DIAMETER Attributes

BNG Supports DIAMETER Gx interface for Policy and Charging Provisioning with the PCRF, and DIAMETER Gy interface for Online Charging Service with OCS.

This Appendix lists the applicable AVPs in each Diameter Request that is sent or received by BNG, and also some sample packets.

- BNG DIAMETER Gx Application AVPs, on page 1
- BNG DIAMETER Gy Application AVPs, on page 3
- BNG DIAMETER NASREQ Application Cisco AVPs, on page 4
- DIAMETER Accounting AVP, on page 7
- DIAMETER Session-Id AVP, on page 8
- RADIUS Attributes in DIAMETER Messages, on page 9
- Sample Packets for BNG DIAMETER Messages, on page 10
- Configuring DIAMETER Attribute lists, on page 15

BNG DIAMETER Gx Application AVPs

The DIAMETER interface with BNG is based on the respective latest 3GPP specifications and Diameter Credit Control Application (RFC 4006) standard. The interface remains the same for any DIAMETER server vendor, but the user must be aware of the set of AVPs being used to address the BNG-DIAMETER deployments and use-cases. This topic lists the BNG DIAMETER Gx Application AVPs.

Table 1: BNG DIAMETER Gx Application AVPs

AVP Name	AVP Code	Vendor	AVP Format	Messages	Source	Flags
Session-ID	263	IETF	String	CCR, CCA	RFC 6733	M
Origin-Host-Name	264	IETF	String	CCR, CCA	RFC 6733	M
Origin-Realm	296	IETF	String	CCR, CCA	RFC 6733	M
Destination Realm	283	IETF	String	CCR, CCA	RFC 6733	M
CC-Request-Type	416	IETF	Ulong	CCR, CCA	RFC 4006	M
CC-Request-Number	415	IETF	Ulong	CCR, CCA	RFC 4006	M

DIAMETER Attributes

AVP Name	AVP Code	Vendor	AVP Format	Messages	Source	Flags
Auth-Application-ID	258	IETF	Ulong	CCR, CCA	RFC 6733	M
ReAuth-Request-Type	285	IETF	Ulong	RAR	RFC 6733	M
Username	1	IETF	String	CCR, CCA	RFC 6733	M
Framed-IP-Address	8	IETF	Address	CCR, CCA	RFC 6733	M
Logical-Access-Id	302	ETSI	OctectString	CCR-I	TS 29.212	
Physical-Access-Id	313	ETSI	OctectString	CCR-I	TS 29.212	
*User-Equipment-Info	458	IETF	Grouped	CCR-I	RFC 6733	
User-Equipment-Info-Type	459	IETF	Enum	CCR-I	RFC 6733	M
User-Equipment-Info-Value	460	IETF	String	CCR-I	RFC 6733	M
Result-Code	268	IETF	Enum	CCA	RFC 6733	M
*Charging-Rule-Install	1001	3GPP	Grouped	CCA, RAR	TS 29.212	M, V
*Charging-Rule-Definition	1003	3GPP	Grouped	CCA, RAR	TS 29.212	M, V
Charging-Rule-Name	1004	3GPP	OctectString	CCA, RAR	TS 29.212	M, V
CC-Service-Identifier	439	IETF	Ulong	CCA, RAR	RFC 4006	M
Rating-Group	432	IETF	Ulong	CCA, RAR	RFC 4006	M
*Charging-Rule-Remove	1002	3GPP	Grouped	RAR	TS 29.212	
Session-Release-Cause	1045	3GPP	Enum	RAR	TS 29.212	M
Gx-Application-ID	14080	Cisco	Ulong	CCR		
Vrf-Id	14002	Cisco	Ulong	CCA-I		
IPv6-Enable	14056	Cisco	Ulong	CCA-I		
IP-Unnumbered	14055	Cisco	String	CCA-I		
Inacl	14009	Cisco	String	CCA-I		
Ipv6-inacl	14010	Cisco	String	CCA-I		
Outacl	14012	Cisco	String	CCA-I		
IPv6-outacl	14013	Cisco	String	CCA-I		
Sub-Qos-Policy-In	14014	Cisco	String	CCA-I		
Sub-Qos-Policy-Out	14015	Cisco	String	CCA-I		
Accounting-List	14016	Cisco	String	CCA-I		

BNG DIAMETER Gy Application AVPs

This table lists the BNG DIAMETER Gy application AVPs.

