
# What time is it?

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# About Netnod

- A neutral, Internet infrastructure organisation
- Largest Internet Exchange Point operator in the Nordics (>250 connected networks in Stockholm)
  - Excellent connectivity to Russian and Baltic regions
- Manages i.root-servers.net, one of 13 logical root name servers in the world
- Offers secondary DNS anycast services to ccTLDs, enterprises and partners
- Provides time and frequency services (NTP, PTP) and Swedish time UTC(SP)

**Key Facts**

Founded: 1996

Location: Stockholm, Sweden

Employees: 30

Ownership: TU-Foundation (non-profit organisation working for the good of the Internet)

# Netnod in the Nordics

- **Stockholm (2 locations)**
- **Copenhagen / Malmö**
- **Gothenburg**
- **Sundsvall / Gävle**
- **Oslo**
- **Luleå**


For maximum resilience, Netnod's infrastructure is secured in bunkers.

# What is the problem?

- When a computer boots, it has no knowledge of what time it is
  - It have to guess, why not 1970-01-01 00:00:00?
- If the guess is wrong, time limited certificates can not be used
  - Neither DNSSEC, nor TLS can be used
  - Specifically, Network Time Security (NTS) does not work
- Of course one can use different heuristics while guessing…
  - But how do you know if your guess is correct?
- Its specifically bad if an antagonist has forced the restart
  - This to make it impossible to use certificates (and secure communication)!
- On top of that you have all existing problems related to time
  - See *Perfekt Tajmat* (in Swedish) from 2007 about traceable time and frequency
  - https://www.regeringen.se/rapporter/2007/10/sparbar-tid-och-frekvens---perfekt-tajmat/

- Measurement- and web servers
- NTP servers
- IP Network management
- PTP and GNSS
- Frequency distribution
- Frequency measurement
- Frequency amplifier
- Frequency and phase adjustment
- Frequency generator (Cs)


CBL: 222, Delay: 6,21 ns
CBL: 208, Delay: 6,17 ns
CBL: 221, Delay: 6,21 ns

# Project and project status

- Adjust servers for NTP and NTS
  - 75% ready
- Set up servers for roughtime (including clean up of protocol)
  - 15% ready
- Create algorithm for setting the time
  - 5% ready
- Implement the algorithm
  - 0%
- Host public meetings related to the algorithm and implementations
  - 0%