An Introduction to Dialogic® NaturalAccess™ Signaling Software

Technology Brief

Dialogic® NaturalAccess™ Signaling Software provides developers and OEMs with a highly productive API for call control combined with point code redundancy features for high-availability in demanding in-network applications. NaturalAccess Signaling Software is an integrated protocol stack working in combination with Dialogic® TX Series SS7 Boards to offer switch-specific and high-availability operations that address worldwide telecom requirements.

Features

- **Integrated board-based protocol stack** — Offloads SS7 protocol processing from the host computer
- **Sharing of a single point code by redundant MTP, ISUP, and BICC protocol layers** — Allows applications to preserve stable calls during maintenance upgrades and board or node failures
- **Health management interface** — Allows applications to detect and recover from hardware or software failures
- **Automatic detection and prevention of application message overloads (congestion handling)** — Prevents service disruption or degradation by proactive management of message volumes that match processing capability
- **Filtering function for passive monitoring of links** — Avoids overloading host with unwanted messages
- **Multiple originating point codes for links, linksets, and routes** — Can be used to emulate multiple endpoints in one or more SS7 networks, eliminating the need for multiple boards

Supports SS7 Signaling

NaturalAccess Signaling Software supports SS7 signaling. The protocol implementations available are shown in relationship to the Open Systems Interconnection Basic Reference Model (OSI Model) in Figure 1.

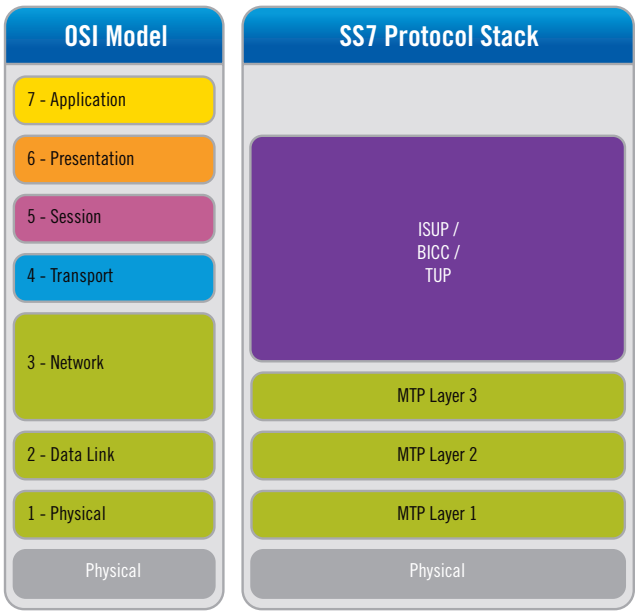

Figure 1. Available Protocol Implementations

Two Platforms with One Point Code

Carrier-grade systems require extremely high levels of network uptime, typically 99.999%. A critical requirement in such systems is the elimination of single points of failure in SS7 links, SS7 boards, and the system chassis. Furthermore, hardware and software upgrades must be performed without system downtime. One solution to this challenge is using multiple chassis, each with an SS7 board supporting one or more SS7 links. NaturalAccess Signaling Software allows two TX Series SS7 Boards to share the same point code, with the remote node seeing the pair of boards as a single entity.

In the system-level fault tolerant configuration shown in Figure 2, the SS7 links and MTP2 layers are active in both the active board in the active signaling server and the standby board in the standby signaling server. On the active board, MTP3, the higher SS7 protocol layers, and the user application can act in a primary (active) mode; on the standby board, each layer acts in a secondary (backup) mode. The primary MTP3 passes MTP checkpoint information, including link, linkset, and route-status changes, to the standby board. The primary ISUP layer passes SS7 traffic data to the application. The application can checkpoint the information to the backup ISUP layer.

