
Triangle MicroWorks, Inc.
DNP3 Master Source Code Library

What's New?

a description of the changes included in all versions of the library

Version 3.13.00
November 17, 2011

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This document describes features or corrections that have been added to the DNP3 Master Source Code Library.

The symbols to the left of each revision are used to help define the following kinds of revisions:

dnp3 Additional or enhanced DNP3 features.



Additional or enhanced source-code features, allowing implementers to more efficiently install the Source Code Library.



Corrections to problems, with indications for when the problems were introduced

Version 3.13.00 (November 17, 2011)



Added XML Device Profile to MDNP Source Code Library.



Corrected a warning caused by an uninitialized structure in LinIOTarg RS232 implementation.



Implemented performance improvement by modifying locking calls in `tmwdb_storeEntry`. This change applies only when processing data asynchronously.



Provided big endian get and put functions.



Description: LinIOTarg could access channel structure members after marking a channel for deletion.

Introduced: v3.07

Resolution: Fixed in v3.13



Description: Malicious checksummed messages could cause the library to access data beyond the end of the message.

Introduced: v3.00

Resolution: Fixed in v3.13



Description: A possible infinite loop could occur in `dnpchnl_sendFragment()` in `dnpchnl.c`.

Introduced: v3.00


Resolution: Fixed in v3.13




Description: The Source Code Library did not properly parse Object 91 Variation 1 Qualifier 0x5b.


Introduced: v3.00


Resolution: Fixed in v3.13

 *Description:* A UDP Bind Error could occur in LinIOTarg when reopening DNP channel.
Introduced: v3.07
Resolution: Fixed in v3.13

Version 3.12.00 (July 7, 2011)


 Improved documentation of the interface to better explain how to send multiple objects in an Activate Config request.


 Added the ability to abort a File Transfer that was started via mdnpbm_copyLocalFile.


 Added display of intermediate “last recorded time” to diagnostics (Protocol Analyzer log).


 Made DNP3 Secure Authentication timeouts behave better with transmit not ready.


 Updated default list of DNP3 Secure Authentication critical messages.


 *Description:* mdnpbm_datasetExchange did not allow multifragment read responses for data sets.
Introduced: v3.00
Resolution: Fixed in v3.12


 *Description:* The timer callback may continue to loop if a very short timer is added in the timer callback.
Introduced: v3.00
Resolution: Fixed in v3.12


 *Description:* tmwdtime_addOffset did not follow 0 -599999 rule.
Introduced: v3.00
Resolution: Fixed in v3.12


 *Description:* LAN timesync did not send request using Secure Authentication aggressive mode.
Introduced: v3.00
Resolution: Fixed in v3.12


 *Description:* The File Transfer permissions and maxBlockSize were not set properly if the user name and password were specified in the call to mdnpbm_copyLocalFileToRemote.
Introduced: v3.00
Resolution: Fixed in v3.12

 *Description:* Some compilers issued warnings when a break followed a return (e.g., in tmwphysd.c).
Introduced: v3.00
Resolution: Fixed in v3.12


 *Description:* In function `tmwmem_lowlnit()`, a failure to allocate memory resulted in a return with no indication to the caller that a failure occurred.
Introduced: v3.00
Resolution: Fixed in v3.12

 *Description:* A DNP3 Secure Authentication Key Change could be delayed during File Transfer.
Introduced: v3.00
Resolution: Fixed in v3.12


 *Description:* `mdnpbrm_datasetExchange` always used an 8-bit qualifier.
Introduced: v3.00
Resolution: Fixed in v3.12


 *Description:* `LinIOTarg` computed date incorrectly when converting a “struct tm” to `TMWDTIME`.
Introduced: v3.07
Resolution: Fixed in v3.12


Version 3.11.00 (October 1, 2010)


 *Description:* The `mdnpbrm_datasetExchange` function always used an 8 bit qualifier.
Introduced: v3.00
Resolution: Fixed in v3.10

Version 3.10.00 (August 25, 2010)













 *Description:* The Source Code Library improperly gave priority to the first session when processing auto request startup messages.
Introduced: v3.00
Resolution: Fixed in v3.10


 *Description:* The Source Code Library did not process an invalid qualifier properly.
Introduced: v3.00
Resolution: Fixed in v3.10


 *Description:* The manual referenced the wrong edition of the DNP3 Networking specification.
Introduced: v3.00
Resolution: Fixed in v3.10


 *Description:* DNP3 Secure Authentication Challenge data and Key Status responses could potentially result in a buffer overflow.
Introduced: v3.07
Resolution: Fixed in v3.10


Version 3.09.00 (March 15, 2010)

-  Improved the Link Reset interface to support an “Implementation Dependent” event that requires a Link Reset.
-  Improved comments for MDNPSESN_AUTO_INTEGRITY_ONLINE to better explain its behavior.
-  Added combineActConfigData in Session configuration structure to allow combining of multiple file names into one object.
-  Modified mdnp091_respObj91v1 to pass index from ‘for’ loop in order to simplify object handler requirements.
-  Added user data pointers to TMWCHNL, TMWSCTR, and TMWSESN.
-  Added ability to notify application if the Outstation does not support Secure Authentication.
-  *Description:* When multiple application contexts are used, closing one deleted the memory pool lock, which could cause problems if another application context was open.
Introduced: v3.00
Resolution: Fixed in v3.09
-  *Description:* WinIOTarg could fail to process all available characters, causing timeouts when running at high baud rates.
Introduced: v3.00
Resolution: Fixed in v3.09
-  *Description:* When configured to use system time, WinIOTarg System time not setting the dstInEffect flag correctly.
Introduced: v3.00
Resolution: Fixed in v3.09
-  *Description:* Closing and reopening an MDNP session could leave pTxSession non-Null.
Introduced: v3.00
Resolution: Fixed in v3.09
-  *Description:* When polling specific variations for Object 2 and Object 4, the default variation would be returned.
Introduced: v3.00
Resolution: Fixed in v3.09
-  *Description:* The Source Code Library could stop responding if a Link Status request was received while waiting for a Link Layer response.
Introduced: v3.00
Resolution: Fixed in v3.09

