ADVA aPNT+™ security enhancements

New software release provides powerful GNSS security controls

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Sync and timing needs by vertical

5G radio access networks	• Higher phase/frequency accuracy to sync IP & legacy networks for efficient use of spectrum	
	• Higher data timestamping accuracy to control complex smart grids DER* flows + **aPNT+****	Smart grids
Cable networks	• Higher PTP timing accuracy distributed to remote PHY devices over IP networks	
	• Migration from NTP to PTP timing for higher timestamping accuracy + **aPNT+****	Financial trading
Data centers	• Consistent NTP/PTP time base to accurately timestamp data in data centers + **aPNT+****	
	• Upgrading gov/defense info system & comm networks to higher PTP accuracy + **aPNT+****	Government/defense communications

*Distributed energy resources | **assured positioning, navigation and timing

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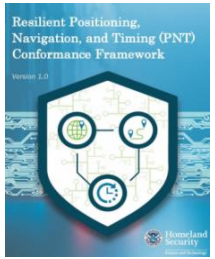
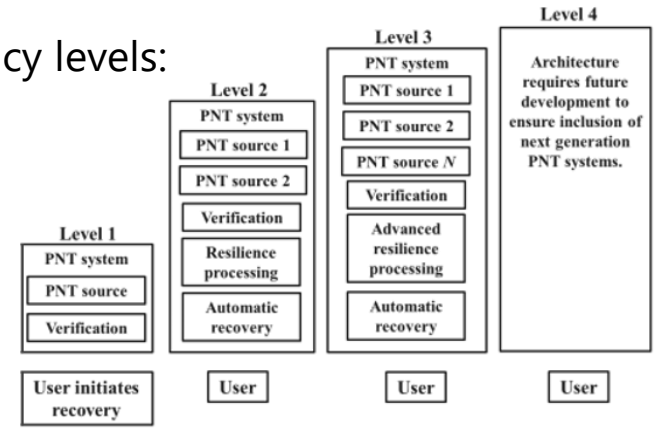
What is resilient PNT and why do we need it?

- $1B/day in economic cost if GPS/GNSS is disrupted
- **T** (timing) is a key enabler of PN (positioning and navigation) capabilities
- US Federal Executive Order 13905 on resilient PNT to protect critical infrastructure
- US resilient PNT initiatives:
  - DHS Resilient PNT Conformance Framework (now under IEEE P1952 standardization)
  - NIST Cybersecurity Framework for PNT Profile
- US DHS Resilient Conformance Framework – four resiliency levels:
  - Level 1: 1 PNT source
  - Level 2: 2 PNT sources
  - Level 3: N PNT sources
  - Level 4: next-gen PNT systems

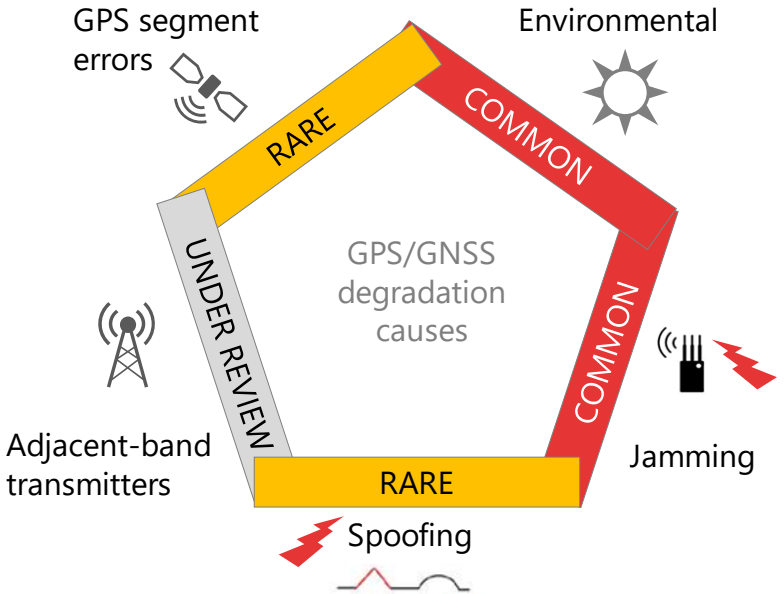




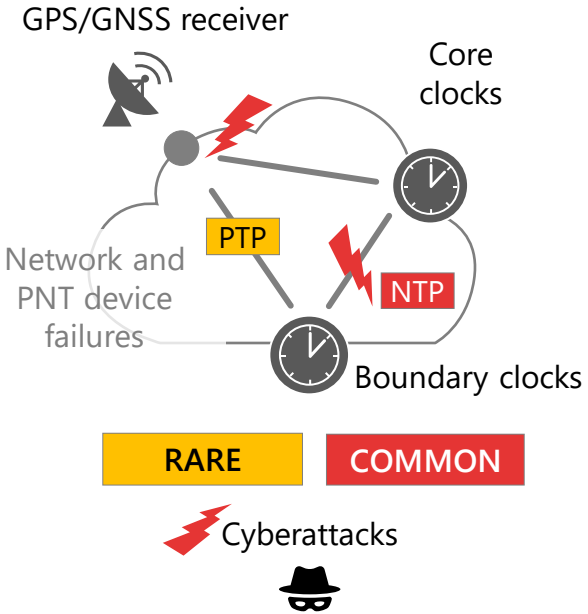
GNSS vulnerabilities driving PNT disruption

