CUWN 8.1 and 8.3 WLC and FC AP–EoGRE Tunnel Gateway Deployment Guide

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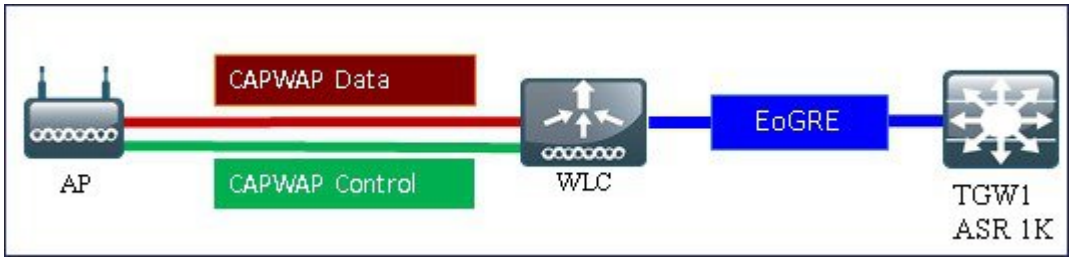
CUWN 8.2 WLC and FC AP - EoGRE Tunnel Gateway Deployment Guide

WLC EoGRE Tunneling

Ethernet over GRE (EoGRE) is a new aggregation solution for aggregating Wi-Fi traffic from hotspots. This solution enables customer premises equipment (CPE) devices to bridge the Ethernet traffic coming from an end host, and encapsulate the traffic in Ethernet

packets over an IP GRE tunnel. When the IP GRE tunnels are terminated on a service provider broadband network gateway, the end host's traffic is terminated and subscriber sessions are initiated for the end host.



Benefits of Tunneling in General

- Client can maintain IP address and policy across heterogeneous access networks with different technologies and/or vendors.
- Bypass MAC address scaling limitation of the L2 switch connecting to the WLC.
- Lawful Intercept (LI)

The EoGRE Tunneling offers the following benefits for mobile operators:

- Reduces network congestion by reducing OpEx and increasing network efficiency by offloading 3G and 4G traffic.
- Provides access to 3G and 4G core in spite of a lack of weak cell signal, leading to subscriber retention.
- Lowers CapEx on per user basis or bandwidth basis in dense metro environments.

The EoGRE tunneling offers the following benefits for wireline and Wi-Fi operators:

- Provides WiFi security and subscriber control.
- Delivers scalable, manageable, and secure wireless connectivity.
- Enables new revenue-sharing business models.
- Delivers a WiFi platform that offers new location-based services.

The EoGRE tunneling offers the following benefits for subscribers:

- Provides enhanced quality of experience to subscribers on WiFi networks.
- Provides unified billing across access networks.
- Provides mobility across radio access technologies—3G or 4G to WiFi and WiFi to WiFi.
- Provides multiple options within the Wi-Fi platform, thereby enabling location-based services.
- Begin with rel 8.2 EoGRE Tunneling is supported on the Dynamic interface.
- In rel 8.3 Dynamic interface with IPv6 supports only as tunnel interface.
- In rel 8.3 maximum number of dynamic interface to which IPv6 address can be assigned is 16.
- In rel 8.3 TGW supports Both IPv4 and IPv6 address format. You can create up to 10 tunnel gateways.

Supported Controller and APs

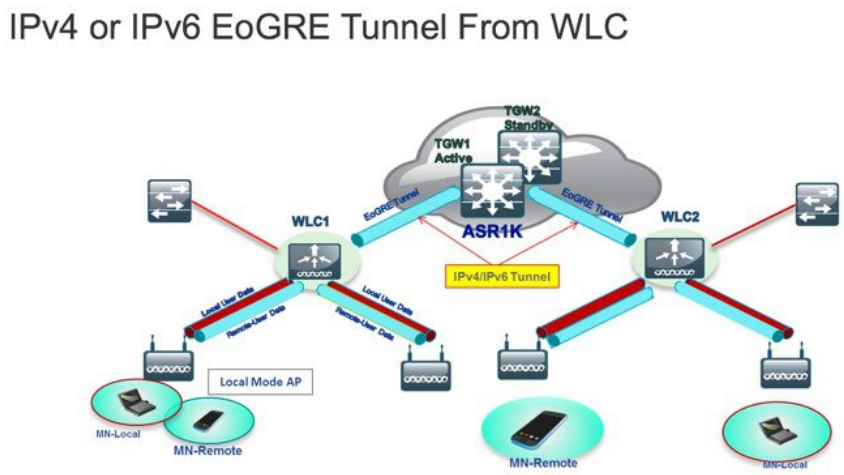
- Cisco 5500 series, WiSM-2, 7500, and 8500 series wireless LAN controller.
- Cisco WLC 8.1 supported access points—3800, 2800, 1800, 3700, 2700, 1700, 1260, 1140, 1600, 3600, 2600, 2700, 702i, 3500, 702w, 1042N, 801, 1552, 1532, 1572.

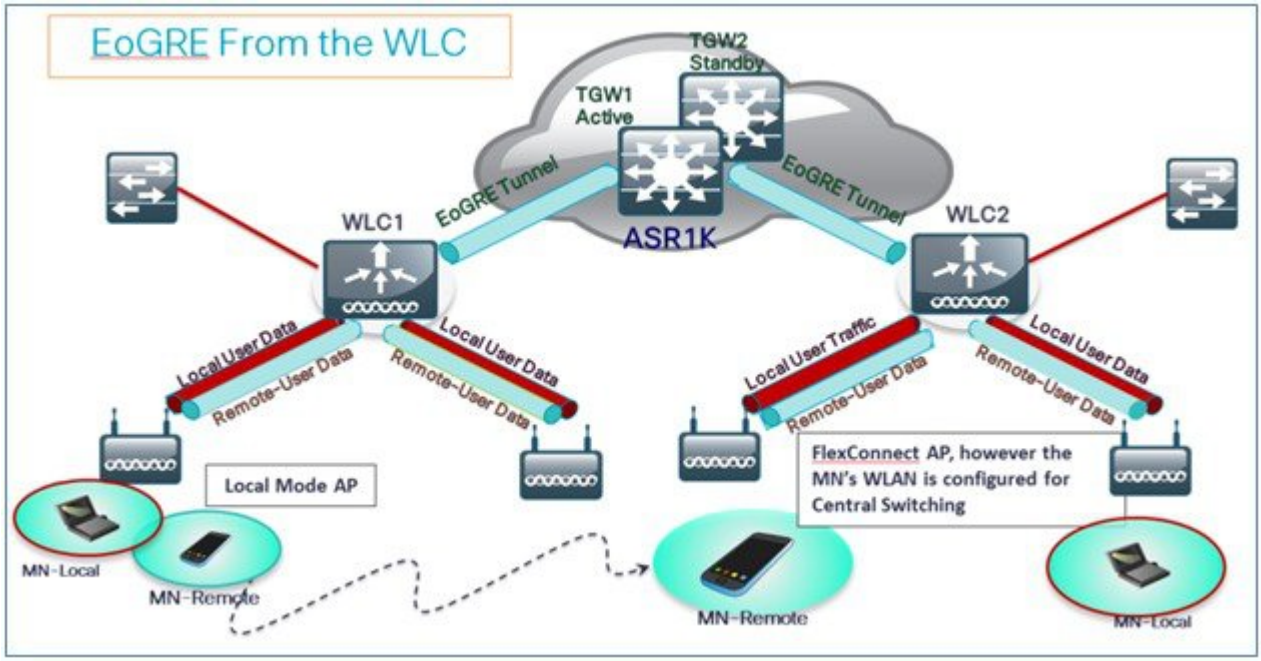
EoGRE Tunnels System Design Options

Design 1: WLC based EoGRE Tunnel

- CAPWAP Control Path (AP-WLC)
- CAPWAP Data Path (AP-WLC)
- EoGRE Data Flow (WLC-TGW)

In this design model, a tunnel gets generated from WLC to the tunnel gateway such as ASR 1000. Begin with release 8.2, controllers supports up to10 tunnel Gateway configurations and 10 EoGRE Tunnel Domains with 10 profile rules per each tunnel. Each profile can also be configured with multiple realms. When realms are configured, it will be a user name followed by @. Realm is a string after @, for example, user_name@realm. Two or more tunnels can be configured for redundancy, so that when the primary or active tunnel fails, the secondary or standby tunnel will take over the operation of the EoGRE tunnel. Intra-controller and Inter-controller mobility is also supported with the EoGRE tunnel configuration.





The WLC in release 8.1 and above supports two tunnel type configurations on the northbound interface:

1 IP/GRE as defined in PMIPv6 (RFC 5213) – L3

2 Ethernet over GRE – L2

Note In this deployment guide, only EoGRE tunnel is discussed.

Only one type of tunnel is supported per WLAN. EoGRE is supported on either open or 802.1x based WLANs. Tunneled clients support EAP-SIM or EAP-AKA mode only. Other authentication modes are not supported by the tunneled clients.

When open SSID WLAN is used, either all local/simple or all tunneled clients are supported but cannot be mixed on the same WLAN. However, 802.1x authenticated simple or tunneled EoGRE clients are supported on the same WLAN.

Prior to Release 8.3, only WLANs configured for Open and WPA2-802.1X were supported.

It is now possible to assign EoGRE Tunnel Profiles to WLANs configured for Internal WebAuth and WPA2-PSK. WLANs configured with WPA2-PSK / WPA2-802.1X and Internal WebAuth are also supported.

Based on authentication, clients will be separated into local or tunneled mode. The WLC supports two types of user's traffic such as **Remote-Tunneled** and **Local** on the same WLAN.

Local users traffic is defined as traffic that is locally bridged by the WLC.

Remote-Tunneled user traffic is defined as traffic of remote-tunnel users and is tunneled by the WLC to a TGW.

AAA override for EoGRE users is supported. Tunnel gateway can also act as AAA proxy.

If AAA Override is enabled on the controller for EoGRE EAP authenticated clients:

- WLC parses Access Accept and looks for MPC-Protocol-Type, such as EoGRE, GTPv2 or PMIPv6.
- If the Protocol-Type AVP exists, WLC looks for all parameters related to that tunnel-type. The static profile is ignored and the AAA provided parameters are used to setup tunnel.

