Dialogic® Distributed Signaling Interface Protocol Stacks

Datasheet
Distributed Signaling Interface

Dialogic® Distributed Signaling Interface (DSI) Protocol Stacks support a range of Signaling System 7 (SS7) and IETF SIGTRAN specifications to provide solid building blocks for the most advanced applications. These signaling protocols have been extended for multiple country-specific and geographic-specific variations, such as the following:

- American National Standards Institute (ANSI) and Telcordia Technologies (formerly Bell Communications Research; Bellcore*) standards within North America
- European Telecommunications Standards Institute (ETSI) standard in Europe
- International Telecommunications Union (ITU) global standard

The Internet Engineering Task Force (IETF) develops and promotes the Signaling Transport (SIGTRAN) protocols that allow the transport of packet-based Public Switched Telephone Network (PSTN) signaling over Internet Protocol (IP) networks. These protocols gain more and more importance as they suitably position customers to participate in the migration to IP networks.

The Dialogic® DSI SS7 Stack and Dialogic® DSI SIGTRAN Stack are complemented by the DSI run-time environment that coordinates the execution of signaling operations among separate processors in the configuration: the application host computer, the Dialogic® Network Interface Boards with protocol acceleration capabilities, and remote signaling servers where messages can be processed without use of host computer cycles. The DSI message handling software transports signaling information between protocol layers or between a protocol layer and an application layer in a totally transparent way, regardless of the physical source and destination of the messages.

Features	Benefits
APIs addresses complete message content	Allows access to all critical data in signaling messages to enable unrestricted service creation
Common API for SS7 and SIGTRAN protocols	Provides a consistent programming interface, aiding migration of services from TDM to IP carrier networks, for example, MTP3 to SUA
Support for industry standards as well as many country variations	Allows deployment in a wide choice of countries and environments
Distributed execution of protocol layers	Facilitates scaling and performance tuning by adding or load-balancing processing components without application changes
Stacks are supported in Solaris, Linux, and Windows®	Allows deployment in the three leading operating systems used for signaling applications
SIGTRAN layers support graduated throughput capability from 312 Kibps to 19,680 Kibps (equivalent of 4 to 256 SS7 links)	Matches costs to message volume processing requirements
SCTP message monitoring using the same API as DSI board-based systems	Enables call monitoring applications in IP networks and eases migrating from TDM

Dialogic® Distributed Signaling Interface Protocol Stacks

The DSI SS7 Stack enables developers to use SS7 for many applications including prepaid calling, Short Message Service (SMS), Location-Based Services (LBS), Intelligent Networking (IN), and many others. The protocol stacks, boards, and servers have been deployed throughout the world, providing signaling in various networks, as well as connections to many switch types. This facilitates the deployment and the portability of Value Added Services (VAS) in circuit switched (PSTN) and Next Generation Networks (IP) at a worldwide level.

DSI Protocol Stacks are discussed in the sections that follow. For an overview of Dialogic® DSI SS7 Boards and Dialogic® DSI Signaling Servers, see

- **DSI SS7 Boards —** http://www.dialogic.com/products/signalingip_ss7components/signaling_boards.htm and DSI
- **DSI Signaling Servers —** http://www.dialogic.com/products/signalingip_ss7components/signaling_servers_and_gateways.htm

The SS7 and SIGTRAN Protocol Stacks

The SS7 and SIGTRAN protocol implementations available from Dialogic® are shown in Figure 1 with their relationship to the Open Systems Interconnection Basic Reference Model (OSI Model).