PNT cyber threats

External GPS/GNSS level



Internal network level



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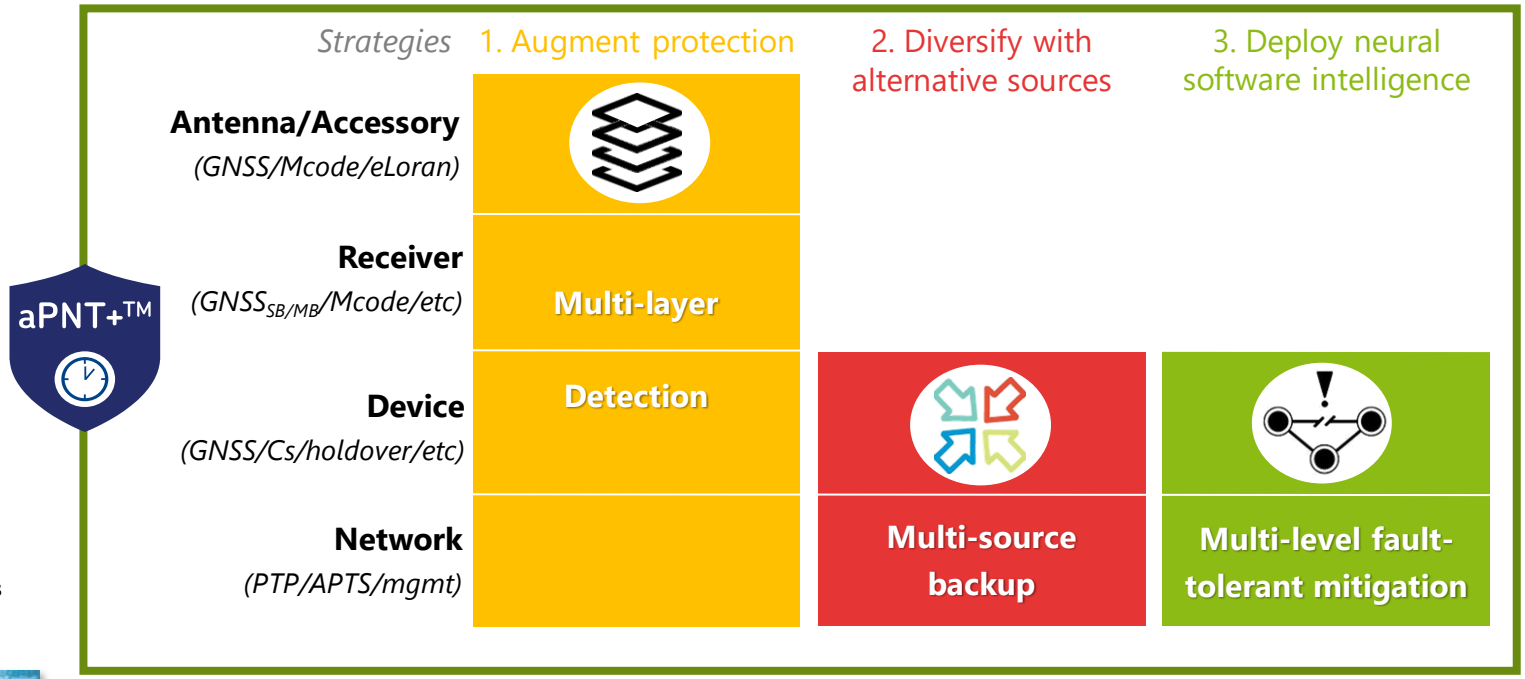
Best practice aPNT+ framework with zero-trust PNT sources



DHS* PNT resiliency level 0 1 2 3 4 Enhanced 4

Augmented resilience + robustness + cybersecurity (*IEEE P1952 standard*)

