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A Guide to Time Synchronisation

for Avid® Interplay™ systems

Revision C – March 2011

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Introduction

Accurate time synchronisation is critical for all Avid® Interplay™ and workgroup systems. For reliable operation, all devices which create media (such as editors, AirSpeeds, TransferManagers, etc) or which control the creation of media (such as CaptureManager servers, CaptureManager clients, etc) must have their time synchronised to within 3 seconds of incoming house timecode and each other. To keep the time-stamp of the created media files consistent, the shared storage must also be synchronised.

This document describes the tested installation procedure to configure a CaptureManager server as a reliable and accurate NTP (Network Time Protocol) server for a typical Avid® Interplay™ system. Whilst the setup of the Avid Time Synchronization Service (ATSS – also known as Interplay Time Service or Framework Time Service) is also covered, be aware that AirSpeeds, Avid Low Resolution Encoders (ALREs), Clusters, System Directors and Unity ISIS blades are all unable to lock to ATSS and therefore NTP will always be required. Unless there is a compelling reason otherwise, it is wise to restrict a system to a single method of time synchronisation to avoid conflicts and so, if a system contains AirSpeeds, ALREs, one or more Windows Server Clusters and/or ISIS, NTP will usually be the time synchronisation method of choice.

The standard NTP server service (W32time) supplied with Windows 2003 Server is, in fact, an SNTP server (Simple Network Time Protocol) which has proven problematic with Unix servers (i.e. AirSpeeds and ALREs). Furthermore, IPV (the manufacturers of the ALRE) have informed us that it is unsupported for use with ALREs. Following testing, the NTP Daemon or NTPD software (which is freeware, supplied by NTP.ORG and sponsored by Meinberg) has proved to be very effective as an NTP server providing that it is configured correctly.

When planning a time synchronisation scheme, please refer to the document "*Example Time Sync Hierarchy Flowcharts.pdf*" (included in the deployment package containing this document) to help you decide upon your specific implementation.

Setting up an NTP Server

In a typical Avid® Interplay™ installation, the CaptureManager server or Interplay Capture server will be configured as the time master (or the primary server where there is more than one). In some configurations it may be a General Purpose Server (GPS) fitted with an Adrienne timecode card.

Timecode Card Installation

Typically, an Adrienne Timecode card will be fitted in the server and will receive house time-of-day-code. The Adrienne software then locks the server's internal PC clock to match the incoming timecode.

The Adrienne software (also known as AECtime) will typically be installed as part of the factory build but, if installation or re-installation is necessary, a suitable version is included in the deployment package containing this document in the file *AECtime.zip*. To install it simply unzip the contents of the file into the folder *C:\AECtime* and then run the file *ClkSampl.bat*. This installs the *AEC_NT_PCI_ClockSet_Service* which synchronises the server's internal clock to the incoming timecode. Note that any existing Adrienne software should be removed beforehand. Remove the existing service by running the file *ClkSamplunload.bat* and then deleting the contents of the C:\AECtime folder before proceeding to install with this version.

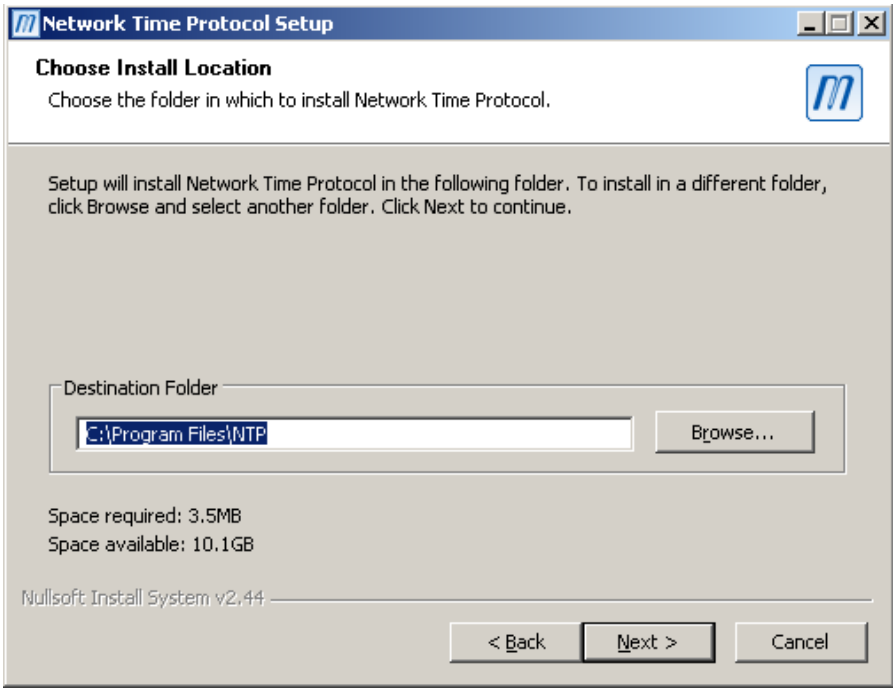
The presence of incoming timecode can be verified by running the *AecPciPoll.exe* application found in the folder *C:\AECtime*. See *Verifying the NTP Server Configuration* below for more information.

NTPD Installation

There are a number of NTPD installation packages around but the required version for reliable operation on Windows 2003 Server is 4.2.4p8 (also known as the Lennon release). This is included in the deployment package containing this document.

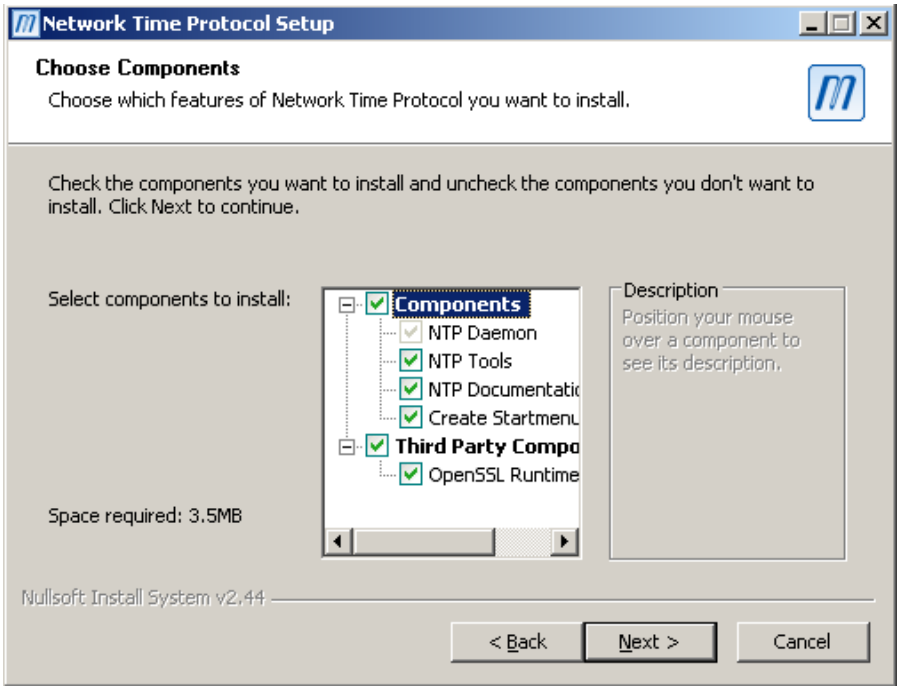
The following instructions will configure the NTPD server software to synchronise to the internal clock. Any client synchronising to the NTP server is therefore also synchronous with house timecode.

Run the executable (*ntp-4.2.4p8@lennon-o-win32-setup.exe*) from the CaptureManager desktop. Accept the license agreement and, after a few seconds, the following prompt will appear:

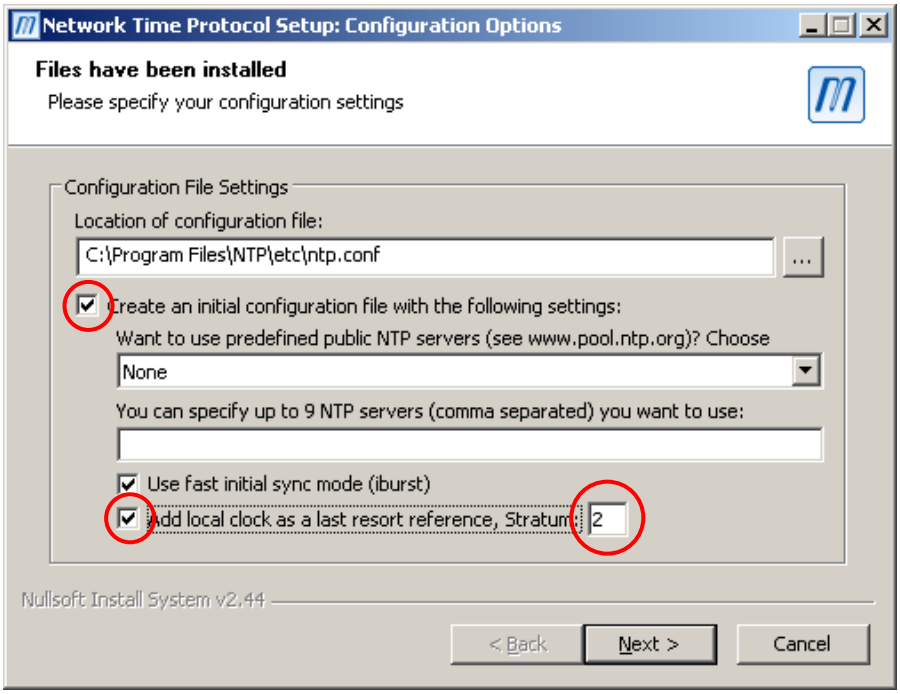


To keep the installation consistent for ease of support, accept the default installation location and click "Next".

