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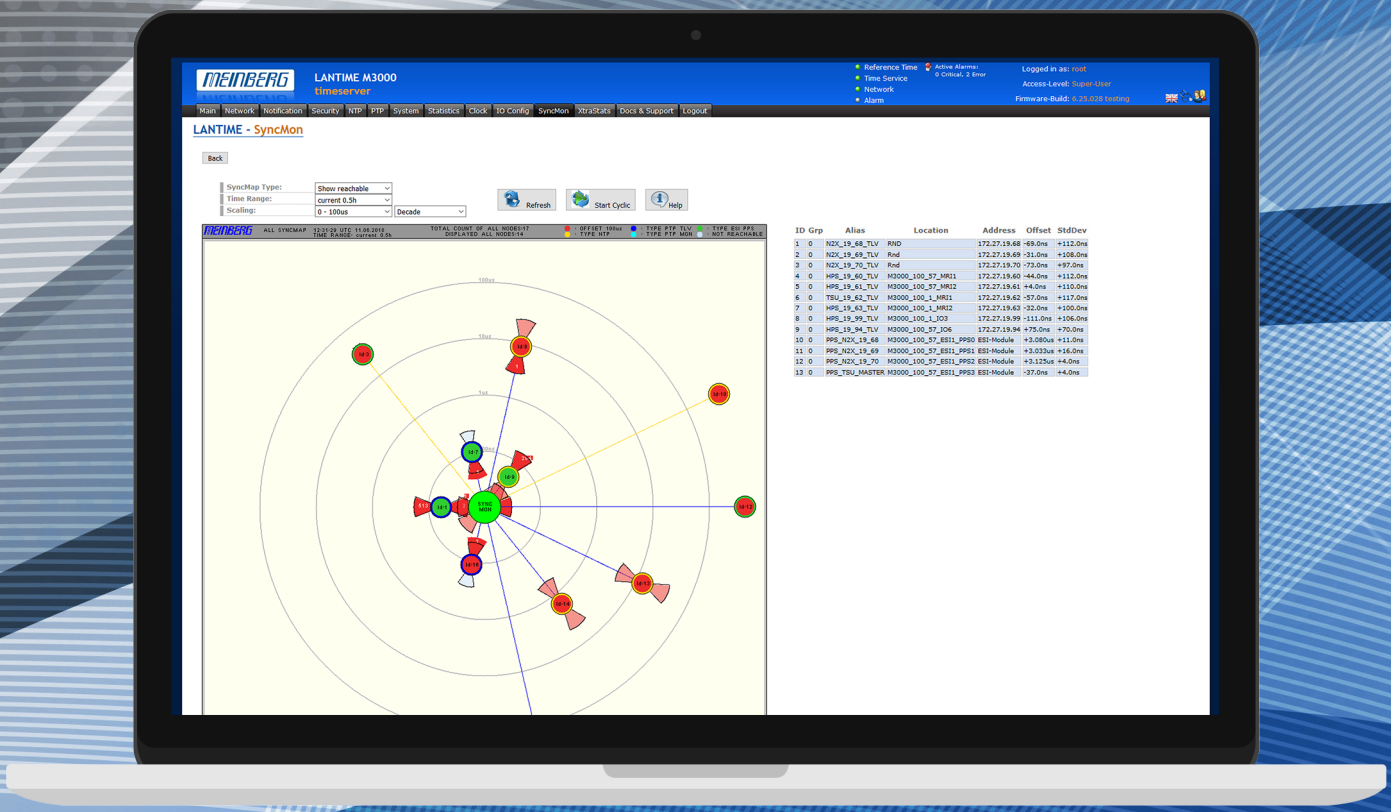
The Synchronization Experts.

NetSync Monitor



Monitoring Tool for NTP, PTP & PPS

www.meinbergglobal.com

NetSync Monitor

NTP & PTP Monitoring Tool

Real Measurements vs. Self Reported State

Meinberg's NetSync Monitor performs real measurements using its built-in highly accurate clock to determine the time error of NTP and PTP clients as well as performing low-nanosecond level measurements of PPS signals. For NTP, the monitoring system sends out real NTP requests, receives the response and calculates the offset from its own synchronized clock. A similar mechanism is used for performing measurements on PTP devices. Querying the offset that a PTP node determined on its own by using standard compliant PTP management messages is only used as a fallback, in case the PTP device does not support the reverse PTP technology. This "real measurements vs. self reported state" approach sets NetSync Monitor apart from other solutions.

