



## Manual for NTP Web Pages

The NTP Web Pages are a set of statically produced HTML documents which extract, visualize and sort the data which is found in the NTP produced log files loopstats and peerstats.

The creation and export of these pages are intended for the user (a client) of an NTP-server or the speaking clock 'Fröken Ur'. By the examination of the pages a user has the possibility to get information about the status of the server at the time of use. We do not intend here to give a complete description of all information in the pages.

For a first rough view of the status of the NTP-servers or 'Fröken Ur', we recommend to take a look at the monthly or yearly summary pages. Comments or questions to the pages are kindly received by Carsten Rieck or Kenneth Jaldehag.

**In both cases, NTP-servers or 'Fröken Ur', the stability and accuracy data yields when the time information is leaving SP. The stability and accuracy of the time information when it arrives to the user, depends in addition on the quality of the link in between.**

### In General

The pages are created via a number of Perl scripts on a computer running a SUSE Linux distribution. One can distinguish roughly six different types of pages. These are:

M	Main Index Pages
S	Day Index Pages for a specific NTP-server
E	Critical summary Pages
DD	Data Page for a specific date
MM	Data Page for a specific calendar month - summary
YY	Data Page for a specific calendar year - summary

## Main Index Page

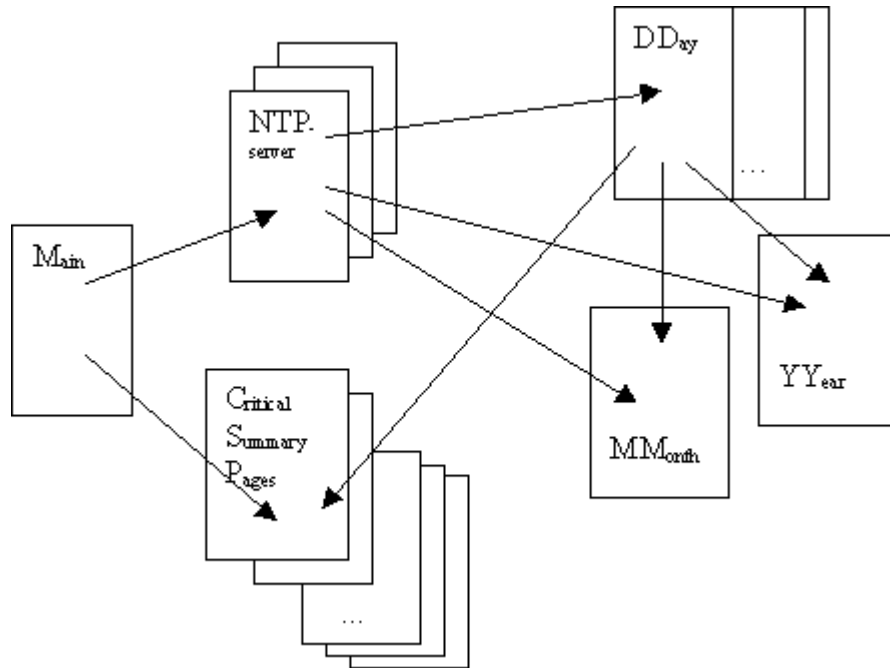
The Main Index Pages are available from the URLs:

<http://tempus.sp.se/spserver> (for NTP-servers at SP)

<http://tempus.sp.se/netnod> (for NTP-servers at Swedish Internet Exchange Points)

<http://tempus.sp.se/fur> (for the speaking clock Fröken Ur)

This is the entry point to the page structure (see figure below) and will lead to all other pages. These are described in the following.



## Day Index Page For A Specific NTP-server

An NTP-server index page consists of links to specific days. These are descending ordered with the most recent month first. Links to the monthly and yearly summary pages are included. In case data irregularities exist, a day entry is extended by a the symbol ☹️. It symbolises a link to a page that summarises the detected irregularities.

## Critical Summary Page

The software package that creates the documents does some rudimentary checks on the data. This includes testing for missing data files and abnormal time offsets, among others. The information is sometimes very specific to the problem and is usually not easily interpreted without a deeper insight into NTP. If questions arise around the information, do not hesitate to send us a mail (Carsten Rieck or Kenneth Jaldehag)

A specific critical summary page includes a link to the data page of the NTP-server on this particular day.

## Data Page For A Specific Date

This page holds the clock and peer information, which is extracted from the NTP data files. The top of the page includes the NTP-server and the date of the day, among some additional information. This is followed by a link to a possible critical summary page, in case irregularities were detected.

