Introduction to Monitoring Use Cases Using Dialogic® DSI SS7HD Network Interface Boards

Executive Summary

Monitoring applications serve various important roles, such as network management and for providing subscriber services. This application note provides an introduction to monitoring applications using example cases that include the Dialogic® DSI SS7HD Network Interface Boards, and provides an overview of operating a monitoring application.
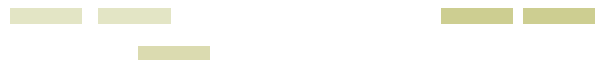
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Introduction

This application note provides an introduction to monitoring applications using use cases as examples that include Dialogic® DSI SS7HD Network Interface Boards. It also provides an operational overview describing what a user can do to configure a monitoring application and obtain feedback, and provides configuration requirements to assists users in understanding some of the equipment that is needed for doing so.

The monitoring examples in this application note use high-density Dialogic® network interface boards available in PCI Express, PCI, and CompactPCI form factors:

- Dialogic® DSI SS7HDE Network Interface Boards
- Dialogic® DSI SS7HDP Network Interface Boards
- Dialogic® DSI SS7HDC Network Interface Boards

In this application note, these boards will be referred to collectively as "DSI SS7HD Boards."

Passive Monitoring

Telecom monitoring has been associated with activities such as lawful intercept, or call tapping. However, other reasons for monitoring networks include some related to security, such as fraud protection, and others pertaining to new business initiatives and service marketing.

Because passive monitoring provides the ability to trigger actions based on information about the traffic being traced between active signaling points, it can be used as the core of new services for applications such as:

- Network management — Analyzers produce comprehensive protocol traces, call statistics, information on bandwidth utilization, and more (see the monitoring use case section for *Commercial Protocol Analyzers*)

- Missed call alert — Fixed-line subscribers can retrieve a list of missed calls (see the monitoring use case section for *Missed Call Notification*)

- Advertising and marketing — Advertisers can use location-based messages and location-sensitive web pages, such as Welcome SMS that sends short messages to users roaming into their network (see the monitoring use case section for *Welcome SMS*)

Monitoring and Dialogic® DSI SS7HD Boards

The DSI SS7HD Boards feature high performance and high-density protocol monitoring capabilities. Because the signaling time slot is treated as an HDLC channel, other HDLC protocols, in addition to SS7 protocols, can be monitored. These include LAPB, Q.931 (ISDN PRI), Q-SIG, and DPNSS.
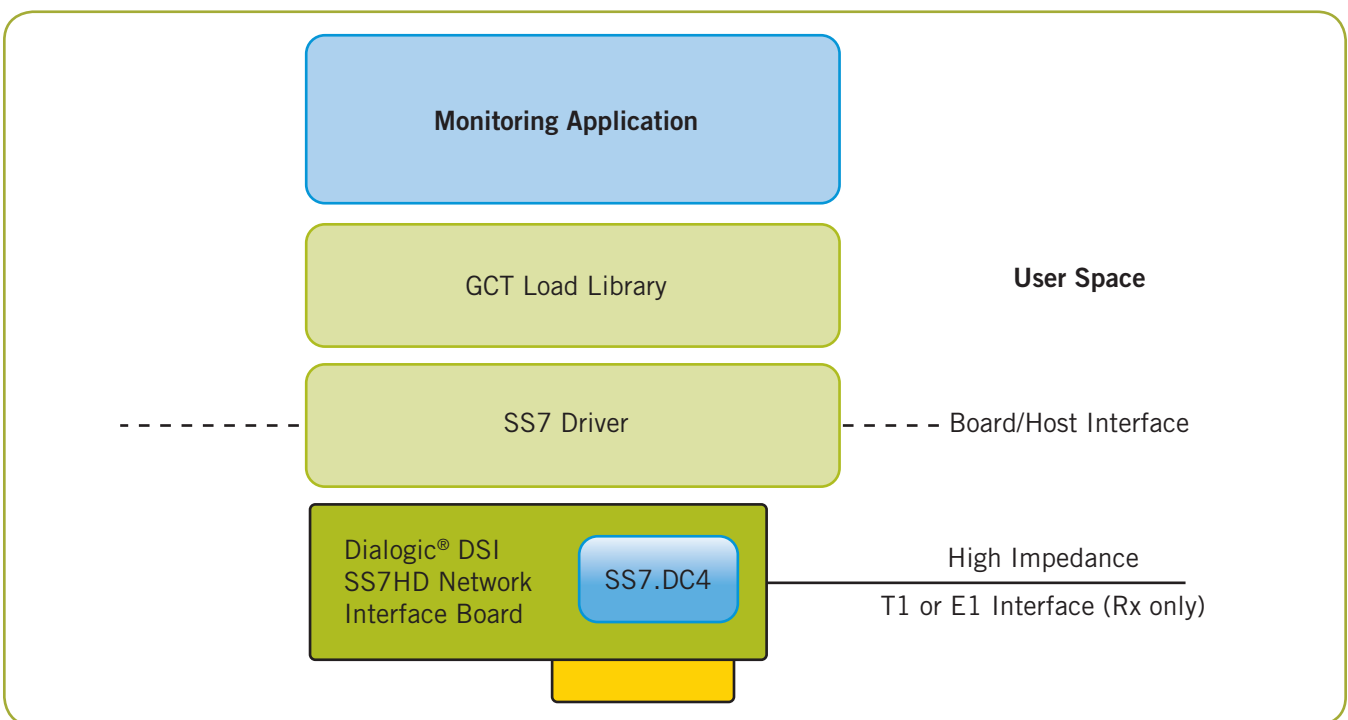

