


syn1588<sup>®</sup>

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## Abstract

This application note describes how to use a syn1588<sup>®</sup> PCIe NIC as a time source for an NTP server. It contains all necessary steps to configure syn1588<sup>®</sup> PCIe NIC to be used by ntpd. Some tools and methods for operation and to check results are presented too. References to the syn1588<sup>®</sup> User Guide are indicated by this symbol: . Currently this application note considers **only Linux**.

## Prerequisites

- A PC equipped with a syn1588<sup>®</sup> PCIe NIC
- Driver for the syn1588<sup>®</sup> PCIe NIC successfully installed
- ntpd installed on the server
- Oregano Systems tools “syn1588” and “lsync”

## Get all necessary information

Before continuing, collect all necessary information:

- **interface name** and **IP address** of your syn1588<sup>®</sup> PCIe NIC on the server. i.e. “eth7”. use “ifconfig” to get the correct values

If the interface does not have an ip-address, please set one manually. These values will later be referenced as *{INTERFACE NAME}* and *{IP-ADDRESS}*.

## Configuring ntpd

It is assumed that the standard ntpd implementation is used on your server (which is usually the case) and the configuration file is located at /etc/ntp.conf. Please alter it by changing the following parameters:

- enable the “local clock”-part by using these configuration directives:

```
server 127.127.1.0 # local clock
fudge 127.127.1.0 stratum 10
```

- ensure, that there are no other enabled server-keywords in the configuration file which might override the local clock.
- stop ntpd if it is currently running. it will be started again after the system clock is in sync with the syn1588<sup>®</sup> PCIe NIC.

## Configuring the syn1588<sup>®</sup> PCIe NIC

There is no special configuration necessary. If no other time source than the syn1588<sup>®</sup> PCIe NIC is present, you can set the syn1588<sup>®</sup> PCIe NIC to the current system time of your server by issuing this command:

```
> echo "time `date +%s,%N`" | ./syn1588
```

Please ensure that you are in the same directory as the tool “syn1588” or modify the path accordingly.

## Synchronizing the Server’s System Clock

The synchronization of the server’s system clock to the syn1588<sup>®</sup> hardware clock is done with the Oregano Systems’ tool “lsync”. Please use as *{NETWORK INTERFACE}* the interface name of your syn1588<sup>®</sup> PCIe NIC as obtained in the first step.

```
> ./lsync -ON -i{NETWORK INTERFACE} -v2
```

One should receive an output like this:

```
SYN1588 0: 1381414180.000031038 (Origin)
Local:      1381414180.000031027

Adjusting Local:
Adjusting clock at 36 ns offset
```

After a few minutes these offset-values drop down to a few nanoseconds, depending on the hardware used.

## Starting the NTP Server

After the clock synchronization between the syn1588<sup>®</sup> PCIe NIC and the server’s system time is stable, the NTP daemon can be invoked:

```
> /etc/init.d ntpd start
```

Optionally verify this step and your configuration by calling:

```
> ntpq -p
```

You should only see your local clock as “LOCAL(0)”. Now the NTP server can distribute the time from the syn1588<sup>®</sup> PCIe NIC into the network via ntp.

## Configuring NTP Client(s)

Treat the syn1588<sup>®</sup> PCIe NIC synchronized server like any other NTP server. Enter it to the list of servers in the clients’ /etc/ntp.conf like this:

```
server {IP-ADDRESS} #syn1588 pcie nic server
```

Now start or restart the ntp-daemon on your client which is usually done using the following command:

```
> /etc/init.d ntpd restart
```

You can watch your client getting synchronized by calling:

```
> watch -n1 ntpq -p
```




Due the algorithms used by NTP a good synchronization with small jitter-values will take some time (hours).

## Other Tools

**ntpdate** can be used to set a client's date and time once.

## Further Readings

You can find more information about Oregano Systems tools in the syn1588<sup>®</sup> User Guide in the following chapters:

-  4.9.3: How-To Synchronize the System Clock
- syn1588:  6.8.1 “syn1588<sup>®</sup> Driver Interface / Accessing registers”
- lsync:  6.8.3 “lsync – Synchronizing the System Clock”

Please contact Oregano Systems to receive the latest version of the syn1588<sup>®</sup> User Guide.


Some more information about the underlying technology:

- NTP: The Network Time Protocol: <http://www.ntp.org/>
- How does it work: <http://www.ntp.org/ntpfaq/NTP-s-algo.htm>

## Troubleshooting

If you run a firewall on your host please check that the NTP port is not blocked.

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