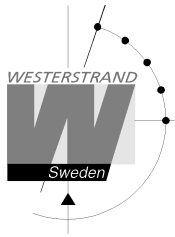


NyToP

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General

This program is used for setting of time in a PC with a Windows operating system. Time is fetched from a NTP server.

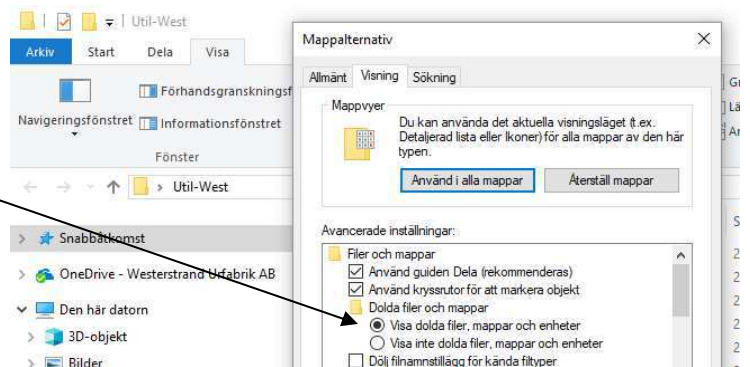
Installation

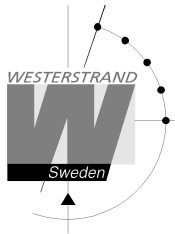
Install by running program `nytopVVV_setup.exe` (VVV=version).

Program files are stored in the program files folder. Data files are stored in the data files folder. The Registry is not used. All parameters are saved in file `NYTOP.INI`. Menu *Help* (see Status Window below) shows the actual folder names:

```
Program: C:\Program Files (x86)\Westerstrand\NyToP\  
Data:    C:\ProgramData\Westerstrand\NyToP\
```

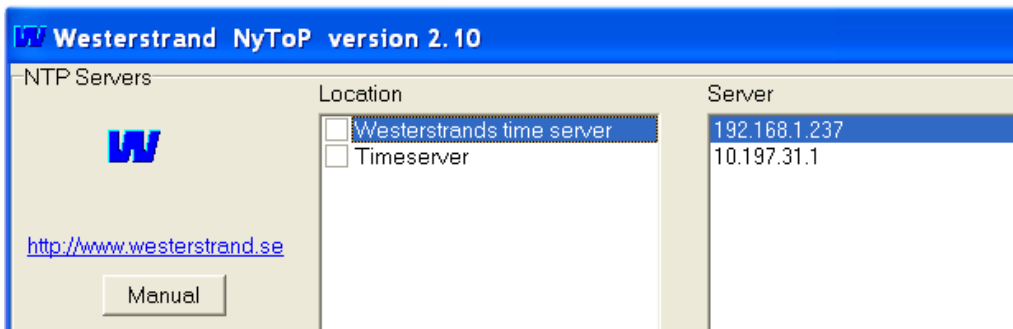
Make sure folder *ProgramData* is visible.
Here an example from the Swedish
version of Windows 10:



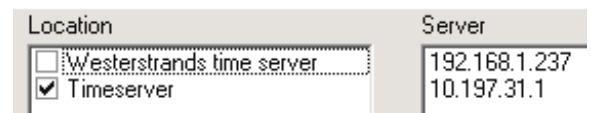


First Run

Start the program. The program tries to access a default timeserver at 192.168.1.237. Probably this request will fail. Assume that your timeserver is at IP address 10.197.31.1. Press Edit and enter the following data:

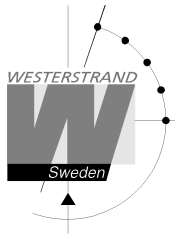


Then activate by clicking 'Timeserver':