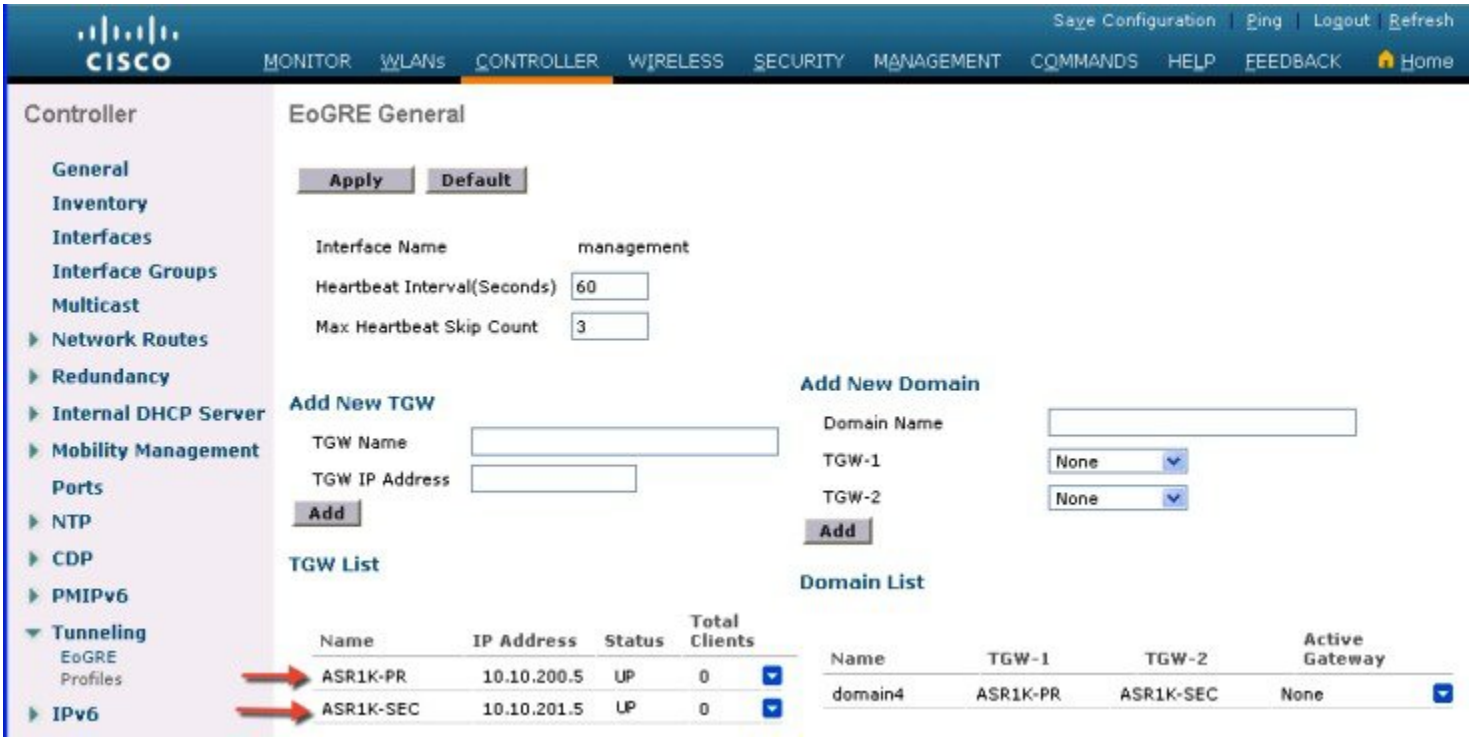
- If AVP is not present, WLC uses static profile on WLC to determine tunnel type based on the realm extracted from user name.
- If some of the parameters are not present, the authentication fails. For example, if everything is present except T-GW IP, then the client authentication fails.
- If the MPC-Protocol-Type is **None**, then it will be simple IP.

Some of the attributes that can be returned by the AAA server are: *User-Name, Calling-Station-Id, gw-domain-name, mn-service, cisco-mpc-protocol-interface, and eogre_vlan_id*.

Redundancy of the EoGRE Tunnels

Two or more tunnels can be configured for redundancy, so that when the primary or active tunnel fails, the secondary or standby tunnel will take over the operation of the EoGRE tunnel. Keep-alive messages are sent periodically and the periodicity is configurable, that is, how many keep-alives can be missed before tunnel is considered as down. This is a global command and is applicable for all types of tunnels. In EoGRE tunnels design, DTLS ICMP packets are sent to the tunnel gateway. When EoGRE tunnel is created, ICMP echo request packet is sent to tunnel gateway. After receiving, ICMP echo response is sent back updating the tunnel gateway status.

When primary tunnel fails, the clients will de-authenticate and dis-associate from the primary WAG. If a secondary WAG is available, the controller will establish a secondary tunnel and reconnect to the secondary WAG, if the secondary tunnel is configured as shown in the following example. After secondary tunnel is established, the remote-client devices will re-authenticate and re-associate to WAG and will renew their IP addresses from the DHCP server on the secondary WAG. Clients will remain connected to the secondary WAG even if the primary WAG comes back on line.



EoGRE Tunnel DHCP Option-82 Design

The DHCP option-82 for EoGRE clients is inserted at the WLC in the bridge mode. The DHCP request packets from the clients are punted up to the controller as with any other DHCP packets. In the controller, based on the client type, the EoGRE clients are handled specially. For EoGRE clients, the DHCP option-82 configurations are picked from the Tunnel Profile data base. The global DHCP configurations have no impact on EoGRE clients.

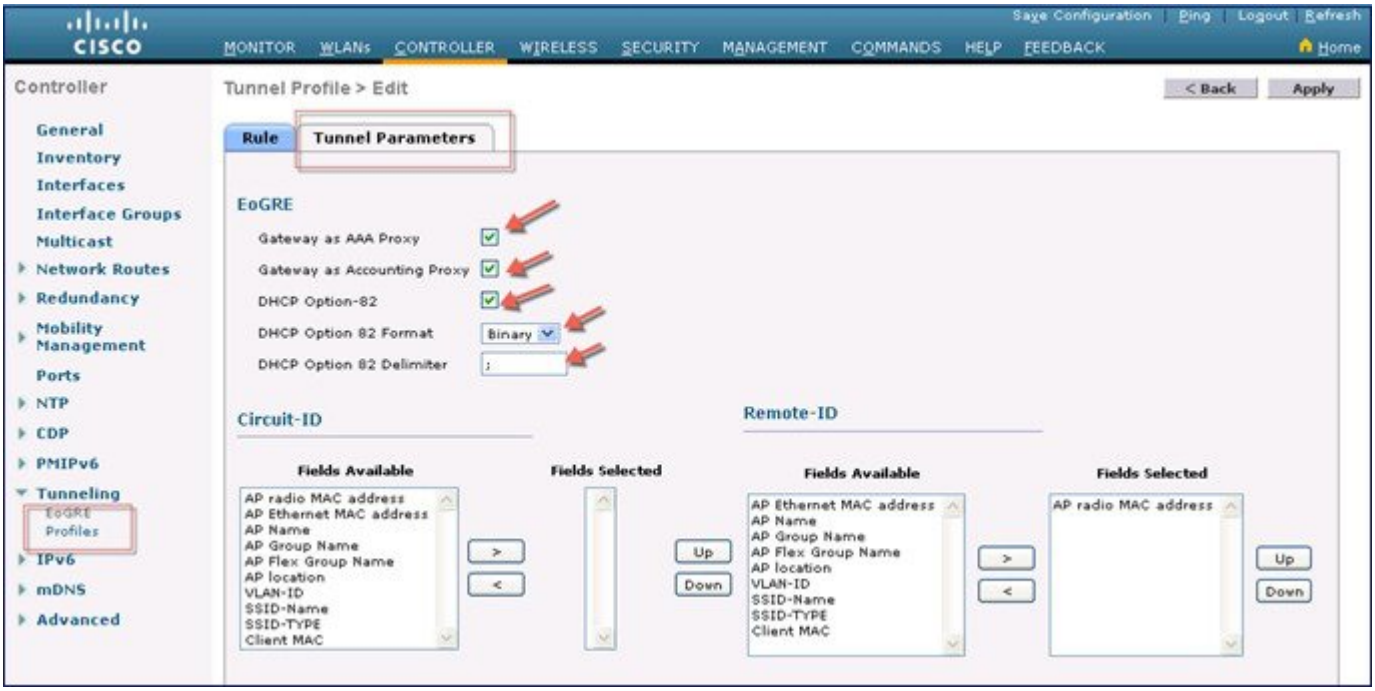
The DHCP code in controller inserts DHCP option-82 parameters based on the tunnel profile configurations. Also, the EoGRE tunnel header information is added in the controller. The controller assembles the complete DHCP packet along with EoGRE tunnel headers and sends out on the tunnel.

The configuration commands gives flexibility to configuring option-82 format, delimiter character, remote-id, and circuit-id. The remote-id and circuit-id can be easily configured by providing up to a maximum of five different parameter-ids supported. The parameters entered will overwrite the previously entered configurations. If no parameters are input, the remote-id and circuit-id will be erased and no parameter for that field will be sent.

Configuration commands

```
config tunnel profile eogre <profile name> dhCP-Opt-82 enable / disable

config tunnel profile eogre <profile name> dhCP-Opt-82 format binary / ascii

config tunnel profile eogre <profile name> dhCP-Opt-82 delimiter <delimiter character>

config tunnel profile eogre <profile name> dhCP-Opt-82 remote-id <Paramater ID - 1> <Paramater ID - 2> <Paramater ID - 3> <Paramater ID - 4> <Paramater ID - 5>

config tunnel profile eogre <profile name> dhCP-Opt-82 circuit-id <Paramater ID - 1> <Paramater ID - 2> <Paramater ID - 3> <Paramater ID - 4> <Paramater ID - 5>
```

Figure 1: DHCP Option-82 Configuration From the GUI Interface



Configuring WLC EoGRE Tunneling

To configue EoGRE tunnel, perform the following steps:

Procedure

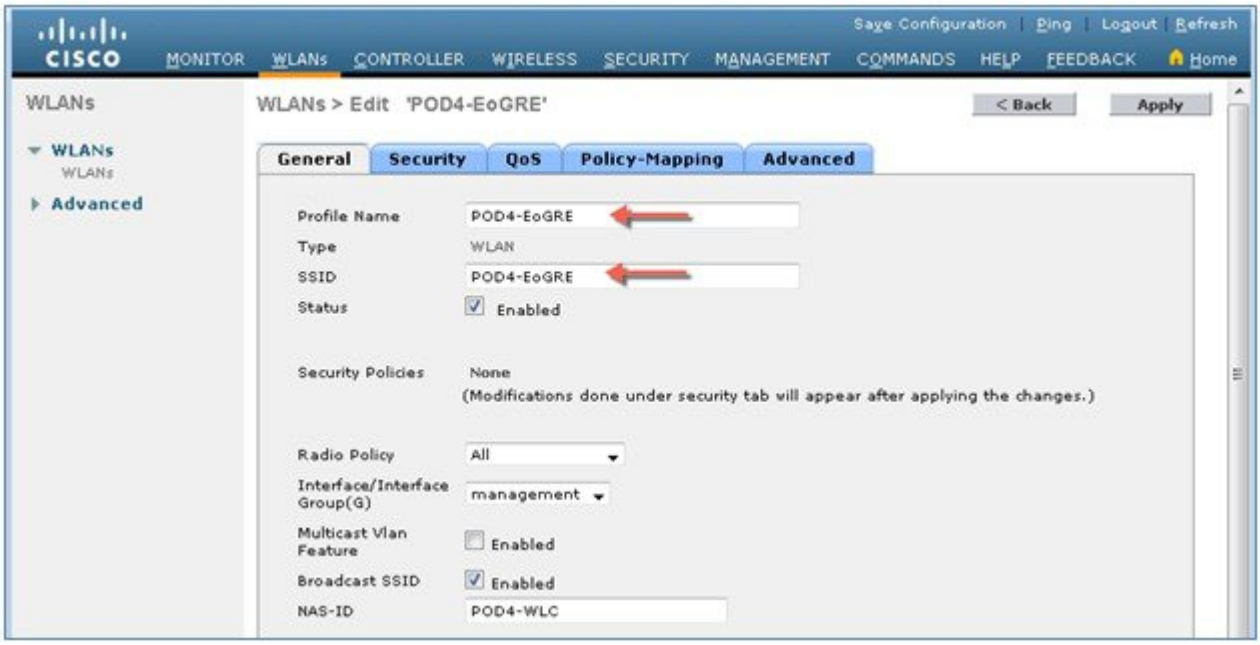
Step 1 To configure EoGRE feature, create SSID.

Step 2 From the WLC main menu, choose **WLANs** and click **Go**.

Step 3 Create a WLAN with the naming convention, for example, POD4-EoGRE, and then click **Apply**.

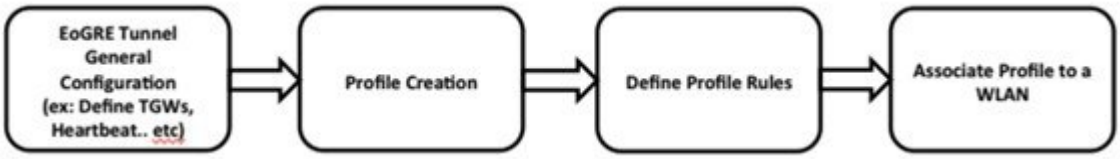
Step 4 On the **General** tab, map the WLAN to management interface or begin with rel 8.2 choose a Management or a Dynamic Interface.

Note *See* section below on changes in configuration option in release 8.2



Step 5 On the **Security** tab, set **Layer 2 Security** to **None**, and then click **Apply**.

Configuring WLC EoGRE tunnel parameters



Note EoGRE tunnel configuration can be performed through GUI or CLI.

Support for IPv6 addresses on the TGW in rel 8.3

In Release 8.3, support is added for client IPv6 traffic and IPv6 address format for the EoGRE tunnel gateway. Client IPv6 traffic is supported on both IPv4 and IPv6 EoGRE tunnels. A maximum of 8 different client IPv6 address supported per client. Cisco WLCs send all the client IPv6 addresses that they have learned to the Accounting server in the accounting update message. All RADIUS or Accounting messages exchanged between Cisco WLCs and tunnel gateways or RADIUS servers are outside the EoGRE tunnel.

To configure the WLC EoGRE tunnel through GUI, perform the following steps:

Procedure

Step 1 Assign a tunnel gateway address:

a) From WLC main menu, choose **CONTROLLER > Tunneling > EoGRE**.

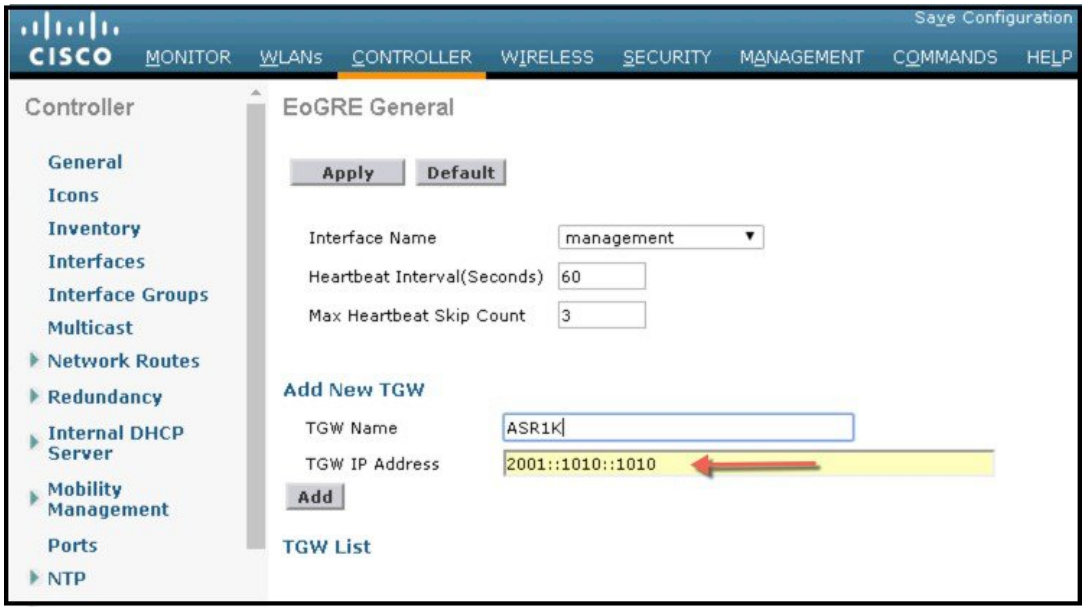
b) Set **Heartbeat Interval** to 60 seconds.
The controller sends keep alive every 60 seconds. If the TGW does not reply after three keep alive pings, then controller decides that the TGW is down.

c) Set **Max Heartbeat Skip Count** to 3.
The number of skip count decides how many times the TGW can skip consecutive replies, before the controller knows the TGW is down.

d) Add **TGW Name**, for example, ASR1K.

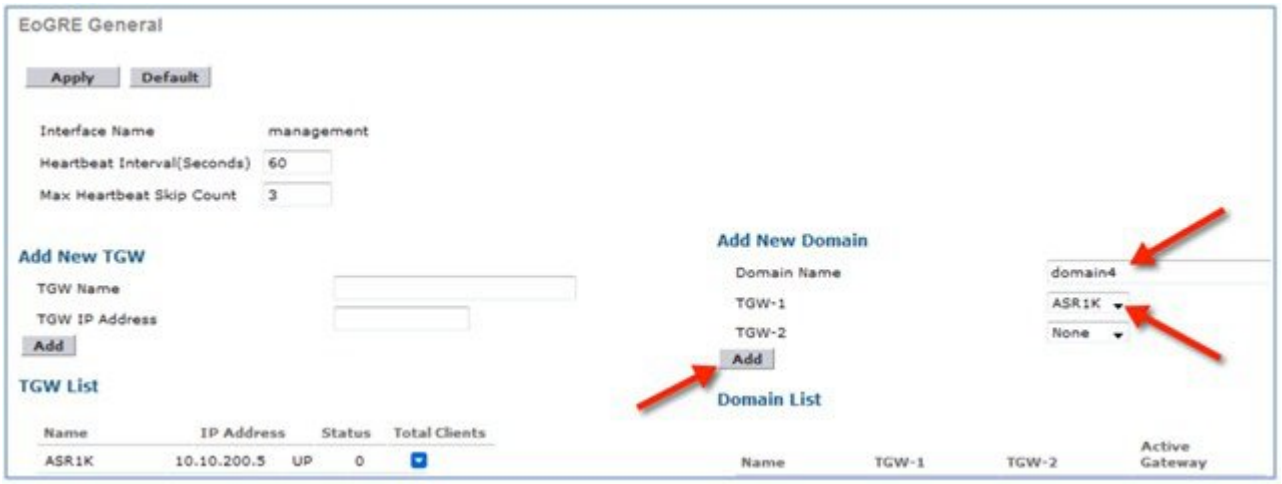
e) Add **TGW IP Address**, for example, 10.10.200.5.

f) Begin with release 8.3 add **TGW IPv6 Address**, for example 2001::1010::1010.



g) Add a **Domain Name**, for example, domain4.

h) Select the tunnel gateway **TGW-1** as **ASR1K**, and click **Add**. If the tunnel gateway is reachable, then the state should show **UP** under the TGW List.



Domain represents a virtual collection of one or more tunnels used for redundancy purposes. As mentioned previously, up to 16 tunnels can exist in one single domain. If one tunnel fails, the traffic will be redirected to another TGW.

Step 2 Create a tunnel profile:

a) From WLC main menu, choose **CONTROLLER > Tunneling > Profiles**.

b) Configure the **Profile Name**, for example, pod6, and click **Add**.

The profile name appears in the **Profile List**.

Step 3 Define a tunnel profile rule:

a) Click the profile (pod6) that you created.

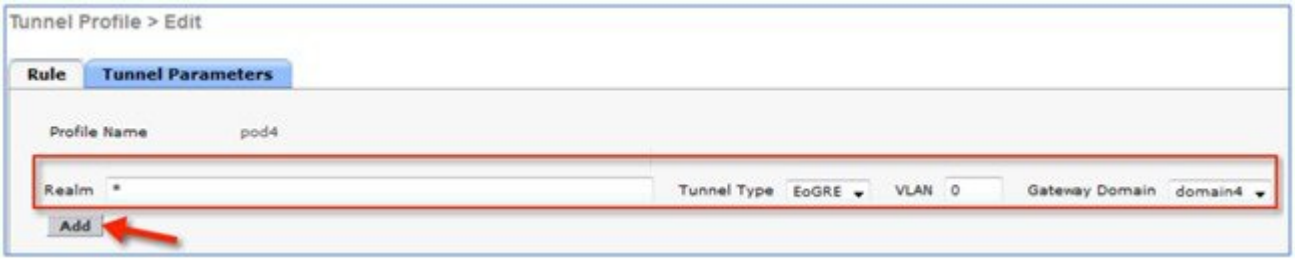
b) To map a specific realm to the profile, enter the realm name such as user_name@realm. To match any **Realm**, use * (* means all realms are accepted).

c) Choose **Tunnel Type** as **EoGRE**.

d) Set **VLAN** to **0**.

e) Choose **Gateway Domain** as **domain4**.

f) Click **Add**.

