

TCRSync

Novell Netware Time Synchronization NLM



W Clark & Associates, Ltd.

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INTRODUCTION

The NLM - TCRSync allows a Netware file server's clock to be locked to an external Time Code (TC) as read by a TCR-200/500 reader card. An external Master Clock source of SMPTE, EBU, or IRIG-B(1) TC is required.

Features

- Selectable port addresses
- +12 to -11 hours of offset from external TC can be specified
- Date support for SMPTE time code (Leitch specification) or IRIG-B time code (IEEE 1344 specification)
- Year 2000 compliant
- Operation logs

INITIAL OPERATION

Operation of TCRSync requires that a TCR-200/500 card be installed in the file server on which it is running and that an appropriate source of external TC (either SMPTE - 25 or 30 fps or IRIG-B(1) modulated) be fed to the card. (See the TCR instruction booklet for details on installation and setup of the card.)

INTERRUPTS NOT USED

Interrupts are not used with this NLM software and it is important that no interrupts be selected with the pin jumpers on the TCR card; remove any that may be present.

NETWARE VERSION

TCRSync for Netware is available for Netware 3.11, 3.12, 4.10, and 4.11 servers. Depending on your requirements you were shipped either a Netware 3.xx or Netware 4.xx version of the NLM software. The Netware 3 version of the NLM software will *NOT* run on Netware 4 and vice-versa.

Not compatible with SFT III

TCRSync for Netware is not compatible with SFT III. Consider installing a non-SFT III server on the same network which will have the primary responsibility of being the "time master". In Netware 4 topologies where an SFT III server was intended to be a SINGLE REFERENCE/REFERENCE time server C & A recommends using it as a PRIMARY or SECONDARY time server instead.

TCRSYNC OPERATION ON A NETWARE 3.x SERVER

On a Netware 3.xx fileserver TCRSync will perform absolute time sets after making any required time zone adjustments.

TCRSYNC OPERATION ON A NETWARE 4.x SERVER

TCRSync for Netware 4.xx features an algorithm that synchronizes a SINGLE REFERENCE/REFERENCE file server UTC time by slowing down or speeding up the effective tick rate of the Netware operating system clock. This does not affect the speed of software execution. This avoids having to set the file server clock backward. This is the same method Netware's TIMESYNC uses to synchronize time clients (PRIMARY and SECONDARY file servers).

When server UTC time is ahead of real/correct time TCRSync will slow the effective operating system clock tick rate by a factor of 18 (approx. 3ms/tick) until real/correct time "catches up with" server time.

When server UTC time is behind real/correct time TCRSync will increase the effective operating system clock tick rate by a factor not to exceed a ceiling of 3000ms/tick. TCRSync will endeavor to map time corrections out to small tick adjustments to minimize noticeable time adjustment.

TCRSync must be installed on a TIMESYNC fileserver of type SINGLE REFERENCE or REFERENCE. Because TCRSync will fail to operate correctly on a PRIMARY or SECONDARY file server TCRSync will abort if loaded on one of them.

The TIMESYNC (not TCRSync) configuration option 'Hardware Clock' must be set to 'OFF' for TCRSync to operate correctly. If not set to 'OFF' TIMESYNC will occasionally set the file server system clock to the system CMOS clock which will negatively affect TCRSync's efforts to synchronize file server time to incoming time code. During TCRSync's system configuration this option will automatically be added/changed in your TIMESYNC.CFG file. If you do not have a TIMESYNC.CFG one will be created for you in SYS:\SYSTEM.

Important note: if the 'Hardware Clock=OFF' option is removed or changed in TIMESYNC.CFG TCRSync will fail to correctly synchronize file server time to incoming time code!

TCRSync will not load unless TIMESYNC has been loaded on your fileserver and the fileserver is configured as a SINGLE REFERENCE/REFERENCE file server.

DAYLIGHT SAVINGS TIME

Be aware that a configured time zone offset will become invalid if a time code source switches its encoded offset (for example, upon entry to daylight time or standard time). In situations where such a time code encoding configuration exists the user must temporarily stop time synchronization and re-configure the time zone offsets when the encoding offset switch occurs to avoid a time synchronization error. W C & A can provide a daylight savings time-sensitive version of TCRSync on a custom basis. Contact the factory for details.