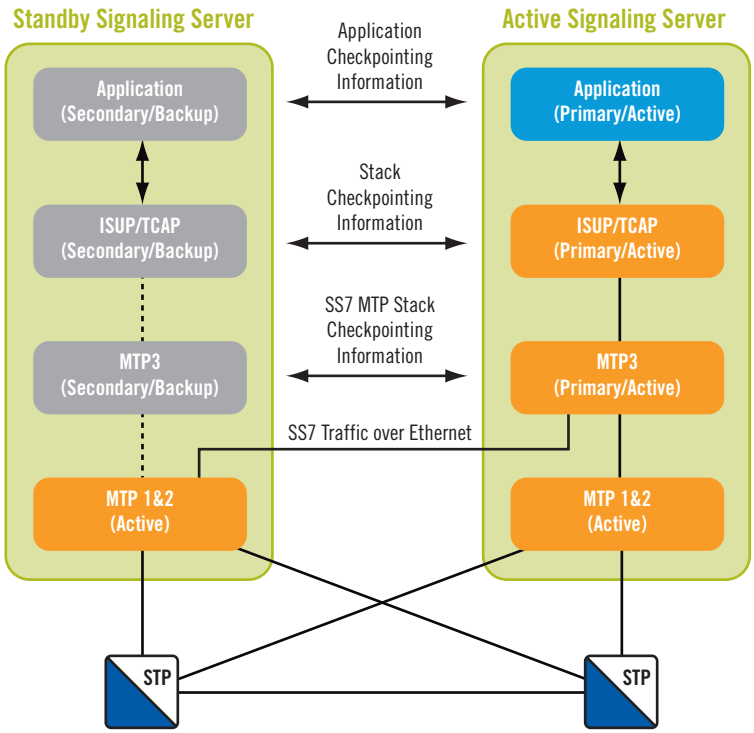

Figure 2. Active and Standby Servers in an SS7 Configuration

An Ethernet connection between the active and standby boards provides monitoring, health, and status checks. In the event of a failure, the standby board takes over, using checkpoint data both to find the current state of the SS7 network and to allow stable calls to remain active. The remote node views the failure of the active board as it would a simple link failure and is able to automatically handle the failure as specified by the SS7 protocol. The two boards may reside in the same chassis, but placing the boards in different chassis is needed for node-level redundancy.

Higher-level SS7 layers automatically communicate status change information from the active to the standby board via checkpoint messages. This allows the standby board to always be ready to take over with no loss of information.

Relationship with Dialogic® TX Series SS7 Boards

NaturalAccess Signaling Software is available with the following TX Series boards:

High-performance range boards:

- Dialogic® TX 5500E PCI Express SS7 Network Interface Board
- Dialogic® TX 4000 PCI SS7 Network Interface Board
- Dialogic® TX 4000C CompactPCI SS7 Network Interface Board

Moderate-performance range boards:

- Dialogic® TX 5020E SS7 Network Interface Board
- Dialogic® TX 4000/20 PCI SS7 Network Interface Board
- Dialogic® TX 4000/20C CompactPCI SS7 Network Interface Board.

Details about the TX Series SS7 Boards are available on the Dialogic website at www.dialogic.com/products/signalingip_ss7components/signaling_boards.htm.

Relationship with Dialogic® NaturalAccess™ Software

Dialogic® NaturalAccess™ Software is a programming environment that allows developers to quickly and easily write applications. SS7 APIs are integrated in this programming environment so that signaling applications can work with other Dialogic® products that use NaturalAccess Software, such as the Dialogic® CG Series Media Boards, which can provide resources for IVR, conferencing, fax, and VoIP.

