

DeltaV™ Network Time Synchronization

This document describes how DeltaV™ system time is managed for Version 5.2 onward.



The Symmetricom SyncServer S250 is the supported NTS for the DeltaV system.

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Introduction

Starting with version 5.2, the DeltaV™ system makes use of a new method for maintaining the system time on DeltaV workstations and controllers. This method is called "Network Time Protocol" (NTP). The DeltaV system uses NTP to keep all the DeltaV workstations and controllers in synchronization with a master timeserver.

The reasons for this change are:

- To support the Sequence of Events (refer to the SOE product data sheet) capability, which requires very accurate time synchronization between Control Network devices.
- To support an external time source.

Network time protocol

Network Time Protocol (NTP) is a standard communication protocol that allows computers to synchronize with a timeserver across a network. NTP timeservers are arranged in a hierarchy. At the top (Stratum 1) are the primary servers. Then come secondary servers (Stratum 2) and so on down to Stratum 16. A Stratum 1 NTP timeserver is a network device that receives its time directly from some standardized reference time source such as Coordinated Universal Time (UTC). The link between a Stratum 1 NTP timeserver and the reference time source is normally via a radio or satellite receiver (eg. Global Positioning System—GPS) or modem. Stratum 2 timeservers receive their time from the Stratum 1 servers. NTP-enabled computers attempt to communicate with the highest level of NTP server that is available on the network.

DeltaV Time Synchronization

Standard System—not using a Stratum 1 NTP Server

The DeltaV system supports master and backup timeservers as a standard feature, as of v5.2. These timeservers can be any local DeltaV workstation and they are lower down in the NTP hierarchy. The master and backup timeservers are defined under the **Properties** of the **Physical Network** in DeltaV Explorer.

By default, the master timeserver is the ProfessionalPLUS Station. The backup timeserver can be any local workstation other than the master timeserver. A download of the **Setup** for the **Control Network** is required if a timeserver is changed to a different workstation.

For DeltaV workstations on a remote network, the remote workstations configured Remote Access Server is the master timeserver.

To set the time on a DeltaV system that isn't using Stratum 1 NTP servers, the existing **Set/Synchronize Network Time** utility is used.

The time synchronization accuracy for workstations and controllers can be expected to be plus/minus 50ms in this configuration.

Using Stratum 1 NTP Time Servers Directly Attached to the DeltaV Control Network

If a Stratum 1 NTP timeserver is installed on the control network, then the DeltaV workstations and controllers will automatically get their time from this server instead. Even the workstations that are defined as master/backup timeservers will request time synchronization messages from this NTP server because it is higher up in the NTP hierarchy. Both master and backup Stratum 1 NTP servers may be deployed.

If the master NTP server becomes unavailable, then the DeltaV nodes will seek the next-highest timeserver, which will be the backup NTP server, if available. If there is no backup NTP server, then the DeltaV workstations that are defined as timeservers will take over.

The Stratum 1 NTP timeservers **must** be configured with certain predefined IP addresses for them to work on the DeltaV control network. Refer to Table 1 below for these addresses. The configuration of these IP addresses is done through the NTP device configuration software and not through any DeltaV application.

Stratum 1 NTP timeserver addresses for the DeltaV control network

	Primary Control Network Address	Secondary Control Network Address
Master NTP Server	10.4.128.1	10.8.128.1
Backup NTP Server	10.4.128.2	10.8.128.2

The **Set/Synchronize Network Time** utility shouldn't normally be used when a Stratum 1 NTP server is in use. The utility will not change the time on the NTP server. The only reason to use this utility should be to set the time on a workstation to be very close to the NTP server time. This helps the workstation achieve quicker synchronization with the NTP server.

The time synchronization accuracy for workstations, using 100Mb ethernet, can be expected to be plus/minus 10ms in this configuration. For MD controllers, using 100Mb ethernet, the accuracy will be plus/minus 1ms. For other controllers, using 10Mb ethernet, the accuracy will be plus/minus 10ms. These accuracies can be achieved only when the Stratum 1 timeserver is directly connected to the DeltaV control network.

