Alcatel-Lucent 7750

SERVICE ROUTER | RELEASE 13.0.R1

GX AVPS REFERENCE GUIDE

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Preface

About This Guide

This guide provides an overview of Gx Attribute Value Pairs (AVP). The implementation is based on Gx Release v11.12, doc 3GPP 29212-bc0.doc).

The AVP descriptions are organized per application.

The following table displays the conventions used in this guide.

Attribute	Description
0	This attribute MUST NOT be present in packet.
0+	Zero or more instances of this attribute MAY be present in packet.
0-1	Zero or one instance of this attribute MAY be present in packet.
1	Exactly one instance of this attribute MUST be present in packet.

Audience

This guide is intended for network administrators who are responsible for configuring and operating the 7750-SR routers. It is assumed that the network administrators have an understanding of networking principles and configurations, routing processes, protocols and standards.

List of Technical Publications

The 7750 SR documentation set is composed of the following guides:

- 7750 SR Basic System Configuration Guide

  This guide describes basic system configurations and operations.
- 7750 SR System Management Guide

  This guide describes system security and access configurations as well as event logging and accounting logs.
- 7750 SR Interface Configuration Guide

  This guide describes card, Media Dependent Adapter (MDA) and port provisioning.
- 7750 SR Router Configuration Guide

  This guide describes logical IP routing interfaces and associated attributes such as an IP address, as well as IP and MAC-based filtering, and VRRP and Cflowd.
- 7750 SR Routing Protocols Guide

  This guide provides an overview of routing concepts and provides configuration examples for RIP, OSPF, IS-IS, BGP, and route policies.
- 7750 SR MPLS Configuration Guide MPLS Guide

  This guide describes how to configure Multiprotocol Label Switching (MPLS) and Label Distribution Protocol (LDP).
- 7750 SR Services Overview Guide
  This guide describes how to configure service parameters such as service distribution points (SDPs), customer information, and user services.
- 7750 SR Layer 2 Services and EVPN Guide
  This guide describes Virtual Leased Lines (VLL), Virtual Private LAN Service (VPLS), Provider Backbone Bridging (PBB), and Ethernet VPN (EVPN).
- 7750 SR Layer 3 Services Guide
  This guide describes Internet Enhanced Services (IES) and Virtual Private Routed Network (VPRN) services.
- 7750 SR Versatile Service Module Guide
  This guide describes how to configure service parameters for the Versatile Service Module (VSM).
- 7750 SR OAM and Diagnostics Guide

  This guide describes how to configure features such as service mirroring and Operations, Administration and Management (OAM) tools.
- 7750 SR Triple Play Guide

This guide describes Triple Play services and support provided by the 7750 SR7450 ESS and presents examples to configure and implement various protocols and services.

- 7750 SR Quality of Service Guide

  This guide describes how to configure Quality of Service (QoS) policy management.

- 7750 SR RADIUS Attributes Guide
  This guide describes all supported RADIUS Authentication, Authorization and Accounting attributes.

- Multi-Service Integrated Service Adapter Guide

  This guide describes services provided by integrated service adapters such as Application Assurance, IPSec, ad insertion (ADI) and Network Address Translation (NAT).

- 7750 SR Gx AVPs Reference Guide

  This guide describes Gx Attribute Value Pairs (AVP).

Feedback

If you purchased a service agreement for your 7750 SR router and related products from a distributor or authorized reseller, contact the technical support staff for that distributor or reseller for assistance. If you purchased an Alcatel-Lucent service agreement, follow this link to contact an Alcatel-Lucent support representative and to access product manuals and documentation updates:

http://support.alcatel-lucent.com

Gx AVP

In This Section

This document provides an overview of supported Gx AVPs in Alcatel-Lucent's 7750 SR-OS R12.0 R4.

Topics include:

AVPs

Certain AVPs are applicable in only one direction, while others are applicable to both directions.

AVPs sent by the 7750 OS are generally used:

- to inform the PCRF of the host creation/termination and the subscriber host identity in 7750
- to inform the PCRF of the functionality supported in 7750
- to report certain events related to the subscriber-host
- to report the status of the rules
- to report usage monitoring
- to report status of the host (existent/non-existent)

AVPs sent by PCRF towards 7750 are generally used:

- to install/activate policies
- to request usage monitoring
- to terminate the subscriber-host
- to request status of the subscriber-host (existent/non-existent).

AVPs that apply to both directions are mostly used for base Diameter functionality such as peering establishment, routing of the Diameter messages, session identification and reporting of catastrophic failures (OSI change).

Reserved Keywords in 7750 OS

Table 1: Reserved Keywords in 7750 OS

Reserved Key-words in 7750	Used in AVP	Comment
ingr-v4:	charging-rule-name	Used to identify referenced object type within 7750. See Table 3, Standard Diameter AVPs (format) for further reference.
ingr-v6:	charging-rule-name	Used to identify referenced object type within 7750. See Table 3, Standard Diameter AVPs (format) for further reference.
egr-v4:	charging-rule-name	Used to identify referenced object type within 7750. See Table 3, Standard Diameter AVPs (format) for further reference.
egr-v6:	charging-rule-name	Used to identify referenced object type within 7750. See Table 3, Standard Diameter AVPs (format) for further reference.
in-othr-v4:	charging-rule-name	Used to identify referenced object type within 7750. See Table 3, Standard Diameter AVPs (format) for further reference.
in-othr-v6:	charging-rule-name	Used to identify referenced object type within 7750. See Table 3, Standard Diameter AVPs (format) for further reference.
sla-profile:	charging-rule-name	Used to identify referenced object type within 7750. See Table 3, Standard Diameter AVPs (format) for further reference.
sub-profile:	charging-rule-name	Used to identify referenced object type within 7750. Table 3, Standard Diameter AVPs (format) for further reference.
inter-dest:	charging-rule-name	Used to identify referenced object type within 7750. See Table 3, Standard Diameter AVPs (format) for further reference.
cat-map:	charging-rule-name	Used to identify referenced object type within 7750. See Table 3, Standard Diameter AVPs (format) for further reference.
aa-functions:	adc-rule-name, charging-rule-name	Used to identify referenced object type within 7750. See Table 3, Standard Diameter AVPs (format) for further reference.
aa-UM	charging-rule-name	Used to identify referenced object type within 7750. See Table 3, Standard Diameter AVPs (format) for further reference.

Standard Diameter AVPs

Legend/Notes

Applications to which described AVPs apply:

- Gx-PM-ESM — Policy Management for Enhanced Subscriber management
- Gx-UM-ESM — Usage Monitoring for Enhanced Subscriber Management
- Gx-PM-AA — Policy Management for Application Assurance
- Gx-UM-AA — Usage Monitoring Application Assurance

The AVPs that do not have application associated with it in the table, are AVPs that are used for generic purpose and their use can extend through all applications.

Table 2: Standard Diameter AVPs (description)

AVP ID	AVP Name	Section Defined	Application	Description
5	NAS-Port	RFC 2865 / §5.5 RFC 4005 / §4.2		Refer to *SR-OS RADIUS Attribute Reference Guide*.
8	Framed-IP-Address	RFC 4005 / §6.11.1		The IPv4 address of the subscriber host. The IPv4 address is obtained prior to Gx session establishment. The IPv4 address cannot be assigned to the subscriber host by PCRF via Gx but is instead used only for reporting.
25	Class	RFC 2865 / §5.25		This attribute is available to be sent by the PCRF to the 7750 and is echoed unmodified by the 7750 to the PCRF. The 7750 does not interpret this attribute locally.
30	Called-Station-Id	RFC 2865 / §5.30 RFC 4005 / §4.5		Refer to the *SR-OS RADIUS Attribute Reference Guide*.
31	Calling-Station-ID	RFC 4005 / §4.6		Refer to the *SR-OS RADIUS Attribute Reference Guide*.
55	Event-Timestamp	RFC 6733 / §8.21		Record the time that this event occurred on the 7750, in seconds since January 1, 1970 00:00 UTC

Table 2: Standard Diameter AVPs (description) (Continued)

AVP ID	AVP Name	Section Defined	Application	Description
61	NAS-Port-Type	RFC 2865 / §5.41 RFC 4005 / §4.4 RFC 4603		Refer to the *SR-OS RADIUS Attribute Reference Guide*.
87	NAS-Port-Id	RFC 2869 / §5.17 RFC 4005 / §4.3		Refer to the *SR-OS RADIUS Attribute Reference Guide*.
92	NAS-Filter-Rule	RFC 4849	Gx-PM-ESM	Refer to the *SR-OS RADIUS Attribute Reference Guide*. This AVP is nested within Charging-Rule-Definition AVP.
97	Framed-IPv6-Prefix	RFC 4005 / §6.11.6		IPv6-prefix/prefix-length that is assigned to the host via SLAAC (Router Advertisement) to the WAN side of the user. The IPv6-prefix/prefix-length is obtained prior to Gx session establishment. The facilities to provide the IPv6-prefix/prefix-length to the subscriber-host are DHCP server/local pools, RADIUS or LUDB. The IPv6-prefix/prefix-length cannot be assigned to the subscriber host by PCRF via Gx. Instead the IPv6-prefix/prefix-length is the one being reported to the PCRF during the host instantiation phase.
123	Delegated-IPv6-Prefix	RFC 4818		Attribute that carries the Prefix (ipv6-prefix/prefix-length) assigned to the host via DHCPv6 (IA-PD) for the LAN side of the user (IPoE, PPPoE). The IPv6-prefix/prefix-length is obtained prior to Gx session establishment. The facilities to provide the IPv6-prefix/prefix-length to the subscriber-host are DHCP server/local pools, RADIUS or LUDB. The IPv6-prefix/prefix-length cannot be assigned to the subscriber host by PCRF via Gx. Instead the IPv6-prefix/prefix-length is the one being reported to the PCRF during the host instantiation phase.

Table 2: Standard Diameter AVPs (description) (Continued)

AVP ID	AVP Name	Section Defined	Application	Description
257	Host-IP-Address	RFC 6733 / §5.3.5		Host-IP-Address AVP is used to inform a Diameter peer of the sender's IP address. The IPv4 address used is the one configured in the *diameter-peer-policy*. If none is configured, then system-ip address is used.
258	Auth-Application-Id	RFC 6733 / §6.8		This AVP indicates supported Diameter applications. The application support is exchanged in CER/CEA when the peering sessions is established. The diameter base protocol does not require application id since its support is mandatory. The Gx application id value is 16777238 and it is advertised in Auth-Application-Id AVP within the grouped Vendor-Specific-Application-Id AVP in CER message. In addition, each Gx specific message carries Auth-Application-Id AVP with the value of 16777238.
260	Vendor-Specific-Application-Id	RFC 6733 / §6.11		This is a grouped AVP that is used to advertise support of a vendor-specific Diameter application in CER/CEA messages. Gx is one such application. This AVP contains the vendor-id AVP of the application and the auth-application-id AVP.
263	Session-id	RFC 6733 / §8.8		This AVP must be present in all messages and it is used to identify a specific IP-Can session. IP-Can session corresponds to a subscriber **host**, which can be DHCPv4/v6, PPPoX or ARP host. Session-id AVP is unique per host. Dual stack host (IPoE or PPPoX) share a single session-id.
264	Origin-Host	RFC 6733 / §6.3		This AVP must be present in all messages and it is used to identify the endpoint (Diameter peer) that originated the message.

Table 2: Standard Diameter AVPs (description) (Continued)

AVP ID	AVP Name	Section Defined	Application	Description
265	Supported-Vendor-Id	RFC 6733 / §5.3.6		This AVP is used in CER/CEA messages in order to inform the peer that the sender supports a subset of) the vendor-specific AVPs defined by the vendor identified in this AVP. Supported vendors in 7750 are: 3GPP — 10415 ETSI — 13019 ALU — 6527 BBF — 3561
266	Vendor-Id	RFC 6733 / §5.3.3		The value of this AVP is the IANA assigned code to a specific vendor. This AVP may be part of the Vendor-Specific-Application-Id AVP, Failed-AVP AVP, Experimental-Result AVP to identify the vendor associated with the relevant message/ AVP. In case of a standalone vendor-id AVP (outside of any grouped AVP) that is conveyed in CER/CEA messages, it is envisioned that this AVP along with the Product-Name AVP and the Firmware-Revision AVP may provide useful debugging information. Supported vendor-id AVPs in 7750 are: 3GPP — 10415 ETSI — 13019 ALU — 6527
267	Firmware-Revision	RFC 6733 / §5.3.4		SROS version is reported.
268	Result-Code	RFC 6733 / §7.1		This AVP indicates whether a particular request was completed successfully or an error occurred. All *answer* messages in Diameter/Gx MUST include one Result-Code AVP or Experimental-Result AVP. For the list of supported error codes see Table 9, Result Codes (Result-Code AVP) on page 55.
269	Product-Name	RFC 6733 / §5.3.7		Vendor assigned name.