APIs are available in NaturalAccess Software for the following operations:

- **Data APIs** — for ISUP, BICC (implemented as an extension to ISUP), TUP, and MTP Layer 3
- **Management APIs** — for ISUP, BICC (implemented as an extension to ISUP), TUP, and MTP Layers 2 and 3
- **Health Management API** —for platform redundancy

Worldwide Deployments

NaturalAccess Signaling Software is compliant with a wide variety of protocols, allowing Dialogic products to be successfully deployed in major networks on six continents. Among these networks are:

- AT&T
- British Telecom
- Chung Hwa Telecom
- Deutsche Telecom
- NTT
- Orange
- Telefonica
- Telstra

Some of the countries in which Dialogic customers have deployed their services using Dialogic NaturalAccess protocols include (not an inclusive list):

- Austria, Croatia, Finland, France, Germany, Hungary, Iceland, Ireland, Italy, Lithuania, Monaco, Russia, Spain, Sweden, Switzerland, United Kingdom
- Australia, Cambodia, China, Indonesia, Japan, Korea, Malaysia, New Zealand, Philippines, Singapore, South Africa, Sri Lanka, Taiwan, Thailand
- Argentina, Brazil, Colombia, Haiti, Mexico, Surinam
- Canada and the United States

Supported SS7 Protocols

MTP (Message Transfer Part)

MTP transports information from the upper layers (including the user parts and SS7 applications) across the SS7 network and includes the network management procedures to reconfigure message routing in response to network failures.

MTP1 is the physical, electrical, and functional interface to the network. MTP2 handles the delivery of messages between the signaling end points to provide functions such as error detection and correction. MTP1 and MTP2 functions are enabled by hardware and firmware components in TX Series SS7 Boards.

MTP3 distributes signaling messages to the correct user part: ISUP for circuit-related messages and SCCP for transaction dialogues and traffic management on the signaling links.

The Dialogic® NaturalAccess™ MTP Layer complies with these specifications:

- ETS 300-008-1, 300-308-2, ETSI, 1997
- GF001-9001 (SS7 for National Telephone Network of China)
- Q.701-702, ITU-T, 1992
- Q.703-704, ITU-T, 1996
- Q.707, ITU-T, 1992
- Q.781-782, ITU-T, 1996
- T1.111, 234, ANSI, 1992
- TTC JJ-90.10
- TTC Q.701-704, Q.707
- NTT Q.701-704, Q.707
- GR-246-CORE
- GR-606-CORE

ISUP (ISDN User Part)

ISUP is the functional part of the SS7 protocol for call control — the part that specifies inter-exchange signaling procedures for the setup and teardown of trunk calls between networks.

The NaturalAccess ISUP Layer complies with these specifications:

- China ISUP
- EN 300-356-1, ETSI ISUP V.3, 1998
- ETS 300-121, ETSI ISUP V.1, 1992
- ETS 300-356-1, ETSI ISUP V.2, 1995
- ETS 300-356-33, ETSI
- Q.730-737, ITU-T, 1992
- Q.761-764, ITU-T, 1997
- Q.767, ITU-T, 1992
- Q.784, ITU-T, 1996-1997
- T1.113, 236, ANSI, 1995
- NTT Q.761-764
- TTC JJ-90.10

In addition, users can take advantage of the Dialogic® Global Messaging Toolkit, which allows them to create support for any ETSI, ITU, or ANSI-based ISUP variant.

BICC (Bearer Independent Call Control)

BICC is a call control protocol that differs from ISUP by operating independently of bearer and signaling message transport technologies.

The NaturalAccess BICC Layer complies with these specifications:

- Q.1901/1902 (CS1/CS2)

TUP (Telephony User Part)

TUP is a predecessor of ISUP, and is primarily used in China.

The NaturalAccess TUP Layer complies with these specifications:

- Q.721-725, ITU-T, 1992
- Q.783, ITU-T, 1992
- GF001-9001

Development Documentation

For detailed descriptions of the supported features of the protocols described in this section, refer to the programmer's guides and release notes for NaturalAccess Signaling Software.

Technical Information

Dialogic® NaturalAccess™ SS7 Stack

MTP

Links per link set	16
Link sets	32
Destination point codes	256
Routes	256 (or memory limited with route masks [partial routes])
MTP Restart	Yes

ISUP

Point codes	256
Circuits	64,000

TUP

See ISUP

BICC

See ISUP

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