The Network Time Protocol (NTP) is a time synchronization system for computer clocks through the Internet network. It provides the mechanisms to synchronize time and coordinate time distribution in a large, diverse internet operating at rates from mundane to light wave. It uses a returnable time design in which a distributed sub network of time servers, operating in a self-organizing, hierarchical master-slave configuration, synchronize logical clocks within the sub network and to national time standards via wire or radio.

Additional information can be found at the NTP web site www.ntp.org.
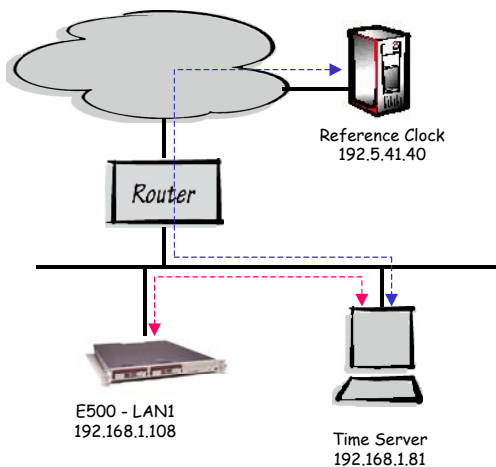
In this scenario I run a local time server to provide clock reference to internal LAN. This is actually the only device allowed to pass the firewall based on NTP/STNP to synchronize with a Stratum reference clock. As a freeware time server application I've used „Absolute Time Server v 2.0 beta" on my local Time Server. I also suggest before testing time synchronization with the appliance to run a Time Tool on a test client to proof SNTP communication. There is a bunch of Time Server tools available, providing NTP on Port 37 per RFC 868, those **will not** work with the appliance. The Appliance supports SNTP on port 123 only, based on RFC 2030.

To configure the appliance for time synchronization you have to edit WebShield.XML based on the example below. After modifying and restoring the configuration onto the appliance perform a complete reboot. The time synchronization will happened during the startup process.

```
<Service ID="DF311E90_E25A_11D5_B87F_00B0D03A936B" name="ntp" realname="ntp" type="def">
        <Property cname="Name" wsn="name">NTPD</Property>
        <Property cname="State" wsn="state">ON</Property>
        <Property cname="Monitor" wsn="monitor">yes</Property>
        <Property cname="ProcessName" wsn="name">ntpd</Property>
        <Property cname="NTPServers" wsn="ntp-servers" wsn="ntp-servers">192.168.1.81</Property>
        <Property cname="AllowRestart" wsn="allowrestart">yes</Property>
        <Property cname="AllowableRestartConditions" wsn="allowable-restart">NOTRUNNING</Property>
        <Property cname="RestartConditions" wsn="restart-conditions">NOTRUNNING</Property>
        <Property cname="Proxy" wsn="proxy">no</Property>
        <Property cname="Threaded" wsn="threaded">no</Property>
        <Property cname="Restart"
wsn="restart">/opt/NETAwss/usr/local/etc/mgmt/restart_service</Property>
        <Property cname="RestartParam" wsn="restartparam">ntpd</Property>
</Service>
```

While NTP functionality is locked down to protect against hacking, it is one more reason to keep the Appliance behind the company firewall. I also suggest to connect to an internal Time Server, which serves the environment using SNTP.

The tool I've used:

ABSOLUTE TIME SERVER 2.0. This Time Server can run NTP (TCP Port 37, UDP Port 37) and SNTP (UDP on Port 123). To adjust time on WebShield Appliance you have to serve SNTP on Port 123. You can download them from http://www.timeutilites.com/

Some detailed Information for Experts

The format of the header is shown in the following illustration:

LI	VN	Mode	Stratum	Poll	Precision
2	3	3	7	6	7 bits

NTP header structure

LI Leap Indicator

A 2-bit code warning of impending leap-second to be inserted at the end of the last day of the current month. Bits are coded as follows:

00   No warning.
01   +1 second (following minute has 61 seconds).
10   -1 second (following minute has 59 seconds).
11   Alarm condition (clock not synchronized).

VN

Version number 3 bit code indicating the version number.

