

Is Time Synchronization in the Cloud Real Challenge to Financial Companies' Digital Transformation?

Areg Alimian

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Sr. Director of Product Management



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Sr. Director of Product
Management
Keysight Technologies

"Is Time Synchronization in the Cloud a
Real Challenge for Financial
Companies' Digital Transformation?"
at



Agenda & registration: www.STACresearch.com/fall2021

Challenges with Digital Transformation in Financial Services



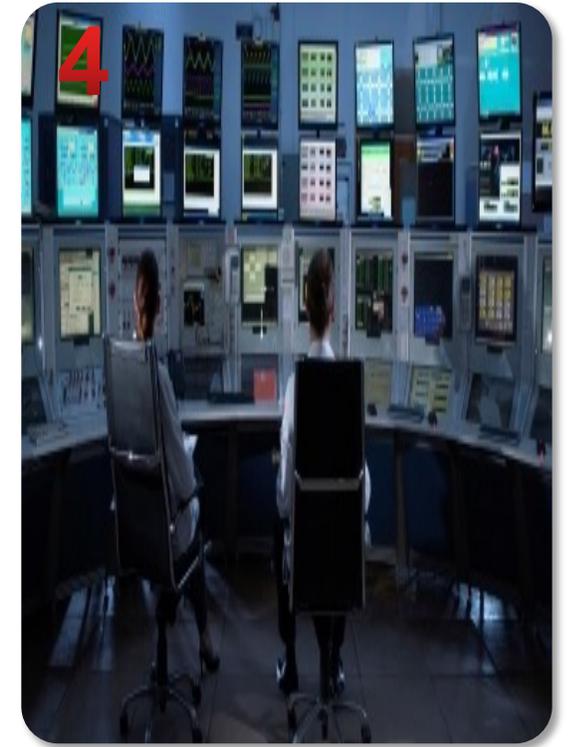
Understanding Service Quality for Remote Users



Configuration & Performance validation of new Services and Networks



Security effectiveness from Outside > In and Inside > Out



In Service SLA monitoring for Services & Networks

Key Questions to Answer in the Digital Transformation Journey



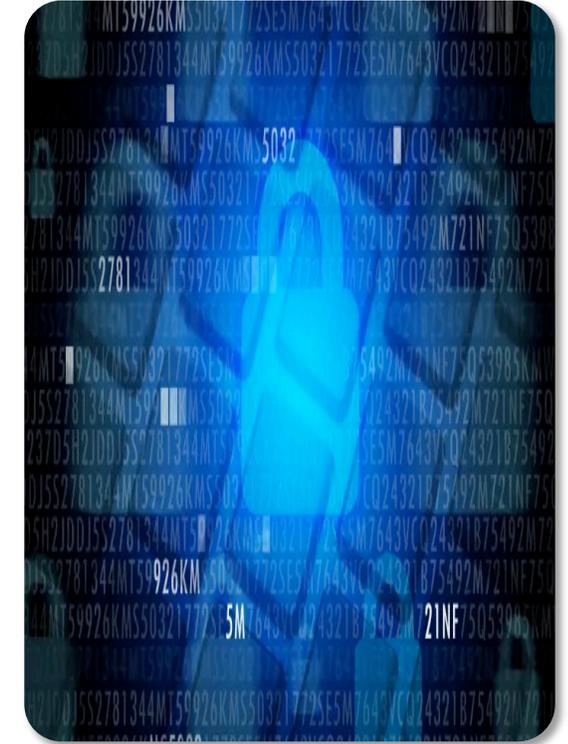
Do I have accurate, reliable, and documentable clock synchronization? Am I in compliance with regulatory requirements?



How does a new Application or Network interop with existing network & services?



How long will my network take to recover from a failure? How does it perform in a failure?



Do my security tools block attacks?

Why is Time Synchronization Important?

Financial Trading

1. Regulations. EU and US regulators (SEC) require time stamping of trades accurate to better than 100 microseconds. Must have audit trail to prove this. Large fines for non-compliance.