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Description: LinIOTarg could cause high levels of processor utilization when multiple channels were opened.
Introduced: v3.07
Resolution: Fixed in v3.09
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Description: The Source Code Library did not always clean up properly if a File Transfer operation failed.
Introduced: v3.00.38
Resolution: Fixed in v3.09
- 


Description: The idle callback could be called while waiting for a Key Status Request response.
Introduced: v3.00
Resolution: Fixed in v3.09
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Description: isEvent was incorrectly called in response to CROB and Analog Output Block responses.
Introduced: v3.00
Resolution: Fixed in v3.09


Version 3.08.00 (September 25, 2009)

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Modified online status detection for serial lines to require reception of data.
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Description: A multifragment select response will deallocate the request, but leave it on the queue. This results in accessing a bad pointer. (Note that a multifragment select response can only occur if the select request is within one byte of filling the fragment, so that the IIN bits from the Slave will not fit in the response.)
Introduced: v3.00
Resolution: Fixed in v3.08
- 








Description: In the simulated database, a Data Set descriptor name is of data type VSTR instead of None.
Introduced: v3.00.43
Resolution: Fixed in v3.08
- 


Description: readFailedCount did not increment properly.
Introduced: v3.05
Resolution: Fixed in v3.08
- 


Description: The session was set offline after the first Read timeout, even if ReadTimeoutsAllowed = 2
Introduced: v3.00
Resolution: Fixed in v3.08


-  *Description:* The 'Last' flag was not always set correctly in the brm callback functions.
Introduced: v3.00
Resolution: Fixed in v3.08
-  *Description:* When reading a data set, a negative integer with a length of either 1 or 2 it incorrectly becomes a positive number.
Introduced: v3.00.43
Resolution: Fixed in v3.08
-  *Description:* When an aggressive mode request is queued it uses a sequence number related to the last challenge received. If a challenge was received while this request was queued, the sequence number could now be incorrect.
Introduced: v3.00.43
Resolution: Fixed in v3.08
-  *Description:* When using multiple keys, if two keys timed out in rapid succession, two key status requests were sent to the Outstation, which made one of the keys in the Outstation invalid for a short period of time.
Introduced: v3.01
Resolution: Fixed in v3.08


Version 3.07.00 (July 17, 2009)

-  Added LinIoTarg (low-level target for Linux) and new command line-based examples (that can be used with Linux).
-  Integrated WinIoTarg (low-level target for Windows) into the standard release package.
-  Updated Device Profile to an XML Device Profile document. Also included a link to the Triangle MicroWorks [ICD Editor](#), which can be used to edit the XML Device Profile document.
-  Improved counting of transmitted and received challenge messages for DNP3 Secure Authentication.
-  Added FormatMessage Win32 API function to WinIoTarg to provide more descriptive errors instead of just numeric values.
-  Increased the maximum UDP Packet size to 2500; also added error logging if this size is exceeded. (This enhancement applies only when WinIoTarg is used and configured for UDP only).
-  Modified Link State behavior and Link Layer error responses to improve compliance.


 *Description:* The DNP3 Master could fail to send a key change (for DNP3 Secure Authentication) when needed.
Introduced: v3.01
Resolution: Fixed in v3.07


 *Description:* Calling dnplink_linkReset() retry did not handle retries properly. (Note: normally, applications should not call this function, but should let the Source Code Library handle Link Resets).
Introduced: v3.00
Resolution: Fixed in v3.07


 *Description:* Setting MDNPSESN_AUTO_INTEGRITY_ONLINE could cause an integrity poll to be sent before the Disable Unsolicited Response request was sent.
Introduced: v3.00
Resolution: Fixed in v3.07

 *Description:* When using WinIOTarg for the low-level target interface, DNP3 broadcast requests were not sent to the broadcast (IP) address.
Introduced: v3.00
Resolution: Fixed in v3.07.00


Version 3.06.00 (April 14, 2009)


 Improved documentation for mdnpbrm_patternMask functions.


 Improved documentation of wrap/unwrap functions for Secure Authentication.

 *Description:* Secure Authentication session keys larger than 16 bytes did not work.
Introduced: v3.01
Resolution: Fixed in v3.05.01

Version 3.05.01 (March 5, 2009)

 Added TMWCNFG_MAX_APPLRCVS to “break out” of loop in tmwappl_checkForInput() after the specified number of iterations.

 Added support for DNP3 Secure Authentication updates due to updates from DNP3 Technical Committee.

 Added notification upon cancellation of pending Select.

 Added retries for DNP Link Layer Test Link and Request Status of Link messages.

 Modified timer values in tmwlink_channelCallback to speed up retries.



Description: Receiving a frame with more than 250 bytes of data (the maximum frame size defined in the specification) could cause the Source Code Library to write past the end of a buffer.