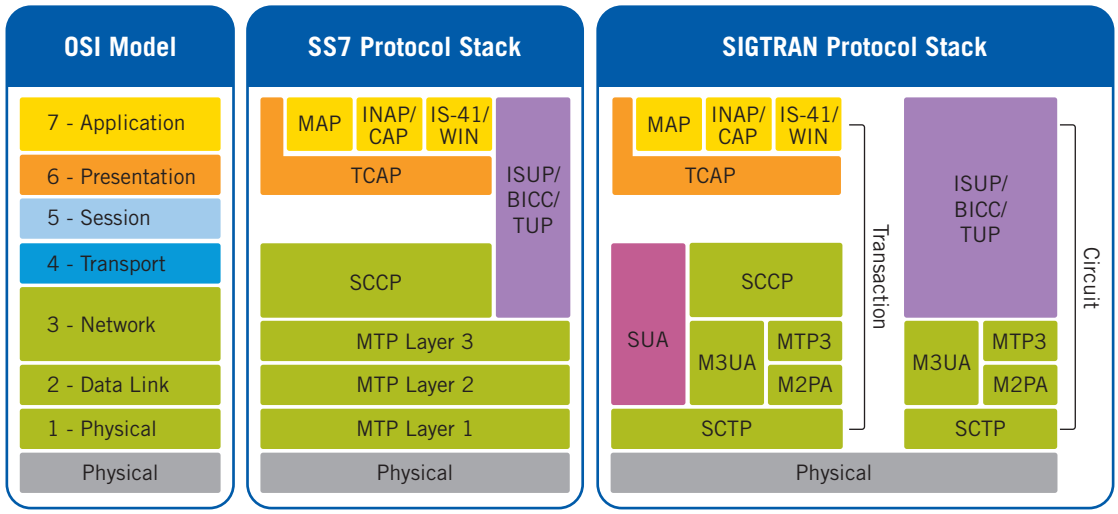

Figure 1. DSI SS7 and SIGTRAN Protocol Stacks

Supported SS7 Protocols

SS7 layers supported in the DSI SS7 Stack are listed in this section along with the industry specifications that they implement. Complete statements of compliance are available by contacting your Dialogic sales representative.

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 including error detection and correction. MTP1 and MTP2 functions are accomplished by hardware and firmware components of the Dialogic® DSI SS7 Boards.

MTP3 distributes signaling messages to the correct user part: ISUP for circuit related messages and SCCP for transaction dialogues and managing traffic on the signaling links. MTP3 can be configured to run on the board or on the application host computer.

DSI MTP Layer complies with these specifications:

- ITU-T Q.700 through Q.707, Q.781, Q.782, Q.791
- ITU-T Q.703 Annex A – "Additions for a national option for high speed signaling links"
- ITU-T Q.704 – MTP Restart
- ANSI T1.111-1992 Message Transfer Part
- UK BTNR5146 and PNO-ISC/SPEC/005

ISUP (ISDN User Part)

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

DSI ISUP Layer complies with these specifications:

- ITU-T Q730, Q.761 through Q.764, Q.767
- ETSI ETS 300 356-1
- ANSI T1.113
- ISUP GR-394 (Telcordia)
- JT-Q761 through JT-Q764, JT-Q850 (Japan TTC)
- YDN 038 (China)
- SSURF (SPIROU) (France)
- ACIF G500 (Australia)
- C2122 Ed. 2 (Belgium)
- SFS 5779. (Finland)
- ZZN7 3.0.0 (Germany)
- HKTA 2202 Issue 02 (Hong Kong)
- Specifica Tecnica N.763 (Italy)
- NOM-112-SCTI (Mexico)
- 8211-A335 ISDN-ISDN and 82211-A325 ISDN-PLMN (GSM) (Sweden)
- PNO-ISC/SPEC/007 2.2 (UK)

BICC (Bearer Independent Call Control)

BICC is a new generation of call control protocol — it differs from ISUP by operating independently of bearer and signaling message transport technologies. BICC functionality is included in the ISUP binary file but is enabled by a separate license.

DSI BICC Layer complies with these specifications:

- ITU-T Q.1901, Q1902.1-Q.1902.5

TUP (Telephony User Part)

TUP is a predecessor to ISUP; this protocol is primarily used in China.

DSI TUP Layer complies with these specifications:

- ITU-T Q.721 through Q.724
- GF001-9001 (China)
- SSUTR2 Specification V11-T 1988 (France)

SCCP (Signaling Connection Control Part)

SCCP provides address resolution services, such as global title, for locating services within the network for both connectionless and connection-oriented operation.