2. Needed for HFTs to be able to accurately measure latency (latency is the subtraction of two synchronized time stamps).

Gen. IT – All Sectors

1. Government cyber security authorities (eg. US) are recommending that all Enterprises (and especially critical infrastructure providers) understand how they use time and be able to detect timing 'anomalies'. Accurate time is required for forensic investigations into cyber breaches.

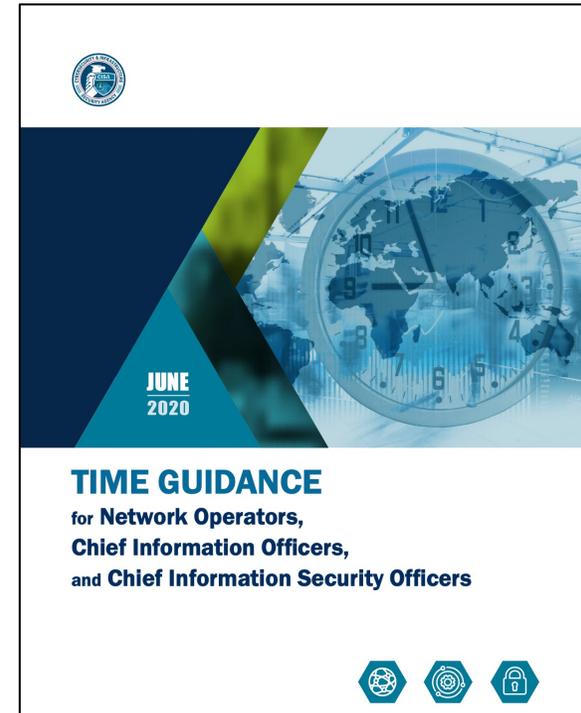
2. Needed for some IT applications – eg. High speed data synchronization.

Emergency Services

Emergency services need to accurately time stamp when calls come in and emergency resources are dispatched. Maybe used in court cases.

Utilities/OT

Electricity grids require accurate time to function correctly – as power sources switched in at planned times. Failure to have accurate time may lead to grid instability.



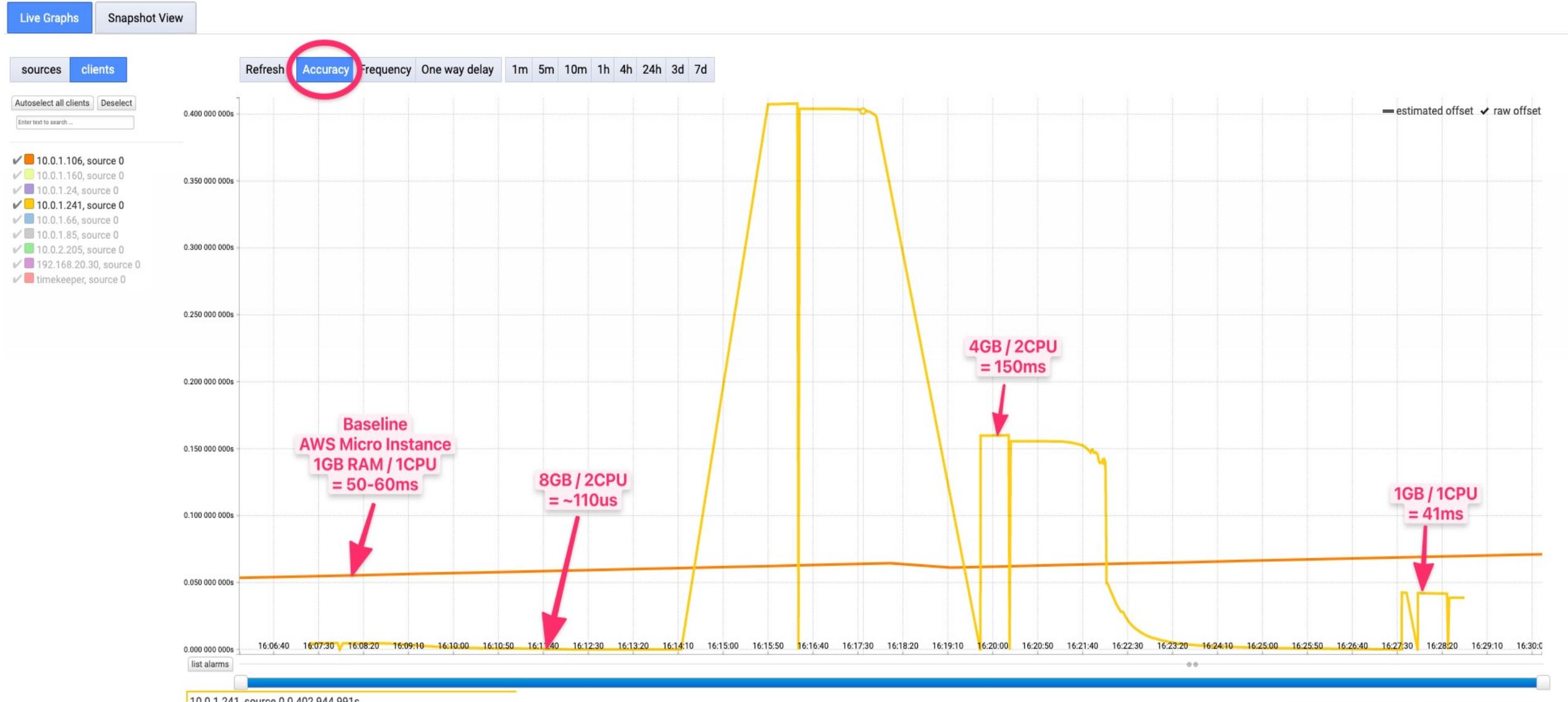
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What Can Go Wrong with Time Synchronization?

