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1   RELEASE OVERVIEW

Dialogic® NaturalAccessTM 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. For complete details of the functions and features of this software, see An Introduction to Dialogic® NaturalAccess™ Signaling Software:
http://www.dialogic.com/products/docs/techbrief/11281-na-signaling-sw-tb.pdf

This revision history summarizes the changes made to the version of the Dialogic® NaturalAccess™ Signaling Software Release 5.3. This document may be subject to updates during the lifetime of the release.

1.1   CONTENTS OF RELEASED IMAGE

Dialogic® NaturalAccess™ Signaling Software Release

Component	Version
TX Base	8.2
MTP2	6.2
MTP3	10.2
SIGTRAN	2.2
ISUP	9.2
SCCP	9.2
TCAP	7.2
TUP	9.2
Util	1.2
MTPCore	1.2

Dialogic® NaturalAccess™ SS7 Monitor Software

Component	Version
SS7MON	3.2

2   SYSTEM REQUIREMENTS

2.1   BASIC HARDWARE REQUIREMENTS

2.1.1   Disk Space

The maximum approximate amount of disk space needed if all packages are installed.

```
Windows 2008 32 bit        37MB
Windows 2008 64 bit        39MB
Solaris SPARC Mixed Mode   24MB
Solaris SPARC 64 bit       24MB
Solaris Intel 32 bit       19MB
Linux ES 5.3 32 bit        24MB
Linux EX 5.3 64 bit        24MB
```

2.1.2 PCI BIOS Requirement

A BIOS upgrade is required if your BIOS does not support PCI Version 2.1 Some chassis are populated with older BIOS versions that only support PCI version 2.0.

2.1.3 Supported Hardware

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

2.2   BASIC SOFTWARE REQUIREMENTS

2.2.1 Supported Operating Systems and Known Compilers

RELEASE NOTE: The Windows release will be available at a later date. Please refer back to the Dialogic® Natural Access™ Signaling Software download web page at a later date to obtain the Windows software release.

Windows
Windows® Server 2008, Enterprise edition R2, 32 bit
Windows® Server 2008, Enterprise edition R2, 64 bit
Compiler Information:
Microsoft Visual Studio 2008, VC 9.0

Solaris Intel
Intel Solaris 10 5/09 Update 7(32 bit)
Compiler Information:
32-bit x86 INTEL – Sun Studio 11 (v5.8 2005/10/13)

SPARC Solaris
Solaris 10 SPARC (5/09) Update 7 (64-bit and compatibility mode)
Compiler Information:
Sun Studio 12(v5.9 2007/07/12)

Linux
Red Hat Enterprise Linux, ES, V 5.3, 32-bit, Kernel – 2.6.18-128 (SNMP or PAE Kernel support)
Red Hat Enterprise Linux, ES, V 5.3, 64-bit compatibility mode,
Kernel - 2.6.18-128
Compiler Information:
GCC Version 4.1.2

2.2.2   Required Software

Dialogic® NaturalAccess™ Development Environment Release 9.0.1 or higher.

2.3   ADDITIONAL REQUIREMENTS

2.3.1   Flash Update Required on TX Hardware

You must update the flash memory of any TX boards with the TX Base kernel that ships with this software release. The software in this release is incompatible with versions of the TX Base kernel prior to Dialogic® NaturalAccess™ Signaling Software Release 5.1. The ss7load.[bat] file uses the txflash utility, specifying the txflash –s option, to automatically update the TX board's flash image with the correct kernel.

 If you do not use ss7load.bat, see the instructions in the TX 4000, TX 4000C, and TX 5000E Series Installation Manual for information regarding updating the kernel using the txflash utility.

2.4   LIMITIATIONS

2.4.1   Windows Only

SS7 Services do not work for Library mode applications when using operating system-specific wait objects.

If an application using SS7 services (MTP, SCCP, TCAP, ISUP and TUP) and running in Library mode uses operating system-specific wait functions to wait on NaturalAccess internal objects, as well as on the network socket and keyboard and mouse objects, it is not possible to retrieve SS7 events when calling ctaWaitEvent() function.

There is no such limitation when running the application in Server mode.

2.4.2 Hyperchannel Limitations

In previous releases, "hyperchannels" (combining multiple timeslots into one Low Speed Link) could be configured and would operate successfully even though this was not a documented and supported feature. Maintaining SS7 link data integrity over hyperchannels may not be possible in certain hardware configurations. If SS7 links of greater than standard capacity are desired then high speed links should be used.

