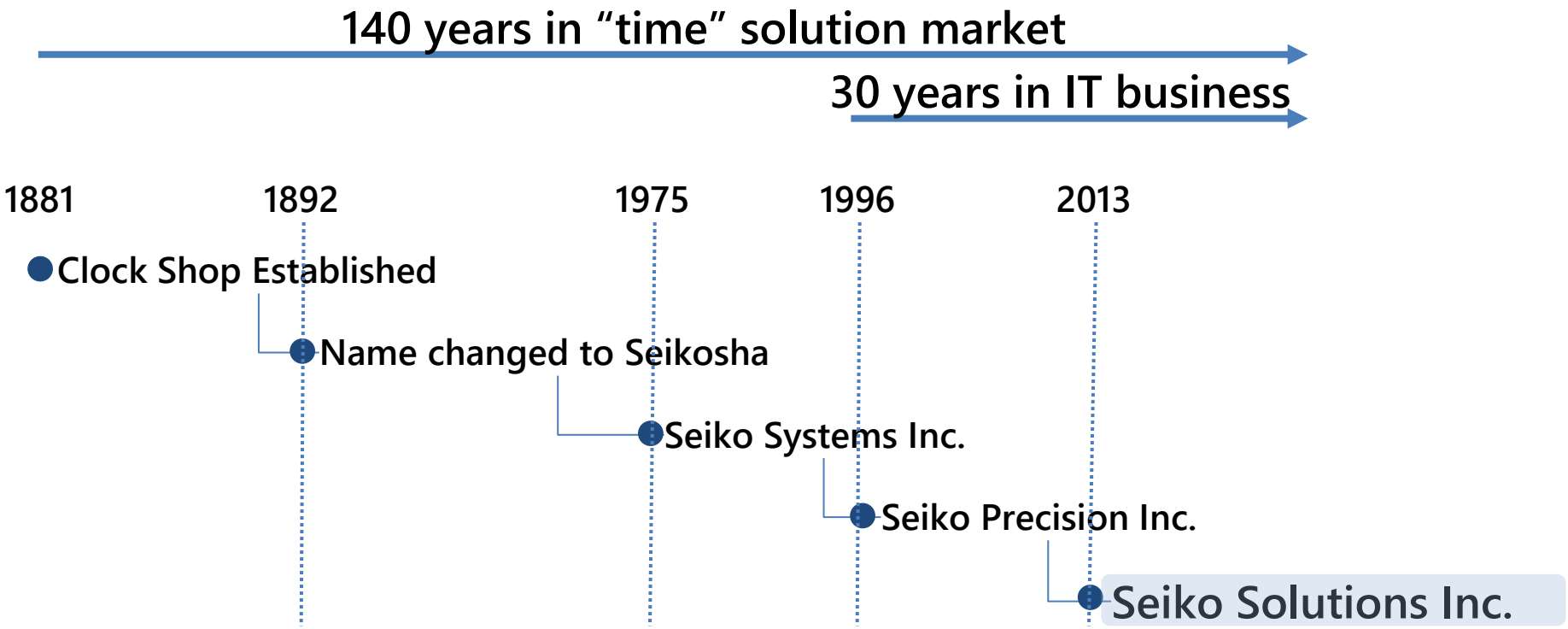
Seiko Time Solution

NTP Time Server

Seiko as Time Solution Provider

More than 140 years of history providing precise time solution with cutting edge products such as clock, watch and electronic devices since the establishment of clock shop by K. Hattori in 1881



Company split out due to business diversification

Seiko Group

SEIKO

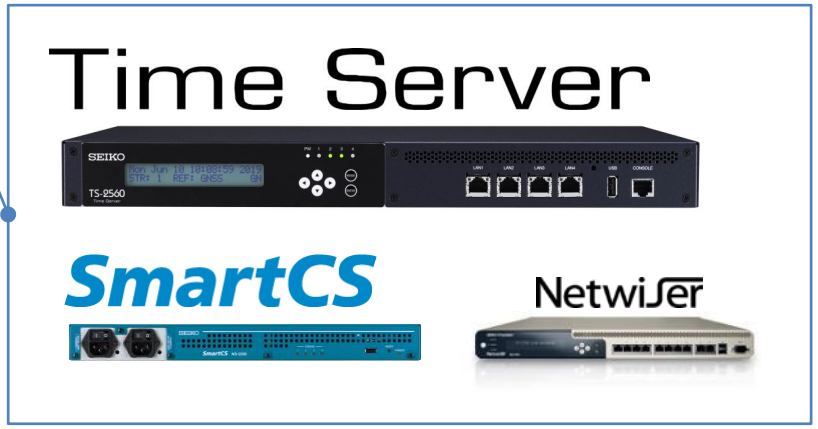
We provide safety and satisfaction based on "reliable quality."

