

KHRONOS PROJECT

RFC9523

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WELCOME

This quarterly Network Time SyncUp Event will review recent updates and future plans for the Khronos Project.

01 Origins and Ongoing Development
02 What is Khronos?
03 Goals
04 Updates to the Existing Code
05 What Else Changed
06 What's Next to be Added
07 Issues
08 References
09 Following Packet Handling Guidelines
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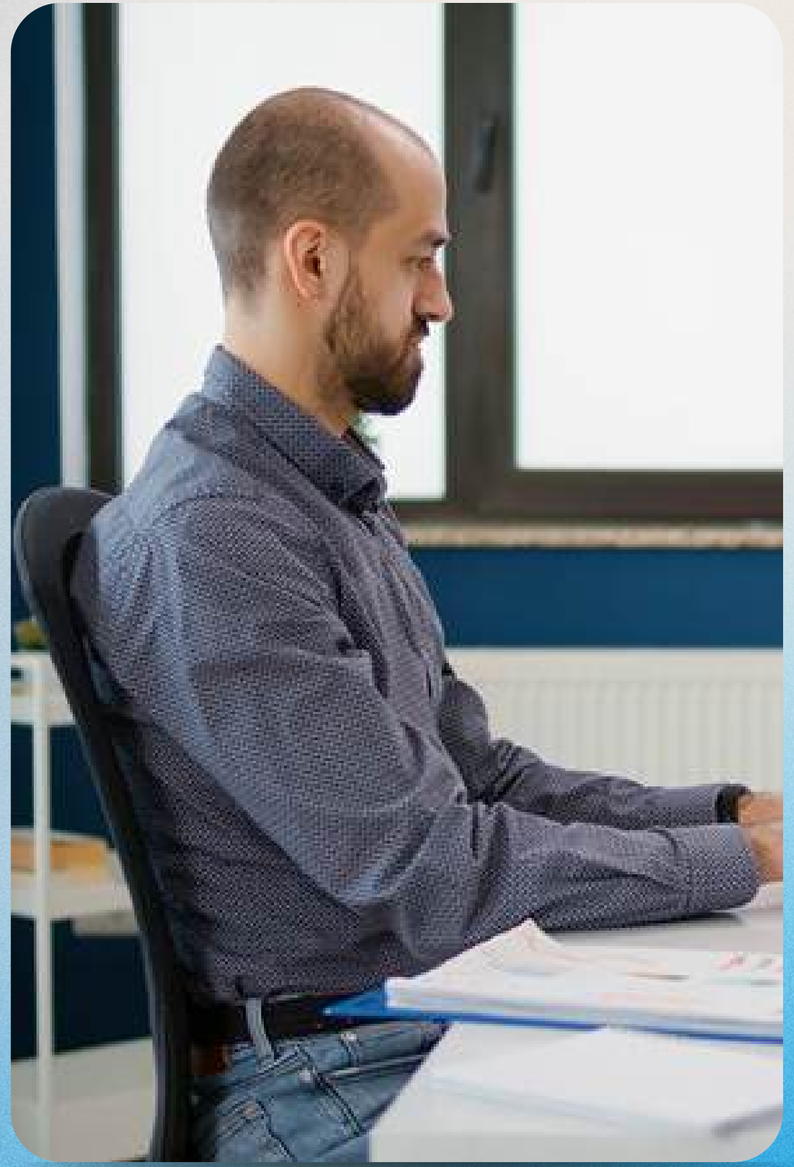
Origins and Ongoing Development

- Why Khronos was originally developed
- Hardening for Resiliency and Robustness
- Changes for Repurposing to Monitor time servers
- 2036/2038 rollover event handling

What is Khronos?

- Provide Improved Security Against Time-Shifting Attacks
- Interoperable with any NTP Client
- Does not affect on-wire protocol
- Operates in the background
- Uses a large number of pool servers
- Averages offsets of the pool servers against the local clock

khronos.nwtime.org



Goals

What are we doing?

01

Monitor NTP Servers

02

Monitor the NTP Servers that those servers are using.

03

Provide alerts when things go wrong.

04

Monitor for 2036/2038 Rollover Events

05

Integration with ntpd when changes are necessary.