Table 2: Standard Diameter AVPs (description) (Continued)

AVP ID	AVP Name	Section Defined	Application	Description
278	Origin-State-Id	RFC 6733 / §8.16		This AVP is used to inform the PCRF of the loss of the state on the 7750 side. Its value monotonically increases each time the PCRF is rebooted with the loss of the previous state. Since Gx sessions are not persistent in 7750, Origin-State-Id increases each time 7750 is rebooted.
279	Failed-AVP	RFC 6733 / §7.5		This is a grouped AVP that provides debugging information in cases where a request is rejected or not fully processed due to the erroneous information in specific AVP. The value of the Result-Code AVP will provide information on the reason for the Failed-AVP AVP. The Failed-AVP AVP contains the entire AVP that could not be processed successfully.
281	Error-Message	RFC 6733 / §7.3		This AVP provides more information of the failure that is indicated in the Result-Code AVP.
283	Destination-Realm	RFC 6733 / §6.6		This AVP represents the realm to which this message is to be routed. The value of this AVP is either explicitly configured in 7x50.
285	Re-Auth-Request-Type	RFC 6733 / §8.12		This AVP is mandatory in RAR requests. The content of this AVP is ignored by 7x50.
293	Destination-Host	RFC 6733 / §6.5		This AVP represents the host to which this message is to be sent. The value of this AVP can be explicitly configured. In case that it is omitted, the DRA (Diameter relay-agent) that receives the message will select the destination host to which the message will be sent.
295	Termination-Cause	RFC 6733 / §8.15		This AVP is used to indicate the reason why a session was terminated on the 7750. The supported termination causes in the 7750 are given in Table 12, Termination Causes (Termination-Cause AVP) on page 6012.
296	Origin-Realm	RFC 6733 / §6.4		This AVP contains the realm of the originator of message. In the 7750, the Origin-Realm is explicitly configured per Diameter peer.

Table 2: Standard Diameter AVPs (description) (Continued)

AVP ID	AVP Name	Section Defined	Application	Description
297	Experimental-Result	RFC 6733 / §7.6		This is a grouped AVP that indicates whether a particular vendor-specific request completed successfully or whether an error occurred. It contains a vendor-assigned value representing the result of processing a request. The result-code AVP values defined in Diameter Base RFC (6733, §7.1) are also applicable to Experimental-Result AVP. For a list of Gx specific Experimental-Result-Code values supported in 7750, see the Table 9, Result Codes (Result-Code AVP) on page 55. For Gx application, the vendor-id AVP is set to 10415 (3GPP). All answer messages defined in vendor-specific application must include either one Result-Code AVP or one Experimental-Result AVP.
298	Experimental-Result-Code	RFC 6733 / §7.7 29.214 / §5.5		Vendor-assigned (3GPP ⟷ Gx) values representing the result of processing the request. For a list of 7750 supported values for Gx refer to Table 9, Result Codes (Result-Code AVP) on page 55
302	Logical-Access-Id	ETSI TS 283 034 / §7.3.3 BBF TR-134 (§7.1.4.1)		This AVP contains information describing the subscriber agent circuit identifier corresponding to the logical access loop port of the Access Node from which the subscriber's requests are initiated, namely: • *circuit-id* from DHCPv4 Option (82,1) • *circuit-id* from PPPoE tag (0x105, 0x00000de9 [dsl forum], 0x01 — DSL Forum TR-101) • *interface-id* from DHCPv6 option 18. The vendor-id in CER is set to ETSI (13019).

Table 2: Standard Diameter AVPs (description) (Continued)

AVP ID	AVP Name	Section Defined	Application	Description
313	Physical-Access-Id	ETSI TS 283 034 / §7.3.14 BBF TR-134 (§7.1.4.1)		This AVP contains information about the identity of the physical access to which the user device is connected, namely: • *remote-id* from DHCPv4 Option (82,2) • *remote-id* from PPPoE tag (0x105, 0x00000de9 [dsl forum], 0x02 — DSL Forum TR-101) • *remote-id* from DHCPv6 option 37. The vendor-id in CER is set to ETSI (13019).
412	CC-Input-Octets	RFC 4006 / §8.24	Gx-UM-ESM Gx-UM-AA	This AVP contains the number of requested, granted or used octets from the user.
414	CC-Output-Octets	RFC 4006 / §8.25	Gx-UM-ESM Gx-UM-AA	This AVP contains the number of requested, granted or used octets towards the user.
415	CC-Request-Number	RFC 4006 / §8.2		This AVP identifies each request within one session. Each request within a session has a unique CC-Request-Number that is used for matching requests with answers.
416	CC-Request-Type	RFC 4006 / §8.3		This AVP identifies the request type: INITIAL_REQUEST (CCR-I) UPDATE_REQUEST (CCR-U) TERMINATION_REQUEST (CCR-T)
421	CC-Total-Octets	RFC 4006 / §8.23	Gx-UM-ESM Gx-UM-AA	This AVP contains the number of requested, granted or used octets regardless of the direction (sent or received).
431	Granted-Service-Unit	RFC 4006 / §8.17	Gx-UM-ESM Gx-UM-AA	Grouped AVP sent by PCRF to the 7750 for usage monitoring purposes. Once the granted amount of units is consumed by the user, a report is sent from the 7750 to the PCRF. The amount of consumed units can be measured on three different levels: • session level (host level) • PCC rule level (credit category in 7750) • ADC rule level (AA level in 7750)
443	Subscription-Id	RFC 4006 / §8.46		This AVP is of type grouped and is used to identify the subscriber host in 7750. The nested AVPs are *subscription-id-data* and *subscription-id-type*.

Table 2: Standard Diameter AVPs (description) (Continued)

AVP ID	AVP Name	Section Defined	Application	Description
444	Subscription-Id-Data	RFC 4006 / §8.48		This AVP is part of the subscription-id AVP and is used to identify the host by: • Circuit-id • Dual-stack-remote-id • Imei • Imsi • Mac of the host • Msisdn • Subscriber-id • Username (ppp-username or a string returned in the Username attribute via RADIUS or NASREQ) Subscription **type** (*subscription-id-type* AVP) has to be explicitly set via CLI. The data will be formatted according to the type set.
446	Used-Service-Unit	RFC 4006 / §8.19	Gx-UM-ESM Gx-UM-AA	This AVP is of type grouped and it represents the measured volume threshold for usage monitoring control purposes. It is sent in the Usage-Monitoring-Report AVP from the 7750 to the PCRF when the granted unit threshold is reached or in response to a usage-report request from the PCRF.
450	Subscription-Id-Type	RFC 4006 / §8.47		This AVP is used to determine which type of identifier is carried by the subscription-id AVP. The following formats (types) are supported in 7750: • E.164 format (ITU-T E.164) • IMSI format (ITU-T E.212) • NAI format (RFC 2486) • Private format
458	User-Equipment-Info	RFC 4006 / §8.49		This is a grouped AVP that carries information about the identity and the capabilities of the host.

Table 2: Standard Diameter AVPs (description) (Continued)

AVP ID	AVP Name	Section Defined	Application	Description
459	User-Equipment-Info-Type	RFC 4006 / §8.50		This AVP is nested within the User-Equipment-Info AVP. The following types are supported in 7750: • IMEISV – contains the IMEI and software version according to 3GPP TS 23.003 document. • MAC address • Eui64 based on 48-bit MAC address with 0xfffe inserted in the middle. • Modified_eui64 — similar to eui64 but with inverted 'u' bit as defined in: **http://standards.ieee.org/develop/regauth/tut/eui64.pdf** and RFC 4291.
460	User-Equipment-Info-Value	RFC 4006 / §8.51		This AVP carries the value that is defined by the User-Equipment-Info-Type AVP.
515	Max-Requested-Bandwidth-DL	29.214 / §5.3.14	Gx-PM-ESM	Depending on the context in which it is configured (nested), this AVP represents the egress PIR of a queue or a policer.
516	Max-Requested-Bandwidth-UL	29.214 / §5.3.15	Gx-PM-ESM	Depending on the context in which it is configured (nested), this AVP represents the ingress PIR of a queue or a policer.
628	Supported-Features	29.229 / §6.3.29 29.212 / §5.4.1		This is a grouped AVP that is used during Gx session establishment to inform the destination host about the required and optional features that the origin-host supports. 7x50 will advertise the support for the following: • Gx Rel 8,9,10,11, 12 • ADC 7x50 sends this AVP with M-bit cleared. This AVP is ignored when received by 7x50.

Table 2: Standard Diameter AVPs (description) (Continued)

AVP ID	AVP Name	Section Defined	Application	Description
629	Feature-List-Id	29.229 / §6.3.30		This AVP contains the identity of a feature list. This AVP allows differentiation between multiple feature lists in case that an application has multiple feature lists defined. Gx reference point has only one feature list defined (feature-list-id = 1). The vendor-id is set to 10415 (3GPP).
630	Feature-List	29.229 / §6.3.31		This AVP contains a bitmask indicating the supported feature in Gx. The Gx features in feature-list 1 are defined in 3GPP TS 29.212, §5.4.1, table 5.4.1.1. 7x50 advertises the support for the following features: • Gx Rel 8,9,10, 11 • ADC
1001	Charging-Rule-Install	29.212 / §5.3.2		This AVP is of type grouped and is used to install or modify PCC rules in 7x50 as instructed by PCRF. Each rule that is to be instantiated is identified by the charging-rule-name AVP. Multiple rules can be installed in a single Charging-Rule-Name directive. The rules can be pre-defined in 7750, in which case the Charging-Rule-Install directive will be used to activate (instantiate) them by referencing their name as locally defined. Alternatively, the already active rules can be modified (overrides) by defining the override within the Charging-Rule-Definition AVP which is then nested inside of the Charging-Rule-Install AVP.
1003	Charging-Rule-Definition	29.212 / §5.3.4		This AVP is of type grouped and is used for rule overrides. It contains nested AVPs that define the overrides (rate changes of a subscriber, a queue or a policer, etc). The override defined by the Charging-Rule-Definition is instantiated via Charging-Rule-Install AVP.

Table 2: Standard Diameter AVPs (description) (Continued)

AVP ID	AVP Name	Section Defined	Application	Description
1005	Charging-Rule-Name	29.212 / §5.3.6		This AVP is used to: • Reference a predefined rule in 7750 for the purpose of: - rule activation within Charging-Rule-Install AVP sent from the PCRF to the 7750 - rule status reporting within Charging-Rule-Report AVP sent from 7750 to the PCRF • Name the rule override in Charging-Rule-Definition AVP sent from the PCRF to the 7750. This name is then used on the 7750 to report the rule status in Charging-Rule-Report AVP sent from the 7750 to the PCRF.
1006	Event-Trigger	29.212 / §5.3.7		This AVP can be sent from the PCRF to subscribe to a particular event in 7750. When certain events occur on the 7750, they will be reported to the PCRF in the related AVP along with the event trigger indication. The supported events are listed in Table 11, Event Triggers (Event-Trigger AVP) on page 59.
1016	QoS-Information	29.212 / §5.3.16	Gx-PM-ESM	This AVP is used to define QoS overrides that can be submitted from PCRF to the 7750. The overrides are nested in Charging-Rule-Definition AVP and are activated in 7750 via Charging-Rule-Install AVP. The supported QoS overrides are: • Queue rates, bursts size and weight • Policer rates and burs size • Subscriber egress aggregate rate limit • Arbiter rates

Table 2: Standard Diameter AVPs (description) (Continued)

AVP ID	AVP Name	Section Defined	Application	Description
1018	Charging-Rule-Report	29.212 / §5.3.18		This AVP is of type grouped and is used to report the status of PCC rules in 7750. **Failure** to install or activate one or more policy rules will be always reported in CCR-u messages. One or more Charging-Rule-Report AVP(s) in CCR-u command will be included, indicating the failed rules. The report about **successful** rule activation or rule resource allocation is not sent to the PCRF even in the cases when the PCRF specifically demands such reports from 7750.
1019	PCC-Rule-Status	29.212 / §5.3.19		This AVP describes the status of the rules as active or inactive and is nested within the Charging-Rule-Report AVP.
1025	Guaranteed-Bitrate-DL	29.212 / §5.3.25	Gx-PM-ESM	Depending on the context in which it is configured (nested), this AVP represents the egress CIR of a queue or a policer.
1026	Guaranteed-Bitrate-UL	29.212 / §5.3.26	Gx-PM-ESM	Depending on the context in which it is configured (nested), this AVP represents the ingress CIR of a queue or a policer.
1027	IP-CAN-Type	29.212 / §5.3.27		This AVP indicates the type of Connectivity Access Network in which the user is connected. The supported value in 7750 is xDSL (code 2).
1031	Rule-Failure-Code	29.212 / §5.3.38		This AVP is sent from 7750 to the PCRF within a Charging-Rule-Report or ADC-Rule-Report AVP to identify the reason a rule is being reported. For the list of supported failure codes in 7750, please see Table 10, Rule Failure Codes (Rule-Failure-Code AVP) on page 58.
1032	RAT-Type	29.212 / §5.3.31		This AVP is used to identify the radio access technology that is serving the UE. This is used for WiFi users and the supported value in 7750 is WLAN(0).