PNT Defense in Depth

*Department of Homeland Security

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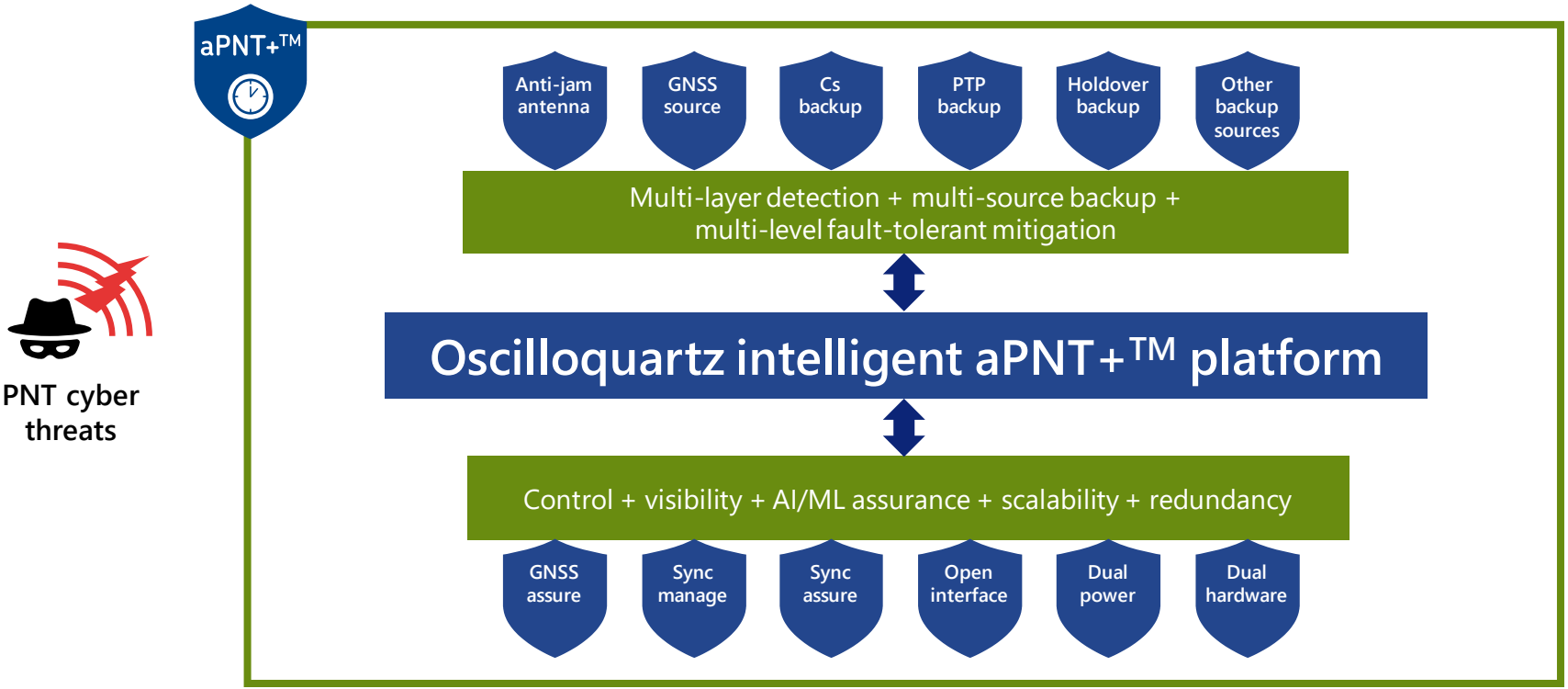
ADVA aPNT+™ technology for resilient PNT mandate



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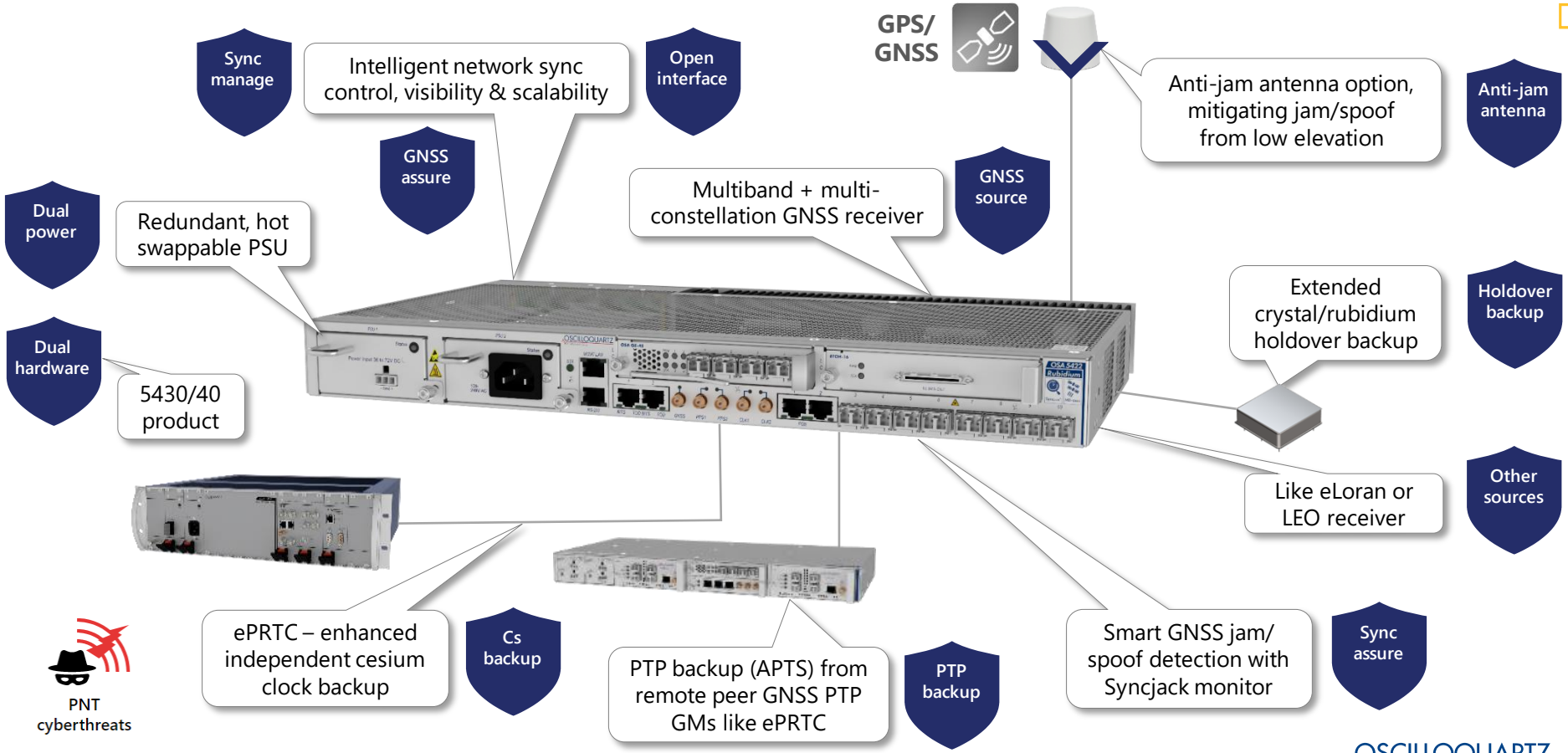
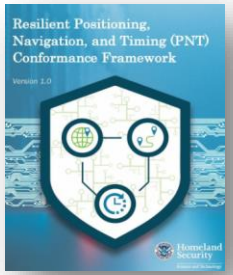
Typical sync product deployment with aPNT+™ capabilities