Table 2: BNG DIAMETER Gy Application AVPs

AVP Name	AVP Code	Vendor	AVP Format	Messages	Source	Flags
Session-ID	263	IETF	String	CCR, CCA	RFC 6733	M
Origin-Host-Name	264	IETF	String	CCR, CCA	RFC 6733	M
Origin-Realm	296	IETF	String	CCR, CCA	RFC 6733	M
Destination Realm	283	IETF	String	CCR, CCA	RFC 6733	M
CC-Request-Type	416	IETF	Ulong	CCR, CCA	RFC 4006	M
CC-Request-Number	415	IETF	Ulong	CCR, CCA	RFC 4006	M
Auth-Application-ID	258	IETF	Ulong	CCR, CCA	RFC 6733	M
ReAuth-Request-Type	285	IETF	Ulong	RAR	RFC 6733	M
Username	1	IETF	String	CCR, CCA	RFC 6733	M
Framed-IP-Address	8	IETF	Address	CCR, CCA	RFC 6733	M
*User-Equipment-Info	458	IETF	Grouped	CCR-I	RFC 6733	-
User-Equipment-Info-Type	459	IETF	Enum	CCR-I	RFC 6733	M
User-Equipment-Info-Value	460	IETF	String	CCR-I	RFC 6733	M
Result-Code	268	IETF	Enum	CCA	RFC 6733	M
Service-Context-Id	461	IETF	String	CCR	RFC 4006	M
Event-Time-Stamp	55	IETF	Ulong	CCR	RFC 6733	M
CC-Multiple-Service-Support	455	IETF	Enum	CCR	RFC 4006	M
*CC-Multiple-Service	456	IETF	Grouped	CCR, CCA	RFC 4006	M
CC-Service-Identifier	439	IETF	Ulong	CCA, RAR	RFC 4006	M
Rating-Group	432	IETF	Ulong	CCA, RAR	RFC 4006	M
*Requested-Service-Unit	437	IETF	Ulong	CCR-I	RFC 4006	-
CC-Session-Failover	418	IETF	Ulong	CCA	RFC 4006	-
*Granted-Service-Unit	431	IETF	Grouped	CCA	RFC 4006	M
CC-Tariff-Time-Change	451	IETF	Ulong	CCR-U, CCA	RFC 4006	M

AVP Name	AVP Code	Vendor	AVP Format	Messages	Source	Flags
CC-Time	420	IETF	Ulong	CCR, CCA	RFC 4006	M
CC-Input-Octets	412	IETF	Ulonglong	CCR, CCA	RFC 4006	M
CC-Output-Octets	414	IETF	Ulonglong	CCR, CCA	RFC 4006	M
CC-Total-Octets	421	IETF	Ulonglong	CCR, CCA	RFC 4006	M
CC-Tariff-Change-Units	446	IETF	Enum	CCR-U	RFC 4006	M
Reporting-Reason	872	IETF	Enum	CCR-U	RFC 4006	M
Volume-Quota-Threshold	869	3GPP	Ulong	CCA	TS 32.299	M, V
Time-Quota-Threshold	868	3GPP	Ulong	CCA	TS 32.2996	M, V
CC-Validity-Time	448	IETF	Ulong	CCA	RFC 4006	M
Quota-Holding-Time	871	3GPP	Ulong	CCA	RFC 4006	M
Credit-Control-Failure-Handling	427	IETF	Enum	CCA	RFC 4006	M
*Final-Unit-Indication	430	IETF	Grouped	CCA	RFC 4006	M
Final-Unit-Action	449	IETF	Enum	CCA	RFC 4006	M
Termination-Cause	295	IETF	Enum	CCR-Final	RFC 6733	M
Service-Information	873	IETF	Ulonglong	CCR-I, CCR-U, CCR-T	RFC 6733	M

BNG DIAMETER NASREQ Application Cisco AVPs

This table lists the BNG DIAMETER NASREQ application Cisco AVPs.