NetSync Monitor

Meinberg's NetSync Monitor has been developed to provide end users with a multifunctional monitoring tool and can be very helpful to meet regulations like MiFID II, by allowing to measure NTP and PTP clients instead of relying on self-reported sync accuracy.

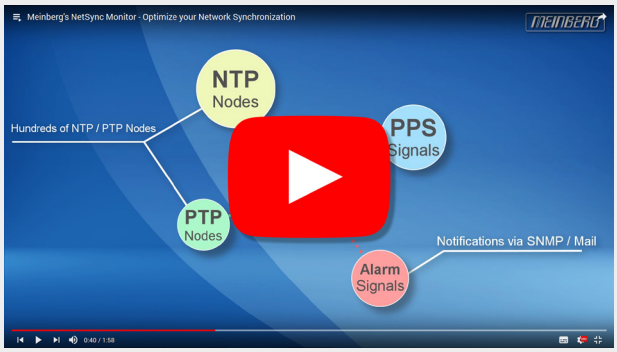
The web based application is available on LANTIME and IMS models running LTOS V6.22 and later. PTP monitoring is possible by using a HPS100 module which is configured to run in monitoring mode.

The user can configure a mix of NTP clients, PTP slaves and incoming PPS signals which will be queried / measured and compared against the internal clock of the LANTIME IMS system. This clock is commonly synchronized to a GNSS like GPS or Galileo or to a local atomic clock using a PPS feed. It can also be synchronized by PTP using a separate module set into slave mode. The PTP feed can be provided by the same Grandmaster Clock that is used for synchronizing the slaves or it can be independent, i.e. a PTP feed from the exchange or an external Time-as-a-Service provider (e.g. NPLTime®).

It is possible to define limits for maximum offset and generate alarm messages when these are violated or when the status of a device changes (i.e. it becomes unreachable).

Key Features

- Helpful visualization capabilities
- Allows to monitor hundreds of individual NTP and PTP nodes
- Completion of reporting tasks in less time
- Web based application
- A mix of NTP clients, PTP slaves and incoming PPS signals can be configured
- Alarming functionality
- Monitor report generation directly out of the web interface
- Archiving monitoring data



Watch our explanatory NetSync Monitor video on YouTube:
www.mbg.link/nsm

Monitoring

NTP Nodes

- The monitoring system will act like a normal NTP client and sends a standard IPv4 or IPv6 NTP request
- The response is then compared against the internal reference clock
- It is possible to define limits for offset and stratum level and symmetric keys can be used, too

PTP Nodes

- PTP monitoring is possible by using Meinberg's HPS100 (1,024 Clients / Level D) module which is configured to run in monitoring mode
- For PTP implementations not yet supporting the protocol extensions, standard PTP management messages can be used (IEEE 1588-2008)
- Most Meinberg devices already support the protocol extension, this includes both PTP ports running in Master mode as well as Slave ports
- Meinberg is currently in discussions with third party vendors to add support for the NetSync Monitor feature to their products Measurements can be carried out with the full accuracy of the slave
- The monitoring of PTP devices can use an extension, which uses standard packet formats with extensions (TLV)
- This extension requires a PTP device to run a PTP implementation that supports this measurement protocol
- The NetSync Monitor application allows to find PTP nodes based on multicast PTP management messages and can monitor nodes using multicast and unicast layer 2 (Ethernet) or layer 3 (IPv4/IPv6) communication

PPS Signals

Some devices provide a pulse per second (PPS) signal which can be measured by an ESI module in the monitoring IMS system and which can also be recorded and checked against user defined offset limits.

Visualization

The SyncMap feature of Meinberg's NetSync Monitor system visualizes all monitored nodes or selected groups on a polar diagram, where circles represent a specific offset value (**Fig. 1**). This enables the user to easily spot whether any node is currently outside of an important limit (e.g. 100 microseconds).

The symbols representing the nodes are providing a number of additional statistical information (cf. **Fig. 2** and Node Description).

For example the minimum and maximum offset values measured in the last 30 minutes and the standard deviation (**Fig. 3**).