Table 2: Standard Diameter AVPs (description) (Continued)

AVP ID	AVP Name	Section Defined	Application	Description
1045	Session-Release-Cause	29.212 / §5.3.33	Gx-PM-ESM Gx-PM-AA	This AVP is used to terminate the Gx session from the PCRF side. The reason for session termination will be included in this AVP. The reason for the session termination is ignored by 7x50.
1050	AN-GW-Address	29.212 / § 5.3.49		This AVP is the system IPv4 address of 7x50.
1066	Monitoring-Key	29.212 / §5.3.59	Gx-UM-ESM Gx-UM-AA	This AVP is used for usage monitoring control purposes as an identifier to a usage monitoring control instance. It will identify the usage monitoring entity on a level provided by the usage-monitoring-level AVP: • If the level is *IP-CAN session*, then the monitoring-key is an arbitrary octet string set by the PCRF – usage monitoring is performed for the entire IP-CAN session (which represent a host/sla-profile instance) • If the level is pcc rule, then the monitoring-key must refer to the predefined category (name) in 7750 that is being monitored. • If the level is adc rule, then the monitoring-key is an arbitrary unique name that refers to a unique Tdf-App-Id defined in an Adc-Rule. There can be up to 3 monitoring-keys in a single Gx messages.
1067	Usage-Monitoring-Information	29.212/ §5.3.60	Gx-UM-ESM Gx-UM-AA	This AVP is of type grouped and it contains the usage monitoring control information. It is used to activate usage monitoring and grant service units when it is sent from the PCRF towards 7750. 7750 will use this AVP to report usage monitoring to the PCRF.

Table 2: Standard Diameter AVPs (description) (Continued)

AVP ID	AVP Name	Section Defined	Application	Description
1068	Usage-Monitoring-Level	29.212 / §5.3.61	Gx-UM-ESM Gx-UM-AA	This AVP is sent by PCRF to indicate the level on which usage monitoring is performed in 7750: • IP-CAN session level • PCC rule level • ADC rule level If usage-monitoring-level AVP is not provided, its absence indicates the pcc rule level usage monitoring.
1069	Usage-Monitoring-Report	29.212 / §5.3.62	Gx-UM-ESM Gx-UM-AA	This AVP is sent by the PCRF to indicate that the accumulated usage monitoring is to be reported by the 7750 regardless of whether a usage monitoring threshold is reached. In other words, this AVP indicated immediate request for a usage monitoring report. A single value for this AVP is defined: 0 — usage_monitoring_report_required
1070	Usage-Monitoring-Support	29.212 / §5.3.63	Gx-UM-ESM Gx-UM-AA	This AVP is sent by the PCRF to indicate whether the usage monitoring will be disabled for certain monitoring key. The following value is defined: 0 — usage_monitoring_disabled When usage-monitoring is disabled for a certain monitoring-key in this fashion, 7750 will generate a new CCR-u with the event-trigger AVP set to 'usage_report' to report the accumulated usage for the disabled usage monitoring entities.
1088	TDF-Application-Identifier	29.212/ §5.3.77	Gx-UM-AA	This AVP is of type OctetString. This AVP can be used in both PCC and ADC rules. For AA, this identifier is a reference to a preconfigured charging-group, app-group or application.
1092	ADC-Rule-Install	29.212 / §5.3.85	Gx-PM-AA Gx-UM-AA	This AVP is of type grouped and is used to install or modify ADC (AA) rules in 7750 as instructed by the PCRF.

Table 2: Standard Diameter AVPs (description) (Continued)

AVP ID	AVP Name	Section Defined	Application	Description
1093	ADC-Rule-Remove	29.212/ §5.3.86	Gx-PM-AA Gx-UM-AA	This AVP is of type Grouped, and it is used to deactivate or remove ADC rules in 7750 as instructed from the PCRF.
1094	ADC-Rule-Definition	29.212 / §5.3.87	Gx-PM-AA Gx-UM-AA	This AVP is of type grouped and it contains the rules that are to be activated. AA rules that can be applied to a subscriber via Gx are: • Application-profile activation/ override. A preexisting application-profile must be defined in 7750. • Application characteristic overrides. • Monitoring Key and a TDF-Application-Identifier. This installation of this rule has the effect of creating a usage monitoring instance for the subscriber for the given TDF-Application-Identifier.
1096	ADC-Rule-Name	29.212 / §5.3.89	Gx-PM-AA Gx-UM-AA	Name of ADC rule that is applied. This is an arbitrary string assigned by the PCRF and is used by the 7750 to report the rule status. In case that AA-Functions AVP is used (app-profile and ASO assignment/modification), this arbitrary name string must be prepended with a 7750 reserved keyword **"AA-Functions:"**
1097	ADC-Rule-Report	29.212 / §5.3.90	Gx-PM-AA Gx-UM-AA	This AVP is of type grouped and is used to report the status of ADC rules which cannot be activated or enforced in 7750.

Standard Diameter AVPs (format)

Legend/Notes

Incl/Excl – attribute can be suppressed via CLI

Flags (as set by 7750 when the AVP is constructed):

- V — Vendor specific bit
- M — Mandatory bit
- P — This bit is always set to 0

UTF8String is a human-readable string using UTF-8 transformation format (which is for 7-bit encoding the same as US-ASCII).

OctetString is a basic data type which contains an arbitrary data. For example class AVP is OctetString according to RFC 6733, *Diameter Base Protocol*, but in 7750 it is displayed as readable string (UTF8String).

Flags for Gx specific AVPs are defined in RFC6733, §4.5; 29.212, §5.3.

Flags for the Gx re-used AVPs will be set as described in RFC6733, §4.5 and in 3GPP 29.219, §5.4 — "The AVPs from Diameter base protocol are not included in table 5.4, but they are re-used for the Gx reference point. Unless otherwise stated, re-used AVPs shall maintain their 'M', 'P' and 'V' flag settings. Where 3GPP RADIUS VSAs are re-used, unless otherwise stated, they shall be translated to Diameter AVPs as described in RFC 4005 [12], *Diameter Network Access Server Application, Security Considerations,* with the exception that the 'M' flag shall be set and the 'P' flag may be set".

The ALU vendor-specific attributes will have the M-bit cleared.

NA — This keyword (Not Advertised) denotes that the AVP is not originated by 7750 and thus the 7750 does not set the flag bits. However, the 7750 will recognize the AVPs and corresponding values listed in the table, regardless of the M-bit flags set by PCRF. However, if the V-bit is present in the received AVP, then the Vendor-Id filed in the AVP layout also must be present and set to a proper value since the AVP with V-bit set is identified by the <avp-id, vendor-id> pair.

Table 3: Standard Diameter AVPs (format)

AVP ID	AVP Name	Incl/ Excl	Type	Flags	Limits	Format
5	NAS-Port	Yes	Unsigned32	M	4 octets	Refer to *SR-OS RADIUS Attribute Reference Guide*.
8	Framed-IP-Address	No	OctetString	M	4 octets	For example: ip-address 10.11.12.13 Framed-IP-Address = 0a0b0c0d As defined in RFC 4005, §6.11.1.
25	Class	No	OctetString	M	253 chars	Refer to *SR-OS RADIUS Attribute Reference Guide*.
30	Called-Station-Id	Yes	UTF8String	M	64 chars	For example: Called-Station-Id = mac:ssid or mac only if ssid is not available.
31	Calling-Station-ID	Yes	UTF8String	M	64 chars	llid|mac|remote-id|sap-id|sap-string (64 char. string configured at sap-level) For example: include-avp calling-station-id sap-id Calling-Station-Id = 1/1/2:1.1
55	Event-Time stamp	No	Time	M	4 octets	Refer to *SR-OS RADIUS Attribute Reference Guide*.
61	NAS-Port-Type	Yes	Enumerated	M	4 octets	The values for this attribute are defined in the RFC 2865, 4005 and 4603. Refer to *SR-OS RADIUS Attribute Reference Guide*.
87	NAS-Port-Id	Yes	UTF8String	M	253 octets	Refer to *SR-OS RADIUS Attribute Reference Guide*.
92	NAS-Filter-Rule	NA	UTF8String	NA	Max 10 attributes per message or max 10 filter entries per message.	Refer to *SR-OS RADIUS Attribute Reference Guide*.

Table 3: Standard Diameter AVPs (format) (Continued)

AVP ID	AVP Name	Incl/ Excl	Type	Flags	Limits	Format
97	Framed-IPv6-Prefix	No	OctetString	M		SLAAC wan-host <ipv6-prefix/prefix-length> with prefix-length 64 The AVP layout is: <1 octet Reserved> <1 octet Length> <max 16 octets for Prefix>
123	Delegated-IPv6-Prefix	No	OctetString	M		<ipv6-prefix/prefix-length> with prefix-length [48..64] The AVP layout is: <1 octet Reserved> <1 octet Length> <max 16 octets for Prefix>
257	Host-IP-Address	No	Address	M		IPv4 Address
258	Auth-Application-Id	No	Unsigned32	M		For example: Gx Auth-Application-Id = 16777238
260	Vendor-Specific-Application-Id	No	Grouped	M		This AVP contains the: Vendor-Id AVP and Auth-Application-Id AVP. For Gx, the vendor-id = 10415 (3GPP) and the Auth-Application-Id = 16777238.
263	Session-id	No	UTF8String	M	102 bytes	The session-id must be globally and eternally unique. The format of the session-id is the following: <DiameterIdentity>;<high 32 bits>;<low 32 bits> In 7750 the session-id is defined as: diameter-identity;boxuptime; seq-number For example: router.workstation.be;1391362206;1
264	Origin-Host	No	DiameterIdentity	M	80 bytes	Example: Origin-Host = host-name-1@domain-name-1
265	Supported-Vendor-Id	No	Unsigned32	M		IANA assigned vendor number: 3GPP — 10415 ETSI — 13019 ALU — 6527

Table 3: Standard Diameter AVPs (format) (Continued)

AVP ID	AVP Name	Incl/ Excl	Type	Flags	Limits	Format
266	Vendor-Id	No	Unsigned32	M		IANA assigned vendor number: 3GPP — 10415 ETSI — 13019 ALU — 6527 BBF — 3561
267	Firmware-Revision	No	Unsigned32	-		Reference to the major/minor release version. For example: 805 — Release 8R5
268	Result-Code	No	Unsigned32	M		See Table 9, Result Codes (Result-Code AVP) on page 55 with Error Codes.
269	Product-Name	No	UTF8String	-		Vendor-assigned name for the product. Example: “SR-OS”
278	Origin-State-Id	No	Unsigned32	M		For example: Origin-State-Id = 10
279	Failed-AVP	No	Grouped	M		This AVP contains the AVP that could not be processed successfully.
281	Error-Message	No	UTF8String	-		String describing the cause of the failure.
283	Destination-Realm	No	DiameterIdentity	M	80 bytes	Example: Destination-Realm = domain.com
285	Re-Auth-Request-Type	No	Enumerated	NA		This AVP is always received in RAR message and it is never sent by 7750. 0 — AUTHORIZE_ONLY 1 — AUTHORIZE_AUTHNETICATE Example: Re-Auth-Request-Type = 0
293	Destination-Host	No	DiameterIdentity	M	80 bytes	Operator configurable.
295	Termination-Cause	No	Enumerated	M		For a list of 7750 supported values for Gx refer to Table 12, Termination Causes (Termination-Cause AVP) on page 60
296	Origin-Realm	No	DiameterIdentity	M	80 bytes	Example: Origin-Realm = origin-domain.com

Table 3: Standard Diameter AVPs (format) (Continued)

AVP ID	AVP Name	Incl/ Excl	Type	Flags	Limits	Format
297	Experimental-Result	No	Grouped	V,M		• A grouped AVP containing: Vendor-Id AVP • Experimental-Result-Code AVP For example: Experimental-Result = {Vendor-id = 10415 (3GPP) Experimental-Result-Code = DIAMETER_PCC_RULE_EVENT (5142)}
298	Experimental-Result-Code	No	Unsigned32	M		For a list of 7750 supported values for Gx refer to Table 9, Result Codes (Result-Code AVP) on page 55.
302	Logical-Access-Id	Yes	OctetString	V		Vendor ID = 13019 (ETSI)
313	Physical-Access-Id	Yes	UTF8String	V		Vendor ID = 13019 (ETSI)
412	CC-Input-Octets	No	Unsigned64	M		Example: CC-Input-Octets = 1000000
414	CC-Output-Octets	No	Unsigned64	M		Example: CC-Output-Octets = 1000000
415	CC-Request-Number	No	Unsigned32	M		Monotonically increasing from 0 for all requests within one session.
416	CC-Request-Type	No	Enumerated	M		Example: CC-Request-Type = 1 (CCR-i) CC-Request-Type = 2 (CCR-u) CC-Request-Type = 3 (CCR-t)
421	CC-Total-Octets	No	Unsigned64	M		Example: CC-Total-Octets = 2000000
431	Granted-Service-Unit	No	Grouped	M		This AVP can contain the following AVPs: • CC-Total-Octets • CC-Input-Octets • CC-Output-Octets
443	Subscription-Id	Yes	Grouped	M		This AVP contains the following AVPs: • Subscription-Id-Type • Subscription-Id-Data

Table 3: Standard Diameter AVPs (format) (Continued)

