Ethernet over GRE Tunnels

- Introduction to EoGRE, on page 1
- Create a Tunnel Gateway, on page 3
- Configuring a Tunnel Domain, on page 4
- Configuring EoGRE Global Parameters, on page 5
- Configuring a Tunnel Profile, on page 5
- Associating WLAN to a Wireless Policy Profile, on page 7
- Attaching a Policy Tag and a Site Tag to an AP, on page 8
- Verifying the EoGRE Tunnel Configuration, on page 8

Introduction to EoGRE

Ethernet over GRE (EoGRE) is an aggregation solution for grouping 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 Generic Routing Encapsulation (GRE) tunnel. When the IP GRE tunnels are terminated on a service provider's broadband network gateway, the end-host traffic is forwarded and subscriber sessions are initiated.

Client IPv6

EoGRE for WLAN

To enable EoGRE for a WLAN, the wireless policy profile should be mapped to a tunnel profile, which may contain the following:

- AAA override: Allows you to bypass rule filtering for a client.
- Gateway RADIUS proxy: Allows forwarding of AAA requests to tunnel gateways.
- Tunnel rules: Defines the domain to use for each realm. They also define VLAN tagging for the client traffic towards tunnel gateways.
- DHCP option 82: Provides a set of predefined fields.

EoGRE Deployment with Multiple Tunnel Gateways

The embedded wireless controller sends keepalive pings to the primary and secondary tunnel gateways and keeps track of the missed pings. When a certain threshold level is reached for the missed pings, switchover

is performed and the secondary tunnel is marked as active. This switchover deauthenticates all the clients to enable them to rejoin the access points (APs). When the primary tunnel come back online, all the client traffic are reverted to the primary tunnel. However, this behavior depends on the type of redundancy.

Load Balancing in EtherChannels

Load balancing of tunneled traffic over Etherchannels works by hashing the source or destination IP addresses or mac addresses of the tunnel endpoint pair. Because the number of tunnels is very limited when compared to clients (each tunnel carries traffic for many clients), the spreading effect of hashing is highly reduced and optimal utilization of Etherchannel links can be hard to achieve.

Using the EoGRE configuration model, you can use the *tunnel source* option of each tunnel interface to adjust the load-balancing parameters and spread tunnels across multiple links.

You can use different source interfaces on each tunnel for load balancing based on the source or destination IP address. For that choose the source interface IP address in such a way that traffic flows take different links for each src-dest IP pair. The following is an example with four ports:

```
Client traffic on Tunnel1 – Src IP: 40.143.0.72  Dest IP: 40.253.0.2
Client traffic on Tunnel2 – Src IP: 40.146.0.94  Dest IP: 40.253.0.6
Client traffic on Tunnel3 – Src IP: 40.147.0.74  Dest IP: 40.253.0.10
```

Use the **show platform software port-channel link-select interface port-channel 4 ipv4** *src_ip dest_ip* command to determine the link that a particular flow will take.

EoGRE Configuration Overview

The EoGRE solution can be deployed in two different ways:

- Central-Switching: EoGRE tunnels connect the embedded wireless controller to the tunnel gateways.
- Flex or Local-Switching: EoGRE tunnels are initiated on the APs and terminated on the tunnel gateways.

To configure EoGRE, perform the following tasks:

1. Create a set of tunnel gateways.
2. Create a set of tunnel domains.
3. Create a tunnel profile with rules that define how to match clients to domains.
4. Create a policy profile and attach the tunnel profile to it.
5. Map the policy profile to WLANs using policy tags.

Note The EoGRE tunnel fallback to the secondary tunnel is triggered after the *max-skip-count* ping fails in the last measurement window. Based on the starting and ending instance of the measurement window, the fall-back may take more time than the duration that is configured.