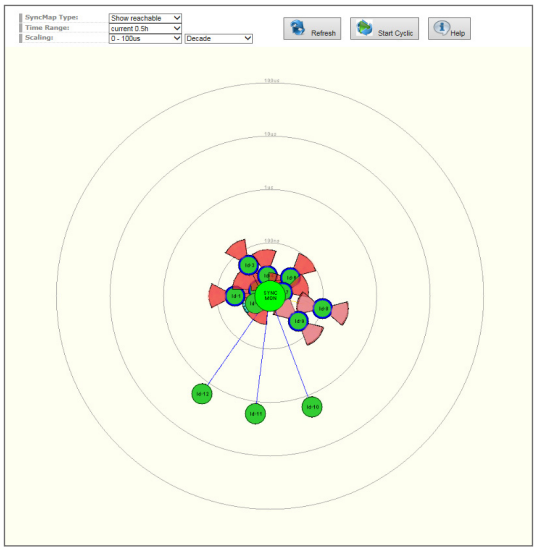


Fig. 1

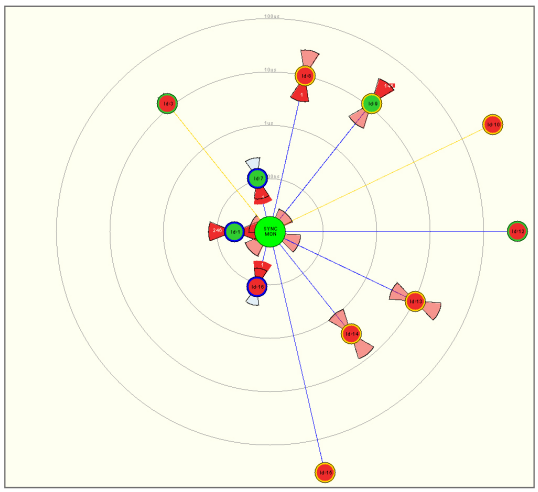
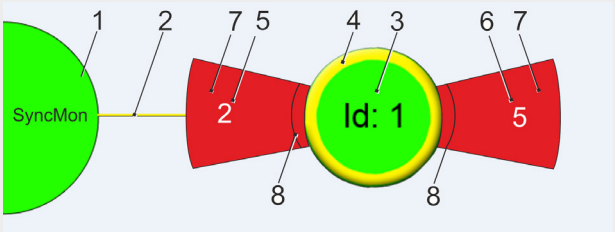


Fig. 2

ID	Grp	Alias	Location	Address	Offset	StdDev
1	0	N2X_19_68_TLV	RND	172.27.19.68	-69.0ns	+112.0ns
2	0	N2X_19_69_TLV	Rnd	172.27.19.69	-31.0ns	+108.0ns
3	0	N2X_19_70_TLV	Rnd	172.27.19.70	-73.0ns	+97.0ns
4	0	HPS_19_60_TLV	M3000_100_57_MR11	172.27.19.60	+44.0ns	+112.0ns
5	0	HPS_19_61_TLV	M3000_100_57_MR12	172.27.19.61	+4.0ns	+110.0ns
6	0	TSU_19_62_TLV	M3000_100_1_MR11	172.27.19.62	-57.0ns	+117.0ns
7	0	HPS_19_63_TLV	M3000_100_1_MR12	172.27.19.63	-32.0ns	+100.0ns
8	0	HPS_19_99_TLV	M3000_100_1_IO3	172.27.19.99	-111.0ns	+106.0ns
9	0	HPS_19_94_TLV	M3000_100_57_IO6	172.27.19.94	+75.0ns	+70.0ns
10	0	PPS_N2X_19_68	M3000_100_57_ES11_PPS0	ESI-Module	+3.080us	+11.0ns
11	0	PPS_N2X_19_69	M3000_100_57_ES11_PPS1	ESI-Module	+3.033us	+16.0ns
12	0	PPS_N2X_19_70	M3000_100_57_ES11_PPS2	ESI-Module	+3.125us	+4.0ns
13	0	PPS_TSU_MASTER	M3000_100_57_ES11_PPS3	ESI-Module	-37.0ns	+4.0ns

Fig. 3

Node Description



1. The Time Monitor node and the current offset measured between its oscillator and the reference time
2. Line connecting each node with the SyncMon.
   Its length represents the absolute average time offset between reference of SyncMon and the node.
   The color defines the sign of the average:
   yellow = negative / blue = positive
3. A measured node, its color inside corresponds to its status
4. Outer ring which corresponds the type of the node
5. Event counter for „Node not reachable"
6. Event counter for „Node Offset Limit exceeded"
7. If Event counter > 0 then this slide is dark red;
   If Event counter = 0 the Standard Deviation is
   light red or light blue
8. Standard deviation measurement. If light red, it exceeds the 100 percent of current offset, otherwise is blue

