS 32.276 (VCS) |
| From-Address | CBC | Note C-1 | TS 32.260 (IMS) |
| IMS-Emergency-Indicator | CBC | Note C-1 | TS 32.260 (IMS) |
| IMS-Visited-Network-Identifier | CBC | Note C-1 | TS 32.260 (IMS) |

| AVP Name | Compliance Level | Comment | Reference |
|---|------------------|---------------------------|-----------------------|
| Instance-Id | CBC | Note C-1 | TS 32.260 (IMS) |
| Inter-UE-Transfer | CBC | Note C-1 | TS 32.260 (IMS) |
| ISUP-Cause | CBC | Note C-1 | TS 32.276 (VCS) |
| ISUP-Cause-Diagnostics | CBC | Note C-1 | TS 32.276 (VCS) |
| ISUP-Location | CBC | Note C-1 | TS 32.276 (VCS) |
| ISUP-Value | CBC | Note C-1 | TS 32.276 (VCS) |
| ISUP-Location-Number | CBC | Note C-1 | TS 32.276 (VCS) |
| Language | CBC | Note C-1 | TS 32.299 |
| Layer-2-Group-Id | CBC | Note C-1 | TS 32.277 (ProSe) |
| LCS-APN | CBC | Note C-1 | TS 32.271 (LCS) |
| Location-Info | CBC | Note C-1 | TS 32.277 (ProSe) |
| Maximum-Detection-Time | NONRO | Note NC-2 | TS 29.336 (HSS) |
| Maximum-Number-Of-Reports | NONRO | Note NC-2 | TS 29.336 (HSS) |
| MBMS-Charged-Party | NONRO | Note NC-2 | TS 32.273 (MBMS) |
| MBMS-Data-Transfer-Start | NONRO | Note NC-2 | TS 32.273 (MBMS) |
| MBMS-Data-Transfer-Stop | NONRO | Note NC-2 | TS 32.273 (MBMS) |
| MME-Name | NONRO | Note NC-2 | TS 29.173 (LCS) |
| MME-Number-for-MT-SMS | NONRO | Note NC-2 | TS 29.272 (MME) |
| MME-Realm | NONRO | Note NC-2 | TS 29.173 (LCS) |
| MMTel-SService-Type | CBC | Note C-1 | TS 32.299 |
| Monitored-HPLMN-Identifier | CBC | Note C-1 | TS 32.277 (ProSe) |
| Monitoring-Duration | NONRO | Note NC-2 | TS 29.336 (HSS) |
| Monitoring-Event-Config-Status | NONRO | Note NC-2 | TS 29.336 (HSS) |
| Monitoring-Event-Configuration-Activity | NONRO | Note NC-2 TS 32.278 (MEC) | |
| Monitoring-Event-Functionality | NONRO | Note NC-2 TS 32.278 (MEC) | |
| Monitoring-Event-Information | NONRO | Note NC-2 TS 32.278 (MEC) | |
| Monitoring-Event-Report-Data | NONRO | Note NC-2 TS 32.278 (MEC) | |
| Monitoring-Event-Report-Number | NONRO | Note NC-2 TS 32.278 (MEC) | |
| Monitoring-Type | NONRO | Note NC-2 | TS 29.336 (HSS) |
| Monitoring-UE-HPLMN-Identifier | CBC | Note C-1 | TS 32.277 (ProSe) |
| Monitoring-UE-Identifier | CBC | Note C-1 | TS 32.277 (ProSe) |
| Monitoring-UE-VPLMN-Identifier | CBC | Note C-1 | TS 32.277 (ProSe) |
| MONTE-Location-Type | NONRO | Note NC-2 | TS 29.336 (HSS) |
| MSC-Address | CBC | Note C-1 | TS 32.276 (VCS) |
| MTC-IWF-Address | CBC | Note C-1 | TS 32.299 |
| NBIFOM-Mode | NONRO | Note NC-2 | TS 29.212 (Policy Gx) |
| NBIFOM-Support | NONRO | Note NC-2 | TS 29.212 (Policy Gx) |
| Neighbour-Node-Address | NONRO | Note NC-2 | TS 29.658 (SIP) |
| Network-Call-Reference-Number | CBC | Note C-1 | TS 32.276 (VCS) |
| NIDD-Submission | NONRO | Note NC-2 | TS 32.299 |
| NNI-Information | NONRO | Note NC-2 | TS 29.658 (SIP) |

