



Ethernet over GRE

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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

Client IPv6 traffic is supported on IPv4 EoGRE tunnels. A maximum of eight different client IPv6 addresses are supported per client. Wireless controller s send all the client IPv6 addresses that they have learned to the accounting server using the accounting update message. All RADIUS or accounting messages exchanged between controller s and tunnel gateways or RADIUS servers are outside the EoGRE tunnel.

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 wireless controller 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 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 Catalyst 9800 Series Wireless Controller , 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 <i>tunnel_number</i> Example: Device(config)# interface tunnel 21	Configures a tunnel interface and enters interface configuration mode.
Step 3	tunnel source <i>source_intf</i> 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 <i>tunnel-address</i> Example: Device(config-if)# tunnel destination 10.11.12.13	Sets the destination address of the tunnel.

	Command or Action	Purpose
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 the Tunnel Gateway (GUI)

Follow the steps given below to configure the tunnel gateway:

Procedure

-
- Step 1** Choose **Configuration > Tags & Profiles > EoGRE**.
- Step 2** Click the **Gateways** tab.
The **Add Gateway** window is displayed.
- Step 3** In the **Tunnel Id** field, specify the tunnel ID.
- Step 4** In the **Destination address(IPv4/IPv6)** field, specify the IPv4 or IPv6 address.
- Step 5** From the **Source Interface** drop-down list, select an interface.
- Step 6** In the **AAA Proxy** section, slide the **AAA Proxy** slider to **Enabled**. When AA Proxy is enabled, complete the following steps:
- From the **Encryption Type** drop-down list, select either **UNENCRYPTED** or **AES ENCRYPTION**.
 - In the **Key Phrase** field, specify the key phrase.
- Step 7** Click **Apply to Device**.
-

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.

	Command or Action	Purpose
Step 2	tunnel eogre domain <i>domain</i> Example: Device(config)# tunnel eogre domain dom1	Configures EoGRE redundancy domain.
Step 3	primary tunnel <i>primary-tunnel_intf</i> Example: Device(config-eogre-domain)# primary tunnel 21	Configures the primary tunnel.
Step 4	secondary tunnel <i>secondary-tunnel_intf</i> 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 Tunnel Domain (GUI)

Follow the steps given below to configure the tunnel domain:

Procedure

-
- Step 1** Choose **Configuration > Tags & Profiles > EoGRE**.
 - Step 2** Click the **Domains** tab.
The **Add Domain** window is displayed.
 - Step 3** In the **Name** field, specify the domain name. The name can be ASCII characters from 32 to 126, without leading and trailing spaces.
 - Step 4** From the **Primary Tunnel Gateway** drop-down list, choose an option.
 - Step 5** From the **Secondary Tunnel Gateway** drop-down list, choose an option.
 - Step 6** Slide the **Status** button to **Enabled**, to activate the domain status.

Step 7 Slide the **Revertive Redundancy** button to **Enabled**, to activate revertive redundancy.

Step 8 Click **Apply to Device**.

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 <i>interval-value</i> Example: Device(config)# tunnel eogre heartbeat interval 600	Sets EoGRE tunnel heartbeat periodic interval.
Step 3	tunnel eogre heartbeat max-skip-count <i>skip-count</i> 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 <i>tunnel_source</i> Example: Device(config)# tunnel eogre source loopback 12	Sets the tunnel EoGRE source interface.
Step 5	tunnel eogre interface tunnel <i>tunnel-intf</i> aaa proxy key <i>key</i> <i>key-name</i> 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 EoGRE Global Parameters (GUI)

Follow the steps given below to configure the EoGRE global parameters:

Procedure

-
- Step 1** Choose **Configuration > Tags & Profiles > EoGRE**.
The EoGRE **Global Config** tab is displayed.
- Step 2** In the **Heartbeat Interval (seconds)** field, specify an appropriate timer value for heartbeat interval. The valid range is between 60 and 600 seconds.
- Step 3** In the **Max Heartbeat Skip Count** field, specify the maximum heartbeat skip count. The valid range is between 3 and 10.
- Step 4** From the **Interface Name** drop-down list, choose an interface name.
- Step 5** Click **Apply**.
-

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 <i>profile-policy-name</i> Example: Device(config)# wireless profile policy eogre_policy	Configures a WLAN policy profile.
Step 3	tunnel-profile <i>tunnel-profile-name</i> Example: Device(config-wireless-policy)# tunnel-profile tunnell	Creates a tunnel profile.
Step 4	exit Example: Device(config-wireless-policy)# exit	Returns to global configuration mode.
Step 5	wireless profile tunnel <i>tunnel-profile-name</i> Example:	Configures a wireless tunnel profile.