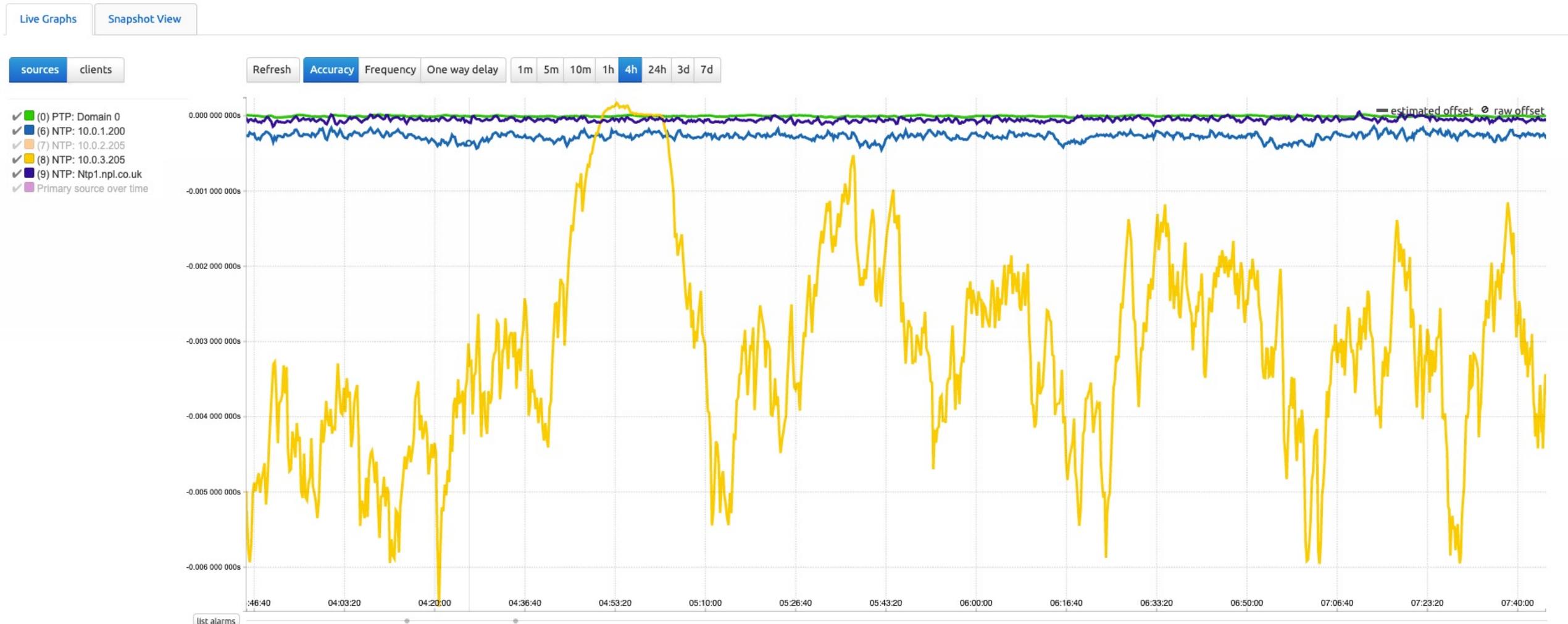
- Cable lengths from GNSS antennae calculated incorrectly or illicitly modified
- GNSS signals jammed by accident or on purpose
- GNSS signals spoofed
- Network traffic congestion (asymmetry)
- Atomic clock time drifts
- Oscillator/Crystal drifts
- Handling of leap seconds
- Network reconfiguration prevent/block NTP/PTP signals
- “Wild” host behavior in the cloud – hosts are stopped, relocated, moved to new regions
- Networking changes happening outside of one's control
- DDoS attacks on the firewalls that Public NTP is passing through