PROCEDURE FOR NETWARE 3 INSTALLATION

- Create a directory on your server called SYS:\SYSTEM\TCRSYNC and copy the files from the distribution floppy diskette there. Your distribution diskette should contain the following files:
TCRSYNC.NLM
TCRCFG.NLM
README.TXT
- Load 'TCRCFG.NLM' to begin software configuration. Configure the software to your operating requirements. See the section entitled 'SYSTEM CONFIGURATION' for additional information on configuration options.

load SYS:[directory]\TCRCFG.NLM

e.g. load SYS:\SYSTEM\TCRSYNC\TCRCFG.NLM

- Verify that time code is being displayed on TCRSync's operation screen. If the message 'No Time Code' is being displayed check connections between external time source and TCR card. See TCR manual for additional information on hardware installation.
- Verify that correct time and date is being displayed on TCRSync's operation screen. If it is not correct verify that the following TCRSync system configuration items are correct:
 - incoming time code hour offset from UTC

- local time hour offset from UTC
 - date decoding
- When it has been determined that TCRSync is operating as required add the following line to your server's AUTOEXEC.NCF to load it automatically each time the server is brought up:

load SYS:[directory]\TCRSYNC.NLM [command-line parameters]

e.g. load SYS:\SYSTEM\TCRSYNC\TCRSYNC.NLM /L

Notes/Tips For Netware 3 Installation

- You should verify that your Netware 3.xx server has the latest operating system and C library patches available from Novell or TCRSync may not function correctly. The latest patches from Novell are available at their World Wide Web site.

PROCEDURE FOR NETWARE 4 INSTALLATION

- Create a directory on your server called SYS:\SYSTEM\TCRSYNC and copy the files from the distribution floppy diskette there.
 - TCRSYNC.NLM
 - TCRCFG.NLM
 - README.TXT
- Load 'TCRCFG' from the console and you will be immediately taken to the system configuration screen. Configure the software to your operating requirements. See the section entitled 'SYSTEM CONFIGURATION' for additional information on configuration options.

load SYS:[directory]\TCRCFG.NLM

e.g. load SYS:\SYSTEM\TCRSYNC\TCRCFG.NLM

- Verify that time code is being displayed on TCRSync's operation screen. If the message 'No Time Code' is being displayed check connections between external time source and TCR card. See TCR manual for additional information on hardware installation.
- Verify that correct UTC time and date is being displayed on TCRSync's operation screen. If it is not correct verify that the following TCRSync system configuration items are correct:

- incoming time code time zone

And verify that the following Netware 4 system configuration items are correct:

- local time zone
- daylight savings time adjustment

- When it has been determined that TCRSync is operating as required add the following line to your server's AUTOEXEC.NCF to load it automatically each time the server is brought up:

load SYS:[directory]\TCRSYNC.NLM [command-line parameters]

e.g. load SYS:\SYSTEM\TCRSYNC\TCRSYNC.NLM /L

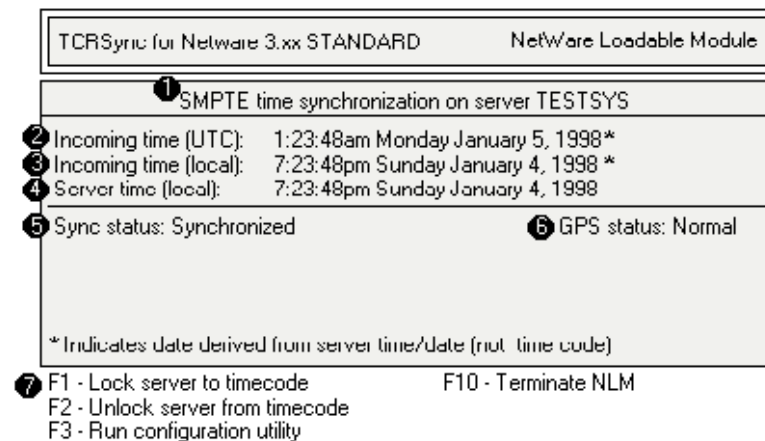
Notes/Tips For Netware 4 Installation

- If you plan to use Netware 4's time synchronization on your network you must have installed, configured, and verified that it is working properly *BEFORE* installing TCRSync. It is very important that time synchronization be configured correctly so that TCRSync can propagate decoded time code properly throughout your network. The November 1993 issue of Novell Application Notes has a detailed article on time synchronization in Netware 4. This can be found on Novell's Network Support Encyclopedia CD-ROM and on Novell's WWW site.
- Netware 4.1 has a operating system bug involving date manipulation after 12/31/2000. To avoid encountering this problem your server should be updated with the latest OS patches made available by Novell on Compuserve and on the World Wide Web at <http://www.novell.com>. Any Year 2000 compliancy issues/questions related to the Netware operating system should be addressed to Novell.

