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White The Rabbit!?!?

Latest on sub-nanosecond timing

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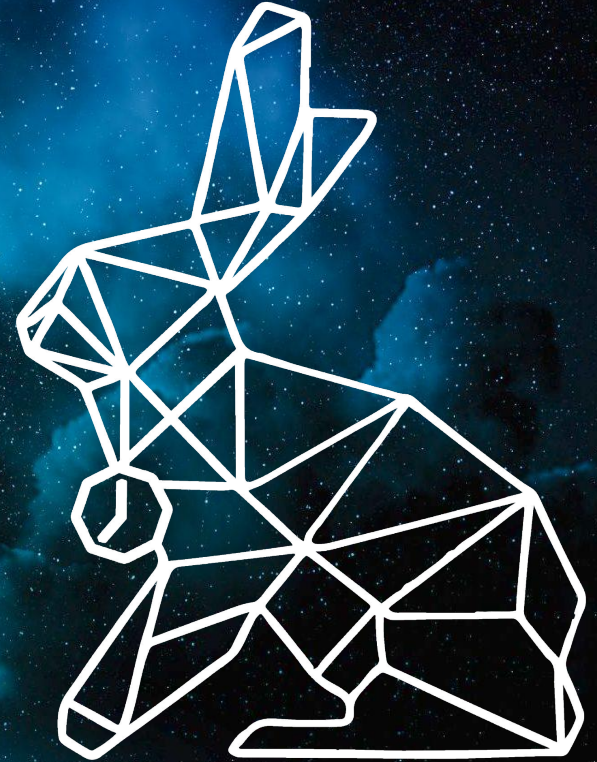
Background to White Rabbit

What is White Rabbit?

White Rabbit (WR) is an ultra-accurate IEEE 1588 (PTP) implementation that achieves **sub-nanosecond** accuracy.

Easy to integrate in **Ethernet** networks

NTP, PTPv2, PPS and **sub-nanosecond WR**

Resilient to GNSS disruption
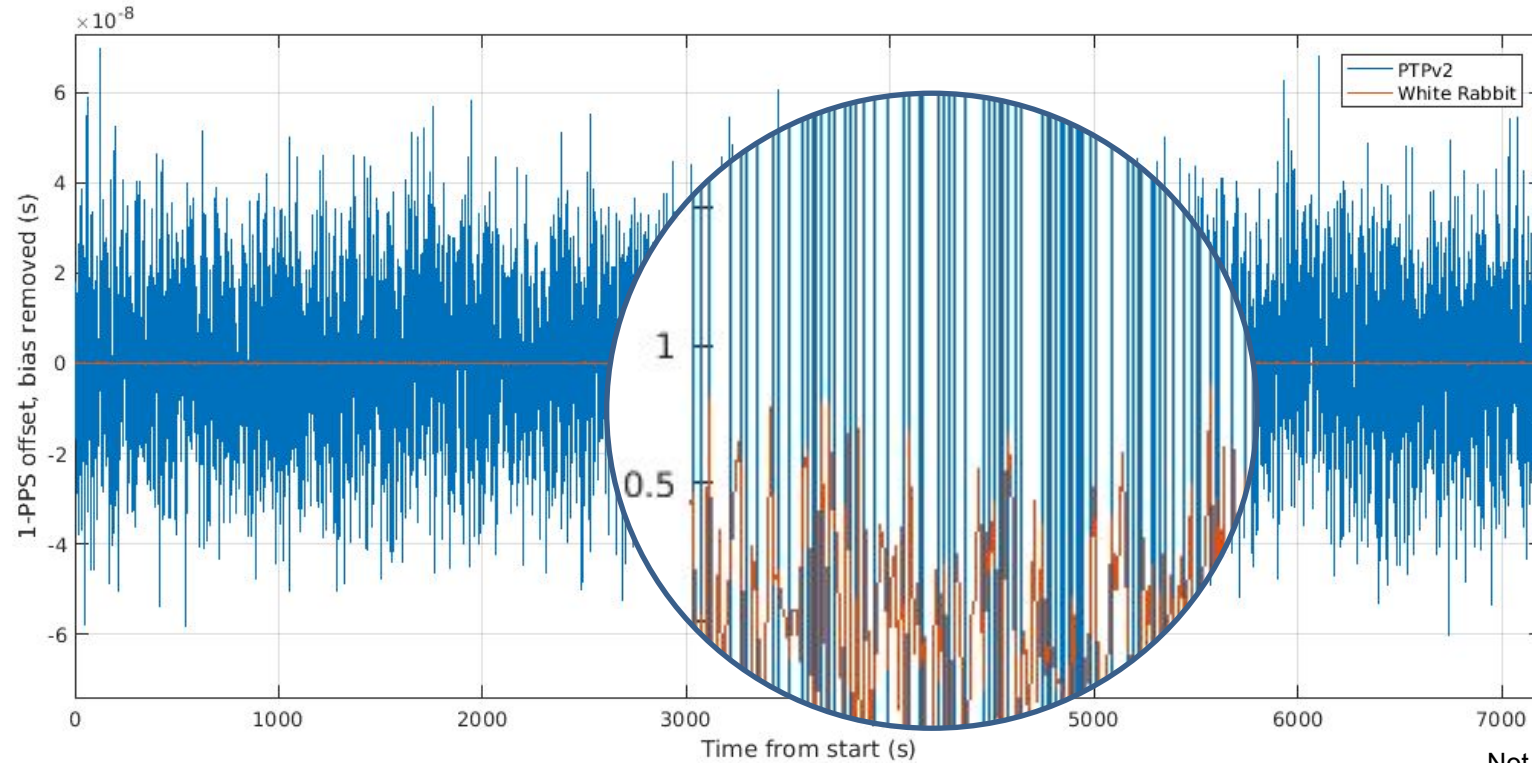
Avoid **calibration** and complex deployments

