

## NTP

Network Time Protocol, all devices have an internal clock, time can be viewed with **command: show clock**. Default time is UTC(Coordinated Universal Time), **command: show clock detail**. For time source of device. Hardware clock is the default time source which is not authoritative, having an accurate time source is important to have accurate logs for troubleshooting, **command: show logging**.  
**command: clock set <hh:mm:ss> <day> <month> <year>**. (privileged exec mode) software clock.  
Hardware and software clocks are separate and can be configured separately.  
**command: calendar set <hh:mm:ss> <day> <month> <year>**. (privileged exec mode) hardware clock.  
**command: show calendar**. **Command: clock update-calendar** to sync calendar to clock time.  
**Command: clock read-calendar** to sync clock to calendar time.  
**Command: clock timezone <name> <hours offset> [minutes-offset]** in config mode.  
**Command: clock summer-time <zone name> <recurring | date> <start week> <start day> <month to start> <start time hh:mm> <end week> <end day> <end month> <end time> [offset in minutes]**. in config mode.

NTP: allows automatic syncing of time over a network, NTP clients request time from NTP servers, a device can be an NTP server and client at the same time, allows accuracy within 1 ms if server in the same LAN and within 50 ms if server is over a WAN/ the internet, some servers are better than the others, distance of NTP server from original reference clock is stratum. Higher level stratum → less accuracy. UDP PORT 123.  
A reference clock is a very accurate time device as atomic or GPS clock, is stratum 0, servers directly connected to it are stratum 1 (primary servers) else secondary servers in client and server mode at the same time.  
Stratum 15 is max, anything above that is unreliable, devices peer with devices at the same stratum to provide more accurate time also as a backup, modes → Server, Client, Symmetric Active, a client can sync to multiple servers.  
**Command: ntp server <ip-address> [prefer → to prefer a specific server]** in config.  
**Command: show ntp associations**. **Command: show ntp status**.  
NTP uses only UTC timezone, doesn't update calendar by default to auto update use command: ntp update-calendar.  
HW clock is used to initialize software clock.  
**Command: ntp source <interface>**.  
**Command: ntp master [stratum number of default 8]** a device operates as ntp server even if not synced to another server.  
**Command: ntp peer <address>**.  
**Command: ntp authenticate** to enable ntp authentication.  
**Command: ntp authentication-key <key-number> md5 <key>**.  
**Command: ntp trusted-key <key-number>**.  
**Command: ntp server <ip -address> key <key-number>**. Not needed on the server.