TCRSYNC MONITOR SCREENS

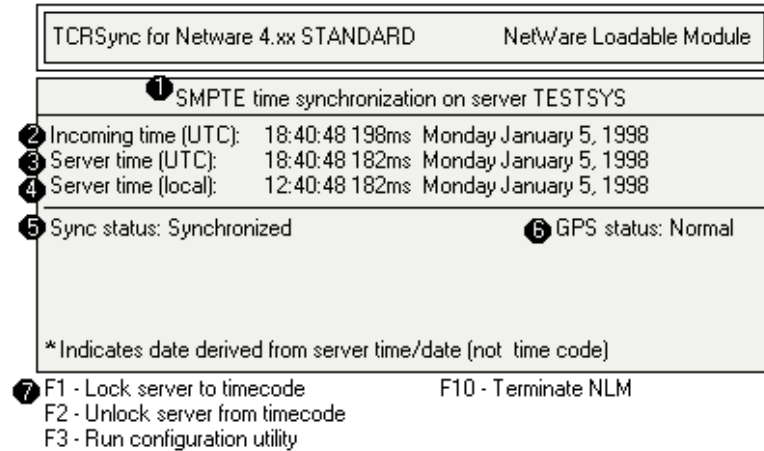
TCRSync presents a screen where time synchronization activity can be monitored and configured. TCRSync will create the display screen when loaded but will not bring it to the console foreground by default. Use the Netware console CTRL-ESC or ALT-ESC functions to switch to the TCRSync screen. Alternately, the command-line parameter /F (or /f) may be specified when TCRSYNC.NLM is loaded to force the monitor screen to the foreground.

Netware 3 monitor screen



1. Indicates the server on which TCRSync is running and the time code type being used for synchronization.
2. Shows the incoming time code time converted to UTC.
3. Shows the incoming time code time converted to local time zone.
4. Shows the current server time. When synchronized this time will be the same as the time shown for #3. A bracket indicator will be shown between lines #3 and #4 to indicate the times are locked together.
5. Indicates time synchronization status.
6. Indicates GPS operation status if time code source is W C &A GPS-100/200 master clock.
7. Operation control selections currently available.

Netware 4 monitor screen



1. Indicates the server on which TCRSync is running and the time code type being used for synchronization.
2. Shows the incoming time code time converted to UTC.
3. Shows the server UTC time. When synchronized this time will be within a few milliseconds of the time shown on #2 or if synchronization is active the time will be converging with that shown in line #2. A bracket indicator will be shown between lines #2 and #3 to indicate the times are locked together.
4. Shows the current server local time. This is derived from the server UTC time based upon the Netware time zone configuration.
5. Indicates time synchronization status.
6. Indicates GPS operation status if time code source is W C & A GPS-100/200 master clock.
7. Operation control selections currently available.

SYSTEM CONFIGURATION

TCRSync configuration is performed by the NLM program “TCRCFG.NLM”. This NLM can be loaded separately or invoked by pressing ‘F3’ from the TCRSync monitor screen. TCRSync accepts “hot configuration changes”. That is, you may change TCRSync configuration while TCRSync is operating. After changes are saved, TCRSync will detect that a new configuration is present and prompt you to reset operation for the new configuration.

IMPORTANT: If you are unsure of the answers to any of the questions that TCRSync configuration poses you should contact the system administrator or engineer responsible for the in-house time code distribution for assistance. Incorrect configuration of TCRSync may lead to unexpected failures which could negatively affect normal operation of your server and time synchronization on your enterprise network.

TCRSync must know information about the following major functions related to time code decoding and time synchronization on your server:

Time code decoder board

A list box will display the various time code decoder boards that TCRSync supports. After selecting a decoder board you will be asked to specify the I/O port your decoder board is configured to use. TCRSync configure will verify your selection by attempting to “talk” to the decoder board.

TCRSync currently supports the TCR-200 series and TCR-500 time code decoder boards from C & A.

Troubleshooting tips: If TCRSync configuration cannot locate your time code decoder board there is either a misconfiguration between the I/O port selected and the jumper settings on the card or there is an I/O port conflict with another device in the system.

Time code source

A list box will display various time code sources that TCRSync supports. TCRSync configure will only list time code sources that generate a time code signal compatible with the time code decoder board you previously selected. The time code source you will select is the device that is directly applying time code to the decoder board installed in your Netware server.

If the time code source you selected supports generation/processing of multiple time code formats you will be asked to specify which time code format is in use.

Troubleshooting tips: Some organizations may have a more complex master clock installation. For example, if your organization has a C & A GPS-100 master clock but is using a C & A TCI-232 to perform time zone offsets on SMPTE time code then your time code source is the TCI-232, not the GPS-100.

Time zone offsets (for Netware 3)

Time code may be referenced to UTC (Greenwich Mean Time), your local time size, or another time zone. You must specify the encoded offset of your time code signal from UTC so that TCRSync can correctly derive the time to synchronize your Netware 3 server.

