Multiple Customized PCO Support

Feature Summary and Revision History

Summary Data

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

Revision History

Revision Details	Release
Support is added for additional Protocol Configuration Options, Custom6 through Custom10.	21.26

Revision Details	Release
Support is added to display a confirmation message before deleting or modifying an existing Container ID value in the Global Configuration mode.	21.24
Enhanced Protocol Configutaion Options (ePCO) support is added with the existing new operator defined PCO for UWB Indicator.	21.20.22
First introduced.	21.20.16

Feature Description

With the multiple PCO support feature, P-GW and GGSN sends customized Protocol Container Options (PCOs) to MS GTP messages. Custom1 is an existing PCO and its Container ID value is FF00H.

P-GW and GGSN support PCOs ranging from Custom1 through Custom10.

The global PCO container IDs are modified during runtime. This modification affects only the new subscriber sessions and doesn't affect the existing subscriber sessions. The PCO container IDs ranging from FF03 to FFFF are configurable.

Operator Defined PCO for Ultra Wideband (UWB) Indicator

P-GW supports either Protocol Configuration Options (PCO) or Enhanced Protocol Configuration Options (ePCO) based on the EPCOSI indication bit received from an UE in Create Session Request and Modify Bearer Request.

If the EPCOSI bit is set, P-GW sends PCO containers in the ePCO IE. If the EPCOSI bit isn't set, then P-GW sends PCO containers in PCO IE.

Note 3G (UMTS) PCO notification to the UE is added to support the Gn or Gp mode. GGSN doesn't support ePCO IE.

How it Works

This section describes the updation of PCO values using the Gx and Gy interfaces. The term Gateway (GW) is interchangeably used in this chapter for P-GW and GGSN.

Updating PCO Value Using Gx Interface

This section describes the procedure to update PCO values using the Gx interface.

- The Policy and Charging Rules Function (PCRF) sends a request to activate the predefined rules.

- If the activation is successful and if the charging action is configured for PCO, then the retrieved value is sent to the UE.

- If the predefined rule creation is performed during session creation (CCA), then the retrieved PCO is sent to the UE in Create Session Response for P-GW and Create PDP Context Response for GGSN.

- If the predefined rule activation is sent in the middle of the session (CCA-U), then the retrieved PCO is sent to the UE with the next message.

- The PCRF sends a request to deactivate predefined rules.

- If the removal of predefined rules is successful and if PCO is configured for charging action, then the configured value in the APN is returned to UE with the next message.

- If multiple predefined rules are enabled, then the last charging action configured for PCO, in the order of rules sent, is considered as valid and Session Manager is updated with the value.

Note   Ensure that the last predefined rule has the correct PCO value for this scenario. The remaining requested rules will follow the regular predefined rule activation procedure.

Updating PCO Value Using Gy Interface

This section describes the procedure to update PCO values using the Gy interface.

- The Online Charging System (OCS) sends a filter ID to enable the corresponding post-processing dynamic rule.

- If the rule activation is successful and if the associated charging action is configured for PCO, then the retrieved value is sent to the Session Manager through the Session Update Indication event.

- The GW sends the PCO value to UE.

- If the OCS sends multiple filter IDs, then the charging action associated with the last filter ID is used for PCO.

- The CRF sends a request to deactivate the predefined rules.

- On successful removal of the predefined rules, if charging action is configured for PCO, then a default PCO value under APN will be returned to UE with the next message.

Configuring PCO

This section describes the PCO configuration. CLI modifications are not permitted when calls are active for APN Configuration mode and Global Configuration mode, but modifications are permitted for active-charging service.

Configuring PCO in Charging Action Mode

Use the following sample configuration to configure multiple PCOs in the ACS Charging Action Configuration Mode.

```
configure
  active-charging service service_name
```

```
charging-action action_name
    { pco-custom1 | pco-custom2 | pco-custom3 | pco-custom4 |
pco-custom5 | pco-custom6 | pco-custom7 | pco-custom8 | pco-custom9 |
pco-custom10 } custom_value
    end
```

NOTES:

- **pco-custom1 - pco-custom10** *custom_value*: Configures multiple operator-specific PCOs. custom_value must be an integer in the range of 0-255.

Configuring Custom1 PCO in APN Configuration Mode

Use the following sample configuration to configure Custom1 PCO in the APN Configuration mode.

```
configure
  context context_name
    apn apn_name
      [ no ] pco-option custom1 [ ue-requested ]
      end
```

NOTES:

- **pco-option custom1**: Configures operator defined PCO container custom1 mode. By default, its container ID value is fixed to 0.

- **ue-requested**: Configures to include Custom PCO Options in PCO IE, only when it requested by UE.

- **no**: Removes custom1 PCO configuration in the APN Configuration mode.

Configuring Multiple PCOs in APN Configuration Mode

Use the following sample configuration to configure multiple PCOs in the APN Configuration mode.

```
configure
  context context_name
    apn apn_name
      [ no ] pco-options { { custom1 | custom2 | custom3 | custom4 |
custom5 | custom6 | custom7 | custom8 | custom9 | custom10 } [ ue-requested
 value custom_value | value custom_value ] }
      end
```

NOTES:

- **custom1 - custom10**: Configures APN to include custom PCO options in PCO IE.

- **ue-requested**: Configures to include custom PCO Options in PCO IE, only when it is requested by UE.

- **value** *custom_value* : Configures the default container value of custom PCO. custom_value must be an integer in the range of 0-255.

- **no**: Removes PCO configuration in the APN Configuration mode.

Configuring PCO Container ID in Global Configuration Mode

Use the following sample configuration to configure multiple PCOs in the Global Configuration mode.

```
configure
  [ no ] pco-options { custom2 | custom3 | custom4 | custom5 | custom6 |
 custom7 | custom8 | custom9 | custom10 } container-id container_id_value
  end
```

NOTES:

- **pco-options { custom2 - custom10}**: Configures custom PCO options in PCO IE.

- **container-id** *container_id_value*: Configures the operator defined container ID and the value ranging from FF03 to FFFF.

- **no**: Removes PCO container ID configuration in the Global Configuration mode.

> **Note**   The custom1 container ID is not configurable in the Global Configuration mode as its container value is fixed to FF00H.

> **Note**   If you delete or modify an existing container ID value for an ongoing session, it affects only the new sessions and does not affect the ongoing or existing sessions.

Monitoring and Troubleshooting

This section provides information on how to monitor and troubleshoot using show commands available in support of this feature.

Show Commands and Outputs

This section provides information regarding show commands and their outputs for this feature.

show active-charging charging-action all

The output of this command is enhanced to display the following field.

Table 1: show active-charging charging-action all Command Output Descriptions

Field	Description
PCO-Custom1-10 value	Indicates the action value for multiple operator-specific PCOs. The value can range from 1 to 10.

show active-charging sessions full all

The output of this command is enhanced to display the following fields.

Table 2: show active-charging sessions full all Command Output Descriptions

Field	Description
custom	Indicates Operator specific custom option.
Value	Indicates the value used for sending in custom PCO container.
Interface	Indicates the interface such as Gx. Gy or n/a based on the following conditions: • Gx: The charging rule is applied from the Gx interface that has custom PCO value. • Gy: The charging rule is applied from the Gy interface that has custom pco value. • n/a: The configured PCO value which is applied from APN profile.

show apn all

The output of this command is enhanced to display the following fields.

Table 3: show apn all Command Output Descriptions

Field	Description
Custom1-10 value	Specifies the action value for multiple operator-specific PCOs. The value can range from 1 to 10.
UE-Requested	Specifies PCO to the UE, which requested for new PCO option.