| AVP Name | Compliance Level | Comment | Reference |
|---|------------------|-----------|-----------------------|
| NNI-Type | NONRO | Note NC-2 | TS 29.658 (SIP) |
| Number-Of-UE-Per-Location-Configuration | NONRO | Note NC-2 | TS 29.128 (MME) |
| Number-Of-UE-Per-Location-Report | NONRO | Note NC-2 | TS 29.128 (MME) |
| Origin-App-Layer-User-Id | CBC | Note C-1 | TS 32.277 (ProSe) |
| PC3-Control-Protocol-Cause | CBC | Note C-1 | TS 32.277 (ProSe) |
| PC3-EPC-Control-Protocol-Cause | CBC | Note C-1 | TS 32.277 (ProSe) |
| Play-Alternative | CBC | Note C-1 | TS 32.299 |
| Presence-Reporting-Area-Identifier | NONRO | Note NC-2 | TS 29.212 (Policy Gx) |
| Presence-Reporting-Area-Information | NONRO | Note NC-2 | TS 29.212 (Policy Gx) |
| Presence-Reporting-Area-Elements-List | NONRO | Note NC-2 | TS 29.212 (Policy Gx) |
| Presence-Reporting-Area-Status | NONRO | Note NC-2 | TS 29.212 (Policy Gx) |
| Priority-Indication | CBC | Note C-1 | TS 32.299 |
| Privacy-Indicator | CBC | Note C-1 | TS 32.299 |
| ProSe-Direct-Discovery-Model | CBC | Note C-1 | TS 32.277 (ProSe) |
| ProSe-Event-Type | CBC | Note C-1 | TS 32.277 (ProSe) |
| ProSe-Function-ID | CBC | Note C-1 | TS 32.277 (ProSe) |
| ProSe-Function-IP-Address | CBC | Note C-1 | TS 32.277 (ProSe) |
| ProSe-Function-PLMN-Identifier | CBC | Note C-1 | TS 32.277 (ProSe) |
| ProSe-Functionality | CBC | Note C-1 | TS 32.277 (ProSe) |
| ProSe-Information | CBCDS | Note C-1 | TS 32.277 (ProSe) |
| ProSe-Range-Class | CBC | Note C-1 | TS 32.277 (ProSe) |
| ProSe-Reason-For-Cancellation | CBC | Note C-1 | TS 32.277 (ProSe) |
| ProSe-Request-Timestamp | CBC | Note C-1 | TS 32.277 (ProSe) |
| ProSe-Role-Of-UE | CBC | Note C-1 | TS 32.277 (ProSe) |
| ProSe-Target-Layer-2-ID | CBC | Note C-1 | TS 32.277 (ProSe) |
| ProSe-UE-ID | CBC | Note C-1 | TS 32.277 (ProSe) |
| ProSe-Validity-Timer | CBC | Note C-1 | TS 32.277 (ProSe) |
| Proximity-Alert-Indication | CBC | Note C-1 | TS 32.277 (ProSe) |
| Proximity-Alert-Timestamp | CBC | Note C-1 | TS 32.277 (ProSe) |
| Proximity-Cancellation-Timestamp | CBC | Note C-1 | TS 32.277 (ProSe) |
| Quota-Indicator | CBC | Note C-1 | TS 32.299 |
| Radio-Frequency | CBC | Note C-1 | TS 32.277 (ProSe) |
| Radio-Parameter-Set-Info | CBC | Note C-1 | TS 32.277 (ProSe) |
| Radio-Parameter-Set-Values | CBC | Note C-1 | TS 32.277 (ProSe) |
| Radio-Resources-Indicator | CBC | Note C-1 | TS 32.277 (ProSe) |
| RAN-NAS-Release-Cause | NONRO | Note NC-2 | TS 29.212 (Policy Gx) |
| Rate-Control-Max-Message-Size | CBC | Note C-1 | TS 32.251 (PS) |
| Rate-Control-Max-Rate | CBC | Note C-1 | TS 32.251 (PS) |
| Rate-Control-Time-Unit | CBC | Note C-1 | TS 32.251 (PS) |
| Reachability-Information | NONRO | Note NC-2 | TS 29.336 (HSS) |
| Reason-Header | CBC | Note C-1 | TS 32.260 (IMS) |
| Related-Change-Condition-Information | NONRO | Note NC-2 | TS 32.251 (PS) |