Figure 1. Monitoring System Configuration using a DSI SS7HD Board

Figure 1 shows an example of a monitoring system configuration using a DSI SS7HD Board. A single code file (SS7.DC4) is supplied with the board and contains onboard software for monitoring and receive-transmit protocol operations. The code file allows these operations to run concurrently on the same DSI SS7HD Board.

Monitoring Use Cases

This section describes three examples of monitoring use cases featuring the DSI SS7HD Boards: commercial protocol analyzer, missed call notification, and Welcome SMS.

Commercial Protocol Analyzers

Companies specializing in network management and protocol tracing can opt to use DSI SS7HD Boards when seeking to build cost-effective solutions to simultaneously monitor a large number of HDLC links.

These solutions allow network engineers to gather link statistics, keep track of bandwidth utilization, and trace message flows when a specific problem needs analysis. Such systems can provide added value because they can decode the raw data captured on the telecom trunk and post-process it to generate ASCII protocol traces, produce billing records, etc.

Missed Call Notification

In fixed line networks, phone stations are usually simple and cannot track the calls that subscribers miss when busy or away. An attractive value-added service that fixed-line operators can offer is a means to check for missed calls through a centralized Interactive Voice Response (IVR) system.

Intelligent Network Application Part (INAP) signaling is one way to feed the missed calls into the database accessed by IVR. However, INAP might not be available on all switches, and enabling INAP on all switches is not the most efficient option for such a service.

A cost-effective way to detect and route missed calls can be to take advantage of the monitoring capabilities of the DSI SS7HD Boards, which can be used to build a system to detect unanswered ISUP calls (see Figure 2). Since the DSI SS7HD Boards can perform passive monitoring (steps 1 through 3 in Figure 2) and active signaling termination simultaneously, the same DSI SS7HD Boards can handle the signaling traffic that takes place when subscribers check their missed calls through the IVR (step 4 Figure 2). The IVR functionality can be provided by a Dialogic® media processing board, such as the Dialogic® DM3 Media Board.
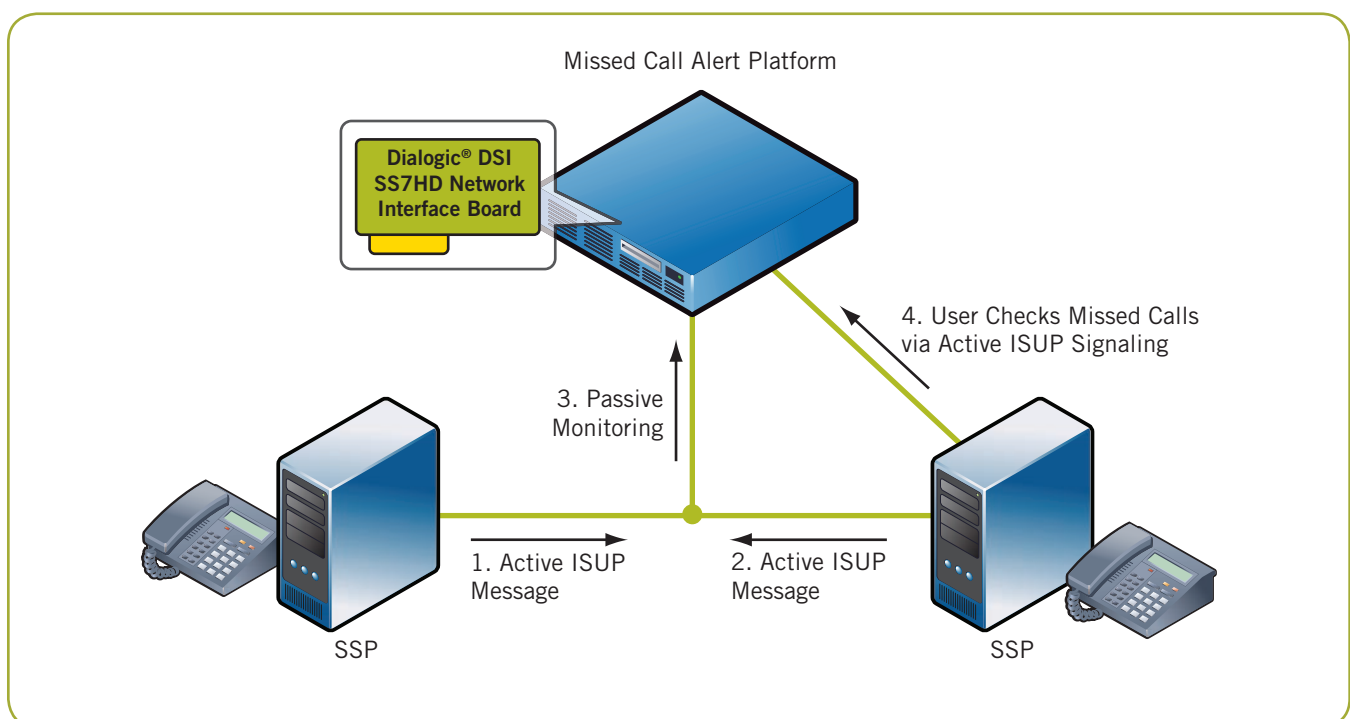

