

Why Timing Infrastructure Is the Next Critical Challenge

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Who am I ?

Kohei Suzuki SEIKO Solutions Inc., STN Division



Joined Seiko Instruments in 2001.

Participated in ITSF, WSTS, ISPCS, EANTC, APRICOT, APNIC, Peering Asia, and many NOG events.

Hobbies: Sauna, magnet collecting

Favorite sports: RugbyFootball, Football, Baseball, Golf

Favorite manga: Ao Ashi, One Piece, Demon Slayer, Kochikame, The Silent Service

People I respect: Professor Toshiyuki Mashiko, Kyojuro Rengoku, Ikujiro Nonaka



| THE SILENT FOUNDATION OF CONNECTIVITY

Time synchronization is no longer just for logs.
It is the heartbeat of modern infrastructure.

- > **Protocol Stability:** Coordinates BGP/OSPF timers to prevent route flapping.
- > **Security Integrity:** Enables TLS certificate validation and security handshakes.
- > **Operational Audit:** Precise timestamps are mandatory for incident forensics and financial audit trails.



NTP VS. PTP: THE EVOLUTION OF ACCURACY

Feature	NTP (Network Time Protocol)	PTP (Precision Time Protocol)
Standard	RFC 5905	IEEE 1588-2019
Accuracy	~Milliseconds (10 ⁻³)	~Nanoseconds (10 ⁻⁹)
Target	General IT / Enterprise Apps	5G Base Stations, Finance, Power Grids
Dependency	Software-based timestamps	Hardware-level timestamping (PHY/MAC)

INDUSTRY-SPECIFIC TIMING REQUIREMENTS



Mobile Infrastructure

5G TDD (Time Division Duplex) requires sub-microsecond phase sync to prevent inter-cell interference and dropped calls.



AI & Data Centers

Distributed GPU clusters require nanosecond sync for optimized parallel processing and cache coherency.



Financial Services

MiFID II / RTS-25 mandates UTC traceability. High-Frequency Trading (HFT) relies on precise trade sequencing.



IP Broadcasting

SMPTE ST-2110 relies on PTP for frame-accurate switching and lip-sync across all-IP media flows.

THE GNSS DEPENDENCY TRAP



⚠ GNSS is a Single Point of Failure

- **Jamming:** Signal blocking is now a persistent threat in geopolitical conflict zones.
- **Spoofing:** Injecting fake signals to manipulate time—hard to detect.
- **Policy Risk:** GPS is a military asset; civilian access is not legally guaranteed.

GNSS failure is not an "if"—it's a "when."

GNSS outage causes serious damages to the world

If the GNSS signal lost for a day...



- > Global: 20 billion USD loss/day
- > JAPAN: 1 billion USD loss/day
- > South Asia: 800 million USD loss/day

GLOBAL MOVEMENT TOWARD RESILIENCE



USA

Executive Order 13905:
Mandates resilient timing for critical infrastructure. GPS-only systems are being phased out.



UK

NPL National Timing Centre delivers UTC via fiber from 4 diverse geographic nodes for sovereign resilience.

Sweden



Regulator mandates GNSS backup. NETNOD IX provides atomic clock-based timing services over its network.

JANOG 57

CASE STUDY

The Japanese Operator Community Debate

(Feb 2026)

INSIGHTS FROM THE JAPAN DEBATE

01. The "Free Time" Dilemma

Users expect time to be "always there" like water. Without a disaster, there is little incentive to pay for protection—until everything stops.

02. Single-Source Risk

Multiple operators shared that a single PTP failure caused a complete wipeout of downstream devices. Multilayer defense is mandatory.

03. Emerging Market

Broadcasters (IP migration) and Data Centers are becoming the first paying customers for managed timing services over fiber.

04. Operational Hurdle

"It's not like NTP." PTP expertise is rare and operationally intensive compared to legacy protocols.

| THE OPERATIONAL STAKES

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5G PHASE ACCURACY LIMIT

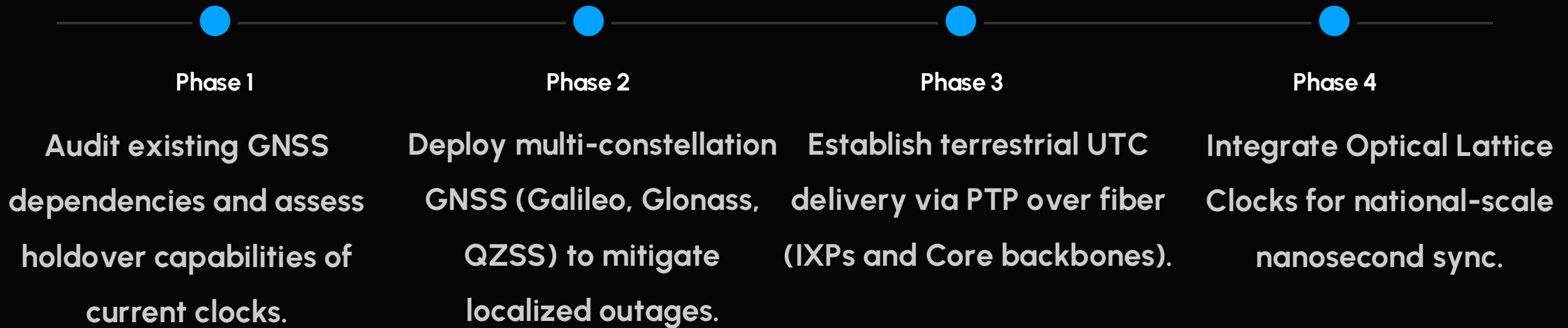
Breaching this leads to immediate cell isolation and service degradation.

100%

GNSS DEPENDENCE

Most current **South Asian networks** lack a terrestrial backup for their PNT data.

ROADMAP TO TIMING SOVEREIGNTY



| HOW JAPANESE COMMUNITY BRIDGES THE GAP

- > **Hardware Expertise:** PTP/NTP servers with high-precision oscillators for long-term holdover.
- > **Network Integration:** Solving WDM asymmetry and multi-hop PTP distribution challenges.
- > **Community Partnership:** Working with NICT and Japanese IXPs to build the fiber-based timing backbone of the future.





QUESTIONS?

Thank you for your attention!

Contact Seiko Solutions Inc.

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