



# **Dialogic® TX Series SS7 Boards**

Loader Library Developer's Reference Manual

July 2009

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## Revision history

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| Revision                    | Release date   | Notes             |
|-----------------------------|----------------|-------------------|
| 9000-6430-10                | June 1998      | GG, loader.doc    |
| 9000-6430-11                | January 1999   | GG/MVH            |
| 9000-6430-12                | September 2000 | MCM, Fusion 3.1   |
| 9000-6430-13                | February 2001  | GJG, SS7 3.6      |
| 9000-6430-14                | August 2001    | GJG, SS7 3.8 Beta |
| 9000-6430-15                | November 2003  | MCM, SS7 4.0      |
| 9000-6430-16                | September 2008 | SRG, SS7 5.0      |
| 64-0457-01 Rev A            | July 2009      | LBG, SS7 5.1      |
| Last modified: July 7, 2009 |                |                   |

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# 1 Introduction

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The *Dialogic® TX Series SS7 Boards Loader Library Developer's Reference Manual* explains how to use the Loader library function to develop applications that perform task loading.

**Note:** The product(s) to which this document pertains is/are among those sold by NMS Communications Corporation ("NMS") to Dialogic Corporation ("Dialogic") in December 2008. Certain terminology relating to the product(s) has been changed, whereas other terminology has been retained for consistency and ease of reference. For the changed terminology relating to the product(s), below is a table indicating the "New Terminology" and the "Former Terminology". The respective terminologies can be equated to each other to the extent that either/both appear within this document.

| Former terminology | Current terminology                         |
|--------------------|---|
| NMS SS7            | Dialogic® NaturalAccess™ Signaling Software |
| Natural Access     | Dialogic® NaturalAccess™ Software           |





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# 2

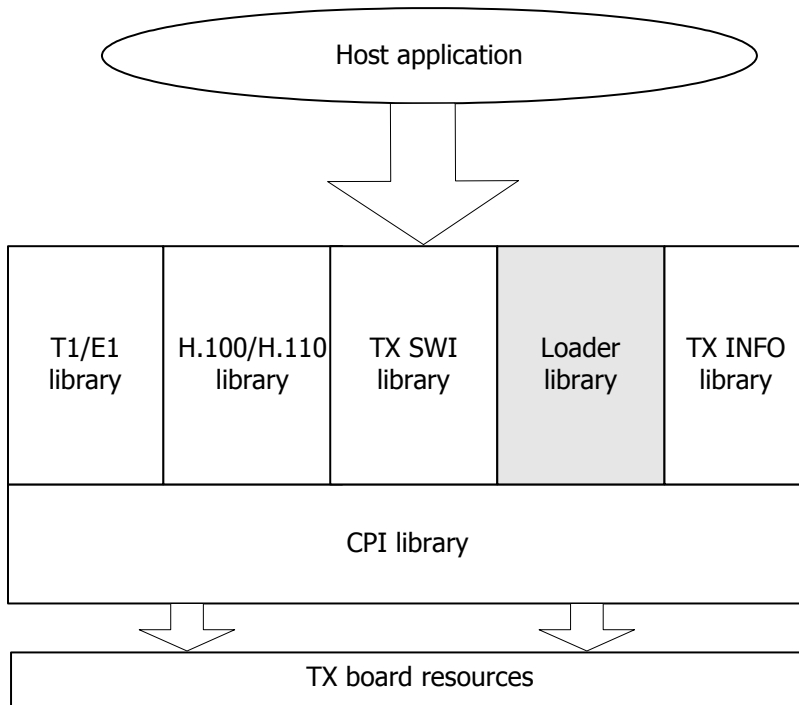
## Overview of the Loader library

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### Development environment

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The TX host application development environment consists of libraries that enable you to configure and control the protocol engines loaded on the TX board. This manual describes the Loader library.



After a system reset, the TX boards are left in a reset state. TX-based system and protocol tasks must be downloaded to the TX board memory. Refer to the *Task executable list* on page 10 for more information. TX-based tasks are usually downloaded with the *cplot* utility, which uses the Loader library to load tasks to the TX board. The Loader library enables you to develop custom applications that perform task loading with an interface rather than by calling the *cplot* utility.