Seiko Solutions Inc.

Company	SEIKO SOLUTIONS INC.
Established	December 13, 2012
Business Starting Date	April 1, 2013
Location	1-8 Nakase, Mihama-ku, Chiba City
Capital	500 million yen
Stockholder	100% by Seiko Holdings Corporation
Employee	Approx. 700
CEO	President Mr. Jun Sekine

Business Lines

- Network Solution
- System Integration
- Payment Solution
- Mobile Solution



Time Synchronization

What is a Time Server?

Time server is a system that obtains accurate time information and distributes it to other devices.It is used to synchronize the clocks of computers such as PCs and servers, network devices like routers, over a TCP/IP network.

Time Synchronization Protocol

The most commonly used protocol for exchanging time information between servers and clients is NTP (Network Time Protocol).

NTP Stratum Structure

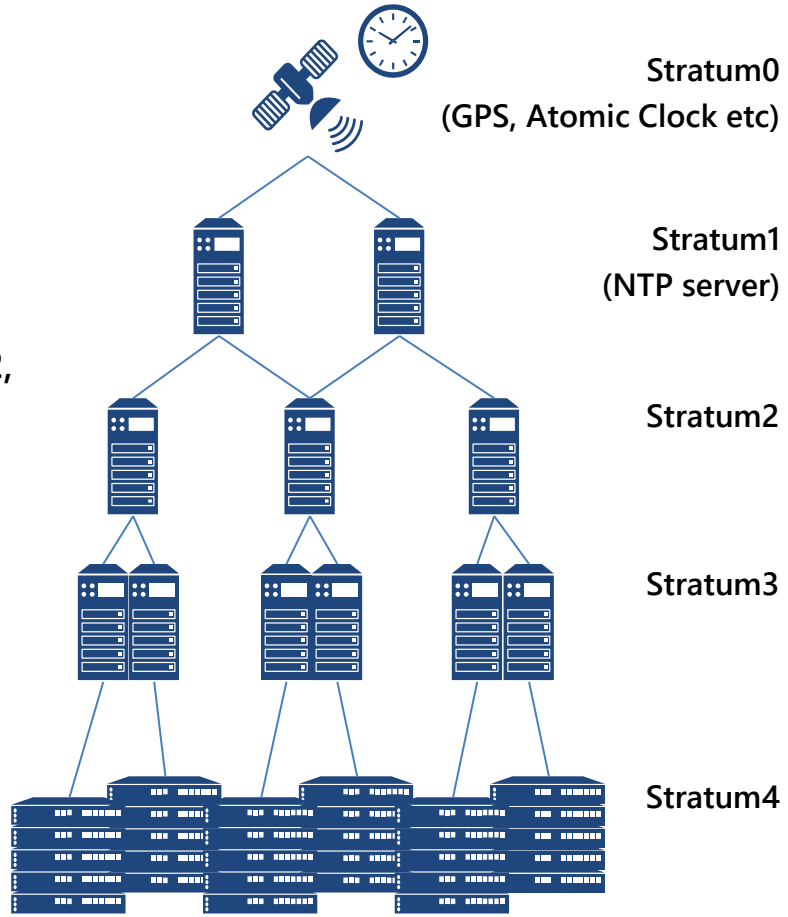
NTP servers are organized in a hierarchical structure called “Stratum.”The layers are referred to as Stratum 1, Stratum 2, and so on, starting from the top.

Stratum1

Directly connected to Stratum 0 reference clocks(e.g., atomic clocks, radio clocks, GNSS receivers)

Stratum2and lower

Synchronize time from upper strata anddistribute accurate time to lower-level servers



Time Deviation and Synchronization

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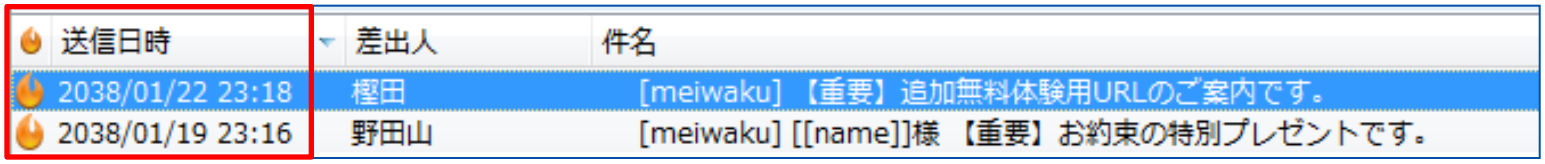
Time deviation may interfere daily business

