

# TIMING & SYNCHRONIZATION

DATACENTERS

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## About us

Safran Electronics & Defense offers comprehensive network time servers and solutions for precise synchronization, security, compliance, and adherence to resilient timing best practices. When precision, safety, security, and reliability matter most, trust Safran's innovative solutions.

### When ultra-precision meets flexibility

Safran offers flexible, scalable solutions designed to integrate seamlessly into existing civilian infrastructure, helping industries meet the growing demand for high-performance timing with reliability and ease.

Safran's innovative solutions are designed with modularity and future-proof capabilities, making them adaptable to the evolving needs of both markets. Whether for mission-critical defense applications or essential civilian infrastructure, Safran provides the precision, security, and flexibility that today's interconnected world demands.

### Datacenter Applications

Precise time synchronization is a critical requirement for system integrity and security inside data centers. Safran [time servers](#), [master clocks](#), and [time distribution switches](#) can help you achieve sub-nanosecond accuracy and ensure your network stays synchronized with guaranteed uptime.

Safran master clocks and time servers are being used in applications for:



**Data Center Facilities:** For server racks and distributed systems that all need to have precise timestamps, the timing information comes from atomic clocks on board satellites.



**Public Safety:** For police and fire call centers, radio communications, and cell phone towers, Safran GNSS receivers provide direct access to satellite links.



**Cell Phone Towers & Telecommunications:** For cell phone towers and telecommunication networks.



**Municipal Radio Communication Centers:** For radio communication centers used by local government, law enforcement and tv stations.

### The Importance of Accurate Time In Enterprise Networks

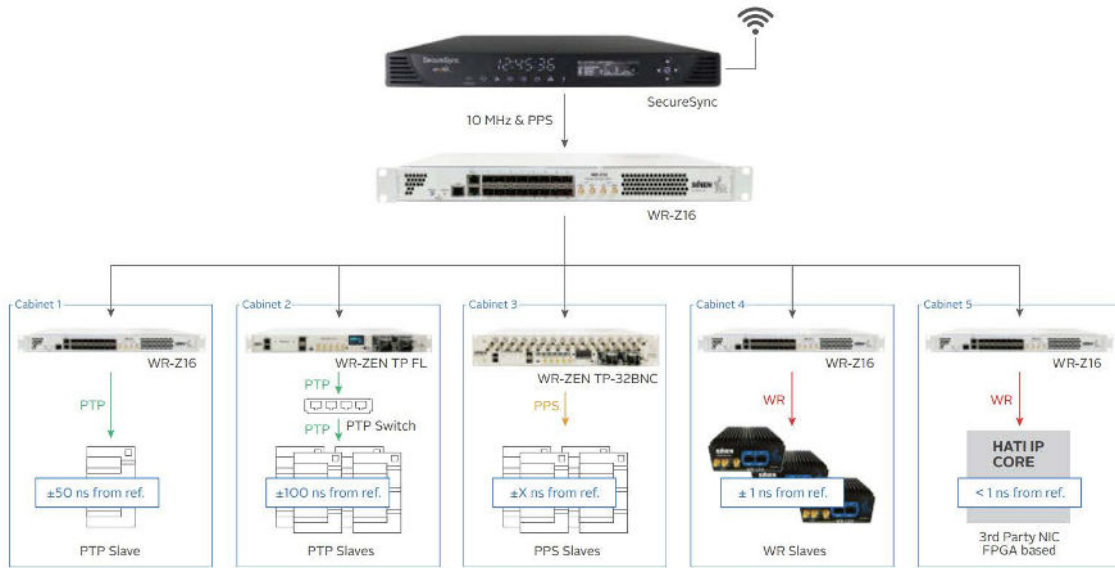
By ensuring precise time alignment across multiple nodes, data operators can unlock a multitude of benefits, including enhanced data integrity, streamlined data processing, improved analytics, and compliance adherence. When your data center infrastructure is synchronized with master clocks, IT administrators can confidently rely on consistent timestamps across nodes. This ensures events and data updates occur in the correct temporal order, mitigating conflicts and discrepancies. As a result, you maintain the integrity of datasets and trust the accuracy of the information processed.