| AVP Name | Compliance Level | Comment | Reference |
|--------------------------------------|------------------|-----------|-------------------|
| Related-Trigger | CBC | Note C-1 | TS 32.299 |
| Related-IMS-Charging-Identifier | CBC | Note C-1 | TS 32.260 (IMS) |
| Related-IMS-Charging-Identifier-Node | CBC | Note C-1 | TS 32.260 (IMS) |
| Relationship-Mode | NONRO | Note NC-2 | TS 29.658 (SIP) |
| Relay-IP-address | CBC | Note C-1 | TS 32.277 (ProSe) |
| Requested-PLMN-Identifier | CBC | Note C-1 | TS 32.277 (ProSe) |
| Requesting-EPUID | CBC | Note C-1 | TS 32.277 (ProSe) |
| Requested-PLMN-Identifier | CBC | Note C-1 | TS 32.277 (ProSe) |
| Requestor-PLMN-Identifier | CBC | Note C-1 | TS 32.277 (ProSe) |
| Role-Of-ProSe-Function | CBC | Note C-1 | TS 32.277 (ProSe) |
| Route-Header-Received | NONRO | Note NC-2 | TS 32.260 (IMS) |
| Route-Header-Transmitted | NONRO | Note NC-2 | TS 32.260 (IMS) |
| RRC-Cause-Counter | NONRO | Note NC-2 | TS 29.128 (MME) |
| SCEF-ID | NONRO | Note NC-2 | TS 29.336 (HSS) |
| SCEF-Reference-ID | NONRO | Note NC-2 | TS 29.336 (HSS) |
| SCS-Address | CBC | Note C-1 | TS 32.251 (PS) |
| SCS-AS-Address | CBCDS | Note C-1 | TS 32.251 (PS) |
| SCS-Realm | CBC | Note C-1 | TS 32.251 (PS) |
| Serving-Node | CBC | Note C-1 | TS 32.299 |
| Serving-Node-Identity | NONRO | Note NC-2 | TS 32.299 |
| Serving-PLMN-Rate-Control | CBS | Note C-1 | TS 29.128 (MME) |
| Session-Direction | NONRO | Note NC-2 | TS 29.658 (SIP) |
| Session-Priority | CBC | Note C-1 | TS 32.260 (IMS) |
| SGi-PtP-Tunnelling-Method | CBC | Note C-1 | TS 32.251 (PS) |
| SM-Device-Trigger-Indicator | CBC | Note C-1 | TS 32.299 |
| SM-Device-Trigger-Information | CBCDS | Note C-1 | TS 32.299 |
| SMS-Result | CBC | Note C-1 | TS 32.299 |
| Sponsor-Identity | NONRO | Note NC-2 | TS 29.214 (PCC) |
| SSID | CBC | Note C-1 | TS 32.251 (PS) |
| Start-Of-Charging | CBC | Note C-1 | TS 32.276 (VCS) |
| Status-AS-Code | NONRO | Note NC-2 | TS 32.260 (IMS) |
| TAD-Identifier | NONRO | Note NC-2 | TS 32.260 (IMS) |
| Target-App-Layer-User-Id | CBC | Note C-1 | TS 32.277 (ProSe) |
| Target-IP-Address | CBC | Note C-1 | TS 32.277 (ProSe) |
| Teleservice | CBC | Note C-1 | TS 32.276 (VCS) |
| Time-First-Reception | CBC | Note C-1 | TS 32.277 (ProSe) |
| Time-First-Transmission | CBC | Note C-1 | TS 32.277 (ProSe) |
| Time-Indicator | CBC | Note C-1 | TS 32.299 |
| Time-Window | CBC | Note C-1 | TS 32.277 (ProSe) |
| Transit-IOI-List | CBC | Note C-1 | TS 32.260 (IMS) |
| Transmitter-Info | CBC | Note C-1 | TS 32.277 (ProSe) |
| TWAG-Address | NONRO | Note NC-2 | TS 32.251 (PS) |
| TWAN-User-Location-Info | CBCDS | Note C-1 | TS 32.251 (PS) |
| UDP-Source-Port | CBC | Note C-1 | TS 32.251 (PS) |
| UE-Local-IP-Address | CBC | Note C-1 | TS 32.251 (PS) |

