CGSIC Timing Subcommittee Report

Patricia Larkoski, Timing Subcommittee Chair

Bijunath Patla, Timing Subcommittee Deputy Chair

Report from NIST
Bijunath Patla, NIST

National Institute of Standards and Technology
U.S. Department of Commerce

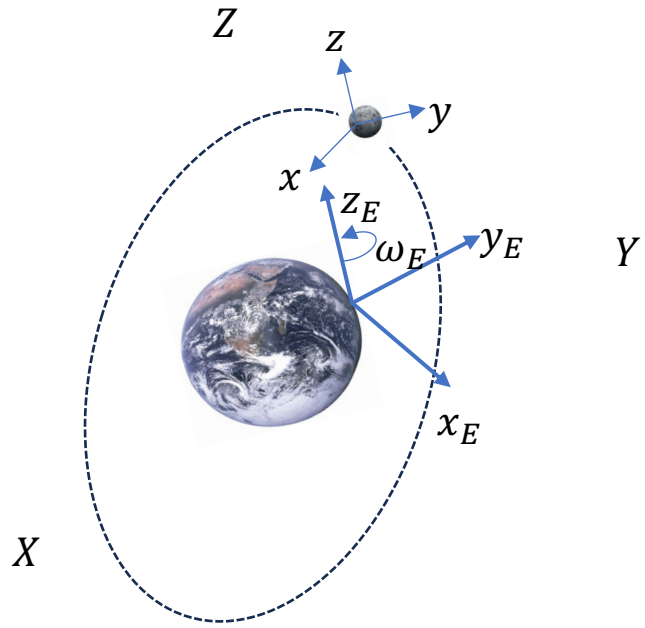
Time Realization & Distribution

NIST Fountains and Strontium ion clock development updates

Updates on Services including NTP, SNTP and real time GNSS data availability

Portable clocks and applications

Coordinate transformations that include full general relativistic treatment for comparing frequencies of space and ground clocks.



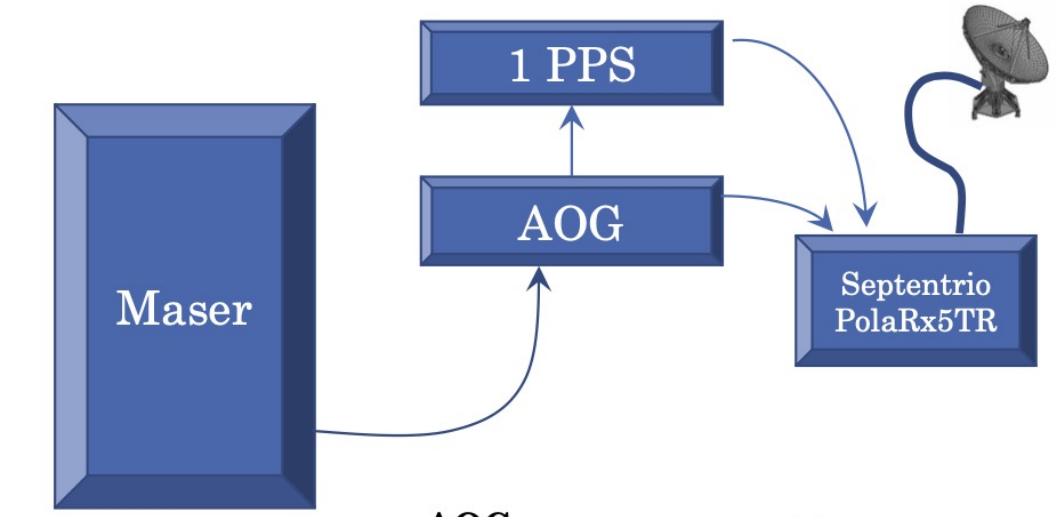
Timing laboratory updates at NRL
Michael Coleman, NRL

GPS extended clock life testing
- Time & frequency component
- Next gen. atomic clocks
- GNSS simulator tests

UTC(NRL) signal generation for GNSS receivers

Results from BIPM traveling receiver calibration comparisons

Updates on Satellite Bus and Special Systems Lab



Maser Stability:
(Hadamard Dev)

~ 7 E–16 / day

Deterministic drift:
(observed up to)

~1 E–15 / day.

AOG

Compensates for drift and clock process noise.

Newer masers tend to have higher drift than older ones.

Timing Receiver

Accepts external clock so observation files can be used to compare UTC signal at this station with others.

