Routing Behind the Mobile Station on an APN

The following rules apply:

- AAA interface of GGSN/P-GW supports receiving "Framed Route AVP" in Radius Access-Accept Message from the Radius Server.
- AAA interface of GGSN/P-GW supports maximum 16 "Framed Route AVP" in Radius Access-Accept Message.
- GGSN/P-GW does not accept framed route with destination address as 0.0.0.0 and/or netmask as 0.0.0.0.
- GGSN/P-GW does not accept framed route where gateway address in the route is not matching with the address that would be assigned to Mobile station.
- GGSN/P-GW ignores duplicate framed routes.
- GGSN/P-GW supports controlling enabling/disabling of this feature through CLI in APN Configuration.
- GGSN/P-GW supports controlling number of framed-routes to be installed through this feature.
- GGSN/P-GW supports controlling number of hosts (addresses) supported behind the mobile station per route.
- The routing behind an MS is supported only for IPv4 PDP contexts.
- Packets routed behind the MS share the same 3GPP QoS settings of the MS.

Feature Description

The Framed-Route attribute provides routing information to be configured for the user on the network access server (NAS). The Framed-Route information is returned to the RADIUS server in the Access-Accept message. Framed-Route can work at a context level or VRF level. VRFs can be on per enterprise and each can have its
own set of framed-routes. In such configuration, framed routes will be installed in VRF's dedicated for respective enterprise. Association of Framed-Route with VRF will be done based on subscriber IP pool.

Mobile Router enables a router to create a PDN Session which the GGSN authorizes using RADIUS server. The RADIUS server authenticates this router and includes a Framed-Route attribute in the access-accept response packet. Framed-Route attribute also specifies the subnet routing information to be installed in the GGSN for the "mobile router." If the GGSN receives a packet with a destination address matching the Framed-Route, the packet is forwarded to the mobile router through the associated PDN session.

How It Works

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Configuring Routing Behind the Mobile Station

The routing behind the MS feature enables the routing of packets to IPv4 addresses that do not belong to the PDN Session (the MS), but exist behind it. The network address of the destination can be different than the MS address.

Before enabling routing behind the MS, the following requirements must be met:

- The MS must use RADIUS for authentication and authorization.
- The Framed-Route (attribute 22) as defined in Internet Engineering Task Force (IETF) standard RFC 2865, must be configured in the profile of a user and contain at least one route, and up to 16 routes for each MS that is to use the routing behind the MS feature.
Routing Behind the Mobile Station on an APN

Configuration Overview

To enable routing behind a Mobile Station perform the following steps:

- **Step 1** Create an APN Profile. Refer to Creating an APN Profile, on page 3.
- **Step 2** Enable or disable a Network behind Mobile Station for APN. Refer to Enabling Routing Behind the Mobile Station, on page 3.

Creating an APN Profile

Use the following example to create an APN profile on the P-GW/SAEGW/S-GW:

```
config
    context context_name
    apn apn_name
end
```

Notes:

- The apn name must be an alphanumeric string from 1 to 64 characters in length.
- Once you have created an APN profile, you will enter the Access Point Profile Configuration Mode.

Enabling Routing Behind the Mobile Station

To enable routing behind an MS, use the following steps command in access-point configuration mode:

```
config
    network-behind-mobile { max-addresses-behind-mobile max_addrs | max-subnets max_subnets } { default | no } network-behind-mobile
end
```

Notes:

- **default** Enables the default settings for this function. It enables NBMS with max-subnets as 10 and max-addresses-behind-mobile as 16,777,214 default values.
- **no** Disables the network behind mobile station functionality on the APN.
Verifying the Routing Behind the Mobile Station

To verify the routing behind the mobile station configuration, use the following show commands.

• **max-addresses-behind-mobile** `max_addrs`
  Configures the maximum number of addresses that are allowed in a single Network/subnet Behind MS.

• **max-subnets** `max_subnets`
  Specifies the maximum number of subnets that can be enabled for a call in the APN.
  
  - `max_subnets` must be an integer from 1 through 16.
  