Table 3: BNG DIAMETER NASREQ Application Cisco AVPs

AVP Name	Value	Format	Type
Framed-IP-Address	8	ipv4addr	ietf
Framed-IP-Address/ Framed-IP-Netmask	9	ipv4addr	ietf
Filter-Id	11	binary	ietf
Framed-MTU	12	ulong	ietf
Framed-Compression	13	enum	ietf
Reply-Message	18	binary	ietf

AVP Name	Value	Format	Type
Framed-Route	22	string	ietf
Session-Timeout	27	ulong	ietf
Idle-Timeout	28	ulong	ietf
Framed-Pool	88	string	ietf
Framed-IPv6-Prefix	97	binary	ietf
Framed-IPv6-Route	99	string	ietf
Framed-IPv6-Pool	100	string	ietf
Delegated-IPv6-Prefix	123	binary	ietf
ip:primary-dns / ip:secondary-dns	135	address	ietf
addrv6	14001	address	cisco_vsa
vrf-id	14002	ulong	cisco_vsa
parent-session-id	14003	string	cisco_vsa
service-name	14004	string	cisco_vsa
disc-cause-ext	14005	enum	cisco_vsa
disconnect-cause	14006	string	cisco_vsa
Ascend-Connect-Progress	14007	ulong	cisco_vsa
Acct-Unique-Session-Id	14008	ulong	cisco_vsa
inacl	14009	string	cisco_vsa
ipv6_inacl	14010	string	cisco_vsa
cisco-nas-port	14011	string	cisco_vsa
outacl	14012	string	cisco_vsa
ipv6_outacl	14013	string	cisco_vsa
sub-qos-policy-in	14014	string	cisco_vsa
sub-qos-policy-out	14015	string	cisco_vsa
accounting-list	14016	string	cisco_vsa
parent-if-handle	14017	ulong	cisco_vsa
acct-input-gigawords-ipv4	14018	ulong	cisco_vsa
acct-input-octets-ipv4	14019	ulong	cisco_vsa

AVP Name	Value	Format	Type
acct-input-packets-ipv4	14020	ulong	cisco_vsa
acct-output-gigawords-ipv4	14021	ulong	cisco_vsa
acct-output-octets-ipv4	14022	ulong	cisco_vsa
acct-output-packets-ipv4	14023	ulong	cisco_vsa
acct-input-gigawords-ipv6	14024	ulong	cisco_vsa
acct-input-octets-ipv6	14025	ulong	cisco_vsa
acct-input-packets-ipv6	14026	ulong	cisco_vsa
acct-output-gigawords-ipv6	14027	ulong	cisco_vsa
acct-output-octets-ipv6	14028	ulong	cisco_vsa
acct-output-packets-ipv6	14029	ulong	cisco_vsa
subscriber:command=account-logon	14030	string	cisco_vsa
subscriber:sd=service1	14031	string	cisco_vsa
subscriber:sa=service1	14032	string	cisco_vsa
subscriber:sm= svc1(interim-interval=120)	14033	string	cisco_vsa
ip:ip-unnumbered=<loopback>	14038	string	cisco_vsa
ipv4:ipv4-multicast=Qos Correlation	14039	enum	cisco_vsa
ip:keepalive	14040	string	cisco_vsa
dual-stack-delay	14041	string	cisco_vsa
idle-timeout-direction	14042	string	cisco_vsa
idlethreshold	14043	ulong	cisco_vsa
ipv4:ipv4-mtu	14044	ulong	cisco_vsa
ipv6:ipv6-mtu	14045	ulong	cisco_vsa
md-ip-addr	14046	address	cisco_vsa
md-port	14047	ulong	cisco_vsa
md-dscp	14048	ulong	cisco_vsa
li-action	14049	ulong	cisco_vsa
intercept-id	14050	binary	cisco_vsa
cisco-mpc-protocol-interface=pmipv6	14051	enum	cisco_vsa