Report from USNO
Arnold Colina, USNO

USNO specializes in real-time timekeeping

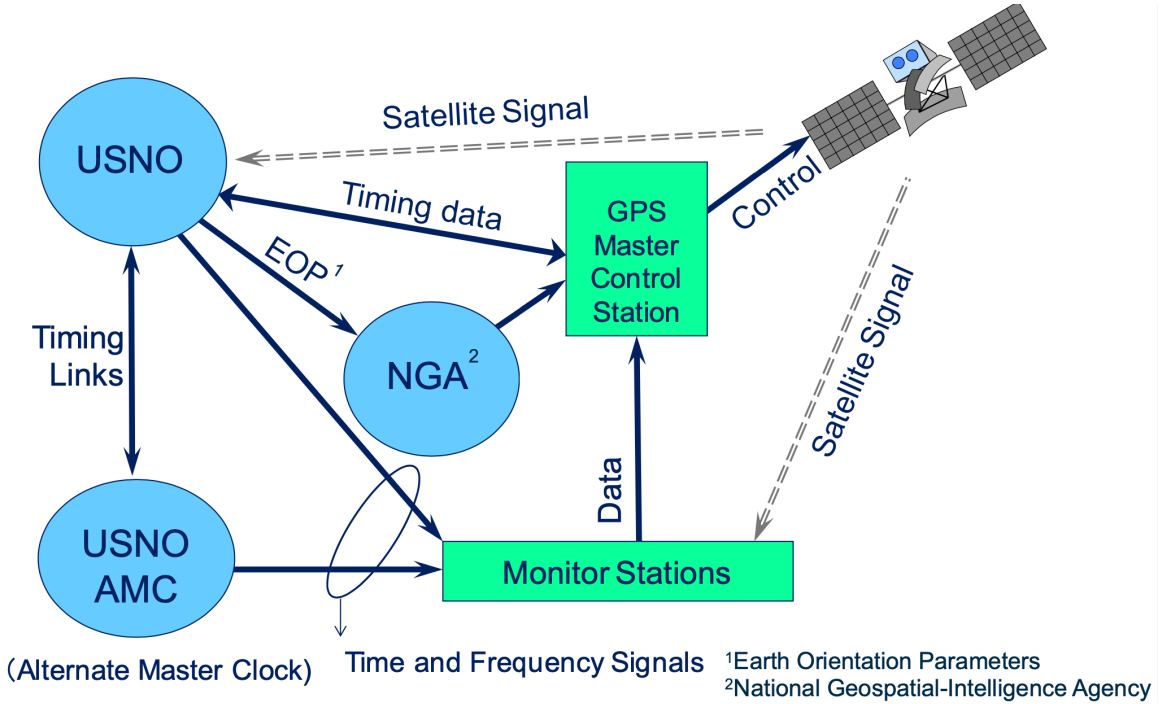
- UTC(USNO) is the official source of time for the DOD
- USNO continues to improve the master clock to support emerging requirements
- UTC(USNO) is disseminated to users via many methods, including GPS

USNO provides the timing reference for GPS

- Monitor and report the offset of GPS Time from UTC(USNO)
- Ensure the validity of reported numbers through receiver calibrations