## INTRA-DATA CENTER TIME DISTRIBUTION

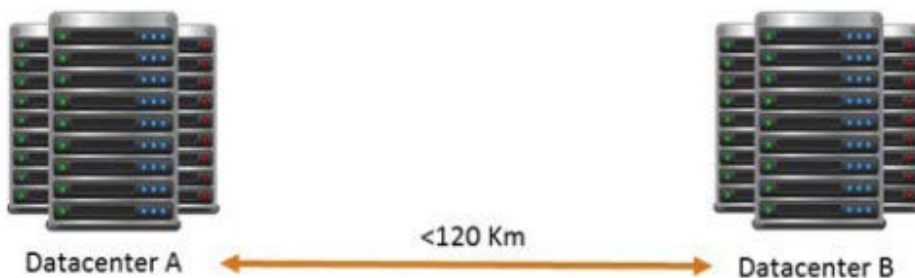
Safran delivers best-in-class synchronization technology inside data centers. The existing network infrastructures that have time synchronization protocols like NTP and PTP are vastly improved by using the White Rabbit protocol for time distribution. For intra-data center distribution, the solution is focused on distributing the resilient time reference provided by the SecureSync. For minimum impact in the time error budget, Safran's White Rabbit devices transfer the reference time to any point, any cabinet, with sub-nanosecond accuracy.

The delivery of timing to the end user's equipment is provided with a wide range of available protocols (NTP, PTP, IRIG-B, ToD) as well as standard legacy timing signals like 10MHz and 1PPS. There is no need for link or cable calibration because White Rabbit is constantly measuring and accounting for the changes in the fiber optic link. White Rabbit is resistant to Packet Delay Variation (PDV) in environments with abrupt changes in traffic. It also allows users to work with redundant links and time references to provide a complete, resilient, PNT solution.