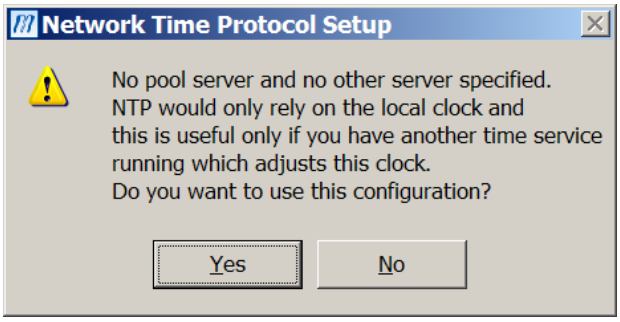
The following window appears. Install all components (the space taken is very small) and click “Next”.



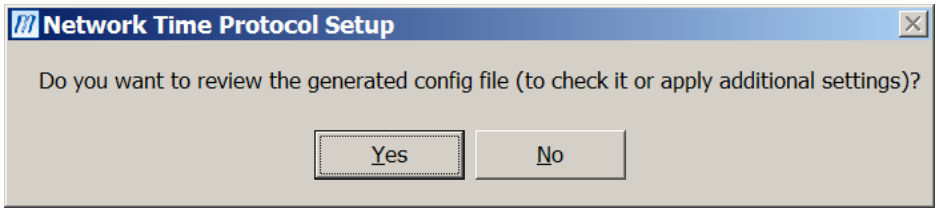
The next prompt specifies the location of the configuration file that will be read by *NTPD.EXE*. Check the box “*Create an initial configuration file with the following settings*” and then “*Add local clock as a last resort reference, Stratum:*”, set the stratum to “2” as shown below and click “Next”.



The following prompt appears. As the NTP server will be using the CaptureManager's internal clock which is synchronized to the house timecode feed, click "Yes.



The following prompt will appear:



If you click "No", a default file will be generated and the installation will continue. It will then be necessary to overwrite the default *ntp.conf* file in the folder *C:\Program Files\NTP\etc* with the file supplied with this document and the skip to the next section.

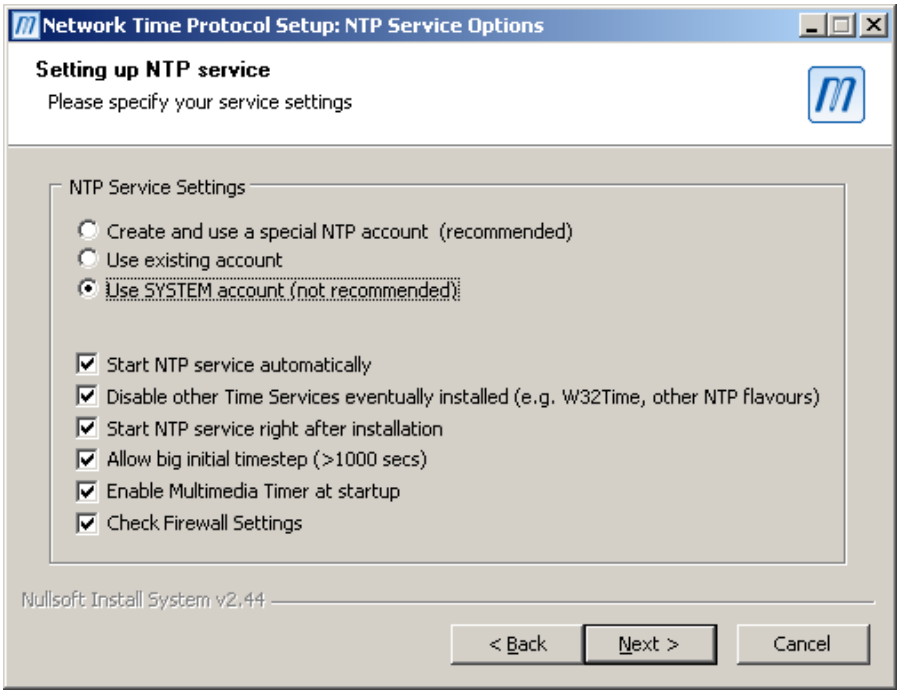
Note that a reboot will then be required after installation in order to read this file. If a reboot will not be possible then click "Yes" and the default *ntp.conf* file will be opened for editing in Notepad.

Make the changes highlighted below …

```
# NTP Network Time Protocol
# Configuration File created by Windows Binary Distribution Installer Rev.: 1.16  mbg
# please check http://www.ntp.org for additional documentation and background information
# Use drift file
driftfile "C:\Program Files\NTP\etc\ntp.drift"
# your local system clock, could be used as a backup
# (this is only useful if you need to distribute time no matter how good or bad it is)
server 127.127.1.0      Ensure the "#" is removed from this line
# but it should operate at a high stratum level to let the clients know and force them to
# use any other timesource they may have.
fudge 127.127.1.0 stratum 2     Ensure the "#" is removed from this line ( stratum should be 2)
# End of generated ntp.conf --- Please edit this to suite your needs
```

… and then save the file to continue the installation.

The settings on the next screen determine which Windows User Account the NTPD service will use. Select the option for "SYSTEM" account. Note that all boxes are checked. Click "Next"



Click "Finish" on the final dialogue to complete the installation.

Following this, navigate to the folder *C:\Program Files\NTP\etc*. This folder should contain the *ntp.conf* file either created by the installation or added by you as above. Add the file *ntp.drift* (supplied with this document) to this folder overwriting the existing file if there.

If you do not have the *ntp.drift* file, a new one can be created in Notepad. Open Notepad, type ".001" (no quotes) followed by <Enter> and the save the file to *ntp.drift* in the folder *C:\Program Files\NTP\etc*.

This completes the installation. If you copied the ntp.conf file supplied rather than editing it, you will need to reboot the CaptureManager server for this to take effect.

See "*Verifying the NTP Server Configuration*" below for information on how to check the operation of NTPD.

Setting the Time Zone and Regional Settings

Choose a Time Zone for the server which is appropriate to your location. If there will be Unix clients on the system, be sure to choose a Time Zone which is appropriate for both Windows and Unix or the Unix servers will be unable to lock. For example, GMT is the same to both Windows and Unix but an AirSpeed set to Eastern European Time will not lock to a Windows server set to Greek Time even though the actual Time Zone is the same.

Note that a Windows client system set to use a 12-hour clock will not be able to lock correctly to a time server set to use a 24-hour clock and vice versa. As a guide, if the clock in the system tray shows "AM" or "PM" after the time then the system is most likely set to use a 12-hour clock.

Setting the Regional Options appropriately for your location will determine whether or not a 24-hour clock is used. The default setting of "*English (United States)"* uses a 12-hour clock. Changing this to "*English (United Kingdom)"* will change the clock to 24-hour. This may be overridden by customising the Regional Settings; go to the Control Panel, select "*Regional and Language Options*", click "*Customise…*" and select the "*Time*" tab.

Avid Time Synchronization Service

Instances where NTP is not used on an Interplay system are very rare (i.e. no, AirSpeed, no ALRE, no clustered Windows Servers, no ISIS) and so the Avid Time Synchronization Service (ATSS) is unlikely to be the sole time synchronisation scheme in use. Care is required when configuring multiple synchronisation schemes to ensure that there are no conflicts and serious consideration should be given to implementing a single scheme.

If ATSS is to be used on the system then an ATSS "Master Mode" host must be configured. If the CaptureManager or Capture server is already the NTP server (and locked to house timecode) then it can function as the ATSS master as well. ATSS should be configured as shown in Fig.1:

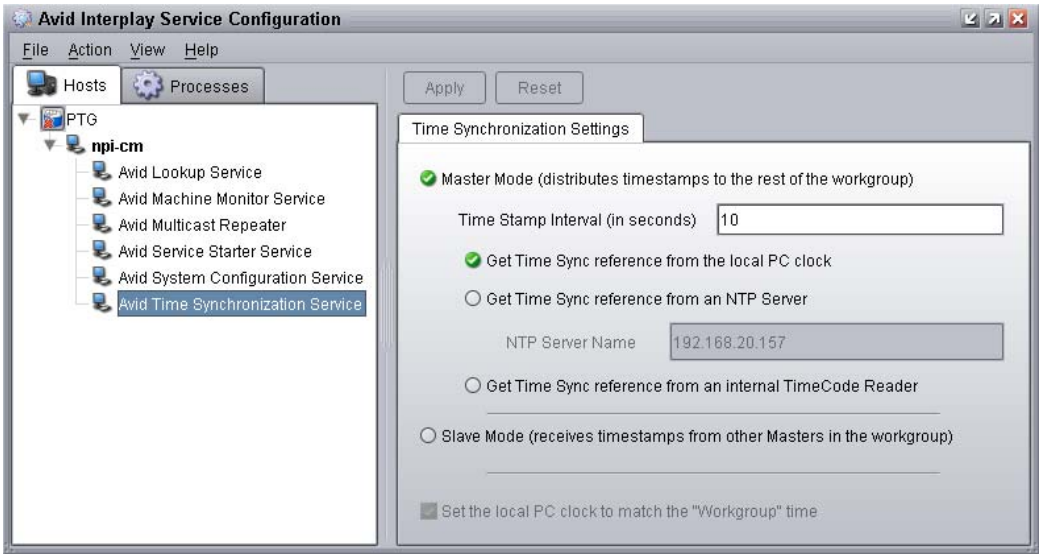


Fig.1 ATSS Time Master configuration on an NTP server

Note that the service is configured to "*Get Time Sync reference from the local PC clock*". As the local clock is locked to incoming timecode, the ATSS will also be synchronised. The option to "*Get Time Sync reference from an Internal TimeCode Reader"* has been observed to add a delay of 5 seconds to the incoming timecode and should not be used. Note that the option to "*Set the local PC clock to match the 'Workgroup' time*" is disabled as the time is being read from the local clock.

