



SCaLE 21x

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# **Network Time Foundation Project Status Updates**



# David L. Mills

3 Jun 1938 - 17 Jan 2024



Mills first designed and implemented the Network Time Protocol in 1981, tackling the challenge of delivering synchronized time on networks.



I remain very glad i was able to learn from and work closely with Dave for the past 30 years' time.

NETWORK TIME FOUNDATION

DEPENDENCY

< < PREV RANDOM NEXT > >

ALL MODERN DIGITAL INFRASTRUCTURE

A PROJECT SOME RANDOM PERSON IN NEBRASKA HAS BEEN THANKLESSLY MAINTAINING SINCE ~~2003~~

1992

oregon

About NTF and its Projects...

(xkcd #2347, with permission)

An old friend of mine annotated this and sent it to me.



## NTF Introduction

- Harlan Stenn has actively worked on the NTP Project since the mid 90s.
- The NTP Project needed the support and backing of a legal entity.
- Harlan felt an “NTP Foundation” would have insufficient scope and decided on Network Time Foundation.
- NTF became a California Public Benefit corporation and certified as an IRS 501(c)(3) in 2011.

This slide tells a bit about how Network Time Foundation came to be. I won't say more because it's in the online presentation slides.



## NTF Hosted Projects

- The NTP Project - the only Reference Implementation of NTP. The Original.
- The LinuxPTP Project.
- The libptpmgmt Project - PTP TLV management library.
- Several SyncE projects.
- The Khronos Project - ongoing provable bounded time limits.

Most people are at least aware of NTP. The LinuxPTP Project's goal is to be the best performing PTP software under the most recent Linux kernel. The libptpmgmt Project is a Type-Length-Value management and monitoring library for LinuxPTP in particular, and other PTP things as allowed. We're spinning up 3 SyncE projects. NTF is neutral and the 3 companies that are working on open source SyncE projects under NTF's umbrella are happy to play nice with each other. The Khronos Project's goal is the delivery of ongoing provable bounded time limits, to prevent time-shifting attacks.



## Khronos Project

- Provable bounds on time accuracy
- Generally 200ms or better
- Secures time: Negligible probability of successful MitM or time-shifting attacks
- Protocol independent
- Low computational and communication overhead
- RFC 9523
- <https://khronos.nwtime.org>

Let's discuss Khronos first because it affects at NTP and PTP. The folks who are working on Khronos have good ideas on what the threats are, how to detect them, and how to mitigate them.

Other folks are concerned that some of the proposed detection and mitigation plans are unworkable.

We're confident that we can come up with solutions that will work for all involved.



## NTP Project Status

- ntp-4.2.8p18 expected in 1-2 months
- Upcoming ntp-4.4 release:
  - NTS
  - New Extension Fields
- Upcoming plans:
  - NTP TCP Services
  - Khronos support
  - DDoS mitigation

ntp-4.2.8p18 fixes somewhere between 2 and 3 dozen bugs.

The NTP/TCP services effort is partially funded by a 2023 ARIN community grant.



## NTP DDoS Mitigation

### DDoS Mitigation:

- Under discussion for the past year
- Real-time reporting of attacks
- Near real-time tracking of IPs that are being attacked
- **Looking for funding and beta partners**
- Once this project is moving, we'll share our results

We're actively identifying DDoS and abuse vectors involving NTP.





# LinuxPTP Project

- Supported profiles: default, automotive, enterprise, telecom G.8265.1, G.8275.1, and G.8275.2
- Updated documentation, including examples and common configurations
- Latest release: 4.2 on 5 December 2023
- 4.3 release scheduled for March 2024 (paint drying on TLV authentication mods)
- <https://linuxptp.nwtime.org>



## libptpmanagement Project

IEEE 1588-2019 Management TLV library -  
Also supports LinuxPTP specific TLVs  
LGPL 3.0

- Current Release: 1.2 (5 December 23)
- Every class and file is documented
- Will be updated with new authentication TLVs
- <https://libptpmanagement.nwtime.org>



## SyncE Projects

SyncE is an ITU-T standard that facilitates the transference of traceable clock signals over the Ethernet physical layer.

- `synced` from Renesas
- SyncESMC from SyncMonk
- ??? from Intel
- <https://sync-e.nwtime.org>

These projects are coming on-board and ramping up now. There will be more information on the website soon.