The following network topologies are supported for the control network:

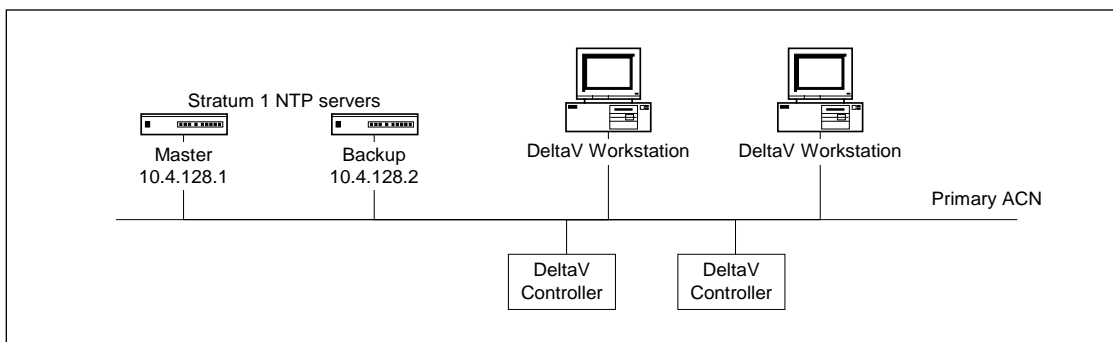


Figure 1. Simplex DeltaV control network with a master and backup NTP server

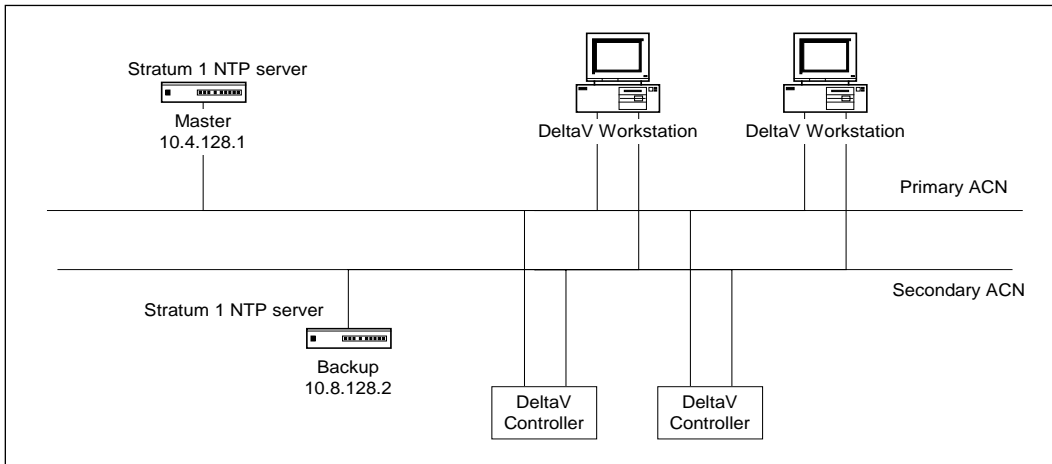


Figure 2. Redundant DeltaV control network with a master and backup NTP server

This is the standard topology for a redundant Control Network. Alternative topologies are shown in Figures 3 and 4.