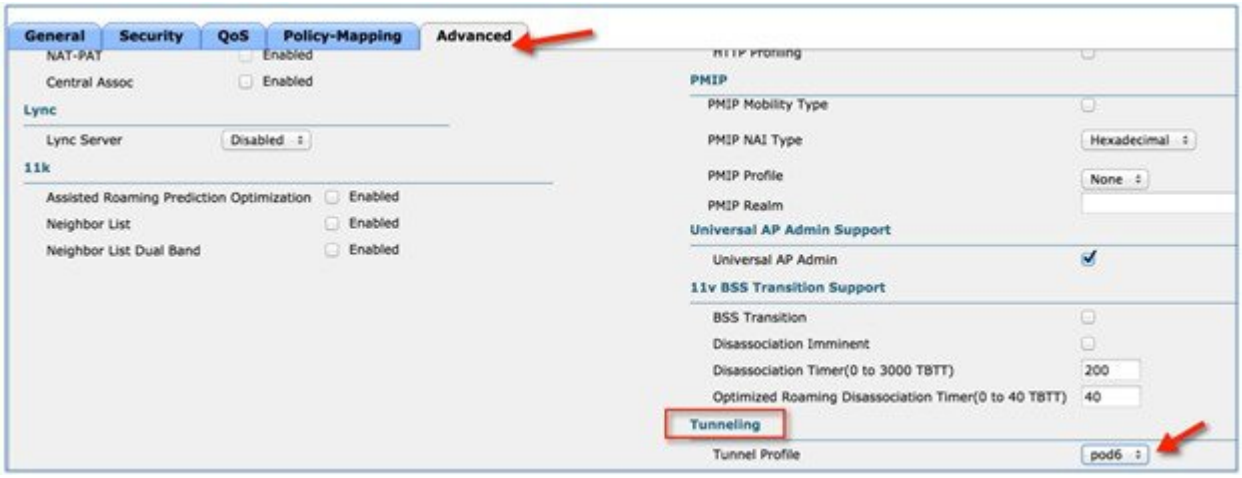


g) Click **Apply** to apply the rule to the profile.

Step 4 Add / Associate the tunnel profile to WLAN:

a) From the WLC GUI, go to WLAN on which enabling EoGRE (POD4-EoGRE) tunnel.

b) On the **Advanced** tab, in the **Tunneling** area, select the **Tunnel Profile** as **pod6**.

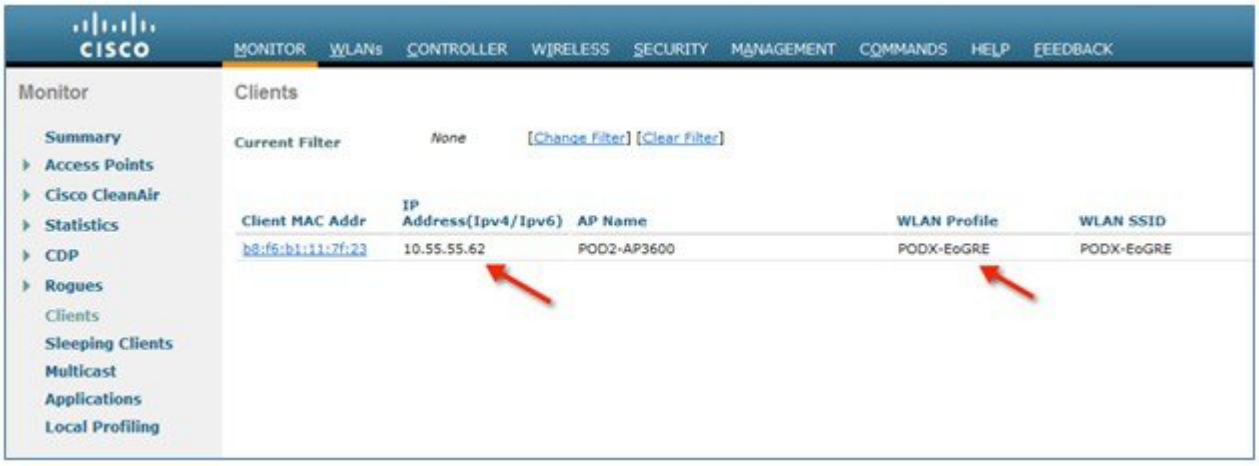


Step 5 To verify if the tunnel is properly configured, from WLC main menu, choose **CONTROLLER > Tunneling > Profiles** and see if the profile name is set to the correct WLAN.
In this example, the ASR1K is pre-configured for EoGRE tunnel and a DHCP pool. For your reference, the tunnel configuration on ASR1K is shown below.

```
ip dhcp pool IPv4-EoGRE
 network 10.55.55.0 255.255.255.0
 default-router 10.55.55.1
 dns-server 171.70.168.183
 domain-name cisco.com
 lease 0 0 10

interface Loopback0
 ip address 11.11.11.11 255.255.255.255
!
interface Tunnel1
 mac-address 0000.5e00.5213
 ip address 10.55.55.1 255.255.255.0
 no ip redirects
 load-interval 30
 tunnel source GigabitEthernet0/0/0.200
 tunnel mode ethernet gre ipv4
!
interface GigabitEthernet0/0/0
 no ip address
 negotiation auto
!
interface GigabitEthernet0/0/0.200
 encapsulation dot1Q 200
 ip address 10.10.200.5 255.255.255.0
```

Note The sample configs are for the Ipv4.

Connect a wireless client to the SSID, for example, POD4-EoGRE. You get an IP address from 10.55.55.0 subnet, which is configured on the ASR1K.

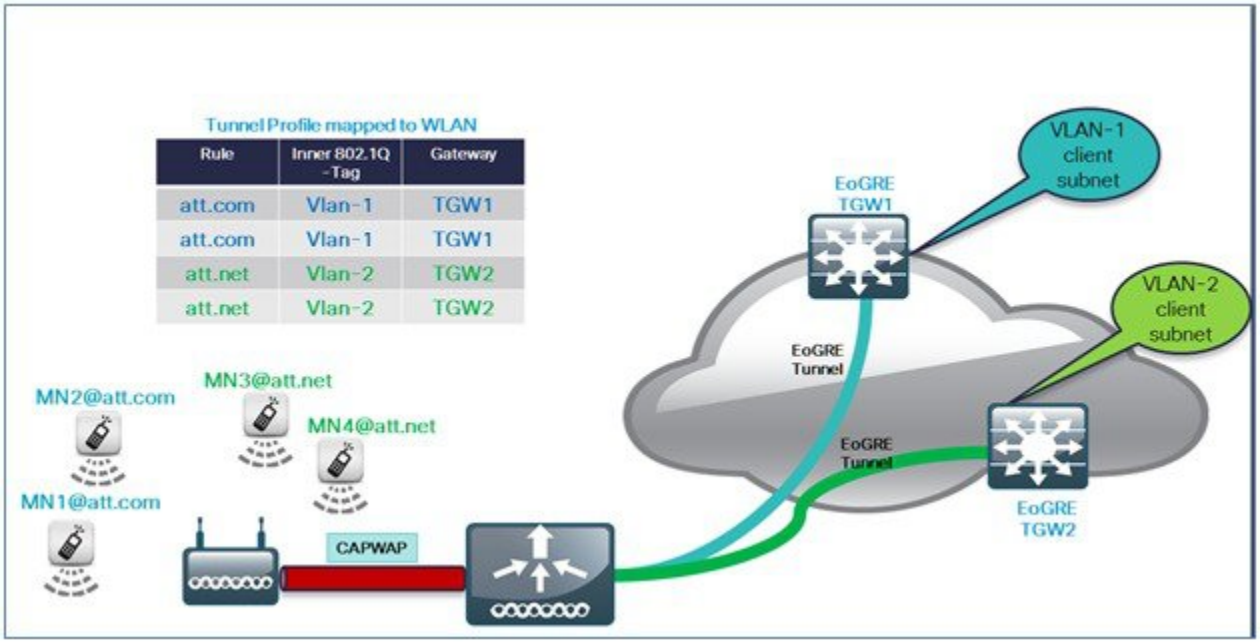


You can also verify that the client is associated through EoGRE tunnel by running **show client detail** command on your POD WLC.

```
(POD2-WLC) >show client detail b8:f6:b1:11:7f:23
Client MAC Address.............................. b8:f6:b1:11:7f:23
Client Username ................................ N/A
AP MAC Address.................................. 3c:ce:73:38:24:70
AP Name......................................... POD2-AP3600
AP radio slot Id................................ 1
Client State.................................... Associated
Client User Group.............................
Client NAC OOB State............................ Access
Wireless LAN Id................................. 2
Wireless LAN Network Name (SSID)................ PODX-EoGRE
Wireless LAN Profile Name....................... PODX-EoGRE
Hotspot (802.11u)............................... Not Supported
BSSID........................................... 3c:ce:73:38:24:7e
Connected For .................................. 1363 secs
Channel......................................... 36
IP Address...................................... 10.55.55.62

Policy Manager State............................ RUN
Policy Manager Rule Created..................... Yes
Audit Session ID................................ none
AAA Role Type................................... none
Local Policy Applied............................ none
IPv4 ACL Name................................... none
FlexConnect ACL Applied Status.................. Unavailable
IPv4 ACL Applied Status......................... Unavailable
IPv6 ACL Name................................... none
IPv6 ACL Applied Status......................... Unavailable
Layer2 ACL Name................................. none
Layer2 ACL Applied Status....................... Unavailable
Client Type..................................... EoGRE
EoGRE AAA MN Service............................ IPv4
EoGRE AAA NAI................................... Unavailable
EoGRE AAA PGW Primary........................... 10.10.200.5
EoGRE AAA PGW Secondary......................... Not Configured
```

Typical Deployment: WLC EoGRE Topology

In this typical EoGRE deployment configuration, two users MN1 and MN2 are connected to Realm @att.com and two other users MN3 and MN4 are connected to Realm @att.net. When the users MN1 and MN2 connect, they must be on the VLAN1 and TGW1 and users MN3 and MN4 must connect to VLAN2 and TGW2 as shown in the following figure. In this setup, two profiles with one realm in each are created and mapped to TGW1 and TGW2 accordingly in the same domain.