AVP Name	Value	Format	Type
cisco-mobile-node-identifier	14052	string	cisco_vsa
cisco-mn-service	14053	enum	cisco_vsa
home-lma	14054	string	cisco_vsa

DIAMETER Accounting AVP

This table lists the DIAMETER Accounting AVPs that describe accounting usage information related to a specific session and for a service.

AVP	Command Code	Description
Accounting-Record-Type	480	Contains the type of accounting record being sent. This is similar to Acct-Status-Type RADIUS IETF AVP. These are the values currently defined for the Accounting-Record-Type AVP: • 1 - EVENT_RECORD • 2 - START_RECORD • 3 - INTERIM_RECORD • 4 - STOP_RECORD
Accounting-Record-Number	485	Identifies the record within one session. For a given BNG session, START_RECORD carries the value 0 (zero) and it increases for the subsequent Accounting-Request for the same BNG Session.
Accounting-Sub-Session-Id	287	Contains the accounting sub-session identifier. The combination of the Session-Id and this AVP must be unique for each sub-session, and the value of this AVP must be increased by one for all new sub-sessions. **Note** This is not supported in BNG.

AVP Considerations

These AVPs are considered to be security-sensitive:

- Acct-Interim-Interval
- Accounting-Realtime-Required
- Acct-Multi-Session-Id
- Accounting-Record-Number
- Accounting-Record-Type
- Accounting-Session-Id
- Accounting-Sub-Session-Id
- Class
- Session-Id
- Session-Binding
- Session-Server-Failover
- User-Name

DIAMETER Session-Id AVP

The Session-Id AVP (AVP code 263) is of type UTF8String and is used to identify a specific diameter application session. All messages pertaining to a given BNG subscriber session have the same Session-Id and uses the same value throughout the life of the session. The Session-Id AVP must appear immediately after the DIAMETER header and it optimizes the session association while parsing the request or response. The Session-Id AVP includes a mandatory portion and an implementation-specific portion.

The syntax for this AVP is:

DiameterIdentity;high 32 bits;low 32 bits;optional value

Table 4: Syntax Description

DiameterIdentity	Used to identify either: • A DIAMETER node for the purpose of duplicate connection and routing loop detection. • A realm to determine whether the messages can be processed locally or whether they must be routed or redirected.

high 32 bits *low 32 bits*	Decimal representation of the high and low 32 bits of a increasing 64-bit value. BNG uses Session-Id (Acct-Session-ID) which is of 32 bits as of now and hence the high 32 bits is 0 (Zero) to start with. To make the DIAMETER Session-Id unique, the high 32 bits is increased every time after a router reload or in process restart scenarios (such as DIAMETER process restart) where the previous Session-Id is lost. This eliminates the possibility of overlapping Session-Ids in such scenarios.
optional value	This is implementation specific, and it may include a Layer 2 address, timestamp and so on. BNG uses the *timestamp* that is retrieved when the first request is being sent to the DIAMETER server for each application. The first message for NASREQ is AA-Request, and for DCCA application, it is CCR-Initial request. The subsequent messages carry the same timestamp for the given BNG subscriber session to ensure that the same Session-Id is used in the entire span of the respective DIAMETER application session.

This is an example of DIAMETER Session-Id AVP (with an optional value):

```
BNG1.example.com;1876543210;523;BNG1@10.0.0.1
```

This is an example of DIAMETER Session-Id AVP (without an optional value):

```
BNG1.example.com;1876543210;523
```

RADIUS Attributes in DIAMETER Messages

A DIAMETER message may include RADIUS attributes, except the ones listed in this table. These RADIUS attributes, if present, are translated internally to similar DIAMETER AVPs.