Figure 2. Missed Call Notification Flow

Welcome SMS

Welcome SMS (Short Message Service) is a way for wireless operators to introduce their services through short messages to users roaming into their network.

Note: Welcome SMS may not be available in all areas because of regional communications regulations prohibiting such operator-generated messages.

The Welcome SMS is triggered by the detection of the foreign user exchanging registration MAP messages between the nearest Mobile Switching Center/Visitor Location Register (MSC/VLR) and the Home Location Register (HLR) of his or her service provider in his or her home country (steps 1 and 2 in Figure 3).

The SS7 can do passive monitoring (step 3) to send the information to the customer's application system (an RMS or a tower workstation or CompactPCI chassis, and containing the DSI SS7HD Board). The SMS is then sent to the originating service provider (step 4).

The principles of Welcome SMS can be applied, for example, to marketing campaigns or location-based advertisements, where the detection of a cell phone in a given geographic area triggers the sending of an SMS with some commercial contents.

Operational Overview

The SS7.DC4 code file is used in conjunction with the SS7 Development Package for the appropriate operating system (Linux, Windows®, or Solaris) to help realize a high performance protocol monitor with up to 16 boards, each monitoring 32, 64, or 128 simplex links (depending on the actual DSI SS7HD Board being used).

The user configures the E1/T1 interfaces and the operating parameters for each link to be monitored. This can be achieved by using the config.txt file in conjunction with the s7_mgt configuration utility. Users wishing to integrate the configuration of their board into their own OA&M program can use discrete messages, as described in the *Dialogic® SS7HD Programmer's Manual* (see the *For More Information* section).

Once configured, whenever an HDLC frame is received, a full copy of that frame (excluding the checksum) is reported to the user's application as an API_MSG_RX_IND message.