Introduced: v3.00

Resolution: Fixed in v3.05.01

Version 3.05.00 (December 4, 2008)



Additional enhancement to support for DNP Authentication, including:

- Support for session key lengths other than 16 bytes
- Support for Secure Authentication Aggressive Mode and Prechallenge in the same message
- Added a flag to indicate when a first unsolicited containing the restart IIN bit should be discarded and the keys should be updated; this flag helps when the outstation restarts and the Master does not see the link go down (e.g., RS232)
- Improvements to handling communications failures
- Added authAggressiveMode as an option for mdnptimesync



Improved comments on compiler options such as `TMWCONFIG_USE_MANAGED_SCL`.



Enhanced comments to better describe available variations for DNP3 requests.



Description: When the Master challenged an unsolicited response, it used the wrong Application Sequence number.

Introduced: v3.04

Resolution: Fixed in v3.05



Description: The Master did not send a key change after receiving a key status with bad hash value.

Introduced: v3.04

Resolution: Fixed in v3.05




Description: If the first timer on the queue has expired, but the channel is being deleted there is a possibility that the channel memory will be deallocated and then the timer callback code will attempt to lock or unlock the channel lock using deallocated memory.

Introduced: v3.00.32


Resolution: Fixed in v3.05

Version 3.04.01 (September 30, 2008)

 *Description:* Setting "enable unsolicited responses when the outstation sets the IIN restart bit" caused the enable unsolicited response request to be sent continuously.

Introduced: v3.04.00

Resolution: Fixed in v3.04.01

 *Description:* The aggressive mode object (g120v9) incorrectly included New CSQ in the HMAC calculation, as it did in Secure Auth Version 1 aggressive mode object (g120v3).

Introduced: v3.04.00

Resolution: Fixed in v3.04.01

Version 3.04.00 (September 12, 2008)



Added support for v2.0 DNP3 Secure Authentication



Improved header comments in DNP requests to better explain the variations available.



Added ability Activate Config to specify more than one file object using a single object header.



Description: DNP Master startup rules were not correctly implemented; in particular, MDNP SCL did not send a disable unsolicited response request as its first request.

Introduced: v3.00

Resolution: Fixed in v3.04



Description: A file transfer error could result in referencing a structure after it was deallocated.

Introduced: v3.00

Resolution: Fixed in v3.04



Description: The authentication statistics incorrectly labeled "sent" as "received."

Introduced: v3.00

Resolution: Fixed in v3.04



Description: tmwdb_lockQueue and tmwdb_unlockQueue were described in the header comments for tmwdb_storeEntry in tmwdb.h, but they were not defined in tmwdb.c.

Introduced: v3.00

Resolution: Fixed in v3.04



Description: Some compiler warnings were encountered when building under Visual Studio C++ 6.0.
Introduced: v3.00
Resolution: Fixed in v3.04

Version 3.03.00 (April 1, 2008)



Added ability to include session indicator in channel statistics.



Improved error handling of responses with invalid time stamps.



Add ability to specify count in MDNPBRM_CROB_INFO.



Description: A file open request (for writing) would send permissions==0.
Introduced: v3.00
Resolution: Fixed in v3.03

Version 3.02.00 (December 7, 2007)



Added configuration option to cause an Integrity Poll when a device comes online.



Added support for writing to IIN 1.4-Need Time bit (in order to clear it).



Added ability to reuse MDNPRequest objects.



Implemented security changes recommended at the 2007 DNP Technical Committee Face-to-Face meeting. (Note that additional changes are likely to be recommended by the Technical Committee once further issues have been resolved.)

Version 3.01.01 (August 8, 2007)



Added ability to keep time on a per-session basis. Added pSession to tmwdtime structure; target layer can use this parameter to return a time specific to the session.



Added ability to configure classes that will be enabled when using the auto enable configuration for unsolicited responses.



Description: DNP Aggressive Mode was not generated or verified correctly.
Introduced: v3.01.00
Resolution: Fixed in v3.02.00

Version 3.01.00 (May 23 2007)



Added support for DNP3 Secure Authentication.



Added Activate Configuration support to Function Code 31.



Description: The Source Code Library would always send the configured Master address in a Reset Link response, rather than using the source address from the Reset Link message.

Introduced: v300

Resolution: Fixed in 3.01.00



Description: The Source Code Library did not adhere to configured/negotiated frame size during file transfer.

Introduced: v3.00.38

Resolution: Fixed in v3.01.00



Description: The comments regarding the status returned by the callback function in MDNPBRM_REQ_DESC were incorrect.

Introduced: v3.00

Resolution: Fixed in v3.01.00



Description: The Source Code Library did not build with MDNPDATA_SUPPORT_OBJ50_V1 True and MDNPDATA_SUPPORT_OBJ_V2 False.

Introduced: v3.00

Resolution: Fixed in v3.01.00

Version 3.00.49 (November 1, 2006)

dnp3 Updated Data Sets support (defined in TB2004-004) to include support for Controls, as described in TB2004-004 Rev e.



Renamed TMWCHNL_STAT_CALLBACK and TMWSESN_STAT_CALLBACK macros to TMWCHNL_STAT_CALLBACK_FUNC and TMWSESN_STAT_CALLBACK_FUNC. This change avoids having a macro and a typedef with the same name.



Description: Losing DNP3 link confirmation for the last request in a message could cause the response to fail.

Introduced: v3.00

Resolution: Fixed in v3.00.49






Description: Losing a link confirmation between the Master and the Slave can cause the Master to think it needs to resend another frame.








Introduced: v3.00

Resolution: Fixed in v3.00.49






Version 3.00.46 (April 27, 2006)

-  Modified release to include WinIoTarg.dll built with Visual Studio 6. This DLL is used when using Visual Studio to build the sample applications.
-  Provided a method to cancel the physical layer if a command is canceled at a higher layer.
-  Updated sample Makefiles to correctly build Source Code Library.