To configure WLC EoGRE, perform the following steps:

Procedure

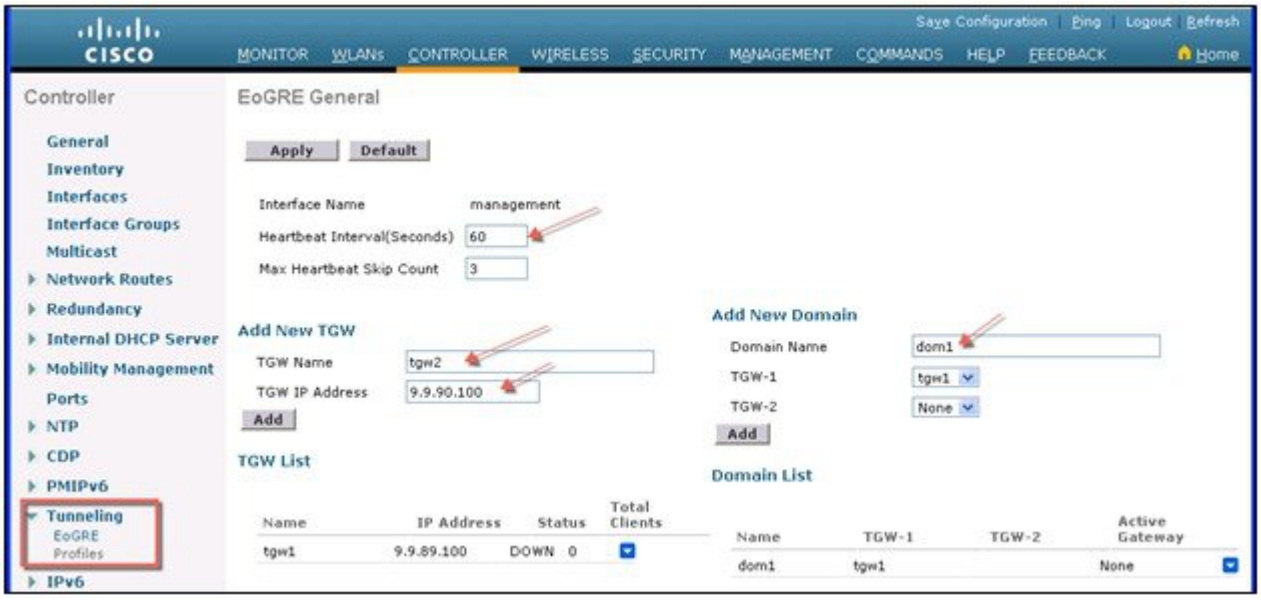
Step 1 Create tunnel gateways and configure heartbeats:

a) From WLC main menu, choose **CONTROLLER > Tunneling > EoGRE**.

b) Set **Heartbeat Interval** to 60 seconds.

c) Set **Max Heartbeat Skip Count** to 3.

d) Set **TGW-1** and **TGW-2** with appropriate IP addresses.



To configure EoGRe heart-beat from CLI:

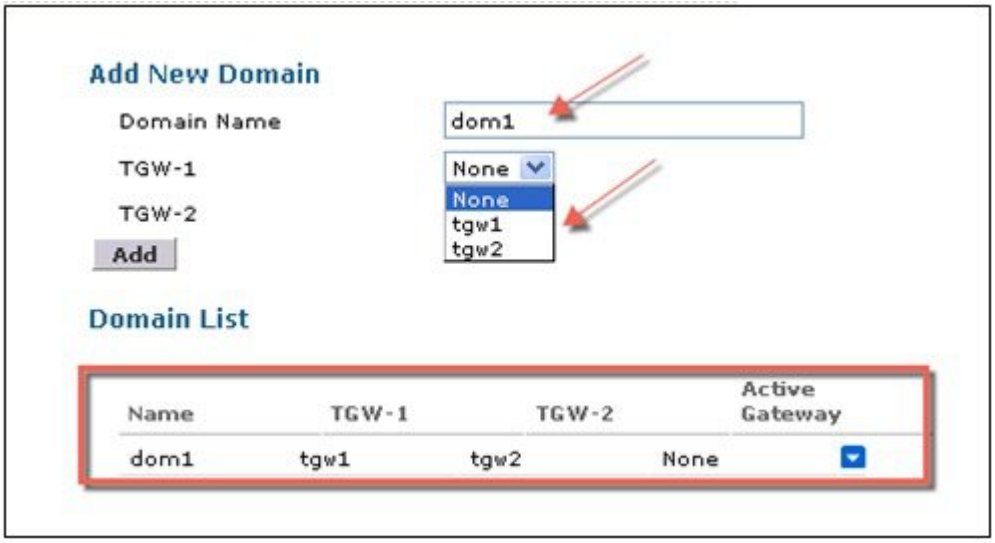
```
config tunnel eogre heart-beat interval 30
config tunnel eogre heart-beat max-skip-count 3
```

To configure EoGRE tunnel from CLI:

```
config tunnel eogre gateway add tgw1 ipv4-address 9.9.89.100
config tunnel eogre gateway add tgw2 ipv4-address 9.9.90.100
```

Step 2 Configure EoGRE Tunnel Domain.

Figure 2: GUI configuration of Domain dom1 with tgw1 and tgw2.

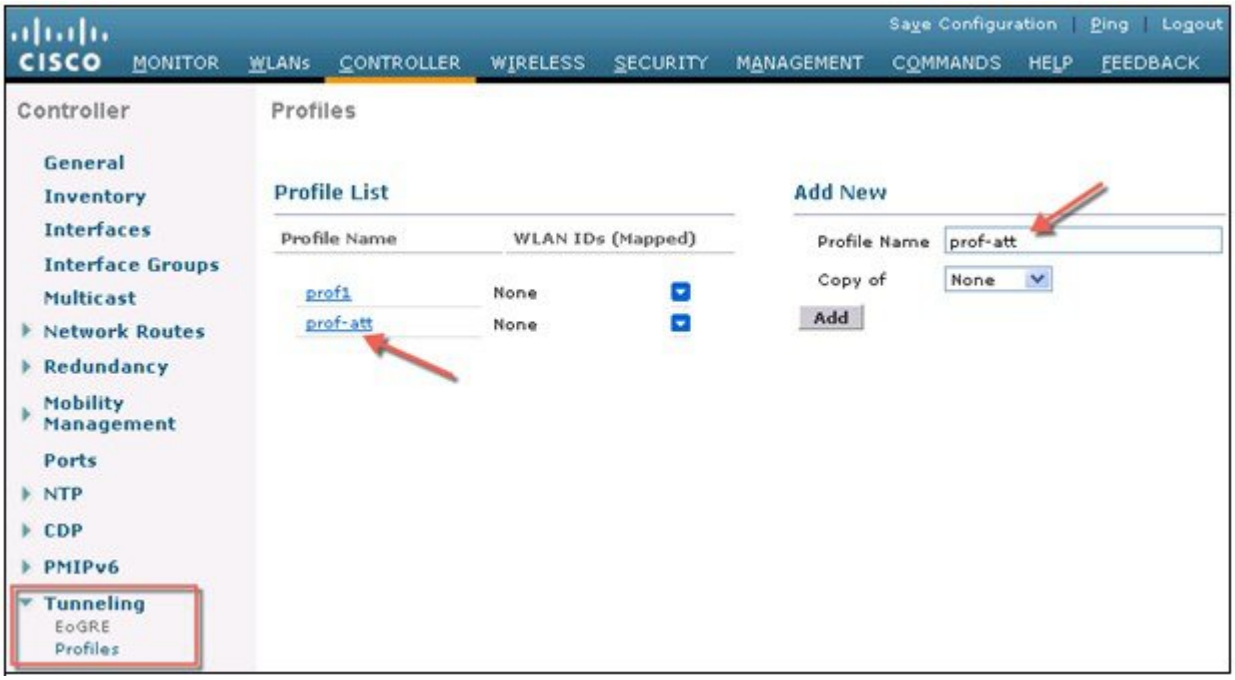


To create tunnel domain from CLI:

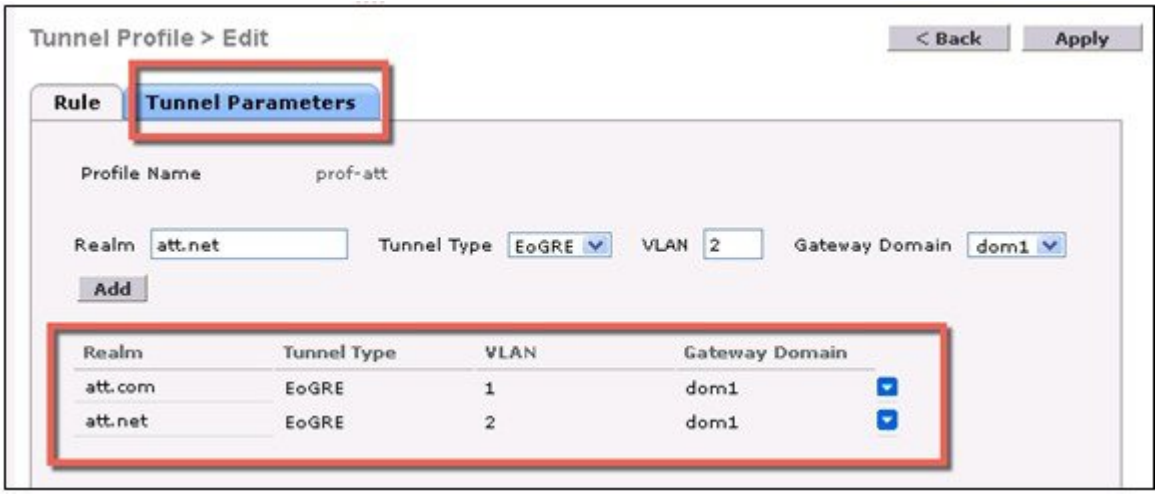
```
config tunnel eogre domain create dom1
config tunnel eogre domain add dom1 tgw1
config tunnel eogre domain add dom1 tgw2
```

Step 3 Create profiles and add rules:

a) Configure a profile, for example, **prof-att**.



b) From the WLC GUI, create realm att.com for VLAN1 and att.net for VLAN2 on domain dom1 and apply them to profile prof-att.