AVP ID	AVP Name	Incl/ Excl	Type	Flags	Limits	Format
444	Subscription-Id-Data	Yes	UTF8String	M		Example: Username — Subscription-Id-Data = u ser1@domain.com Mac — Subscription-Id-Data = 11:22:33:44:55:66 Circuit-id — Subscription-Id-Data = dslam1 eth 2/1:100 Dual-stack-remote-id — Subscription-Id-Data = myRemoteId Subscriber-id — Subscription-Id-Data = sub-id-1 Imsi Subscription-Id-Data = 204047910000598 Msisdn Subscription-Id-Data = 13109976224 Imei — Subscription-Id-Data = 356938035643809
446	Used-Service-Unit	No	Grouped	M		This AVP contains the following AVPs: • CC-Total-Octets • CC-Input-Octets • CC-Output-Octets
450	Subscription-Id-Type	Yes	Enumerated	M		Example: Subscription-Id-Type = 0 (end_user_e164) Subscription-Id-Type = 1 (end_user_imsi) Subscription-Id-Type = 3 (end_user_nai) Subscription-Id-Type = 4 (end_user_private)
458	User-Equipment-Info	Yes	Grouped	M		This AVP contains the following AVPs: • User-Equipment-Info-Type • User-Equipment-Info-Value
459	User-Equipment-Info-Type	Yes	Enumerated	-		Example: User-Equipment-Info-Type = 0 (emissive User-Equipment-Info-Type =1 (mac) User-Equipment-Info-Type = 2 (eui64) User-Equipment-Info-Type = 3 (modified_eui64)
460	User-Equipment-Info-Value	Yes	OctetString	-		

Table 3: Standard Diameter AVPs (format) (Continued)

AVP ID	AVP Name	Incl/ Excl	Type	Flags	Limits	Format
515	Max-Requested-Bandwidth-DL	No	Unsigned32	NA, V		The units of this parameter are *kbps*. The rate accounts for the IP header and above (no L2 header). Vendor-ID = 10415 (3GPP) Example: Max-Requested-Bandwidth-DL = 1000 — 1mbps
516	Max-Requested-Bandwidth-UL	No	Unsigned32	NA, V		The units of this parameter are *kbps*. The rate accounts for the IP header and above (no L2 header). Vendor-ID = 10415 (3GPP) Example: Max-Requested-Bandwidth-UL = 1000 — 1mbps
628	Supported-Features	No	Grouped	V		This AVP contains the following AVPs: • Vendor-Id • Feature-List-Id • Feature-List Vendor-ID = 10415 (3GPP) Example: Supported-Features • {Vendor-Id = 10415 3GPP • Feature-List-Id = 1 • Feature-List = 72}
629	Feature-List-Id	No	Unsigned32	V		Vendor-ID = 10415 (3GPP) Example: Feature-List-Id = 1 Feature-List-Id of 1 is defined in 29.212 / §5.4.1, table 5.4.1.1.
630	Feature-List	No	Unsigned32	V		Vendor-ID = 10415 (3GPP) Example: Feature-List = 262219.
1001	Charging-Rule-Install	No	Grouped	NA, V		Vendor-ID = 10415 (3GPP) This AVP contains the following AVPs: • Charging-Rule-Definition • Charging-Rule-Name

Table 3: Standard Diameter AVPs (format) (Continued)

AVP ID	AVP Name	Incl/ Excl	Type	Flags	Limits	Format
1003	Charging-Rule-Definition	No	Grouped	NA, V		Vendor-ID = 10415 (3GPP) This AVP contains the following nested AVPs: • Charging-Rule-Name (provides the name to the overrides so that they can be referred in the Charging-Rule-Report – successful or failed rule instantiation) • QoS-Information (defines Qos overrides) • NAS-Filter-Rule • Alc-NAS-Filter-Rule-Shared • AA-Functions

Table 3: Standard Diameter AVPs (format) (Continued)

AVP ID	AVP Name	Incl/ Excl	Type	Flags	Limits	Format
1005	Charging-Rule-Name	No	OctetString	V,M	128 bytes	Vendor-ID = 10415 (3GPP) Predefined rules in 7750 are referenced by the following syntax: Filters: • Ingr-v4:<id> • Ingr-v6:<id> • Egr-v4:<id> • Egr-v6:<id> • In-Othr-v4:<id> (one-time-http-redirect) ESM Strings: • Sla-Profile:*sla-profile-string (16Byte)* • Sub-Profile:*sub-profile-string (16Byte)* • Inter-Dest:*Inter-Dest-String* //to associate subscriber with Vport • Category-Map (for usage monitoring): • Cat-Map:*category-map-name* AA Strings • AA-functions: <name_string> • AA-UM: <name_string> Example: Charging-Rule-Name = ingr-v4:5 — reference to the predefined ingress IPv4 filter in 7750. The filter id is 5. Charging-Rule-Name =sla-profile:my-premium-sla — reference to the predefined sla-profile in 7750. The sla-profile name is 'my-premium-sla'. Charging-Rule-Name =cat-map:my-cat-map — reference to the predefined category-map in 7750. The category-map name is 'my-cat-map'.Any rule name within the *limits* can be given to the override that is defined in Charging-Rule-Definition AVP sent from PCRF to 7750.
1006	Event-Trigger	No	Enumerated	NA, V		Vendor-ID = 10415 (3GPP) For the list of supported event-triggers in 7750, see Table 11, Event Triggers (Event-Trigger AVP) on page 59.

Table 3: Standard Diameter AVPs (format) (Continued)

AVP ID	AVP Name	Incl/ Excl	Type	Flags	Limits	Format
1016	QoS-Information	NA	Grouped	NA, V		This AVP contains the following nested AVPs: • Max-Requested-Bandwidth-UL • Max-Requested-Bandwidth-DL • Guaranteed-Bitrate-UL • Guaranteed-Bitrate-DL • Alc-Queue • Alc-Queue-id • Alc-Committed-Burst-Size-UL • Alc-Committed-Burst-Size-DL • Alc-Maximum-Burst-Size-UL • Alc-Maximum-Burst-Size-DL • Alc-Wrr-Weight-UL • Alc-Wrr-Weight-DL • Alc-Policer • Alc-Policer-Id • Alc-Sub-Egress-Rate-Limit • Alc-Arbiter • Alc-Arbiter-Name • Alc-Arbiter-Rate-Limit-DL • Alc-Arbiter-Rate-Limit-UL Vendor-ID = 10415 (3GPP) Example: QoS-Information {Alc-Queue { Alc-Queue-id = 5 Max-Requested-Bandwidth-UL = 100000 Max-Requested-Bandwidth-DL = 1000000 Guaranteed-Bitrate-UL = 50000 Guaranteed-Bitrate-DL = 50000 Alc-Committed-Burst-Size-UL = 1000 Alc-Maximum-Burst-Size-UL = 2000 Alc-Committed-Burst-Size- = 1000 Alc-Maximum-Burst-Size- = 2000} Alc-Sub-Egress-Rate-Limit = 3000000}

Table 3: Standard Diameter AVPs (format) (Continued)

AVP ID	AVP Name	Incl/ Excl	Type	Flags	Limits	Format

1018	Charging-Rule-Report	No	Grouped	V,M		Vendor-ID = 10415 (3GPP)
						This AVP contains the following nested AVPs:
						• Charging-Rule-Name
						• PCC-Rule-Status
						• Rule-Failure-Code
						Example:
						Charging-Rule-Report {
						Charging-Rule-Name = sla-profile:failed-profile
						PCC-Rule-Status = 1 (inactive)
						Rule-Failure-Code = 4 (GW/ 7750_MALFUNCTION)
						}

1019	PCC-Rule-Status	No	Enumerated	V,M		Vendor-ID = 10415 (3GPP) Supported values in 7750: 1 – inactive Example: PCC-Rule-Status = 0 — rule is active
1025	Guaranteed-Bitrate-DL	NA	Unsigned32	NA,V		The units of this parameter are *kbps*. The rate accounts for the IP header and above (no L2 header). Vendor-ID = 10415 (3GPP) Example: Guaranteed-Bandwidth-DL = 500 — 500kbps
1026	Guaranteed-Bitrate-UL	NA	Unsigned32	NA,V		The units of this parameter are *kbps*. The rate accounts for the IP header and above (no L2 header). Vendor-ID = 10415 (3GPP) Example: Guaranteed-Bandwidth-UL = 500 — 500kbps
1027	IP-CAN-Type	Yes	Enumerated	NA,V		Vendor-ID = 10415 (3GPP) Example: IP-CAN-Type = 2 — xDSL
1031	Rule-Failure-Code	No	Enumerated	V,M		Vendor-ID = 10415 (3GPP) Example: Rule-Failure-Code = 1 — UNKNOWN_RULE_NAME
1032	RAT-Type	Yes	Enumerated	V		Vendor-ID = 10415 (3GPP) Example: RAT-Type = 0 — WLAN

Table 3: Standard Diameter AVPs (format) (Continued)

AVP ID	AVP Name	Incl/ Excl	Type	Flags	Limits	Format
1045	Session-Release-Cause	NA	Enumerated	V,M		Vendor-ID = 10415 (3GPP) This AVP is only received by 7750 and it is never sent by 7750. 0 — UNSPECIFIED-REASON 1 — UE_SUBSCRIPTION_REASON This value is used to indicate that the subscription of UE has changed (e.g. removed) and the session needs to be terminated. 2 — INSUFFICIENT_SERVER_ RESOURCES This value is used to indicate that the server is overloaded and needs to abort the session. Example: Session-Release-Cause = 0
1050	AN-GW-Address	Yes	IPv4Address	V		Vendor-ID = 10415 (3GPP) Example: AN-GW-Address = 10.10.10.10
1066	Monitoring-Key	No	OctetString	NA,V	32 bytes	Vendor-ID = 10415 (3GPP) Category name configured in 7750 or a string used for session monitoring.
1067	Usage-Monitoring-Information	No	Grouped	V		• Vendor-ID = 10415 (3GPP) This AVP contains the following nested AVPs: Monitoring-Key • Granted-Service-Unit • Used-Service-Unit • Usage-Monitoring-Level • Usage-Monitoring-Report • Usage-Monitoring-Support

Table 3: Standard Diameter AVPs (format) (Continued)

AVP ID	AVP Name	Incl/ Excl	Type	Flags	Limits	Format
1068	Usage-Monitoring-Level	No	Enumerated	V		Vendor-ID = 10415 (3GPP) The following values are defined: 0 – session_level 1 – pcc_rule_level 2 – adc_rule_level Example: Usage-Monitoring-Level = 0 — usage monitoring is performed based on sla-profile (IP-CAN session level) of the host. Usage-Monitoring-Level = 1 — usage monitoring is performed based on predefined category as indicated by the monitoring-key AVP Usage-Monitoring-Level = 2 — usage monitoring is performed based on ADC rule, as indicated by the monitoring-key AVP
1069	Usage-Monitoring-Report	No	Enumerated	V		Vendor-ID = 10415 (3GPP) Example: Usage-Monitoring-Report = 0 (usage_monitoring_report_required)
1070	Usage-Monitoring-Support	No	Enumerated	NA,V		Vendor-ID = 10415 (3GPP) Example: Usage-Monitoring-Support = 0 — usage_monitoring_disabled
1088	TDF-Application-Identifier		OctetString	NA,V	32 chars long	Vendor-ID = 10415 (3GPP) Example: 0_rated, BitTorrent
1092	ADC-Rule-Install	No	Grouped	NA,V		Vendor-ID = 10415 (3GPP) This AVP contains the following nested AVPs: ADC-Rule-Definition
1093	ADC-Rule-Remove		Grouped	NA,V		Vendor-ID = 10415 (3GPP) This AVP contains the following nested AVPs: ADC-Rule-Name

Table 3: Standard Diameter AVPs (format) (Continued)

AVP ID	AVP Name	Incl/ Excl	Type	Flags	Limits	Format
1094	ADC-Rule-Definition	No	Grouped	NA,V		Vendor-ID = 10415 (3GPP) This AVP contains the following nested AVPs: • ADC-Rule-Name • Monitoring Key • TDF-Application-Id • AA-Functions {AA profile - AA-App-Service-Options { - AA-App-Service-Options-Name - AA-App-Service-Options-Value}
1096	ADC-Rule-Name	No	OctetString	V	17 chars for prefix/ separator (optional) + 32 chars for name	Vendor-ID = 10415 (3GPP) Example: For app-profile and ASO changes: ADC-Rule-Name = "**AA-Functions:** AdcRuleWithAAFtn" For usage monitoring: ADC-Rule-Name = "AdcRuleWithoutAAFtn"
1097	ADC-Rule-Report	No	Grouped	V		Vendor-ID = 10415 (3GPP) This AVP contains the following nested AVPs: • ADC-Rule-Name • PCC-Rule-Status • Rule-Failure-Code

ALU-Specific AVPs

Table 4: ALU-Specific AVPs

AVP ID	AVP Name	Application	Description
99	Alc-IPv6-Address (IA-NA)	Gx-PM-ESM Gx-PM-AA	Attribute that carries the IPv6 address assigned to the IPoE/ PPPoE host via DHCPv6 (IA-NA). The IPv6address is obtained prior to Gx session establishment. The facilities to provide the IPv6 address to the subscriber-host are DHCP server, RADIUS or LUDB. The IPv6 address cannot be assigned to the subscriber host by PCRF via Gx. Instead the IPv6 address is the one being reported to the PCRF during the host instantiation phase.
158	Alc-NAS-Filter-Rule-Shared	Gx-PM-ESM	Refer to *SR-OS RADIUS Attribute Reference Guide*. This AVP is nested within Charging-Rule-Definition AVP.
1001	AA-Functions	Gx-PM-AA	This is a grouped AVP that contains a set AA related AVPs used to apply overrides to the AA subscriber. AA-Function AVP encompasses application-profile instantiation/overrides and the overrides of the ASOs within the application-profile. (AA subscriber state must exist for app-profiles and ASO overrides to be applied).
1002	AA-App-Profile-Name	Gx-PM-AA	The name of the application profile (app-profile) that is to be applied (instantiated or overridden) to the subscriber. The app-profile must be predefined in the 7750.
1003	AA-App-Service-Options	Gx-PM-AA	This AVP is of type grouped and it contains AVPs related to application service options (ASO) which are configurable strings in AA context used to further refine identification criteria within the same application and consequently apply more targeted actions.
1004	AA-App-Serv-Options-Name	Gx-PM-AA	AA service option name.
1005	AA-App-Serv-Options-Value	Gx-PM-AA	AA service option value.
1006	Alc-Queue	Gx-PM-ESM	This AVP is a grouped AVP that contains AVPs related to the queue parameters that can be overridden.
1007	Alc-Queue-Id	Gx-PM-ESM	Queue id of a queue for which the parameters are being modified.
1008	Alc-Committed-Burst-Size-UL	Gx-PM-ESM	Committed burst size of an ingress queue or a policer in bytes.
1009	Alc-Maximum-Burst-Size-UL	Gx-PM-ESM	Maximum burst size of an ingress queue or a policer in bytes.