New OSA 54xx features: improved resiliency



Exceeding resiliency level 3

New

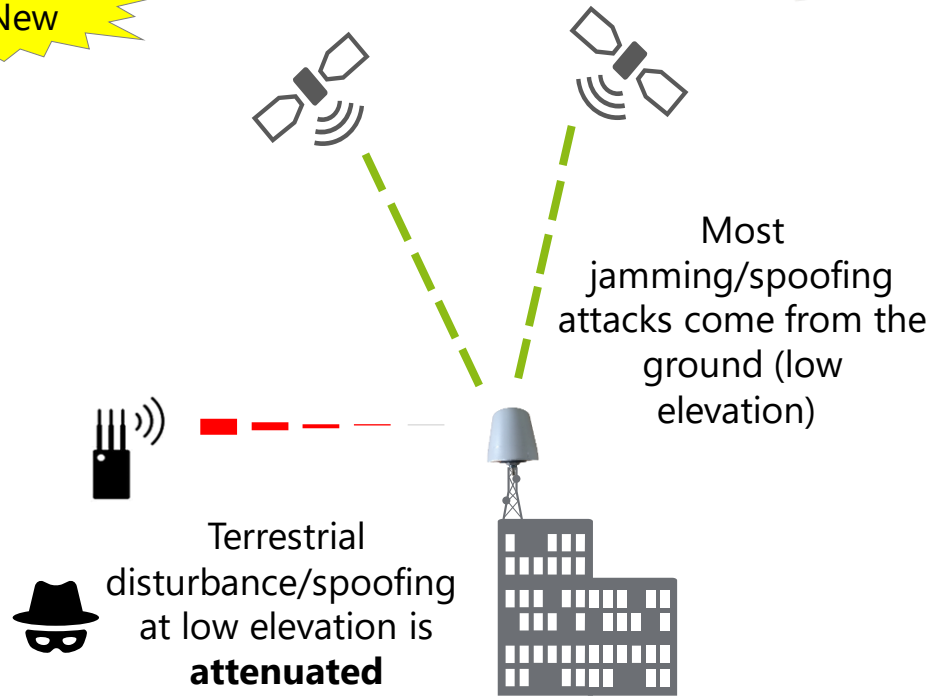
- Support multiple phase, time and frequency sources
  - Phase and time sources: SB-GNSS, MB-GNSS, PTP input, PPS+ToD input, IRIG input
  - Frequency sources: SyncE, CLK, BITS, PTP input, local oscillator
- Automatic source validation and selection between validated sources
- Automatic switching to backup in case GNSS jamming/spoofing/interface detected
- Exceeding DHS resiliency level 3 and design to meet future development of level 4

Anti-jam GNSS antennas

Main characteristics

New

- Supports GPS/GLONASS/BEIDOU/GALILEO
- Antenna uses 20-30dB **rejection** at low elevation between 0° - 20°
- Antenna **gain** for satellite signals at high elevation between 45° and 135°
- Compatible with existing antenna kits (standard antenna can be replace with AJ-antenna)
- Compatible with OSA 540x and OSA 54xx product lines