After loading all desired protocol tasks, a TX board is ready for configuration. To download a configuration file to TX boards, use the *txconfig* utility. For more information on creating a TX board configuration file, refer to the *NaturalAccess™ Signaling Software Configuration Manual*. As an alternative to the *txconfig* utility, use the TX SWI library to perform TX board configuration directly from a host application. Refer to the *Dialogic® TX Series SS7 Boards TDM for SS7 Developer's Reference Manual* for more information about the TX SWI library.

The Loader function prototypes and structure definitions are located in the *cplot.h* include file and are provided by the *cplot* library module (*cplot.lib* for Windows systems, *libtxld.so* for UNIX systems).

## Task executable list

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The following table lists the TX board task executable files and the priority at which each task executes:

| <b>File</b>        | <b>Name</b> | <b>Priority</b> | <b>Description</b>                              |
|--------------------|-------------|-----------------|---|
| <i>debug.elf</i>   | debug       | 11              | Low level debugger                              |
| <i>isup.elf</i>    | isup        | 20              | SS7 ISUP task<br>Stack size: 40960              |
| <i>mtp.elf</i>     | mtp         | 19              | SS7 MTP layers 1 through 3<br>Stack size: 40960 |
| <i>sigtran.elf</i> | sigtran     | 20              | SS7 M3UA and SCTP layers<br>Stack size: 40960   |
| <i>sccp.elf</i>    | sccp        | 21              | SS7 SCCP task                                   |
| <i>tcap.elf</i>    | tcap        | 23              | SS7 TCAP task                                   |
| <i>tup.elf</i>     | tup         | 22              | SS7 TUP task                                    |
| <i>txmon.elf</i>   | txmon       | 18              | TX health monitor task                          |

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# 3

## Function reference

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### Using the function reference

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This section provides a reference to the Loader library function. A typical function includes:

|                  |   |
|------------------|---|
| <b>Prototype</b> | The prototype is followed by a list of the function's arguments. Dialogic data types include: <ul style="list-style-type: none"><li>• U8 (8-bit unsigned)</li><li>• S8 (8-bit signed)</li><li>• U16 (16-bit unsigned)</li><li>• S16 (16-bit signed)</li><li>• U32 (32-bit unsigned)</li><li>• S32 (32-bit signed)</li></ul> If a function argument is a data structure, the complete data structure is defined. |
|------------------|---|

## TxLoader

Downloads a task to the TX board.

### Prototype

U32 TxLoader ( TXLOADER\_DESC \**desc*)

| Argument    | Description  |
|-------------|--|
| <i>desc</i> | <p>Pointer to the following parameter structure that controls the loading and execution of the task:</p> <pre> /* Loader description structure */ typedef struct { U8    debug;           /* Debug level */ U8    priority;       /* Task priority */ U8    cp;             /* Communications processor (TX board) number */ U8    avail[5];      /* For future use */ U32   exopts;        /* Task execution options */ U32   stack_size;   /* Task stack size */ S8    taskname[10]; /* Name of task */ S8    loadfile[128]; /* Filename containing binary image of the task */ S8    cmdline[128]; /* Optional command line string */ S8    *descrip;     /* Pointer to 80 byte array for description */ U32   status;       /* Completion status */ U8    reserved[128]; /* Reserved for future use */ } TXLOADER_DESC; </pre> <p>Refer to the Details section for field descriptions.</p> |