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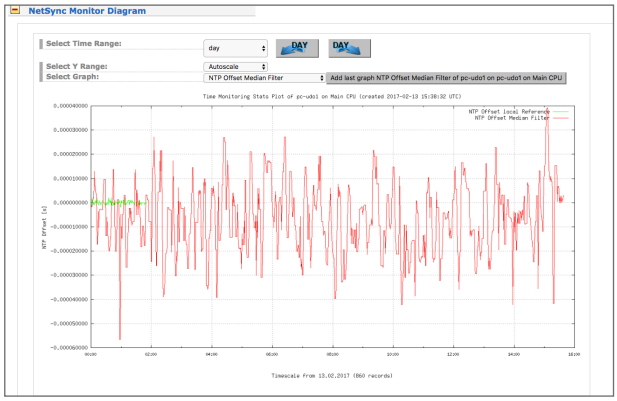
Graphical Diagram

Offsets are collected for each NTP/PTP or PPS monitored node and can be visualized as graphical representation for selectable time intervals (day, week, month or manual selection) in the WebGUI of the SyncMon node.

The red line represents the offset between a Sync node reference time and the measured time of a monitored device. The sync node reference is depicted as a green line.

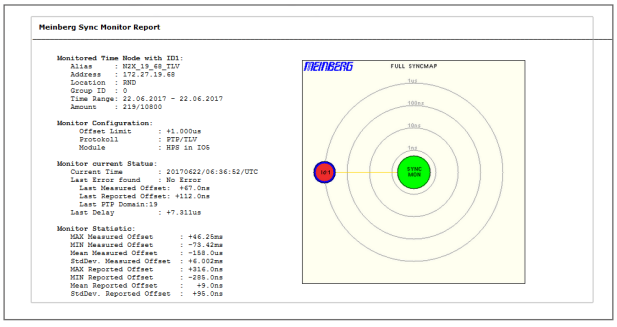
The monitored data are continuously saved on the LANTIME flash card. Data are available at any time for further statistic processing. There is an indicator implemented which informs about the available flash space and the number of days left for monitoring of the current NTP setup.



Meinberg Sync Monitor Report

In addition to individual diagrams and the SyncMap, the NetSync Monitor application can generate reports directly out of the web interface.

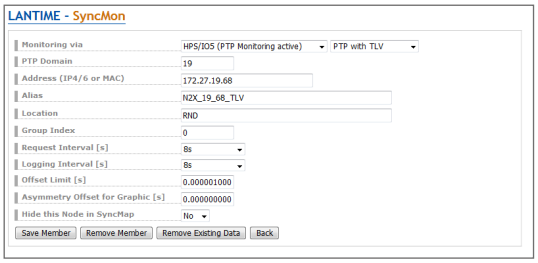
The reports are based on the obtained measurement data and can be used to document the sync performance of a node or a group of nodes.

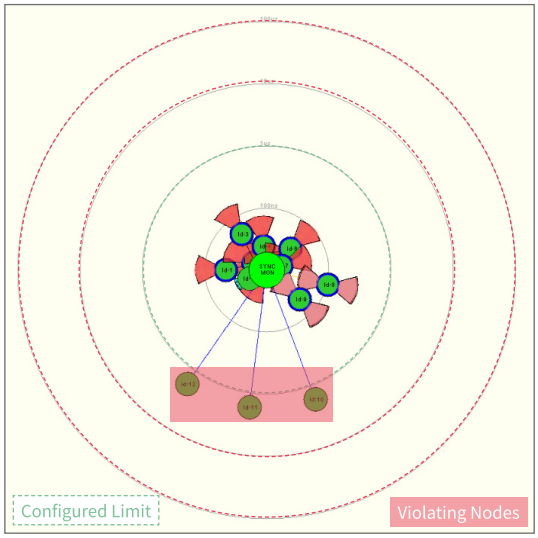


Alarming

If a monitored node exceeds the configured limit or experiences a state change, the NetSync Monitor system can generate an alarm using the standard LTOS6 notification engine.

That means that SNMP traps, syslog messages and emails can be generated to inform administrators about the potential problem.





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