Table 1: EoGRE Authentication Methods

Method Name	First Supported Release	Mode
PSK	17.2.1	Local/Flex (central authentication)
Open	16.12.1	Local/Flex (central authentication)
LWA	16.12.1	Local/Flex (central authentication)
Dot1x	16.12.1	Local/Flex (central authentication)
CWA	16.12.1	Local/Flex (central authentication)

Create a Tunnel Gateway

Note In the Cisco Embedded Wireless Controller on Catalyst Access Points, a tunnel gateway is modeled as a tunnel interface.

Procedure

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 2	**interface tunnel** *tunnel_number* **Example:** `Device(config)# interface tunnel 21`	Configures a tunnel interface and enters interface configuration mode.
Step 3	**tunnel source** *source_intf* **Example:** `Device(config-if)# tunnel source 22`	Sets the source address of the tunnel interface. The source interface can be VLAN, Gigabit Ethernet or loopback.
Step 4	**tunnel destination** *tunnel-address* **Example:** `Device(config-if)# tunnel destination 10.11.12.13`	Sets the destination address of the tunnel.
Step 5	**tunnel mode ethernet gre** {**ipv4** | **ipv6**} **p2p** **Example:** `Device(config-if)# tunnel mode ethernet gre ipv4 p2p`	Sets the encapsulation mode of the tunnel to Ethernet over GRE IPv4 or Ethernet over GRE IPv6.

Configuring a Tunnel Domain

Note Tunnel domains are a redundancy grouping of tunnels. The following configuration procedure specifies a primary and a secondary tunnel, along with a redundancy model.

Procedure

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 2	**tunnel eogre domain** *domain* **Example:** `Device(config)# tunnel eogre domain dom1`	Configures EoGRE redundancy domain.
Step 3	**primary tunnel** *primary-tunnel_intf* **Example:** `Device(config-eogre-domain)# primary tunnel 21`	Configures the primary tunnel.
Step 4	**secondary tunnel** *secondary-tunnel_intf* **Example:** `Device(config-eogre-domain)# secondary tunnel 22`	Configures the secondary tunnel.
Step 5	**redundancy revertive** **Example:** `Device(config-eogre-domain)# redundancy revertive`	Sets the redundancy model as revertive. When redundancy is set to revertive and the primary tunnel goes down, a switchover to secondary tunnel is performed. When the primary tunnel comes back up, a switchover to the primary tunnel is performed, because the primary tunnel has priority over the secondary tunnel. When redundancy is not set to revertive, tunnels will have the same priority, and a switchover to the primary tunnel is not performed if the active tunnel is the secondary tunnel and the primary tunnel comes back up.

Configuring EoGRE Global Parameters

Procedure

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 2	**tunnel eogre heartbeat interval** *interval-value* **Example:** `Device(config)# tunnel eogre heartbeat interval 600`	Sets EoGRE tunnel heartbeat periodic interval.
Step 3	**tunnel eogre heartbeat max-skip-count** *skip-count* **Example:** `Device(config)# tunnel eogre heartbeat max-skip-count 7`	Sets the maximum number of tolerable dropped heartbeats. After reaching the maximum number of heartbeats that can be dropped, the tunnel is declared as down and a switchover is performed.
Step 4	**tunnel eogre source loopback** *tunnel_source* **Example:** `Device(config)# tunnel eogre source loopback 12`	Sets the tunnel EoGRE source interface.
Step 5	**tunnel eogre interface tunnel** *tunnel-intf* **aaa proxy key** *key key-name* **Example:** `Device(config)# tunnel eogre interface tunnel 21 aaa proxy key 0 mykey`	(Optional) Configures AAA proxy RADIUS key for the AAA proxy setup. **Note** When the tunnel gateway is behaving as the AAA proxy server, only this step is required for the configuration.

Configuring a Tunnel Profile

Before you begin

Ensure that you define the destination VLAN on the controller. If you do not define the VLAN, clients will not be able to connect.