| AVP Name | Compliance Level | Comment | Reference |
|--|------------------|-----------|-----------------------|
| UE-Reachability-Configuration | NONRO | Note NC-2 | TS 29.336 (HSS) |
| UNI-PDU-CP-Only-Flag | CBC | Note C-1 | TS 32.251 (PS) |
| Unused-Quota-Timer | CBC | Note C-1 | TS 32.251 (PS) |
| Usage-Information-Report-Sequence-Number | NONRO | Note NC-2 | TS 32.277 (ProSe) |
| UWAN-User-Location_Info | CBCDS | Note C-1 | TS 32.251 (PS) |
| User-Location-Info-Time | NONRO | Note NC-2 | TS 29.212 (Policy Gx) |
| Variable-Part | CBC | Note C-1 | TS 32.299 |
| Variable-Part-Order | CBC | Note C-1 | TS 32.299 |
| Variable-Part-Type | CBC | Note C-1 | TS 32.299 |
| Variable-Part-Value | CBC | Note C-1 | TS 32.299 |
| VCS-Information | CBCDS | Note C-1 | TS 32.276 (VCS) |
| Visited-PLMN-Id | NONRO | Note NC-2 | TS 29.272 (MME) |
| VLR-Number | CBC | Note C-1 | TS 32.276 (VCS) |
| WLAN-Link-Layer-Id | CBC | Note C-1 | TS 32.277 (ProSe) |

Compliance Levels and Considerations

Definition of compliance levels

| Compliance Level | Meaning |
|----------------------------|--|
| Fully compliant | DCA understands and supports the AVP. Will provide the functionality intended. Where relevant, scope of compliance indicated by accompanying note. |
| Non compliant | DCA does not support the AVP. However limited AVP support can still be obtained using the DCA configuration and the feature set provided by ACS. See indicated "NC" Notes and "G" Notes. |
| Compliant by configuration | DCA does not use the AVP. However partial or full AVP support can still be obtained using DCA configuration and the feature set provided by ACS. See indicated Note(s). |
| N/A - Offline | DCA is an online charging application. The AVP is marked for use with ACR/ACA offline charging and is not applicable to DCA. See Note NC-1. |
| N/A - Non-Ro | DCA is an online charging application (Ro Interface). See Note NC-2. |

Considerations

Where a specific AVP is marked as "Compliant by configuration", the compliance level is limited by the notes below:

Note C-1

The specific AVP can be mapped through DCA AvpMapping configuration and used in the ACS control plan such as in branch decisions and inclusion in ACS generated EDRs and in various fields and records (for example, to complete the information collected for rating of the session).

Note that currently some limitations exists in the capabilities of ACS and CCS. If Convergent Charging Controller CCS Prepaid Charging is used, the specific AVP (if relevant) may be used

to select a Tariff Plan only at the start of a charging session (for example, at CCR Initial Requests for session based reservations) or for a re-engaged session* by using the ACS Tariff Plan Override control plan node. For some scenarios (for example, in a UATB Node for a non re-engaged session), the tariff plan cannot be subsequently changed mid-session. See Convergent Charging Controller *Charging Control Services User's Guide* and *Charging Control Services Technical Guide* for details.

Where applicable, "Note C-2" may also apply.

The above limitations are based on the current service logic used for rating (that is, when using the UATB node). The interface provides the flexibility to allow future customized service logic nodes (through SDK or future developments), and future product capabilities, to utilize (and set) values mid-session.

Non-complaint, if the requirements cannot be meet by any of the approaches described above:

- See Note NC-4 where applicable.
- See NC-6 for OctetString and UTF8String AVPs that contain sub-fields or are formatted using data structures not supported by DCA.

* A re-engaged session is one where DCA treats the inbound Diameter CCR Update Request as an Initial Request and creates a new charging session through ACS. An example is when a new requested unit type is received in an Update Request for an existing service. See *Diameter Control Agent Technical Guide* for full details.

DCA may be used in different network configurations:

(i) with Convergent Charging Controller Prepaid Charging/VWS and the standard UATB Node in the ACS control plans.(ii) with a convergent billing engine (Oracle BRM or third party using Convergent Charging Controller DCD)(iii) with (i) or (ii) but with Custom development (using SDK).

Limitations described here apply to (i) only.

These limitations may be non-existent in (ii) and (iii).

Note C-2

Where the specific AVP is an address, "Note C-1" above applies except that, in addition to mapping to acsProfile fields, the specific AVP may be mapped to a predefine set of INAP address fields (for example, the called or calling party number) and sent to ACS and used in the ACS control plan such as in branch decisions and inclusion in ACS generated EDRs or in various fields and records. If the AVP is mapped as an acsProfile field (for example, through Raw Data mapping), the Profile may be copied to the relevant ACS address field (for example, Session Data's calling party number or equivalent). The scope is limited by the featureset and capabilities of ACS and CCS.