Scalable to thousands of nodes in **metro areas**

Unprecedented trading capabilities

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Ultra high accuracy technology

Not STAC benchmark

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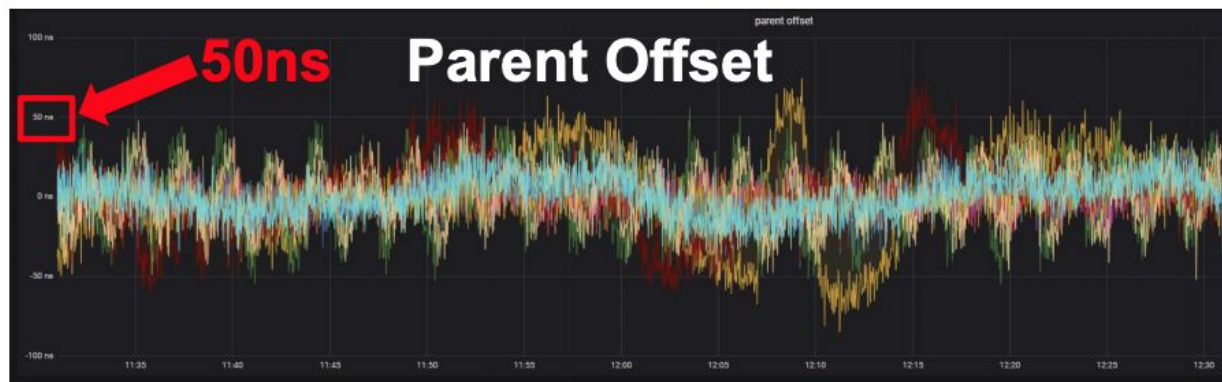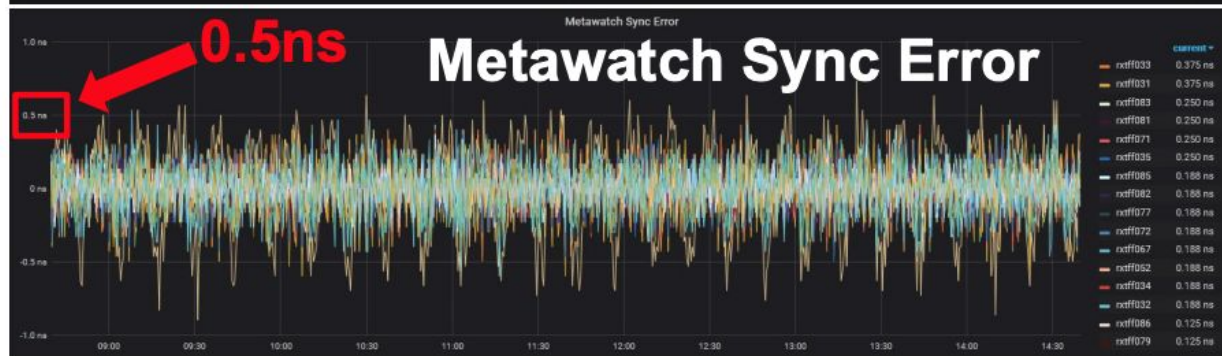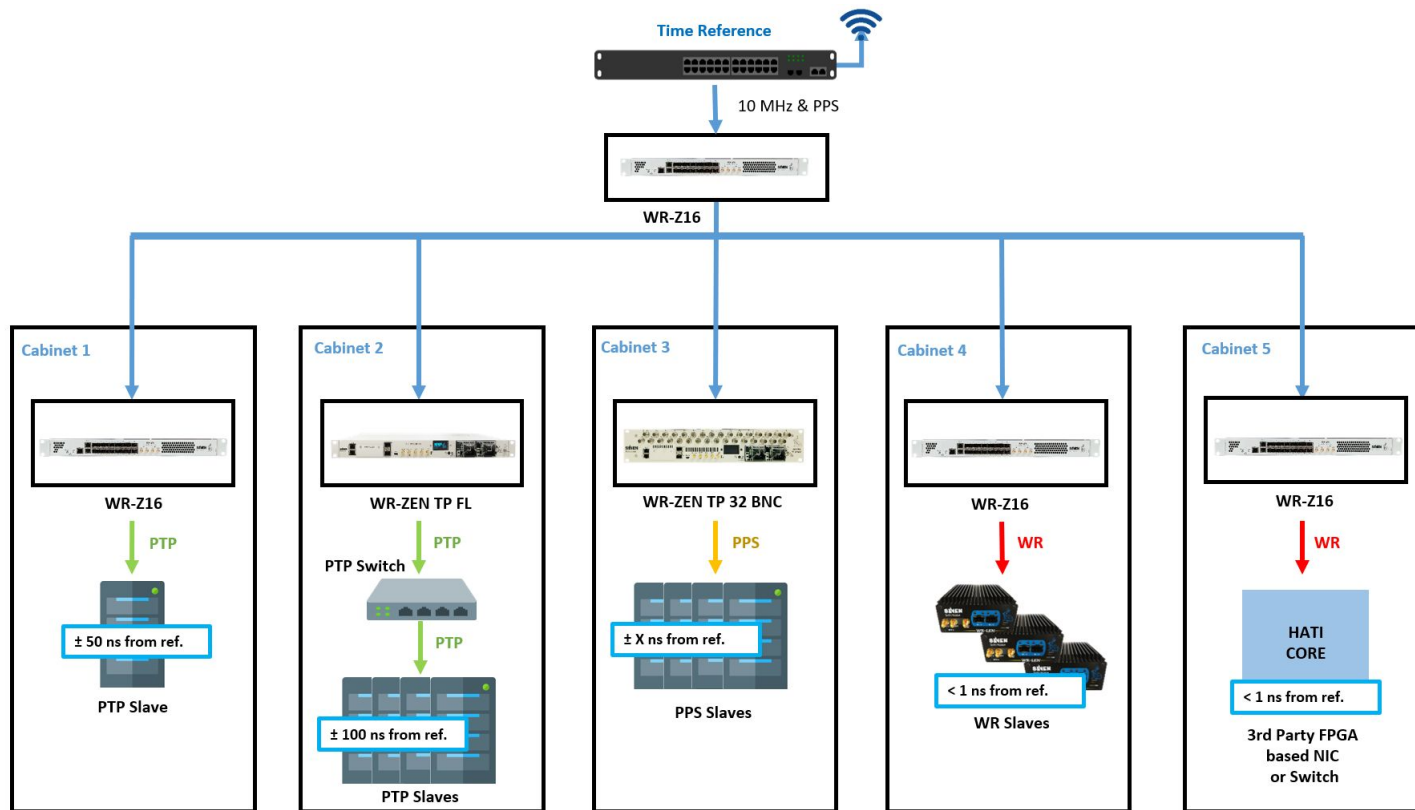
White Rabbit vs PTP

