Introducing the OSA 5405-P substation grandmaster for smart grid timing

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Distributed control requires tight synchronization

Steadily increasing timing requirements

Outages of synchronization networks can have a catastrophic impact

Currently applied sync solutions do not meet actual demand

Power utilities need to improve their synchronization architecture

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Synchronization accuracy requirements

PTP

1µs

NTP

1ms

- Fault localization
- Synchrophasor measurements

IRIG

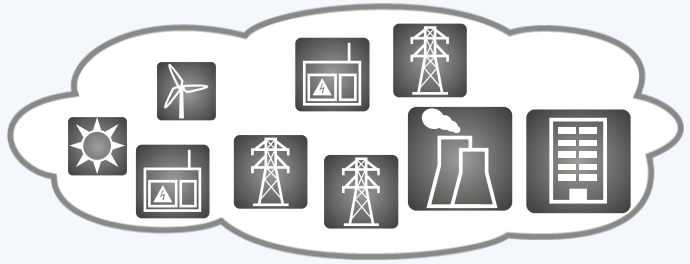
1s

- SCADA
- Frequency measurement
- Event recorder

- Bulk metering
- Customer premises metering

IEEE C37.238 2011 and 2017 “IEEE standard profile for use of IEEE 1588™ precision time protocol in power system applications”

IEC PAS 61850-9-3 “Precision time protocol profile for power utility automation”



Power grids need a combination of all timing technologies

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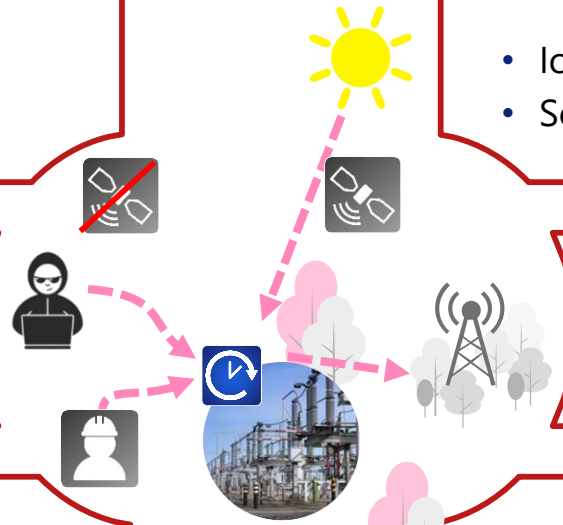
Challenges with satellite-delivered timing

- GNSS outages or temporarily degraded signal quality

- Ionospheric disturbances
- Solar activity

- Jamming: overpowering weak GNSS signals
- Spoofing: fake GNSS signals



- Interference from high-power RF transmitters such as TV, cellular, radar and µWave

- Antenna construction frequently does not achieve clear sky view

- Obstructions from new buildings and growing trees

Is GNSS your only synchronization source? You should be scared!

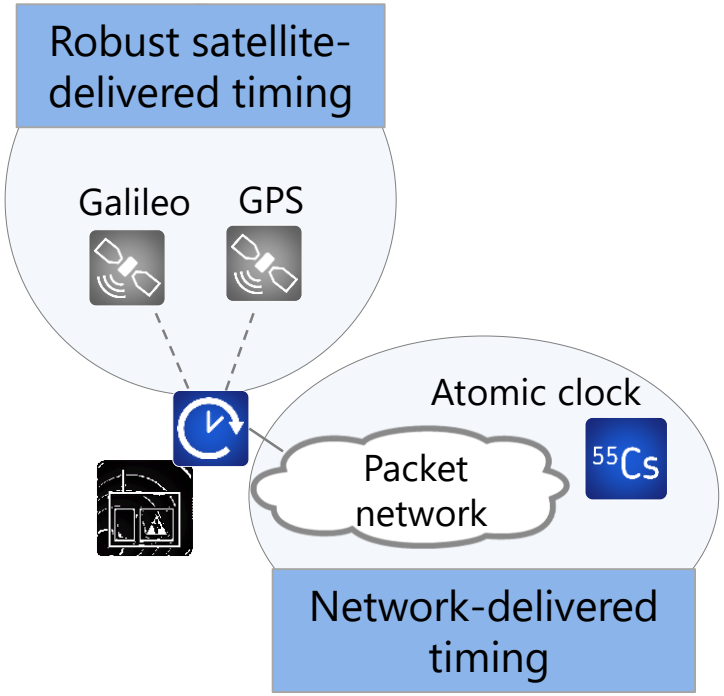
Resilient PNT is a matter of national interest

