Leveraging
HATI for high resolution timing in FPGA

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SAFRAN

5 minutes

=

300,000,000,000 Nanoseconds
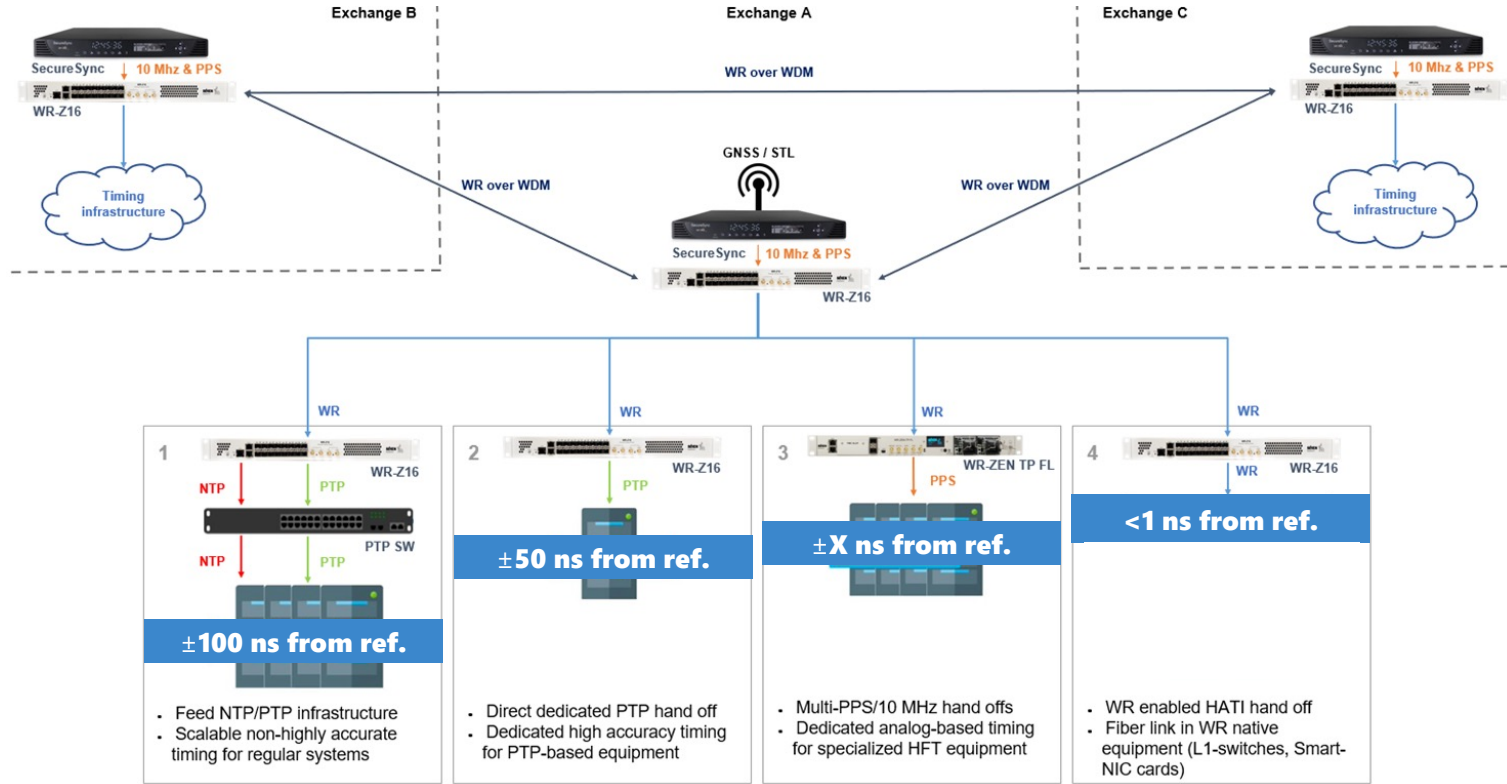
=

300,000,000,000,000 Picoseconds

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Safran: Timing for finance

- **SecureSync 2400**
  - Accurate, secure, timing / GNSS receiver

- **White Rabbit**
  - Sub-nanosecond timing distribution