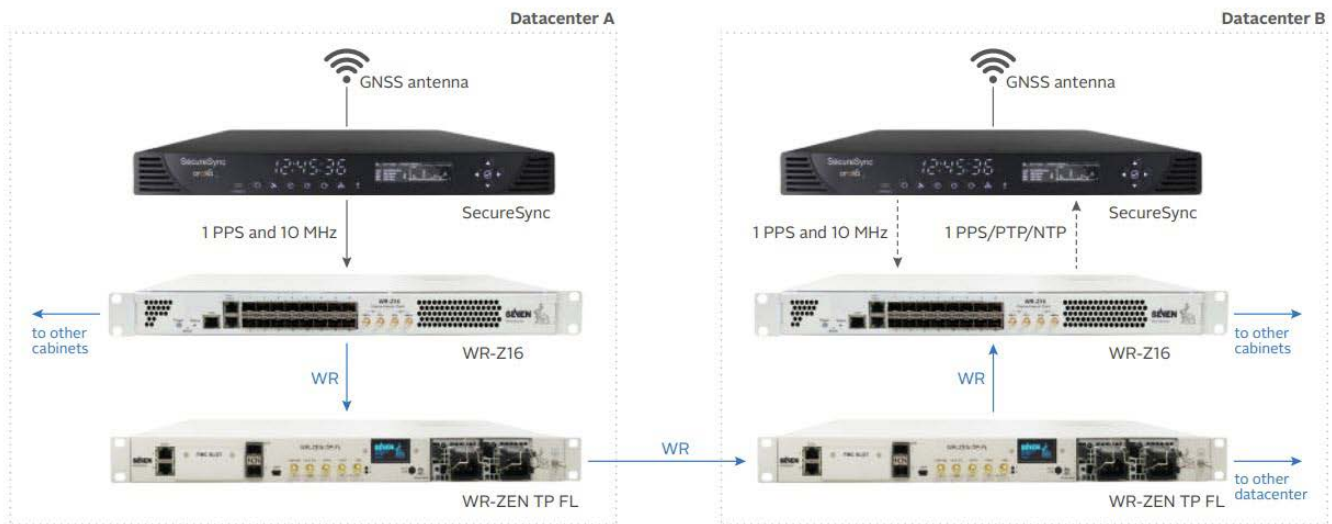
## INTER-DATA CENTER TIME DISTRIBUTION

In a metro area, using the same time reference can be achieved by sending the clock reference over fiber from data center A to data center B. The only requirement is that the clock reference be in an area of around 100-150 Km wide, so they can be reached in a single hop. The end-to-end distance can be extended by using optical amplification or timing regeneration via intermediate WR nodes. The solution includes an external time reference provided by the SecureSync and the White Rabbit network, which distributes this time reference over several data centers. Interoperability with third-party equipment has been already tested with satisfactory results at the end nodes (NICs, packet capturing devices, etc.). The resilience of the SecureSync combined with the failover mechanisms and holdover capabilities integrated in WR devices provides the ability to work in multi-source time references scenarios, resulting in a fully resilient PNT solution.



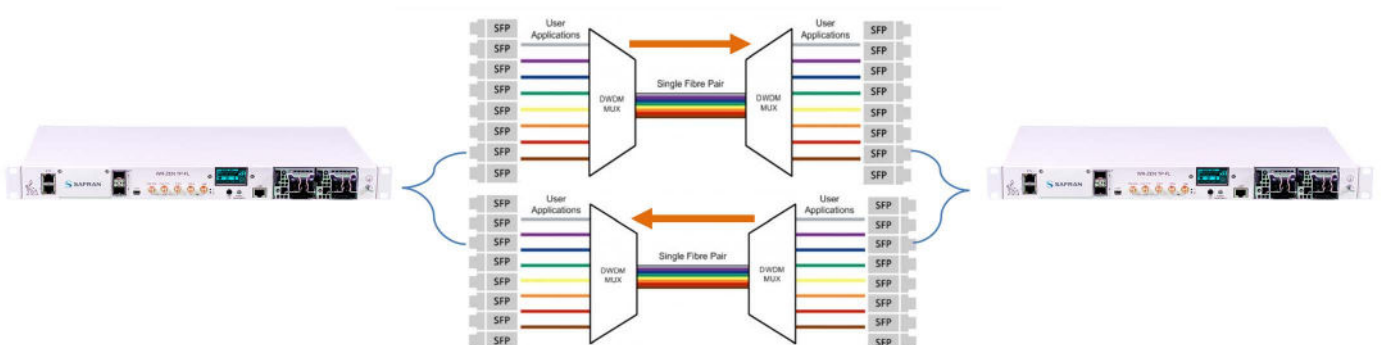
## WR over Dedicated Fiber

The use of dedicated fiber greatly simplifies installation and first operation. With its exceptional advantages over PTP, White Rabbit helps users benefit from automatic, dynamic compensation of the asymmetry. This makes installation much easier by avoiding the need to calibrate the links. This scheme allows data centers to easily become sub-nanosecond synchronized. After that, users can distribute timing through the entire data center or extend it to a third.



## WR Over Shared Fiber

Using shared fiber in DWDM systems is a much more cost-effective solution. The only disadvantage is that the automatic asymmetry compensation is not possible because the elements on the optical path can change between different infrastructures. This causes an unknown offset at the timing slave that must be compensated for. This handicap is overcome by using calibration methods. There are different methods, depending on feasibility, and they can be GNSS-assisted or stand-alone synchronization systems. After proper calibration, the high precision and stability of White Rabbit ensures sub-nanosecond accuracy in this kind of scenario.