2.4.3 Out-of Band Data used for Flow Control

The 75 ohm E1 pulse shape runs a little "hot" on the TX 4000C boards with the present default software XPM parameters. If planning on using 75 ohm E1, then contact Technical Services for a software patch.

2.5 EQUIPMENT AND CONFIGURATIONS TESTED

2.5.1 Multiprocessor Support

This release has been tested and supported on multiprocessor hosts. Host systems involving both dual and quad processors have been tested.

2.5.2 Test Platforms per Operating System

Windows Test Platform
    TX 4000
    HP ProLiant DL380 G3 server
    CPU: Intel(R) Xeon(TM) 3.4GHz MEM: 1G -to- 3.6G

    TX 4000C
    Intel(R) Pentium III
    Cpci: CPU 697Mhz MEM: 512Mhz

    TX 5000/TX 4000 Series
    Intel(R) Server Chassis SR2400
    CPU: Intel(R) Xeon(TM) CPU 3.6GHz MEM: 2G

    Intel(R) Server Chassis SR2500
    CPU: Intel(R) Xeon(TM) 2.9GHz| MEM: 2G

Solaris Test Platform

TX 4000

HP ProLiant DL380 G3 server
CPU: Intel(R) Xeon(TM) 3.4GHz MEM: 1G -to- 3.6G

Sun Blade 1500: (SPARC)
CPU: sun4u 1062MHz MEM: 512M

SunBlade 150: (SPARC)
CPU: sun4u 650MHz MEM: 512M

TX 4000C

Intel(R) Pentium III
Cpci: CPU 697Mhz MEM: 512Mhz

Solaris Test Platform

TX 5000/TX 4000 Series

Intel® Server Chassis SR2400
CPU: Intel(R) Xeon(TM) CPU 3.6GHz MEM: 2G

Intel® Server Chassis SR2500
CPU: Intel(R) Xeon(TM) 2.9GHz| MEM: 2G

Sun Netra T5220 Server (SPARC)
CPU: sun4v 1.2GHz MEM: 4G

Super Micro Computer System AS4021M
CPU: i86pc 2.2GHz MEM: 8G

Linux Test Platform

TX 4000

HP ProLiant DL380 G3 server
 CPU: Intel(R) Xeon(TM) 3.4GHz MEM: 1G -to- 3.6G

TX 4000C

 Intel(R) Pentium III
 Cpci: CPU 697Mhz MEM: 512Mhz

TX 5000/TX 4000 Series
Intel(R) Server Chassis SR2400
CPU: Intel(R) Xeon(TM) CPU 3.6GHz MEM: 2G

Intel(R) Server Chassis SR2500
CPU: Intel(R) Xeon(TM) 2.9GHz| MEM: 2G

Super Micro Computer System AS4021M
CPU: i86pc 2.2GHz MEM: 8G

3   NEW FEATURES AND PROBLEMS CORRECTED

3.1   ALL OPERATING SYSTEMS

TX Base

TX 5000 Kernel: Ethernet route leaves task(s) holding, Priority boost, HSL unused trunk handling, Secondary clock master

Ethernet route leaves task(s) holding:

In a redundant configuration (TDM based), the first link that is routed over TX board -to- TX board Ethernet operates properly, but additional links that are routed over TX board -to- TX board Ethernet can be setup with a cyclic routing table entry. Once data is passed to a destination link that is involve with this cyclic route it is possible that the kernel task for maintaining communication with the host ($hcomm) will enter the HOLDING state. It is also possible for the kernel task responsible for maintaining IP communication ($ipeth) to end up in a HOLDING state. A problem was found in the TX board's IP packet routing algorithm. Release 5.3 corrects the issue.

Another Ethernet related issue was discovered in which received Ethernet packets may not be serviced as soon as these packets were received. Modifications were made to the TX 5000's Ethernet level-1 driver interface to maintain synchronization with the Ethernet co-processor.

Priority boost:

A scenario exists in which the TX operating system can have a higher priority task ready to execute but cannot execute that task due to a lock held by a lower priority task. Release 5.3 eliminates this situation. Anytime a high priority task is about to wait on a lower priority task the low-priority task is temporarily boosted to the higher task priority in order to release the lock as soon as possible.