Mode

The mode: This field can contain the following values:

0   Reserved.
1   Symmetric active.
3   Client.
4   Server.
5   Broadcast.
6   NTP control message.

Stratum

An integer identifying the stratum level of the local clock. Values are defined as follows:

0   Unspecified.
1   Primary reference (e.g. radio clock).
2...n   Secondary reference (via NTP).

Poll

Signed integer indicating the maximum interval between successive messages, in seconds to the nearest power of 2.

Precision

Signed integer indicating the precision of the local clock, in seconds to the nearest power of 2.
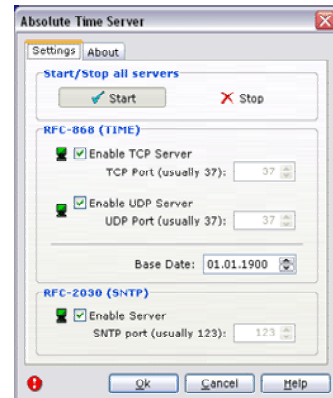
Two Frames showing NTP Comminunication, where TimeServer is local and 192.5.41.40 is a fake Stratum Reference Clock

```
TimeServer2Stratum.cap: Decode, 1/2 Ethernet Frames                    _ □ ×

 No.   Status  Source Address   Dest Address      Summary                 Len [B] Delta Time   Rel. Time
 1     M       TimeServer       [192.5.41.40]     NTP/SNTP:  Version 1     90      0.000.000    0:00:00.000
 2             [192.5.41.40]    TimeServer        NTP/SNTP:  Version 1     90      0.147.082    0:00:00.147

 NTP: ----- NTP/SNTP header -----
    NTP:
    NTP: LI, VN, Mode:        = 0B
    NTP:             00.. .... = Leap Indicator 0(no warning)
    NTP:             ..00 1... = Version Number 1
    NTP:             .... .011 = Mode 3(client)
    NTP: Stratum             = 0 (unspecified)
    NTP: Poll                = 0 (invalid)
    NTP: Precision           = 0 (1 seconds)
    NTP: Root Delay          = 0. seconds
    NTP: Root Dispersion     = 0. seconds (invalid)
    NTP: Reference Clock ID  = (Unknown)
    NTP: Reference Timestamp = 0 (undefined)
    NTP: Originate Timestamp = Tue Feb 11 11:22:19 2003
    NTP:    Fraction         = 0.9260003661950561262512207031250
    NTP: Receive Timestamp   = 0 (undefined)
    NTP: Transmit Timestamp  = 0 (undefined)
    NTP:
    NTP: [Normal end of "NTP/SNTP header".]
    NTP:

 Expert  Decode  Matrix  Host Table  Protocol Dist.  Statistics
```

```
TimeServer2Stratum.cap: Decode, 2/2 Ethernet Frames                    _ □ ×

 No.   Status  Source Address   Dest Address      Summary                 Len [B] Delta Time   Rel. Time
 1     M       TimeServer       [192.5.41.40]     NTP/SNTP:  Version 1     90      0.000.000    0:00:00.000
 2             [192.5.41.40]    TimeServer        NTP/SNTP:  Version 1     90      0.147.082    0:00:00.147

 NTP: ----- NTP/SNTP header -----
    NTP:
    NTP: LI, VN, Mode:        = 0C
    NTP:             00.. .... = Leap Indicator 0(no warning)
    NTP:             ..00 1... = Version Number 1
    NTP:             .... .100 = Mode 4(server)
    NTP: Stratum             = 1 (primary reference(e.g., radio clock))
    NTP: Poll                = 0 (invalid)
    NTP: Precision           = -17 (2**-17 seconds)
    NTP: Root Delay          = 0. seconds
    NTP: Root Dispersion     = 0.00048828125 seconds (invalid)
    NTP: Reference Clock ID  = (Unknown)
    NTP: Reference Timestamp = Tue Feb 11 12:44:20 2003
    NTP:    Fraction         = 0.1470400366175887518295288085937
    NTP: Originate Timestamp = 0 (undefined)
    NTP: Receive Timestamp   = Tue Feb 11 12:44:34 2003
    NTP:    Fraction         = 0.6332711226851046116485595703125
    NTP: Transmit Timestamp  = Tue Feb 11 12:44:34 2003
    NTP:    Fraction         = 0.6334223240951972277053833007812
    NTP:

 Expert  Decode  Matrix  Host Table  Protocol Dist.  Statistics
```