Version 3.00.45 (March 17, 2006) 🍀

-  Improved documentation in protocol-specific section of the manual. Provided additional text, reorganized layers, and included all header files that comprise the API.
-  Added support for Object 10, Variation 1 (Binary Outputs). (This variation is beyond Subset Level 3).
-  Added support for the previous format of Group 0, Variation 255.
-  *Description:* The Source Code Library would send and Integrity Poll after a Select if Select was called with Feedback = True (which shouldn't happen). Per the specification, outstations would cancel the Select if this happened.
Introduced: v3.00
Resolution: Fixed in v3.00.45
-  *Description:* When performing file transfer, mdpnbrm_copyLocalFileToRemote() did not use a lowered max block size sent from the outstation.
Introduced: v3.00.38
Resolution: Fixed in v3.00.45
-  *Description:* When performing file transfer, the Source Code Library would issue a read request for block 0, even if the file size returned at the open request is 0 (empty file).
Introduced: v3.00.38
Resolution: Fixed in v3.00.45
-  *Description:* During file transfer, the end of file was not properly flagged if the file size was a multiple of the block size.
Introduced: v3.00.38
Resolution: Fixed in v3.00.45



Version 3.00.44 (February 2, 2006)


- dnp3** Updated Data Sets support (defined in TB2004-004) to include support for Rev. D. TYPE now allows optional name following UUID.
- dnp3** Added support for Output Event objects, and updated Configuration/Interoperability (C-I) guide to show supported functions and variations.
-  Added a sample application to provide an example of a multi-threaded, event-driven application.
-  Set receive indication in diagnostic information to indicate the direction of the message.
-  Enhanced statistics to include additional values such as CRC errors, number of invalid start bytes, frame length errors, etc. Added confirm timeout and request status timeout to link layer statistics.
-  Split into tmwtarg.h/c into tmwtarg.h/c and tmwtargp.c/c. This change moves all Triangle MicroWorks, Inc. specific code into a separate file. Customers only need to modify tmwtarg.c.
-  Updated Configuration/Interoperability (C-I) guide to show Output Event objects.

Version 3.00.43 (December 2 2005)



- dnp3** Added support for Data Sets (defined in TB2004-004).
- dnp3** Added support for Object 0 (Device Description), as defined in TB2003-001.
-  Added error message to diagnostic data when a parsing error is encountered.
-  Added tmwtarg_getSFloat and tmwtwarg_storeSFloat functions to retrieve/store 32-bit single precision floating point values, compensating for byte order (and floating point format if the native format is not IEEE-754).
-  Renamed variable *data* to *dataBuf* in mdnppmem.c, dnpmem.c, and tmwmem.c because *data* is a reserved word in some compilers.

Version 3.00.42 (September 9, 2005)







-  Improved documentation by updating *DNP3 Master.doc* to improve readability and include all user-modifiable files.
-  Added subversion to SCL filename (e.g., mdnppv30042.exe). This allows the version number to be determined from the file name. The version number continues to be defined in tmwvrsn.h.

-  *Description:* The Source Code Library could potentially reference a Null pointer in `tmwdlist_removeEntry`
Introduced: v3.00
Resolution: Fixed in v3.00.42



Version 3.00.41 (July 20, 2005)

-  Improved documentation (in `mdnpdata.h`) of counter objects to facilitate compliance with TB2002-001.
-  *Description:* Fixed frames were sent using TCP, even when configured for UDP only.
Introduced: v3.00.39
Resolution: Fixed in v3.00.41

Version 3.00.40 (June 3, 2005)

-  Added support for Object 80 Variation 1 Read (Read IIN).
-  Added DNPMaster sample application executables and required DLLs to allow running this application without having to build it.
-  Improved documentation of memory type configuration.
-  Fixed compiler warning for `TMWTYPES_BOOL` type.
-  *Description:* `mdnppmem_init()` used compiled values instead of runtime values for initialization.
Introduced: v3.00.39
Resolution: Fixed in v3.00.40
-  *Description:* `TMWMEM_FREE_FUNC` was doubly defined.
Introduced: v3.00.39
Resolution: Fixed in v3.00.40

Version 3.00.39 (March 29, 2005)

-  Added `tmwtarg_transmitUDP()` function and `networkType` field to `dnplink_config` structure to facilitate implementation of the DNP IP Networking Specification and Dual End Point Configurations described in this specification.
-  Improved memory management within Source Code Library. Added new `#define` (`TMWCNFG_ALLOC_ONLY_AT_STARTUP`) to `tmwcnfg.h`. Also added new functions that the target to set the maximum number of each buffer in each pool at runtime. Both

“only at startup” and static allocations use a linked list of free and allocated buffers instead of just an array that was accessed sequentially.



Added #define statements to dnpcnfg.h to allow individual DNP3 statistics to be compiled in or out.



Improved startup processing to avoid sending duplicate class polls on startup.



Description: The protocol analyzer did not display time stamps for Analog events with time stamps.

Introduced: v3.00

Resolution: Fixed in v3.00.39



Description: mdnpesn_auto_integrity_timeout was defined but not implemented.

Introduced: v3.00

Resolution: Fixed in v3.00.39

Version 3.00.38 (January 18, 2005)

dnp3 Added support for new double bit and self address discovery mechanism.

dnp3 Added support for double bit input object groups 3 and 4s.



Modified the API for the channel, session, sector modify functions to initialize a structure with the current settings. Any of these settings may then be modified by the target code.



Improved API to simplify modification of the frame and fragment sizes.



Added support for the address discovery mechanism described in the DNP SelfAddress document.