PTP

White Rabbit

Not STAC benchmark

https://stacresearch.com/system/files/resource/files/STAC-Summit-15-Nov-2018-White%20Rabbit.pdf

Latest on sub-nanosecond timing

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Sub nano data center time distribution

Time Reference

10 MHz & PPS

WR-Z16

Cabinet 1
WR-Z16
PTP
± 50 ns from ref.
PTP Slave

Cabinet 2
WR-ZEN TP FL
PTP
PTP Switch
PTP
± 100 ns from ref.
PTP Slaves

Cabinet 3
WR-ZEN TP 32 BNC
PPS
± X ns from ref.
PPS Slaves

Cabinet 4
WR-Z16
WR
< 1 ns from ref.
WR Slaves

Cabinet 5
WR-Z16
WR
HATI CORE
< 1 ns from ref.
3rd Party FPGA based NIC or Switch

Not STAC benchmark

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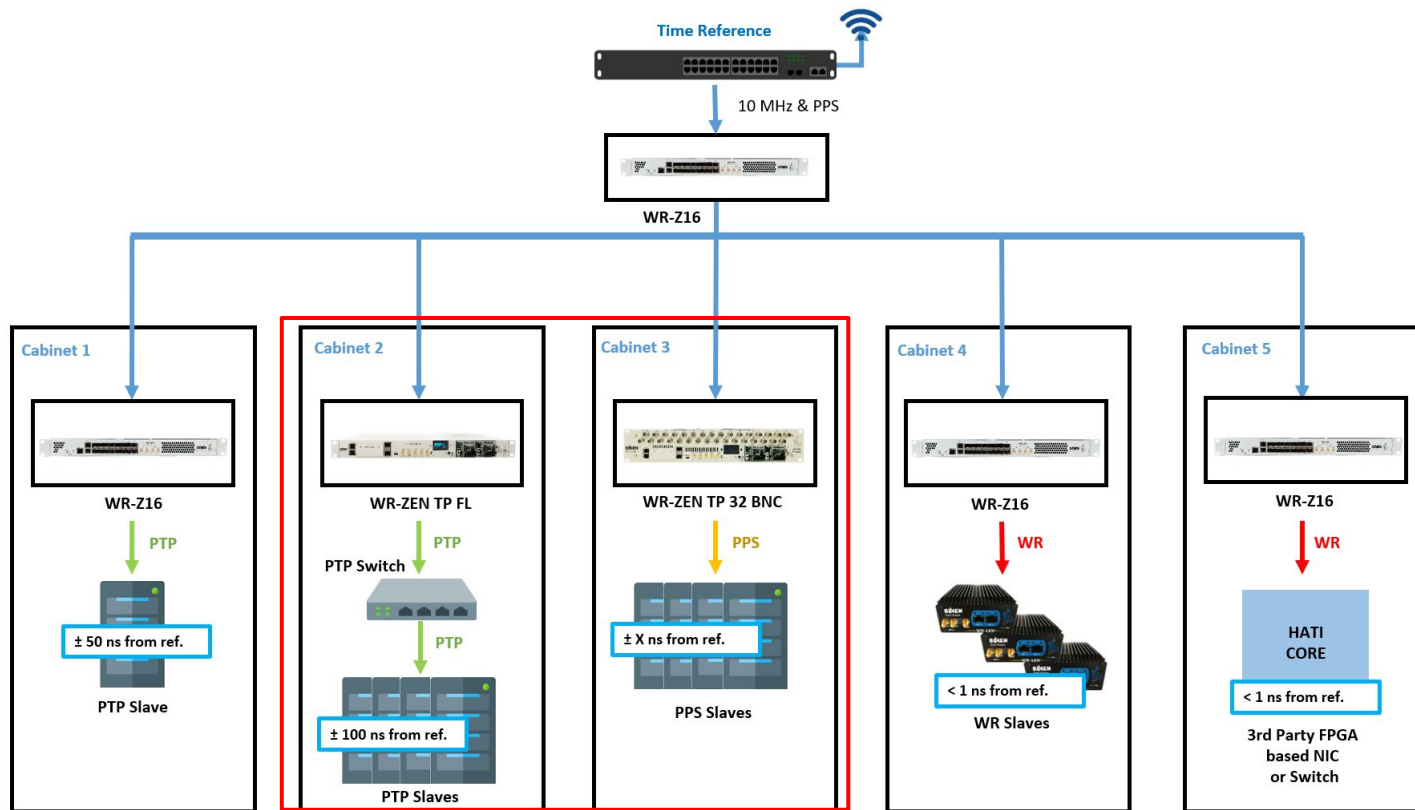SEVEN Solutions