DSI SCCP Layer complies with these specifications:

- ITU-T Q.711 through Q.714
  - — Connectionless – Class 0 and 1
  - — Connection-Oriented – Class 2
- ETSI ETS 300 589
- ANSI T1.112

TCAP (Transaction Capabilities Application Part)

TCAP is used for transporting transaction-oriented data across the SS7 network. It implements standard Remote Operation Service Element (ROSE) services for applications such as GSM-MAP and IS-41. These applications provide IN services such as Home Location Register (HLR) or Short Message Service (SMS).

DSI TCAP Layer complies with these specifications:

- ITU-T Q.771 through Q.774, X.680, X.690
- ETSI ETS 300 134, ETS 300 287
- ANSI T1.114

MAP (Mobile Application Part)

MAP addresses the registration of roamers and the intersystem hand-off procedure in Global System for Mobile Communications (GSM) wireless mobile telephony.

DSI MAP implements a number of services, including Short Message Service (SMS), Unstructured Supplementary Service Data (USSD), supplementary services, location service management services, IMEI management services, and Any Time Information handling services.

DSI MAP Layer complies with these specifications:

- GSM 09.02 (TS 100 974)
- GSM 29.002

INAP (Intelligent Network Application Part)

INAP enables network services and customer applications within the distributed environment of the Intelligent Network (IN) to deliver easily programmable services on a per customer basis, such as follow-me, televoting, prepaid, and credit card calls.

DSI INAP Layer complies with these specifications:

- ETSI ETS 300 374-1 – ETSI CS1
- EN 301 140-1 – ETSI CS2
- ITU-T Q.1218 CS-1R

CAP (CAMEL Application Part)

CAP provides an extension to enable implementation of IN-based services in GSM/3G mobile networks, such as prepaid roaming, fraud control, special numbers, and closed user groups.

DSI CAP Layer complies with these specifications:

- GSM 09.78 (ETSI TS101 046 - V5.6.0) CAMEL Phase 1
- GSM 09.78 (ETSI TS101 046 - V6.3.0) CAMEL Phase 2
- GSM 09.78 (ETSI TS129 078 - V4.6.0) CAMEL Phase 3
- 3GPP TS 29.078 V7.3.0 R7, 3GPP TS 29.278 V7.0.0 R7 (IMS) CAMEL Phase 4

AIN (Advanced Intelligent Network)

AIN is a telephone network architecture that separates service logic from switching equipment, allowing new services to be added without having to redesign switches to support new services. Developed by Bell Communications Research, AIN is recognized as an industry standard in North America.

DSI AIN Layer supports selected operations of this specification:

- GR-1299-Core

IS-41 (Electronic Industries Association/Telecommunications Industry Association Interim Standards-41)

ANSI-41 (IS-41) is a standard for identifying and authenticating users, and routing calls on mobile phone networks. The standard also defines how users are identified and calls are routed when roaming across different networks. ANSI-41 is the standard used by AMPS (analog), IS-136 (TDMA), and CDMA networks. GSM and WCDMA networks use a different standard, known as MAP.

WIN (Wireless Intelligent Network, including IS-826-Prepaid)

WIN is a concept intended to drive Intelligent Network (IN) capabilities, based on Interim Standard (IS)-41, into wireless networks. IS-41 is a standard currently being embraced by wireless providers because it facilitates roaming. Basing WIN standards on this protocol enables evolution to an IN without making current network infrastructure obsolete. DSI IS-41 supports full access to the Short Message Service (SMS) operations and associated parameters.

DSI IS-41 Layer complies with these specifications:

- ANSI/TIA/EIA-41.5-D
- ANSI/TIA/EIA/771
- ANSI/TIA/EIA/826

Supported SIGTRAN Protocols

SIGTRAN protocols specify the means by which SS7 messages can be reliably transported over IP networks. SIGTRAN protocols run on the host.

SCTP (Stream Control Transmission Protocol)

The DSI SIGTRAN Stack can be used with native operating system versions of SCTP for Linux and Solaris or the DSI SCTP Layer, which is a proprietary implementation.