### Details

The following table describes the TXLOADER\_DESC fields:

| Name       | Type  | Description  |
|------------|-------|--|
| debug      | U8    | Level of debug messages returned.<br>0 = No debug output<br>1 = Limited debug output<br>2 = Standard debug output<br>3 = Verbose debug output  |
| priority   | U8    | Priority at which the task executes. Allowed values are from 1 through 31, with 1 being the highest priority. Refer to the <i>Task executable list</i> on page 10 to determine the priority to use.  |
| cp         | U8    | Communications processor (TX board) number. Specifies which TX board to load the task on in multi-board systems. Valid values are 1 through 16.  |
| avail      | U8[5] | Not currently used. Zero-fill for future backwards compatibility.  |
| exopts     | U32   | Execution options. Internal flags used for debugging. Set to 0.<br><b>Note:</b> Some downloadable tasks use execution options to control task-specific behavior; other tasks use command line strings to control behavior. Set execution options only if specifically indicated for the given downloaded task. |
| stack_size | U32   | Size of the stack used for task execution. Minimum value is 4096 (default). The default is sufficient for most tasks. Tasks requiring additional stack space are noted in the <i>Task executable list</i> on page 10.  |

| Name     | Type    | Description  |
|----------|---------|--|
| taskname | S8[16]  | Name of the task. Refer to the <i>Task executable list</i> on page 10 to determine the name to use. Must be null terminated.<br><b>Note:</b> The TX operating system currently limits task names to 8 characters.  |
| loadfile | S8[128] | Filename containing the binary image of the task. This is a pointer to a null-terminated string containing the filename. If the file to be loaded is not in the path variable, the filename must be fully qualified.   |
| cmdline  | S8[128] | Optional command line string. Normally, set [0] = 0 to indicate no command line string.<br><b>Note:</b> Certain downloadable tasks use execution options to control task-specific behavior; other tasks use command line strings to control behavior. Set command line options only if specifically indicated for the given downloaded task. |
| descrip  | S8[128] | An area where a task information string is stored upon successful task download or where an error description string is stored upon failed task download.  |
| status   | U32     | Completion status (0 if task loaded successfully; otherwise an error code). Refer to <i>Return values</i> on page 14.  |
| reserved | U8[128] | Reserved for future use.   |

## Return values

The following table lists the values that can be returned from **TxLoader**. These return values are defined in the *cplot.h* include file.

In addition to the return values listed in the table, it is also possible to receive a CPI error code that is transparently passed back to the calling function. CPI error codes are defined in *txcpi.h* and can be differentiated from loader errors as follows:

```
if (error >= CPI_ERRCODE_BASE)
<handle as CPI error code>
else
<handle as loader error>
```

| Return value     | Description  |
|------------------|--|
| TXLDERR_CPI      | CPI library returned an error that was not transparently passed back to the calling function.                |
| TXLDERR_OPEN     | Unable to open the task load file specified in loadfile.   |
| TXLDERR_TRUNC    | Truncated load file detected. The task load file header indicates more data than the file actually includes. |
| TXLDERR_INVALID  | Invalid load file detected. The task load file either is not a loadable object file or is corrupt.           |
| TXLDERR_XFER     | Error occurred while transferring a code block to the TX board.  |
| TXLDERR_EXISTS   | Task of the name specified in task_name already exists on the TX board.                                      |
| TXLDERR_CREATE   | Unable to create the task on the TX board.   |
| TXLDERR_NOMEM    | Insufficient memory on the host system to complete the load request.   |
| TXLDERR_CPMEM    | Unable to obtain the required TX-board based memory.   |
| TXLDERR_CLOSING  | Error while closing the load file.   |
| TXLDERR_TASKPC   | Error while setting the task's program counter.  |
| TXLDERR_BADFUNC  | Unknown kernel function requested.   |
| TXLDERR_DRVINIT  | Unable to access the TX device driver.   |
| TXLDERR_CHANNEL  | Unable to obtain the communications channel used for task loading.   |
| TXLDERR_BADTYPE  | Unknown type of TX board reported.   |
| TXLDERR_TASKNAME | Invalid task name specified in taskname.   |
| TXLDERR_TSKSTART | Error when attempting to start the task.   |
| TXLDERR_MAXFRAG  | Number of code fragments in the load file exceeds the maximum allowed.                                       |
| TXLDERR_FRAGHDR  | Bad fragment header detected in the load file.   |
| TXLDERR_DPR      | Anomaly detected in the dual-port-ram communication.   |

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