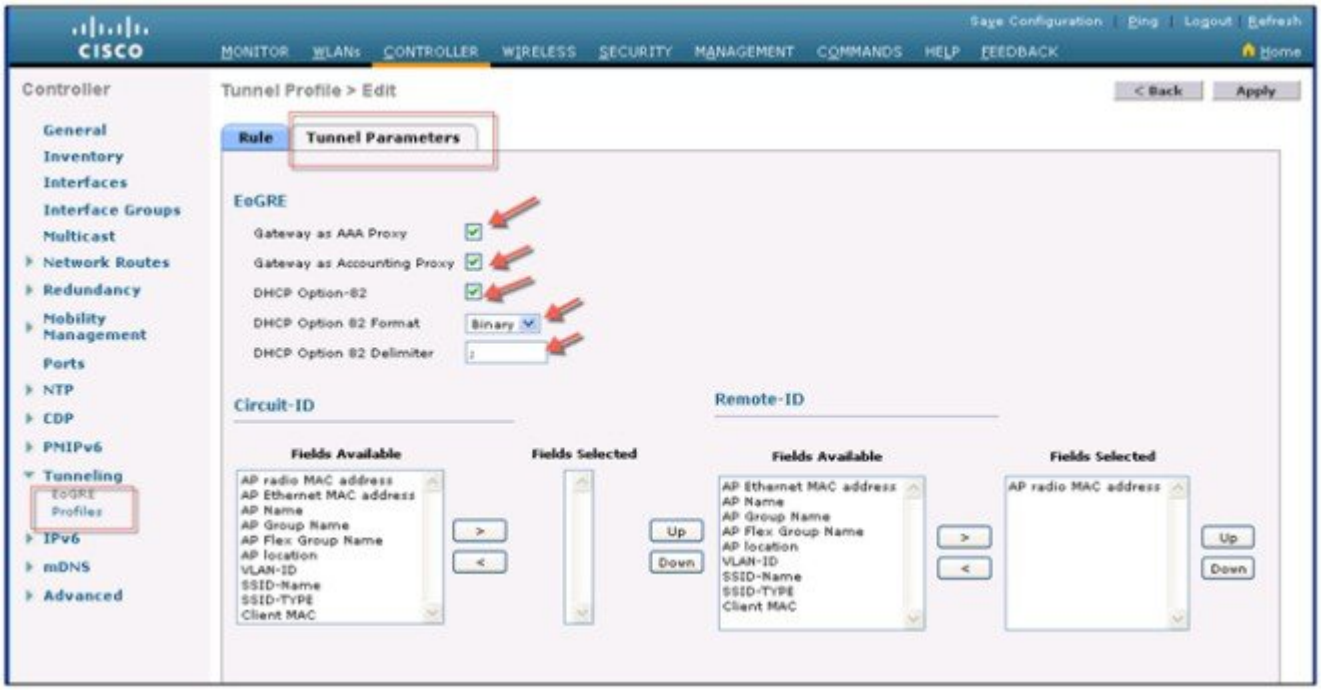


To create profiles and realms from CLI:

```
config tunnel profile create prof-att

config tunnel profile rule add prof-att realm-filter att.com eogre vlan 1 dom1

config tunnel profile rule add prof-att realm-filter att.net eogre vlan 2 dom1

config tunnel profile rule add prof1 realm-filter * eogre vlan 0 dom1
```

Note * means wild card to catch everyone not belonging to any other rules; it is last in the order and will drop users on VLAN 0.

Step 4 Configure the tunnel parameters.
The following figure shows a sample configuration from GUI of tunnel parameters with AAA proxy GW enabled and and DHCP option-82 enabled.



To configure DHCP option82 from CLI:

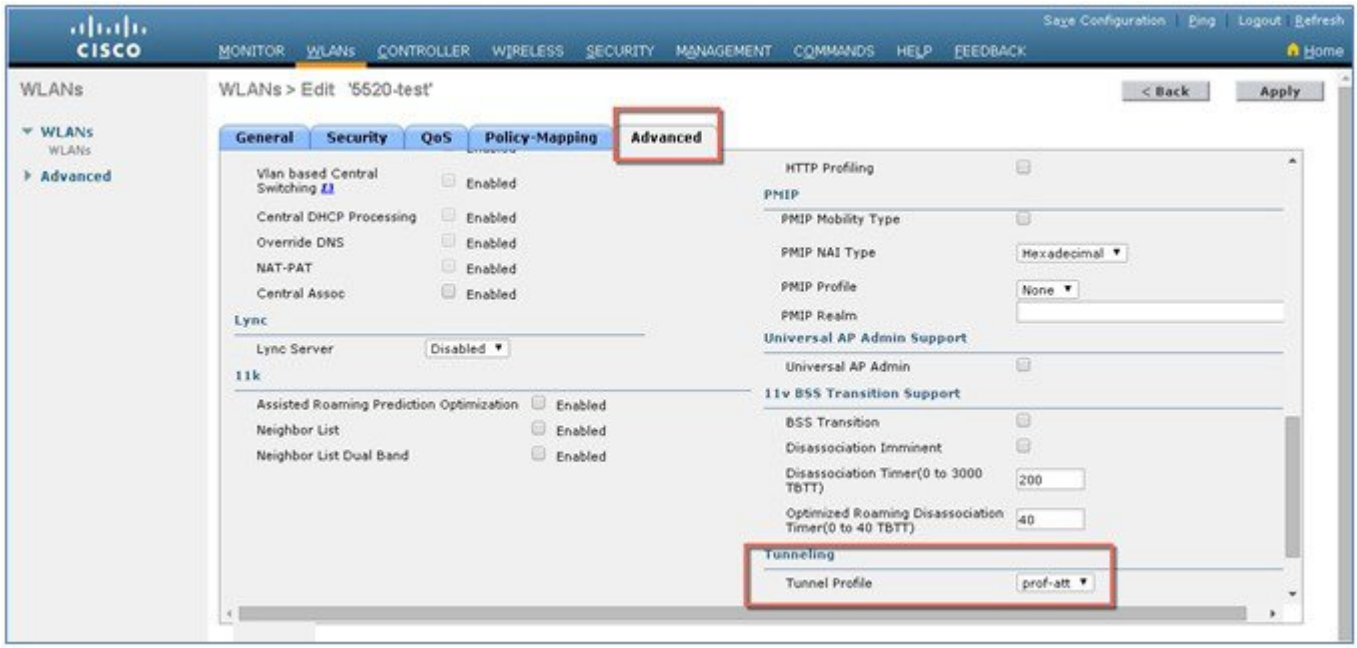
```
config tunnel profile eogre prof-att DHCP-Opt-82 format Binary

config tunnel profile eogre prof-att DHCP-Opt-82 delimiter

config tunnel profile eogre prof-att DHCP-Opt-82 enable

config tunnel profile eogre prof-att DHCP-Opt-82 circuit-id ap-ethmac flex-group-name ap-group-name

config tunnel profile eogre prof1 DHCP-Opt-82 remote-id ap-name ap-location
```

To configure gateway as AAA proxy from CLI:

```
config tunnel profile eogre prof-att gateway-radius-proxy enable

config tunnel profile eogre prof-att gateway-radius-proxy accounting enable
```

Step 5 Map the profile to a WLAN.

Figure 3: Mapping the profile "prof-att" to WLAN



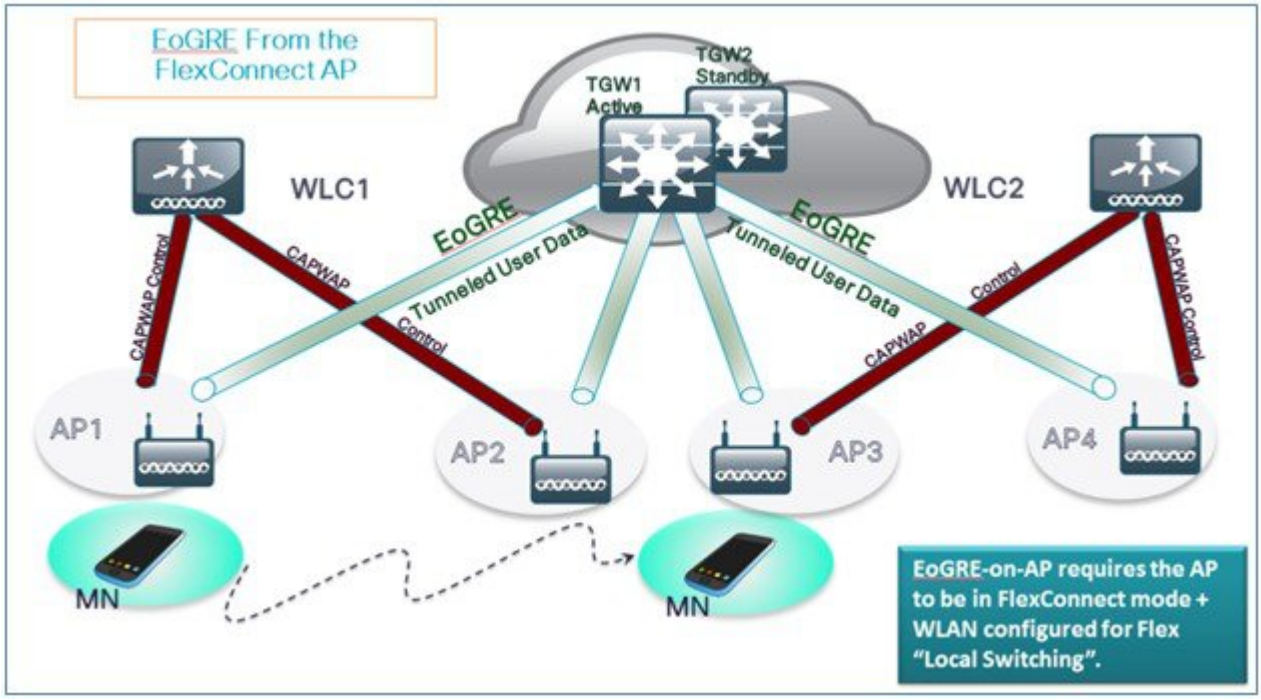
To map the profile to WLAN2 from CLI:

```
config wlan tunnel profile prof1 2

config wlan enable 2
```

Design 2: FlexConnect AP based EoGRE Tunnel

- CAPWAP Control Path (Flex AP-WLC)
- EoGRE Data Path (Flex AP-TGW)
- Once tunnel is established, data flows from FC AP directly to the TGW.

In this design, direct tunneling from the AP offers data and control planes separation from the controller and the AP. The central data throughput is limited only by the capacity of the core network with optimal data-path routing towards the core of the network. The inter/intra controller mobility is not supported but client can still roam in the same FlexConnect group in Locally Switched mode.