DSI SCTP Layer complies with these specifications:

- RFC2960
- RFC3309

M2PA (MTP2 User Peer-to-Peer Adaptation)

M2PA protocol allows SS7 signaling links to use IP as its transport layer. These links may be inter-chassis links, part of a dual-resilient pair, or network-facing links to any other equipment supporting M2PA.

DSI M2PA Layer complies with these specifications:

- RFC4165 (final version)
- RFC4165 (draft version 9)

M3UA (MTP3 User Adaptation)

M3UA offers a standard-based interface between MTP3 user parts (ISUP and SCCP running on an application host) and a signaling gateway offering MTP services.

DSI M3UA Layer complies with this specification:

- RFC3332

SUA (Signaling Connection Control Part User Adaptation)

SUA is a protocol for the transport of any Signaling Connection Control Part user signaling over IP using the SCTP. The protocol is designed to be modular and symmetric, to allow it to work in diverse architectures, such as a Signaling Gateway to IP Signaling Endpoint architecture as well as a peer-to-peer IP Signaling Endpoint architecture.

DSI SUA Layer complies with this specification:

- RFC 3868

Dialogic® Distributed Signaling Interface Protocol Stacks

Dialogic® DSI SIGTRAN Monitor

Dialogic® DSI SIGTRAN Monitor enables SS7 messages to be monitored on SIGTRAN SCTP associations executing over Ethernet. SCTP messages from one or more Ethernet ports can be selectively passed to a user application in real time. Because the SIGTRAN Monitor's API is similar to the Dialogic® hardware monitoring API for TDM, existing monitoring applications can be ported easily from monitoring TDM links to monitoring SIGTRAN links. SIGTRAN Monitor is available for Solaris and Linux environments. For additional details, see http://www.dialogic.com/products/signalingip_ss7components/SIGTRAN_Monitor.htm.

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 the specific product by using the documentation link at http://www.dialogic.com/products/signalingip_ss7components/SS7_Protocols.htm.

Technical Specifications

DSI SS7 Stack

DSI SS7 Layers can be executed in host memory or on Dialogic® DSI SS7HD Network Interface Boards or Dialogic® DSI SPCI Network Interface Boards with the purchase of an appropriate license.

MTP

Links per link set:	16
Link sets:	64
Destination point codes:	128
Routes:	4,096
Routes from single point code:	500
MTP Restart:	Yes
8-bit SLS rotation:	Yes

SCCP

Global Title Translation entries:	256

ISUP, TUP, BICC

Point codes:	128
Circuits:	64,000

TCAP, INAP, MAP, IS-41

Simultaneous dialogues per process:	64,000

SIGTRAN Stack

DSI SIGTRAN Layers execute with variable capacities depending on the license purchased. The throughput rate is equated to the number of links carried over a 64 Kibps TDM link (link equivalents). The connection capacity is measured in the number of associations, link sets, or remote peers supported.

Technical Specifications *(continued)*

SCTP

Associations:	256
Native kernel SCTP support:	Adaptation layer for Linux and Solaris

M2PA

Licensed capacities:	
— Throughput (link equivalents):	4 / 16 / 32 / 64 / 128 / 256
— Associations:	4 / 16 / 32 / 64 / 128 / 256

M3UA

ASP (connect to SG):	Yes
IPSP (peer-peer):	Yes
Routes:	256
Licensed capacities:	
— Throughput (link equivalents):	4 / 16 / 32 / 64 / 128 / 256
— Associations:	4 / 16 / 32 / 64 / 128 / 256

SUA

ASP (connect to SG):	Yes
IPSP (peer-to-peer):	Yes
Global Title Translation entries:	1,000,000+ (memory limited)
Routing keys:	256 (for Remote SG or Remote AS)
Local Application Servers:	4
Licensed capacities:	
— Throughput (link equivalents):	4 / 16 / 32 / 64
— Associations:	4 / 16 / 32 / 64

SIGTRAN Monitor

Licensed capacities:	
— Throughput (link equivalents):	16 / 32 / 64 / 128 / 256 / 640 / 1,280
— Number of Taps (message types and destinations):	2 / 4 / 8 / 16 / 32 / 64 / 64

Dialogic® Distributed Signaling Interface Protocol Stacks

Ordering Information

DSI Layers can be downloaded and used without a license for evaluation purposes. Full functionality of the API is enabled for 10 hours per session. After 10 hours, the application using the API must be restarted.