HSL unused trunk handling:

The TX 5000 kernel provided with Release 5.1 included a restriction that required all 4 trunks to be configured if any High Speed Links (HSLs) were being used. Release 5.3 removes this restriction, allowing HSLs to operate properly without requiring configuration of unused trunks.

If an active HSL were connected to an unused trunk on a TX 5000 that had been configured to use HSLs over other trunks it was possible for a message received over an unused link to be reported as arriving over a used link. This would result in the MTP task issuing an internal error alarm. Release 5.3 corrects the issue.

Secondary clock master:

In Release 5.1, when a TX5000E board is configured as the secondary clock master and the primary clock source fails, the TX 5000 does switch to driving the secondary clock; but almost immediately there is an alarm generated which indicates an additional clock failure which causes the TX 5000 to abandon acting as secondary clock master and to instead be clocked by the board's internal oscillator. A change was made to properly setup the TDM clocking control interface such that no false clock failure event would be reported. Release 5.3 corrects the issue.

TX 5000E host driver issues related to resetting or closing under heavy traffic load

In a Release 5.1, resetting TX 5000E when the controlling application has transmits outstanding can result in a number of transmit I/O's that never complete.

The TX 5000E host-side driver tracks each transmit that is in progress to the TX board. When the TX board is reset any In-progress transmits will never be acknowledged by the board. A problem was found related to locking of a mutex used to maintain the list of in-progress transmits. In Release 5.1 it was possible (based on specific traffic flow) for the driver to lose track of one or more of these never-to-complete transmits. Release 5.3 corrects the issue.

The TX 5000E host-side driver can report list corruption on txreset during heavy load.

Due to processing flow (especially in a multi-CPU environment) it was possible for a transmit complete indication to be processed which referred to an earlier transmit that should have been considered as dropped once the given TX board was reset. Release 5.3 corrects the issue.

TX 4000 kernel: Ethernet traffic stops on RNR indication, Ethernet route leaves task(s) holding, Priority boost

Ethernet traffic stops on RNR indication:

The Ethernet device used on the TX 4000 can report RNR (Receiver Not Ready) if the TX board is under heavy load when a large burst of additional Ethernet traffic is

received. After RNR has been reported no further Ethernet traffic is received. The 4000 kernel was modified to re-initialize Ethernet receive handling whenever RNR is reported, allowing Ethernet receive traffic to resume.

Ethernet route leaves task(s) holding:

In a redundant configuration (TDM based), the first link that is routed over TX board -to- TX board Ethernet operates properly, but additional links that are routed over TX board -to- TX board Ethernet can be setup with a cyclic routing table entry. Once data is passed to a destination link that is involve with this cyclic route it is possible that the kernel task for maintaining communication with the host ($hbus) will enter the HOLDING state. It is also possible for the kernel task responsible for maintaining IP communication ($ipeth) to end up in a HOLDING state. A problem was found in the TX board's IP packet routing algorithm. Release 5.3 corrects the issue.

Priority boost:

A scenario exists in which the TX operating system can have a higher priority task ready to execute but cannot execute that task due to a lock held by a lower priority task. Release 5.3 corrects the issue. Anytime a high priority task is about to wait on a lower priority task the low-priority task is temporarily boosted to the higher task priority in order to release the lock as soon as possible.

Redundancy Issue: Loading primary may not result in backup becoming primary

Under certain timing conditions it is possible for a load of the primary board to not result in the backup board becoming primary. Release 5.3 increases the switchover timer timeout value, allowing the link timer ample time to expire first. This corrects the issue, resulting in the backup consistently becoming primary if the primary is ever loaded.

Upper layer SS7 message routed to non-existent destination could leak

The SS7 message routing code that is part of each SS7 TX-board-based communication layer can queue an outbound message based on the ultimate destination of the message. Release 5.3 corrects this potential issue in the MTP, ISUP, SCCP, TCAP and TUP tasks.

txinfo utility does not recognize a TX 5020E
The txinfo utility displays basic information for a given TX board. This utility is provided in both source and binary form. The version released as part of SS7 5.1 does not recognize the system ID used to identify a TX 5020E board. Release 5.3 corrects the issue.

