

TIME SYNCHRONIZE A MIXED WINDOWS ENVIRONMENT

This Application Note provides detailed information on synchronizing mixed environments where the Primary Domain Controller is Windows NT and the workstations are Windows XP/2000/NT/98/95.

NOTE:

The following Application Note provides additional information to assist you with installing the W32Time program. Spectracom cannot supply you with the W32Time program. For Windows NT Server or NT Workstation editions, the program can be downloaded at no cost from Microsoft. The address is <ftp://ftp.microsoft.com/reskit/y2kfix/>. Windows XP, 2000 Professional, Server and Advanced editions include pre-loaded time synchronization software. No software download is required.

TECHNICAL SUPPORT

For technical support on synchronizing computers or 911 equipment, contact Spectracom Tech Support via phone or email at the address information below. Tech Support is available Monday through Friday from 8:00 AM –5:00PM (Eastern).

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SECTION 1: CONNECTING THE SPECTRACOM MASTER CLOCK TO THE PRIMARY SERVER

In a WinNT or Win2000 network running W32Time, one WinNT or Win2000 Server is designated as the DC (Domain Controller). The DC obtains its time from the Authoritative Time Server (Spectracom Models 8188/8189/8190) via SNTP (Simple Network Time Protocol). Workstations are known as “Secondary” and sync to the Domain Controller. Workstations broadcast a request for time data. The Primary Server is told to listen for those requests and to respond when appropriate. Windows 2000 workstations on a WinNT Primary Domain Controller (PDC) sync via LocalNTP. Refer to SECTION 5: SYNCHRONIZING IN A MIXED ENVIRONMENT OF A WINDOWS NT SERVER AND WINDOWS 2000 WORKSTATIONS for further details.

W32Time does not accept RS-232 data from the Spectracom Netclock. The only available input to W32Time is Network Time Protocol (NTP). The following explains how to obtain NTP from the Spectracom Netclock Master Clock.

- A) Spectracom Model 8188 Ethernet TimeServer – The Model 8188 connects to the Remote RS-485 port of the Master clock. The device synchronizes to the Spectracom Netclock and provides an Ethernet connection to an available 10BaseT Hub or Switch on the Network using standard Network cable.
- B) Spectracom Models 8189 and 8190 Netclock Master Clocks- The Models 8189 and 8190 are Master Clocks that synchronize to the GPS satellite system. The clock provides an Ethernet connection on the rear panel that connects to an available 10BaseT Hub or Switch on the Network using standard Network cable.

Contact our Sales Department at (585) 381-4827 for information on the Models 8188, 8189 or 8190.

REDUNDANCY

The W32Time program DOES NOT support the use of multiple NTP Servers on the same network. If you desire to have more than one Time Server on the network, contact Spectracom Tech Support for information on other available time synchronization programs. Spectracom recommends having more than one Time Server on the Network, especially where time synchronization is critical. The Models 8188/8189/8190 can handle up to 300 requests per second or 20 per second when running in the encrypted mode. The reason we recommend multiple servers is in case something was to happen to that Time Server, time sync would not be lost.

ADDITIONAL SOFTWARE

There is no additional software required for the Netclock Master Clock. Win32Time is the only required software. The Win32Time program needs to be installed on every WinNT machine (Server and all NT Workstations) on the Network. Windows 95 or 98 Workstations utilize the built-in software command “Net Time” to synchronize. Refer to section 8 for instructions on syncing Win 95 and Win 98 workstations.

TIME ADJUSTMENT

The default time sync is every 45 minutes until the time successfully syncs, then every 8 hours. This value can be changed by either editing the period value in the W32Time.ini file or by using SpecialSkew string values. (i.e WeeklySpecialSkew, WeeklySpecialSkew, TriDailySpecialSkew, BidailySpecialSkew).

Target time is the time W32Time determines the local time of the PC should be set to. If the target time is ahead of the PC's time, the time is immediately changed to the target time. If the Target time is behind the PC's time, the local clock is slewed over the next 20 minutes, unless it is more than 2 minutes out of synchronization, in which case the time is immediately set.

SECTION 2: HOW TO INSTALL THE W32TIME PROGRAM ON A WINDOWS NT SERVER AND NT WORKSTATIONS

This section describes how to install the W32Time program on all NT Servers and NT Workstations.

NOTE:

Windows 95 and Windows 98 Workstations do not use W32Time to synchronize. These workstations use the Net Time command. Refer to Section 6: TO SYNC WINDOWS 95 OR 98 WORKSTATIONS TO THE PRIMARY SERVER.

