

Tunnelling of Explicit Congestion Notification

This chapter describes the tunneling of Explicit Congestion Notification (ECN) for ePDG in the following sections:

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Feature Summary and Revision History

Summary Data

Applicable Product(s) or Functional Area	ePDG
Applicable Platform(s)	• ASR 5500 • VPC-DI • VPC-SI
Feature Default	Enabled - Configuration Required
Related Changes in This Release	Not applicable
Related Documentation	• *Command Line Interface Reference* • *ePDG Administration Guide* • *Statistics and Counters Reference*

Revision History

Revision Details	Release
First introduced.	21.4

Feature Description

ePDG supports tunneling of Explicit Congestion Notification (ECN) so that the network can detect and react to network congestions. This feature is compliant to *RFC 6040 - Tunnelling of Explicit Congestion Notification*.

ECN tunneling supports the default tunnel ingress behavior (encapsulation) and default tunnel egress behavior (decapsulation) as per RFC 6040. The "normal mode" and "compatibility mode", are two modes of encapsulation required for ECN. These modes are specific only to the ingress tunnel endpoint, and not the whole tunnel. A tunnel ingress must implement the normal mode and the compatibility mode for backward compatibility with tunnel egresses that do not propagate explicit congestion notifications.

The ECN tunneling feature can be enabled in normal mode or compatible mode using the S2b-GTP and SWu-IPsec interfaces.

- **S2b interface**: For GTP tunneling in the S2b interface, the ECN enabling is done for the session based on the configuration in the call control profile associated with the session. The same configuration controls both ingress and egress for the S2b-GTP interface.
- **SWu interface**: For IPsec tunneling in the SWu interface, the ECN enabling is done based on the configuration in the crypto template associated with the ePDG service. The same configuration controls both ingress and egress for the SWu-IPsec interface.

Relationships to Other Features

SR/ICSR Recovery: For session recovery or unplanned card migration, the ECN must be updated properly based on the mode during encapsulation and decapsulation.

Standards Compliance

The ECN Tunneling feature complies with the following standards:

- *RFC 6040 - Tunnelling of Explicit Congestion Notification*

Configuring ECN Tunneling

This section describes the configuration to enable ECN in normal or compatible mode in GTP tunnel over S2b interface and IPsec tunnel over SWu interface.

Configuring ECN for GTP Tunnel

Use the following configuration to enable explicit congestion notification (ECN) in normal mode or compatible mode for the GTP tunnel in S2b interface.

```
configure
  call-control-profile profile_name
    ecn gtp mode normal
    remove ecn gtp mode
    end
```

Notes:

- **ecn**: Specifies ECN over GTP tunnel in normal mode.
- **gtp**: Enables ECN handling over GTP tunnel.
- **mode**: Specifies the tunnel ingress encapsulation mode.
- **normal**: Specifies the normal mode of encapsulation.
- **remove**: Enables ECN in compatible mode for GTP tunnel in the S2b interface. The default mode is the compatible mode, supported for backward compatibility.

Verifying the Configuration

Use the following command to verify the ECN configuration for GTP tunnel in the S2b interface:

```
show call-control-profile full all
```

Configuring ECN for IPsec Tunnel

Use the following configuration to enable explicit congestion notification (ECN) in normal mode or compatible mode for IPsec tunnel in the SWu interface.

```
configure
  context context_name
    crypto template template_name ikev2-dynamic
      [ no ] ecn
      end
```

Notes:

- **ecn**: Specifies ECN over IPsec tunnel in normal mode.
- **no**: Enables ECN in compatible mode for IPsec tunnel in the SWu interface. The default mode is the compatible mode, supported for backward compatibility.

Verifying the Configuration

Use the following command to verify the ECN configuration for IPsec tunnel in the SWu interface:

```
show crypto template tag map_name
```

Monitoring and Troubleshooting ECN Tunneling

This section provides information on how to monitor and troubleshoot the ECN Tunneling feature.

Show Commands and Outputs

This section provides information on show commands and their corresponding outputs for the ECN Tunneling feature.

show call-control-profile full all

The **Gtp Tunnel ECN Ingress Mode** field is added to the output of this command to display the mode of ECN configured for the GTP tunnel.

show crypto template tag

The **Ipsec Tunnel Ecn Ingress Mode** field is added to the output of this command to display the mode of ECN configured for the IPsec tunnel.

show daughtercard counters

The following new fields are added to the output of this command:

- ECN Total Pkts drop: Total number of packet drops due to unexpected ECN field.
- ECN CU Pkts: Total number of packets with currently unused (CU) combination of ECN handling.

show epdg-service statistics

The following new fields are added to the output of this command:

- ECN Total Pkts drop: Total number of packet drops due to unexpected ECN field.
- ECN CU Pkts: Total number of packets with currently unused (CU) combination of ECN handling.