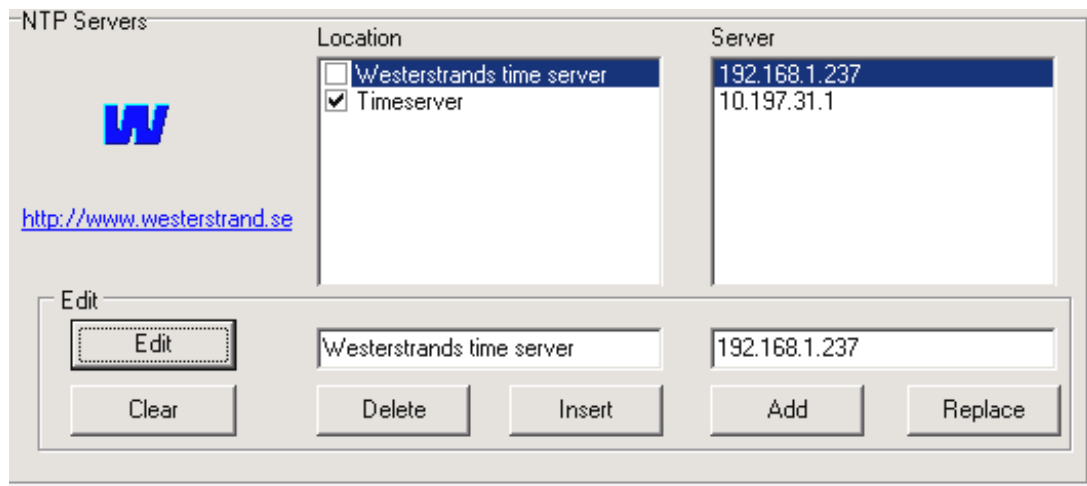
Press button *Time Request*.

The received time is displayed in the lower yellow window.



Edit

Start by selecting an unused timeserver, i.e. a timeserver that not is 'clicked'. Here 'Westerstrands time server' is selected. Then press *Edit*. Make appropriate editing.



Then press *Delete*, *Insert*, *Add* or *Replace*.

Interval

Enter time in seconds between time requests.

Min. correction

Minimal correction in seconds. If the difference is less, then no time setting will take place.

Max. correction

Maximal correction in seconds. If the difference is more, then no time will be set. Value 0 will accept all times.

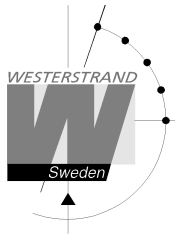
Max. stratum

Max. stratum for acceptance of time. Enter 16 for acceptance of all stratum except 0.

Minimised at start

The program is minimised at start as an icon in the taskbar.





Only accept Westerstrand time server

If 'Only accept Server=WEST' is checked, then only a time message from a Westerstrand time server is accepted. The first 3 letters of the name is checked. These must contain 'WES'.

Authentication

NyToP supports Symmetric Key Authentication according to RFC 1305.

This checkbox is only visible if file NYTOP.INI section [GENERAL] contains the line *MD5_ON=1*

This option requires a NTP Server that can handle authentication.

If [Authentication] is checked, then a 4-byte open-key identification (KEYID) and a 16-byte Message Authentication Code (MAC) is added to the NTP request message. If the MAC is false, then the server will return NTP time but KEYID is set to 0. If the MAC is correct the server will add the correct KEYID and MAC to the message. In this way the NTP client can verify that the time not is corrupt.

Default values for a Westerstrand NTP server:

```
[GENERAL]  
KEY_ID=25281  
AUTHENTICATION=WESTERSTRAND
```

DST - Day-Light-Savings

This checkbox is only visible if file NYTOP.INI in section [GENERAL] contains the line *DST_ON=1*

This option requires a NTP Server that can transmit Day-Light-savings information.

If [DST] is checked than information in the NTP message is used for calculation of local time in the PC.

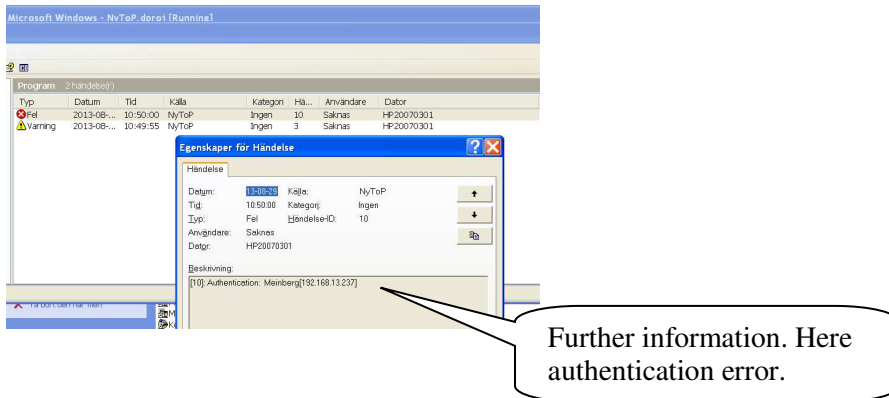
If [DST] is unchecked, then the internal rules in the PC are used for calculation of local time.