To install W32Time Synchronizing Service:

- 1) Verify there are no other Time Service programs running in the background (i.e. Net Time which is a built-in time program that would be loaded in a start-up batch file, Timeserv program found in "Services" or Clock Update Service which would be found in "Services"). The Timeserv program, as well as any other time services have to be disabled or removed prior to running W32Time. These programs conflict with W32Time and may cause erroneous time jumps.
- 2) (Skip to step 4 if you are performing this on a Windows2000 Server edition). Copy the **W32time.exe** file to the %SYSTEMROOT%\SYSTEM32 folder.
- 3) Copy the **W32time.ini** file to the %SYSTEMROOT% folder.
- 4) Edit the W32Time.ini file to configure W32Time. The W32Time.ini file is edited to allow operation from an Ethernet TimeServer, or from a synchronized Primary Server. Refer to the following steps for W32Time.ini configurations using Spectracom products. The REM statements and unnecessary changes have been deleted from these sections to simplify the application note.
 - A. To sync the WinNT to a NTP Server, refer to Section 3: TO EDIT W32TIME.INI TO SYNC PRIMARY SERVER USING AN ETHERNET TIME PROVIDER (NTP).
OR
 - B. To synchronize other WinNT servers and workstations, refer to SECTION 4: TO EDIT W32TIME.INI TO SYNC WINDOWS NT WORKSTATIONS TO THE PRIMARY SERVER.
- 5) Exit and save the file.

- 6) Reboot the machine. The service should start automatically. You can also manually start and stop the service. Refer to **NOTES** below.
- 7) The Win NT clock in the bottom right hand corner should update within a couple of minutes of starting the service.
- 8) To verify everything is correct, stop the service (see Notes below). Manually change the system clock to a bogus time and go back in and restart the service. The time should jump to the correct time. Go into the Event Viewer. Look at the Application Log and click on the W32Time event. Click on view, then Refresh. You should get a line stating that time offset is either < or > .5 seconds indicating the service is operating correctly. The < or > sign depends on the amount of change that occurred from the original setting.

NOTES

To manually start /stop

WinNT Start button to Settings, to Control panel, to Services. Select W32Time Service. Depress either NetStart or NetStop.

Event Viewer

Start button to Programs, to Administrative tools, to Event Viewer. Look at the Application Log and click on the W32Time event. Click on view, then Refresh. The W32Time program only logs the first time synchronization. All future time syncs are not logged. Only errors obtained while running W32Time are logged after the initial time sync. Refer to the Event Viewer to help troubleshoot problems with W32Time service.

SECTION 3: TO EDIT W32TIME.INI TO SYNC THE PRIMARY NT SERVER USING AN ETHERNET TIME PROVIDER (NTP).

This section describes how to edit W32Time.ini for synchronizing the Primary Server to a Model 8188/8189/8190.

- 1) "Type=" is used to specify whether the Service is working as a Primary or a Secondary Service (not the location of where time is being derived from). The W32Timeserv program was written to accept time from either a Master Time Server on the network or from a Primary Server.
Type=NTP **(Remove the semicolon from this statement)**
;Type=PRIMARY
;Type=SECONDARY
- 2) "Period = " is used to determine the delay between each Time Set. Initially, an attempt to sync will occur once every 45 minutes until initial sync. Thereafter, two to three times a day by. The period can be set to a specific number of times per day. For example Period=1" for once every 24 hours, "Period=2" for once every 12 hours or "Period=3" for once every 8 hours.
Period=3 **(No semicolon. Enter the number of times daily that you desire the service to update the system clock. Using a high value can cause errors. We do not recommend using more than about 3 times per day.)**

- 3) "TAsync=" means to use the TimeAdjustment API to disable CMOS synchronization.
Tasync=no **(No semicolon)**
- 4) "NTPServer=" is used to direct the NT Server to the Model 8188/8189/8190 NTP Servers.
NTPServer= **(Remove the semicolon and enter the IP address or addresses of the NTP TimeServer. NOTE: This is Network Dependent. See your Network Administrator)**
- 5) "Log=yes" places an entry in the Application event log for only the first successful sync with an NTP Server. Failures are always logged no matter what the "Log=" statement is set to.
;Log=no
Log=yes **(No semicolon)**
- 6) "LocalNTP" indicates whether to start an NTP server on the local machine. . If the workstations are Windows XP/2000 on a WinNT server, also refer to SECTION 5: SYNCHRONIZING IN A MIXED ENVIRONMENT OF A WINDOWS NT SERVER AND WINDOWS XP/2000 WORKSTATIONS
LocalNTP=yes **(No semicolon)**
- 7) PrimarySource lists all known Master Time Servers in your network.
;PrimarySource=\\MYNTPSERVER **(Leave Semicolon) Note: the W32Time program appears to support multiple timeservers but does not.**
- 8) "RandomPrimary=" is used to determine if the list of available time servers is followed in order from the top or selecting a TimeServer randomly, rather than starting at the top. Setting to yes will choose a random entry in the list of Master Servers.