TCRSync converts your incoming time code to UTC (if required) then back to your local time zone to support maximum flexibility with respect to time synchronization requirements.

Consider the following scenario: your Netware 3 server is located in Fresno, California and therefore will require time synchronization adjusted to Pacific Standard Time. However, your time code signal originates from New York, New York and is referenced to Eastern Standard Time. TCRSync provides the capability to convert one format to the other. In this scenario you would configure:

- Incoming time zone offset from UTC: -05:00
- Local time zone offset from UTC: -08:00

This scenario represents the most complicated type of time code configuration.

Troubleshooting tips: If the end result of time synchronization on your Netware 3 server is in error by some constant amount of time then either your incoming time zone offset or local time zone offset has been configured incorrectly.

Time zone offsets (for Netware 4)

Unlike Netware 3, Netware 4 knows about time zones. A time zone was configured when the Netware 4.xx server operating system was installed. The Netware OS uses this information to present local time when required (such as with the 'time' console command). The Netware 4 OS clock actually uses UTC (Greenwich Mean Time) internally and UTC is also used for all network time synchronization if TIMESYNC is activity. For this reason, server time synchronization performed by TCRSync is significantly different than that performed on Netware 3.

Time code may be referenced to UTC (Greenwich Mean Time), your local time size, or another time zone. You must specify the encoded offset of your time code signal from UTC so that TCRSync can correctly derive the time to synchronize your Netware 4 server.

TCRSync synchronizes your Netware 4 server to UTC time. If your incoming time code is not already referenced to UTC it must be converted to such.

Consider the following scenario: your Netware 4 server is located in Fresno, California. Your time code signal originates from New York, New York and is referenced to Eastern Standard Time. TCRSync will provides the capability to convert to time to UTC. In this scenario you would configure:

- Incoming time zone offset from UTC: -05:00

TCRSync will convert incoming time from Eastern Standard Time reference to UTC reference and synchronize Netware 4 server UTC time.

Troubleshooting tips: Remember that the local time the Netware server presents (such as that given by the Netware console command *time*) is converted from the Netware OS UTC clock as a function of the Netware server time zone configuration. If it is incorrect, either of the following could be the problem:

- Erroneous Netware time zone configuration
- Erroneous Netware UTC time (resulting from TCRSync misconfiguration)

Log File Configuration

By default, the TCRSync log (TCRSYNC.LOG) will be stored in the SYS:\ETC directory and will grow to a maximum of 64K. The location and maximum size of the TCRSync log is configurable.

Display configuration

Allows user to specify the format in which time and date information will be presented.

TCRSYNC OPERATION LOG

TCRSync keeps a log of all significant events during operation. These include software start/stop, synchronization start/stop, synchronization adjustments performed on the Netware OS clock, and configuration changes. When the TCRSync log reaches the maximum size as specified in the configuration it will be renamed as an "old" log with a numeric filename extension (e.g. TCRSYNC.001) and a new TCRSYNC.LOG file will be opened. The administrator may choose to periodically purge the "old" log files.

USING THE GPS-100/200 AS A TIME CODE SOURCE

Because of atmospheric and other conditions it is possible for the GPS-100/200 to become temporarily unlocked (unsynchronized) with the GPS satellites. When this occurs the GPS-100/200 will go into a "free-wheeling" mode whereby it continues to generate time code that is not locked to the GPS satellites. In this "freewheel mode" the time code will remain (under normal conditions) within < 10 ms of true time over a several hour period. Upon re-acquisition of satellite signal (re synchronization with the GPS satellites) the GPS-100/200 will automatically revert to the "Normal", i.e. locked mode.

Permitting time synchronization during GPS-100/200 freewheeling allows your Netware server to be synchronized to incoming time code as generated by the GPS-100/200 even if it is in "Freewheeling" time code generation mode. Answering "No" to this question disallows server synchronization if the GPS-100/200 is "Freewheel" generating time code. C & A recommends allowing time synchronization during freewheeling.

COMMAND-LINE PARAMETERS

The following command-line parameters are available to initialize the TCRSYNC.NLM software when first invoked at the console command line or in your AUTOEXEC.NCF:

/F (or /f) force the TCRSync operation screen to appear upon NLM load

/L (or /l) start locking file server clock immediately if time code is available. Default lock status is not locking.

Other command-line options available in previous versions of TCRSync have been removed.

UNLOADING TCRSYNC

TCRSync may be unloaded by pressing F10 from its monitor screen (recommended) or by using the file server console command 'UNLOAD'.

NOTES

The software will synchronize the file server's clock:

- when the program is first started and the /L (locking) parameter is specified
- when TC is regained from a lost state
- at the 30 second point during normal updates

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