Network Time Protocol (NTP)

NTP stands for Network Time Protocol, and it is an Internet protocol used to synchronize the clocks of computers to sometime reference. NTP is an Internet standard protocol originally developed by Professor David L. Mills at the University of Delaware.

Why should Time be synchronized?

Time usually just advances. If you have communicating programs running on different computers, time still should even advance if you switch from one computer to another. Obviously if one system is ahead of the others, the others are behind that particular one. From the perspective of an external observer, switching between these systems would cause time to jump forward and back, a non-desirable effect.

As a consequence, isolated networks may run their own wrong time, but as soon as you connect to the Internet, effects will be visible. Just imagine some EMail message arrived five minutes before it was sent, and there even was a reply two minutes before the message was sent.

Even on a single computer some applications have trouble when the time jumps backwards. For example, database systems using transactions and crash recovery like to know the time of the last good state.

What are the basic features of NTP?

There exist several protocols to synchronize computer clocks, each having distinguished features. Here is a list of NTP's features:

- NTP needs some reference clock that defines the true time to operate. All clocks are set towards that true time. (It will not just make all systems agree on *some* time, but will make them agree upon the true time as defined by some standard.)
- NTP is a fault-tolerant protocol that will automatically select the best of several available time sources to synchronize to. Multiple candidates can be combined to minimize the accumulated error. Temporarily or permanently insane time sources will be detected and avoided.
- NTP is highly scalable: A synchronization network may consist of several reference clocks. Each node of such a network can exchange time information either bidirectional or unidirectional. Propagating time from one node to another forms a hierarchical graph with reference clocks at the top.
- Having available several time sources, NTP can select the best candidates to build its estimate of the current time. The protocol is highly accurate, using a resolution of less than a nanosecond (about 2^-32 seconds). (The popular protocol used by **rdate** and defined in [RFC 868] only uses a resolution of one second).
- Even when a network connection is temporarily unavailable, NTP can use measurements from the past to estimate current time and error.
- For formal reasons NTP will also maintain estimates for the accuracy of the local time.
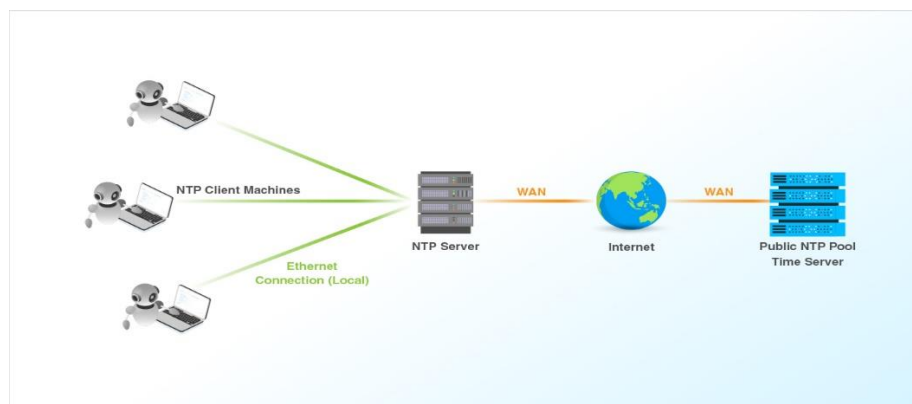
NTP Configuration:
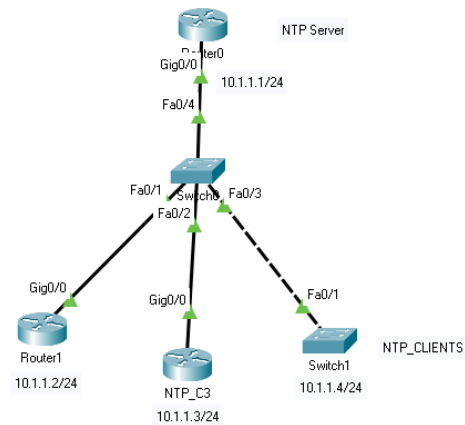
NTP_SERVER (config) # ntp master 1   # command to create ntp server

NTP_C1 (Config) # ntp server 10.1.1.1

NTP_C2 (Config) # ntp server 10.1.1.1

NTP_SWITCH (Config) # interface vlan1
NTP_SWITCH (Config) # ip address 10.1.1.1 255.255.255.0
NTP_SWITCH (Config) # no shutdown

To Verify:
 NTP_C1 # sh ntp associations
 NTP_C1 # sh ntp status