DATA SHEET

# CISCO GATEWAY GPRS SUPPORT NODE RELEASE 5.0

**The Cisco® Gateway GPRS Support Node (GGSN) is a high-performance data gateway connecting General Packet Radio Service (GPRS) and Universal Mobile Telecommunications Service (UMTS) mobile operators' Public Land Mobile Networks (PLMNs) to external data networks (Internet, corporate intranet, or multimedia services, for example). The Cisco GGSN supports GPRS 2.5G- and UMTS third-generation (3G)-connected mobile networks. The Cisco GGSN connects the GPRS Tunneling Protocol (GTP) tunnel directly from the mobile subscriber to the external data network. The Cisco GGSN software runs on industry-leading Cisco routing platforms and is based on Cisco IOS® Software technology.**

Cisco GGSN Release 5.0 builds on the feature set of widely deployed Release 4.0, bringing Cisco GGSN up to date with the latest standards and customer-requested features. The new features add greater availability, customization, and operator control to the GGSN, making it the most flexible and reliable GGSN available on the market today.

The Cisco GGSN forms part of the Cisco Mobile Exchange architecture. Cisco Mobile Exchange offers mobile operators a complete solution for connectivity, control, and charging. Cisco Mobile Exchange delivers flexible billing methods, ranging from flat-rate, volume-based billing to content-aware per-download or per-click billing. Cisco Mobile Exchange uses the proven Cisco 7600 Series router platform to deliver all of the connectivity needs required, including support for GPRS, UMTS, wireless LAN (WLAN), packet data serving node (PDSN), and tunneling protocols such as generic routing encapsulation (GRE), IP Security (IPSec), and Layer 2 Tunneling Protocol (L2TP).

## CISCO GGSN RELEASE 5.0 FEATURE OVERVIEW

Cisco GGSN Release 5.0 supports all of the features included in Release 4.0. For more information on Release 4.0, the Cisco GGSN Release 4.0 data sheet is available at http://www.cisco.com/go/mobile under the CMX, Packet Gateways-GGSN section.

Cisco GGSN Release 5.0 adds the following features:

### Standards Update

Cisco GGSN Release 5.0 conforms to the latest relevant Third Generation Partnership Project (3GPP) Release 99, Release 4, and Release 5 specifications to the following levels:

**Table 1.** 3GPP Compliance Matrix

| Area | Specification | 3GPP Release | | | |
|---|---|---|---|---|---|
| | | 98 | 99 | 4 | 5 |
| **GPRS Stage 2** | 03.60<br>23.060 | 7.7.0<br>– | –<br>3.14.0 | –<br>4.7.0 | –<br>5.4.0 |
| **Mobile Radio Interface Layer 3** | 04.08<br>24.008 | 7.14.0<br>– | –<br>3.14.0 | –<br>4.9.0 | –<br>5.6.0 |
| **GTP Across Gn and Gp** | 09.60<br>29.060 | 7.9.0<br>– | –<br>3.15.0 | –<br>4.6.0 | –<br>5.4.0 |

| Area | Specification | 3GPP Release | | | |
|---|---|---|---|---|---|
| | | 98 | 99 | 4 | 5 |
| **Interworking with Public Data Network (PDN)** | 09.61<br>29.061 | 7.4.0<br>– | –<br>3.11.0 | –<br>4.6.0 | –<br>5.4.0 |
| **Charging** | 12.15<br>32.015<br>32.215 | 7.1.0<br>–<br>– | –<br>3.10.0<br>– | –<br>–<br>4.4.0 | –<br>–<br>5.2.0 |
| **QoS Concept and Architecture** | 23.107 | – | 3.9.0 | 4.6.0 | 5.7.0 |

## MULTIPLE TRUSTED PLMNS

With the increase in operator mergers and global groups, operators need to include more that just their local users in specific user groups or global access point names (APNs). Cisco GGSN Release 5.0 supports multiple PLNM networks as trusted and may restrict GGSN access based on this list.

