NTP for Macintosh

Executive Overview

Disclaimer

The following information is believed to be accurate but is not guaranteed. It is provided solely to help you determine the applicability of the described software to your particular environment. This text has been excerpted primarily from Chapter 1 and Appendix B of the *Network Time Protocol for Macintosh* User's Guide.

Introduction

NTP for Macintosh is a set of software components that synchronize the system clock of the Macintosh with other computers in a network. *NTP for Macintosh* is based upon the Internet standard Network Time Protocol as described in RFC 1119. This protocol is widely used within the TCP/IP community. It features high reliability, low overhead, and can provide accuracy to 232 picoseconds. The protocol distributes time in a tree topology using clients, servers, peers, and broadcast technology.

NTP for Macintosh is implemented as a pair of Control Panel devices (containing a pair of corresponding system extensions and one device driver) for the Macintosh Operating System, and optional software for Apple's A/UX and DEC's VAX/VMS operating systems. *NTP for Macintosh* can use either AppleTalk (DDP) or IP (UDP), or both, as the transport protocol. These protocols are used for their extremely low overhead. The NTP upper level protocol is error resistant and is intended to work with datagram oriented transport protocols. It can work effectively even in very congested networks.

The use of DDP/AppleTalk allows this software to work with any Macintosh using existing built-in networking capabilities. Therefore, no additional hardware or software is required.

The UDP/IP capability is suitable for use in industry standard TCP/IP environments. This provides vendor independence and compatibility. To use this mode, the MacTCP software must be installed.

Typical uses for this software include:

- Synchronizing file and mail servers as well as user work stations.
- Synchronizing distributed development environments using common file servers. Keeps each client Macintosh with the same idea of time so that software builds can be done conveniently.
- Providing accurate time stamps for other applications such as journaling, time-based transaction processing, alarm and reminder management systems, and network file backup systems.

Feature Summary

Common features

Both the NTP Client and NTP Server for the Macintosh Operating System support the following features.

- Implements Version 2 of the Network Time Protocol; compatible with both Version 3 and Version 1 implementations
- Works on any model Macintosh running System 6.0.5 or later software (it is System 7 friendly). Any Macintosh can be a client as well as a server. Works on the new Power Macintoshes in compatibility mode.
- Compatible with AppleTalk Phases 1 and 2 (LocalTalk, EtherTalk, and TokenTalk)
- Runs quietly, asynchronously in the background; never ties up the Macintosh
- Has balloon help (System 7 only) for all dialogs and controls
- 32–bit clean
- AppleTalk transition event aware
- Compatible with dial–in AppleTalk products such as AppleTalk Remote Access (ARA), Liaison, and Timbuktu
- Compatible with other servers such as Apple's AppleShare server and Microsoft's Mail Server and CE Software's QuickMail
- Power Manager aware for PowerBooks and Portables
- Virtual Memory compatible (System 7 only)
- Supports MacTCP and any link access protocols that it supports including Ethernet, SL/IP, LocalTalk, EtherTalk, and others
- Allows you to synchronize your Macintosh computers to a corporate (local) time standard or to a national time standard (such as WWV, WWVH, or WWVB managed by NIST via the Internet)
- Extremely easy to configure. Configurations can be created and locked. This makes distributing pre-configured software around a campus easy.
- Current implementation maintains accuracy to ± 1.9 seconds
- API provides services for other applications (time stamps, time conversion, UTC offset, DST values, clock synchronization status and performance, etc.)

NTP Client

- The NTP client, server, and broadcast server modes (3, 4, and 5) are supported; the symmetric and reserved modes (1, 2, 6, and 7) are not currently implemented

- Supports communication with one polled server and/or one broadcast server
- Automatically compensates for the local offset from UTC (GMT) based upon geographic location as set in the Map Control Panel
- Automatically adjusts the clock to account for any local Daylight Savings Time policy using easy to configure dialogs

NTP Server

- The server (MacOS) software supports NTP, DATE (UDP only) as described in RFC 867, and TIME (UDP only) as described in RFC 868
- May serve any number of clients
- Can be configured to act as a broadcast NTP server
- May be optionally configured as a primary (stratum 1) server for isolated networks

Other Capabilities

In addition to the software for the Macintosh, server software is also available for Apple's A/UX, compatible with V2.0.1 and later as well as the Apple WorkGroup Server, and VAX/VMS using AppleTalk for VMS V3.0 and later. Both of these packages may be used to communicate with *NTP for Macintosh* using the AppleTalk transport protocols.