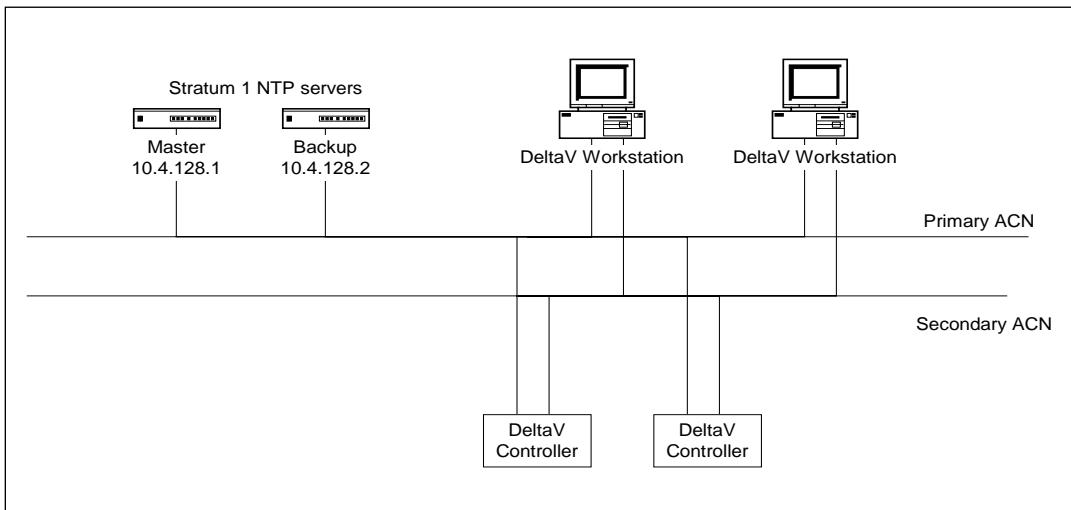


Figure 3. Redundant DeltaV control network with a master and backup NTP server (Alternate 1)

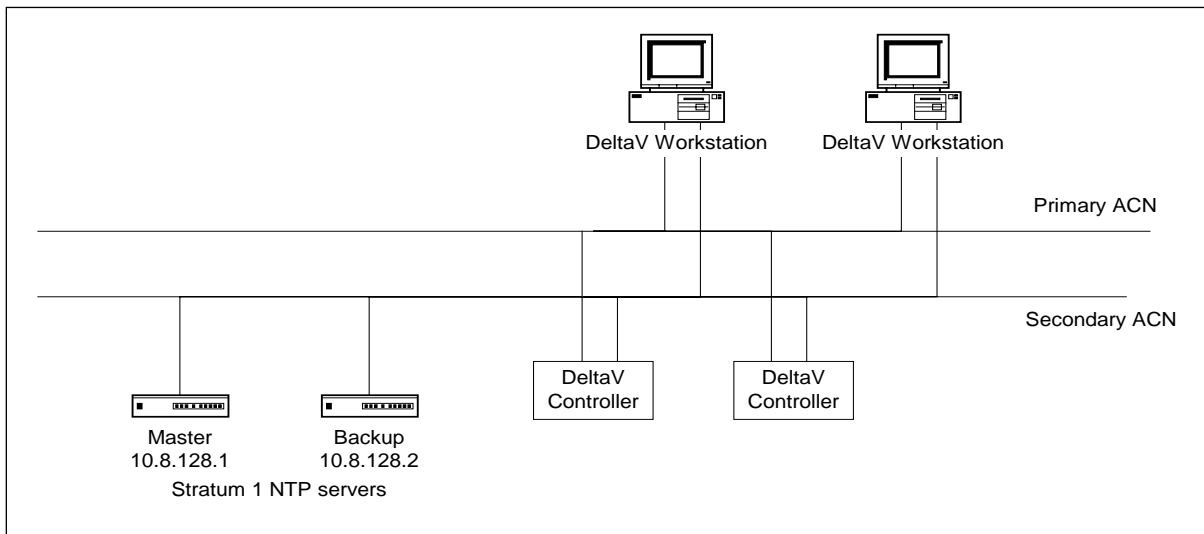


Figure 4. Redundant DeltaV control network with a master and backup NTP server (Alternate 2)

Using Stratum 1 NTP Timeservers on a Remote DeltaV Network

For remote DeltaV networks, the same basic topologies as described above for the control network are supported. For simplex remote networks, both the master and backup NTP servers are attached to the same remote network. For redundant remote network configurations, the standard configuration will be to have the master NTP server on the primary remote network and the backup NTP server on the secondary remote network. Configurations with both the master and backup NTP servers on the primary remote network or both on the secondary remote network are also supported.