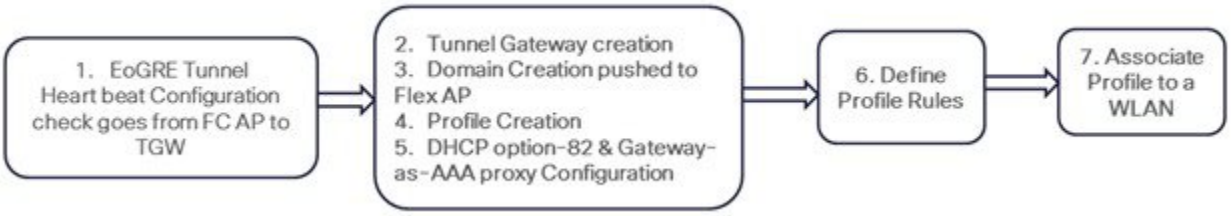
- FlexConnect AP – EoGRE is supported on Open and 802.1x based WLANs.
- 802.1x authenticated "simple" and "tunneled" EoGRE clients are supported on the same WLAN.
- Based on authentication, clients are separated into local or tunneled mode.
- Tunneled clients support EAP-SIM or EAP-AKA modes.
- Open SSID WLAN supports either all local or all tunneled clients.
- AAA override for EoGRE users is supported.
- Tunnel GW can also act as AAA proxy.
- Flex Connect AP supports TGW failure detection and switch over to alternate TGW.
- TGW supports Fault Tolerance with Active/Standby mode.
- Inter and Intra Controller mobility is supported in connected FlexAP mode.
- In Stand-Alone mode, mobility supported only within FlexConnect group tunnel GW can be configured as AAA and Accounting proxy.
- Tunnel GW supports "Configurable" DHCP Option-82.
- Flex Connect doesn't support IPv6 addresses in 8.–8.3 releases.

Basic Flex AP EoGRE Configuration

When configuring Flex AP with EoGRE tunnel:

- Same tunnel configurations apply to WLC or FC AP tunnels when profile is applied on the WLAN.
- When FC AP is in Locally Switched mode, the FC AP gateway tunnel automatically applies.

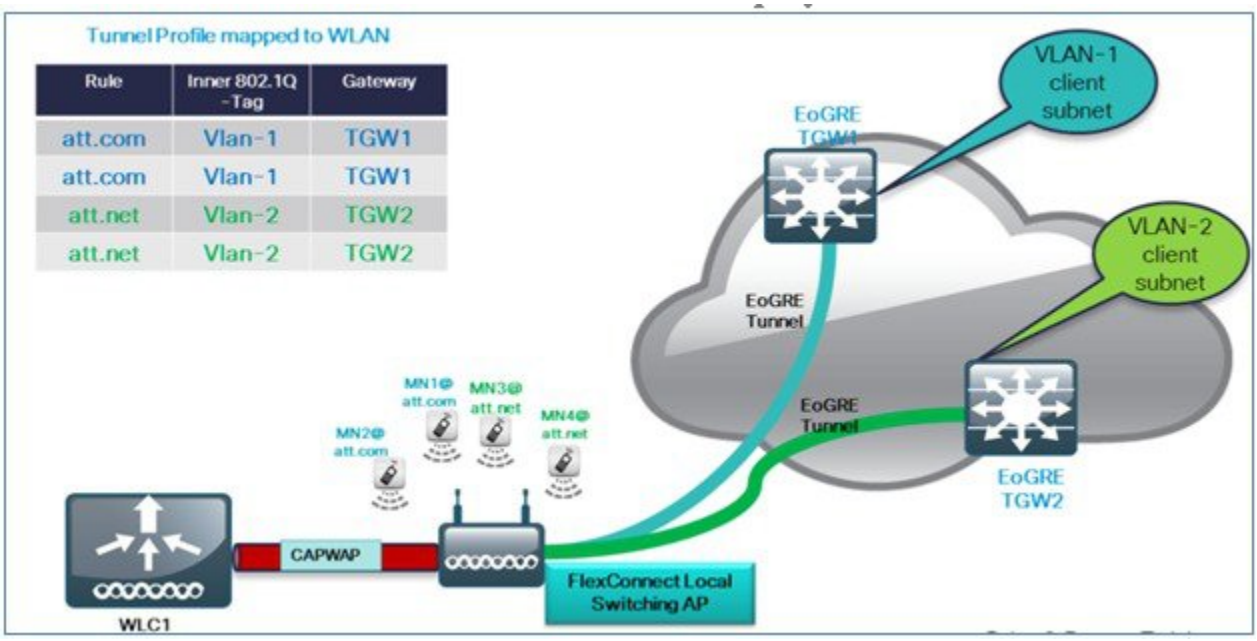
- Clients connected to Local Mode AP communicates through the WLC-TGW tunnel.
- Clients connected to FC AP communicates through the FC AP-TGW tunnel.
- Client selection is also impacted by the AAA or Profile override.



Note In redundancy tunnel configuration mode, the keep-alive pings will be sent from every FC AP that is configured in the EoGRE tunnel mode.

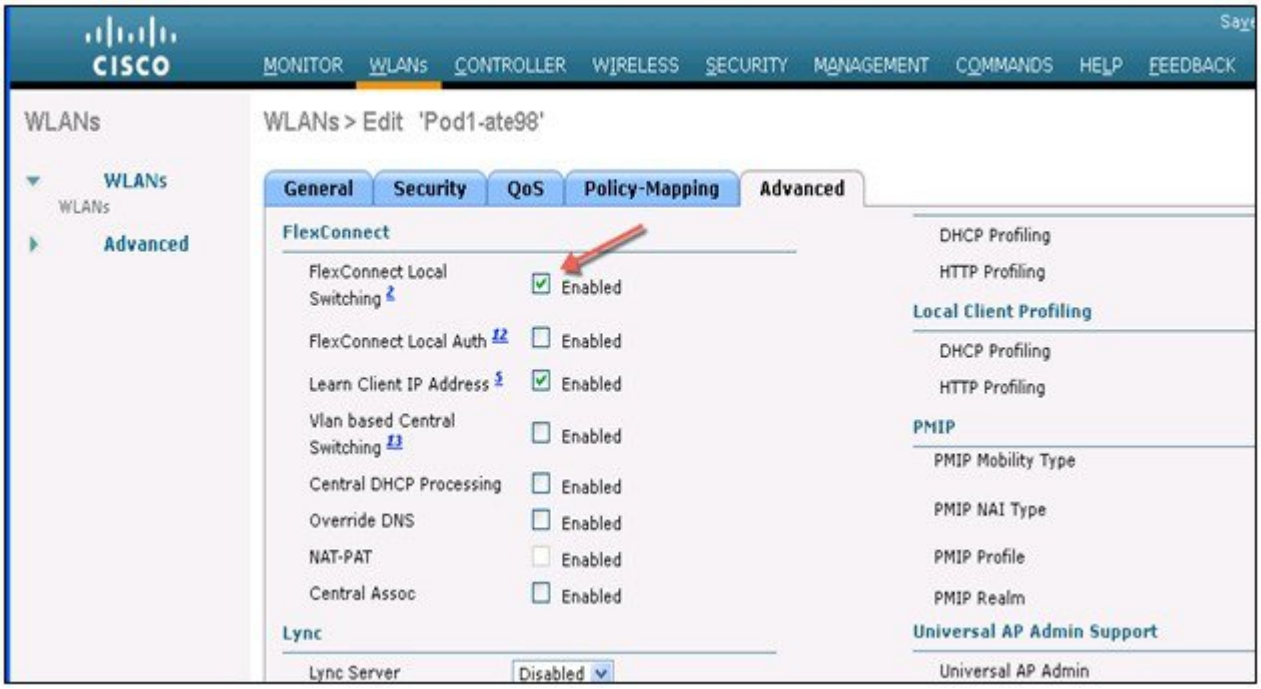
Typical Deployment: Flex Connect AP - EoGRE Topology

In this typical FC AP -EoGRE tunnel deployment configuration, two users MN1 and MN2 are connected to Realm @att.com and two other users MN3 and MN4 are connected to Realm @att.net. When users MN1 and MN2 connect, they should be on the VLAN1 and TGW1 and users MN3 and MN4 should connect to VLAN-2 and TGW2 as shown in the following figure. In this setup, two profiles with one realm in each will be created and mapped to TGW1 and TGW2 accordingly in the same domain. In this deployment scenario, the tunnel will be setup directly between FlexConnect AP in a Locally switched mode and TGW1 and TGW2; all data traffic will flow bypassing the controller.



Note In this configuration, EoGRE tunnel TGW, Domain, Profile Rules, and Realms are setup exactly in the same manner as in the deployment scenario with WLC-EoGRE. The only change is FC AP is setup in the Locally Switched mode.

1 Configure AP to FlexConnect Local Switching.



Note Only **FlexConnect Local Switching** option has to be configured on the FG AP or FC Group to enable FC AP-TGW tunnel. Other WLC EoGRE configurations will apply to FC AP-EoGRE settings.

Tunneling Source Changes in Release 8.2

Prior to releases 8.2, for all Tunnels, e.g. EoGRE, PMIPV6 etc., only management interface could be used as the tunnel end point. In release 8.2 a capability was added to specify a tunnel source other than management interfaces so that data traffic and management traffic in the network can be segregated in different network segments. Also, this is required to support the IPv6 addresses on dynamic interface. In controller release 8.2:

- There are 4094 L3 interfaces available for configuration.
- Admin is able to configure the dynamic interface as the tunnel endpoint for tunnels like EoGRE
- There are no changes in the configuration for any features with the exception of tunneling protocols mentioned above.
- IPv6 addresses on dynamic interface are not be supported in 8.2.
- AP Manager cannot be enabled on the L3 interface, which is hosting a tunnel (EoGRE, PMIPv6 and so on).

- All Controllers including vWLC and 2500 are supported.

In Release 8.2, all 4094 interfaces are L3 dynamic interfaces (if IPv4 is configured as IPv6 then it is not supported on these interfaces in 8.2) for all types of supported controllers except vWLC, for which only 512 L3 interfaces will be supported. If IP address is not configured, they remain as L2 interface. These L2 interfaces are not used as client interfaces in this release to avoid change in the behavior of the controller already deployed in the field, upgrade or downgrade scenario, and DHCP Support (Supporting DHCP using the L2 parameter instead of L3 parameter in Option 82 to get the IP on that L2 interface). Based on the requirements these L2 interfaces may be used as client interfaces in subsequent releases.