Procedure

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 2	**wireless profile policy** *profile-policy-name* **Example:** `Device(config)# wireless profile policy eogre_policy`	Configures a WLAN policy profile.
Step 3	**tunnel-profile** *tunnel-profile-name* **Example:** `Device(config-wireless-policy)# tunnel-profile tunnel1`	Creates a tunnel profile.
Step 4	**exit** **Example:** `Device(config-wireless-policy)# exit`	Returns to global configuration mode.
Step 5	**wireless profile tunnel** *tunnel-profile-name* **Example:** `Device(config)# wireless profile tunnel wl-tunnel-1`	Configures a wireless tunnel profile.
Step 6	**dhcp-opt82 enable** **Example:** `Device(config-tunnel-profile)# dhcp-opt82 enable`	Activates DHCP Option 82 for the tunneled clients.
Step 7	**dhcp-opt82 remote-id** *remote-id* **Example:** `Device(config-tunnel-profile)# dhcp-opt82 remote-id vlan`	Configures Remote ID options. Choose from the comma-separated list of options such as **ap-mac**, **ap-ethmac**, **ap-name**, **ap-group-name**, **flex-group-name**, **ap-location**, **vlan**, **ssid-name**, **ssid-type**, and **client-mac**.
Step 8	**aaa-override** **Example:** `Device(config-tunnel-profile)# aaa-override`	Enables AAA policy override.
Step 9	**gateway-radius-proxy** **Example:** `Device(config-tunnel-profile)# gateway-radius-proxy`	Enables the gateway RADIUS proxy.

	Command or Action	Purpose
Step 10	**gateway-accounting-radius-proxy** **Example:** `Device(config-tunnel-profile)# gateway-accounting-radius-proxy`	Enables the gateway accounting RADIUS proxy.
Step 11	**rule** *priority* **realm-filter** *realm* **domain** *domain-name* **vlan** *vlan-id* **Example:** `Device(config-tunnel-profile)# rule 12 realm-filter realm domain dom1 vlan 5`	Creates a rule to choose a domain, using the realm filter, for client Network Access Identifier (NAI), tunneling domain name, and destination VLAN.

Associating WLAN to a Wireless Policy Profile

Procedure

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 2	**wireless tag policy** *policy-tag-name* **Example:** `Device(config)# wireless tag policy eogre_tag`	Configures a policy tag and enters policy tag configuration mode.
Step 3	**wlan** *wlan-name* **policy** *profile-policy-name* **Example:** `Device(config-policy-tag)# wlan eogre_open_eogre policy eogre_policy`	Maps an EoGRE policy profile to a WLAN profile.
Step 4	**end** **Example:** `Device(config-policy-tag)# end`	Saves the configuration, exits configuration mode, and returns to privileged EXEC mode.

Attaching a Policy Tag and a Site Tag to an AP

Procedure

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 2	**ap** *mac-address* **Example:** `Device(config)# ap 80E8.6FD4.0BB0`	Configures an AP and enters AP profile configuration mode.
Step 3	**policy-tag** *policy-tag-name* **Example:** `Device(config-ap-tag)# policy-tag eogre_tag`	Maps the EoGRE policy tag to the AP.
Step 4	**site-tag** *site-tag-name* **Example:** `Device(config-ap-tag)# site-tag sp-flex-site`	Maps a site tag to the AP.
Step 5	**end** **Example:** `Device(config-ap-tag)# end`	Saves the configuration, exits configuration mode, and returns to privileged EXEC mode.

Verifying the EoGRE Tunnel Configuration

The `show tunnel eogre` command displays the EoGRE clients, domains, gateways, global-configuration, and manager information in the local mode.

To display the EoGRE domain summary in the local mode, use the following command:

```
Device# show tunnel eogre domain summary

Domain Name          Primary GW   Secondary GW      Active GW      Redundancy
-------------------------------------------------------------------------------
domain1              Tunnel1      Tunnel2           Tunnel1        Non-Revertive
eogre_domain         Tunnel1      Tunnel2           Tunnel1        Non-Revertive
```

To display the details of an EoGRE domain in the local mode, use the following command:

```
Device# show tunnel eogre domain detailed domain-name

Domain Name    : eogre_domain
 Primary GW    : Tunnel1
```

```
 Secondary GW  : Tunnel2
 Active GW     : Tunnel1
 Redundancy    : Non-Revertive
```

