Configuring Charging on the GGSN

This chapter describes how to configure the charging function on the GGSN. Charging processing is enabled by default on the GGSN. There are several ways to customize communication with a charging gateway. Many of the default values for the charging options will provide a satisfactory configuration until you become more familiar with your network and decide to customize the charging interface.

For a complete description of the GPRS commands in this chapter, refer to the *Cisco IOS Mobile Wireless Command Reference*. To locate documentation of other commands that appear in this chapter, use the command reference master index or search online.

This chapter includes the following sections:

- Configuring a Physical Interface to the Charging Gateway, page 41 (Required)
- Configuring the Charging Gateway, page 43 (Required)
- Configuring the Transport Protocol for the Charging Gateway, page 44 (Optional)
- Customizing the Charging Gateway, page 44 (Optional)
- Disabling Charging Processing, page 46 (Optional)
- Monitoring and Maintaining Charging on the GGSN, page 47
- Configuration Example, page 47

Configuring a Physical Interface to the Charging Gateway

To establish access to an external charging gateway in the GPRS network, you must configure a physical interface on the GGSN to connect to the network of the charging gateway. In GPRS, this interface between the GGSN and the charging gateway is referred to as the Ga interface.

For more information about configuring physical interfaces on Cisco Systems’ routers, see the *Cisco IOS Interface Configuration Guide* and the *Cisco IOS Interface Command Reference*. 
To configure a physical interface to the charging gateway that supports Fast Ethernet on a Cisco 7200 series router, use the following commands beginning in global configuration mode:

**Command**

**Step 1**  
Router(config)# interface type slot/port  

Define a physical interface on the GGSN, where type is **fastethernet**, and slot/port is the hardware slot and port on the interface.

**Step 2**  
Router(config-if)# ip address ip-address mask [secondary]  

Specify an IP address for the interface, where:
- **ip-address**—Specifies the IP address of the interface in dotted decimal format.
- **mask**—Specifies a subnet mask in dotted decimal format.
- **secondary**—Specifies that the configured address is a secondary IP address. If this keyword is omitted, the configured address is the primary IP address.

**Step 3**  
Router(config-if)# ip route-cache cef  

(Optional) Enables CEF operation on an interface.

**Verifying Interface Configuration to the Charging Gateway**

To verify the physical interface to the charging gateway you can first verify your GGSN configuration and then verify that the interface is available.

**Step 1**  
To verify that you have properly configured a Ga interface on the GGSN, use the `show running-config` command. The following example is a portion of the output from the command showing the FastEthernet5/1 physical interface configuration as the Gn interface to the SGSN:

```
Router# show running-config
Building configuration...

Current configuration : 2875 bytes
!
version 12.2
!
interface FastEthernet5/1
   description Ga interface
   ip address 10.9.0.1 255.255.255.0
   no ip mroute-cache
   duplex full
   ...  
```
Configuring the Charging Gateway

To verify that a physical interface is available, use the `show ip interface brief` command. The following example shows that the FastEthernet5/1 interface to the charging gateway is in “up” status and the protocol is also “up”:

```
Router #show ip interface brief
Interface                  IP-Address      OK? Method Status                Protocol
FastEthernet0/0 10.10.1.3 YES NVRAM  up up
FastEthernet1/0            10.29.0.2 YES NVRAM  up                    up
FastEthernet2/0            unassigned      YES NVRAM  administratively down down
FastEthernet5/1            10.9.0.1 YES NVRAM  up                    up
Ethernet6/0                10.99.0.12 YES NVRAM  up                    up
Ethernet6/1                unassigned      YES NVRAM  administratively down down
Ethernet6/2                unassigned      YES NVRAM  administratively down down
Ethernet6/3                unassigned      YES NVRAM  administratively down down
Ethernet6/4                unassigned      YES NVRAM  administratively down down
Ethernet6/5                unassigned      YES NVRAM  administratively down down
Ethernet6/6                unassigned      YES NVRAM  administratively down down
Ethernet6/7                10.35.35.2      YES NVRAM  up                    up
Virtual-Access1            10.44.44.1      YES TFTP   up                    up
Virtual-Template1          10.44.44.1      YES manual down                  down
```

Configuring the Charging Gateway

To configure the default charging gateway, use the following command in global configuration mode:

```
Router(config)# gprs default charging-gateway (ip-address | name) [(ip-address | name)]
```

Specifies a primary charging gateway (and backup), where:

- `ip-address`—Specifies the IP address of a charging gateway. The second (optional) `ip-address` argument specifies the IP address of a secondary charging gateway.
- `name`—Specifies the host name of a charging gateway. The second (optional) `name` argument specifies the host name of a secondary charging gateway.

