



GNSS TIMING RECEIVER RESILIENCE WORKSHOP

A VIEW FROM THE FINANCIAL SECTOR

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AGENDA

- Why does the Financial Services Sector care about precision time
- What challenges does the FSS care about
- Typical timing system in FSS
- Enhanced requirements
- Thoughts on possible solutions
- Discussion

WHY DOES THE FINANCIAL SERVICES SECTOR CARE ABOUT PRECISION TIME

- Regulation
- Operation
- Advanced trading techniques

REGULATION

- FINRA/MiFID II/NMS CAT
 - Traceability
 - Timestamping of transactions
- 1 μ S precision
- 100 μ S Alignment to authoritative source
- Traceability to authoritative source

OPERATIONS

- Network monitoring
 - Packet capture (10 nS)
 - Global network event logging and control
- System operations
 - Global server synchronization
 - Global autonomous control
- Applications time stamping
 - For operations and regulatory compliance

ADVANCED TRADING TECHNIQUES

- When is now?
- Global synchronization of trades
- Global synchronization of market information
 - Traditional ticker
 - Social media feeds
 - News feeds

WHAT CHALLENGES DOES THE FSS CARE ABOUT

- Reliability

- Detection of a time shift (remember the 13 μ S oops, Leap second, or DST)
- Correction of a time shift
- Extended hold over on signal loss for any reason

- Traceability

- Detect and advise on constellation change
- Correct for constellation time delta

- Precision & Accuracy

- Continuously validate precision and alignment against internal ST1 source and space references

TYPICAL TIMING SYSTEM IN FSS

- Per mid to large firm
- Cost is secondary to reliability and integrity
- 30 locations world wide (where the markets are)
 - 2 antennas
 - 2 Grand Masters with Rubidium local clocks
 - 1 Cesium clock
 - Redundant PPS distribution network
 - Redundant (in band) PTP distribution network
 - PTP and PPS enabled NIC's in each server

ENHANCED REQUIREMENTS

- Better urban penetration
- Better resistance to both space and terrestrial weather
- Access to terrestrial based timing source (E-LORAN or Land Lines)
- Cyber protection
- FSS is not cost sensitive for improved overall performance

THOUGHTS ON POSSIBLE SOLUTIONS

- Bring back Terrestrial base timing source(s)
- Provide down link “firewall”
- Provide real time operational status updates
- Can the need for a local ST1 source be reduced?

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DISCUSSION