To view the EoGRE tunnel gateway summary and statistics in the local mode, use the following command:

```
Device# show tunnel eogre gateway summary

Name               Type  Address                                    AdminState  State  Clients
-------------------------------------------------------------------------------------------------
Tunnel1             IPv4  9.51.1.11                                   Up          Up     0

Tunnel2             IPv4  9.51.1.12                                   Up          Down   0

Tunnel10            IPv6  fd09:9:8:21::90                             Down        Down   0

Tunnel11            IPv4  9.51.1.11                                   Up          Up     0

Tunnel12            IPv6  fd09:9:8:21::90                             Up          Down   0

Tunnel100           IPv4  9.51.1.100                                  Up          Down   0
```

To view the details of an EoGRE tunnel gateway in the local mode, use the following command:

```
Device# show tunnel eogre gateway detailed gateway-name

Gateway : Tunnel1
 Mode   : IPv4
 IP     : 9.51.1.11
 Source : Vlan51 / 9.51.1.1
 State  : Up
 SLA ID : 56
 MTU    : 1480
 Up Time: 4 minutes 45 seconds

 Clients
  Total Number of Wireless Clients      : 0
 Traffic
  Total Number of Received Packets      : 0
  Total Number of Received Bytes        : 0
  Total Number of Transmitted Packets   : 0
  Total Number of Transmitted Bytes     : 0
 Keepalives
  Total Number of Lost Keepalives       : 0
  Total Number of Received Keepalives   : 5
  Total Number of Transmitted Keepalives: 5
  Windows                               : 1
  Transmitted Keepalives in last window : 2
  Received Keepalives in last window    : 2
```

To view the client summary of EoGRE in the local mode, use the following command:

```
Device# show tunnel eogre client summary

Client MAC      AP MAC          Domain                          Tunnel        VLAN  Local
-------------------------------------------------------------------------------------------
74da.3828.88b0  80e8.6fd4.9520  eogre_domain                     N/A           2121   No
```

To view the details of an EoGRE global configuration in the local mode, use the following command:

```
Device# show tunnel eogre global-configuration

Heartbeat interval       : 60
Max Heartbeat skip count : 3
Source Interface         : (none)
```

To view the details of the global tunnel manager statistics in the local mode, use the following command:

```
Device# show tunnel eogre manager stats global

Tunnel Global Statistics
Last Updated                     : 02/18/2019 23:50:35
EoGRE Objects
  Gateways                       : 6
  Domains                        : 2

EoGRE Flex Objects
  AP Gateways                    : 2
  AP Domains                     : 1
  AP Gateways HA inconsistencies : 0
  AP Domains HA inconsistencies  : 0

Config events
  IOS Tunnel updates             : 806
  IOS Domain updates             : 88
  Global updates                 : 48
  Tunnel Profile updates         : 120
  Tunnel Rule updates            : 16
  AAA proxy key updates          : 0

AP events
  Flex AP Join                   : 1
  Flex AP Leave                  : 0
  Local AP Join                  : 0
  Local AP leave                 : 0
  Tunnel status (rx)             : 4
  Domain status (rx)             : 1
  IAPP stats msg (rx)            : 3
  Client count (rx)              : 6
  VAP Payload msg (tx)           : 4
  Domain config (tx)             : 1
  Global config (tx)             : 1
  Client delete (tx)             : 1
  Client delete per domain (tx)  : 3
  DHCP option 82 (tx)            : 4

Client events
  Add-mobile                     : 2
  Run-State                      : 3
  Delete                         : 1
  Cleanup                        : 0
  Join                           : 2
  Plumb                          : 0
  Join Errors                    : 0
  HandOff                        : 0
  MsPayload                      : 2
  FT Recover                     : 0
  Zombie GW counter increase     : 0
  Zombie GW counter decrease     : 0
  Tunnel Profile reset           : 88
  Client deauth                  : 0
  HA reconciliation              : 0

Client Join Events
```

```
  Generic Error                 : 0
  MSPayload Fail                : 0
  Invalid VLAN                  : 0
  Invalid Domain                : 0
  No GWs in Domain              : 0
  Domain Shut                   : 0
  Invalid GWs                   : 0
  GWs Down                      : 0
  Rule Match Error              : 0
  AAA-override                  : 0
  Flex No Active GW             : 0
  Open Auth join attempt        : 2
  Dot1x join attempt            : 2
  Mobility join attempt         : 0
  Tunnel Profile not valid      : 2
  Tunnel Profile valid          : 2
  No rule match                 : 0
  Rule match                    : 2
  AAA proxy                     : 0
  AAA proxy accounting          : 0
  AAA eogre attributes          : 0
  Has aaa override              : 0
  Error in handoff payload      : 0
  Handoff AAA override          : 0
  Handoff no AAA override       : 0
  Handoff payload received      : 0
  Handoff payload sent          : 0

SNMP Traps
  Client                        : 0
  Tunnel                        : 2
  Domain                        : 0

IPC
  IOSd TX messages              : 0

Zombie Client
  Entries                       : 0
```