For systems where there is no Capture or CaptureManager server and NTP synchronisation is provided by an external (i.e. non-Avid) server, another server (such as the General Purpose Server) should be nominated as the ATSS master. This may also be the case if the Interplay Framework is not installed on the capture server. Configure the ATSS master server as a standard NTP Client (see *Windows Client Synchronisation* below) and configure ATSS as shown in Fig.1 above. Alternatively, the ATSS can be configured as an to read directly from the NTP server as shown in Fig.2:

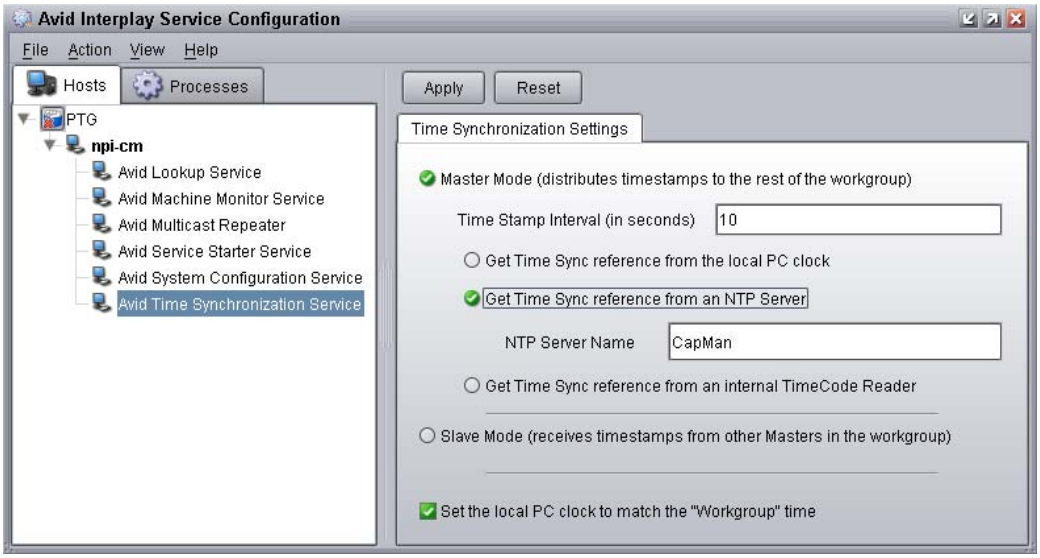


Fig.2 ATSS Time Master configuration on non-NTP server

Verifying the NTP Server Configuration

The presence of incoming timecode be verified by running the *AecPciPoll.exe* application found in the folder *C:\AECtime*. If timecode is being correctly received by the Adrienne card then it will be seen counting up in the window as shown:

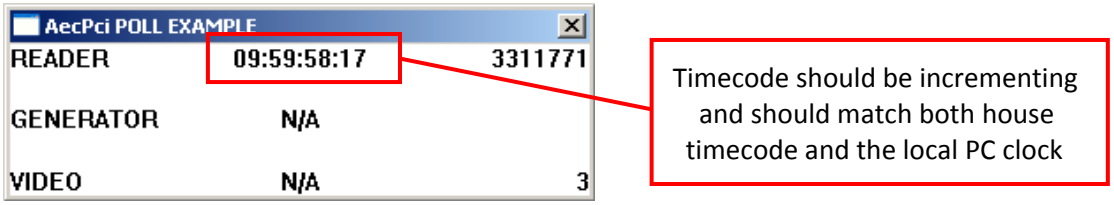


Fig.3 Verifying incoming timecode

The installation of the Adrienne service and the NTPD service can be verified using the NTP tab of SvrPrep and selecting the "NTP Server" option as shown below:

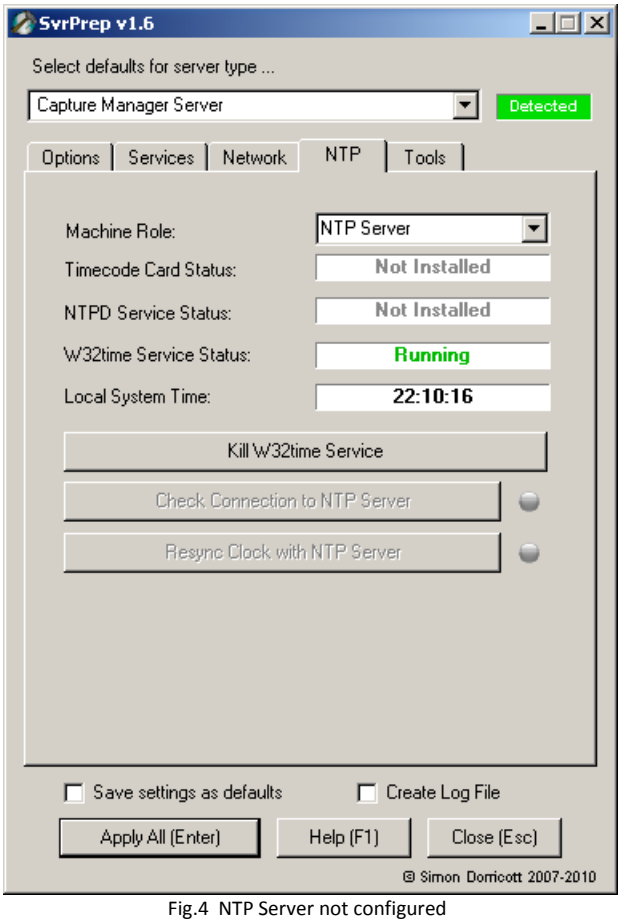


Fig.4 NTP Server not configured

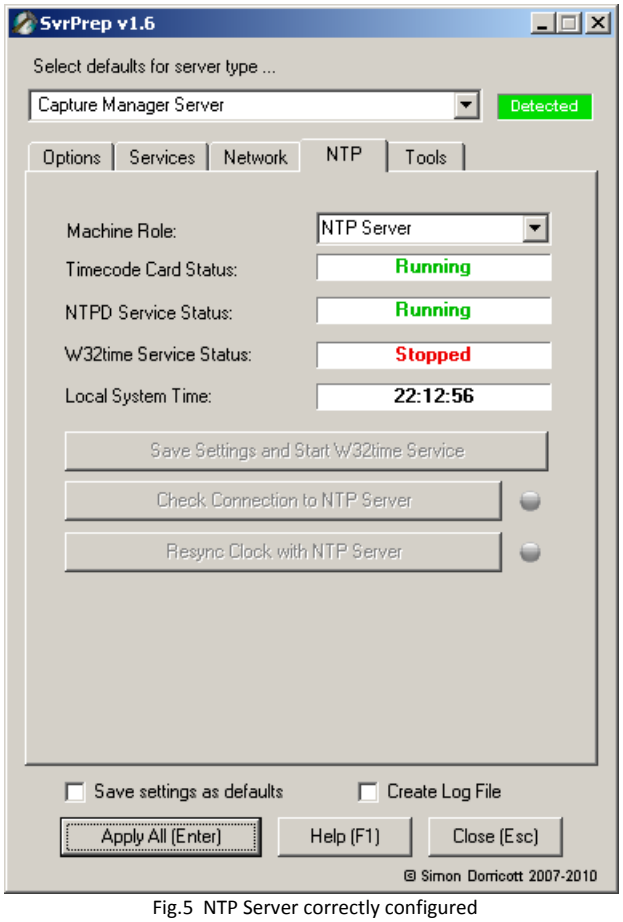


Fig.5 NTP Server correctly configured

Fig.4 above shows that either the Timecode Card or its service are not installed, that NTPD is not installed and that the Windows W32time service is still running.

In Fig.5 both the Timecode Card and NTPD are running correctly and the W32time service has been stopped by clicking the "Kill W32time Service" button.

Alternatively, open the Services page in the System Management Console and verify that both the "NTPD" and "AEC PCI ClockSet Service" (or similar) services are running and that the "Windows Time" service is disabled and stopped.

Windows Client Synchronisation

Most Windows clients are set by default to use the W32time service synchronise their time every 7 days to an internet NTP server (usually *time.windows.com*). This is not suitable for Interplay client systems as their time must be locked to system timecode and the internal clock will drift by more than the 100 frames tolerance.