Phenomena examples

1） Contradiction between the enterprise
2） Failure of dealings
3） Receiving / Sending mail from the future



送信日時	差出人	件名
2038/01/22 23:18	樫田	[meiwaku]【重要】追加無料体験用URLのご案内です。
2038/01/19 23:16	野田山	[meiwaku] [[name]]様 【重要】お約束の特別プレゼントです。

What happens in the system when time is not synchronized

1） Processing doesn't work on schedule
2） Time shift may occur in the message log
3） May fail to log in the system due to access error

Time Deviation and Synchronization

Unreliable accuracy of clock inside device

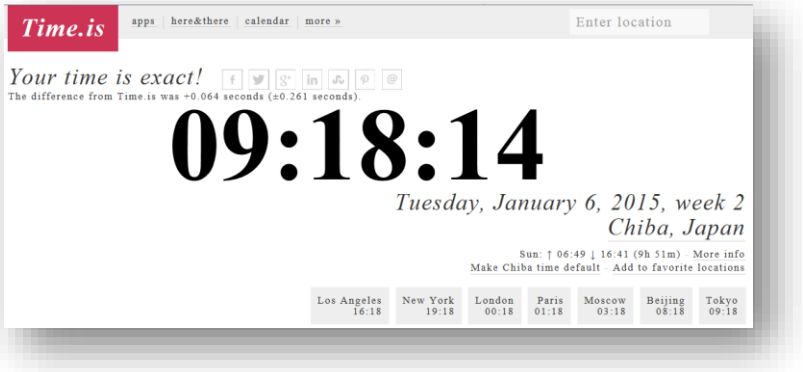
Relying on the internal RCT of device may cause several seconds of time deviation per day since it easily gets affected by the environment.

Necessity of network system synchronization

Time deviation among multiple devices may cause system failure, thus time synchronization is required for the whole network system.

You can confirm the deviation at the site below

URL http://time.is



Typical Options for Time Synchronization

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Several issues have been pointed out for typical options

Manual setting	・Man-hour increases when setting up ・Time may be set to wrong date and time ・Difficult to maintain the synchronization of complicated system
Public NTP server via the Internet	・Security hole risk ・Service availability may not meet the requirement ・Time Accuracy depends on environment
Adapting general device as NTP server	・Risk similar to the option using public NTP server ・Lower reliability compared to the dedicated NTP server ・Practical use is difficult as its cost increases

This is why we recommend to introduce our Time Server in the system

Typical Options for Time Synchronization

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Prevent DDOS attack by NTP port

Internet-based NTP is increasingly used in DDoS attacks via UDP source-spoofing

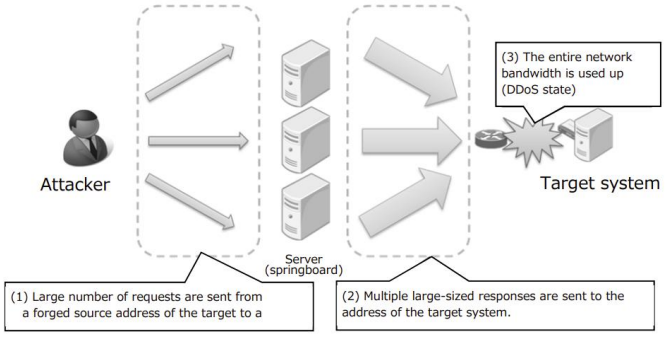

Figure 1 DDoS attack in which the source address of UDP packet is spoofed

GNSS-based NTP server helps prevent UDP-based NTP reflection/amplification DDoS attacks

◆White paper :
https://www.janog.gr.jp/wg/doc/ntp-wg-en.pdf

A leap Second

Prevents system errors or log confusioncaused by a sudden 1-second jump.

Adjust Mode:
Smoothly corrects the leap second without a sudden 1-second jump.