Unix systems, including A/UX, may use the public domain software `ntpd` or `xntpd` available via "anonymous FTP" from `louie.udel.edu` in `pub/ntp` to provide server functions via IP transport protocols.

VAX/VMS systems may use MultiNet (from TGV Software) or other commercially available NTP implementations to provide IP server functions.

Prerequisites

System Software

System software Version 6.0.5 or later is required. MultiFinder need not be running. *NTP for Macintosh* operates in the background and can be used on most existing servers (e.g., mail, file) as well as all user work stations. If the TCP/IP protocols are to be used, MacTCP (Version 1.0.2 or later) must also be installed.

System Hardware

Any model Macintosh may be used with *NTP for Macintosh*. RAM requirements are: 41KB for the `.NTP` driver code and constants and $9\frac{1}{4}$KB of system heap (variable) space, 25KB for the Control Panel device; 105KB of disk space are required for installation. Connection to a network is required: AppleTalk over either LocalTalk or EtherTalk is acceptable. AppleTalk Remote Access may be used to provide a network connection over phone lines. When MacTCP is used, any transport supported by MacTCP is acceptable.

Competing Products

There are a number of freeware, shareware, and commercial applications available for the Macintosh which also provide time synchronization.

Freeware & Shareware

Authentication Manager is a free Kerberos authentication Control Panel developed by Robert John Churchill for the University of Michigan. It can set the clock of the Macintosh once at boot time using the TIME, BOOTP, or NTP protocols. The software has numerous other capabilities unrelated to time service. *NTP for Macintosh* can be used in place of the time capabilities of this software to provide the synchronization needed. The software is available at a few archives; use `archie` to look for "authman." Robert can be contacted at `rjc@umich.edu`.

AutoClock (Version V1.4.4) has been updated and released by Jean-Pierre Gachen. This software uses a modem attached to the Macintosh to dial an automated time server. AutoClock can correct the clock time, account for changes due to Daylight Saving Time, and schedule automatic, periodic calls to the selected time server. The software is available at more major archives. Jean-Pierre can be contacted at `jpg11@calvacom.fr`; Résidence Beaucastel, 4, avenue François Mauriac, F-64200 Biarritz, France.

Clock Sync (Version 0.9.0) is a shareware utility developed by Jeremy Kezer. This software allows clients running AppleShare to synchronize the clocks of their Macintoshes to an AppleShare server (by using the GetServerTime function of AFP?). Jeremy can be contacted at `jbkezer@aol.com`; 143 Songbird Lane, Farmington, CT, 06032-3433.

Daemon (Version 1.0.1) is a free general IP server developed by Peter N. Lewis. This software provides a number of IP services that are typically present on Unix machines. Services implemented include finger, whois, ident, daytime, and an NTP server. This software won't synchronize the host machine but could be used to synchronize other machines. The software is available at most major archive sites. Peter can be contacted at `peter.lewis@info.curtin.edu.au`; 10 Earlston Way, Booragoon, Perth, WA, 6154, Australia.

Daylight (Version 1.1) is a freeware utility that automatically adjusts the Macintosh clock for Daylight Savings Time changes. It was developed by Gregory J. Smith who may be contacted at Bucknell Computer Services, Bucknell University, Lewisburg, PA, 17837. The software may be obtained from `rascal.ics.utexas.edu` in the file `misc/mac/system-related/Daylight_Savings_1.1_SIT_bin`.

Daylight! (Version 4.0.3) is a freeware utility that does not synchronize the clock, but rather is used to adjust the Macintosh clock for Daylight Saving Time changes automatically. It was developed by Mark Malson. The software may be obtained from any major archive site. Mark can be contacted at `markm@xetron.com`; CompuServ [71561,1313]; 914 Richwood Avenue, Hamilton, OH, 45013-3829.

LocalTime is a free utility developed by Peter Cooper. The software, implemented as a client and a server set of system extensions, uses a proprietary message protocol over AppleTalk to synchronize computers in a single zone. The software is available at major archive sites under the name `localtime.cpt.hqx`. Peter can be contacted at `comrade@uniwa.uwa.edu.au`.

Network Time (Version 2.0.1) has been released by Pete Resnick. It has been enhanced to optionally use NTP to obtain time. The software is available at most major archive sites. Pete can be contacted at `resnick@cogsci.uiuc.edu`; 1009 North Busey Avenue, Urbana, IL, 61801.