Version 3.00.37 (December 15, 2004)



Description: Sending an application confirmation could cause a queued request to not be sent. This condition only happened if a response requiring an application confirmation was received while a request was queued at the Transport layer.

Introduced: v3.00


Resolution: Fixed in v3.00.37






Description: Issuing an MDNP time sync with delay measurement command to a broadcast address would cause a crash. (Note that there is no valid use for issuing this command to a broadcast address.)

Introduced: v3.00







Resolution: Fixed in v3.00.37


-  *Description:* The simulated database incorrectly stored virtual terminal (vterm) data as string data.
Introduced: 3.00
Resolution: Fixed in v3.00.37

Version 3.00.36 (November 2, 2004)

-  Added support for file transfer event mode.
-  Added session configuration parameter (MDNPSESN_AUTO_TIME_SYNC_LAN) to specify LAN time sync method.
-  The Source Code Library now uses the same transmit data structure for multi step commands such as file transfer, select before operate, etc.


Version 3.00.35 (September 22, 2004)

-  Added #define TMWCNFG_MEMORY_ALIGN_NEEDED to tmwcnfg.h to support processors requiring long word (4 byte) alignment and compilers that create unpacked structures.
-  Added tmwapp_startTimer and tmwapp_cancelTimer to tmwtarg.c.
NOTE: These functions must be defined in the target in order for the Source Code Library to link.
-  *Description:* The parameter list was inconsistent in TMWLINK_OPEN_SESSION_FUNC and _openSession in dnplink.c.
Introduced: v3.00.00
Resolution: Fixed in v3.00.35
-  *Description:* The link status request configuration could cause a failure to send a response.
Introduced: v3.00
Resolution: Fixed in v3.00.35
-  *Description:* _checkAddressMatchCallback passed the wrong parameters to _findSession.
Introduced: v3.00.22
Resolution: Fixed in v3.00.35
-  *Description:* The Source Code Library could stop calling tmwtarg_transmit() if tmwtarg_transmit() returned TMWDEFS_FALSE.
Introduced: v3.00
Resolution: Fixed in v3.00.35

 *Description:* The Source Code Library did not parse the response from a Direct Operate command. It should check for a nonzero status code and set the channel status in the user callback function accordingly.

Introduced: v3.00


Resolution: Fixed in v3.00.35


 *Description:* The Source Code Library incorrectly stopped parsing the Select or Operate response once a nonzero status was found. As a result, the rest of the response did not call diagnostic functions and display in the protocol analyzer log.

Introduced: v3.00

Resolution: Fixed in v3.00.35


Version 3.00.34 (July 30, 2004)

 Added mdnpdata function for Object 52 (time delay). This function provides access to the value returned from the Slave in response to a Warm or Cold Restart command.

 *Description:* The Source Code Library could call tmwtarg_startTimer with a negative value. For some operating systems, this causes timers to stop running.


Introduced: v3.00.32

Resolution: Fixed in v3.00.34

 *Description:* The algorithm for sorting timers did not work properly if the two times being compared were more than 17 days apart.


Introduced: v3.00

Resolution: Fixed in v3.00.34

 *Description:* CRC calculations and checks did not work properly with 32-bit data types.

Introduced: v3.00


Resolution: Fixed in v3.00.34

 *Description:* The simulated database did not check for an error return from tmwsim_newPoint, potentially causing the sample application to crash.

Introduced: v3.00

Resolution: Fixed in v3.00.34

Version 3.00.33 (June 17, 2004)

 Modified queuing of requests of duplicate commands. If the request is a duplicate, the previously queued request is canceled.

Version 3.00.32 (June 4, 2004)



Enhanced support for multiple threads. Added support for one timer queue per channel. Also improved locking/unlocking to prevent threads from being interrupted or deadlocked. This enhancement required two changes to the API:

- Added new `#define(TMWCNFG_MULTIPLE_TIMER_QS)` to allow support of multiple timer queues (default is `TMWDEFS_FALSE`)
- Added new parameter to `tmwdb_storeEntry()` to indicate whether the queue should be locked (default is not to lock the queue).

Any implementation using multiple threads should upgrade to this release



Added a channel activity timeout timer (`channelResponseTimeout`).



Improved generation of link status messages. The Link Status request will now be sent only if the session is idle for the configured period of time.



Added a session-level statistic to indicate that an application layer response timed out.



Enhanced File Transfer functionality.



Description: The `_timerCallback` function in `tmwtimer.c` did not always lock the proper channel.

Introduced: v3.00

Resolution: Fixed in v3.00.32



Description: If a DNP3 Master issued a Select Operate command and did not receive a response, the command could become stuck in the queue, blocking subsequent requests.

Introduced: v2.00

Resolution: Fixed in v3.00.32



Description: Closing a Master DNP3 session that used the asynchronous database could leave entries on the database queue.

Introduced: v3.00

Resolution: Fixed in v3.00.32



Description: `tmwappl_initApplication()` could not be called more than once.

Introduced: v3.00.29

Resolution: Fixed in v3.00.32



Description: A 31-day timer would expire immediately.

Introduced: v3.00

Resolution: Fixed in v3.00.32

Version 3.00.29 (March 31, 2004)



Added support for receiving Object 52, Variation 1.



Updated Configuration/Interoperability Guide to more clearly show Function Code and qualifier support for each object and variation.



Provided database access commands (*mdnpbrm_*xxx) for Read Time functions.