Further, four main sections can be distinguished:

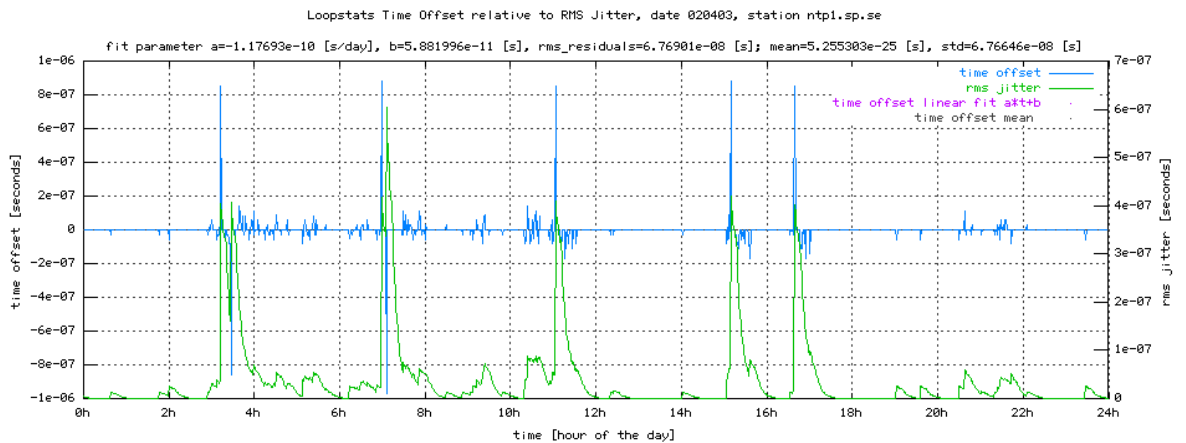
1. Data derived from the NTP loopstats file
2. Data derived from the server logd file
3. Data derived from the NTP peerstats file
4. Other relevant information

## Loopstats:

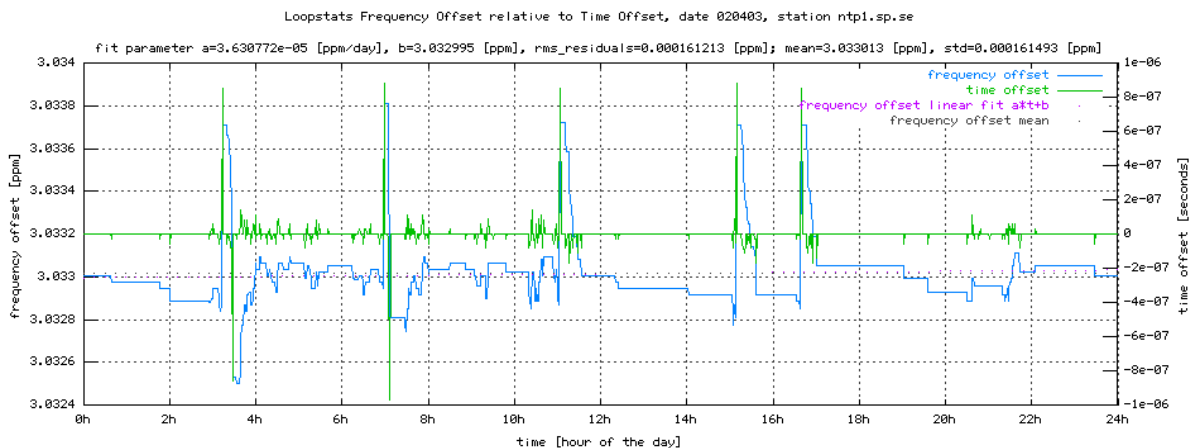
This file holds information about the particular NTP-server itself, also called the loopstats filter statistics. We distinguish:

- Time Offset: **estimated offset of system time from NTP-time**
- Frequency Offset: **estimated relative system oscillator frequency offset from "NTP" oscillator**
- Clock Discipline Time Constant: **behaviour of the loopstats filter, an indicator for how balanced the system is**
- RMS Jitter: **information about general stability of the filter (NTP version 4 only)**
- Allan Deviation: **statistical information about NTP-time (NTP version 4 only)**

For a user the most valuable information is in the Time Offset diagram (see below). It shows the difference between the server system time (which is the time distributed) and the NTP-time (the time steered to the external UTC-traceable clocks). The time offset (blue) is related to the RMS jitter (green, if available) in order to make correlations between them visible. The quantities have their own Y-axis, the time offset on the left side in seconds and the RMS jitter on the right side in seconds. The processing software attempts to fit a linear expression  $f(t) = at + b$  to the time offset data. The estimated parameters are given above the diagram. Parameter  $a$  indicates a drift value given in seconds per day,  $b$  is a constant offset given in seconds. In the same fashion the statistical mean and the standard deviation are shown. The graph shows two dotted lines representing the fit and the mean. Under normal circumstances they coincide with each other and are "hidden" under the time data at the zero-axis, which is the case in the figure.