Table 4: ALU-Specific AVPs (Continued)

AVP ID	AVP Name	Application	Description
1010	Alc-Committed-Burst-Size-DL	Gx-PM-ESM	Committed burst size of an egress queue or a policer in bytes.
1011	Alc-Maximum-Burst-Size-DL	Gx-PM-ESM	Maximum burst size of an egress queue or a policer in bytes.
1013	Alc-Wrr-Weight-DL	Gx-PM-ESM	Weight with which a queue is parented into the HSMDA scheduler. This AVP is only applicable to HSMDA boards.
1014	Alc-Policer	Gx-PM-ESM	This AVP is a grouped AVP that contains AVPs related to the policer parameters that can be overridden.
1015	Alc-Policer-Id	Gx-PM-ESM	Policer id of a policer for which the parameters are being modified.
1016	Alc-Sub-Egress-Rate-Limit	Gx-PM-ESM	This AVP contains the aggregate egress rate for the subscriber.
1017	Alc-Arbiter-Rate-Limit-DL	Gx-PM-ESM	This AVP contains the egress arbiter rate for the subscriber.
1018	Alc-Arbiter-Rate-Limit-UL	Gx-PM-ESM	This AVP contains the ingress arbiter rate for the subscriber.
1021	Alc-Arbiter	Gx-PM-ESM	This AVP is a grouped AVP that contains AVPs related to the arbiter parameters that can be overridden.
1022	Alc-Arbiter-Name	Gx-PM-ESM	Arbiter name for which the parameters are being modified.

ALU-Specific VSAs (format)

Vendor-ID = 6527 (ALU)

Table 5: ALU-Specific VSAs (format)

AVP ID	AVP Name	Conf	Type	Flags	Limits	Format
99	Alc-IPv6-Address (IA-NA)	No	OctetString	V		The AVP layout is: <16 octets for address>
158	Alc-NAS-Filter-Rule-Shared	NA	UTF8String	NA,V	Max 50 attributes per message or max 50 filter entries per message.	Refer to *SR-OS RADIUS Attribute Reference Guide*.

1001	AA-Functions	NA	Grouped	NA,V	One per ADC rule. AA-Functions AVP must contain at least one AA-App-Profile-Name or one AA-App-Service-Options AVP.	This AVP contains the following nested AVPs:
						• AA-App-Profile-Name
						• AA-App-Service-Options {
						- AA-App-Service-Options-Name
						- AA-App-Service-Options-Value
						}

1002	AA-App-Profile-Name	NA	UTF8String	NA,V	32chars	Example: AA-App-Profile-Name = MyAppProfile
1003	AA-App-Service-Options	NA	Grouped	NA,V	Max 32 per AA-Functions	This AVP contains the following nested AVPs: AA-App-Serv-Options-Name AA-App-Serv-Options-Value

Table 5: ALU-Specific VSAs (format) (Continued)

AVP ID	AVP Name	Conf	Type	Flags	Limits	Format
1004	AA-App-Serv-Options-Name	NA	UTF8String	NA,V	32chars Max one AVP per AA-App-Service-Options AVP	Example: A A-App-Serv-Options-Name = p2p
1005	AA-App-Serv-Options-Value	NA	UTF8String	NA,V	32chars Max one AVP per AA-App-Service-Options AVP	AA-App-Serv-Options-Value = HiPrioSub
1006	Alc-Queue	NA	Grouped	NA,V		This AVP contains the following nested AVPs: • Alc-Queue-Id • Max-Requested-Bandwidth-UL • Max-Requested-Bandwidth-DL • Guaranteed_Bitrate_UL • Guaranteed_Bitrate_DL • Alc-Committed-Burst-Size-UL • Alc-Maximum-Burst-Size-UL • Alc-Committed-Burst-Size-DL • Alc-Maximum-Burst-Size-DL • AAlc-Wrr-Weight-DL
1007	Alc-Queue-Id	NA	Unsigned 32	NA,V		Example: Alc-Queue-Id = 3
1008	Alc-Committed-Burst-Size-UL	NA	Unsigned 32	NA,V		Example: Alc-Committed-Burst-Size-UL = 300000 Burst size of 300,000bytes.
1009	Alc-Maximum-Burst-Size-UL	NA	Unsigned 32	NA,V		Example: Alc-Maximum-Burst-Size-UL = 300000 Burst size of 300,000bytes.
1010	Alc-Committed-Burst-Size-DL	NA	Unsigned 32	NA,V		Example: Alc-Committed-Burst-Size-DL = 300000 Burst size of 300,000bytes.

Table 5: ALU-Specific VSAs (format) (Continued)

AVP ID	AVP Name	Conf	Type	Flags	Limits	Format
1011	Alc-Maximum-Burst-Size-DL	NA	Unsigned 32	NA,V		Example: Alc-Maximum-Burst-Size-DL = 300000 Burst size of 300,000bytes.
1013	Alc-Wrr-Weight-DL	NA	Unsigned 32	NA,V		Example: Alc-Wrr-Weight-DL = 2
1014	Alc-Policer	NA	Grouped	NA,V		This AVP contains the following nested AVPs: • Alc-Policer-Id • Max-Requested-Bandwidth-UL • Max-Requested-Bandwidth-DL • Guaranteed_Bitrate_UL • Guaranteed_Bitrate_DL • Alc-Committed-Burst-Size-UL • Alc-Maximum-Burst-Size-UL • Alc-Committed-Burst-Size-DL • Alc-Maximum-Burst-Size-DL
1015	Alc-Policer-Id	NA	Unsigned 32	NA,V		Example: Alc-Policer-Id = 10
1016	Alc-Sub-Egress-Rate-Limit	NA	Unsigned 32	NA,V		Example: Alc-Sub-Egress-Rate-Limit = 10000000
1017	Alc-Arbiter-Rate-Limit-DL	NA	Unsigned 32	NA,V		Example: Alc-Arbiter-Rate-Limit-DL = 10000000
1018	Alc-Arbiter-Rate-Limit-UL	NA	Unsigned 32	NA,V		Example: Alc-Arbiter-Rate-Limit-UL = 10000000
1021	Alc-Arbiter	NA	Grouped	NA,V		This AVP contains the following nested AVPs: • Alc-Arbiter-Name • Alc-Arbiter-Rate-Limit-UL • Alc-Arbiter-Rate-Limit-DL

Table 5: ALU-Specific VSAs (format) (Continued)

AVP ID	AVP Name	Conf	Type	Flags	Limits	Format
1022	Alc-Arbiter-Name	NA	UTF8String	NA,V	32 char	Example: Alc-Arbiter-Name = root

Diameter-Based AVP Applicability

Legend/Notes

The following tables use the following symbols:

- 0 — The AVP MUST NOT be present in the message.
- 0+ — Zero or more instances of the AVP MAY be present in the message.
- 0-1 Zero or one instance of the AVP MAY be present in the message. It is considered an error if there are more than one instance of the AVP.
- 1 — One instance of the AVP MUST be present in the message.
- 1+ — At least one instance of the AVP MUST be present in the message.
- N — The AVP is nested inside of a grouped AVP that is present in this message.

Table 6: Diameter-Based AVP Applicability

AVP ID	AVP Name	CER	CEA	DPR	DPA	DWR	DWA	ASR	ASA
257	Host-IP-Address	1	1+	0	0	0	0	0	0
258	Auth-Application-Id	1	0+	0	0	0	0	1	0
260	Vendor-Specific-Application-Id	0+	0+	0	0	0	0	0	0
263	Session-id	0	0	0	0	0	0	1	1
264	Origin-Host	1	1	1	1	1	1	1	1
265	Supported-Vendor-Id	1+	0+	0	0	0	0	0	0
266	Vendor-Id	1	1	0	0	0	0	0	0
267	Firmware-Revision	1	0-1	0	0	0	0	0	0
268	Result-Code	0	1	0	1	0	1	0	1
269	Product-Name	1	1	0	0	0	0	0	0
273	Disconnect-Cause	0	0	1	0	0	0	0	0
278	Origin-State-Id	1	0-1	0	0	0	0-1	0-1	0-1
279	Failed-AVP	0	0-1	0	0-1	0	0-1	0	0-1
281	Error-Message	0	0	0	0	0	0	0	0
283	Destination-Realm	0	0	0	0	0	0	1	0
293	Destination-Host	0	0	0	0	0	0	1	0

Table 6: Diameter-Based AVP Applicability (Continued)

AVP ID	AVP Name	CER	CEA	DPR	DPA	DWR	DWA	ASR	ASA
294	Error-Reporting-Host	0	0	0	0	0	0	0	0-1
296	Origin-Realm	1	1	1	1	1	1	1	1

Gx AVP Applicability

Table 7: Gx AVP Applicability

AVP ID	AVP Name	CCR	CCA	RAR	RAA
5	NAS-Port	0-1	0	0	0
8	Framed-IP-Address	0-1	0	0	0-1
25	Class	0-1	0-1	0	0
30	Called-Station-Id	0-1	0	0	0
31	Calling-Station-ID	0-1	0	0	0
55	Event-Timestamp	0-1	0-1	0-1	1
61	NAS-Port-Type	0-1	0	0	0
87	NAS-Port-Id	0-1	0	0	0
92	NAS-Filter-Rule	0	0+	0+	0
97	Framed-IPv6-Prefix	0-1	0	0	0-1
123	Delegated-IPv6-Prefix	0-1	0	0	0-1
258	Auth-Application-Id	1	1	1	0
263	Session-id	1	1	1	1
264	Origin-Host	1	1	1	1
266	Vendor-Id	0	N	0	0
268	Result-Code	0	1	0	0-1
278	Origin-State-Id	1	0-1	0-1	1
279	Failed-AVP	0-1	0+	0	0-1
281	Error-Message	0-1	0-1	0	0-1
283	Destination-Realm	1	0	1	0
285	Re-Auth-Request-Type	0	0	1	0
293	Destination-Host	0-1	0	1	0
295	Termination-Cause	0-1	0	0	0
296	Origin-Realm	1	1	1	1
297	Experimental-Result	0	0-1	0	0-1

Table 7: Gx AVP Applicability (Continued)

AVP ID	AVP Name	CCR	CCA	RAR	RAA
298	Experimental-Result-Code	0	N	0	N
302	Logical-Access-Id	0-1	0	0	0
313	Physical-Access-Id	0-1	0	0	0
412	CC-Input-Octets	N	N	N	0
414	CC-Output-Octets	N	N	N	0
415	CC-Request-Number	1	1	0	0
416	CC-Request-Type	1	1	0	0
421	CC-Total-Octets	N	N	N	0
431	Granted-Service-Unit	0	0-1	N	0
443	Subscription-Id	1	0	0	0
444	Subscription-Id-Data	N	0	0	0
446	Used-Service-Unit	N	0	0	0
450	Subscription-Id-Type	1	0	0	0
458	User-Equipment-Info	0-1	0	0	0
459	User-Equipment-Info-Type	N	0	0	0
460	User-Equipment-Info-Value	N	0	0	0
515	Max-Requested-Bandwidth-DL	0	N	N	0
516	Max-Requested-Bandwidth-UL	0	N	N	0
628	Supported-Features	0-1	0+	0	0
629	Feature-List-Id	N	N	0	0
630	Feature-List	N	N	0	0
1001	Charging-Rule-Install	0	0+	0+	0
1003	Charging-Rule-Definition	0	N	N	0
1005	Charging-Rule-Name	N	N	N	N
1006	Event-Trigger	0+	0+	0+	0
1016	QoS-Information	0	N	N	0

Table 7: Gx AVP Applicability (Continued)