Changing the Default Charging Gateway

To change the default charging gateway, use the following commands beginning in global configuration mode:

```
Step 1  Router(config)# gprs default charging-gateway 10.9.0.2
Step 2  Router(config)# no gprs default charging-gateway 10.9.0.2
Step 3  Router(config)# gprs default charging-gateway 10.9.0.3
```

Specifies a primary charging gateway at IP address 10.9.0.2.

Removes the primary charging gateway at IP address 10.9.0.2.

Specifies the new default primary charging gateway at IP address 10.9.0.3.
Configuring the Transport Protocol for the Charging Gateway

You can configure the GGSN to support either Transport Control Protocol (TCP) or User Datagram Protocol (UDP) as the transport path protocol for communication with the charging gateway.

The GPRS default configuration specifies UDP, which is a connectionless protocol that is considered an unreliable transport method but can yield greater performance.

Configuring TCP as the Charging Gateway Path Protocol

TCP is a connection-based protocol that provides reliable transmission through packet acknowledgment. To specify TCP as the transport path protocol, use the following commands beginning in global configuration mode:

<table>
<thead>
<tr>
<th>Command</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td>Router(config)# gprs charging cg-path-requests 1</td>
</tr>
<tr>
<td>Step 2</td>
<td>Router(config)# gprs charging path-protocol tcp</td>
</tr>
</tbody>
</table>

Configuring UDP as the Charging Gateway Path Protocol

The GPRS default configuration specifies UDP as the transport path protocol to the charging gateway. If you need to reconfigure the charging gateway for UDP transport, use the following command in global configuration mode:

<table>
<thead>
<tr>
<th>Command</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Router(config)# gprs charging path-protocol udp</td>
</tr>
</tbody>
</table>

Customizing the Charging Gateway

For the GPRS charging options, the default values represent recommended values. Other optional commands also are set to default values, but Cisco Systems recommends modifying these commands to optimize your network as necessary, or according to your router hardware.

The GGSN uses echo timing to maintain the path between SGSNs and external charging gateways. However, the GGSN can only implement a single method of echo timing for all of the paths it needs to maintain. To learn more about echo timing on the GGSN, or to modify the echo timing feature, see the “Configuring Echo Timing on the GGSN” section on page 20 in the “Configuring GGSN GTP Services” chapter.
Use the following global configuration commands to fine-tune charging processing on the GGSN:

<table>
<thead>
<tr>
<th>Command</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>Router(config)# gprs charging cdr-aggregation-limit CDR_limit</code></td>
<td>Specifies the maximum number of CDRs that the GGSN aggregates in a charging data transfer message to a charging gateway. The default is 255 CDRs.</td>
</tr>
<tr>
<td><code>Router(config)# gprs charging cdr-option apn-selection-mode</code></td>
<td>Enables the GGSN to provide the reason code for APN selection in G-CDRs. This is disabled by default.</td>
</tr>
<tr>
<td><code>Router(config)# gprs charging cdr-option local-record-sequence-number</code></td>
<td>Enables the GGSN to use the local record sequence number field in G-CDRs. This is disabled by default.</td>
</tr>
<tr>
<td><code>Router(config)# gprs charging cdr-option node-id</code></td>
<td>Enables the GGSN to specify the node that generated the CDR in the node ID field in G-CDRs. This is disabled by default.</td>
</tr>
<tr>
<td><code>Router(config)# gprs charging cdr-option no-partial-cdr-generation</code></td>
<td>Disables the GGSN from creating non-primary partial G-CDRs. The default is non-primary partial CDR creation is enabled. <strong>Note</strong> Enable this feature only when there are no active PDP contexts. Enabling this feature will affect all subsequent PDP contexts.</td>
</tr>
<tr>
<td><code>Router(config)# gprs charging cdr-option packet-count</code></td>
<td>Enables the GGSN to provide uplink and downlink packet counts in the optional record extension field in G-CDRs. This is disabled by default.</td>
</tr>
<tr>
<td><code>Router(config)# gprs charging cdr-option served-msisdn</code></td>
<td>Enables the GGSN to provide the MSISDN number from the create PDP context request in G-CDRs. This is disabled by default.</td>
</tr>
<tr>
<td><code>Router(config)# gprs charging cg-path-requests minutes</code></td>
<td>Specifies the number of minutes that the GGSN waits before trying to establish the TCP path to the charging gateway when TCP is the specified path protocol. The default is 0 minutes, which disables the timer.</td>
</tr>
<tr>
<td><code>Router(config)# gprs charging container change-limit number</code></td>
<td>Specifies the maximum number of charging containers within each G-CDR from the GGSN. The default is 5.</td>
</tr>
<tr>
<td><code>Router(config)# gprs charging container sgsn-change-limit number</code></td>
<td>Specifies the maximum number of SGSN changes that can occur before closing a G-CDR for a particular PDP context. The default is disabled.</td>
</tr>
<tr>
<td><code>Router(config)# gprs charging container volume-threshold threshold_value</code></td>
<td>Specifies the maximum number of bytes that the GGSN maintains in a user’s charging container before closing it and updating the G-CDR. The default is 1,048,576 bytes (1 MB).</td>
</tr>
<tr>
<td><code>Router(config)# gprs charging disable</code></td>
<td>Disables charging transactions on the GGSN. Charging is enabled by default.</td>
</tr>
<tr>
<td><code>Router(config)# gprs charging flow-control private-echo</code></td>
<td>Implements an echo request with private extensions for maintaining flow control on packets transmitted to the charging gateway. This is disabled by default.</td>
</tr>
<tr>
<td><code>Router(config)# gprs charging map data tos tos_value</code></td>
<td>Specifies an IP ToS mapping for GPRS charging packets. The default is 3.</td>
</tr>
<tr>
<td><code>Router(config)# gprs charging packet-queue-size queue_size</code></td>
<td>Specifies the maximum number of unacknowledged charging data transfer requests that the GGSN maintains in its queue. The default is 128 packets.</td>
</tr>
</tbody>
</table>
Disabling Charging Processing