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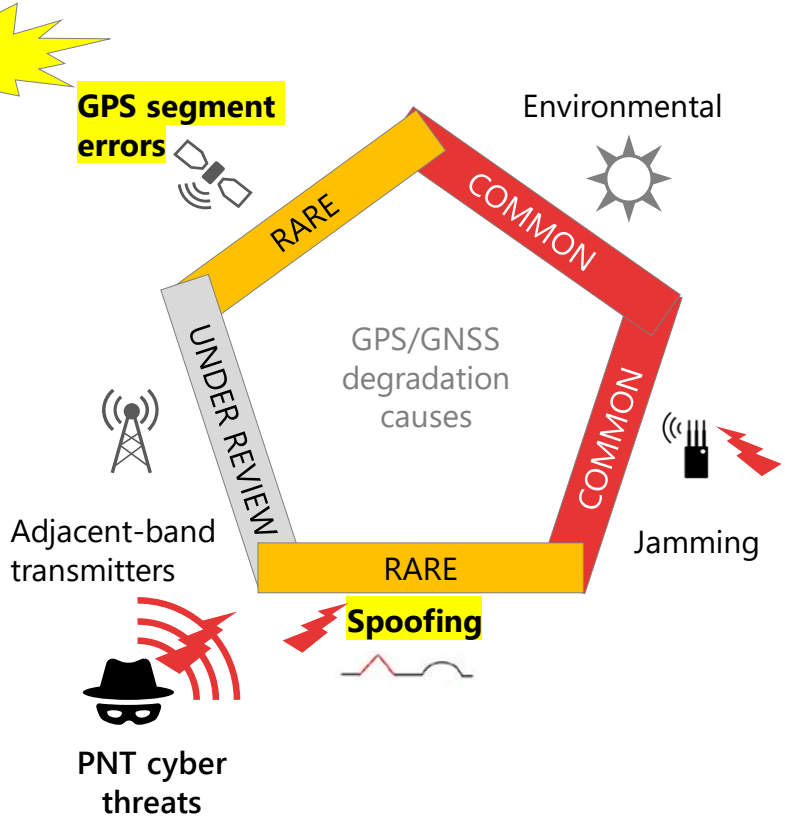
Advanced GNSS spoofing detection

Advanced GNSS protection controls

New

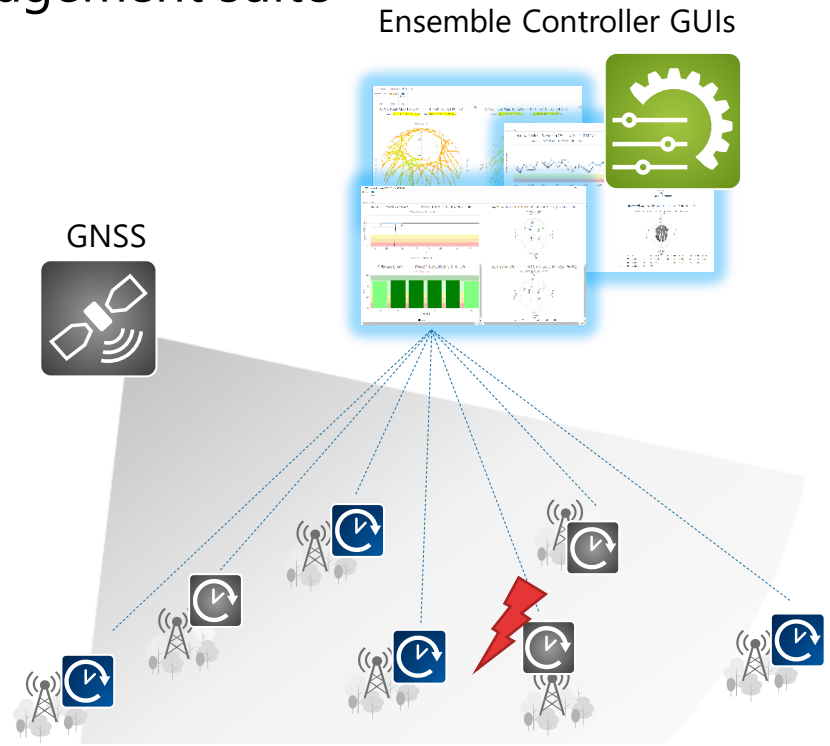
- Detects data & range spoofing, time shifts, combined attacks & multiple attack sources
- Independent software mechanisms and algorithms to detect spoofing attacks; tested and verified by third parties
- Upon detection of GNSS spoofing, an alarm is raised and the OSA 54xx can automatically switch to alternative source
- Also helps in detecting and mitigating GNSS segment errors



GNSS assurance / GNSS firewall

Fully integrated with our Ensemble management suite

- Collect GNSS health information from OSA 54xx and third-party GNSS receivers
- Graphical representation of network-wide status and easy identification of any problems
- Real-time and historical data
- Utilize ML/AI for automated optimization and security protection of GNSS
- Simplifies manual operations in reaction to device-reported synchronization alarms



AI-assisted monitoring and fault detection of GNSS receivers

Ensemble Sync Director – PTP and Sync Assurance

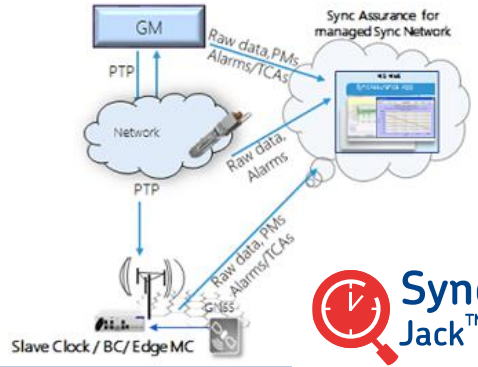
Time and phase quality monitoring and analysis