;RandomPrimary=yes **(Remove semicolon only if you desire a specific order in the list of available time servers)**
- 9) Timesource is used to tell the server to listen for Time Request broadcasts from the clients. Only turn this on if the Server is the Primary Server used to sync clients.
;timesource=no **(Leave semicolon)**
timesource=yes **(Remove semicolon)**
- 10) SecondaryDomain tells the secondary PC which domain to broadcast their time requests to. Since this is being configured on a Primary Server, leave this entry blank.
SecondaryDomain=

SECTION 4: TO EDIT W32TIME.INI TO SYNC WINDOWS NT WORKSTATIONS TO THE PRIMARY SERVER

This section describes how to edit W32Time.ini for Windows NT Workstations to sync to the NT Domain Controller.

- 1) "Type=" is used to specify whether the Service is working as a Primary or a Secondary Service (not the location of where time is being derived from). The W32Timeserv program was written to accept time from either a Master Time Server on the network or from a Primary Server.
;Type=NTP
Type=PRIMARY **(Remove the semicolon from this statement)**
;Type=SECONDARY
- 2) "Period = " is used to determine the delay between each Time Set. Initially, an attempt to sync will occur once every 45 minutes until initial sync. Thereafter, two to three times a day by. The period can be set to a specific number of times per day. For example Period=1" for every 24 hours, "Period=2" for every 12 hours or "Period=3" for every 8 hours.
Period=3 **(Leave semicolon for the default of two to three times per day. Remove the semicolon and enter the number of times daily that you desire the service to update the system clock if you have a preference. Using a high value can cause errors. We do not recommend using more than about 3 times per day.)**
- 3) "TAsync=" means to use the TimeAdjustment API to disable CMOS synchronization.
Tasync=no **(No semicolon)**
- 4) "NTPServer=" is the name(s) or numeric address(es) of the Model 8188 or 8189. Since Workstations get their time from the Primary Server, this statement is not used.
;NTPServer= **(Has semicolon)**
- 5) "Log=yes" places an entry in the Application event log for only the first successful sync with an NTP Server. Failures are always logged no matter what the "Log= " statement is set to.
;Log=no
Log=yes **(No semicolon)**
- 6) "LocalNTP" indicates whether to start an NTP server on the local machine.
LocalNTP=yes **(Remove semicolon)**
- 7) "PrimarySource" lists all known Master Time Servers in your network. Since the Workstation syncs only to the Primary Server, this line is not used.
;PrimarySource=\\MYNTPSERVER **(Leave semicolon)**
- 8) "RandomPrimary=" is used to randomly choose NTP servers. Since the Workstation syncs only to the Primary Server, this line is not used.
;RandomPrimary=yes **(Leave semicolon)**

- 9) Timesource= is used to listen for broadcasts by Secondary clients. Since the workstation does not need to listen for broadcasts, set the "timesource=" to "no".
timesource=no **(Remove the semicolon from this statement)**
;timesource=yes
- 10) SecondaryDomain tells the workstations which domain to broadcast their time requests to. If this entry is empty or missing, these clients will query the current domain for a Primary Time Server. If the PDC is in another domain, specify it here.
SecondaryDomain=**(No semicolon. Leave blank if workstation is in same domain as the PDC)**

SECTION 5: SYNCHRONIZING A WINDOWS XP WORKSTATION TO A WINDOWS NT SERVER

Windows XP workstations can sync to a Windows NT server as long as the NT server is running W32Time as the time service. If the Windows NT Server is running Timeserv as the time service, the Windows 2000 workstations will not synchronize to the NT server. Timeserv does not support being a Local NTP Server. The Timeserv program will need to be disabled or removed and W32Time program installed. Refer to Section 2: HOW TO INSTALL THE W32TIME PROGRAM ON WINNT SERVERS/WORKSTATIONS AND WIN2000 WORKSTATIONS.

NOTE:

To ensure proper operation, the NT Server W32Time.ini file must be configured as described in Section 3.

Windows XP workstations must be manually configured to synchronize to a Windows NT domain controller. To configure Windows XP workstations to synchronize to a WinNT Server, type the follow line in command prompt at EACH Windows XP workstation:

Net time /setsntp:domain controller (where domain controller is the name of the WinNT Server)

If the Windows XP workstation is part of a Domain, the PC will then automatically time sync to the Domain Controller at the next scheduled update. The default update interval is once every 7 days. Refer to **SECTION 6: CHANGING THE TIME UPDATE INTERVAL OF WINDOWS XP** for instructions on changing the interval.