The DST information is hidden in the fraction part of T0. See **Protocol NTP** below.

Event Log

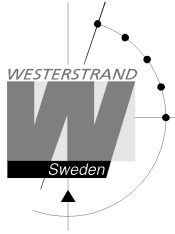
Write information and errors to the windows event log. Make sure check box *Event Log* is enabled.

Example from a Swedish version of Windows XP:



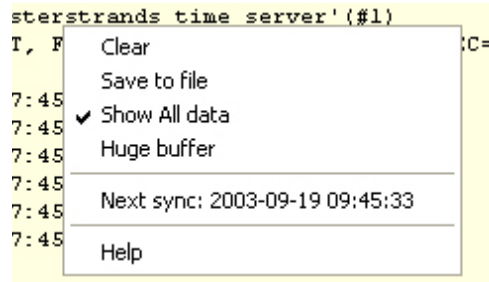
These events are defined:

Event-ID	Text	Type
1	OK	Information
2	(not used)	
3	Stop	Warning
4	(not used)	
5	No servers	Error
6	Network	Error
7	Timeout	Error
8	Synchronization	Error
9	Authentication	Error
10	Stratum	Error
11	Not a WEST server	Error



Status window

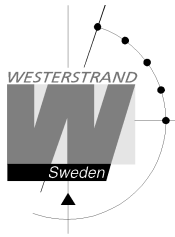
This window shows data about the time server communication. By right clicking this window is displayed:



Usually only the new time is displayed. By selecting *Show all data* more information is displayed. Then T0..T5 is displayed according to:

T0	Last synchronisation in timeserver.
T1	Client request time.
T2	Server receive time.
T3	Server transmit time.
T4	Client receive time.
T5	New time based on T1..T4.

A short manual is shown by clicking on *Help*.



Protocol NTP

UDP port 123 is dedicated for the NTP protocol. The protocol is based on UTC time, so it is up to the client to transform the time to local time using rules for day light saving and offset to UTC.

Procedure:

A client makes a request at time T1.

The request is read at time T2 by the server.

At time T3 the server will send an answer.

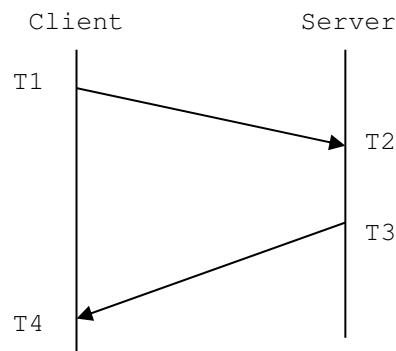
The answer is read by the client at time T4.

A new time T5 is calculated according to:

$$T5 = T3 + ((T4-T1) - (T3-T2)) / 2 = T3 + ((T2-T1) + (T4-T3)) / 2$$

$$\text{Delay } d = (T4 - T1) - (T3 - T2)$$

$$\text{Offset } t = ((T2 - T1) + (T3 - T4)) / 2$$



The request message has the same size as the answer message, so if the network is balanced, i.e. elapsed time for the request ($T2-T1$) is the same as the elapsed time for the answer ($T4-T3$), then the time is optimal.

The data part of the NTP message has size 48 bytes according to:

Bytes	
0..15	Status
16..23	Reference time (T0). Time for last sync of the time server
24..31	T1
32..39	T2
40..47	T3

A time stamp, e.g. T3 has size 64 bits:

32 bits with number of seconds from 1st Jan 1900 and a 32-bit fraction part.

In year 2036 the seconds will overflow!

More information about NTP is found at <http://www.ntp.org/>.

Also see RFC documents 4330 (SNTP) and 5905 (NTP version 4) for more information.