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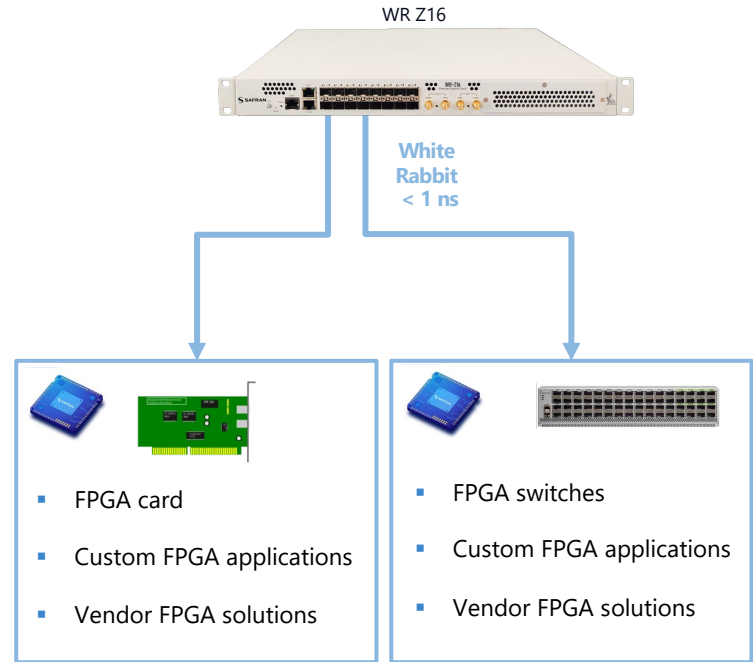# White Rabbit: 101

NOT STAC BENCHMARK

Introducing HATI

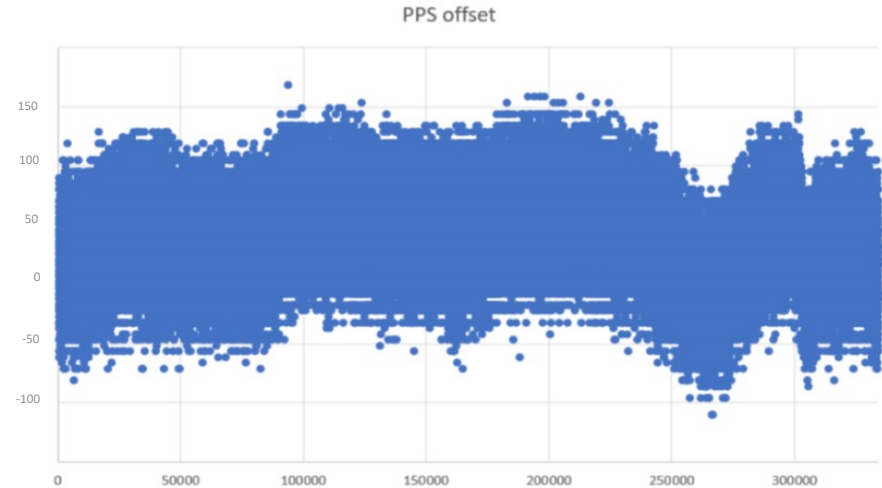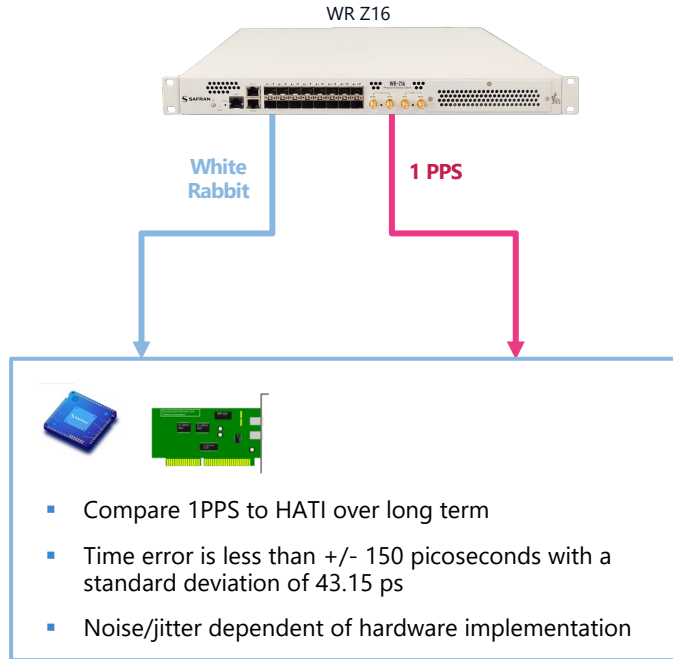
ELECTRONICS & DEFENSE

HATI
High Accuracy Timing IP

HATI is an IP core which enables White Rabbit sub-nanosecond timing into third-party FPGA applications.

WHAT THIS MEANS?