Time Accuracy Impacted by Resource Allocation - AWS



Time Accuracy Impacted by Resource Allocation - GCP



Introducing TimeKeeper

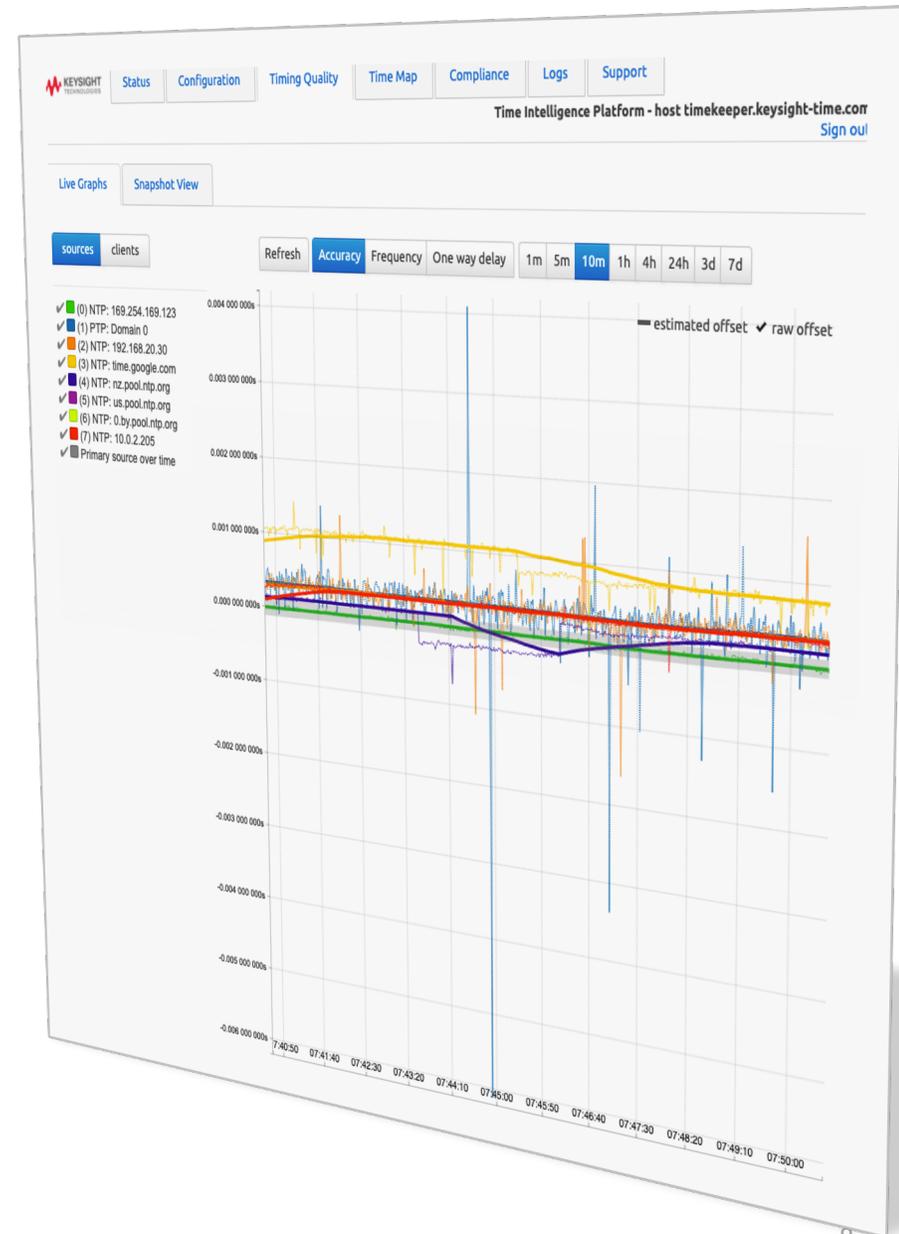
RELIABLE CLOCK SYNC AND TIME DISTRIBUTION