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WR Z16

- **Multi-port synchronization** fanout.
- 16 x WR, HATI, IEEE 1588 PTPv2 and NTP **interoperability** optical interfaces.
- **Multi-source** time references.
- **Failover** mechanisms.
  - Automatic switchover.
  - Holdover.
- Time **traceability** for regulatory purposes.
- **Extended monitoring** and management tools (Authentication, SNMP, security…).
- **Redundant power** supply and fans.
- Serial and Ethernet RJ45 ports.
- Additional features to come!

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Sub nano data center time distribution

Time Reference

10 MHz & PPS

WR-Z16

| Cabinet 1	Cabinet 2	Cabinet 3	Cabinet 4	Cabinet 5
WR-Z16	WR-ZEN TP FL	WR-ZEN TP 32 BNC	WR-Z16	WR-Z16
PTP	PTP	PPS	WR	WR
	PTP Switch			HATI CORE
	PTP			
± 50 ns from ref.	± 100 ns from ref.	± X ns from ref.	< 1 ns from ref.	< 1 ns from ref.
PTP Slave	PTP Slaves	PPS Slaves	WR Slaves	3rd Party FPGA based NIC or Switch

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WR-ZEN TP-FL

- Standalone White Rabbit **distribution.**

- 2 x WR, IEEE 1588 PTPv2 and NTP **interoperability** optical interfaces.

- **Redundant** White Rabbit or 10 MHz & PPS inputs

- 10 MHz, PPS and CLK **outputs**

- **Redundant** power supply and fans.

- Serial and Ethernet RJ45 ports.

- 4 or 8 port SMA PPS **expansion** boards supported (factory installed).