RADIUS Attribute	RADIUS Attribute Name	Nearest DIAMETER AVP
3	CHAP-Password	CHAP-Auth Group
26	Vendor-Specific	Vendor Specific AVP
29	Termination-Action	Authorization-Lifetime
40	Acct-Status-Type	Accounting-Record-Type
42	Acct-Input-Octets	Accounting-Input-Octets
43	Acct-Output-Octets	Accounting-Output-Octets
47	Acct-Input-Packets	Accounting-Input-Packets

RADIUS Attribute	RADIUS Attribute Name	Nearest DIAMETER AVP
48	Acct-Output-Packets	Accounting-Output-Packets
49	Acct-Terminate-Cause	Termination-Cause
52	Acct-Input-Gigawords	Accounting-Input-Octets
53	Acct-Output-Gigawords	Accounting-Output-Octets
80	Message-Authenticator	No corresponding DIAMETER AVP. If this attribute is present, it is checked and discarded.

Sample Packets for BNG DIAMETER Messages

This topic lists the sample packets for BNG DIAMETER messages.

GX - CCR-Initial Message from BNG to PCRF

```
Session-Id                        [263]     "cisco123.com;3201010A;0"  (M)
  Origin-host-name                [264]     "cisco123.com"             (M)
  Origin-Realm                    [296]     "cisco.com"                (M)
  CC-request-type                 [416]     ccr-initial                (M)
  CC-request-number               [415]     0                          (M)
  Destination-Realm               [283]     "cisco.com"                (M)
  Auth-Application-ID             [258]     16777238                   (M)
  User-name                       [1]       "prepaid-user"             (M)
  Framed-IP-Address               [8]       10.0.0.1                   (M)
  User-Equipment-Info             [458]
  User-Equipment-Info-Type        [459]     MAC (1)                    (M)
     User-Equipment-Info-Value    [460]     "0219.a220.e809"             (M)
```

GX - CCA-Initial Message from PCRF to BNG

```
Session-Id                         [263]    "cisco123.com;3201010A;0"  (M)
 Result-code                       [268]    2001                       (M)
 Auth-Application-ID               [258]    16777238                   (M)
 Origin-host-name                  [264]    "pcrf.cisco.com"           (M)
 Origin-Realm                      [296]    "cisco.com"                (M)
 Destination-Realm                 [283]    "cisco.com"                (M)
 CC-request-type                   [416]    ccr-initial                (M)
 CC-request-number                 [415]    0                          (M)
 Vendor, 3GENPP                    [10415]
 Charging-Rule-Install             [1001]                              (M)
     Vendor, 3GENPP                [10415]
     Charging-Rule-Definition      [1003]                              (M)
         Vendor, 3GENPP            [10415]
         Charging Rule Name        [1005]   "HSI_10MB"                 (M)
         CC-service-identifier     [439]     5                         (M)
         Rating group              [432]     3                         (M)
```

Gx - Application RA-Request Message

Session-Id	[263]	"cisco123.com;3201010A;0"	(M)
Origin-host-name	[264]	"cisco123.com"	(M)
Origin-Realm	[296]	"cisco.com"	(M)
Re-Auth-Request-Type	[285]	AUTHORIZE_ONLY (0)	(M)
CC-request-number	[415]	0	(M)
Destination-Realm	[283]	"cisco.com"	(M)
Auth-Application-ID	[258]	Gx (16777238)	
Vendor, 3GENPP	[10415]		(M)
Charging Rule Remove	[1002]		
Vendor, 3GENPP	[10415]		
Charging Rule Name	[1005]	"HSI_10MB"	(M)
Vendor, 3GENPP	[10415]		(M)
Charging Rule Install	[1001]		
Vendor, 3GENPP	[10415]		
Charging-Rule-Definition	[1003]		(M)
Vendor, 3GENPP	[10415]		
Charging Rule Name	[1005]	"LOW_BW128KB"	(M)
CC-service-identifier	[439]	6	(M)
Vendor, 3GENPP	[10415]		
Rating group	[432]	4	(M)