Enhanced File Transfer mechanism. Note that these changes affect the API:

- *sdnpdata_readFileInfo* added two parameters (*maxNameSize* and *pLast*)
- *sdnpdata_openFile*: *maxBlockSize* changed to **pMaxBlockSize*
- *sdnpdata_readFile*: removed *block*
- *sdnpdata_writeFile*: removed *block*
- *sdnpdata_abortFileTransfer* was removed; it is the same as *sdnpdata_closeFile* from the database point of view)



Description: The Source Code Library did not calculate times correctly

Introduced: v3.00.27

Resolution: Fixed in v3.00.29



Description: The *mdnpbrm_writeDeadband* and *mdnpbrm_binaryCommand* (with qualifier *8bitindex*) functions could potentially write past the end of the buffer.

Introduced: v3.00

Resolution: Fixed in v3.00.29



Description: When configured for Static memory support, the Source Code Library could fail to allocate buffers if they contained non-zero data on startup.

Introduced: v3.00.23

Resolution: Fixed in v3.00.29



Description: The Source Code Library checked the wrong byte for the status of a pattern block response message.

Introduced: v3.00

Resolution: Fixed in v3.00.29



Description: The Source Code Library did not properly check for *TMWDNFG_SIMULATED_DB* when configured for static memory, which could result in accesses to unallocated memory when testing with the simulated database.

Introduced: v3.00.20

Resolution: Fixed in v3.00.29

Version 3.00.28 (March 2, 2004)



Provided database access commands (*mdnpdata_*xxx) for File Transfer operations.



Added support for callback function to be called when a fragment is given to the transport layer for transmission.



Removed Incremental Timeout parameter, since it does not apply to DNP3 Master sessions.



Added enhancements to support simultaneous Master and Slave sessions on the same channel.



Continued improvements to documentation. Provided more descriptive comments in session header files.



Description: Memory could be leaked when processing Diagnostic code on inactive sessions.

Introduced: v3.00

Resolution: Fixed in v3.00.28

Version 3.00.27 (February 3, 2004)



Description: Reading/Writing an invalid point indicated DNPCHNL_RESP_STATUS_SUCCESS, even though IIN2.1 bit indicated Object Unknown.

Introduced: v3.00

Resolution: Fixed in v3.00.27. Added code to check IIN bits in the response to read and write commands and set a new status enum if they indicate a failure.



Description: The link layer did not always set the DIR bit correctly.

Introduced: v3.00

Resolution: Fixed in v3.00.27

Version 3.00.26 (January 15, 2004)



Added new Build Request Module (brm) functions for feedback polls: mdnpbm_operateFeedbackPoll replaced by:

- mdnpbm_binOutFeedbackPoll and
- mdnpbm_anlgOutFeedbackPoll.


Also added mdnpbm_frznCtrFeedbackPoll, which can be called after mdnpbm_freezeCounters completes. Added a parameter to mdnpbm_freezeCounters to allow this to be done automatically.





The number of requests that can be queued on a channel is now configurable.




Modified the default application layer confirm timeout to 10 seconds to prevent timeouts on slow baud rates.


 *Description:* The Source Code Library did not call the user function to process IIN bits for other than the final fragment.
Introduced: v3.00
Resolution: Fixed in v3.00.26


 *Description:* Multiple write time requests could be queued and sent.
Introduced: v3.00
Resolution: Fixed in v3.00.26


 *Description:* DNP3 broadcast messages used Function Code 3 instead of Function Code 4
Introduced: v3.00
Resolution: Fixed in v3.00.26

 *Description:* The unsolicited retry counter could roll over from 65535 to 0, which would restart the online retry rate.
Introduced: v3.00
Resolution: Fixed in v3.00.26

Version 3.00.25 (December 12, 2003)

 Modified Source Code Library's interpretation of the session auto mask to allow sending both "enable unsolicited" and "disable unsolicited" commands, as described in the draft MDNP Conformance Test document.


 *Description:* The Source Code Library could reference a deallocated buffer if it did not receive the requested link confirm but did receive a response message.
Introduced: v3.00
Resolution: Fixed in v3.00.25

 *Description:* When sending a broadcast frame, no session was attached to the txData structure. As a result, the synchronization frame was not updated.
Introduction: v3.00
Resolution: Fixed in v3.00.25

Version 3.00.24 (November 10, 2003)

No updates to DNP3 Master Source Code Library in this release.

Version 3.00.23 (October 31, 2003)

 Added locks to tmwmem.c to add support for multiple threads to memory management routines.



Provided optimizations when diagnostics are not compiled in.



Added support for automatic installation of sessions. Added support for a user callback function that will be called when a message is received on an open channel for an address that is not configured. After calling this callback function, the Source Code Library will again check to see if a session is open for this address. If so, the message will be processed.



Description: Link Status messages could be sent to all sessions on a channel without waiting for the response.

Introduced: v3.00

Resolution: v3.00.23



The diagnostic routines would sometimes not display DNP Analog floating point values correctly.

Introduced: v2.00

Resolution: Fixed in v2.00.23

Version 3.00.22 (October 8, 2003)



Added support for all variations of Object 32 (Analog Change Event).



Added pCheckAddrCallbackFunc function. This function facilitates the use of modem pools with the Source Code Library.



Description: Attempting to send or receive large (more than 250 character) DNP Virtual Terminal messages could cause a buffer overflow condition in the DNP diagnostics routine.

Introduced: v3.00

Resolution: Fixed in v3.00.22



Description: The Source Code Library sent one less link retry than was configured.

Introduced: v3.00

Resolution: Fixed in v3.00.22

Version 3.00.20 (September 2, 2003)



Added callback function to let target application know when a channel is idle and can be disconnected. This change resulted in a change to the API: the number of parameters passed to dnpchnl_openChannel() was reduced by two.