- Extended **monitoring** and **management** tools (Authentication, SNMP, security…).
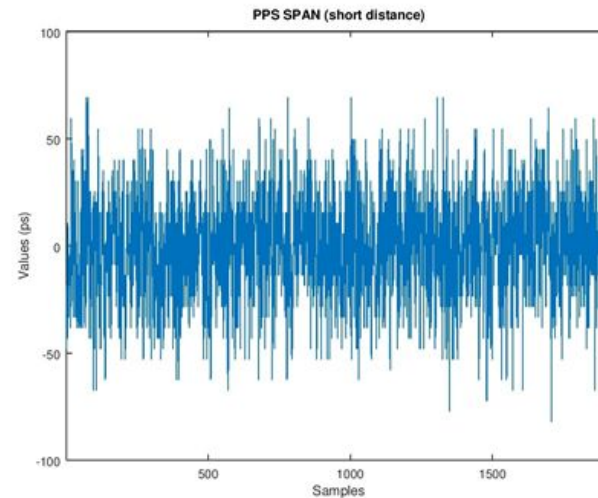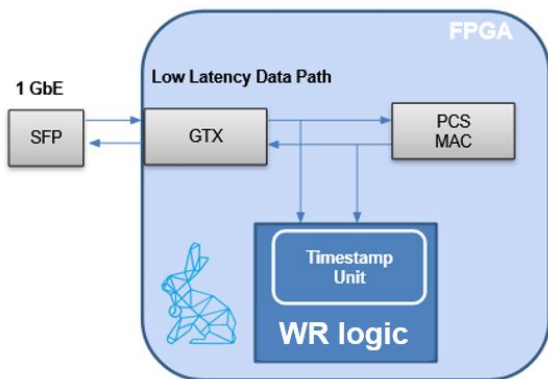
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Sub nano data center time distribution
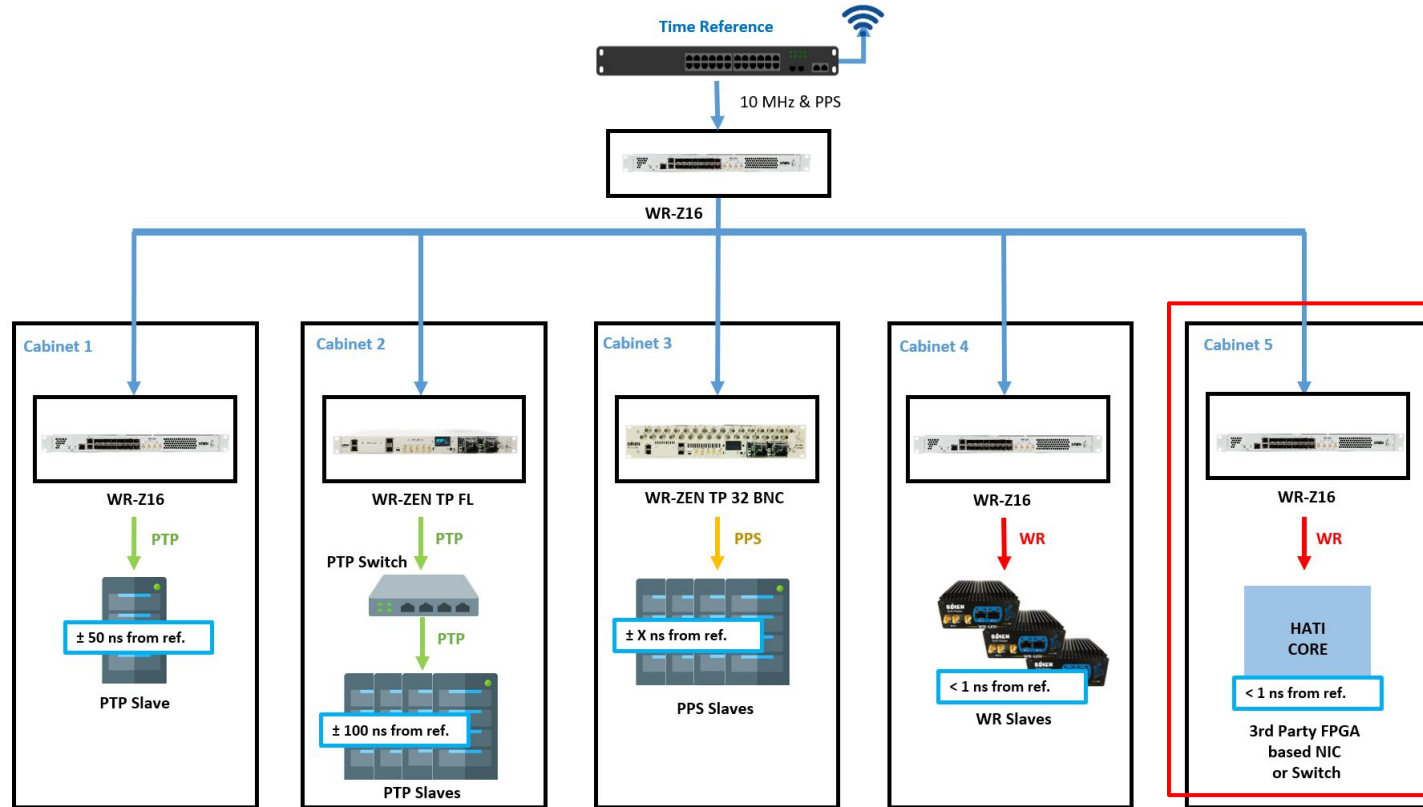
HATI Core

- High Accuracy timing **integration** in Xilinx **FPGAs** (including US+).