UPDATES TO THE EXISTING CODE

01 Validation

02 Handling Features

03 Removal of failing pool servers

04 Fetching new pool servers when needed

05 Reports

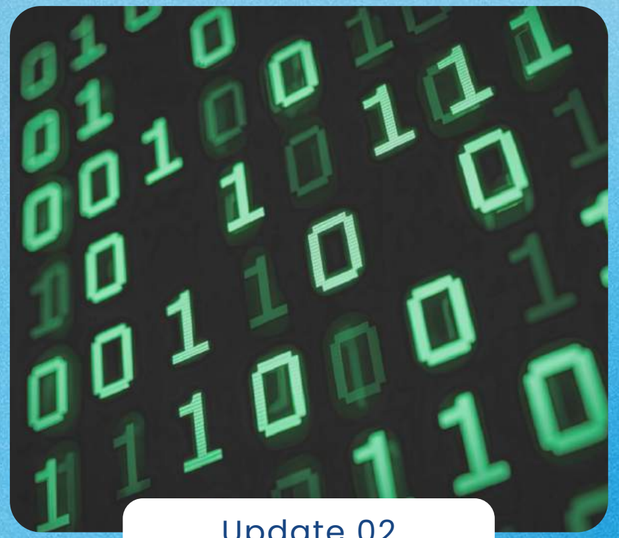
06 Jitter and ABH’s monitoring scores

WHAT ELSE CHANGED



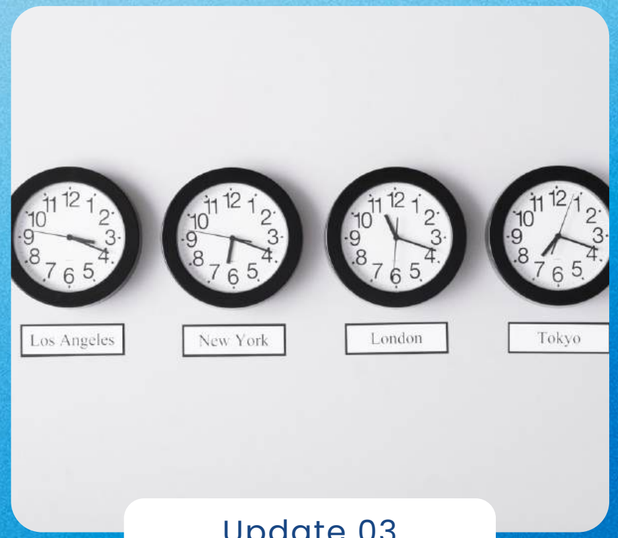
Update 01

Refactored heavily



Update 02

Logging



Update 03

Zone Selection



Update 04

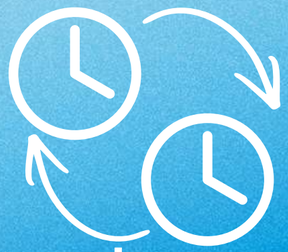
Removed ability to update local clock

What’s Next to be Added?

Ongoing development



Monitor targeted servers



Monitor the targeted servers time sources



Sending alerts



Targeted Server Reports



Issues - Decisions to be made

- How many pool servers are needed?
- What is the server on which Khronos resides using to discipline its own time?
- Security
- When should a pool server IP address be removed from list?
- Interpretation of offset failures
- Jitter interpretation

References

- **Khronos Repo:** https://github.com/nwtime/khronos
- **RFC 9523: A Secure Selection and Filtering Mechanism for the Network Time Protocol with Khronos:** https://datatracker.ietf.org/doc/rfc9523/
- **Preventing Network Time Travel with Khronos (NDSS 2018):** https://community.nwtime.org/t/preventing-network-time-travel-with-khronos-ndss-2018

Following Packet Handling Guidelines

Examine carefully what you receive to make sure that the contents are sane and make sense.

- Validate all parts of the NTP packet
- Examine all timestamps to ensure that they are reasonably close to expectations
- Check for KOD packets
- Check for valid Stratum between 1 and 15
- Check for synchronization leap indicator != 3
- Check for valid NTP version
- Check for valid response mode

NETWORK TIME FOUNDATION



THANKS

For Watching

Continue the discussion at
https://community.nwtime.org/c/khronos