NTP Configuration

Windows clients should be set to resynchronise with the NTP server every 1-3 hours to maintain an accurate time. NTP client settings can be easily configured using the NTP tab of either EdPrep or SvrPrep as shown below in Fig.6:

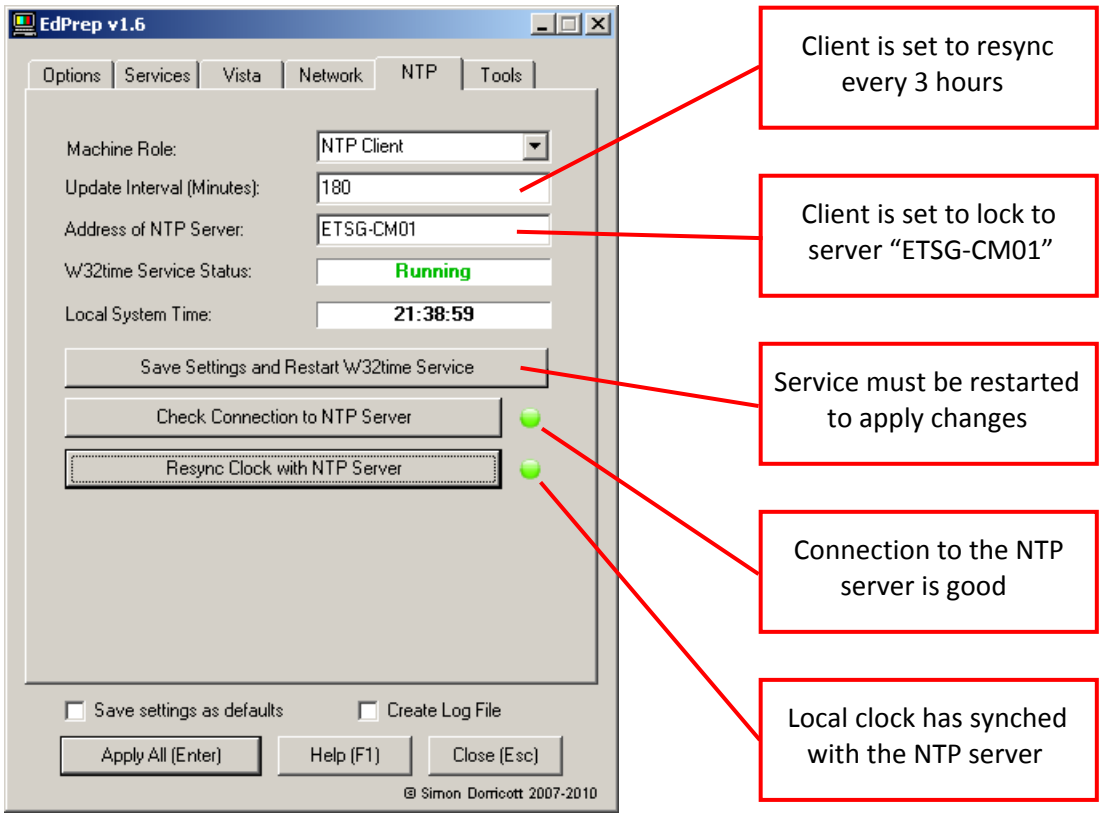


Fig.6 Configuring a Windows client with EdPrep

When using NTP for synchronisation, install the ATSS but disable it as shown below. This ensures that the ATSS will continue to provide time-stamps for Interplay Log Files but not cause a conflict by trying to set the system clock.

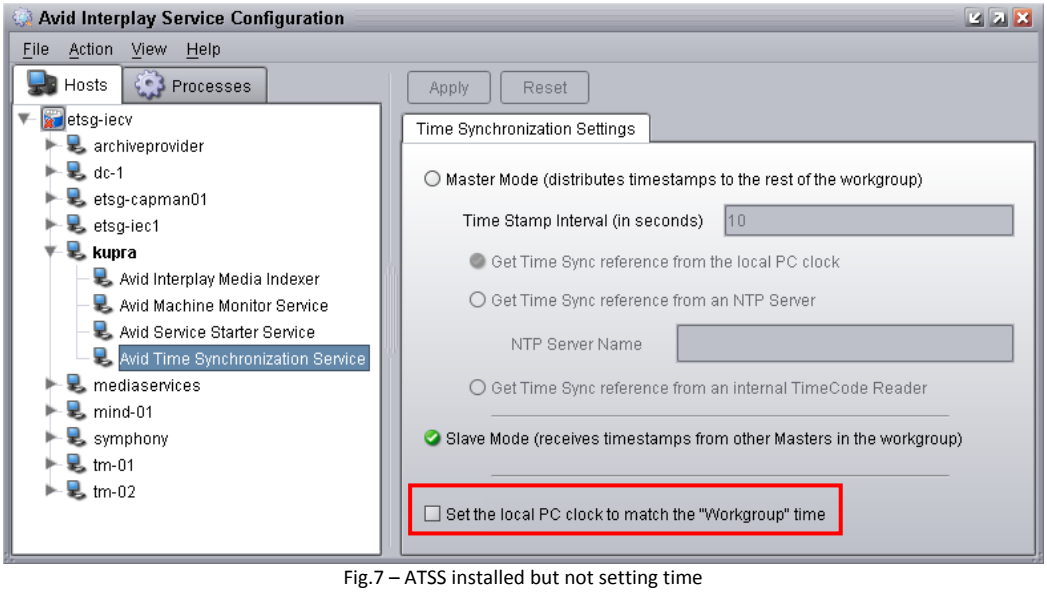


Fig.7 – ATSS installed but not setting time

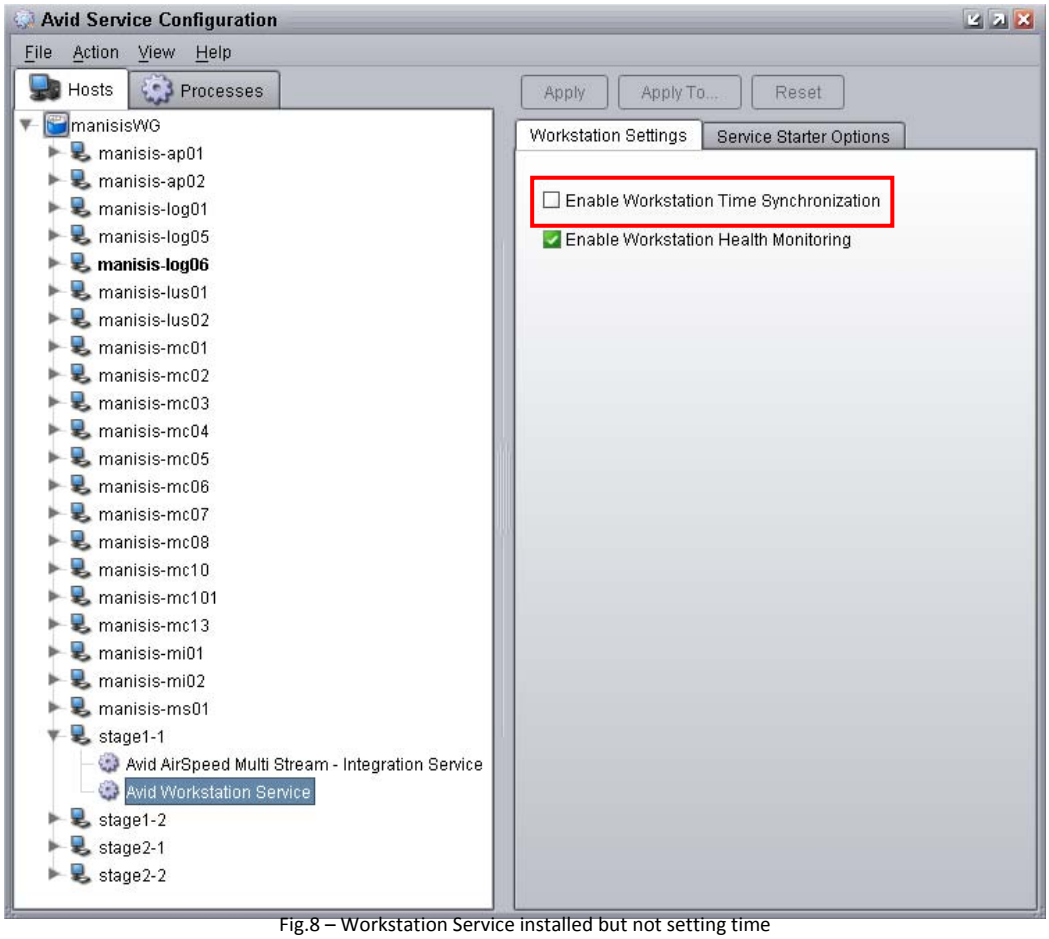


Fig.8 – Workstation Service installed but not setting time

Setting the Time Zone and Regional Settings

Select an identical Time Zone for the client to that set on the NTP server. The client will fail to lock to a server set to a different Time Zone. Set the system's Regional Settings to match the server and determine whether or not a 24-hour clock is to be used. The clock setting for the selected locale may be overridden with the Regional Settings in Control Panel. See the section *Setting the Time Zone and Regional Settings* above for more information.