To view the tunnel manager statistics of a specific process instance in the local mode, use the following command:

```
Device# show tunnel eogre manager stats instance instance-number

Tunnel Manager statistics for process instance : 0
Last Updated                    : 02/18/2019 23:50:35
EoGRE Objects
  Gateways                      : 6
  Domains                       : 2

EoGRE Flex Objects
  AP Gateways                   : 2
  AP Domains                    : 1
  AP Gateways HA inconsistencies : 0
  AP Domains HA inconsistencies  : 0

Config events
  IOS Tunnel updates            : 102
  IOS Domain updates            : 11
  Global updates                : 6
  Tunnel Profile updates        : 15
  Tunnel Rule updates           : 2
  AAA proxy key updates         : 0
```

```
AP events
  Flex AP Join                    : 1
  Flex AP Leave                   : 0
  Local AP Join                   : 0
  Local AP leave                  : 0
  Tunnel status (rx)              : 4
  Domain status (rx)              : 1
  IAPP stats msg (rx)             : 3
  Client count (rx)               : 6
  VAP Payload msg (tx)            : 4
  Domain config (tx)              : 1
  Global config (tx)              : 1
  Client delete (tx)              : 1
  Client delete per domain (tx)   : 3
  DHCP option 82 (tx)             : 4

Client events
  Add-mobile                      : 2
  Run-State                       : 3
  Delete                          : 1
  Cleanup                         : 0
  Join                            : 2
  Plumb                           : 0
  Join Errors                     : 0
  HandOff                         : 0
  MsPayload                       : 2
  FT Recover                      : 0
  Zombie GW counter increase      : 0
  Zombie GW counter decrease      : 0
  Tunnel Profile reset            : 11
  Client deauth                   : 0
  HA reconciliation               : 0

Client Join Events
  Generic Error                   : 0
  MSPayload Fail                  : 0
  Invalid VLAN                    : 0
  Invalid Domain                  : 0
  No GWs in Domain                : 0
  Domain Shut                     : 0
  Invalid GWs                     : 0
  GWs Down                        : 0
  Rule Match Error                : 0
  AAA-override                    : 0
  Flex No Active GW               : 0
  Open Auth join attempt          : 2
  Dot1x join attempt              : 2
  Mobility join attempt           : 0
  Tunnel Profile not valid        : 2
  Tunnel Profile valid            : 2
  No rule match                   : 0
  Rule match                      : 2
  AAA proxy                       : 0
  AAA proxy accounting            : 0
  AAA eogre attributes            : 0
  Has aaa override                : 0
  Error in handoff payload        : 0
  Handoff AAA override            : 0
  Handoff no AAA override         : 0
  Handoff payload received        : 0
  Handoff payload sent            : 0

SNMP Traps
```

```
  Client                          : 0
  Tunnel                          : 2
  Domain                          : 0

IPC
  IOSd TX messages                : 0

Zombie Client
  Entries                         : 0
```

The `show ap tunnel eogre` command displays the tunnel domain information, EoGRE events, and the tunnel gateway status on the APs, in the flex mode.