During operation the user may also read (and optionally reset) various statistics on a per-link basis by sending the DVR_MSG_R_L1_STATS message.
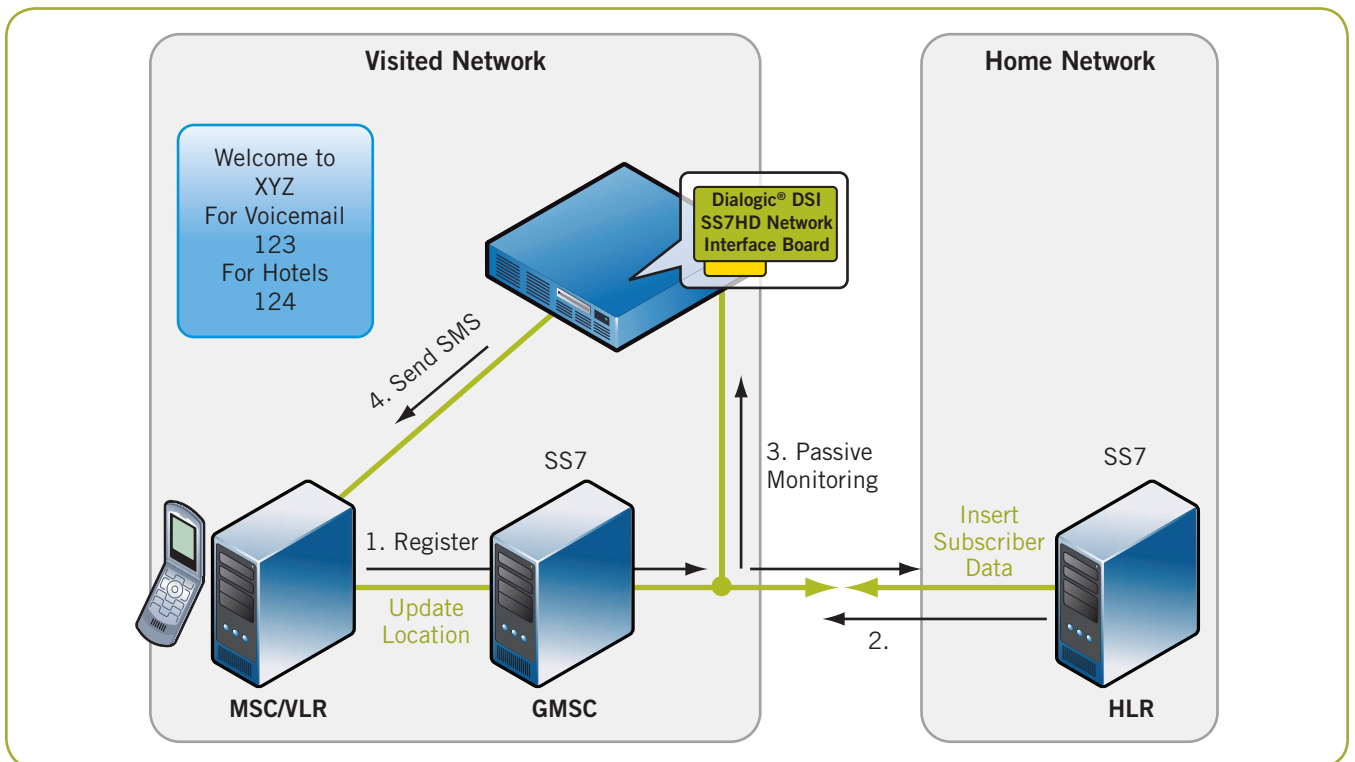

Figure 3. Welcome SMS Message Flow

Configuration Requirements

The following address some configuration requirements for monitoring applications:

- A license button is needed to monitor SS7 traffic using an SS7HDC, SS7HDE, or SS7HDP Board. The BA license button enables monitoring up to 32 simplex links (or 16 duplex links) per signaling processor. The number of signaling processors is indicated by a letter in the product name (S stands for single, D for dual, and Q for quad). For example, the SS7HDE**D** has two signaling processors, the SS7HDC**Q** has four, etc.

- An external device for tapping into the telecom trunk to monitor SS7 traffic does not need to be purchased because the DSI SS7HD Board allows its E1/T1 trunks to be configured for high impedance mode. Therefore, a special-purpose cable can be built that will bring the SS7 link directly into the DSI SS7HD Board without disturbing the trunk being monitored.

- A single DSI SS7HD Board allows both passive monitoring and active signaling transmit-and-receive operations. One can use one of the signaling end-point license buttons (BC, BD, BE, or BF) to simultaneously define active link sets (MTP_LINKSET) and passive monitoring links (MONITOR_LINK) in the config.txt file. This capability enables building cost-effective solutions that need to combine both functionalities (for example, a missed call notification platform).

- The Dialogic® DSI SS7 Protocol Libraries offer decoding capabilities. The HDLC frames received on the monitored HDLC links are sent in raw data to the user's application in the API_MSG_RX_IND message. It is then up to the application to decode the received frame and trigger any appropriate action.

Acronyms

API	Application Programming Interface
GMSC	Gateway Mobile Switching Center
HDLC	High-Level Data Link Control
HLR	Home Location Register
INAP	Intelligent Network Application Part
ISUP	ISDN User Part
IVR	Interactive Voice Response
MAP	Mobile Application Part
MSC	Mobile Switching Center
SMS	Short Message Service
SSP	Service Switching Points
VLR	Visitor Location Register

For More Information

Dialogic® SS7HD Programmer's Manual — http://resource.dialogic.com/telecom/support/ss7/cd/ProductSpecific/SS7HD/Documentation/SS7HD-PM-Iss008.pdf

For monitoring capabilities in an IP network using Dialogic® DSI SIGTRAN Monitor — http://www.dialogic.com/products/signalingip_ss7components/SIGTRAN_Monitor.htm

For information about developing a call monitoring application using the Dialogic® SS7 signaling and media products — http://www.dialogic.com/goto/?10968

For an overview of non-intrusive monitoring using Dialogic® MSP 1010 Multi-Services Platform — http://www.dialogic.com/products/docs/techbrief/10865_MSP1010_NonIntrusive_SS7_tb.pdf

To learn more about Dialogic® products, visit **www.dialogic.com.**

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