- **Sub-nanosecond** time accuracy on **L1 switches** and **NICs.**

- **No** need for expensive **oscillators/clocks.**

- Distribution over **fiber without calibration.**

Not STAC benchmark
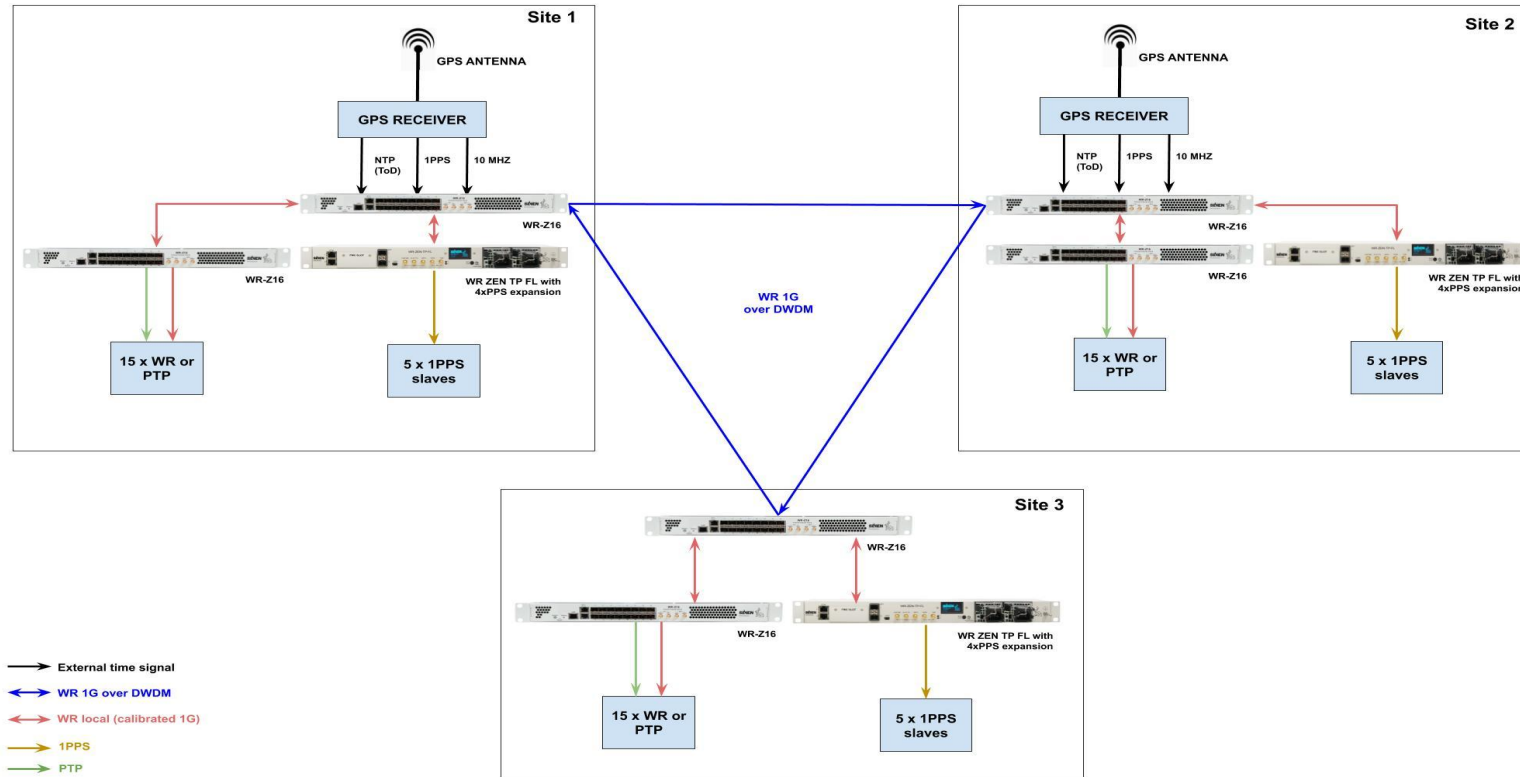
HATI Core: Arista 7130 use case

- **Sub-nanosecond** time accuracy on **Arista 7130.**
- Compatible with **7130L, LB and EH** models**.**
- Distribution over **fiber without calibration** from the WR-Z16**.**
- Working with Arista to integrate **HATI and 7130 applications.**
- **Available** to anyone who wants to develop a **custom application.**

Case study: Proprietary trading firm

Sub-nanosecond time accuracy in metro areas.

Resiliency to disruptions on **GNSS** receivers.

Multiprotocol interoperability (NTP, PTP, PPS, WR and HATI).

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Reference projects

Best-in-class **synchronization accuracy** for the next electronic trading generation.

- Deutsche Börse: https://stacresearch.com/STAC-Summit-6-Jun-2019-deutsche-boerse
- Optiver: https://www.youtube.com/watch?v=pe6Gh_fi3Wc&t=2s
- Spanish stock market: https://ieeexplore.ieee.org/document/9071992

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  - E-mail: francisco.girela@sevensols.com
  - Available during the whole show!

Don't forget to tick our box and visit our booth!

Thank you for your attention.

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