The Role of Time Server

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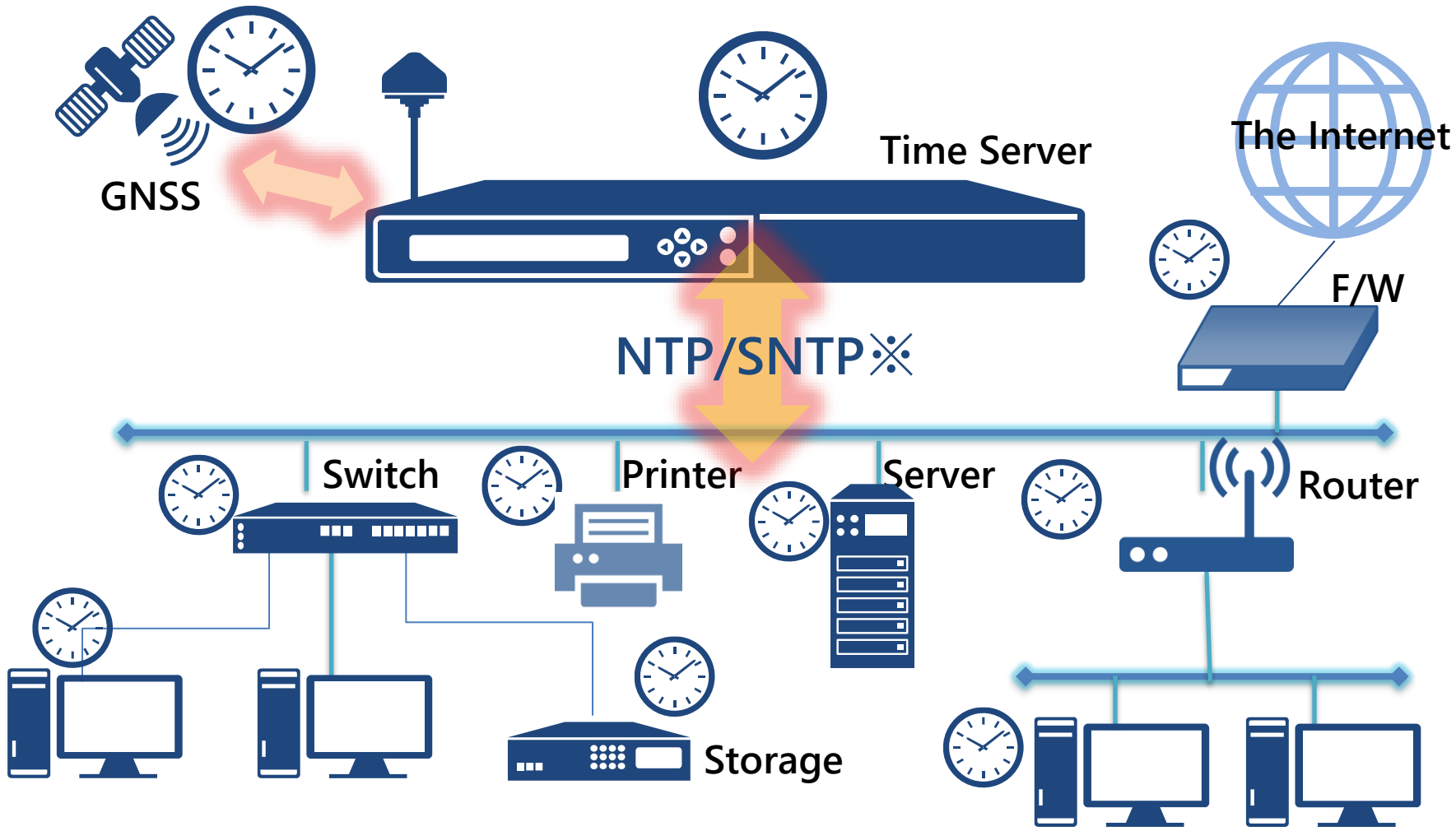
Time Server receives the standard time from GPS satellite and distributes the accurate time to clients at their request.

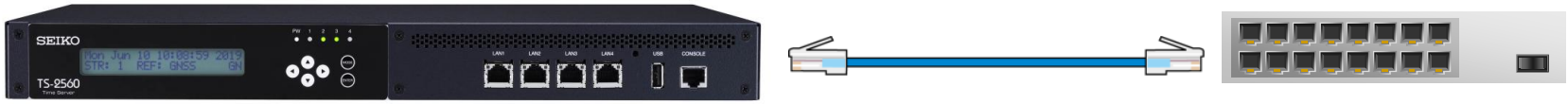


※NTP:Network Time Protocol / SNTP:Simple Network Time Protocol

Time Server Easy Installation

STEP1. Install GPS antenna in a location
where the sky is visible widely
without obstructions and interference.