Gx - Application RA-Answer Message

Session-Id	[263]	"cisco123.com;3201010A;0"	(M)
Result-code	[268]	2001	(M)
Auth-Application-ID	[258]	Gx (16777238)	(M)
Origin-host-name	[264]	"pcrf.cisco.com"	(M)
Origin-Realm	[296]	"cisco.com"	(M)
Destination-Realm	[283]	"cisco.com"	(M)

Gx - RA-Request Message to Release the Session

Session-Id	[263]	"cisco123.com;3201010A;0"	(M)
Origin-host-name	[264]	"cisco123.com"	(M)
Origin-Realm	[296]	"cisco.com"	(M)
Re-Auth-Request-Type	[285]	AUTHORIZE_ONLY (0)	(M)
CC-request-number	[415]	0	(M)
Destination-Realm	[283]	"cisco.com"	(M)
Auth-Application-ID	[258]	Gx (16777238)	
Vendor, 3GENPP	[10415]		
Session-Release-Cause	[1045]	“UNSPECIFIED_REASON”	(M)

Gy - CCR-Initial Message

Session-Id	[263]	"cisco123.com;3201010A;0"	(M)
Origin-host-name	[264]	"cisco123.com"	(M)
Origin-Realm	[296]	"cisco.com"	(M)
CC-request-type	[416]	ccr-initial	(M)
CC-request-number	[415]	0	(M)
Destination-Realm	[283]	"cisco.com"	(M)
Auth-Application-ID	[258]	4	(M)
User-name	[1]	“prepaid-user”	(M)
Service_Context_Id	[461]	"32251@3gpp.org”	(M)
Framed-IP-Address	[8]	10.0.0.1	(M)

DIAMETER Attributes

```
  Event-Timestamp                  [55]      3426644002                 (M)
  CC-Multiple-service-support      [455]     multiple-service-supported (M)
  CC-multiple-service              [456]
      CC-service-identifier        [439]     5                          (M)
      Rating group                 [432]     3                          (M)
      CC-requested-service-unit    [437]
      User-Equipment-Info          [458]
    User-Equipment-Info-Type       [459]     MAC (1)                    (M)
        User-Equipment-Info-Value  [460]     "0219.a220.e809"             (M)
```

Gy - CCA-Initial Message

```
  Session-Id                       [263]     "cisco123.com;3201010A;0"  (M)
  Result-code                      [268]     2001                       (M)
  Origin-host-name                 [264]     "cisco123.com"             (M)
  Origin-Realm                     [296]     "cisco.com"                (M)
  CC-request-type                  [416]     ccr-initial                (M)
  CC-request-number                [415]     0                          (M)
  Destination-Realm                [283]     "cisco.com"                (M)
  Auth-Application-ID              [258]     4                          (M)
  User-name                        [1]       "prepaid-user"             (M)
  Framed-IP-Address                [8]       10.0.0.1                   (M)
  Event-Timestamp                  [55]      3426644002                 (M)
  CC-session-failover              [418]     NOT_SUPPORTED (0)          (M)
  CC-multiple-service              [456]
   Granted-Service-Unit            [431]
    CC-Tariff-Time-Change          [451]     10:10:10  Thu Dec 28 2006  (M)
    CC-Total-Octets                [414]     1000                       (M)
   Vendor, 3GENPP                  [10415]
   Volume-Quota-threshold          [869]     10
   Rating-Group                    [432]     3                          (M)
   Service-Identifier              [439]     5                          (M)
   CC-validity-time                [448]     1000                       (M)
   Result-code                     [268]     2001                       (M)
   Vendor, 3GENPP                  [10415]
   Quota-Holding-Time              [871]     10000                      (M)
  Credit-Control-Failure-Handling  [427]     CONTINUE (1)               (M)
```