To view the summary information of an EoGRE tunnel gateway in the flex mode, use the following command:

```
Device# show ap tunnel eogre domain summary

AP MAC          Domain                              Active Gateway
-------------------------------------------------------------------------------
80e8.6fd4.9520  eogre_domain                        Tunnel1
```

To view the wireless tunnel profile summary, use the following command:

```
Device# show wireless profile tunnel summary

Profile Name                     AAA-Override AAA-Proxy DHCP Opt82 Enabled
-------------------------------- ------------ --------- ---------- ---------
eogre_tunnel                              No        No        Yes       Yes
eogre_tunnel_set                          No        No        Yes        No
eogre_tunnel_snmp                         No        No         No        No
```

To view a wireless tunnel profile's details, use the following command:

```
Device# show wireless profile tunnel detailed profile-name

Profile Name : eogre_tunnel
Status : Enabled
 AAA-Proxy/Accounting-Proxy: Disabled / Disabled
 AAA-Override : Disabled
 DHCP Option82 : Enabled
  Circuit-ID : ap-mac,ap-ethmac,ap-location,vlan
  Remote-ID : ssid-name,ssid-type,client-mac,ap-name

Tunnel Rules

Priority Realm                Vlan Domain (Status/Primary GW/Secondary GW)
-------- -------------------- ---- ---------------------------------------------
1        *                    2121 eogre_domain (Enabled/Tunnel1/Tunnel2)
```

To view detailed information about an EoGRE tunnel domain's status, use the following command:

```
Device# show ap tunnel eogre domain detailed

Domain     : eogre_domain
AP MAC     : 80e8.6fd4.9520
Active GW  : Tunnel1
```

To view the EoGRE events on an AP, use the following command:

```
Device# show ap tunnel eogre events

AP 80e8.6fd4.9520  Event history
```

```
Timestamp               #Times   Event               RC Context
----------------------- -------- ------------------- --
-----------------------------------------
02/18/2019 23:50:26.341 6        IAPP_STATS           0 GW Tunnel2 uptime:0s

02/18/2019 23:49:40.222 2        CLIENT_JOIN          0 74da.3828.88b0, (eogre_domain/2121)

02/18/2019 23:48:43.549 1        CLIENT_LEAVE         0 74da.3828.88b0, (eogre_domain/2121)

02/18/2019 23:47:33.127 1        DOMAIN_STATUS        0 eogre_domain Active GW: Tunnel1

02/18/2019 23:47:33.124 4        AP_TUNNEL_STATUS     0 Tunnel2 Dn

02/18/2019 23:47:33.124 1        MSG_CLIENT_DEL       0 GW Tunnel2 (IP: 9.51.1.12)

02/18/2019 23:47:33.124 2        TUNNEL_ADD           0 GW Tunnel2

02/18/2019 23:47:33.120 3        MSG_CLIENT_DEL_PD    0 GW Tunnel1 (IP: 9.51.1.11)

02/18/2019 23:47:31.763 2        AP_DOMAIN_PUSH       0 Delete:eogre_domain_set, 0 GWs

02/18/2019 23:47:31.753 4        AP_VAP_PUSH          0 profile:'eogre_tunnel',
wlan:pyats_eogre
```

To view the summary information of the EoGRE tunnel gateway, use the following command:

```
Device# show ap tunnel eogre gateway summary

AP MAC          Gateway          Type  IP                                        State  Clients
-------------------------------------------------------------------------------------------------
80e8.6fd4.9520  Tunnel1          IPv4  9.51.1.11                                   Up     1

80e8.6fd4.9520  Tunnel2          IPv4  9.51.1.12                                   Down   0
```