	Command or Action	Purpose
	Device (config)# wireless profile tunnel wl-tunnel-1	
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 <i>remote-id</i> 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.
Step 10	gateway-accounting-radius-proxy Example: Device (config-tunnel-profile)# gateway-accounting-radius-proxy	Enables the gateway accounting RADIUS proxy.
Step 11	rule <i>priority</i> realm-filter <i>realm</i> domain <i>domain-name</i> <i>vlan</i> <i>vlan-id</i> 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.

Configuring the Tunnel Profile (GUI)

Follow the steps given below to configure the tunnel profile:

Procedure

Step 1 Choose **Configuration > Tags & Profiles > EoGRE**.

Step 2 Click the **Tunnel Profiles** tab.

- Step 3** Click the **Add** button.
The **Add Tunnel Profile** window is displayed.
- Step 4** Click the **General** tab and complete the following steps:
- In the **Name** field, specify the tunnel profile name. The name can be ASCII characters from 32 to 126, without leading and trailing spaces.
 - In the **Status** field, slide the button to change the status to **Enabled**.
 - In the **Central Forwarding** field, slide the button to **Enabled**, to enable the feature.
 - In the **DHCP Option-82** section, change the **Status** field and the **ASCII** field to **Enabled**, as per requirement.
 - In the **Delimiter** field, specify the delimiter.
 - From the **Circuit ID Available Services** list, select an available services and click the > sign to add the services to the assigned list.
 - From the **Remote ID Available Services** list, select an available services and click the > sign to add the services to the assigned list.
 - In the **AAA** section, choose an appropriate status for the **Radius Proxy** field, the **Accounting Proxy** field, and the **Override** field.
- Step 5** Click the **Rules** tab, and complete the following steps:
- Click the **Add Rules** button.
 - In the **Priority** field, specify the priority of the rule from a range of 1 to 100.
 - In the **Realm** field, specify a realm.
 - From the **Domain** drop-down list, choose a domain.
 - In the **VLAN Id** field, specify the VLAN ID that ranges between 1 and 4094.
 - Click **Save**.
- Step 6** Click **Apply to Device**.

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 <i>policy-tag-name</i> Example: Device(config)# wireless tag policy eogre_tag	Configures a policy tag and enters policy tag configuration mode.
Step 3	wlan <i>wlan-name</i> policy <i>profile-policy-name</i> Example:	Maps an EoGRE policy profile to a WLAN profile.

	Command or Action	Purpose
	<code>Device(config-policy-tag)# wlan eogre_open_eogre policy eogre_policy</code>	
Step 4	end Example: <code>Device(config-policy-tag)# end</code>	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: <code>Device# configure terminal</code>	Enters global configuration mode.
Step 2	ap mac-address Example: <code>Device(config)# ap 80E8.6FD4.0BB0</code>	Configures an AP and enters AP profile configuration mode.
Step 3	policy-tag policy-tag-name Example: <code>Device(config-ap-tag)# policy-tag eogre_tag</code>	Maps the EoGRE policy tag to the AP.
Step 4	site-tag site-tag-name Example: <code>Device(config-ap-tag)# site-tag sp-flex-site</code>	Maps a site tag to the AP.
Step 5	end Example: <code>Device(config-ap-tag)# end</code>	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 death                 : 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   : Tunnell
```

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: Tunnell
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 Tunnell (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	Tunnell	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 : Tunnell
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	Tunnell

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	RC	Context
Timestamp	#Times	Event	
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: Tunnell
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 Tunnell (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       : Tunnell
Secondary GW     : Tunnel2
Active GW        : Tunnell
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	Tunnell	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
```