Governmental requests

US executive order on strengthening national resilience through responsible use of positioning, navigation, and timing (PNT) services. Feb 2020

Many other countries have similar directives, orders or regulations

Solution



The solution: combining robust GNSS receivers and network-delivered timing

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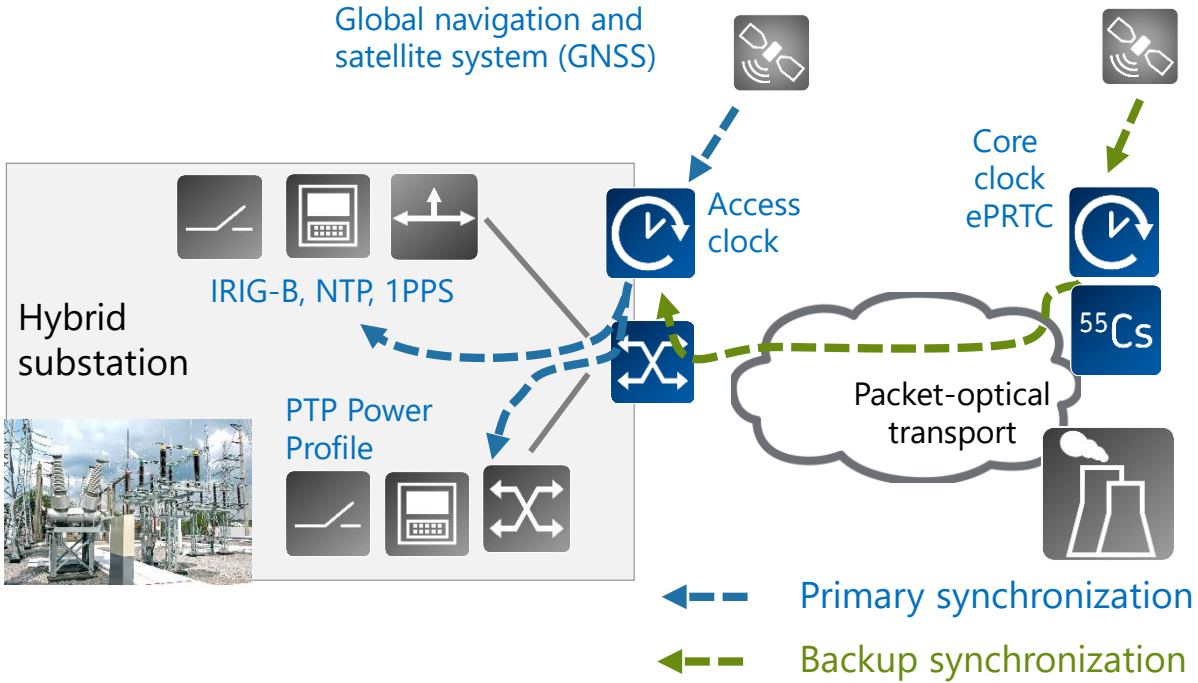
Resilient and accurate substation timing



