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Framework Architecture for Signaling Transport

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Abstract

This document defines an architecture framework and functional requirements for transport of signaling information over IP. The framework describes relationships between functional and physical entities exchanging signaling information, such as Signaling Gateways and Media Gateway Controllers. It identifies interfaces where signaling transport may be used and the functional and performance requirements that apply from existing Switched Circuit Network (SCN) signaling protocols.

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1. Introduction

1.1 Overview

This document defines an architecture framework for transport of message-based signaling protocols over IP networks. The scope of this work includes definition of encapsulation methods, end-to-end protocol mechanisms and use of existing IP capabilities to support the functional and performance requirements for signaling transport.

The framework portion describes the relationships between functional and physical entities used in signaling transport, including the framework for control of Media Gateways, and other scenarios where signaling transport may be required.

The requirements portion describes functional and performance

specific SCN signaling protocols.

1.2 Terminology

The following are general terms are used in this document:

Backhaul:

Backhaul refers to the transport of signaling from the point of interface for the associated data stream (i.e., SG function in the MGU) back to the point of call processing (i.e., the MGCU), if this is not local.

Signaling Transport (SIG):

SIG refers to a protocol stack for transport of SCN signaling protocols over an IP network. It will support standard primitives to interface with an unmodified SCN signaling application being transported, and supplements a standard IP transport protocol underneath with functions designed to meet transport requirements for SCN signaling.

Switched Circuit Network (SCN):

The term SCN is used to refer to a network that carries traffic within channelized bearers of pre-defined sizes. Examples include Public Switched Telephone Networks (PSTNs) and Public Land Mobile Networks (PLMNs). Examples of signaling protocols used in SCN include Q.931, SS7 MTP Level 3 and SS7 Application/User parts.

The following are terms for functional entities relating to signaling transport in a distributed gateway model.

Media Gateway (MG):

A MG terminates SCN media streams, packetizes the media data,, if it is not already packetized, and delivers packetized traffic to the packet network. It performs these functions in reverse order for media streams flowing from the packet network to the SCN.

Media Gateway Controller (MGC):

An MGC handles the registration and management of resources at the MG. The MGC may have the ability to authorize resource usage based on local policy. For signaling transport purposes, the MGC serves as a possible termination and origination point for SCN application

Signaling Gateway (SG):

An SG is a signaling agent that receives/sends SCN native signaling at the edge of the IP network. The SG function may relay, translate or terminate SS7 signaling in an SS7-Internet Gateway. The SG function may also be co-resident with the MG function to process SCN signaling associated with line or trunk terminations controlled by the MG (e.g., signaling backhaul).

The following are terms for physical entities relating to signaling transport in a distributed gateway model:

Media Gateway Unit (MGU)

An MG-Unit is a physical entity that contains the MG function. It may contain other functions, esp. an SG function for handling facility-associated signaling.

Media Gateway Control Unit (MGCU)

An MGC-Unit is a physical entity containing the MGC function.

Signaling Gateway Unit (SGU)

An SG-Unit is a physical entity containing the SG function.

Signaling End Point (SEP):

This is a node in an SS7 network that originates or terminates signaling messages. One example is a central office switch.

Signal Transfer Point (STP):

This is a node in an SS7 network that routes signaling messages based on their destination point code in the SS7 network.

1.3 Scope

Signaling transport provides transparent transport of message-based signaling protocols over IP networks. The scope of this work includes definition of encapsulation methods, end-to-end protocol mechanisms and use of IP capabilities to support the functional and performance requirements for signaling.

Signaling transport shall be used for transporting SCN signaling between a Signaling Gateway Unit and Media Gateway Controller Unit. Signaling transport may also be used for transport of message-based

two Signaling Gateway Units connecting signaling endpoints or signal transfer points in the SCN.

Signaling transport will be defined in such a way as to support encapsulation and carriage of a variety of SCN protocols. It is defined in such a way as to be independent of any SCN protocol translation functions taking place at the endpoints of the signaling transport, since its function is limited to the transport of the SCN protocol.

Since the function being provided is transparent transport, the following areas are considered outside the scope of the signaling transport work:

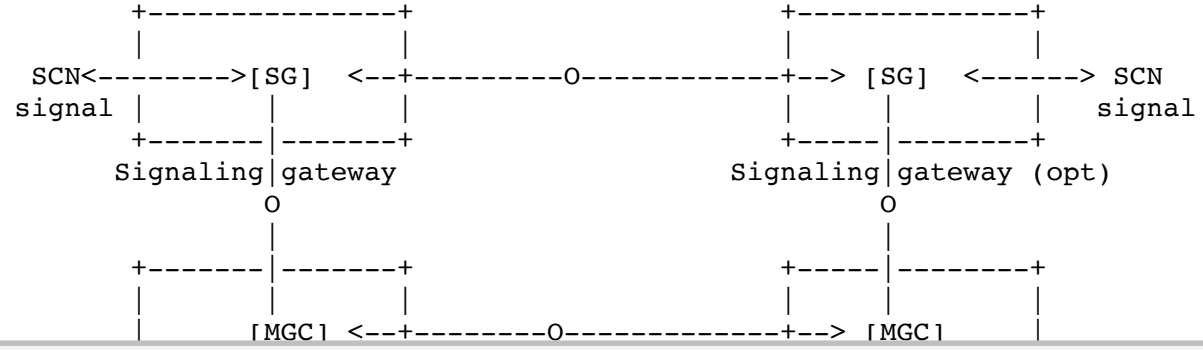
- definition of the SCN protocols themselves.
- signaling interworking such as conversion from Channel Associated Signaling (CAS) to message signaling protocols.
- specification of the functions taking place within the SGU or MGU
- in particular, this work does not address whether the SGU provides mediation/interworking, as this is transparent to the transport function.
- similarly, some management and addressing functions taking place within the SGU or MGU are also considered out of scope, such as determination of the destination IP address for signaling, or specific procedures for assessing the performance of the transport session (i.e., testing and proving functions).

2. Signaling Transport Architecture

2.1 Gateway Component Functions

Figure 1 defines a commonly defined functional model that separates out the functions of SG, MGC and MG. This model may be implemented in a number of ways, with functions implemented in separate devices or combined in single physical units.

Where physical separation exists between functional entities, Signaling Transport can be applied to ensure that SCN signaling information is transported between entities with the required functionality and performance.



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