“TMWCHNL_STAT_CALLBACK pCallback” and “void *pCallbackParam” were moved to structure DNPCHNL_CONFIG, which is also an argument to the dnpchnl_openChannel function.



Description: If TMWCNFG_SUPPORT_DOUBLE wasn't supported, compilation issues would occur.

Introduced: v3.00

Resolution: Fixed in v3.00.20

Version 3.00.19 (August 8, 2003)



Description: The Source Code Library could call tmwtarg_startTimer even if the timer was already running. This issue only affected event driven implementations (i.e., implementations that did not use the polled timer implementation).

Introduced: v3.00

Resolution: Fixed in v3.00.19



Description: The DNP Master Source Code Library did not validate application sequence numbers.

Introduced: v3.00

Resolution: Fixed in v3.00.19. The message is discarded if the application sequence number is invalid.



Description: The DNP Master Source Code Library did not set the DIR bit in link control the field for Broadcast messages.

Introduced: v3.00

Resolution: Fixed in v3.00.19



Description: The DNP Link layer checked the FCB before checking the data block CRCs.

Introduced: v3.00

Resolution: Fixed in v3.00.19



Description: If a command using the Select Before Operate mode failed on the Select command, an OperateCallbackData structure would not be deallocated.

Introduced: v3.00

Resolution: Fixed in v3.00.19





Description: The Source Code Library did not verify that the Slave device echoed the Select or Execute request exactly.

Introduced: v3.00






Resolution: Fixed in v3.00.19.


Version 3.00.18 (July 22, 2003)


-  **Description:** Defining TMWCNFG_SUPPORT_FLOAT to TMWDEFS_FALSE in tmwconfig.h caused the build to fail.
Introduced: v3.00
Resolution: Fixed in v3.00.18


-  **Description:** The Source Code Library did not validate application layer sequence numbers.
Introduced: v3.00
Resolution: Fixed in v3.00.18. Added check for sequence numbers and discard message if invalid.

Version 3.00.17 (July 10, 2003)







-  Improved message displayed when a frame is received for an address that is not configured. This message now also includes the link address.
-  Improved handling of Delay Measurements. Improved diagnostics and error checking, modified calculation to be based on first byte time, and removed leading zeros.
-  An evaluation version of a working sample of a Windows application is now shipped with the Source Code Library. The evaluation expires after running for two hours.
-  Improved implementation of internal data passed to callback functions to return a well defined structure and status codes.
-  Added TMWTARG_CONFIG structure to allow specification of parameters that are common to multiple protocols.

-  **Description:** Analog values with the over-range bit set did not display properly in the Protocol Analyzer output.
Introduced: v3.00
Resolution: Fixed in v3.00.17



-  **Description:** The MDNP assign class function did not work for 8/16bit index data. This functionality is beyond Subset Level 3.
Introduced: v3.00
Resolution: Fixed in v3.00.17

-  **Description:** The Source Code Library improperly used Signed values for Analog Deadbands (Object 35 variation 1)
Introduced: v3.00
Resolution: Fixed in v3.00.17

Version 3.00.16 (June 19, 2003)

-  Added limit checks for sprintf statements. This prevents buffer corruption caused by writing past the end of the current buffer.
-  Added current version number to *tmwvrsn.c/h* in the *utils* directory to simplify determining which version of the Source Code Library is in use.
-  Cleaned up compiler warnings and issues identified by *lint*.
-  *Description:* An sprintf statement in *dnpchnl.c* had incorrect number of arguments, potentially causing crashes.
Introduced: v3.00.15
Resolution: Fixed in v3.00.16
-  *Description:* The Source Code Library could hang when multiple DNP Master sessions were configured on a single channel.
Introduced: v3.00.15
Resolution: Fixed in v3.00.16.
-  *Description:* If the DNP Link Layer discarded a frame (for example, due to an invalid start character or an invalid CRC), it might also discard the start character of the next frame.
Introduced: v3.00
Resolution: Fixed in v3.00.16

Version 3.00.15 (May 27, 2003)

-  *Description:* The *mdnpbrm_eventPoll* and *mdnpbrm_integrityPoll* functions could display misleading diagnostic information if the Request Descriptor was reused.
Introduced: v3.00
Resolution: Fixed in v3.00.15. Modified *mdnpbrm_eventPoll* and *mdnpbrm_integrityPoll* to restore the *pMsgDescription* to *TMWDEFS_NULL*, if applicable.
-  *Description:* The DNP Transport Function Sequence Number would rollover from 62 to 0, instead of from 63 to 0.
Introduced: v3.00
Resolution: Fixed in v3.00.15

Version 3.00.14 (May 13, 2003)

-  Added support for DNP3 Time Synchronization over a Local Area Network (LAN)



Added support for Function Code 24 (Record Current Time)



Added support for Object 50, Variation 3 (Time and Date Last Recorded)



The DNP3 link layer can now request and respond to requests for link status (link function code 9). In addition there is a configuration parameter to support issuing a request for link status periodically. There is also a new function in *dnplink.c* that will allow the user to issue a request for link status.



Improved detection of sessions going offline. Any application layer error will now take a session offline. Receiving any valid fragment from that session will take it back online.



Improved memory management. Implemented a new memory management scheme that supports static memory as well as providing limits on the number of each type of structure that can be allocated. It also provides details on how many structures of each type have been allocated and keeps track of the maximum number that was allocated. This provides feedback that can be used in sizing applications and monitoring allocated memory. Cleaned several areas in which memory was not being freed properly.



Added ability to insert multiple objects in DNP requests.

Description: Response Timer did not operate properly for all MDNP sessions.

Introduced: Version 3.00

Resolution: Fixed in version 3.00.14.



