


syn1588®

Version 1.3 – March 2019

Abstract

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

Prerequisites

- A PC equipped with a syn1588® PCIe NIC
- Driver for the syn1588® 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® 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® PCIe NIC.

Configuring the syn1588® PCIe NIC

There is no special configuration necessary. If no other time source than the syn1588® PCIe NIC is present, you can set the syn1588® 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® hardware clock is done with the Oregano Systems’ tool “lsync”. Please use as *{NETWORK INTERFACE}* the interface name of your syn1588® 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® 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® PCIe NIC into the network via ntp.

Configuring NTP Client(s)

Treat the syn1588® 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[®] User Guide in the following chapters:

-  4.9.3: How-To Synchronize the System Clock
- syn1588:  6.8.1 “syn1588[®] Driver Interface / Accessing registers”
- Isync:  6.8.3 “Isync – Synchronizing the System Clock”


Please contact Oregano Systems to receive the latest version of the syn1588[®] 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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