STEP2. Connect “Time Server” to the network.



STEP3. Set up the configuration of NTP/SNTP for the clients
which you want to synchronize.

Time Server Market

Time Server is widely introduced
to support economic and social infrastructure

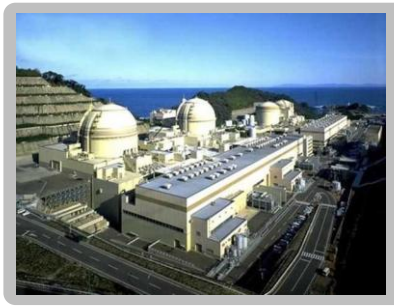
Transportation

Broadcasting

Telecom

Financial

Medical



And more

Seiko Time Server

Time Server

TS-2560

High-End Model
with Power Redundancy

- Oscillator stability: +/-10ms/day
- Time source: GNSS

TS-2220

Feature-Rich
Standard Time Server

- Oscillator stability: +/-100ms/day
- Time source: GNSS

Seiko Time Server Specifications

	TS-2220	TS-2560
Time source	GNSS	GNSS
Correction accuracy	± 1μs	± 1μs
Holdover stability	± 100ms/d	± 10ms/d
Leap second adjustment	Automatic	Automatic
Pulse output	N/A	1 PPS/10 MHz
Ethernet port	（10BASE-T/100BASE-TX/ 1000BASE-T） x1	（10BASE-T/100BASE-TX/ 1000BASE-T） x4
Processing capability	4,000 packets/sec	10,000 packets/sec
NTP, SNTP	Yes	Yes
Autokey certification	Yes	Yes
MD5 certification	Yes	Yes
Oscillator	TCXO	OCXO

Seiko Time Server Specifications

	TS-2220	TS-2560
IPv6	Yes	Yes
HTTP	Yes	Yes
HTTPS	N/A	Yes
Telnet	Yes	Yes
SSH	N/A	Yes
SNMP	Yes	Yes
Syslog	Yes	Yes
SMTP	N/A	Yes
UPS-MIB	N/A	Yes
Web certification	Digest	Cookie

Default setting: All protocol disabled

Seiko Time Server Specifications

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	TS-2220 GPS	TS-2560 GPS
Rated voltage(AC)(*1)	AC100V+/-10%(50/60Hz) AC200V+/-10%(50/60Hz)	AC100V+/-10%(50/60Hz) AC200V+/-10%(50/60Hz)
Rated current	0.12A	0.32A
Power consumption	6W	18W
Calorific value	22kJ/h	65kJ/h
Operation temperature	0-40 deg. C	0-40 deg. C
Operation humidity	20-80%(non condensation)	20-80%(non condensation)
Installation style	Rack mount	Rack mount
Dimensions	425.5(W)x280(D)x44(H) mm (Projections not included)	425.5(W)x280(D)x44(H) mm (Projections not included)
Weight	Approx. 3.1kg	Approx. 3.5kg
Certifications	VCCI-A(*2), RoHS, PSE(*3)	VCCI-A(*2), RoHS, PSE(*3)
Accessories	Antenna and Holder (including 10m cable)	Antenna and Holder (including 10m cable)

(*1)SSOL is going to comply with all necessary regulations in EU before selling the products into EU market.
(*2) VCCI: Voluntary Control Council for Interference by Data Processing Equipment & Electronic Office Machine (Japanese EMI regulation)
(*3) PSE :Product Safety for Electrical appliance & materials (Japanese Safety regulation)

FYI: Time Sources in Japan

- **GNSS（Global Navigation Satellite System）**
  - the standard generic term for satellite navigation systems
  - refers to satellites providing signals from space that transmit positioning and timing data
  - GPS, GLONASS, Galileo, QZSS
- **Telephone JJY**
  - Time information supply system by telephone line
  - Operated by NICT, Japan's national research and development agency
- **Standard long radio wave JJY**
  - Time information supply system by standard radio wave
  - Operated by NICT
- **FM**
  - Time information provided via FM broadcast
  - Provided by NHK (Japan Broadcasting Corporation)
- **Secondary**
  - Synchronizes to the NTP server in upper layer

Seiko's Time Server supports a wide range of time source options

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