NIST Time (Version 1.1) is a shareware package developed by Jeffrey Andre. This software uses an attached modem to dial the NIST phone number in Boulder, Colorado to communicate with the ACTS. Using a simple protocol, the program is able to synchronize the Macintosh clock in about twenty seconds.

SetClock (Version 3.3) is a free (?) utility, the author is unknown. It is apparently capable of dialing ACTS in order to synchronize the clock of the Macintosh.

The University of Melbourne, Australia, has created a pair of utilities called `timelord` and `tardis`. The `timelord` utility runs on both Macintoshes and Unix machines running CAP and provides time service to Macintoshes running the `tardis` utility. The `timelord` server responds to time request messages from `tardis` by replying with the current local time. The software may be obtained from `munnari.oz.au` in the file `mac/timelord.1.4.shar.Z`.

Time Server (Version 1.0.2) is a free utility developed by John Raymonds, Jr. This software, implemented as a client, server, and Chooser set of system extensions, uses an unpublished message protocol over AppleTalk to synchronize Macintosh computers. John can be contacted at Captive Plastics, Inc., 251 Circle Drive North, Piscataway, NJ, 08855-0277.

Commercial

VersaTerm (and the Pro version) includes a utility called the VersaTerm Time Client (Version 1.1.3). Uses TCP TIME I think. Synergy Software is located at 2457 Perkiomen Ave., Reading Pa 19606. Telephone (215) 779-0522, FAX (215) 370-0548, e-mail `maxwell@sales.synergy.com`.

Another commercial product is NetTime, Version 1.3, by Jeddak, Inc. I don't know anything about this, but have seen advertisements for it. Current advertised prices are $69 for a two–user pack. The company is at 2540 N. First St., Suite 301, San Jose, CA, 95131. Telephone (408) 894-6900, FAX (408) 894-9020.

Product Differentiation

Why would I go to such lengths to tell you about other available time synchronization solutions for the Macintosh? Once you try *NTP for Macintosh*, I feel that you will be able to make your own comparative analysis. You will find the solution that works the best in your environment and solves your problems.

What distinguishes or differentiates this from other products? *NTP for Macintosh* provides integrated time keeping and adjustment for both UTC offset and DST; runs over AppleTalk or TCP/IP; provides both client and server functions; does not require external hardware (such as a modem) or dial–up costs; uses an Internet standard upper–level protocol; compatible with Macintosh, Unix, and VAX/VMS operating systems; supports national time standards; allows preconfiguration and campus distribution; supports a number of communication modes (i.e., broadcast and/or direct polling).

Anticipated Users

Any user of a network containing two or more Macintoshes will find this product useful. Macintosh users who need to interoperate with other Unix or VAX/VMS systems will similarly recognize the utility of this product.

Wouldn't you like to have accurate time stamps on your files and mail messages? Tired of adjusting the Macintosh clock when Daylight Savings Time changes? Would you like your reminder alarms delivered at the *correct* time? Try *NTP for Macintosh*! I think that you'll find it is the best Macintosh time synchronization product available anywhere.

Pricing

The NTP Client software is available as shareware for a suggested price of $25 per copy. Upon payment of the shareware fee, you will receive one copy of the User's Manual (a 91 page, manual which describes all of the available software including the servers for Macintosh, A/UX, and VAX/VMS), will become a registered user, and will be notified of future upgrades to the software. Site licensing and volume discounts are available; contact the author for details.

The NTP Server software for Macintosh, A/UX, and VAX/VMS is available at a modest price directly from the author. The User's Manual is available separately, priced at $10 per copy.

Future Enhancements

Possible future enhancements to the *NTP for Macintosh* software include the following.

- Incorporate cisco's multiplexed broadcast technology into the broadcast code
- Include optional `timelord` services in all of the servers
- Implement NTP mode 6 and 7 status and management packets over UDP/IP or AppleTalk
- Implement NTP symmetric modes (1 and 2)
- Improved clock accuracy (to $\leq \pm 0.5$ seconds)
- Support up to four servers, four broadcast servers, and four peers
- Support the DATE/TCP and TIME/TCP protocols in the Macintosh server
- Support full the NTP Version 3 specification including authentication
- Implement a CAP compatible server

- Implement support for timecode receivers connected directly to the Macintosh
- Add protocol support for the DECnet and OSI stacks
- Add optional support for DEC's Digital Time Service (DTS)
- Support the Apple Internet Router (AIR)

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