Gy - CCR-Update Message

```
Session-Id                         [263]    " cisco123.com;3201010A;0"     (M)
  Origin-host-name                 [264]    "cisco123.com"                 (M)
  Origin-Realm                     [296]    "cisco.com"                    (M)
  Auth-Application-ID              [258]    4                              (M)
  CC-request-type                  [416]    ccr-update                     (M)
  CC-request-number                [415]    1                              (M)
  Service_Context_Id               [461]    "bng1@cisco.com                (M)
  Framed-IP-Address                [8]      10.0.0.1                       (M)
  User-Name                        [1]      "prepaid-user"                 (M)
  Event-Timestamp                  [55]     3426644119                     (M)
  Destination-Realm                [283]    "cisco.com"                    (M)
  CC-multiple-service              [456]
   CC-rating-group                 [432]    3                              (M)
   Service-Identifier              [439]    5                              (M)
    Used-Service-Unit              [446]
    CC-Time                        [420]    1                              (M)
    Vendor, 3GENPP                 [10415]
    Reporting- Reason              [872]    QUOTA_EXHAUSTED (3)            (M)
   Used-Service-Unit               [446]
    CC-Total-Octets                [421]    2                              (M)
```

```
    Vendor, 3GENPP             [10415]
    Reporting-Reason           [872]    QUOTA_EXHAUSTED (3)            (M)
    CC-Input-Octets            [412]    1                              (M)
    CC-Output-Octets           [414]    1                              (M)
   User-Equipment-Info         [458]
    User-Equipment-Info-Type   [459]    MAC (1)                        (M)
    User-Equipment-Info-Value  [460]    "0219.a220.e809"                 (M)
```

CCR-Update Message with Tariff Change Units

```
CC-multiple-service             [456]
  CC-rating-group               [432]    3                             (M)
  Service-Identifier            [439]    5                             (M)
  CC-Service-Unit               [446]
    CC-Time                     [420]    166                           (M)
    CC-tariff-change-units      [452]    units-before-tariff-change    (M)
  CC-Service-Unit               [446]
    CC-Total-Octets             [421]    264                           (M)
    CC-Input-Octets             [412]    132                           (M)
    CC-Output-Octets            [414]    132                           (M)
    CC-tariff-change-units      [452]    units-before-tariff-change    (M)
  CC-Service-Unit               [446]
    CC-Time                     [420]    129                           (M)
    CC-tariff-change-units      [452]    units-after-tariff-change     (M)
  CC-Service-Unit               [446]
    CC-Total-Octets             [421]    132                           (M)
    CC-Input-Octets             [412]    66                            (M)
    CC-Output-Octets            [414]    66                            (M)
    CC-tariff-change-units      [452]    units-after-tariff-change     (M)
```

Gy - CCA-Update Message

```
Session-Id                      [263]     "cisco123.com;3201010A;0"   (M)
Result-code                     [268]     2001                        (M)
Origin-host-name                [264]     "cisco123.com"              (M)
Origin-Realm                    [296]     "cisco.com"                 (M)
CC-request-type                 [416]     ccr-update                  (M)
CC-request-number               [415]     0                           (M)
Destination-Realm               [283]     "cisco.com"                 (M)
Auth-Application-ID             [258]     4                           (M)
CC-session-failover             [418]     NOT_SUPPORTED (0)           (M)
CC-multiple-service             [456]
 Granted-Service-Unit           [431]
  CC-Tariff-Time-Change         [451]     10:10:10  Thu Dec 28 2006   (M)
  CC-Total-Octets               [414]     1000                        (M)
 CC-final-unit-indication       [430]
 Final-Unit-Action              [449]     0 (Terminate)               (M)
 Vendor, 3GENPP                 [10415]
 Volume-Quota-threshold         [869]     10
 Rating-Group                   [432]     3                           (M)
 Service-Identifier             [439]     5                           (M)
 Result-code                    [268]     2001                        (M)
 Vendor, 3GENPP                 [10415]
 Quota-Holding-Time             [871]     10000                       (M)
 Quota-Validity-Time            [448]     10000                       (M)
Credit-Control-Failure-Handling [427]     CONTINUE (1)                (M)
```