- FPGA developers can leverage White Rabbit accurate timing in their applications.
- Vendors have the capability of integrating White Rabbit into their hardware platforms.
- Sub-ns accuracy to vendor hardware and custom applications.
- Simpler infrastructure: no more messy co-axial cables.
- Monitor time distribution right through to application.
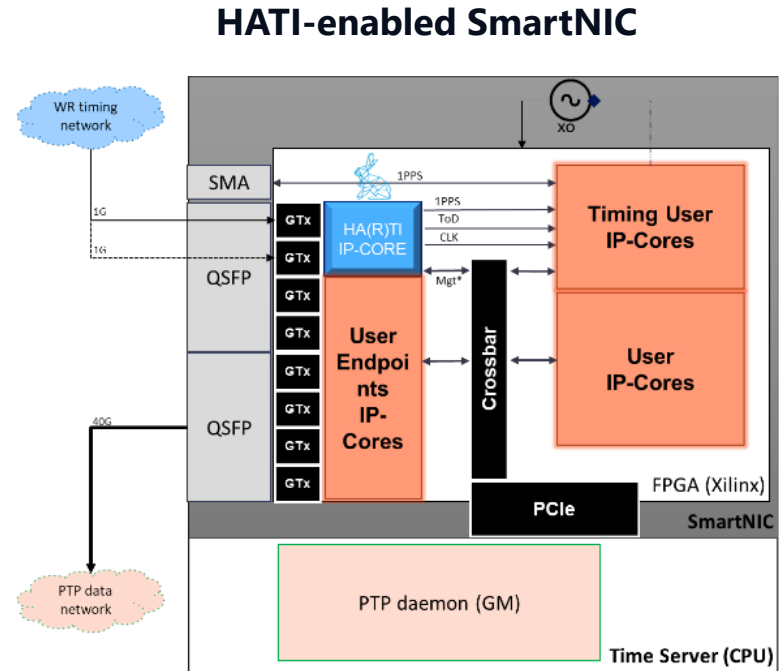- Cost savings: no more calibration!

WR Z16

White Rabbit < 1 ns

- FPGA card
- Custom FPGA applications
- Vendor FPGA solutions

- FPGA switches
- Custom FPGA applications
- Vendor FPGA solutions

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HATI Performance

WR Z16

White Rabbit

1 PPS

- Compare 1PPS to HATI over long term

- Time error is less than +/- 150 picoseconds with a standard deviation of 43.15 ps

- Noise/jitter dependent of hardware implementation

PPS offset

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~2 minutes

=

120,234,647,531 Nanoseconds

=

120,234,647,531,851 Picoseconds

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Use Case #1 – Timestamp in a HATI-enabled SmartNIC

HATI-enabled SmartNIC

Use Case #2 – Embedded within network switch

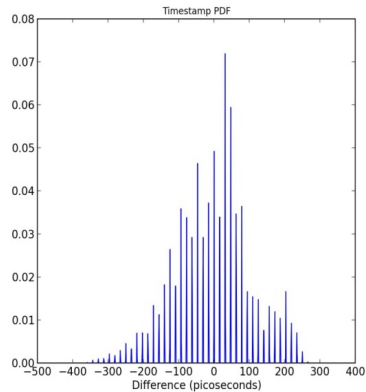**HATI IP core** is embedded within Arista MetaWatch application (v3.7)

- Sub-nanosecond timestamp error on Arista 7130-LB platforms.

- Optimized performance and monitoring of time distribution.

- Timing received from any White Rabbit Z16 device.

- Reduces the requirement for long/un-calibrated coaxial runs.

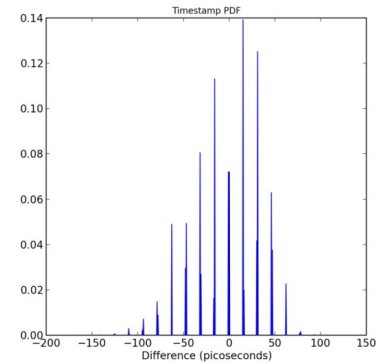- Tried and tested, production ready!

ARISTA

MetaWatch with PPS

```
***********************
Iteration  :        0
Timesource :      pps
***********************
Median     :   47.000
Mid-range  :    0.500
Half-range :  390.500
Std dev    :  107.219
Mean       :   44.173
***********************
```


Timestamp PDF

Half Range: **390 ps**

MetaWatch with White Rabbit

```
***********************
Iteration  :        0
Timesource : whiterabbit
***********************
Median     :  -62.000
Mid-range  :   78.000
Half-range :  157.000
Std dev    :   36.391
Mean       :  -63.846
***********************
```


Timestamp PDF

Half Range: **157 ps**

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000,000,000,000,000 Picoseconds

Come visit our booth

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| HATI Introduction – September 2023

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