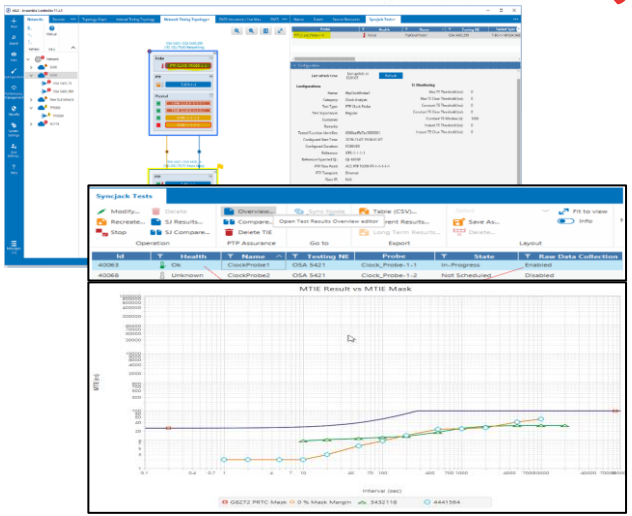
Key features

- Leveraging Syncjack™ probing functionality for improved sync assurance
  - Collecting raw time error data from Syncjack™ probes in large networks, creating long-term history
  - Exporting TE/TIE data for detailed analysis
- On-demand advanced analytics enhancements
  - MTIE/TDEV calculation
  - Custom masks

Benefits

- Monitoring clock recovery quality of PTP boundary clocks and PTP slaves
- Identifying problems, analyzing bottlenecks
- SLA conformance reporting to end customers
- Enable customers to offer timing-as-a-service





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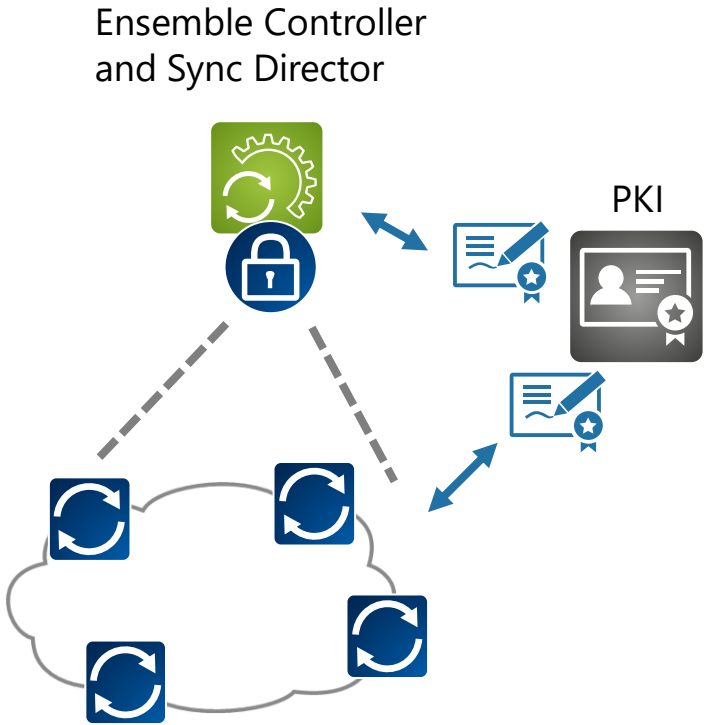
Cybersecurity enhancements



Security enhancements

New

- Certification management – import of CA approved certificates
- Public-key infrastructure (PKI), automatic enrollment of certificates
- Password with special characters
- Multiple TACACS+ authenticated users on the same privilege level
- SSH/SSL SHA-256 key and SSL version updates

Cost-effective sync product family solutions robustly secured

Ensemble Sync Director

aPNT+™

accessSync™

OSA 5401
SFP SyncPlug

OSA 5405-I/O/MB/P

edgeSync™

OSA 541x

OSA 5412

edgeSync+™

OSA 5420/21

OSA 5422

coreSync™

OSA 5430 NG GM/SSU

OSA 5440 NG GM/SSU

coreSync™

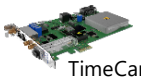
OSA 3350 optical Cs ePRC+

3230B Cs magnetic PRC/ePRC

OSAinside™

OSA 5400

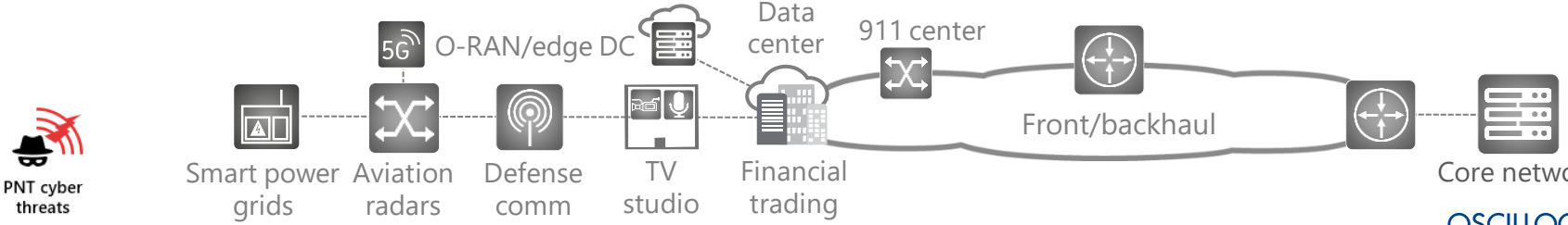
SyncModule



TimeCard

Sync Jack™
device/network monitor

11.1.1 release for OSA 5412/20/21/22/30/40



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Additional features in OSA 54xx release 11.1.1