DIAMETER Attributes

Gy - Sample RAR Packet

```
Session-Id                  [263]     "bng;167;1234567"              (M)
Origin-host-name            [264]     "diameter1.cisco.com"          (M)
Origin-Realm                [296]     "cisco.com"                    (M)
Destination-Realm           [283]     "cisco.com"                    (M)
Destination host name       [293]     "diamclient1.cisco.com"        (M)
Auth-Application-ID         [258]     4                              (M)
Re-Auth-Request-Type        [285]     Authorize-Only                 (M)
```

Gy - Sample RAA Packet

```
Session-Id                  [263]     "bng;167;217443434"             (M)
Result-code                 [268]     2001                            (M)
Origin-Realm                [296]     "cisco.com"                     (M)
Origin-host-name            [264]     "diamclient1.cisco.com"         (M)
Origin-host-name            [264]     "diamclient1.cisco.com"         (M)
Origin-Realm                [296]     "cisco.com"                     (M)
```

Gy - CCR-Final Message

```
Session-Id                  [263]   "63;3201010A;4294967295"  (M)
   Origin-host-name         [264]    "cisco123.com"           (M)
   Origin-Realm             [296]    "cisco.com"              (M)
   Auth-Application-ID      [258]    4                        (M)
   CC-request-type          [416]    ccr-final                (M)
   CC-request-number        [415]    3                        (M)
   Service_Context_Id       [461]    "bng1@cisco.com          (M)
   Framed-IP-Address        [8]      "10.0.0.1"    (M)
   User-Name                [1]      "prepaid-user"           (M)
   Event-Timestamp          [55]     3426644295               (M)
   Termination_Cause        [295]    Diameter Administrative  (M)
   Destination-Realm        [283]    "cisco.com"              (M)
   CC-multiple-service      [456]
      CC-rating-group       [432]    3                        (M)
      Service-Identifier    [439]    5                        (M)
      Used-Service-Unit     [446]
         Vendor, 3GENPP     [10415]
         Reporting-Reason   [872]    FINAL (2)                (M)
         CC-Time            [420]    1                        (M)
      Used-Service-Unit     [446]
         Vendor, 3GENPP     [10415]
         Reporting-Reason   [872]    FINAL (2)                (M)
         CC-Total-Octets    [421]    2                        (M)
         CC-Input-Octets    [412]    1                        (M)
         CC-Output-Octets   [414]    1                        (M)
```

Gy - CCA-Final Message

```
Session-Id                      [263]    "cisco123.com;3201010A;0" (M)
  Result-code                   [268]    2001                      (M)
  Origin-host-name              [264]    "cisco123.com"            (M)
  Origin-Realm                  [296]    "cisco.com"               (M)
  CC-request-type               [416]    ccr-final                 (M)
  CC-request-number             [415]    0                         (M)
  Destination-Realm             [283]    "cisco.com"               (M)
```

```
  Auth-Application-ID              [258]    4                          (M)
  CC-session-failover              [418]    NOT_SUPPORTED(0)           (M)
  Credit-Control-Failure-Handling  [427]    CONTINUE (1)               (M)
```

Configuring DIAMETER Attribute lists

The following snippet of running-configuration shows the DIAMETER attribute list configuration for grouped and individual attributes:

Running Configuration

```
diameter attribute list 1
 attribute vendor-id 10415 873 grouped 2 mandatory
!
diameter attribute list 2
 attribute vendor-id 10415 874 grouped 3 mandatory
!
diameter attribute list 3
 attribute vendor-id 0 30 string ftth
 attribute vendor-id 10415 2 string pdtest28@ftth:1513611843 mandatory
 attribute vendor-id 10415 18 string 41603
 attribute vendor-id 10415 2050 ulong 0
!

diameter attribute list 4
 attribute vendor-id 0 421 ulonglong 2000000 /* 421 is to configure CC-Total-Octets */
```