To verify the Windows XP workstation is syncing to the Domain Controller

- 1) Stop the W32Time Service
Type **net stop w32time** <enter> **(Stops the time service)**
- 2) Manually change the time using the Date/Time properties screen in the lower right-hand corner of the screen.

- 3) Re-start the W32Time Service
Type **net start w32time**<enter> **(Starts the time service)**
- 4) Observe the time updates to the correct time.

Note: You can also stop and start Windows Time Service in Services (Located in Control Panel/Administrative Tools).

SECTION 6: CHANGING THE TIME UPDATE INTERVAL OF WINDOWS XP

By default, Windows XP updates the system clock once every seven days. Due to the fact that the computer could drift several seconds or even minutes in this time frame, you may wish to change the update interval in the system registry.

TO CHANGE THE UPDATE INTERVAL

- 1) Start the **Registry Editor**
- 2) Go to **HKEY_LOCAL_MACHINE \ SYSTEM \ CurrentControlSet \ Services \ W32Time \ TimeProviders \ NTPClient **
- 3) Double-click the **SpecialPollInterval** value, and change the Base of the **Value data to Decimal**
- 4) Now change the **Value data** to the time interval you desire, noting that the time is given in seconds. The default value is 604800 seconds which equals seven days. A typical interval is once per hour or 3600 seconds.
- 5) Close the registry editor.

SECTION 7: SYNCHRONIZING A WINDOWS 2000 WORKSTATION TO A WINDOWS NT SERVER

Windows 2000 workstations can sync to a Windows NT server as long as the NT server is running W32Time as its time service. If the Windows NT Server is running Timeserv as the time service, the Windows 2000 workstations will not synchronize to the NT server. Timeserv does not support being a Local NTP Server. The Timeserv program will need to be disabled or removed and W32Time program installed. Refer to Section 2: HOW TO INSTALL THE W32TIME PROGRAM ON WINNT SERVERS/WORKSTATIONS AND WIN2000 WORKSTATIONS

Note: To ensure proper operation, the NT Server W32Time.ini file must be configured as described in Section 3.

Windows 2000 workstations must be manually configured to synchronize to a Windows NT domain controller. To configure Windows 2000 workstations to synchronize to a WinNT Server, type the following line in command prompt at EACH Windows 2000 workstation:

Net time /setsntp:domain controller (where domain controller is the name of the WinNT Server)

You can verify time sync by following the procedure below.

To verify the Windows 2000 workstation is syncing to the Domain Controller

- 1) Stop the W32Time Service
- 2) Type **net stop w32time** <enter> **(Stops the time service)**
- 3) Manually change the time using the Date/Time properties screen in the lower right-hand corner of the screen.
- 4) Re-start the W32Time Service
- 5) Type **net start w32time**<enter> **(Starts the time service)**
- 6) Observe the time updates to the correct time.

Note: You can also stop and start Windows Time Service in Services (Located in Control Panel/Administrative Tools).

SECTION 8: SYNCHRONIZING WINDOWS 95 OR 98 WORKSTATIONS TO THE PRIMARY SERVER

This section describes how to use the Net Time Command to allow Windows 95 and 98 Workstations to sync to the Primary Server.

- 1) Add the following to the Logon Batch File. This file is located on the Domain Controller as c:\WinNT\System32\Repl\Import\Scripts\Win95.bat. The time will update each time the workstation is rebooted.
`NET TIME \\NTSERVER /S /Y` (Where NTSERVER is the name of the Primary Server).
- 2) Go to Windows Explorer. Go to Windows. Right click on Net.exe. Click properties. Go to program. Check "close on exit".
Typing net time in the Command Prompt window can then also manually set the time.

TASK SCHEDULER

If you are using Internet Explorer 4.0, 4.0, 4.2 etc. there is a program called Task Scheduler which can be set to update the workstation at a user specified schedule so you do not have to reboot or type net time.

- 1) Download Task scheduler add-on or obtain from CD-ROM.
- 2) Double click on Task Scheduler.
- 3) Click on Browse. Double click on Windows.
- 4) Double click on Net.exe.
- 5) Click when you want to schedule a TIME update. Click Next.
- 6) Open advanced properties. Click Finish.
- 7) Change the Run line to C:\\Windows \\Net.exe time \\ (name of your primary server) /s /y.

The time of the workstation will now update the time from the primary server (which is synced to the Netclock) based on the schedule you chose. The operator will just see a small flash on the screen each time the update occurs.