## CHARGING ENHANCEMENT

### Time-Based Call Detail Report (CDR) Generation

Cisco GGSN Release 5.0 supports closing of a CDR based on a time threshold.

### Charging Profile Support

Cisco GGSN Release 5.0 introduces support for charging profiles with selection based on the charging characteristics information element requested in the PDP create request message or a default profile. The GGSN will apply the configured profile to the user; profiles are supported on a per-APN or default configuration

Charging profiles consist several parameters to allow the greatest flexibility for charging, including time and volume trigger limits, tariff time change, and the ability not to generate a CDR.

Some CDR values have additionally been made switchable to allow further flexibility for the operator.

### Additional Charging Gateway Function (CGF) Support

Cisco GGSN Release 5.0 supports an additional charging gateway, bringing the total to three. It also introduces a priority scheme for the configured CGFs and the ability to fail back to a higher-priority CGF if one becomes active.

## ROUTING BEHIND THE MOBILE STATION

As GPRS and UMTS technologies become widely deployed and applications become more varied, Cisco Systems sees a greater need for not just a single device at the mobile station, but an entire network. Cisco GGSN Release 5.0 supports the ability to treat the mobile station as a router and to route additional networks beyond the mobile station.  This feature was introduced in later versions of Release 4.0.

### QOS ENHANCEMENT: CALL ADMISSION CONTROL

As higher-bandwidth applications propagate into the mobile service providers, correct allocation of bandwidth to the right users and applications becomes a high priority. Call Admission Control (CAC) is a standards-based method of checking if the bandwidth requested by the Packet Data Protocol (PDP) is available without affecting other PDP contexts. This is particularly useful when real-time applications such as voice over IP (VoIP) and multimedia streaming are being shared across APNs

In Release 5.0, the GGSN supports per-PDP CAC. The GGSN will check, on creation of each new PDP, that the requested quality of service (QoS) values are available. Each APN is assigned a pool of bandwidth, which allows bandwidth negotiation and reservation during context setup and guaranteed bandwidth enforcement for traffic.

### QOS ENHANCEMENT: PER PDP POLICING

Cisco GGSN Release 5.0 offers per-PDP policing. Combined with CAC, this delivers the “traffic conditioner” function for enforcing data rates negotiated by CAC. Any oversubscribed packets are either dropped, or marked as preferred to be dropped. All queuing and policing methods are supported through use of Cisco IOS Software-based QoS technology and techniques as used by standard Cisco routing products.

### Multi-APN in Same VRF

Operators constantly have to adapt to the changing needs of their customers, so a change in customer situation should not cause the operator any logistical issues. A new feature included in Cisco GGSN Release 5.0 is the ability to include multiple APNs in a single VPN routing and forwarding (VRF) instance (a per-customer routing table). This allows the operator to smoothly and easily merge customer networks.

Having multiple APNs mapped into one VRF provide many advantages:

- Flexibility for the operator when migrating multiple customers to one common domain. For example, two customers that merge can use a single routing domain.
- Multiple service applications may use different service related APNs but a common routing table.
- Customers may require multiple APNs for billing purposes but use a single routing table or tunnel to their corporate networks.

### MAINTENANCE MODE

The GGSN configuration is constantly changing as customers request new features and service plans change. To help with the changes, Cisco GGSN Release 5.0 supports maintenance mode for both APN configuration and charging configuration. Maintenance mode allows the operator to maintain any active PDPs on the GGSN while making changes to configuration. Maintenance mode charging operations will not affect new CDR generation. The Dynamic Feedback Protocol (DFP) weight will also be adjusted to inform the server load balancer that the GGSN is in maintenance mode.

### RADIUS ENHANCEMENTS

### Session Timeout

Some operators choose to limit the duration of a PDP context. In response to customer requests, Cisco GGSN Release 5.0 supports the ‘session-timeout’ RADIUS attribute. This dictates the total duration of a PDP and will delete the PDP after this time, regardless of whether data is being sent.