Feature Configuration Step-by-Step

There is no new CLI requirement for supporting L3 interface as such. In releases prior to 8.2, user cannot select any configured interface as tunnel end point other than management. New CLI, for configuring the global interface to be used as tunnel end point, will be required. This configuration will be separate for different types of tunnels e.g. EoGRE, PMIPv6 and so on.

For details on configuring PMIPv6 tunnels please refer to the following Deployment Guide http://www.cisco.com/c/en/us/support/docs/wireless/5500-series-wireless-controllers/113686-pmipv6-config-00.html

Configuring EoGRE Tunnel from CLI

```
config tunnel eogre interface <interface-name>
```

Show Command:

```
show tunnel eogre summary
```

Configuring PMIPv6 Tunnel from CLI

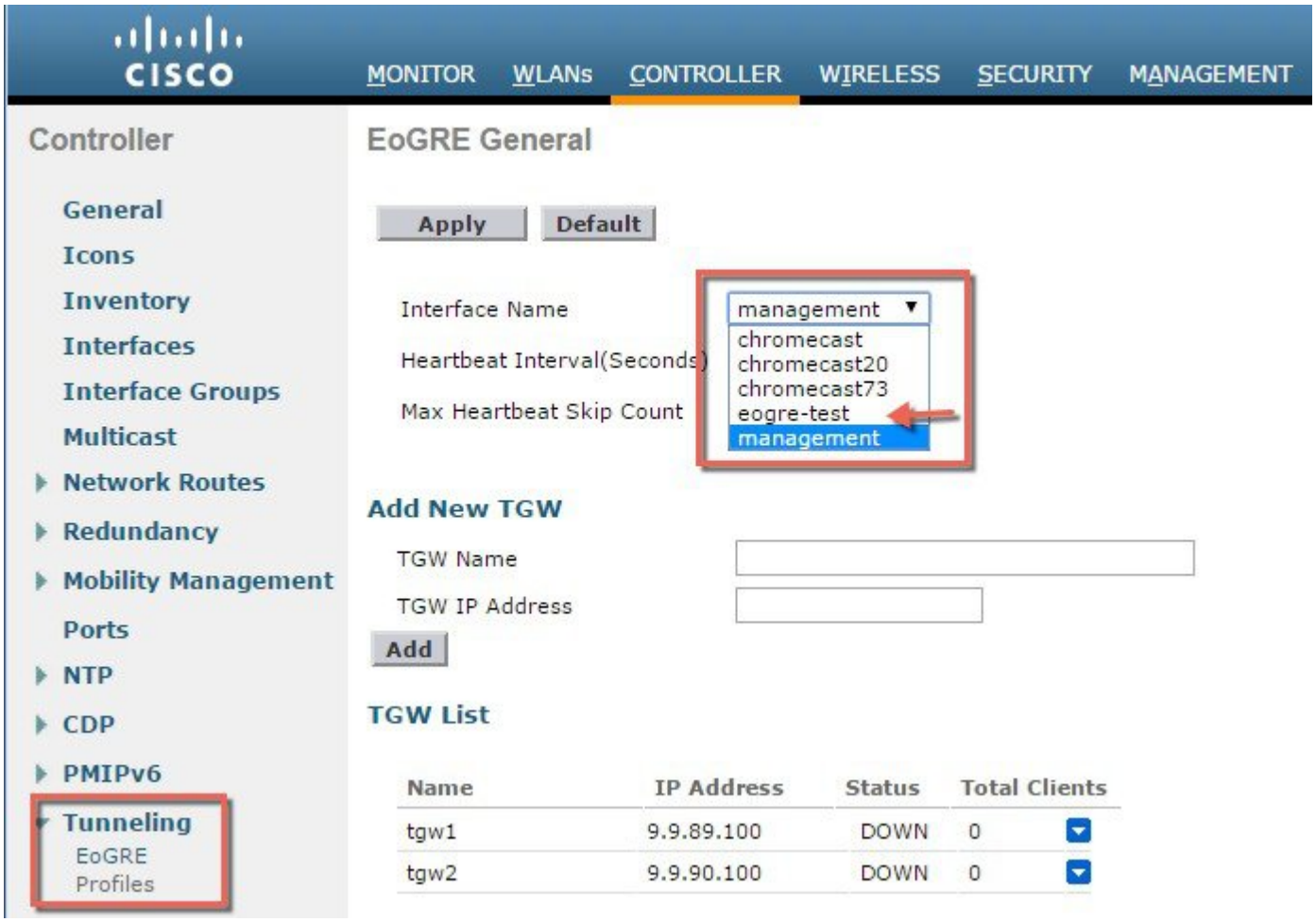
```
config pmipv6 interface <interface-name>
```

Show Command:

```
show pmipv6 mag globals
```

Configuring EoGRE Tunnel from GUI

On the controller general interface when configuring Interface name choose other than Management interface.



Troubleshooting commands

Existing interface/application related debugs will be reused. Below are the debugs and show commands to be used for packet flow, tunnel and IPv6 related issues.

Debugs:

```
debug arp all/detail/error/message enable/disable
debug packet logging enable all
debug pm rules enable/disable
debug ipv6 neighbor-binding
debug ipv6 address-learning
debug system printk
debug Tunnel eogre
debug Tunnel errors/events
Show commands:
debug fastpath dump vlandb
debug fastpath dump portdb
show system route
show arp kernel
```

Show Commands

Show Commands on WLC

```
Show tunnel eogre summary

show tunnel eogre gateway summary

show tunnel eogre domain summary

show tunnel profile summary

show tunnel profile detail <profile name>

show ap eogre domain <ap-name>

Show ap eogre gateway <ap-name>
```

Show Commands on AP

```
show dot11 eogre-tunnel domain summary

show dot11 eogre-tunnel gateway summary

show capwap reap associations

show capwap client detailrcb
```

Example Configuration of the EoGRE Feature

CLI Summary Steps on ASR 1K

1. enable
2. configure terminal
3. interface interface-name
4. ip unnumbered loopback interface-name or ip address ip-address
5. tunnel source interface-type interface-number
6. (For simple IP mode) mac-address H.H.H
7. tunnel mode ethernet gre ipv4 or tunnel mode ethernet gre ipv6
8. (Optional) tunnel vlan vlan-id
9. end

Sample Configuration on ASR 1K

```
aaa new-model
!
aaa group server radius AAA_SERVER_CAR
server-private 5.3.1.76 auth-port 2145 acct-port 2146 key cisco
!
```

```
aaa authentication login default none
aaa authentication login ISG_PROXY_LIST group AAA_SERVER_CAR
aaa authorization network ISG_PROXY_LIST group AAA_SERVER_CAR
aaa authorization subscriber-service default local group AAA_SERVER_CAR
aaa accounting network PROXY_TO_CAR
action-type start-stop
group AAA_SERVER_CAR
!
aaa accounting network ISG_PROXY_LIST start-stop group AAA_SERVER_CAR
!
```


Example: Configuring the EoGRE Feature

```
aaa server radius dynamic-author
client 5.3.1.76 server-key cisco
auth-type any
ignore server-key
!!
ip dhcp excluded-address 172.16.254.254
!
ip dhcp pool ISG_SIMPLE_IP
network 172.16.0.0 255.255.0.0
default-router 172.16.254.254
domain-name cisco.com
!
policy-map type control EOGRE_L2_ISG
class type control always event session-start
2 authorize aaa list ISG_PROXY_LIST password cisco identifier mac-address
4 set-timer IP_UNAUTH_TIMER 5
!
class type control always event service-start
1 service-policy type service identifier service-name
2 collect identifier nas-port
!
!
```

```
interface Loopback0
ip address 9.9.9.9 255.255.255.255
interface GigabitEthernet1/0/0
ip address 192.168.0.9 255.255.255.0
negotiation auto
!
interface GigabitEthernet1/0/0.778
description "to ASR5K GGSN"
encapsulation dot1Q 778
ip address 172.16.199.9 255.255.255.0
!
interface Tunnel10
description "EoGRE Tunnel for Simple IP subscribers"
mac-address 0000.5e00.5213
ip address 172.16.254.254 255.255.0.0
no ip redirects
tunnel source 172.16.199.9
tunnel mode ethernet gre ipv4
service-policy type control EOGRE_L2_ISG
ip subscriber l2-connected
initiator unclassified mac-address
initiator dhcp
interface Tunnel100
description "IPv4 EoGRE Tunnel for PMIP/GTP subscribers"
ip unnumbered Loopback0
tunnel source GigabitEthernet1/0/0
tunnel mode ethernet gre ipv4
tunnel vlan 100
service-policy type control EOGRE_L2_ISG
ip subscriber l2-connected
initiator unclassified mac-address
initiator dhcp
!
interface Tunnel200
description "IPv6 EoGRE Tunnel for PMIP/GTP subscribers"
ip unnumbered Loopback0
```

tunnel source 2001:161::9
tunnel mode ethernet gre ipv6
tunnel vlan 200
service-policy type control EOGRE_L2_ISG
ip subscriber l2-connected
initiator unclassified mac-address
initiator dhcp
!
mcsa
enable sessionmgr
!
ipv6 mobile pmipv6-domain D1
replay-protection timestamp window 255
lma LMA_5K
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Service Provider WiFi: Support for Integrated Ethernet Over GRE
Example: Configuring the EoGRE Feature
ipv4-address 192.168.199.1
!
ipv6 mobile pmipv6-mag M1 domain D1
sessionmgr
role 3GPP
address ipv4 9.9.9.9
interface Tunnel100
interface Tunnel200
lma LMA_5K D1
ipv4-address 192.168.199.1
encap gre-ipv4
!
ntp master
!
gtp
information-element rat-type wlan
interface local GigabitEthernet1/0/0.778
apn 1

apn-name gtp.com

ip address ggsn 172.16.199.1

fixed link-layer address 00ab.00cd.00ef

default-gw 20.100.254.254 prefix-len 16

dns-server 20.100.254.254

dhcp-server 20.100.254.254

!

end

You can use the following commands to check and show subscriber session information:

show ip dhcp sip statistics

show subscriber statistics

show subscriber session

show ipv6 mobile pmipv6 mag binding

show gtp pdp-context all

show interface tunnel-name

References

Refer to the Intelligent Wireless Access Gateway (IWAG) Configuration Guide.

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Americas Headquarters
Cisco Systems, Inc.
San Jose, CA 95134-1706
USA

Asia Pacific Headquarters
Cisco Systems (USA) Pte. Ltd.
Singapore

Europe Headquarters
Cisco Systems International BV
Amsterdam, The Netherlands

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