## SecureSync

The SecureSync provides industry-leading security for high performance and low latency applications with enhanced resiliency provided by alternative signals and Interference Detection Mitigation (IDM) technologies for mission critical and time sensitive networks. Premium, GNSS-Based Time Server Platform

- Premium, GNSS-Based Time Server Platform.
- Supports Unicast, Broadcast, Multicast, Symmetric Key Encryption, Peering, Statum 2.
- 1 PPS Timing Output for PTP and network synchronization.



## White Rabbit Z16

The WR-Z16 implements the White-Rabbit (WR) protocol, a high-accuracy extension of PTP based on SyncE, that allows to easily distribute sub-nanoseconds timing within Metro Area Network distances and beyond. Worth to mention, that a timing network using WR protocol is not affected by the traffic load nor the number of hops.

- Sub-Nanosecond Time Accuracy.
- 16 Optical Timing Ports for WR, PTPv2 and NTP.
- Inter-Datacenter Synchronization.

# WROX

## White Rabbit Option Card

Accurate network time transfer is a key enabler for designing reliable, redundant, time distribution architectures over large infrastructure networks, which combine different types of time reference acquisition and distribution. Using combined PTP/White Rabbit network time distribution, along with GNSS, is an efficient way to address weaknesses of GNSS signals, in particular their vulnerability to GNSS interferences.



Staying true to SecureSync's strong modularity, the 1204-58 and 1204-59 WROX Option Cards introduce a new level of network-time distribution. They offer, respectively, 1 Gb Ethernet and 10 Gb Ethernet interoperability for NTP, PTP, and White Rabbit time distribution. These cards also preserve the wide range of options available with SecureSync, including oscillator, timing interface option cards, and power supply.

The WROX Card stands out as a high-speed Ethernet Option Card boasting 1G and 10G capabilities. Equipped with four ports (Small Form-factor Pluggable Plus transceivers or SFP+), it integrates Network Time Protocol (NTP), Precision Time Protocol (PTP), and White Rabbit features, ensuring flexible and exceptionally precise network time distribution down to the sub-nanosecond level with the highest build-in resiliency features.

## Use cases

- Network-synchronization as a backup to GNSS-based synchronization, providing ns level accuracy to UTC.
- Improved transaction time-stamping resolution and accuracy, for high-rate transaction infrastructures.
- Efficiency improvement and throughput increase for data replication mechanisms in datacenters.
- Improved visibility on time-distribution monitoring, within infrastructures (time probing and traceability).
- Enabler for Time As A Service.



And also, in combination with Safran timing portfolio:

- Easier connection between a WR Z16 and a SecureSync GrandMaster through a WR link (not requiring anymore 1 pps, 10 MHz and NTP links).
- A point to point WR link can be created more efficiently between a SecureSync (as the GrandMaster) and a ZEN TP-FL (as the end node).
- Two SecureSync on distant sites can be WR linked, each site acting as a WR backup in case GNSS becomes unavailable on the other site.

Adds White Rabbit interface to SecureSync

White Rabbit & PTP GrandMaster

1 G and 10 G configurations

4 ports per card, up to 2 option cards fit in SecureSync 2400



## Timing & Synchronization monitoring

With PNT 360, **precision meets control** with Timing & Synchronization Monitoring.

Seamlessly visualize critical timing system metrics and effortlessly configure devices centrally from a unified platform.

This software solution allows you to manage your timing system while tracing how time propagates through your chain of timing devices.

Dashboards are fully customizable, allowing you to focus on metrics most relevant to your specific needs, allowing for quicker identification of issues and more efficient troubleshooting.

Choose from pre-defined visualization templates through an easy-to-use basic mode or get more granular by choosing the exact metrics and chart types that you wish to view.

The simple drag-and-drop management of the dashboards allows you to quickly move things around and organize your display so you can target the most relevant data.

**Customize your experience by creating your own dashboards and adding the metrics that are the most important to you.**

Thanks to **PNT 360** you will be able to view and monitor metrics related to:

- network performance,
- timing accuracy,
- timing references
- oscillator data,
- component temperature data,
- timing errors,
- ... and more...**All in one location**



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