



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.

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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 |

| 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 | <p>Contains the type of accounting record being sent.</p> <p>This is similar to Acct-Status-Type RADIUS IETF AVP. These are the values currently defined for the Accounting-Record-Type AVP:</p> <ul style="list-style-type: none"> • 1 - EVENT_RECORD • 2 - START_RECORD • 3 - INTERIM_RECORD • 4 - STOP_RECORD |
| Accounting-Record-Number | 485 | <p>Identifies the record within one session.</p> <p>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.</p> |
| Accounting-Sub-Session-Id | 287 | <p>Contains the accounting sub-session identifier.</p> <p>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.</p> <p>Note This is not supported in BNG.</p> |

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

| | |
|-------------------------|---|
| <i>DiameterIdentity</i> | <p>Used to identify either:</p> <ul style="list-style-type: none"> • 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. |
|-------------------------|---|

| | |
|--|---|
| <p><i>high 32 bits</i></p> <p><i>low 32 bits</i></p> | <p>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.</p> |
| <p><i>optional value</i></p> | <p>This is implementation specific, and it may include a Layer 2 address, timestamp and so on. BNG uses the <i>timestamp</i> 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.</p> |

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]
    Vendor, 3GENPP        [10415]
      Charging-Rule-Definition [1003]
        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) |

| | | | |
|-----------------------------|-------|----------------------------|-----|
| 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) |

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 */
```