AVP ID	AVP Name	CCR	CCA	RAR	RAA
1018	Charging-Rule-Report	0+	0	0	0+
1019	PCC-Rule-Status	N	0	0	N
1025	Guaranteed-Bitrate-DL	0	N	N	0
1026	Guaranteed-Bitrate-UL	0	N	N	0
1027	IP-CAN-Type	0-1	0	0	0-1
1031	Rule-Failure-Code	N	0	0	N
1032	RAT-Type	0-1	0	0	0-1
1033	Event-Report-Indication	0	0	0-1	0
1045	Session-Release-Cause	0	0	0-1	0
1050	AN-GW-Address	0-1	0	0	0-1
1066	Monitoring-Key	N	N	N	0
1067	Usage-Monitoring-Information	0+	0+	0+	0
1068	Usage-Monitoring-Level	0	N	N	0
1069	Usage-Monitoring-Report	0	N	N	0
1070	Usage-Monitoring-Support	0	N	N	0
1088	TDF-Application-Identifier	0	N	N	0
1092	ADC-Rule-Install	0	0+	0+	0
1093	ADC-Rule-Remove	0	0	0	0
1094	ADC-Rule-Definition	0	0	0	0
1096	ADC-Rule-Name	N	N	N	N
1097	ADC-Rule-Report	0+	0+	0	0+

ALU-Specific AVP Applicability

Table 8: ALU-Specific AVP Applicability

AVP ID	AVP Name	CCR	CCA	RAR	RAA
99	Alc-IPv6-Address (IA-NA)	0-1	0	0	0-1
158	Alc-NAS-Filter-Rule-Shared	0	0+	0+	0
1001	AA-Functions	0	0+	0+	0
1002	AA-App-Profile-Name	0	N	N	0
1003	AA-App-Service-Options	0	N	N	0
1004	AA-App-Serv-Options-Name	0	N	N	0
1005	AA-App-Serv-Options-Value	0	N	N	0
1006	Alc-Queue	0	N	N	0
1007	Alc-Queue-Id	0	N	N	0
1008	Alc-Committed-Burst-Size-UL	0	N	N	0
1009	Alc-Maximum-Burst-Size-UL	0	N	N	0
1010	Alc-Committed-Burst-Size-DL	0	N	N	0
1011	Alc-Maximum-Burst-Size-DL	0	N	N	0
1013	Alc-Wrr-Weight-DL	0	N	N	0
1014	Alc-Policer	0	N	N	0
1015	Alc-Policer-Id	0	N	N	0
1016	Alc-Sub-Egress-Rate-Limit	0	N	N	0
1017	Alc-Arbiter-Rate-Limit-DL	0	N	N	0
1018	Alc-Arbiter-Rate-Limit-UL	0	N	N	0
1021	Alc-Arbiter	0	N	N	0
1022	Alc-Arbiter-Name	0	N	N	0

Result Codes (Result-Code AVP)

Table 9: Result Codes (Result-Code AVP)

Result Code Id	Result Code Name	Description
Success		
2001	DIAMETER_SUCCESS	The request was successfully completed.
Protocol Errors		
3001	DIAMETER_COMMAND_UNSUPPORTED	Rx: treated as error. Tx: not supported.
3002	DIAMETER_UNABLE_TO_DELIVER	Rx: Ignored. Consequently the originally sent message will timeout in 7x50 and potentially it be retransmitted (following the peer failover procedure). Tx: not supported.
3003	DIAMETER_REALM_NOT_SERVED	Rx: treated as error. Tx: not supported.
3004	DIAMETER_TOO_BUSY	Rx: Ignored. Consequently the originally sent message will timeout in 7x50 and potentially it be retransmitted (following the peer failover procedure). Tx: not supported.
3005	DIAMETER_LOOP_DETECTED	Rx: treated as error. Tx: not supported.
3006	DIAMETER_REDIRECT_INDICATION	Rx: treated as error. Tx: not supported.
3007	DIAMETER_APPLICATION_UNSUPPORTED	Rx: treated as error. Tx: not supported.
3008	DIAMETER_INVALID_HDR_BITS	Rx: treated as error. Tx: not supported.
3009	DIAMETER_INVALID_AVP_BITS	Rx: treated as error. Tx: not supported.
3010	DIAMETER_UNKNOWN_PEER	Rx: treated as error. Tx: not supported.
Permanent Failures		

Table 9: Result Codes (Result-Code AVP) (Continued)

Result Code Id	Result Code Name	Description
5001	DIAMETER_AVP_UNSUPPORTED	Rx: treated as error. Tx: Reception of an **unrecognized AVP** with M-bit set will trigger a response (RAA) message that contains the Result-Code AVP whose value is set to DIAMETER_AVP_UNSUPORTED, and the Failed-AVP AVP containing the offending AVP.
5002	DIAMETER_UNKNOWN_SESSION	Rx: treated as error. TX: In case that a message from PCRF is received for a non-existing session, 7x50 will reply with this value.
5004	DIAMETER_INVALID_AVP_VALUE	Rx: treated as an error. Tx: Reception of an AVP with **invalid value** will trigger a response message (RAA) that contains the Result-Code AVP whose value is set to DIAMETER_INVALID_AVP_VALUE, and the Failed-AVP containing the AVP that caused the error.
5005	DIAMETER_MISSING_AVP	Rx: treated as error. Tx: not supported.
5007	DIAMETER_CONTRADICTING_AVPS	Rx: treated as error. Tx: not supported.
5008	DIAMETER_AVP_NOT_ALLOWED	Rx: treated as error. Tx: not supported.
5009	DIAMETER_AVP_OCCURS_TOO_MANY_TIMES	Rx: treated as error. Tx: not supported.
5010	DIAMETER_NO_COMMON_APPLICATION	Rx: treated as error. Tx: not supported.
5011	DIAMETER_UNSUPPORTED_VERSION	Rx: treated as error. Tx: not supported.
5012	DIAMETER_UNABLE_TO_COMPLY	Rx: treated as error. Tx: not supported.
5013	DIAMETER_INVALID_BIT_IN_HEADER	Rx: treated as error. Tx: not supported.
5014	DIAMETER_INVALID_AVP_LENGTH	Rx: treated as error. Tx: not supported.
5015	DIAMETER_INVALID_MESSAGE_LENGTH	Rx: treated as error. Tx: not supported.

Table 9: Result Codes (Result-Code AVP) (Continued)

Result Code Id	Result Code Name	Description
5016	DIAMETER_INVALID_AVP_BIT_COMBO	Rx: treated as error. Tx: not supported.
5017	DIAMETER_NO_COMMON_SECURITY	Rx: treated as error. Tx: not supported.
Gx Specific Permanent Failures		
5140	DIAMETER_ERROR_INITIAL_PARAMETERS	Rx: treated as error. Tx: not supported.
5141	DIAMETER_ERROR_TRIGGER_EVENT	Rx: treated as error. Tx: not supported.
5142	DIAMETER_PCC_RULE_EVENT	Rx: treated as error. Tx: not supported.
5148	DIAMETER_ADC_RULE_EVENT	Rx: treated as error. Tx: not supported.

Rule Failure Codes (Rule-Failure-Code AVP)

Table 10: Rule Failure Codes (Rule-Failure-Code AVP)

Rule Failure Code Id	Rule Failure Name	Description
1	UNKNOWN_RULE_NAME	Rx: treated as error. Tx: not supported.
4	GW/7750_MALFUNCTION	This value indicates the problem related to the value carried in the AVP. For example the value references a non-existing object (rule), the value is out of bounds or any other unexpected error. The error-message AVP in CCR/RAA carried on the top level or Failed-AVP will provide more information about the event for debugging purposes.
5	RESOURCE_LIMITATION	Rx: treated as error. Tx: not supported.
14	TDF_APPLICATION_IDENTIFIER_ERROR	Rx: treated as error. Tx: not supported.

Event Triggers (Event-Trigger AVP)

Table 11: Event Triggers (Event-Trigger AVP)

Event Trigger Id	Event Trigger Name	Description
13	USER_LOCATION_CHANGE	This AVP is used when the UE moves between the access points (WiFi).
14	NO_EVENT_TRIGGERS	Sent in CCA and RAR by the PCRF to indicate that PCRF does not require any Event Trigger notification except for those events that do not require subscription and are always provisioned.
18	UE_IP_ADDRESS_ALLOCATE	When used in a CCR command, this value indicates that the 7750 generated the request because a client's IPv4 address is allocated. The Framed-IP-Address, Framed-IPv6-Prefix, Delegated-IPv6-Prefix or Alc-IPv6-Address AVPs will be provided in the same request. This event trigger is reported when the corresponding event occurs, even if the event trigger is not provisioned by the PCRF.
19	UE_IP_ADDRESS_RELEASE	When used in a CCR command, this value indicates that the 7750 generated the request because a client's IP address/prefix is released. The Framed-IP-Address, Framed-IPv6-Prefix, Delegated-IPv6-Prefix or Alc-IPv6-Address AVPs will be provided in the same request. This event trigger shall be reported when the corresponding event occurs, even if the event trigger is not provisioned by the PCRF.
22	SUCCESSFUL_RESOURCE_ALLOCATION	Not supported.
33	USAGE_REPORT	This value is used in a CCA and RAR commands by the PCRF when requesting usage monitoring on 7750. The PCRF will also provide in the CCA or RAR command the Usage-Monitoring-Information AVP(s) including the Monitoring-Key AVP and the Granted-Service-Unit AVP. When used in a CCR command, this value indicates that the 7750 generated the request to report the accumulated usage for one or more monitoring keys. The 7750 provides the accumulated usage volume using the Usage-Monitoring-Information AVP(s) including the Monitoring-Key AVP and the Used-Service-Unit AVP.

Termination Causes (Termination-Cause AVP)

Table 12: Termination Causes (Termination-Cause AVP)

Termination Cause Id	Termination Cause Name	Description	Reference
1	DIAMETER_LOGOUT	Example reasons: Clear subscriber via CLI PADT Received	[RFC 3588][RFC 6733]
2	DIAMETER_SERVICE_NOT_PROVIDED	Example reasons: Subscriber-host is terminated via force-NACK received via RADIUS CoA	[RFC 3588][RFC 6733]
3	DIAMETER_BAD_ANSWER	Example reason: Problem with initial parameters during sub-host instantiation while Gx fallback is disabled or default subscriber parameters are not available.	[RFC 3588][RFC 6733]
4	DIAMETER_ADMINISTRATIVE	Example reasons: Host deleted via RADIUS DISCONNECT Service shutdown for PPPoE subscriber	[RFC 3588][RFC 6733]
5	DIAMETER_LINK_BROKEN	Example reasons: SAP is deleted SHCV check fails	[RFC 3588][RFC 6733]
8	DIAMETER_SESSION_TIMEOUT	Example reason: When idle timeout for the subscriber-host is enabled and its value is reached.	[RFC 3588][RFC 6733]

Standards and Protocol Support

Note that this Standards Compliance list is subject to change.

Ethernet Standards

IEEE 802.1ab-REV/D3 Station and Media Access Control Connectivity Discovery
IEEE 802.1d Bridging
IEEE 802.1p/Q VLAN Tagging
IEEE 802.1s Multiple Spanning Tree
IEEE 802.1w Rapid Spanning Tree Protocol
IEEE 802.1x Port Based Network Access Control
IEEE 802.1ad Provider Bridges
IEEE 802.1ah Provider Backbone Bridges
IEEE 802.1ag Service Layer OAM
IEEE 802.3ah Ethernet in the First Mile
IEEE 802.1ak Multiple MAC Registration Protocol
IEEE 802.3 10BaseT
IEEE 802.3ad Link Aggregation
IEEE 802.3ae 10Gbps Ethernet
IEEE 802.3ah Ethernet OAM
IEEE 802.3u 100BaseTX
IEEE 802.3x Flow Control
IEEE 802.3z 1000BaseSX/LX
ITU-T Y.1731 OAM functions and mechanisms for Ethernet based networks
ITU-T G.8031 Ethernet linear protection switching
ITU-T G.8032 Ethernet Ring Protection Switching (version 2)

OSPF

RFC 1765 OSPF Database Overflow
RFC 2328 OSPF Version 2
RFC 2370 Opaque LSA Support
RFC 2740 OSPF for IPv6 (OSPFv3)
RFC 3101 OSPF NSSA Option
RFC 3137 OSPF Stub Router Advertisement
RFC 3623 Graceful OSPF Restart – GR helper
RFC 3630 Traffic Engineering (TE) Extensions to OSPF Version 2
RFC 4203 OSPF Extensions in Support of Generalized Multi-Protocol Label Switching (GMPLS) - (support of Link Local/Remote Identifiers and SRLG sub-TLVs)
RFC 5185 OSPF Multi-Area Adjacency
RFC5243 OSPF Database Summary List Optimization