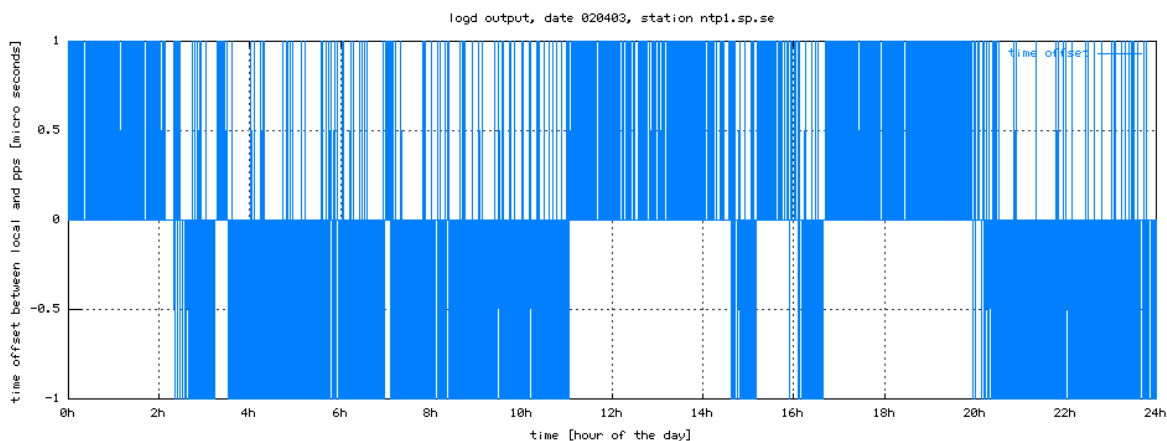


The frequency offset diagram looks similar. It correlates the frequency offset (blue) on the left Y axis to the time offset (green) on the right. Fit values, mean and RMS values are given in the top. The parameter  $a$  describes the frequency drift over one day in ppm (parts-per-million). The parameter  $b$  is a constant offset which should be close the mean value. In the example below, the fit and mean lines are clearly visible.



## Logd files

In most of our NTP-servers, the time difference between the incoming 1-pulse-per-second (1-pps) and the server system time is measured. The *logd* data contains this difference. The 1-pps is a sharp pulse from the external reference clock, traceable to UTC within a few  $\mu$ s (microseconds). Since the server system time is the time distributed to NTP-users, the *logd* data, together with the time offset data (described above), is a valuable indication of the accuracy of the time distributed. A normal reading (see figure below) of *logd* data is an alternating of offset values between  $-1\mu$ s and  $+1\mu$ s.



### Peerstats Files:

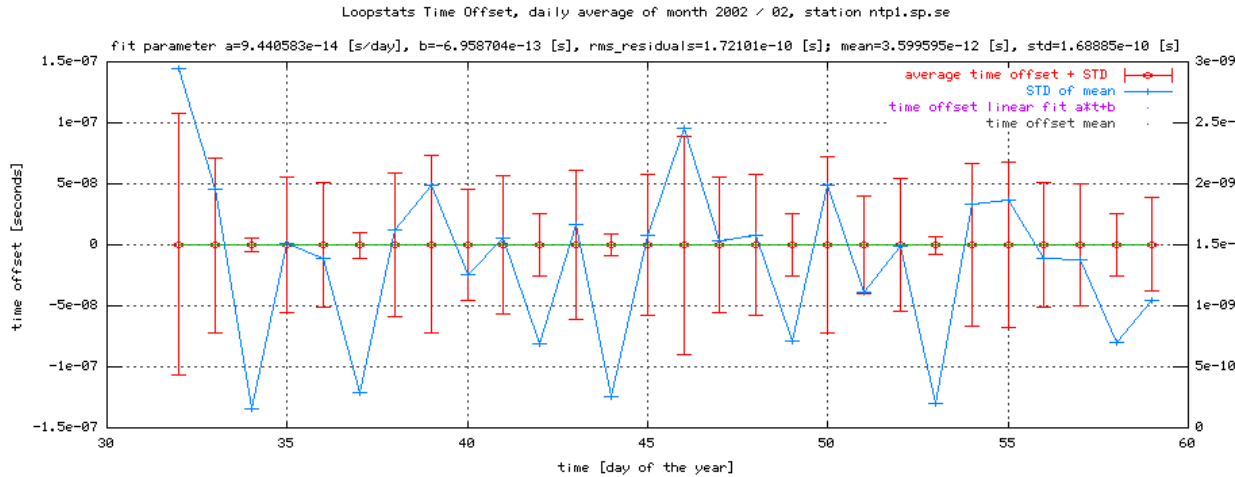
This file holds data about the peers that are used for the synchronisation of the NTP-server, among them, the external 1-pps as described above. The data contains the time difference between the peer and the NTP-time, the network time delay and RMS-jitter. The 1-pps (127.127.32.0) is the normal synchronisation source. Since this peer is a reference clock (not obtained via the network), the time delay is always close to zero (a few nanoseconds).

### Other relevant data:

Our software extracts changes in status, and presents the information peer wise. A list with all the synchronization sources is available. This includes start, stop, duration and off synchronization times. A histogram and a synchronization diagram show how often and when certain peers were used to synchronise the host. Under normal conditions, this consists of only one synchronization source which comes from the reference 1-pps clock.

## Data Page For A Specific Calendar Month – Summary

In order to oversee the vast amount of data in the daily pages, monthly summaries are made available. The page contains daily averages of time offset and frequency offset data. The graphs (see example below) include the daily statistical mean and standard deviation on the Y-left axis and the standard deviation of the mean on the Y right axis. A linear fit, monthly mean and STD are available.



## Data Page For A Specific Calendar Year – Summary

Yearly summaries are very similar to monthly summaries. The only difference is that they contain more data points, up to a year.