The IP addresses for NTP timeservers on a remote DeltaV network are not controlled by the DeltaV system. However, the DeltaV system needs to be told what these addresses are so that the remote workstations know where to request time from. These IP addresses must be defined under the **Properties** of the **Remote Network** in DeltaV Explorer. A download of the **Setup Data** for the workstation that contains the remote network is required if a timeserver IP address is changed.

The following is a typical configuration with both a redundant control network and a redundant remote network:

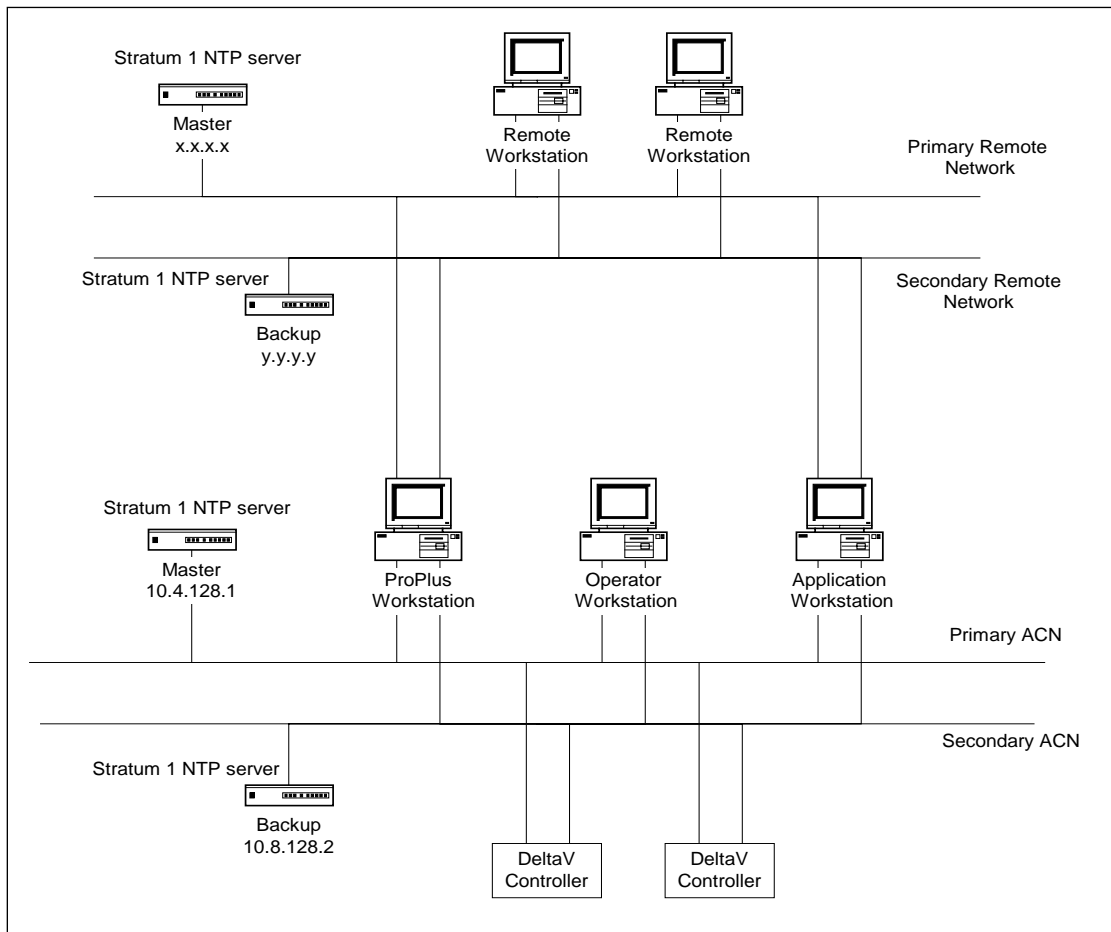


Figure 5. Remote DeltaV network with a master and backup NTP server

Using Stratum 1 NTP servers on a Remote Network to Set the Time on the DeltaV Control Network