## Other NTF Topics

Looking for:

- Financial Support
- Volunteers
  - sysadmin
  - coding (developers, QA)
  - documentation
  - fundraising
- Additional related/fun/interesting projects

We get no government funding. The bulk of our funds comes from our institutional members.

Individual memberships and donations also help a lot. We use our funds to continue to improve and evolve all of our projects' security, support services, and documentation.

We hope that the more you learn about NTF the more you'll understand and appreciate the work we do.

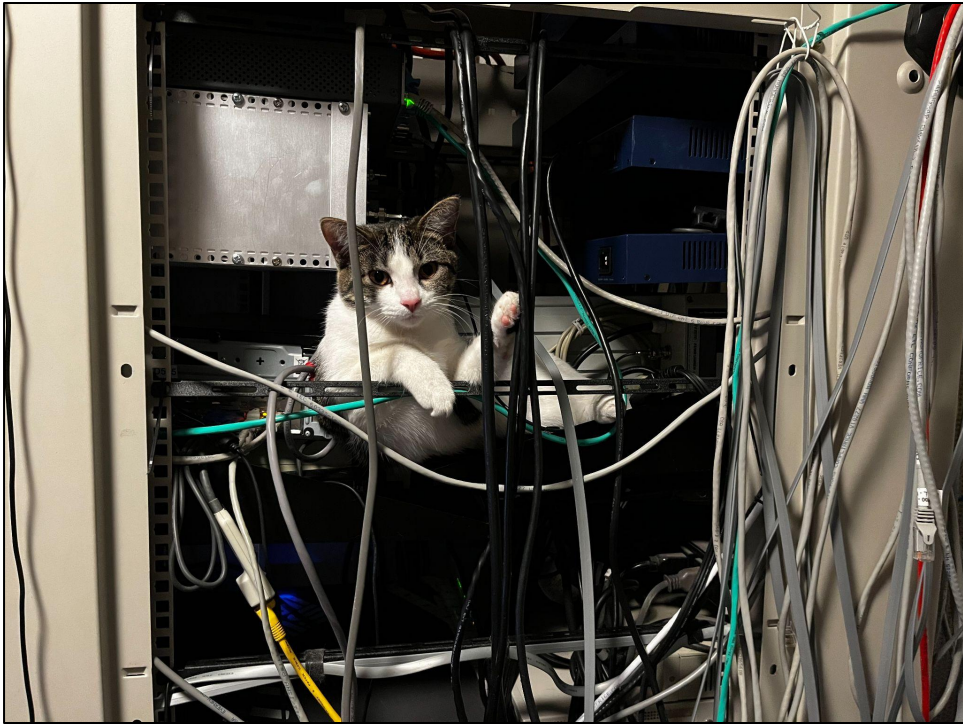
The global user community relies on NTF's technology every minute of every day.



## Follow NTF...

- X (Twitter): @networktimefnd
- LinkedIn: Network Time Foundation
- <https://www.facebook.com/nwtime.org>
- Slack Channels
- <https://www.youtube.com/@networktimefoundation>

We invite everyone to follow us and share and submit posts that are of interest to the community.

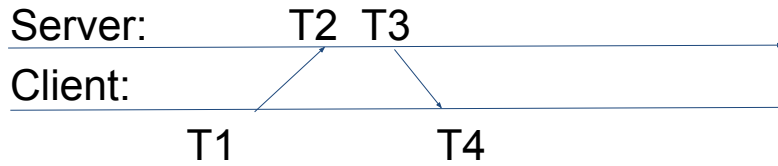


**Ruthie.**

**Margaret likes to joke that we use cat5 cables.**



## An NTP volley



T1 Client sends, T2 Server gets, T3 Server sends, T4 Client gets.

Server overhead:  $T3 - T2$       RTT:  $T4 - T1 - (T3 - T2)$

One-way time:  $RTT/2$  (symmetric link)

If client and server are sync'd,  
 $T3 + RTT/2 = T4$



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Probably - did the remote clock change its time in the interim? Did yours?



## In conclusion...

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<https://nwttime.org/donate>

Questions? [info@nwttime.org](mailto:info@nwttime.org)