USNO monitors other GNSS Time

- Will report GGTO data to GPS with OCX

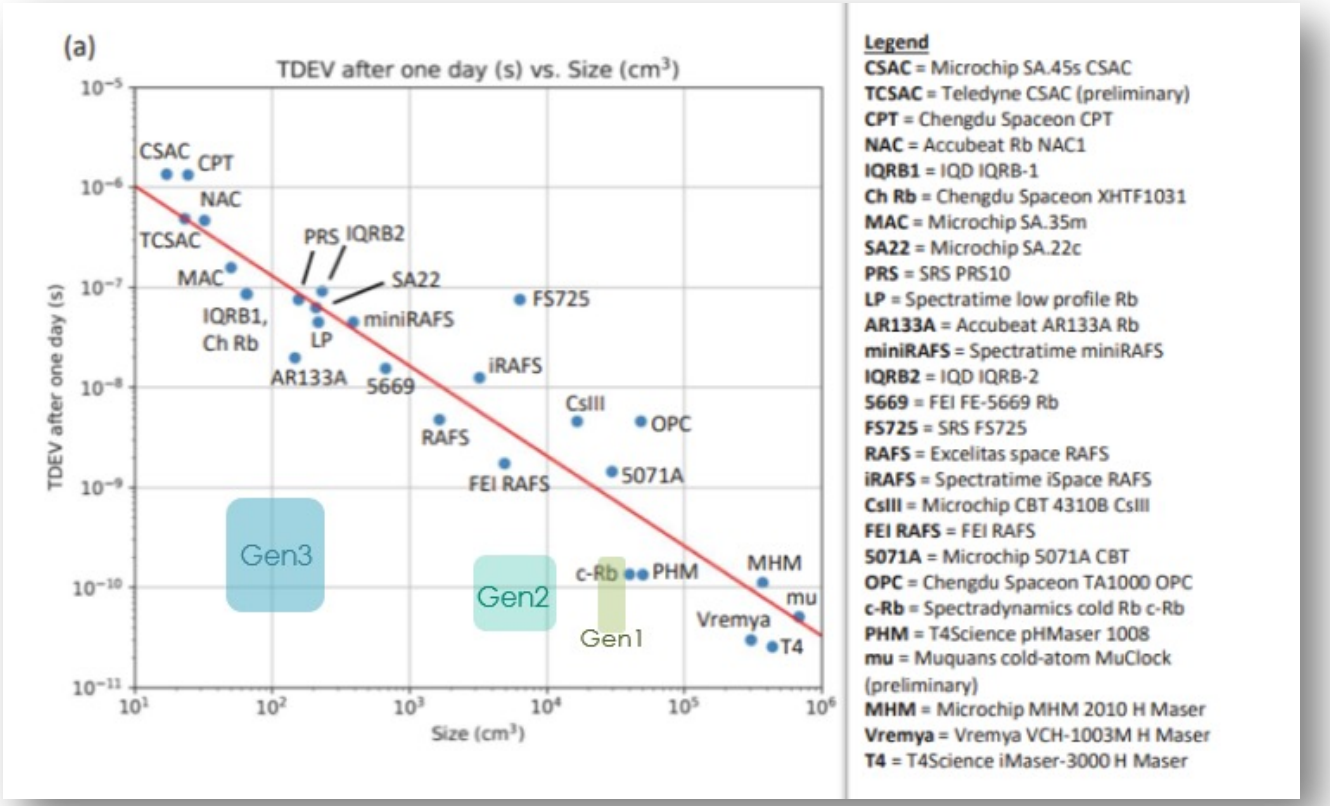


Optical Atomic Clocks for Enhanced Timing Performance
Judith Olson, Infleqtion

Optical clocks coming to market now, pre-production units available

Maser-like performance with added benefits of:

- More fieldable, ruggedized
- Lower cost
- Shorter lead times
- Much smaller size
- Better holdover/drift performance



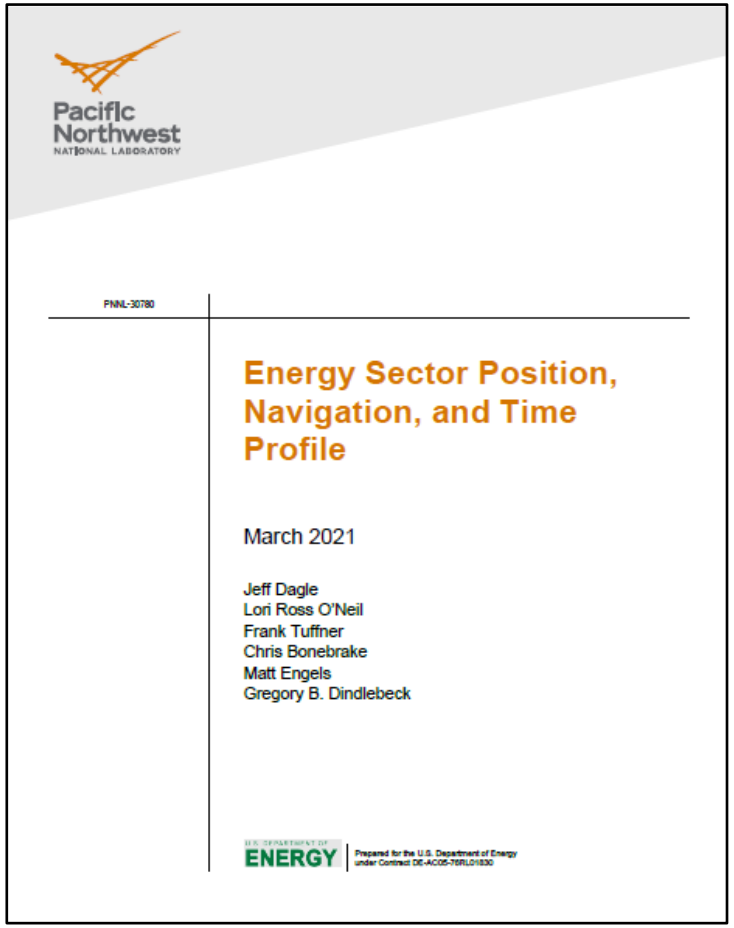
Electric Power Applications Enabled by Wide-Area Synchronized Time
Jeff Dagle, PNNL

DOE's Energy Sector PNT Profile – March 2021
Profile focuses on electricity applications in the µs class of timing precision and accuracy.

Precise timing is widely used to support synchrophasor applications in the electric power sector.

Extended GPS loss today would not be expected to result in a high-consequence reliability event, but measurement applications could be impacted.

In the future, emerging applications will require increased integrity, availability, and robustness.



Precision Time Synchronization in Data Centers

Ahmad Byagowi, Meta

Data Centers need time synchronization

Solutions:

Open Time Server

Time Card