If Convergent Charging Controller CCS Prepaid Charging is used, the address† (if applicable) may be used in the rating of the call when address-based CLI-DN tariffs are applied. For some scenarios (for example‡, in a UATB Node for a non re-engaged session), if the specific AVP is mapped to a location-specific address, the location information cannot be updated mid-session to change or update the tariff used for rating of the current session. The Tariff Plan (once selected at the start of the UATB session) cannot be subsequently changed mid-session.

Also, session based Convergent Charging Controller CCS Prepaid Charging when used with the Convergent Charging Controller VWS has the following limitations:

- Use of 2 addresses for CLI-DN tariffs. However, if additional addresses are to be used to determine the rating (and if inclusion of the additional information in ACS generated EDRs is not sufficient), other CCS feature have to be employed such as Tariff Plan Override.

- Use of address fields that are digits only (that is, UTF8String AVP Format) or that which where the digits can be extracted from (for example, TEL URI such as "tel:+12015550123"). The CLI-DN tariffs only deal with pure digit-based addresses. Non-digit addresses cannot be handled and have to be mapped externally before these can be used in the CLI-DN tariffs.

The above VWS-specific limitations are not applicable if BRM is used instead of Convergent Charging Controller CCS Prepaid Charging. See Note C-3. Consult BRM documentation and the Convergent Charging Controller <BCD_Tg_fn> for details.

Non-complaint, if the requirements cannot be met by any of the approaches described above; See "Note NC-4".

† Only specific numbers (for example, Calling Party or Called Party numbers) can be used for CLI-DN Rating. See *Charging Control Services Technical Guide* for details.

‡ Tariff plan override node permits configuration according to changes in location mid-call/mid-session.

However this depends on the sending of ATI messages which DCA does not currently support.

Note C-3

For outbound AVPs, fully compliant AVP values are set in the service logic.

For outbound AVPs that are compliant by configuration, user-configurable mappable values may be mapped from:

- An ACS field (for example, an acsProfile Session Data fields).
- A literal (fixed value or constant) or a literal that is dependent on the value of another AVP field or acsProfile field

In any case, the AVP mapping must be applied for a specific service.

If the outbound AVP forms a request to the Diameter client, the following restrictions apply:

- The outbound AVP is fixed to a specific outbound diameter message type as defined by the configuration. This may restrict the message sequence or scenarios required to be supported.
- The request to the diameter client in the form of outbound AVPs in the Diameter response message may result in subsequent AVPs that are "Compliant by configuration" to be sent to DCA. See Note C-1 for details, however if these inbound AVPs required.

Non-complaint, if the requirements cannot be meet by any of the approaches described above; See "Note NC-5".

Note C-4

DCA does not contain inbuilt support for envelop reporting. Partial or limited compliance may be possible by configuration and restricting the use of the AVP:

- To a specific service
- With a single set value or a limited range of values
- To specific messages or under a limited set of scenarios (message flows) only

Non-Compliance Issues

NC-1

DCA is an online charging application. AVPs associated only with offline charging are marked as "N/A". However, if the specific AVP is received, "Note C-1" can still be applied for this AVP.

NC-2

AVPs associated with non-Ro interfaces are marked as "N/A". However, if the specific AVP is received, "Note C-1" can still be applied for this AVP.

NC-3

When used with the Convergent Charging Controller VWS, DCA does not provide inbuilt support for the AoC Service. If no configuration is applied:

- DCA is able to receive AoC (Advice of Charge) AVPs in the inbound Diameter request messages (all unconfigured AVPs are simply ignored),
- DCA will not send AoC AVPs in the outbound Diameter messages.
- DCA does support Diameter Event based Price Enquiry which allows for reporting the price of the call/session separately from the call/session itself (for example, before the call).

With the appropriate configuration:

- For session based charging, sending of AoC information AVPs at the end of the call is not readily supported without configuration issues.
- For event based charging, when the Named Event node is used in the ACS control plan, DCA may be able to map the session charge into outbound AoC information AVPs but under a restricted set of conditions (See *Diameter Control Agent Technical Guide* and *Charging Control Services Technical Guide* for details).
- Sending of real-time (AoC) information (for example, to provide accumulated cost for ongoing usage every 5 seconds) is not supported. DCA is non-compliant for real-time AoC service when used with the Convergent Charging Controller VWS.
- Any Diameter responses sent will be limited by DCA's AvpMapping configuration, the ACS UATB control plan node (for Session-based charging) and "Note C-1" (above).
- When used with BRM or the Convergent Charging Controller DCD application, support for the AoC Service is dependent on the external billing or rating system. See G-2 and G-3 for details and specific limitations.