Availability: Combining satellite- with network-delivered timing

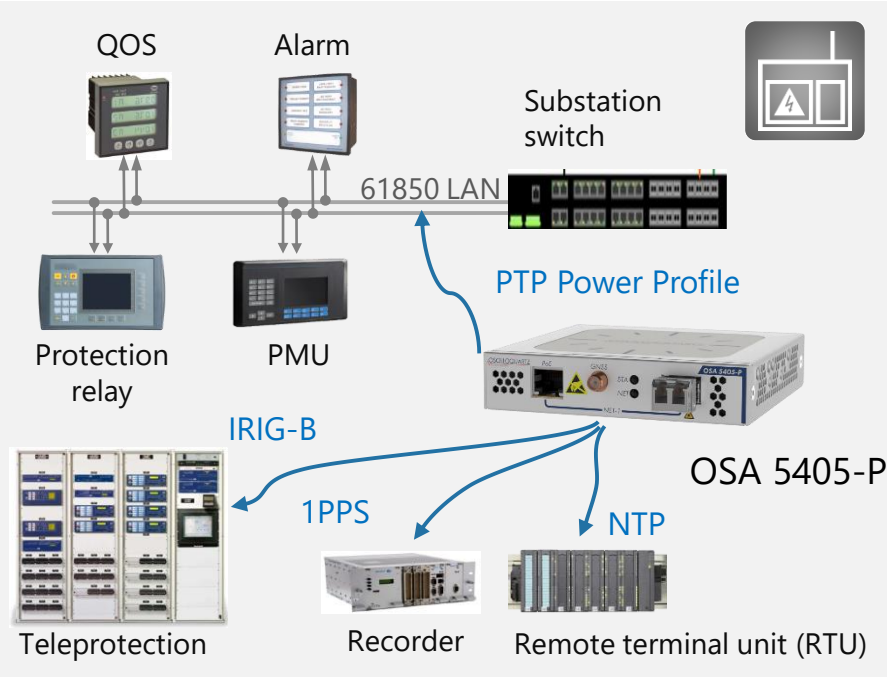
Synchronization interfaces: Legacy NTP, PPS and IRIG-B as well as latest PTP featuring power profile

Best practices: Applying multi-technology devices for seamless migration and resilient operation

Combining GNSS with network timing for accuracy and resilience

Synchronizing substations with OSA 5405-P

Combining network- and satellite-delivered synchronization



Multi-technology synchronization

Ultra-compact grandmaster with 1GbE copper/fiber and electrical interfaces

SyncE and PTP supporting several profiles

Multi-constellation GNSS receiver featuring jamming and spoofing detection

Wide range of client interfaces for legacy timing such as IRIG, PPS, as well as NTP

Powerful Ensemble Controller combines transport and sync management with comprehensive GNSS and sync assurance features

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OSA 5405-P substation grandmaster

Electrical and optical Ethernet interfaces, IRIG AM and DCLS, PPS I/O, SyncE, GNSS input, PoE

Integrated GNSS receiver, PTP grandmaster, boundary and slave clock, NTP server, multiple IRIG clocks

Up to three concurrent GNSS constellations (GPS/GLONASS/BEIDOU/GALILEO/SBAS/QZSS)

PTP grandmaster supporting telecom, enterprise, power and default profiles

PTP profile conversion between telecom and power profiles

Comprehensive synchronization assurance with unique Syncjack™ feature set

Managed by Ensemble Controller and Ensemble Sync Director

OSA 5405-P front

OSA 5405-P back

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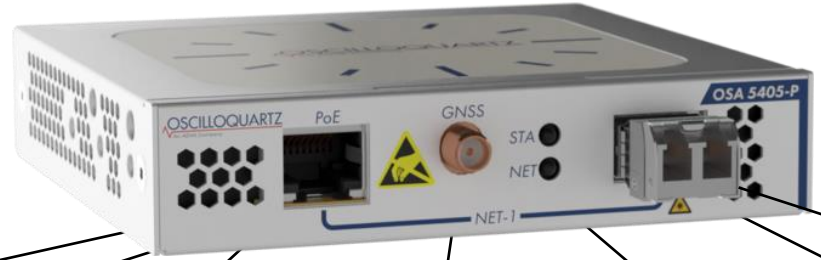
Supporting multiple applications



PTP G.8265.1 → 2G/3G/4 G/5G FDD BS

PTP G.8275.2 → DOCSIS 3.1/4.0 and APTS

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

PTP/NTP enterprise → MIFID ii

PTP broadcast → Studio

PTP power → Power utilities

IRIG → Power utilities

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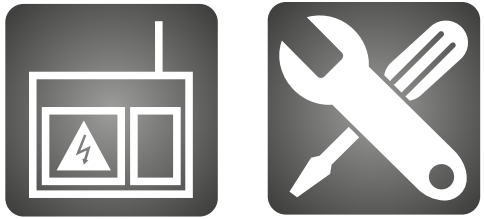
Multiple mounting options



OSA 5405-P DIN mounting

OSA 5405-P rack mounting (dual units)

OSA 5405-P wall mounting

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Summary

Today's power utility timing is not accurate or resilient enough

NTP, IRIG-B and PPS need to be augmented for more precise timing

Backing up satellite-based with network-based synchronization makes timing resilient

OSA 5405-P is a compact grandmaster, cost-optimized for power stations

When timing gets tough, OSA solutions keep going

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Thank you

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