To view detailed information about an EoGRE tunnel gateway, use the following command:

```
Device# show ap tunnel eogre gateway detailed gateway-name

Gateway : Tunnel1
 Mode   : IPv4
 IP     : 9.51.1.11
 State  : Up
 MTU    : 1476
 Up Time: 14 hours 25 minutes 2 seconds
 AP MAC : 80e8.6fd4.9520

 Clients
  Total Number of Wireless Clients      : 1
 Traffic
  Total Number of Received Packets      : 6
  Total Number of Received Bytes        : 2643
  Total Number of Transmitted Packets   : 94
  Total Number of Transmitted Bytes     : 20629
  Total Number of Lost Keepalive        : 3
```

To view summary information about the EoGRE tunnel gateway status, use the following command:

```
Device# show ap tunnel eogre domain summary

AP MAC          Domain                          Active Gateway
-------------------------------------------------------------------------------
80e8.6fd4.9520  eogre_domain                    Tunnel1
```

To view information about EoGRE events on an AP, use the following command:

```
Device# show ap name ap-name tunnel eogre events

AP 80e8.6fd4.9520  Event history
Timestamp               #Times   Event               RC Context
----------------------- -------- ------------------- --
----------------------------------------
02/18/2019 23:50:26.341 6        IAPP_STATS           0 GW Tunnel2 uptime:0s

02/18/2019 23:49:40.222 2        CLIENT_JOIN         0 74da.3828.88b0, (eogre_domain/2121)

02/18/2019 23:48:43.549 1        CLIENT_LEAVE        0 74da.3828.88b0, (eogre_domain/2121)

02/18/2019 23:47:33.127 1        DOMAIN_STATUS        0 eogre_domain Active GW: Tunnel1

02/18/2019 23:47:33.124 4        AP_TUNNEL_STATUS     0 Tunnel2 Dn

02/18/2019 23:47:33.124 1        MSG_CLIENT_DEL       0 GW Tunnel2 (IP: 9.51.1.12)

02/18/2019 23:47:33.124 2        TUNNEL_ADD           0 GW Tunnel2

02/18/2019 23:47:33.120 3        MSG_CLIENT_DEL_PD    0 GW Tunnel1 (IP: 9.51.1.11)

02/18/2019 23:47:31.763 2        AP_DOMAIN_PUSH       0 Delete:eogre_domain_set, 0 GWs

02/18/2019 23:47:31.753 4        AP_VAP_PUSH          0 profile:'eogre_tunnel',
wlan:pyats_eogre
```

To view the summary information about EoGRE tunnel domain's status on an AP, use the following command:

```
Device# show ap name ap-name tunnel eogre domain summary

AP MAC          Domain                          Active Gateway
-------------------------------------------------------------------------------
80e8.6fd4.9520  eogre_domain
```

To view the detailed information about EoGRE tunnel domain on an AP, use the following command:

```
Device# show ap name ap-name tunnel eogre domain detailed

Domain Name    : eogre_domain
 Primary GW    : Tunnel1
 Secondary GW  : Tunnel2
 Active GW     : Tunnel1
 Redundancy    : Non-Revertive
 AdminState    : Up
```

To view the summary information about EoGRE tunnel gateways on an AP, use the following command:

```
Device# show ap name ap-name tunnel eogre gateway summary

AP MAC          Gateway          Type  IP                                      State  Clients
-----------------------------------------------------------------------------------------------
80e8.6fd4.9520  Tunnel1          IPv4  9.51.1.11                                 Up     1

80e8.6fd4.9520  Tunnel2          IPv4  9.51.1.12                                 Down   0
```

To view detailed information about an EoGRE tunnel gateway's status on an AP, use the following command:

```
Device# show ap name ap-name tunnel eogre gateway detailed gateway-name
```

```
Gateway : Tunnel2
 Mode   : IPv4
 IP     : 9.51.1.12
 State  : Down
 MTU    : 0
 AP MAC : 80e8.6fd4.9520

 Clients
  Total Number of Wireless Clients      : 0
 Traffic
  Total Number of Received Packets      : 0
  Total Number of Received Bytes        : 0
  Total Number of Transmitted Packets   : 0
  Total Number of Transmitted Bytes     : 0
  Total Number of Lost Keepalive        : 151
```