Generic capabilities and limitations for sending outbound information are summarized in Note C-3 and NC-5.

NC-4

Not compliant if the specific AVP is a context or identifier or field that requires correlation with another session for tariff determination of the current session and/or the specific AVP involves other service-specific correlation or if the charging session flow involves non-standard session-control or real-time requirement that cannot be handled by the capabilities and featureset of DCA and/or the ACS control plan.

Note that Northbound convergent billing/rating engines may offer the ability to correlate this information. The ability to do this is dependent on the capabilities of the target convergent platform. See Note G-3.

NC-5

Non compliant if the outbound AVP is a concept that ACS does not understand (that is, AVP value cannot be mapped from any available ACS field) and the AVP cannot be dealt with using the DCA AvpMapping configuration (for example, by assigning a fixed constant per applicable service to be returned in the Diameter response message).

Note however that new fields can be defined as a user-defined ACS Profile and used in the ACS control plan and subsequently mapped to an outbound AVP. This may or may not provide the level of functionality or compliance required.

NC-6

For some highly complex data structure, the DCA Raw Data AvpMapping feature may not be sufficient to provide adequate compliance (see Note G-2 for additional details).

For example, if a complex AVP contains multiple subfields and:

- only subfield-1 is required and subfield-1 is always present and always located at the start of the AVP and has a known fixed length, then this subfield can be extracted and hence DCA complies for the specific AVP.
- only subfield-8 is required, but subfield-8 does not have a known (well-defined) offset within the AVP value and it is not the first or last subfield in the AVP and it's length is variable, then it is likely that DCA would not comply for the specific AVP.

NC-7

DCA does not support non-Ro interface messages, Price Request/Response, Tariff Request/Response, Service Usage Request/Response; DCA also does not support AVPs associated with these messages. Non-compliant if AVP is received in these messages.

However Note C-1 still applies for support messages such as Credit Control Request/Response.

DCA also supports Event-based Price Enquiry when sent over the Ro interface.

General

For *all* compliance levels (including some non-compliant AVPs), the following notes apply.

Note that all "G" notes below apply to all AVPs shown in 7.1 and 7.2.

Note G-1

The AVP can be received by DCA without causing adverse conditions. If no Inbound AvpMapping is configured, DCA will simply ignore the AVP. If an Inbound AvpMapping is configured, see Note C-1.

The AVP will not be sent by DCA in outbound diameter message if no Outbound AvpMapping is configured. If an Outbound AvpMapping is configured, see Note C-3.

Note G-2

DCA Raw Data Mapping can be used to extract information (sub-fields) from AVPs that contain complex data structures. If DCA Raw Data mapping is used, the specific AVP value (or a sub-field) can be mapped from an OctetString to ACS. This feature allows unsupported AVP formats to be mapped but is limited to the capabilities of the Raw Data feature described in the *Diameter Control Agent Technical Guide*. See NC-6 for additional details.

Note G-3

The specific AVP can be passed through to the Convergent Charging Controller DCD Application to a third Party Convergent Billing Engine (using Diameter Credit-Control). Compliance would depend on the capabilities of the external Credit-Control server (The capabilities of the external Credit-Control server is out-of-scope). Also, if during mid-session (CCR Update) requests, the units (used-service-units AVP) is determined to be not sufficiently exhausted (based on specific CCS threshold parameters; see *Charging Control Services Technical Guide* for details), the SLC (CCS/ACS) may not request additional units from the external Credit-Control server. This feature may restrict timely pass-through of specific AVPs and may impact services that require proper real-time transfer of AVPs through the SLC.

Note G-4

For convergent deployments where BRM is used for rating (as opposed to VWS) compliance would depend on the capabilities of BRM (the BRM specifics are out-of-scope; consult BRM documentation for details). Also, if during mid-session (CCR Update) requests, the units (used-service-units AVP) is determined to be not sufficiently exhausted (based on specific CCS threshold parameters; see *Charging Control Services Technical Guide* for details), the SLC (CCS/ACS) may not request additional units from the BRM server. This feature may restrict timely pass-through of specific AVPs and may impact services that require proper real-time transfer of AVPs through the SLC.

Note G-5

If configured to use an external billing system, compliance would depend on the capabilities of external system and with the limitations described in Notes G-2 and G-3 above.