### Operator-Defined Attributes

Cisco GGSN Release 5.0 allows the operator to additionally set some RADIUS attributes.

## GTP Server Load Balancing

The Cisco GTP server load balancer software has been updated to support the CAC function (if configured), which resigns any PDP context rejected due to QoS negotiation failure to another GGSN.

## GTP SESSION REDUNDANCY

With high session density and 'always-on' GPRS services becoming more prevalent worldwide, it has become highly critical for GPRS operators to ensure high-availability on their GPRS solutions, and to prevent service interruption for end users. For the GGSN, this translates to preventing loss of sessions upon failure. To this end, GTP session redundancy provides stateful PDP context failover between two multiprocessor WAN application module (MWAM) cards across two Cisco 7600 Series router chassis. This allows user sessions to be virtually uninterrupted by any single point failure on a 76XX chassis.

This feature provides 1:1 redundancy between an active and standby pair. All user sessions are handled by the active processor, while the standby processor communicates with the active processor and continuously checkpoints user session information. Once the standby processor detects a failure on the active processor, it assumes the active role and henceforth handles all user sessions.

**This feature is supported only on the Cisco MWAM card with the Cisco GGSN 5.0 Premium License.**

### Prepaid and Postpaid Billing Support

This feature extends the GGSN charging model to provide a standardized prepaid/postpaid access paradigm that eliminates unnecessary transactional mediation. The Cisco GGSN works together with the Cisco Content Services Gateway (CSG) to provide an enhanced GGSN capability for real-time online billing support.

**This feature is supported only on the Cisco MWAM card with the Cisco GGSN 5.0 Premium License. A Cisco CSG is required for the support of this feature.**

### Cisco GGSN Functional Interfaces Supported

Cisco GGSN Release 5.0 supports the following interfaces:

- Gn—GTP tunnel (between Cisco GGSN and Serving GPRS Support Node [SGSN])
- Gp—PLMN to PLMN (between two GPRS networks)
- Ga—Interface to the charging gateway (GTP)
- Gi—IP networking, initially IPv4 (between Cisco GGSN and external data networks)

## CISCO GGSN HARDWARE PLATFORMS

Cisco GGSN Release 5.0 is supported on the same platforms as Release 4.0. For a detailed description of the hardware platforms, please refer to the Cisco GGSN Release 4.0 data sheet at http://www.cisco.com/en/US/products/sw/wirelssw/ps873/products_data_sheet09186a00801c33a8.html.

Cisco GGSN is supported on two standard Cisco routing platforms—high-end Cisco 7600 Series routers and the market-entry Cisco 7200 Series VXR routers. These platforms are unchanged from the normal routing platform except they require special Cisco IOS Software to run the Cisco GGSN function. An overview of the hardware platforms follows.

The Cisco 7600 Series is made up of high-performance routers deployed at the network edge, where performance, IP services, redundancy, and fault resiliency are critical. Combined with a central route processor and forwarding engine, the Cisco 7600 Series provides up to 30-Mpps forwarding rates.

The Cisco 7600 Series is an outstanding choice for multiple applications. When combined with the Cisco 7600 MWAM and Cisco GGSN software, it delivers a high-performance, highly flexible, redundant platform for mobile service delivery. For more information about the Cisco 7600 Series, visit http://www.cisco.com/go/7600.

### Cisco GGSN MWAM for 7600 Series

The Cisco MWAM is a Cisco IOS Software application module that can be installed in Cisco Catalyst® 6500 Series switches or Cisco 7600 Series routers (Figure 1). The module runs multiple instances of a Cisco application such as the Cisco GGSN. The MWAM card is required to run the GGSN application in a Cisco 7600 Series chassis.