It is possible to synchronize the time on the control network with a Stratum 1 NTP server on a remote network. To do this, the NTP server is used to synchronize the time of the workstation that is connected to the remote network. This workstation is also defined as the master timeserver for the control network. See Figure 6 below:

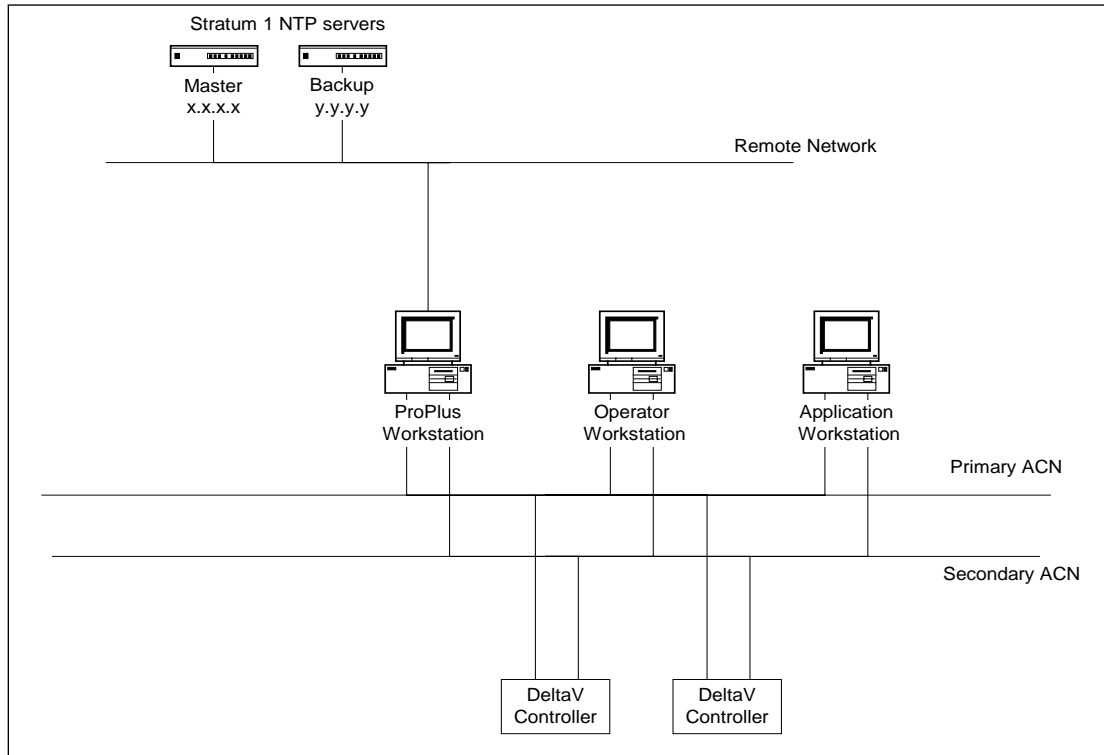


Figure 6. DeltaV control network with a remote NTP server

Time Server Devices

The recommended Stratum 1 NTP timeserver device is the Symmetricom SyncServer S-250 from Datum (<http://www.datum.com>). The time server must support NTP Version 3. This is the only model that has been tested with the DeltaV system. The S-250 supports both NTP (used by the DeltaV system) and IRIG-B (used by Ovation) for time synchronization; therefore, we are able to provide one solution for both platforms.

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