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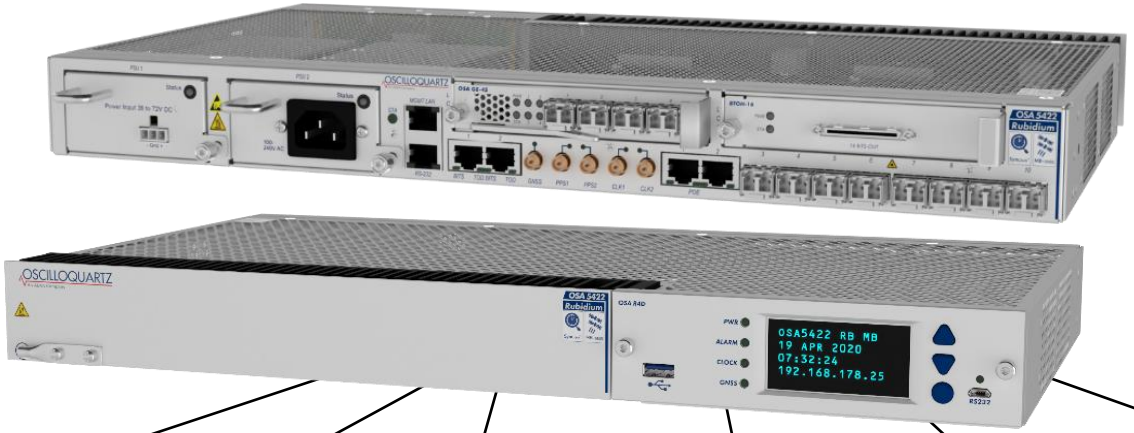
Precisely synchronizing a wide range of applications



PTP G.8265.1 → 2G/3G/4G/5G FDD

PTP G.8275.2 → DOCSIS 3.1 small cells APTS

PTP G.8275.1 → 5G/LTE TDD LTE-A small cells

PTP/NTP enterprise → MIFID II automation

PTP broadcast (SMPTE ST-2059-2/AES67) → Professional broadcast

PTP power → Power utilities

New

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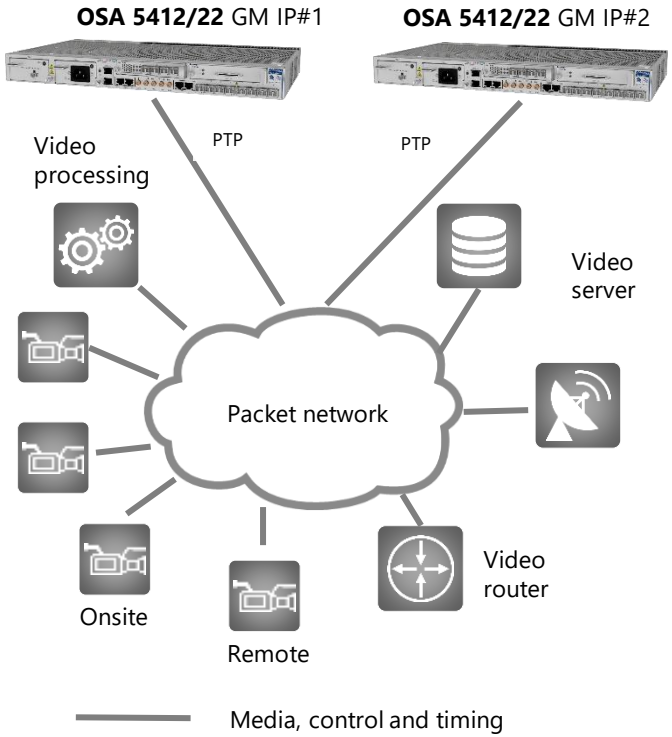
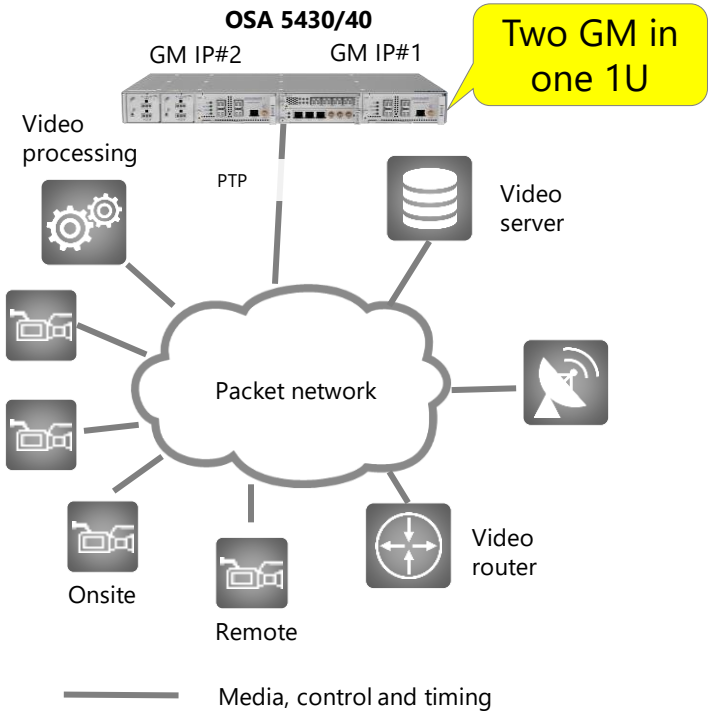
Redundant PTP broadcast GM with OSA 54xx