**Caution**

The `gprs charging disable` command removes charging data processing on the GGSN, which means that the data required to bill customers for network usage is not being collected by the GGSN nor sent to the charging gateway. Cisco Systems, Inc. recommends that you avoid using this command in production GPRS network environments. When necessary to use this command, use it with extreme care and reserve its usage only under non-production network conditions.

You can disable charging on the GGSN only when all open CDRs have been processed and sent to the charging gateway. To clear the current GPRS CDRs, use the `clear gprs charging cdr` privileged EXEC command.

To disable charging processing on the GGSN, use the following command beginning in global configuration mode:

<table>
<thead>
<tr>
<th>Command</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>Router(config)# gprs charging disable</code></td>
<td>Disables charging transactions on the GGSN.</td>
</tr>
</tbody>
</table>

For information about configuring GPRS GTP options, see the “Customizing the GGSN Configuration” section on page 30 in the “Configuring GGSN GTP Services” chapter.
Monitoring and Maintaining Charging on the GGSN

This section provides a summary list of the `show` commands that you can use to monitor charging functions on the GGSN.

The following privileged EXEC commands are used to monitor and maintain charging on the GGSN:

<table>
<thead>
<tr>
<th>Command</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Router# <code>show gprs charging parameters</code></td>
<td>Displays information about the current GPRS charging configuration.</td>
</tr>
<tr>
<td>Router# <code>show gprs charging statistics</code></td>
<td>Displays cumulative statistics about the transfer of charging packets between the GGSN and charging gateways.</td>
</tr>
<tr>
<td>Router# <code>show gprs charging status</code></td>
<td>Displays current statistics about the transfer of charging packets between the GGSN and charging gateways.</td>
</tr>
</tbody>
</table>

Configuration Example

The following configuration example shows part of a sample GGSN configuration with some of the commands that you use to configure charging services:

```
Router# `show running-config`

show gprs ggsn
!

interface Ethernet5/1
 description Ga interface
 ip address 10.9.0.1 255.255.0.0
duplex half
!

interface Virtual-Template1
 ip address 10.40.40.1 255.255.255.0
 encapsulation gtp
 gprs access-point-list gprs
!

gprs access-point-list gprs
    access-point 1
    access-point-name auth-accounting
    access-mode non-transparent
    aaa-group authentication first
    aaa-group accounting second
    ip-address-pool dhcp-proxy-client
dhcp-server 10.60.0.1
dhcp-gateway-address 10.60.0.1
exit
!
```
gprs default charging-gateway 10.9.0.2
gprs charging send-buffer 1000
gprs charging container volume-threshold 500000
gprs charging container change-limit 3
gprs charging cdr-aggregation-limit 10
gprs charging cdr-option apn-selection-mode
gprs charging cdr-option served-msisdn
!
...
!
end