ATSS (Avid Time Synchronization Service) synchronisation

If you have decided to use ATSS instead of NTP on a client you should first disable the Windows Time service. This can be done easily using the NTP tab of either EdPrep or SvrPrep as shown:

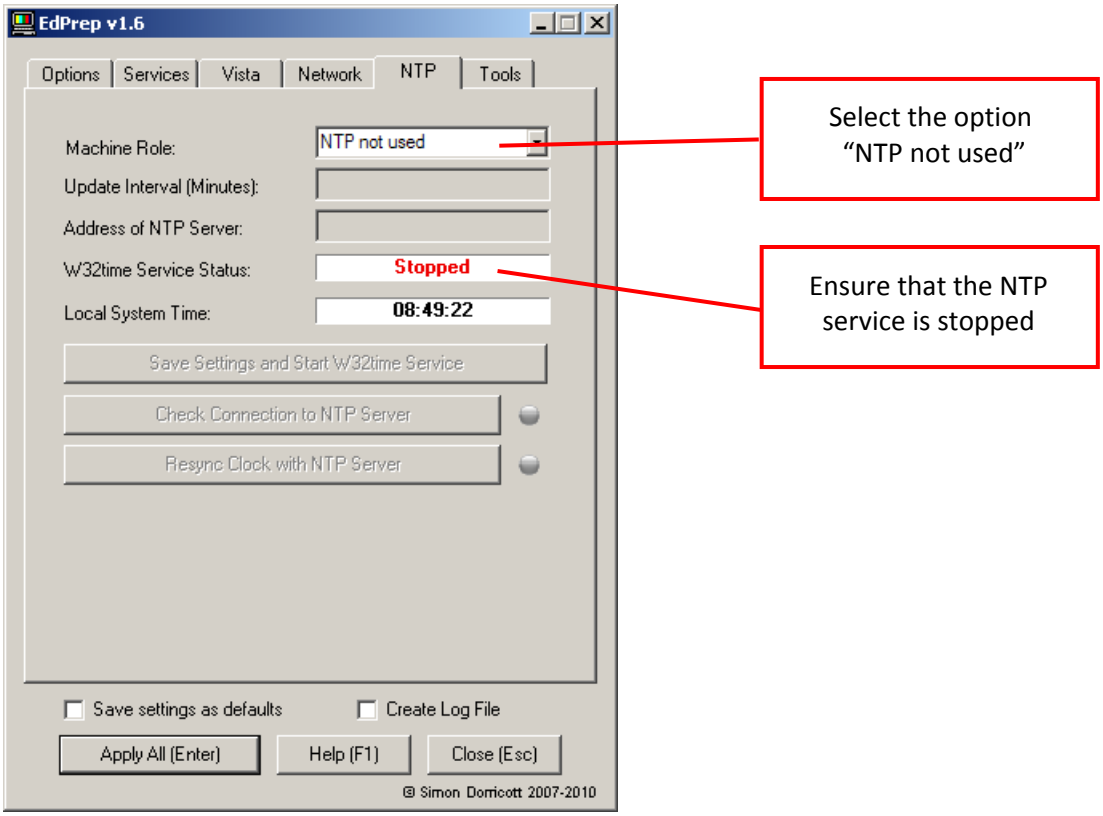


Fig.9 Turning off NTP with EdPrep

Configure the Avid Time Synchronization Service itself as shown in Fig.10 making sure to check the option to "*Set the local PC clock to match the 'Workgroup' time*" option. An ATSS Master must be configured for the client to lock to - see the section *Avid Time Synchronization Service* above for more information.

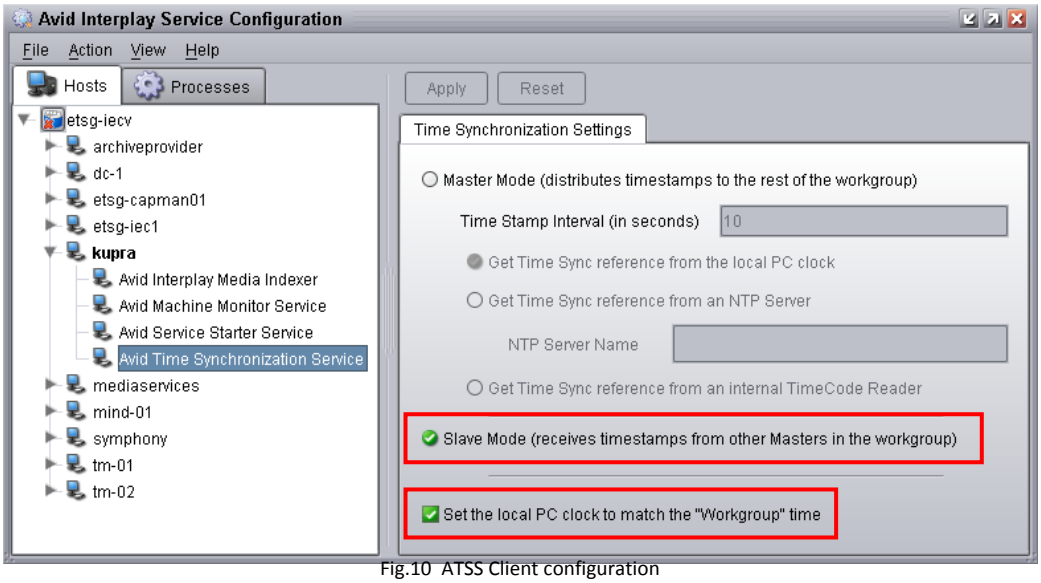


Fig.10 ATSS Client configuration

Unity MediaNetwork synchronisation

If the system is a Unity MediaNetwork client (either Fibre or Ethernet attached) then you may decide to use Connection Manager to synchronise with the File Manager or MediaEngine by selecting "Synchronise your system's clock with the server's clock" from the Advanced options as shown in Fig.11 below:

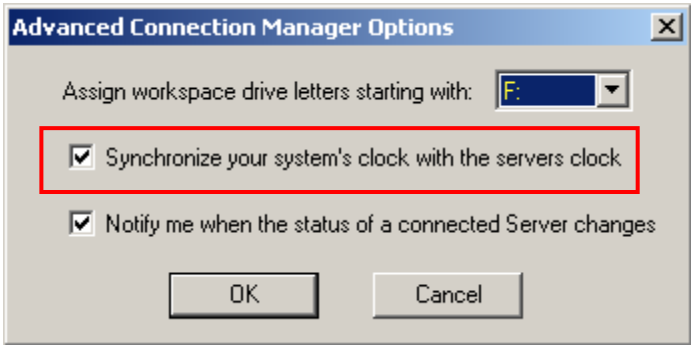


Fig.11 Configuring Windows Connection Manager

When using this feature, ATSS should not be used and the Windows Time Service (NTP) should be disabled locally. This is easily performed with EdPrep as shown in Fig.7 above.

Note that an Avid Unity MediaEngine should never be configured as an NTP server. To ensure that Unity MN clients synchronised by the above method receive an accurate time it should be locked to an external NTP server in the same way as any other Windows client.

Domain Time

In a domain, domain controllers can broadcast time stamps to the computers in the domain, possibly in conflict with NTP or ATSS. If using either of these please ensure that domain time is disabled.

Domain time is difficult to synchronise with timecode and should be avoided unless absolutely required. If domain time must be used, the domain controller **must** be synchronised to a time server which is, in turn, synchronised to house timecode. In line with Avid recommendations, ensure that all Avid machines are in their own domain which has its own Active Directory and DNS and establish a trust to the in house domain.

Macintosh Client Synchronisation

Most Macintoshes are set by default to synchronise their time with an internet NTP server (usually *time.apple.com, time.euro.apple.com* or *time.asia.apple.com*). This is not suitable for Interplay client systems as the time must be locked to system timecode with a tolerance of 100 frames.

NTP Configuration

As a flavour of Unix, MacOS-X runs an NTP daemon by default. To configure this to lock to the Capture or CaptureManager server, open the "*Date & Time*" dialogue by clicking on the clock at the top left of the screen and selecting "*Date & Time Preferences …*" as shown:

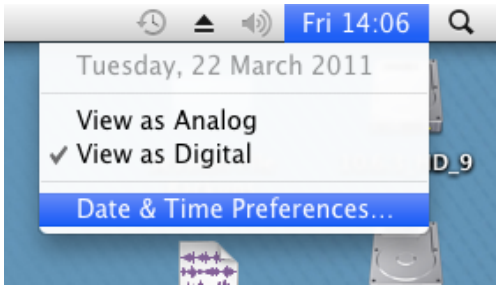


Fig.12 – Macintosh Date & Time preferences

You will then be presented with the following dialogue where the address of the NTP server can be entered:

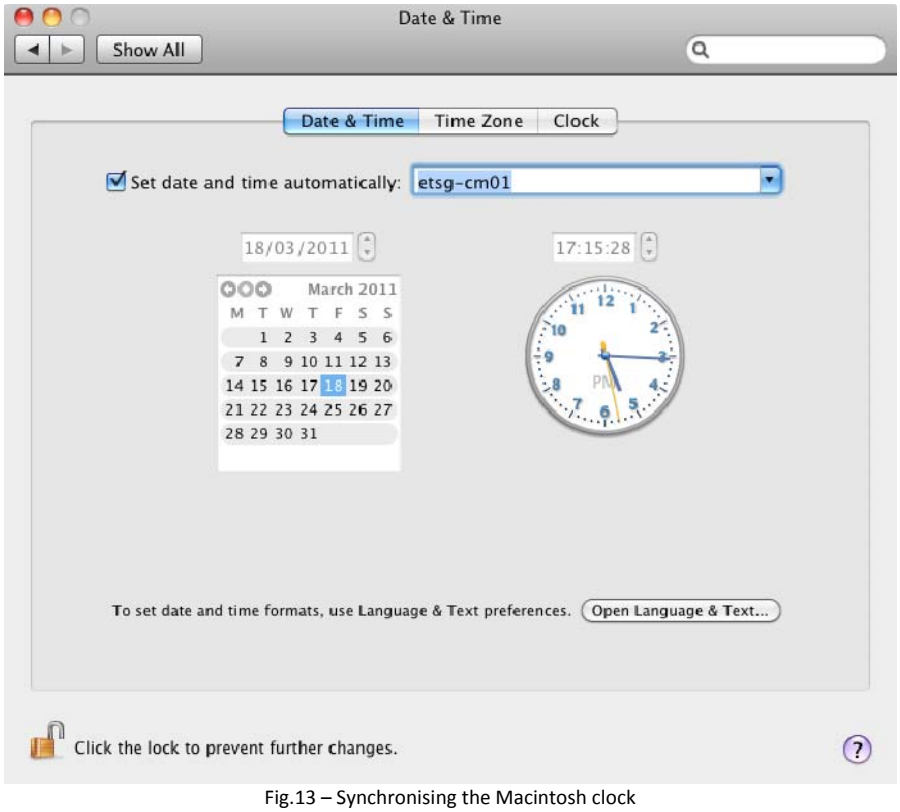


Fig.13 – Synchronising the Macintosh clock

You should see the clock lock to the server fairly soon after entering the new address. Alternatively, open a terminal window and use the Unix command-line commands *NTPDC* and *NTPDATE* as described in the AirSpeed and ALRE sections below.

Setting the Time Zone and Regional Settings

Select an identical Time Zone for the client to that set on the NTP server. The Macintosh will fail to lock to a server set to a different Time Zone. Set the Mac's Time Zone to match the server from the following dialogue:

Fig.14 – Setting the MacOS time zone

Unity MediaNetwork synchronisation

If the Macintosh is a Unity MediaNetwork Ethernet Attached Client then you may decide to use Connection Manager to synchronise with the File Manager or MediaEngine by selecting "*Synchronise the system clock with the server*" as shown in Fig.15 below:

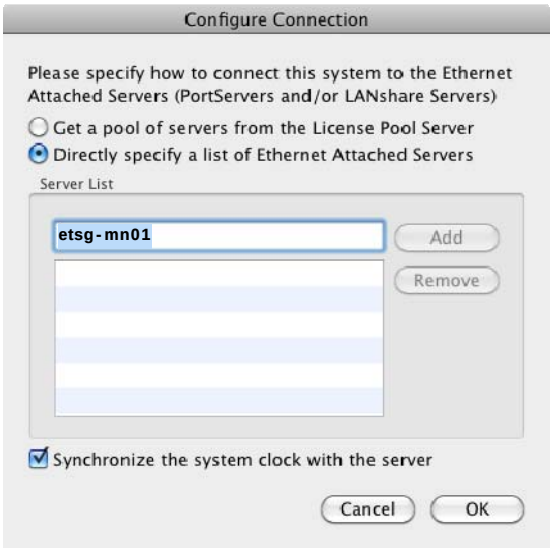


Fig.15 Configuring Connection Manager

This option is not available for Fibre Attached Clients which should be configured to use NTP Instead as described above.

Note that an Avid Unity MediaEngine should never be configured as an NTP server. To ensure that Unity MN clients synchronised by the above method receive an accurate time it should be locked to an external NTP server in the same way as any other Windows client.

AirSpeed Time synchronisation

The original AirSpeed (FreeBSD Unix Operating System) runs NTPD by default. This is configured as follows:

NTP Server address

Use VNC to access the AirSpeed GUI, go to the setup page, select the Network tab and check that the IP address of the NTP server is entered correctly as shown below:

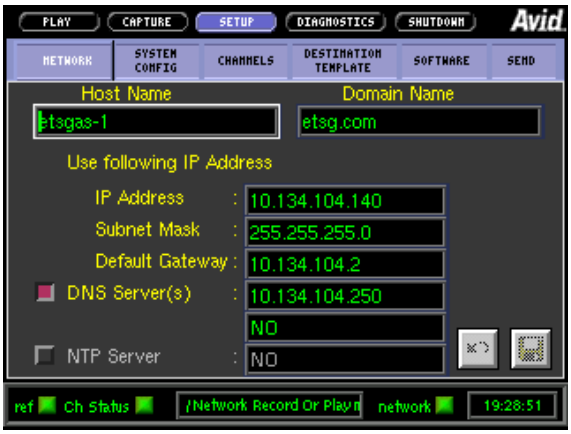


Fig.16 AirSpeed NTP Server not set

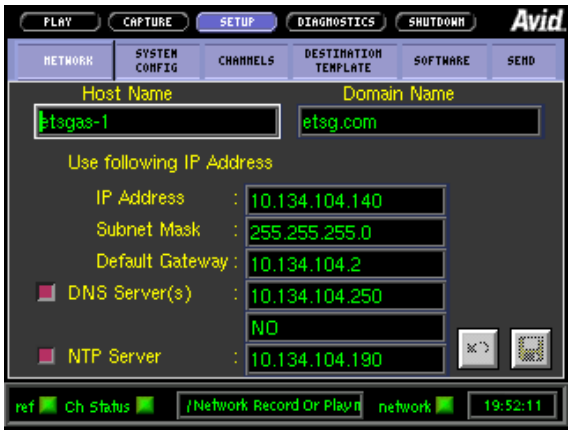


Fig.17 AirSpeed NTP Server set correctly

Once entered you will be prompted to restart the AirSpeed. If, when the unit has restarted, the NTP Server field remains blank and the indicator remains dark then the AirSpeed is unable to contact the NTP server or the address entered was incorrect. If the correct address was entered then the network configuration should be checked and rectified.

Setting the Time Zone

To perform the following actions, connect to the AirSpeed via telnet either the Windows command-line, PuTTY or another Telnet application with the following credentials:

Login Name: **maint** Password: **mars**

The Time Zone on an AirSpeed is set by copying (or creating a symbolic link to) a suitable "*zoneinfo*" file to the file "*localtime*" in the folder */etc*. The following example shows how to set the time zone to GMT. At the % prompt type the following:

```
cp /usr/share/zoneinfo/GMT /etc/localtime
```

This will copy the file *GMT* from the folder *zoneinfo* to the file *localtime* in the folder *etc*. Alternatively, create a symbolic link by typing the following commands at the % prompt:

```
cd /etc
rm localtime
ln -s /usr/share/zoneinfo/GMT localtime
```

This will create a symbolic link to the file which has the advantage that you can see which time zone the AirSpeed is set to by typing the following command:

```
ls -l /etc/loc*
```

```
[etsgas-1 ]% ls -l loc*
lrwxr-xr-x  1 root  wheel   23 Jul  5 14:36 localtime -> /usr/share/zoneinfo/GMT
-rw-r--r--  1 root  wheel  619 Oct 27  2003 locate.rc
```

Fig.18 Checking the time zone on an AirSpeed

The above example shows how to set the time zone to GMT. If a different time zone is required then those available can be displayed by typing the following line at the % prompt:

```
ls /usr/share/zoneinfo
```

Substitute the name of the chosen time zone file for "GMT" in the above examples (remember that Unix is case sensitive). Note that the zoneinfo folder contains further time zone files in various subdirectories.

Verifying Synchronisation

To check that the AirSpeed is synchronised with the NTP server, type the following at the % prompt:

Type **`date`** to check the current date, time and time zone
Type **`ntpdate –u <`***NTP server IP Address***`>`** to force an update from the NTP server
Type **`date`** again to check that the new date and time are correct
Type **`ntpdc –c peers`** to check that the system is locked to the NTP server

```
[etsgas-1]% date
Thu Nov  6 17:49:10 GMT 2010
[etsgas-1 ]% ntpdate -u 10.134.104.190
6 Nov 18:33:57 ntpdate[1104]: step time server 10.134.104.190 offset 10528.125687 sec
[etsgas-1 ]% date
Thu Nov  6 18:34:11 GMT 2010
[ingest7]% ntpdc -c peers
     remote           local      st poll reach  delay   offset    disp
==============================================================================
*etsg-cm01.etsg. 10.134.104.190   3  128  377 0.00017  0.002198 0.00534
[etsgas-1 ]%
```

Fig.19 Verifying AirSpeed NTP synchronisation

The "*" character just before the FQDN (Fully Qualified Domain Name) of the NTP server (shown here as *etsg-cm01.etsg*) indicates that the machine is locked.

A "=" sign just before the FQDN of the NTP server would indicate that a valid NTP server has been found but the system is not yet locked to it.

If neither are present (i.e. a space character) then the NTP server cannot be contacted. Additionally, the AirSpeed's "NTP Server" indicator (see above) will remain dark and the server address will not be retained. The network configuration should be checked and rectified.

The Stratum will be around 3 when the system is time locked. If the *ntpdate -u* command is not used then the system will take about 45 minutes to settle automatically. This will be more rapid (about 2 minutes) the next time the machine is restarted.