BGP

RFC 1397 BGP Default Route Advertisement
RFC 1772 Application of BGP in the Internet
RFC 1965 Confederations for BGP
RFC 1997 BGP Communities Attribute
RFC 2385 Protection of BGP Sessions via MD5
RFC 2439 BGP Route Flap Dampening
RFC 2558 Multiprotocol Extensions for BGP-4
RFC 2918 Route Refresh Capability for BGP-4
RFC 3107 Carrying Label Information in BGP-4
RFC 3392 Capabilities Advertisement with BGP4
RFC 4271 BGP-4 (previously RFC 1771)
RFC 4360 BGP Extended Communities Attribute
RFC 4364 BGP/MPLS IP Virtual Private Networks (VPNs) (previously RFC 2547bis BGP/MPLS VPNs)
RFC 4456 BGP Route Reflection: Alternative to Full-mesh IBGP
RFC 4486 Subcodes for BGP Cease Notification Message
RFC 4577 OSPF as the Provider/ Customer Edge Protocol for BGP/ MPLS IP Virtual Private Networks (VPNs)
RFC 4659 BGP-MPLS IP Virtual Private Network (VPN) Extension for IPv6 VPN
RFC 4684 Constrained Route Distribution for Border Gateway Protocol/MultiProtocol Label Switching (BGP/MPLS) Internet Protocol (IP) Virtual Private Networks (VPNs)
RFC 4724 Graceful Restart Mechanism for BGP – GR helper
RFC 4760 Multi-protocol Extensions for BGP
RFC 4798 Connecting IPv6 Islands over IPv4 MPLS Using IPv6 Provider Edge Routers (6PE)
RFC 4893 BGP Support for Four-octet AS Number Space
RFC 5004 Avoid BGP Best Path Transitions from One External to Another
RFC 5065 Confederations for BGP (obsoletes 3065)
RFC 5291 Outbound Route Filtering Capability for BGP-4
RFC 5575 Dissemination of Flow Specification Rules
RFC 5668 4-Octet AS Specific BGP Extended Community
draft-ietf-idr-add-paths Advertisement of Multiple Paths in BGP
Advertisement of the Best External Route in BGP
draft-ietf-idr-best-external

IS-IS

ISO/IEC 10589:2002, Second Edition Intermediate System to Intermediate System Intra-Domain Routeing Information Exchange Protocol
RFC 1195 Use of OSI IS-IS for Routing in TCP/IP and Dual Environments
RFC 2973 IS-IS Mesh Groups
RFC 3359 Reserved Type, Length and Value (TLV) Codepoints in Intermediate System to Intermediate System
RFC 3719 Recommendations for Interoperable Networks using Intermediate System to Intermediate System (IS-IS)
RFC 3787 Recommendations for Interoperable IP Networks using

Intermediate System to Intermediate System (IS-IS)
RFC 4971 Intermediate System to Intermediate System (IS-IS) Extensions for Advertising Router Information
RFC 5120 M-ISIS: Multi Topology (MT) Routing in IS-IS
RFC 5301 Dynamic Hostname Exchange Mechanism for IS-IS
RFC 5302 Domain-wide Prefix Distribution with Two-Level IS-IS
RFC 5303 Three-Way Handshake for IS-IS Point-to-Point Adjacencies
RFC 5304 IS-IS Cryptographic Authentication
RFC 5305 IS-IS Extensions for Traffic Engineering TE
RFC 5306 Restart Signaling for IS-IS
RFC 5307 IS-IS Extensions in Support of Generalized Multi-Protocol Label Switching (GMPLS)
RFC 5309 Point-to-Point Operation over LAN in Link State Routing Protocols
RFC 5310 IS-IS Generic Cryptographic Authentication
RFC 6213 IS-IS BFD-Enabled TLV
RFC 6329 IS-IS Extensions Supporting IEEE 802.1aq Shortest Path Bridging
draft-ietf-isis-mi-02 IS-IS Multi-Instance

IPSec

RFC 2401 Security Architecture for the Internet Protocol
RFC 2406 IP Encapsulating Security Payload (ESP)
RFC 2409 The Internet Key Exchange (IKE)
RFC 2560 X.509 Internet Public Key Infrastructure
Online Certificate Status Protocol - OCSP
RFC 3706 IKE Dead Peer Detection
RFC 3947 Negotiation of NAT-Traversal in the IKE
RFC 3948 UDP Encapsulation of IPsec ESP Packets
RFC 4210 Internet X.509 Public Key Infrastructure
Certificate Management Protocol (CMP)
RFC 4211 Internet X.509 Public Key Infrastructure
Certificate Request Message Format (CRMF)
RFC 5996 Internet Key Exchange Protocol Version 2 (IKEv2)
RFC 5998 An Extension for EAP-Only Authentication in IKEv2
draft-ietf-ipsec-isakmp-xauth-06 – Extended Authentication within ISAKMP/Oakley (XAUTH)
draft-ietf-ipsec-isakmp-modecfg-05 – The ISAKMP Configuration Method

IPv6

RFC 1981 Path MTU Discovery for IPv6
RFC 2375 IPv6 Multicast Address Assignments
RFC 2460 Internet Protocol, Version 6 (IPv6) Specification
RFC 2461 Neighbor Discovery for IPv6
RFC 2462 IPv6 Stateless Address Auto configuration
RFC 2464 Transmission of IPv6 Packets over Ethernet Networks
RFC 2529 Transmission of IPv6 over IPv4 Domains without Explicit Tunnels
RFC 2545 Use of BGP-4 Multiprotocol Extension for IPv6 Inter-Domain Routing
RFC 2710 Multicast Listener Discovery (MLD) for IPv6
RFC 2740 OSPF for IPv6
RFC 3306 Unicast-Prefix-based IPv6 Multicast Addresses
RFC 3315 Dynamic Host Configuration Protocol for IPv6
RFC 3587 IPv6 Global Unicast Address Format
RFC3590 Source Address Selection for the Multicast Listener Discovery (MLD) Protocol
RFC 3810 Multicast Listener Discovery Version 2 (MLDv2) for IPv6
RFC 4007 IPv6 Scoped Address Architecture
RFC 4193 Unique Local IPv6 Unicast Addresses
RFC 4291 IPv6 Addressing Architecture
RFC 4443 Internet Control Message Protocol (ICMPv6) for the Internet Protocol Version 6 (IPv6) Specification
RFC 4552 Authentication/Confidentiality for OSPFv3
RFC 4659 BGP-MPLS IP Virtual Private Network (VPN) Extension for IPv6 VPN
RFC 5072 IP Version 6 over PPP
RFC 5095 Deprecation of Type 0 Routing Headers in IPv6
draft-ietf-isis-ipv6-05
draft-ietf-isis-wg-multi-topology-xx.txt

Multicast

RFC 1112 Host Extensions for IP Multicasting (Snooping)
RFC 2236 Internet Group Management Protocol, (Snooping)
RFC 3376 Internet Group Management Protocol, Version 3 (Snooping)
RFC 2362 Protocol Independent Multicast-Sparse Mode (PIMSM)
RFC 3618 Multicast Source Discovery Protocol (MSDP)
RFC 3446 Anycast Rendevous Point (RP) mechanism using Protocol Independent Multicast (PIM) and Multicast Source Discovery Protocol (MSDP)
RFC 4601 Protocol Independent Multicast - Sparse Mode (PIM-SM): Protocol Specification (Revised)
RFC 4604 Using IGMPv3 and MLDv2 for Source-Specific Multicast
RFC 4607 Source-Specific Multicast for IP
RFC 4608 Source-Specific Protocol Independent Multicast in 232/8
RFC 4610 Anycast-RP Using Protocol Independent Multicast (PIM)
draft-ietf-pim-sm-bsr-06. Bootstrap Router (BSR) Mechanism for PIM
draft-rosen-vpn-mcast-15.txt Multicast in MPLS/BGP IP VPNs
draft-ietf-l3vpn-2547bis-mcast-07: Multicast in MPLS/BGP IP VPNs
draft-ietf-l3vpn-2547bis-mcast-bgp-05: BGP Encodings and Procedures for Multicast in MPLS/BGP IP VPNs
RFC 3956: Embedding the Rendezvous Point (RP) Address in an IPv6 Multicast Address

MPLS-GENERAL

RFC 2430 A Provider Architecture DiffServ & TE

RFC 2474 Definition of the DS Field the IPv4 and IPv6 Headers (Rev)

RFC 2597 Assured Forwarding PHB Group (rev3260)

RFC 2598 An Expedited Forwarding PHB

RFC 3031 MPLS Architecture

RFC 3032 MPLS Label Stack Encoding

RFC 3140 Per-Hop Behavior Identification Codes

RFC 3443 Time To Live (TTL) Processing in Multi-Protocol Label Switching (MPLS) Networks

RFC 4182 Removing a Restriction on the use of MPLS Explicit NULL

RFC 4023 Encapsulating MPLS in IP or Generic Routing Encapsulation (GRE)

RFC 5332 MPLS Multicast Encapsulations

MPLS — LDP

RFC 3037 LDP Applicability

RFC 3478 Graceful Restart Mechanism for LDP – GR helper

RFC 5036 LDP Specification

RFC 5283 LDP extension for Inter-Area LSP

RFC 5443 LDP IGP Synchronization

RFC 6388 LDP Extensions for Point-to-Multipoint and Multipoint-to-Multipoint LSP

RFC 6826 Multipoint LDP in-band signaling for Point-to-Multipoint and Multipoint-to-Multipoint Label Switched Paths

draft-pdutta-mpls-tldp-hello-reduce-04, Targeted LDP Hello Reduction

MPLS/RSVP-TE

RFC 2702 Requirements for Traffic Engineering over MPLS

RFC2747 RSVP Cryptographic Authentication

RFC 2961 RSVP Refresh Overhead Reduction Extensions

RFC3097 RSVP Cryptographic Authentication - Updated Message Type Value

RFC 3209 Extensions to RSVP for Tunnels

RFC 3473 Generalized Multi-Protocol Label Switching (GMPLS) Signaling

Resource ReserVation Protocol-Traffic Engineering (RSVP-TE) Extensions – (support of IF_ID RSVP_HOP object with unnumbered interface and RSVP-TE Graceful Restart Helper Procedures)

RFC 3477 Signalling Unnumbered Links inResourceReSerVationProtocol-Traffic Engineering (RSVP-TE)

RFC 3564 Requirements for Diff-Serv-aware TE

RFC 3906 Calculating Interior Gateway Protocol (IGP) Routes Over Traffic Engineering Tunnels

RFC 4090 Fast reroute Extensions to RSVP-TE for LSP Tunnels

RFC 4124 Protocol Extensions for Support of Diffserv-aware MPLS Traffic Engineering

RFC 4125 Maximum Allocation Bandwidth Constraints Model for Diffserv-aware MPLS Traffic Engineering

RFC 4127 Russian Dolls Bandwidth Constraints Model for Diffserv-aware MPLS Traffic Engineering

RFC 4561 Definition of a RRO Node-Id Sub-Object

RFC 4875 Extensions to Resource Reservation Protocol - Traffic Engineering (RSVP-TE) for Point-to-Multipoint TE Label Switched Paths (LSPs)

RFC 5151 Inter-domain MPLS and GMPLS Traffic Engineering – RSVP-TE Extensions

RFC 5712 MPLS Traffic Engineering Soft Preemption

RFC 5817 Graceful Shutdown in GMPLS Traffic Engineering Networks

draft-newton-mpls-te-dynamic-overbooking-00 A Diffserv-TE Implementation Model to dynamically change booking factors during failure events

MPLS — OAM

RFC 4379 Detecting Multi-Protocol Label Switched (MPLS) Data Plane Failures

RFC 6424 Mechanism for Performing Label Switched Path Ping (LSP Ping) over MPLS Tunnels

RFC 6425 Detecting Data Plane Failures in Point-to-Multipoint Multiprotocol Label Switching (MPLS) - Extensions to LSP Ping

MPLS-TP (7750/7450 only)

RFC 5586 MPLS Generic Associated Channel

RFC 5921 A Framework for MPLS in Transport Networks

RFC 5960 MPLS Transport Profile Data Plane Architecture

RFC 6370 MPLS-TP Identifiers

RFC 6378 MPLS-TP Linear Protection

RFC 6428 Proactive Connectivity Verification, Continuity Check and Remote Defect indication for MPLS Transport Profile

RFC 6426 MPLS On-Demand Connectivity and Route Tracing

RFC 6478 Pseudowire Status for Static Pseudowires

draft-ietf-mpls-tp-ethernet-addressing-02 MPLS-TP Next-Hop Ethernet Addressing

RIP

RFC 1058 RIP Version 1

RFC 2080 RIPng for IPv6

RFC 2082 RIP-2 MD5 Authentication

RFC 2453 RIP Version 2

TCP/IP

RFC 768 UDP

RFC 1350 The TFTP Protocol (Rev.