Improving sync networks with professional broadcast



OSA 5412/2x/30/40 are now supporting PTP broadcast profiles

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OSA 5440 BITSx16R cards output 1:1 protection

Carrier grade next-generation SSU

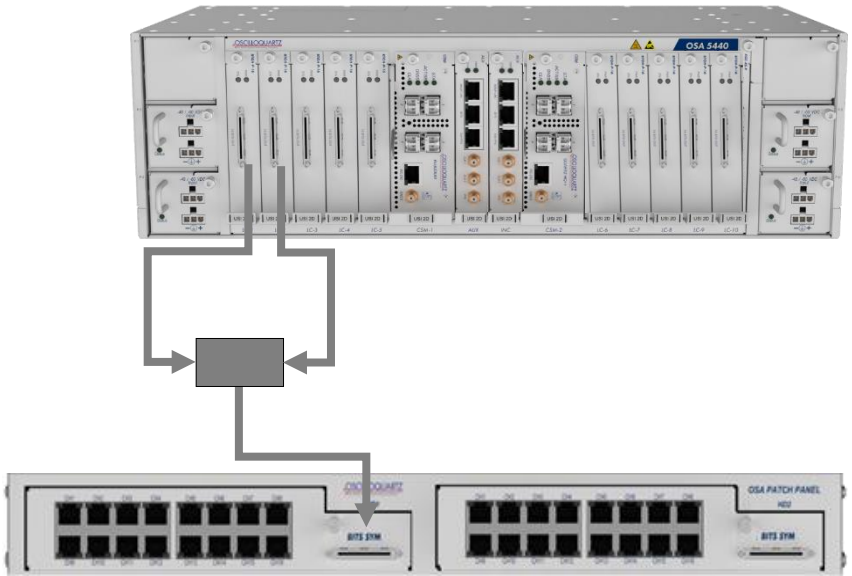
New

Making BITS at scale redundant

- All hardware modules are fully redundant (power, input, output and clock modules)
- Up to 160xBITS E1/2.048MHz outputs
- Up to 64xBITS protected outputs (1:1 protection)
- Hitless switching in case of failure
- Up to 48x 1G/10G Ethernet ports
- Up to 50x composite clock protected outputs

OSA 5440

ePRTC , PRTC-A/B, NG SSU , PTP GM



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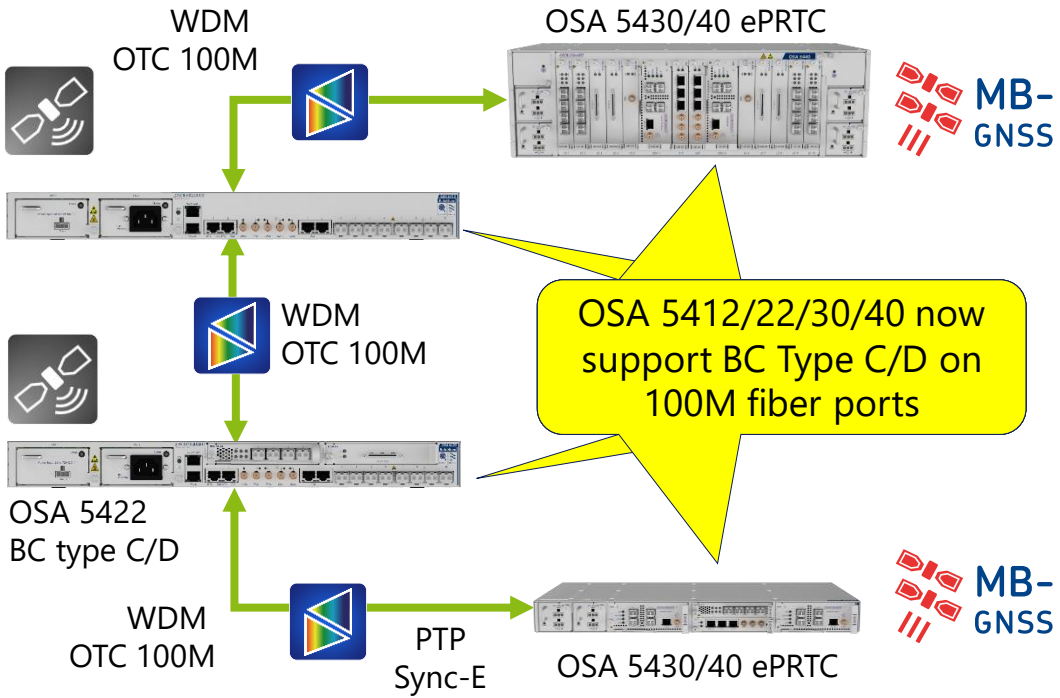
Optical timing channel (OTC) over 100Mbit/s I/F

OSA 54xx now support multiple 100Mbit/s I/F over fiber

Separate timing channel

- 100 Mbit/s gray/colored interfaces
- Robust transmission for highest availability and best accuracy
- High link-loss margins simplify planning

New



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Thank you

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