MTP123

MTP task should execute at priority 4 to avoid RX message loss under load

It is possible for a burst of messages from the host to control TX-based processing long enough that the MTP task is unable to service newly received messages (from TDM links). In this case these messages must be retransmitted. The TX board operating system processes messages from the host system at priority 5 in earlier releases. Release 5.3 provides load scripts that load the MTP task at priority 4 so that MTP traffic processing takes precedence over host message processing.

Any customer-specific load script / application used instead of the ss7load scripts should also be modified to load the MTP task at priority 4.

Chassis with TX 5000 series board installed can fail to warm boot

Certain types of chassis with certain riser card options create a situation where a cold boot with a TX 5000 series board installed boots normally but a warm boot can fail to boot. A modification was made to the TX operating system (or kernel) to inhibit the generation of interrupts to the host system until the host driver has indicated to the board that it is ready to receive interrupts.

MTP12

None

ISUP

Added CGB and CGU support for JNTT variant

Added support of CGB and CGU for JNTT variant. Edit the 'ss7load' file by adding -o 0x100 option at the cplot command line that loads the ISUP task to the board as shown below:

%TXUTIL%\cplot –c %BRD% -f %TXCP%\isup.%TASKTYPE% -n isup –o 0x100 –p 21 –a –s 40960

Perform a txreset

APP IE encoded correctly to be included in IAM for ANSI BICC

Updated the ANSI BICC table so as to encode APP IE correctly in the outgoing IAM message.

Resolved issues with GRS for ITU BICC configuration and missing 'LOADSHARE' enum value in config schema.

The ISUP stack running on the TX board now acknowledges the incoming GRS, when the VS signaling server software is configured for ITU BICC

The 'LOADSHARE' enum value has been added to the SS7 configuration schema for SIGTRAN Peer Server mode config.

SCCP

None

SIGTRAN

Bundling and disable support in SIGTRAN

Implemented bundling support and the ability to disable associations initially.

Bundling is enabled when TMR_BUNDLE in the SCTP SAP is configured to be non-zero. Bundling can be disabled by setting TMR_BUNDLE to 0. When bundling is enabled, if there is already a transmit outstanding, chunks will be stored and packed into a single IP packet until one of these things occurs, at which point whatever is bundled will be sent:

1. The TMR_BUNDLE timer expires
2. The maximum transmission unit (mtu) is reached
3. A shutdown is received
4. The RTO timer expires
5. A SACK is received (potentially opening the transmit window)

Associations can be disabled initially by setting the new configuration parameter DISABLED to TRUE in the M3UA PSP configuration section. When disabled an association will not be automatically established by M3UA when configured as an ASP or IPSP with CLIENT_SIDE TRUE. Instead the association must be manually enabled through m3uamgr with the ASSOC EST <pspId> command.

M3UA requires all PSs active for resume - make default FALSE

The PS configuration parameter reqAvail is not configurable through M3UAcfg and its default is TRUE. Now that an issue has been corrected related to multiple route instances going out in an ASPAC, so that there is a separate ASPAC for each NSAP/route context, having reqAvail TRUE for all PS's means that upper layers won't get resumes until all have bound and ASPAC's get sent. For example if SCCP binds to M3UA (as it does immediately), but an ISUP app is not started (which will

cause ISUP to bind to M3UA), SCCP will not get a RESUME until the ISUP app is started. Therefore the default and only value should be reqAvail = FALSE. Release 5.3 changes reqAvail to a value of FALSE, correcting the issue.

Need to differentiate COMM_LOST TermInd reasons

Multiple things can cause a COMM_LOST termination indication from SCTP to M3UA. It is helpful when diagnosing communication problems to know the underlying reason whenever communication is lost. Release 5.3 uses a SIGTRAN task that reports the reason for any loss in communication (via a new set of alarm messages).

SS7 Monitor

None

3.2   APPLIES TO UNIX ONLY

TX BASE

Closing a channel to a TX 5000E series board under traffic load can panic the system.

The UNIX PCI Express driver was modified to manage channel closing such that a close would be suspended if there were active work items in progress on behalf of that channel. Only after all work related to the channel is complete will the close itself be allowed to complete.

Unix CPI library can receive -EAGAIN (instead of +EAGAIN) - must handle both

Testing communication with a TX 5000E series board on certain versions of the Solaris 10 operating system showed that the cpia_intr function could receive -EAGAIN as an indication that no further I/O is ready for processing. All previous Unix operating systems had provided +EAGAIN for this type of indication. The Unix CPI library now handles both positive and negative error codes to reads issued to any type of TX driver.