RFC 791 IP

RFC 792 ICMP

RFC 793 TCP

RFC 826 ARP

RFC 854 Telnet

RFC 951 BootP (rev)

RFC 1519 CIDR

RFC 1542 Clarifications and Extensions for the Bootstrap Protocol

RFC 1812 Requirements for IPv4 Routers

RFC 2347 TFTP option Extension
RFC 2328 TFTP Blocksize Option
RFC 2349 TFTP Timeout Interval and Transfer
Size option
RFC 2401 Security Architecture for Internet Protocol
RFC 2428 FTP Extensions for IPv6 and NATs
RFC 3596 DNS Extensions to Support IP version 6
RFC 5880 Bidirectional Forwarding Detection
RFC 5881 BFD IPv4 and IPv6 (Single Hop)
RFC 5883 BFD for Multihop Paths
RFC 5286 Basic Specification for IP Fast Reroute: Loop-Free Alternates
draft-litkowski-rtgwg-lfa-manageability-01 Operational management of Loop Free Alternates

VRRP

RFC 2787 Definitions of Managed Objects for the Virtual Router Redundancy Protocol
RFC 3768 Virtual Router Redundancy Protocol
draft-ietf-vrrp-unified-spec-02 Virtual Router Redundancy Protocol Version 3 for IPv4 and IPv6

PPP

RFC 1332 PPP IPCP
RFC 1377 PPP OSINLCP
RFC 1638/2878PPP BCP
RFC 1661 PPP (rev RFC2151)
RFC 1662 PPP in HDLC-like Framing
RFC 1877 PPP Internet Protocol Control Protocol Extensions for Name Server Addresses
RFC 1989 PPP Link Quality Monitoring
RFC 1990 The PPP Multilink Protocol (MP)
RFC 1994 PPP Challenge Handshake
Authentication Protocol (CHAP)
RFC 2516 A Method for Transmitting PPP Over Ethernet
RFC 2615 PPP over SONET/SDH
RFC 2686 The Multi-Class Extension to Multi-Link PPP

Frame Relay

FRF.1.2 - PVC User-to-Network Interface (UNI) Implementation Agreement
FRF.5 - Frame Relay/ATM PVC Network Interworking Implementation
ANSI T1.617 Annex D, DSS1 — Signalling Specification For Frame Relay Bearer Service.
FRF2.2. PVC Network-to- Network Interface (NNI) Implementation Agreement.
FRF.12 Frame Relay Fragmentation Implementation Agreement
FRF.16.1 Multilink Frame Relay UNI/NNI Implementation Agreement
ITU-T Q.933 Annex A Additional procedures for Permanent Virtual Connection (PVC) status management

ATM

RFC 1626 Default IP MTU for use over ATM AAL5
RFC 2514 Definitions of Textual Conventions and OBJECT_IDENTITIES for ATM Management
RFC 2515 Definition of Managed Objects for ATM Management RFC 2684 Multiprotocol Encapsulation over ATM Adaptation Layer 5
AF-TM-0121.000 Traffic Management Specification Version 4.1
ITU-T Recommendation I.610 B-ISDN Operation and Maintenance Principles and Functions version 11/95
ITU-T Recommendation I.432.1 BISDN user-network interface – Physical layer specification: General characteristics
GR-1248-CORE Generic Requirements for Operations of ATM Network Elements (NEs). Issue 3
GR-1113-CORE Bellcore, Asynchronous Transfer Mode (ATM) and ATM Adaptation Layer (AAL) Protocols Generic Requirements, Issue 1
AF-ILMI-0065.000 Integrated Local Management Interface (ILMI) Version 4.0
AF-TM-0150.00 Addendum to Traffic Management v4.1 optional minimum desired cell rate indication for UBR
AF-PHY-0086.001 Inverse Multiplexing for ATM (IMA) Specification Version 1.1

DHCP

RFC 2131 Dynamic Host Configuration Protocol (REV)
RFC 3046 DHCP Relay Agent Information Option (Option 82)
RFC 1534 Interoperation between DHCP and BOOTP

Policy Management and Credit Control

3GPP TS 29.212 Policy and Charging Control (PCC) over Gx/Sd Reference Point (Release 11) - Gx support as it applies to wireline environment (BNG)
RFC 3588 Diameter Base Protocol
RFC 4006 Diameter Credit Control Application

NAT

RFC 6333 Dual-Stack Lite Broadband Deployments Following IPv4 Exhaustion
RFC 6334 Dynamic Host Configuration Protocol for IPv6 (DHCPv6) Option for Dual-Stack Lite
RFC 6888 Common Requirements For Carrier-Grade NATs (CGNs)
RFC 5508 NAT Behavioral Requirements for ICMP
RFC 5382 NAT Behavioral Requirements for TCP
RFC 6146 Statefull NAT64

VPLS

RFC 4761 Virtual Private LAN Service (VPLS) Using BGP for Auto-Discovery and Signaling
RFC 4762 Virtual Private LAN Services Using LDP
RFC 5501 Requirements for Multicast Support in Virtual Private LAN Services
RFC 6074 Provisioning, Auto-Discovery, and Signaling in Layer 2 Virtual Private Networks (L2VPNs)
draft-ietf-l2vpn-vpls-mcast-13. Multicast in VPLS

RFC 7041 Extensions to the Virtual Private LAN Service (VPLS) Provider Edge (PE) Model for Provider Backbone Bridging

Pseudowire

RFC 3985 Pseudo Wire Emulation Edge-to-Edge (PWE3)

RFC 4385 Pseudo Wire Emulation Edge-to-Edge (PWE3) Control Word for Use over an MPLS PSN

RFC 3916 Requirements for Pseudo-Wire Emulation Edge-to-Edge (PWE3)

RFC 4717 Encapsulation Methods for Transport ATM over MPLS Networks

RFC 4816 PWE3 ATM Transparent Cell Transport Service

RFC 4448 Encapsulation Methods for Transport of Ethernet over MPLS Networks

RFC 4619 Encapsulation Methods for Transport of Frame Relay over MPLS Networks

RFC 4446 IANA Allocations for PWE3

RFC 4447 Pseudowire Setup and Maintenance Using LDP

RFC 5085 Pseudowire Virtual Circuit Connectivity Verification (VCCV): A Control Channel for Pseudowires

RFC 5659 An Architecture for Multi-Segment Pseudowire Emulation Edge-to-Edge

RFC 5885 Bidirectional Forwarding Detection (BFD) for the Pseudowire Virtual Circuit Connectivity Verification (VCCV)

RFC 6310 Pseudowire (PW) OAM Message Mapping

RFC6391 Flow Aware Transport of Pseudowires over an MPLS PSN

RFC 6575 ARP Mediation for IP Interworking of Layer 2 VPN

RFC 6718 Pseudowire Redundancy

RFC 6870 Pseudowire Preferential Forwarding Status bit

draft-ietf-l2vpn-vpws-iw-oam-03 OAM Procedures for VPWS Interworking

draft-ietf-pwe3-mpls-eth-oam-iwk-07 MPLS and Ethernet OAM Interworking

draft-ietf-pwe3-dynamic-ms-pw-16 Dynamic Placement of Multi Segment Pseudo Wires

MFA Forum 9.0.0 The Use of Virtual trunks for ATM/MPLS Control Plane Interworking

MFA Forum 12.0.0 Multiservice Interworking - Ethernet over MPLS

MFA Forum 13.0.0 Fault Management for Multiservice Interworking v1.0

MFA Forum 16.0.0 Multiservice Interworking - IP over MPLS

ANCP/L2CP

RFC 5851 ANCP framework

draft-ietf-ancp-protocol-02 ANCP Protocol

Voice /Video Performance:

ITU-T G.107 The E Model- A computational model for use in planning.

ETSI TS 101 329-5 Annex E extensions- QoS Measurement for VoIP - Method for determining an Equipment Impairment Factor using Passive Monitoring

ITU-T Rec. P.564 Conformance testing for voice over IP transmission quality assessment models

ITU-T G.1020 Appendix I Performance Parameter Definitions for Quality of Speech and other Voiceband Applications Utilizing IP Networks- Mean Absolute Packet Delay Variation.& Markov Models.

RFC 3550 Appendix A.8- RTP A Transport Protocol for Real-Time Applications- Estimating the Interarrival Jitter.

Circuit Emulation

RFC 4553 Structure-Agnostic Time Division Multiplexing (TDM) over Packet (SAToP)

RFC 5086 Structure-Aware Time Division Multiplexed (TDM) Circuit Emulation Service over Packet Switched Network (CESoPSN)

MEF-8 Implementation Agreement for the Emulation of PDH Circuits over Metro Ethernet Networks, October 2004

RFC 5287 Control Protocol Extensions for the Setup of Time-Division Multiplexing (TDM) Pseudowires in MPLS Networks

SONET/SDH

ITU-G.841 Telecommunication Standardization Section of ITU, Types and Characteristics of SDH Networks Protection Architecture, issued in October 1998 and as augmented by Corrigendum1 issued in July 2002

AAA

RFC 2865 Remote Authentication Dial In User Service

RFC 2866 RADIUS Accounting

draft-grant-tacacs-02. The TACACS+ Protocol

SSH

RFC 4250 The Secure Shell (SSH) Protocol Assigned Numbers

RFC 4251 The Secure Shell (SSH) Protocol Architecture

RFC 4254 The Secure Shell (SSH) Connection Protocol

OpenFlow

ONF OpenFlow Switch Specification Version 1.3.1 (Hybrid-switch/ FlowTable)

Timing

GR-253-CORE SONET Transport Systems: Common Generic Criteria. Issue 3, September 2000

ITU-T G.781 Telecommunication Standardization Section of ITU, Synchronization layer functions, issued 09/2008

ITU-T G.813 Telecommunication Standardization Section of ITU, Timing characteristics of SDH equipment slave clocks (SEC), issued 03/2003.

GR-1244-CORE Clocks for the Synchronized Network: Common Generic Criteria, *Issue 3, May 2005*

ITU-T G.8261 Telecommunication Standardization Section of ITU, Timing and synchronization aspects in packet networks, issued 04/2008.

ITU-T G.8262 Telecommunication Standardization Section of ITU, Timing characteristics of synchronous Ethernet equipment slave clock (EEC), issued 08/2007.

ITU-T G.8264 Telecommunication Standardization Section of ITU, Distribution of timing information through packet networks, issued 10/2008.

ITU-T G.8265.1 Telecommunication Standardization Section of ITU, Precision time protocol telecom profile for frequency synchronization, issued 10/2010.

IEEE 1588-2008 IEEE Standard for a Precision Clock Synchronization Protocol for Networked Measurement and Control Systems

Network Management

ITU-T X.721 Information technology-OSI-Structure of Management Information

ITU-T X.734 Information technology-OSI-Systems Management: Event Report Management Function

M.3100/3120 Equipment and Connection Models

TMF 509/613 Network Connectivity Model

RFC 1157 SNMPv1

RFC 1215 A Convention for Defining Traps for use with the SNMP

RFC 1657 BGP4-MIB

RFC 1724 RIPv2-MIB

RFC 1850 OSPF-MIB

RFC 1907 SNMPv2-MIB

RFC 2011 IP-MIB

RFC 2138 RADIUS

RFC 2206 RSVP-MIB

RFC 2452 IPv6 Management Information Base for the

Transmission Control Protocol

RFC 2465 Management Information Base for IPv6: Textual Conventions and General Group

RFC 2558 SONET-MIB

RFC 2571 SNMP-FRAMEWORKMIB

RFC 2572 SNMP-MPD-MIB

RFC 2573 SNMP-TARGET-&-NOTIFICATION-MIB

RFC 2574 SNMP-USER-BASED-SMMIB

RFC 2575 SNMP-VIEW-BASEDACM-MIB

RFC 2576 SNMP-COMMUNITY-MIB

RFC 2578 Structure of Management Information Version 2 (SMIv2)

RFC 2665 EtherLike-MIB

RFC 2819 RMON-MIB

RFC 2863 IF-MIB

RFC 2864 INVERTED-STACK-MIB

RFC 2987 VRRP-MIB

RFC 3014 NOTIFICATION-LOGMIB

RFC 3019 IP Version 6 Management Information Base for The Multicast Listener Discovery Protocol

RFC 3164 Syslog

RFC 3273 HCRMON-MIB

RFC 3411 An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks

RFC 3412 Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)

RFC 3413 Simple Network Management Protocol (SNMP) Applications

RFC 3414 User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)

RFC 3418 SNMP MIB

RFC 3826 The Advanced Encryption Standard (AES) Cipher Algorithm in the SNMP User-based Security Model

RFC 4113 Management Information Base for the User Datagram Protocol (UDP)

RFC 4292 IP-FORWARD-MIB

RFC 4293 MIB for the Internet Protocol

RFC 5101 Specification of the IP Flow Information Export (IPFIX) Protocol for the Exchange of IP Traffic Flow Information

RFC 6242 Using the NETCONF Protocol over Secure Shell (SSH)

draft-ietf-bfd-mib-00 Bidirectional Forwarding Detection Management Information Base

draft-ietf-isis-wg-mib-06 Management Information Base for Intermediate System to Intermediate System (IS-IS)

draft-ietf-ospf-mib-update-04 OSPF Version 2 Management Information Base

draft-ietf-mboned-msdp-mib-01 Multicast Source Discovery protocol MIB

draft-ietf-mpls-lsr-mib-06 Multiprotocol Label Switching (MPLS) Label Switching Router (LSR) Management Information Base

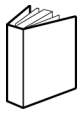
draft-ietf-mpls-te-mib-04 Multiprotocol Label Switching (MPLS) Traffic Engineering Management Information Base

draft-ietf-mpls-ldp-mib-07 MPLS Label Switch Router Management Information Base Using SMIv2

IANA ifType MIB

IEEE 802.3- LAG-MIB

Customer documentation and product support



Customer documentation

http://documentation.alcatel-lucent.com

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