Signaling Gateway and Application Gateways

Overview

When configured as a Signaling Gateway (SG) node, the DSC Platform offers the unparalleled performance and functionality demanded from VoIP, wireline, and wireless networks of today and tomorrow. This powerful SG has all the standard features and functionality expected to support the convergence of legacy SS7 and IP networks.

The DSC Platform may be engineered and configured to serve as a bridge between traditional time division multiplexed (TDM) networks and IP-enabled signaling endpoints. These systems provide complete SG functionality, terminating SS7 MTP2, MTP3, and Signaling Connection Control Part (SCCP) protocol layers and incorporating the SIGTRAN MTP Level 3 (MTP3) User Adaptation Layer (M3UA), Signaling Connection Control Part (SCCP) User Adaptation Layer (SUA), and SCTP standards to deliver the SS7 payload to the IP-enabled endpoint.

Up to 1,024 individual routing keys or Application Servers (ASs) are available for SS7 message filtering and routing, extending the traditional call control functionality and in-service capabilities to the IP-enabled soft switches and application servers.

The SG supports an N-peer routing architecture for Circuit Identification Code (CIC) User Adaptation (UA) Layer (CIC UA), Message Transfer Part 3 (M3UA), and Signaling Connection Control Part (SCCP) User Adaptation (SUA) Layer protocols. SS7 traffic received on any of the MTP3 or SCCP NAs that are routed for the Destination Point Code (DPC) of an Application Server Process (ASP) which contains routing data that matches the SG Application Server (AS) routing information, is sent to the Routing CPU (Routing and Management VM or Routing VM) to which the ASP is registered. The SG on the SS7 Routing CPU (Routing and Management VM or Routing VM) converts the SS7 traffic into M3UA, SUA, or CIC UA messages and sends these messages to the M3UA or SUA ASP over the Stream Control Transmission Protocol (SCTP) or Transmission Control Protocol (TCP) association, or to the CIC UA ASP over the TCP connection.

All AS data configured on the SG is fully distributed among all available Routing CPUs (Routing and Management VMs or Routing VMs); therefore, it is the responsibility of the ASP to determine which Routing CPUs (Routing and Management VMs or Routing VMs) the ASP registers with based on the IP address of the TCP or SCTP servers established on each Routing CPU (Routing and Management VMs or Routing VMs).

For information about configuring SG, see Configuring the Signaling Gateway.
Signaling Gateway Components

This section provides information about the various SG components.

Application Server Process

An Application Server Process (ASP) is an IP-based network element that conveys CIC UA, M3UA, or SUA SS7 signaling traffic over an SCTP or TCP association to and from the SG. The SG converts these messages so the messages are sent from the IP network to the SS7 network or from the SS7 network to the IP network. An ASP can connect to any Routing CPU (Routing and Management VM or Routing VM) on the DSC Platform based on the IP addresses associated with the SCTP or TCP servers created on each CPU (VM) to support CIC UA, M3UA, or SUA traffic.

Application Server and SS7 Stack Registration

Before communication can occur, an ASP registers with an Application Server (AS) on the SG. A SG AS can be dynamically or manually configured with specific routing data that matches the routing data contained in the ASP registration request. When the ASP to AS registration has occurred, the SG then uses a subset of the AS routing data attributes to register to the associated MTP3 or SCCP NA. CIC UA, M3UA, and SFG UA Application Servers use a Destination Point Code (DPC) and Service Indicator (SI) combination or an Application ID (App ID) to register with an MTP3 NA. SUA Application Servers use a DPC and subsystem number (SSN) combination or an App ID to register with an SCCP NA.

When an ASP is registered with both the SG and the SS7 stack, SS7 traffic can be routed to and from the IP network. The following illustration shows the main components of the DSC Platforms for IP services.

Figure 1: Signaling Gateway Connections
M3UA

Message Transfer Part Level 3 (MTP3) User Adaptation Layer (M3UA) supports the transport of any SS7 MTP3 user signals [for example, Integrated Service Digital Network (ISDN) User Part (ISUP) and SCCP messages] to an Application Server (AS). Messages are exchanged over SCTP.

M3UA routes the contents of an incoming SS7 MSU based on a routing key or Application Server (AS) that map to a relevant IP address. When using M3UA, Application Server Processes (APSs), may, or may not require a point code (PC) depending on the application. If the application uses, for example, Service Control Point (SCP) functionality, the Application ID (AppID) may be used to address the required ASP without a need for PCs. Alternatively, if the application is a Voice over IP (VoIP) gateway [a Service Switching Point (SSP)] whose PC is visible within the SS7 network, a PC is required at the ASP.

Typically, the DSC Platforms deployed as a Signaling Gateway (SG) are implemented as servers. These servers expect the ASP to act as the client and initiate the connection. It is possible for the reverse to take place. This non-standard functionality is sometimes referred to as client-side M3UA. This link type exists for network policies and indicate that end nodes must communicate by M3UA as ASPs. The motivation for this link type is unusual; an M2PA link is more common.

The following illustration depicts the graphical representation of M3UA on the DSC Platforms.

**Figure 2**: M3UA on the DSC Platforms

![M3UA Diagram](image)
**SUA**

Signaling Connection Control Part (SCCP) User Adaptation (SUA) is a protocol for the transport of any SS7 SCCP user signaling message such as Transaction Capabilities Application Part (TCAP), Radio Access Network Application Part (RANAP), or Mobile Application Part (MAP) over IP using Stream transmission Control Protocol (SCTP) services. The ASP appears as a remote subsystem on the SG and the content of incoming SS7 MSUs is routed based on routing keys or Application Servers (ASs). The DSC Platformstake on the role of a server and expect the ASP to be the client, initiating the connections and registering with an Application ID (AppID).

The following illustration depicts the graphical representation of SUA on the DSC Platforms.

**Figure 3: SUA on the DSC Platforms**
**Sonus CIC UA**

The Sonus Circuit Identification Code (CIC) User Adaptation (UA) layer is a Sonus proprietary protocol used to exchange Integrated Services Digital Network User Part (ISUP) messages over TCP/IP using CIC ranges and originator (Sonus proprietary). User Applications or Application Server Processes (ASPs) connect and send registration requests. The SG dynamically creates routing keys or Application Servers (ASs). These routing keys are used to route MTP ISUP messages to registered ASPs.

CIC UA is used for CIC range application registration and can be registered on the SG allowing ASPs with the appropriate CIC ranges and PCs to route traffic to and from the SS7 network and the IP network.

**SFG UA**

The SS7 Database Application (SDA) Features Gateway (SFG) User Adaptation (UA) is an internal protocol for SDA services. SFG UA is only available on the Web UI if an SDA service, such as Number Portability, is licensed.

The SFG UA MTP3 Application Servers (AS) are configured to register with MTP3 using either the Point Code (PC) and Service Indicator (SI) combination or the Application ID attributes on a given NA. The key distinction for the SFG UA integration is the Service Handler ID attribute that determines which SDA service receives the associated traffic.