**Figure 1.** Cisco MWAM Card

### CISCO 7200 SERIES WITH NPE-400 PROCESSOR

The Cisco 7200 Series delivers exceptional performance, price, modularity, and scalability in a compact form factor with a wide range of deployment options. With processing speeds up to 400,000 packets per second, port adapters ranging from n x DS-0 to OC-12, and an unparalleled number of high-touch IP services, the Cisco 7200 Series is the ideal GGSN platform for smaller service providers. The Cisco GGSN software is supported only on the Cisco NPE-400 Network Processing Engine.

### ORDERING INFORMATION

Tables 2, 3, and 4 provide ordering information for Cisco 7206 GGSN Release 4.0 and Cisco GGSN Release 5.0.

**Table 2.** Cisco GGSN Release 4.0 Software on Cisco 7206 Routers

| Product Code | Product Description |
|---|---|
| **S72AW-12308T** | Cisco 7200 Series GGSN 4.0 (base) |
| **S72AK8W-12308T** | Cisco 7200 Series GGSN 4.0 (IPSec) |
| **S72AK9W-12308T** | Cisco 7200 Series GGSN 4.0 (Triple Data Encryption Standard [3DES]) |
| **S72AWUB-12208YW** | Cisco 7200 Series upgrade from GGSN Release 3.0 to Release 4.0 |

**Table 3.** Cisco GGSN Release 5.0 Software for Cisco MWAM Card

| Product Code | Product Description |
|---|---|
| **SC-SVC-GG50B** | Cisco GGSN Release 5.0 full Basic license on MWAM |
| **SC-SVC-GG50P** | Cisco GGSN Release 5.0 full Premium license on MWAM |
| **SC-SVC-GG50UP=** | Cisco GGSN Release 5.0 upgrade from Basic to Premium license on MWAM |
| **SC-SVC-GG50BIM** | Cisco GGSN Release 5.0 single Basic license on MWAM |
| **SC-SVC-GG50PIM** | Cisco GGSN Release 5.0 single Premium license on MWAM |
| **SC-SVC-GG50UPIM=** | Cisco GGSN Release 5.0 upgrade from single Basic to Premium |
| **SC-SVC-GG50UBB=** | Cisco GGSN upgrade from Release 4.0 to Release 5.0 full Basic on MWAM |
| **SC-SVC-GG50UBP=** | Cisco GGSN upgrade from Release 4.0 to Release 5.0 full Premium on MWAM |
| **SC-SVC-G50UBBIM=** | Cisco GGSN upgrade from Release 4.0 to Release 5.0 single Basic on MWAM |
| **SC-SVC-GG50UBPIM** | Cisco GGSN upgrade from Release 4.0 to Release 5.0 single Premium on MWAM |
| **WS-SVC-MWGG50-BDL** | Cisco GGSN Release 5.0 2-unit bundle |

**Table 4.** Base and Premium Included Feature List

| Base License Features | Premium License Features |
|---|---|
| **All GGSN Release 4.0 Features** | All Basic features |
| **3GPP Standards Upgrade** | CAC |
| **RADIUS Enhancements** | Per-PDP policing |
| **Time-Based Charging** | • Maintenance mode<br>• Multi-APNs per VRF<br>• Multiple trusted PLMNs<br>• KPI enhancements<br>• GTP session redundancy<br>• Prepaid/postpaid billing support with DCCA<br>• Additional features due for release later in the Release 5.0 lifecycle |

## SERVICE AND SUPPORT

Cisco Systems is unmatched in the breadth and depth of its access to resources, shared intellectual capital, and leading data and telecommunications products and expertise. This combination helps enable Cisco to provide the highest quality available in carrier-class support, solutions, and vision for its service provider customers. Cisco service and support solutions enhance the value of your investment in your network infrastructure, resulting in an overall reduced cost of doing business. Now you can deliver fully on the promise of internetworking technology, with the backing of world-class support and service.

## FOR MORE INFORMATION

For more information about Cisco mobile wireless products, including Cisco Mobile Exchange, go to http://www.cisco.com/go/mobile.


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