



NTP Server: Free Public Internet Time Servers

There are a large number of public NTP time servers available across the Internet. Here we aim to provide an insight into available network time servers, configuring your client and synchronization best practices.

The NTP Pool Project: Public Time Servers For Everyone

The NTP pool project has been around for some time. The project provides Internet access to very large virtual clusters of NTP servers. The time servers that make up the pools are volunteered and made public by individuals or enterprises that have servers on the internet. Pools of servers are located in most countries around the world. This allows clients to utilize a server that is relatively close, reducing round-trip delays and improving integrity.

The project is a subscription free service that is used world-wide by thousands of clients. Many computer systems and network devices are configured by default to synchronize to their time servers.

The NTP pool project is maintained by Ask Bjørn Hansen and a group of contributors.

Using the NTP Server Pools

You can simply specify the domain name “pool.ntp.org” which will instruct the pool system to attempt to find the closest available server to your location.

You can also use the prefix 0, 1 or 2 to specify different pools of servers, if multiple server names are required:

0.pool.ntp.org

1.pool.ntp.org

2.pool.ntp.org

Pool Zones

Almost every continent has a large number of clustered NTP time servers available. Including as of 2017, Europe at 2732, North America at 944, Asia at 243, Oceania at 109, making up a grand total of 4106 servers.

If you wish, you can specify continental zones in the domain name, as follows:

eu.pool.ntp.org

na.pool.ntp.org

asia.pool.ntp.org

Alternatively, you can specify specific country zones:

Common European Pool Zones:

uk.pool.ntp.org (UK)

de.pool.ntp.org (Germany – Deutschland)

fr.pool.ntp.org (France – Française)

es.pool.ntp.org (Spain – España)

it.pool.ntp.org (Italy – Repubblica Italiana)
nl.pool.ntp.org (Netherlands – Nederland)
no.pool.ntp.org (Norway – Norge)
pt.pool.ntp.org (Portugal – Portuguesa)
se.pool.ntp.org (Sweden – Sverige)

Common North American Pool Zones:

us.pool.ntp.org (USA)
ca.pool.ntp.org (Canada)

Common Asian Pool Zones:

ae.pool.ntp.org (United Arab Emirates)
cn.pool.ntp.org (China)
in.pool.ntp.org (India)
sa.pool.ntp.org (Saudi Arabia)

Again, for each of these zones, you can specify a 0, 1 or 2 prefix if multiple server names are required. For instance:

0.uk.pool.ntp.org
1.uk.pool.ntp.org
2.uk.pool.ntp.org

The domain names point to a random set of time servers in a particular zone that change every hour.

Regular changes are required so that clients can be distributed evenly between the available NTP servers, to prevent overloading.

Google Public Network Time Servers

Google have recently revealed that they have implemented public NTP with load balancers and atomic clocks in their world-wide data centres. However, Google have adopted a slightly different non-standard approach to leap second insertion. They have adopted leap-smearing technology to smoothly insert leap seconds over a period of time.

Most Unix and Linux operating systems insert leap seconds by repeating the last second of the day. This can cause problems with some software. Leap smearing involves slowing clocks for a period of time before and after the actual leap second. This prevents leap seconds from being potentially disruptive events. However, leap smearing servers will provide a slightly different time to other servers during the insertion period. For this reason, Google recommends that its public NTP servers are not used in conjunction with other non leap-smearing servers.

Googles public NTP servers use the following domain names:

time1.google.com
time2.google.com



time3.google.com

time4.google.com

Configuring NTP Clients

For Windows Operating Systems:

Most Windows operating systems can be configured to use a public NTP server as follows:

Open the Control Panel.

Click the “Date and Time” icon from the Control Panel.

Select the “Internet Time” tab.

Click the “Change settings...” button.

Check the box “Synchronize with an Internet time server”.

Next to “Server:”, enter the domain name or IP address of the required NTP server.

If the “Internet Time” tab is not present, your PC may be part of a domain. If so, it will synchronize to the domain controller. In this instance, you will need to configure the domain controller to synchronize with an NTP server.

For Linux and Unix Operating Systems:

Most Linux and Unix operating systems use the standard NTP distribution (ntpd). The ntpd daemon is configured from a configuration file ntp.conf.

Using a text editor, edit /etc/ntp.conf.

Add servers using the server configuration command, as follows:

server 0.uk.pool.ntp.org

server 1.uk.pool.ntp.org

server 2.uk.pool.ntp.org

Use “sudo service ntp reload” to restart the ntpd daemon and effect any configuration changes.

Note: Remember that it is not recommended to configure smeared and non-smeared NTP servers.

Good Practice When Using Public NTP Servers

You should avoid excessive use of public NTP servers. Only query servers at reasonable intervals. This may vary from once a day to a few times an hour, depending on your system requirements.

NTP clients should never be configured to request time from a NTP server more frequently than once every four seconds. Clients that exceed this rate may be flagged as attempting a denial of service (DoS) attack and may be refused service.

It is generally accepted good practice to choose a relatively local time reference. Using local time references will reduce network latency and round-trip delays and provide a more robust time service.

Do not hard code Public NTP servers into any device.

Best Practice

Public time servers are often maintained by volunteers. They provide no guarantee of availability or accuracy. You use them at your own risk. There are a number of well-known instances of internet

time server “hiccups”. Also, many NTP authentication and security mechanisms cannot be used with public time servers, which may leave your systems open to abuse.

If your organisation requires an accurate and reliable source of time, you should seriously consider installing a local time reference.



TimeTools is a UK-based manufacturer of NTP servers and precision timing equipment. Based on GPS and Multi-GNSS technology, our products provide a reliable, accurate and traceable source of time, inside your firewall.