Product Code	Order Code	Description
SS7SBHSTMTP3	852-875-02	DSI MTP3 host license
SS7SBHSTISUP	852-876-02	DSI ISUP host license
SS7SBHSTTUP	852-886-02	DSI TUP host license
SS7SBHSTBICC	884-569-02	DSI BICC host license [1,2]
SS7SBHSTSCCPCL	852-879-02	DSI SCCP Connectionless host license
SS7SBHSTSCCPCO	852-880-02	DSI SCCP Connection Oriented host license
SS7SBHSTTCAP	852-881-02	DSI TCAP host license
SS7SBHSTMAP	852-878-02	DSI MAP host license
SS7SBHSTINAP	852-884-02	DSI INAP host license
SS7SBHSTIS41	852-883-02	DSI IS-41 host license [3]
SCTP	N/A	Included in DSI Development Package
SS7SBHSTM2PAU	G09-005-01	DSI M2PA host license, 4 link equivalent / assoc
SS7SBHSTM2PAS	G10-005-01	DSI M2PA host license, 16 link equivalent / assoc
SS7SBHSTM2PAR	G11-005-01	DSI M2PA host license, 32 link equivalent / assoc
SS7SBHSTM2PAL	G12-005-01	DSI M2PA host license, 64 link equivalent / assoc
SS7SBHSTM2PAK	G13-005-01	DSI M2PA host license, 128 link equivalent / assoc
SS7SBHSTM2PAJ	G20-005-01	DSI M2PA host license, 256 link equivalent / assoc
SS7SBHSTM3UAU	G01-005-01	DSI M3UA host license, 4 link equivalent / assoc
SS7SBHSTM3UAS	887-243-01	DSI M3UA host license, 16 link equivalent / assoc
SS7SBHSTM3UAR	887-365-01	DSI M3UA host license, 32 link equivalent / assoc
SS7SBHSTM3UAL	887-242-01	DSI M3UA host license, 64 link equivalent / assoc
SS7SBHSTM3UAK	G15-005-01	DSI M3UA host license, 128 link equivalent / assoc
SS7SBHSTM3UAJ	G14-005-01	DSI M3UA host license, 256 link equivalent / assoc
SS7SBHSTSUAU	G08-005-01	DSI SUA host license, 4 link equivalent / assoc
SS7SBHSTSUAS	G07-005-01	DSI SUA host license, 16 link equivalent / assoc
SS7SBHSTSUAR	G06-005-01	DSI SUA host license, 32 link equivalent / assoc
SS7SBHSTSUAL	G05-005-01	DSI SUA host license, 64 link equivalent / assoc
SS7SBHSTSMONS	G02-005-01	DSI SIGTRAN Monitor license, 16 link equivalent / 2 taps
SS7SBHSTSMONR	G03-005-01	DSI SIGTRAN Monitor license, 32 link equivalent / 4 taps
SS7SBHSTSMONL	G04-005-01	DSI SIGTRAN Monitor license, 64 link equivalent / 8 taps
SS7SBHSTSMONK	G19-005-01	DSI SIGTRAN Monitor license, 128 link equivalent / 16 taps
SS7SBHSTSMONJ	G18-005-01	DSI SIGTRAN Monitor license, 256 link equivalent / 32 taps
SS7SBHSTSMONH	G17-005-01	DSI SIGTRAN Monitor license, 640 link equivalent / 64 taps
SS7SBHSTSMONF	G16-005-01	DSI SIGTRAN Monitor license, 1280 link equivalent / 64 taps

1 - BICC licenses also permit ISUP functionality to be used

2 - BICC functionality is contained in the ISUP module

3 - CAMEL functionality is contained in the INAP module

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11/08 9726-03