AirSpeed Multi Stream synchronisation

AirSpeed Multi Stream servers have ATSS installed by default but may, under some circumstances produce a status of “Unstable” in the Avid health monitor as shown below.

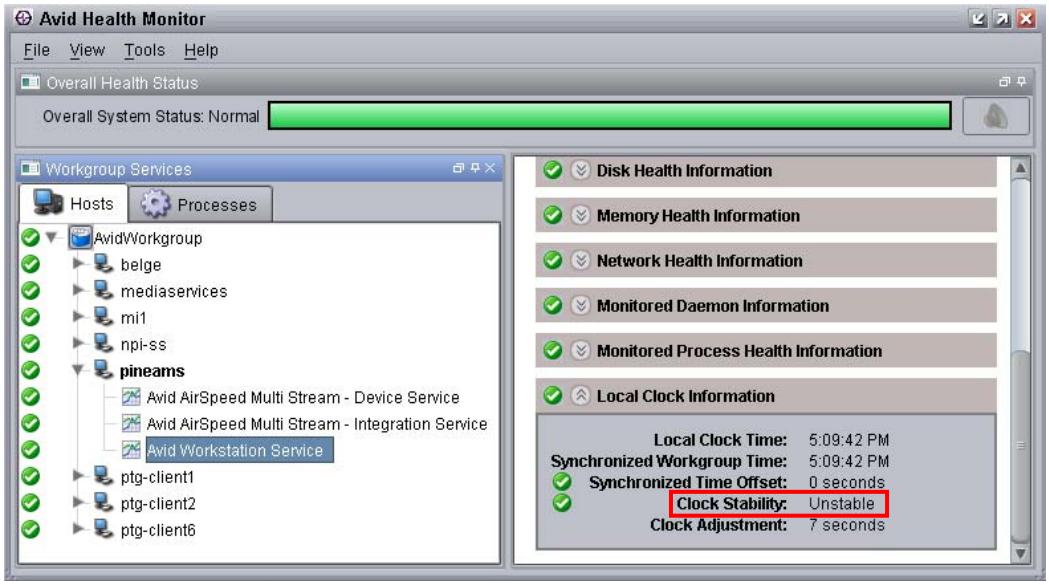


Fig.20 – Interplay Health Monitor showing Unstable time sync

To resolve this (or to use NTP instead of ATSS anyway) you can use NTP as the time synchronisation method. Unfortunately, the standard Microsoft W32time SNTP service does not work well on AMS so a local installation of NTPD must be performed.

First, disable ATSS time synchronisation as shown in Fig.21 below:

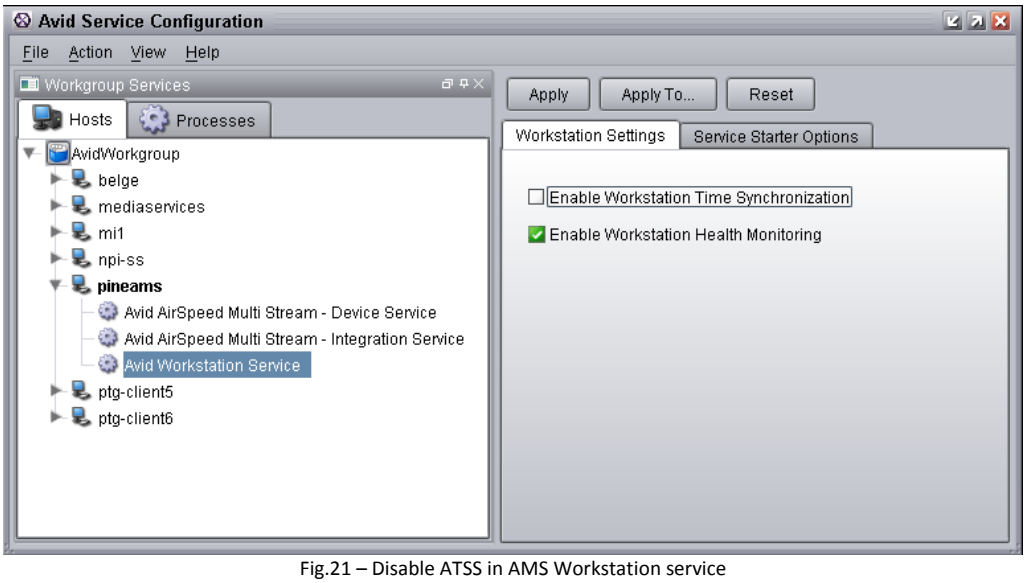
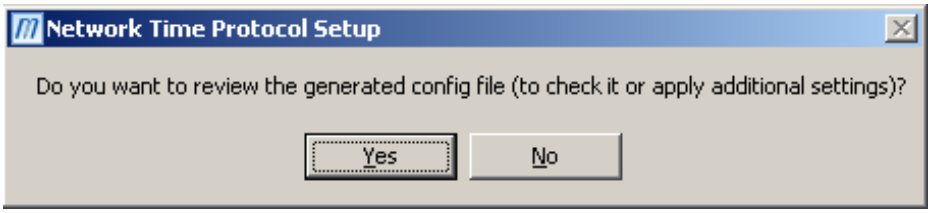


Fig.21 – Disable ATSS in AMS Workstation service

Following this, install NTPS as described above in the section *NTPD Installation* and proceed as described until you receive the following prompt:



Select “Yes” and then make the changes to the configuration file as highlighted below:

```
# NTP Network Time Protocol
# Configuration File created by Windows Binary Distribution Installer Rev.: 1.16  mbg
# please check http://www.ntp.org for additional documentation and background information
# Use drift file
driftfile "C:\Program Files\NTP\etc\ntp.drift"
# your local system clock, could be used as a backup
# (this is only useful if you need to distribute time no matter how good or bad it is)
server <NTP Server Address>  Remove the “#” from this line and enter the address of the NTP Server
# but it should operate at a high stratum level to let the clients know and force them to
# use any other timesource they may have.
# fudge 127.127.1.0 stratum 2
# End of generated ntp.conf --- Please edit this to suite your needs
```

For <NTP Server Address> enter the IP address of the NTP server and then save the file to continue the installation and continue to proceed as described.

Note that you may be required to reboot the AMS to complete the installation.

ALRE Time synchronisation

Like most Unix systems, ALREs run an NTP Daemon by default. The time, date and current time zone may be set from here by clicking on the *Adjust* button as shown below:

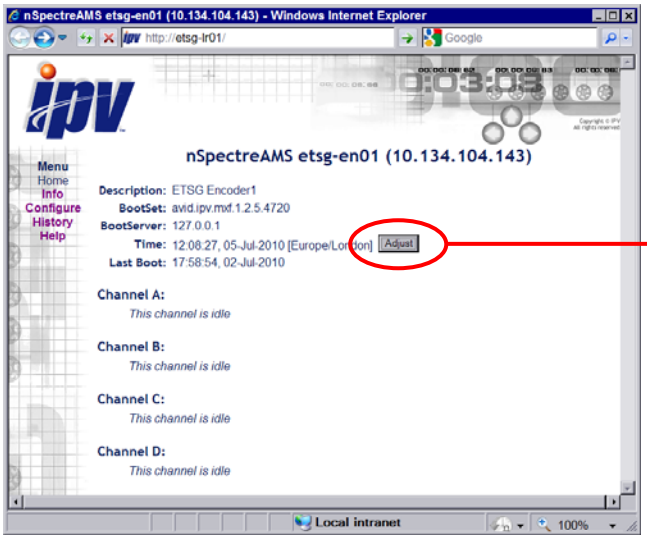


Fig.22 ALRE Main Page

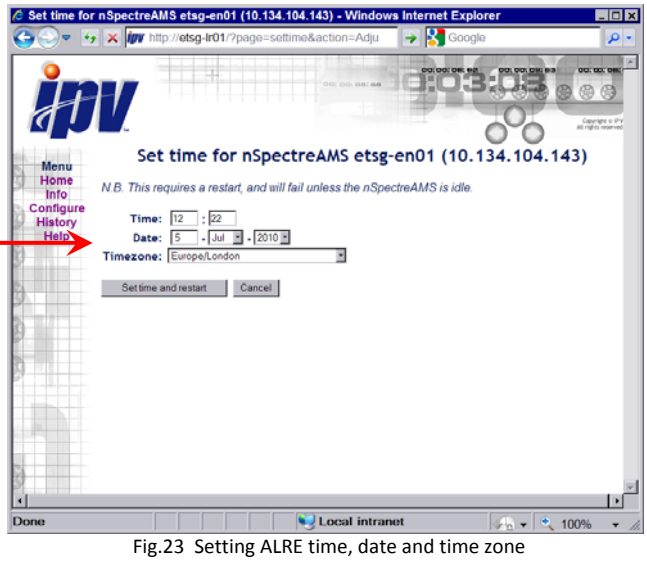


Fig.23 Setting ALRE time, date and time zone

Setting NTP Server address and Time Zone

The address of the NTP server may be viewed and changed from the *Configure* page. Select *Configure* from the menu on the left and then click the *Edit* button to make changes if required:

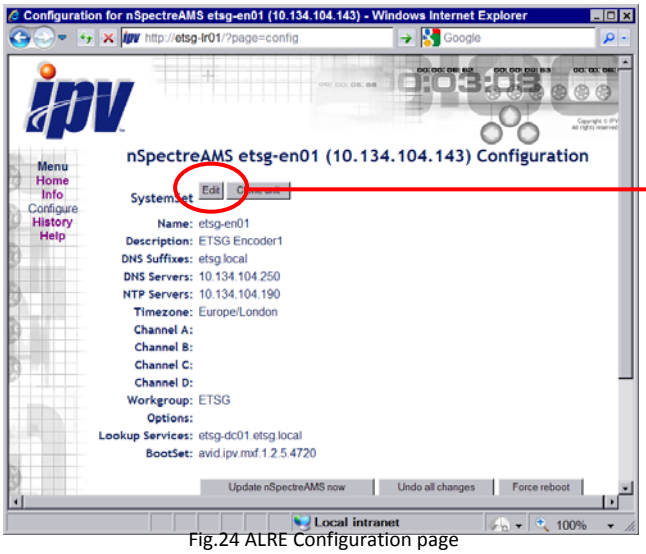


Fig.24 ALRE Configuration page

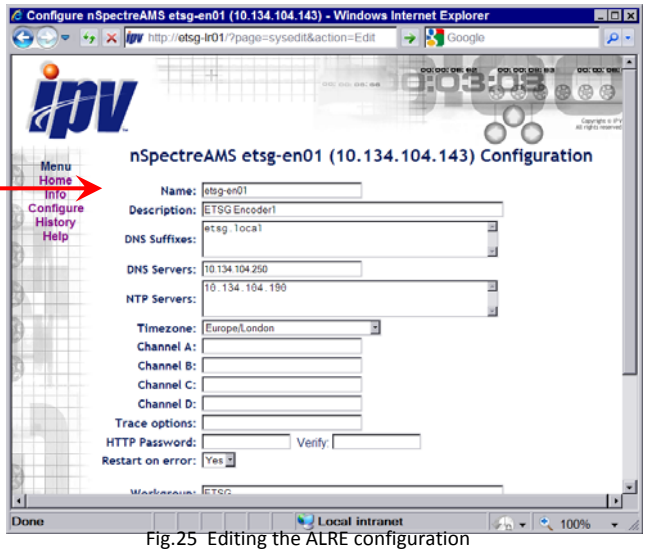


Fig.25 Editing the ALRE configuration

Enter the IP address of the NTP server in the *NTP Servers* box, select a suitable time zone (if not set above) from the combo box and apply the changes. This will return you to the *Configure* page where you will need to click the *Update nSpectreAMS now* button.

A restart should not be necessary unless you have made any other changes.

Verifying Synchronisation

To check the synchronisation you will need to connect to the ALRE via telnet using either the Windows command-line, PuTTY or another Telnet application with the following credentials:

Login Name: **root** Password: **willywonka**

To check that the ALRE is synchronised with the NTP server, type the following at the # prompt:

Type **date** to check the current date, time and time-zone
Type **ntpdate –u <** *NTP server IP Address*> to force an update from the NTP server
Type **date** again to check that the new date and time are correct
Type **ntpdc –c peers** to check that the system is locked to the NTP server:

```
[root@etsg-lr01 ~]# date
Tue Nov 11 09:00:10 WET 2008
[root@ etsg-lr01~]# ntpdate -u 10.134.104.190
11 Nov 11:55:57 ntpdate[1104]: step time server 10.134.104.190 offset 10528.125687 sec
[root@ etsg-lr01~]# date
Tue Nov 11 11:56:06 WET 2008
[root@ etsg-lr01~]# ntpdc -c peers
     remote           local      st poll reach  delay   offset    disp
==============================================================================
*etsg-cm01.etsg. 10.134.104.190   3   64  377 0.00023 -0.000482 0.00266
[root@ etsg-lr01 ~]#
```

Fig.26 Verifying ALRE NTP synchronisation

The "*" character just before the FQDN (Fully Qualified Domain Name) of the NTP server (shown here as *etsg-cm01.etsg*) indicates that the machine is locked.

A "=" sign just before the FQDN of the NTP server would indicate that a valid NTP server has been found but the system is not yet locked to it.

If neither are present (i.e. a space character) then the NTP server cannot be contacted and the network configuration should be checked and rectified.

The Stratum will be around 3 when the system is time locked. If the *ntpdate -u* command is not used then the system will take about 45 minutes to settle automatically. This will be more rapid (about 2 minutes) the next time the machine is restarted.

Unity ISIS Synchronisation

In order to ensure that all media files are appropriately time stamped, both ISIS System Directors must be accurately time synchronised. It is not supported to install the Interplay Framework on System Directors and so they must be configured as NTP clients (see *Windows Client Synchronisation* above) in order to synchronise to the time server.

Each ISIS Switch and Storage blade runs a Unix Operating System and an NTP Daemon should be enabled to ensure that each is on the correct time. Note that ISIS blades are not DST aware. All blades can be set simultaneously with a single operation through an ISIS Switch Blade Agent, preferably the stack master.

Log into the ISIS Blade Agent (password: **`se-admin`**) and choose *Basic* from menu on the left. You will see a screen similar to that below. Check the *Enable network time protocol* box to enable the daemon, enter the NTP server address in the first box, set the Time Zone and click the submit button.

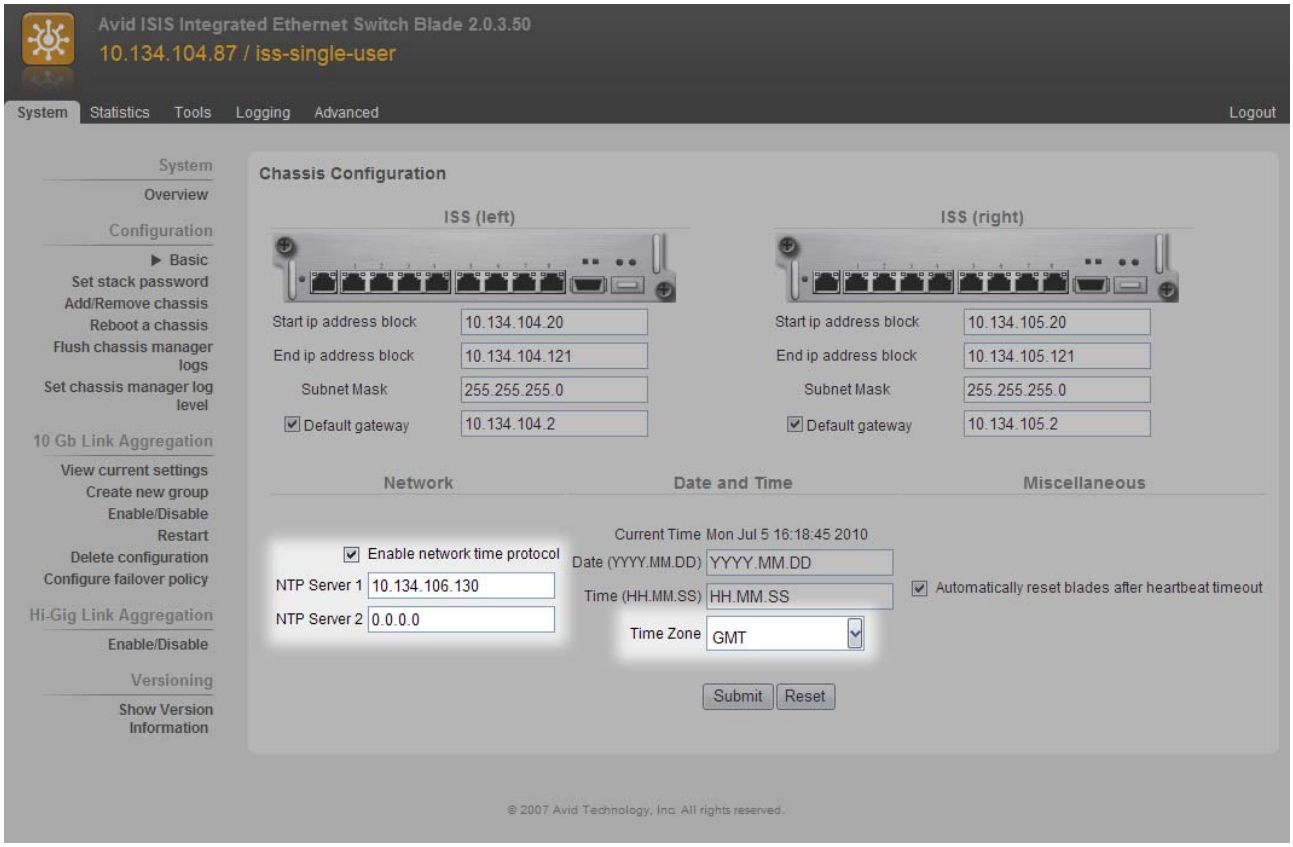


Fig.27 ISIS Blade Synchronisation

A screen showing progress of the operation will be displayed and the operation should complete after a short while. Note that there may be an interruption to the operation of the ISIS while this happens so do not perform this operation at a critical time.

Notes

EdPrep, SvrPrep and the package containing this document may be downloaded from http://emeacs.avid.com and may also be requested from Avid support staff.

EdPrep and the package containing this document may also be downloaded from the Avid Knowledge base.

EdPrep is also available for download outside Avid from http://www.preptools.net.

Time Synchronisation for Avid® Interplay™ systems

Simon Dorricott
Avid CS EMEA
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