Description: DIR bit was not set properly for Application Confirm messages.

Introduced: Version 3.00

Resolution: Fixed in Version 3.00.14



Description: DNP Fragment Size and frame size configuration did not work properly.

Introduced: Version 3.00

Resolution: Fixed in Version 3.00.14. There are now channel level configuration parameters for transmit/receive fragment and frame size. Frame size is specified in bytes on the wire, fragment size is specified as application layer data bytes in a fragment.

Version 3.00.12 (April 28, 2003):



Improved description of formal parameters and functions in header files.



Added Incremental Application Layer Response Timeout configuration parameter.



The Incremental Timeout timer is now disabled if the timeout value is set to zero



Description: The Source Code Library could reference unallocated memory and cause a crash if Link Layer Confirms were enabled and the Application Layer timeout was configured to be less than ((Link Layer timeout) * (number of Link Layer retries+1)).

Introduced: Version 3.00

Resolution: Fixed in version 3.00.12. When the Application Layer times out, it now tells the Transport Layer, which in turn tells the Link Layer.



Description: Analog values were stored as unsigned (instead of signed) values

Introduced: Version 3.00

Resolution: Fixed in version 3.00.12. Modified DNPUTIL_ANALOG_VALUE structure and related code to use signed values.

Version 3.00.11 (April 24, 2003):



If a connection is broken or the remote device restarts, the Source Code Library will attempt to reopen the connection.

Version 3.00 (November 20, 2002):



The Triangle MicroWorks, Inc. Source Code architecture was redesigned and reimplemented to follow modern software engineering practices and leverage new techniques in software design. We have also incorporated suggestions from our existing customer base. The main advantages to this redesign include:

- 1) Common source code architecture across all TMW libraries - The use of a common architecture across all libraries significantly reduces time required to port additional protocols to a target device. In addition, using common software across all products results in better code, since common functions are utilized much more frequently than protocol specific functions.
- 2) Source Code Library calling routines are now compatible with a wider variety of event driven techniques, allowing the target application to be achieve higher performance.
- 3) Most configuration parameters are now passed as arguments in Source Code Library function calls instead of macros. This allows for data hiding and protects configuration parameters from accidentally being changed while the Source Code Library is running. In addition, macro calls to target

hardware and the database interface routines were replaced with function calls.

- 4) Significant reduction in the time to implement new features - In addition to being more flexible, the use of modern software design practices significantly reduces the time required for Triangle MicroWorks to support new features. As the existing protocols are constantly being improved by the associated Technical Committees and Working Groups, it is essential that the Source Code Libraries are able to remain up to date with the latest standards.

Version 2.12 (July 10, 2002):

dnp3 Added support for Object 12 Variations 2 and 3, Pattern Control Blocks and Pattern Masks. These variations support the simultaneous control of multiple binary outputs.

dnp3 Added support for Object 70 Variation 2, File Authentication. The File Authentication request is now supported and the authentication key is included in file open and file delete requests.



Description: In `mdnpbrm.c`, the code for a delay measurement before a time synchronization command was accidentally omitted.

Introduced: Version 2.09.

Resolution: Fixed in version 2.12.

Version 2.11 (March 27, 2002):

dnp3 Added support for analog input deadbands, object 34 variations 1 through 3, through the macro `MDNPDATA_ANLG_DEADBAND_STORE()`.

dnp3 Added support for of user defined internal indications, object 80 variation 1, through the macro `MDNPDATA_USER_INDICATIONS_STORE()`.



Added `DNPDEFS_CROB_ST_LOCAL` constant definition to list of control relay output block status codes.



Description: In `mdnpdvrs.c`, the variable `nativeTimeStamp` inside the function `mdnpdvrs_transTimerControl()` caused a compiler warning as a variable used but not initialized when the macro `MDNPARG_GET_TIME_STAMP()` was not used.

Introduced: Prior to version 2.07.

Resolution: Fixed in version 2.11.

Version 2.10 (February 8, 2002):

dnp3 Now fulfills all requirements for compliance with DNP3-2000 and DNP3-2001. Most of these requirements were already covered by the Source Code Library, but the following changes were made in this version:

- Three new Control Relay Output Block status codes were added. They are:
 - 8 (`TOO_MANY_OPS` – request not accepted because too many operations requested).

- 9 (**NOT_AUTHORIZED** – request not accepted because of insufficient authorization).
- 126 (**UNDEFINED** – request not accepted because of some other undefined reason).

dnp3 Added support for floating point analog change events with and without time (Object 32, Variations 5 and 7).

dnp3 Replaced signed long with **MDNPSCL_ANLG_UNION** structure to the following macros, which allows the value passed to these macros to be either signed long, unsigned long or float: **MDNPDATA_ANLG_INPUT_STORE** and **MDNPDATA_ANLG_OUTPUT_STAT_STORE**.

dnp3 Added new feature to sequential file transfer (Object 70, Variations 3-7). Previously, a master could only handle sequential file transfer responses from a slave received by the master as unsolicited events, a response to a class poll, or a response to a file event read request. Now, the master is also able to handle sequential file transfer responses received immediately from the slave due to a sequential file transfer request.



Added two new commands for Assign Class and Restart to the command line processor.



Replaced all sequential file transfer constants defined in **dnpdefs.h** so they are all 31 characters or less and all are unique within the first 25 characters.



Description: If an application layer retry was enabled (using **MDNPCNFG_APPL_ATTEMPT_RETRY()**) for a cold/warm restart command, the cold/warm restart command would be resent when the restart delay period expired.

Introduced: Prior to version 2.07.

Resolution: Fixed in version 2.10.



Initial release of this document.