3.3   APPLIES TO WINDOWS ONLY

None

4 INSTALLATION OVERVIEW, CONFIGURATION AND LICENSING

4.1 INSTALLATION OVERVIEW

The Dialogic® NaturalAccess™ Signaling Software Release 5.3 (Release 5.3) is binary-backward-compatible with the Dialogic(R) NaturalAccess(TM) Software Release 5.1 but is not binary-backward-compatible with earlier releases. To migrate from Release 5.0 or Release 4.3, applications must be recompiled. All structure packing from these releases has been replaced as needed with padding in order to achieve pure natural alignment of all structures. This means that NaturalAccess applications built against the Release 5.0 or Release 4.3 do not require any source code changes but do require a re-build of the software in order to adopt the new field offsets / structure sizes.

See the Dialogic website for software downloads, documentation, detailed installation and removal instructions at: http://www.dialogic.com/products/signalingip_ss7components/download/tx-software-5.3.htm "Installing Dialogic® NaturalAccess™ Signaling Software Release 5.3." and "Installing Dialogic® NaturalAccess™ SS7 Monitor Software 3.2"

4.2 CONFIGURATION

4.2.1 TX Series SS7 Board Configuration

See the Dialogic website to view the specific board installation manuals *"Dialogic® TX 5000E PCI Express SS7 Boards Installation Manual"* or *"Dialogic® TX 4000 PCI SS7 Network Interface Board Installation Manual"* for detailed instructions to:

- *Assign a CP number*
- *Add a board*
- *Change a CP number*
- *Move a board*
- *Remove a board*

4.2.2 Configuring Your System for Redundancy

See the Dialogic website to view the specific board installation manual *"Dialogic® TX Series SS7 Boards Health Management Developer's Reference Manual"* for detailed instructions to:

- Health Management
- Redundant Signaling subsystem architecture
- Failure detection and recovery
- Developing specific redundant applications
- Setting up a redundant system
- Information of specific demo programs

View the *"Dialogic® NaturalAccess™ Signaling Software Configuration Manual"*
on the Dialogic website at:
http://www.dialogic.com/products/signalingip_ss7components/download/tx-software-5.3.htm
for complete instructions on configuring your TDM, IP or redundancy setup.

4.3   LICENSING

The TX 5500E and TX 5020 are available in models that support a range of link capacities and protocol operations. The capacities and options purchased are enabled at the time of manufacturing. The options available are:

-   4, 16, 32, 64 or 128 low speed links

-   0 or 4 high-speed links

-   MTP or Full Stack(all protocols from MTP to TCAP plus SIGTRAN layers SCTP and M3UA)

Customers wishing to increase capacities or protocol options should contact their Dialogic sales representative to arrange for the purchase of additional capability which can be enabled via a Return Material Authorization(RMA).

5   OA&M HEALTH MANAGEMENT INTERFACE

5.1   COMMON HMI ERROR MESSAGES

The following are some common error messages related to the HMI daemon:

- Error [HMI_ERR_INTERROR] opening HMI service, hot swap functionality
   disabled

This error appears in the command prompt window when either txalarm or cpcon is run without the HMI daemon running.

5.2   CPCON AND TX ALARM REQUIRE HMI

The Health Management Interface (HMI) provided as part of the MTP123 product is required for proper functioning of the operator console (CPCON)and alarm reception (TXALARM) programs. HMI must be installed and running on the host system in order for CPCON and TXALARM to establish communication with any TX board.

6   PROGRAMMING LIBRARIES

Descriptions of the libraries can be found in the corresponding manuals located at the following Dialogic web location:

http://www.dialogic.com/products/signalingip_ss7components/download/tx-software-5.3.htm

7   DEMONSTRATION SOFTWARE

All Demo Software is described in the manuals of the corresponding layers at the following Dialogic web location:
http://www.dialogic.com/products/signalingip_ss7components/download/tx-software-5.3.htm

8   DOCUMENTATION

Dialogic® NaturalAccess™ Signaling and Dialogic® NaturalAccess™ SS7 Monitor Software and Documentation downloads can be found at the following website:

http://www.dialogic.com/products/signalingip_ss7components/download/tx-software-5.3.htm