  Default: 10
1. Router show ip route vrf vpn_am2
   "*" indicates the Best or Used route. S indicates Stale.
   Destination     Nexthop     Protocol Prec Cost Interface
   *(nhlfe-ix:3)*  10.7.104.2 bgp 20  0      bgp_neighbour
   *17.18.19.20/32  0.0.0.0  connected  0  0      vpn_am2lb1
   *17.18.19.21/32  0.0.0.0  connected  0  0
   *40.40.41.0/24  0.0.0.0  connected  0  0
   *41.40.41.0/24  0.0.0.0  connected  0  0
   *42.40.41.0/24  0.0.0.0  connected  0  0
   *43.40.41.0/24  0.0.0.0  connected  0  0
   *44.40.41.0/24  0.0.0.0  connected  0  0
   *45.40.41.0/24  0.0.0.0  connected  0  0
   *46.40.41.0/24  0.0.0.0  connected  0  0
   *47.40.41.0/24  0.0.0.0  connected  0  0
   *48.40.41.0/24  0.0.0.0  connected  0  0
   *49.40.41.0/24  0.0.0.0  connected  0  0
   *106.106.0.0/16  0.0.0.0  connected  0  0      pool pool_test_3
   Total route count : 13
   Unique route count: 13
   Connected: 12 BGP: 1

2. show subscribers pgw-only full all
   Username: starent
   Subscriber Type : Visitor
   Status : Online/Active
   State : Connected
   Auto Delete : No
   Idle time : 00h00m50s
   MS TimeZone : n/a Daylight Saving Time: n/a
   Access Type: gtp-pdn-type-ipv4 Network Type: IPv4
   Access Tech: eUTRAN
   pgw-service-name: PGW21
   Callid: 0d8d3a3
   IMSI: 123456789012345
   Protocol Username: starent
   MSISDN: 932673773
   Interface Type: SS7/GTP Low Access Priority: N/A
   Emergency Bearer Type: N/A
   IMS-media Bearer: No
   S6b Auth Status: N/A
   Access Peer Profile: default
   Acct-session-id (C1): 14141650F55555B
   ThreeGPP2-correlation-id (C2): 17767C4D / 6SKdhW-2
   Card/Cpu: 12/0 Sessmgr Instance: 47
   Bearer Type: Default
   Bearer-ID: 5
   Bearer State: Active
   IP allocation type: local pool
   IPv6 allocation type: N/A
   IP address: 106.106.0.5
   Framed Routes:
   40.40.41.0  255.255.255.0  106.106.0.5
   41.40.41.0  255.255.255.0  106.106.0.5
   42.40.41.0  255.255.255.0  106.106.0.5
   43.40.41.0  255.255.255.0  106.106.0.5
   44.40.41.0  255.255.255.0  106.106.0.5
   45.40.41.0  255.255.255.0  106.106.0.5
   46.40.41.0  255.255.255.0  106.106.0.5
   47.40.41.0  255.255.255.0  106.106.0.5
   48.40.41.0  255.255.255.0  106.106.0.5
   49.40.41.0  255.255.255.0  106.106.0.5
   ULI:
   TAI-ID:
   MCC: 214 MNC: 365
   TAC: 0x6789
   ECGI-ID:
   MCC: 214 MNC: 365
   ECI: 0x1234567
   Accounting mode: None
   APN Selection Mode: Sent by MS
   MEI: 1122334455667788
   Serving Nw: MCC=123, MNC=765
   charging id: 257250635
   charging chars: normal
   Source context: EPC2
   Destination context: ISP1
   SS/S8/S2b/S2a-APN: cisco.com
   SGi-APN: cisco.com
   APN-OI: n/a
   Restoration priority level: n/a

Routing Behind the Mobile Station on an APN
Verifying the Routing Behind the Mobile Station
Verifying the Routing Behind the Mobile Station

Routing Behind the Mobile Station on an APN
Monitoring and Troubleshooting the Routing Behind the Mobile Station

Routing Behind the Mobile Station Show Command(s) and/or Outputs

```
show apn name <apn_name>

... proxy-mip: Disabled
proxy-mipv6: Disabled
proxy-mip null-username static home address: Disabled
Network Behind Mobile Station: Enabled
Maximum subnets behind Mobile station: 10
Maximum Addresses Behind Mobile Station: 16777214
L3-to-L2 tunnel address-policy no-alloc-validate
tunnel address-policy alloc-validate
NPU QoS Traffic Priority: Derive from packet DSCP
```
Routing Behind the Mobile Station Show Command(s) and/or Outputs