Keysight has partnered with FSM Labs to sell their TimeKeeper Product

Trusted by some of the largest banks for Time Distribution and Clock Synchronisation for 25 years

TimeKeeper's Key Features

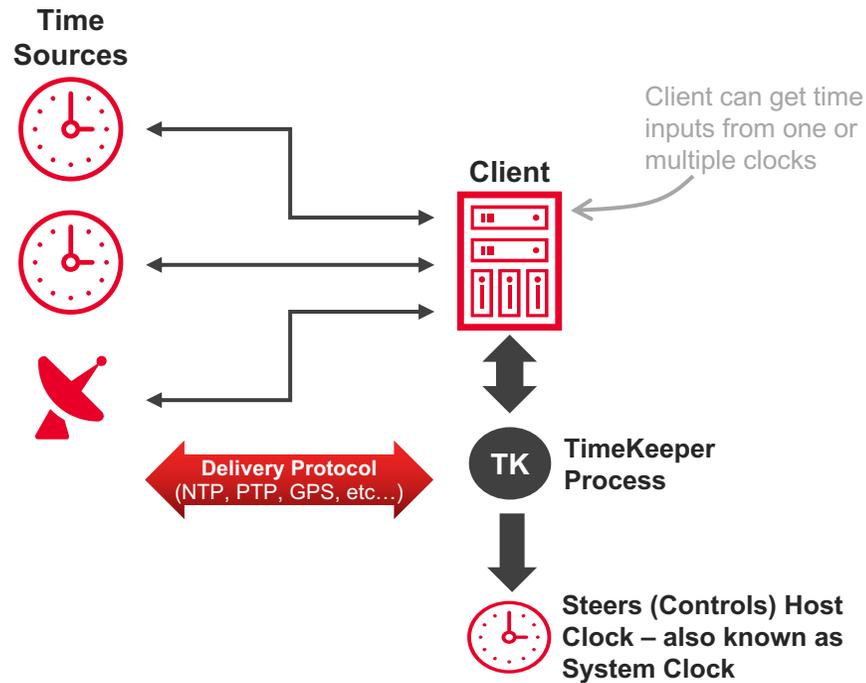
- Time Synchronisation
- Time Distribution (Server)
- Compliance Reporting (Server)
- Synchronisation Graphing, Mapping and Logging
- Synchronisation Behaviour Monitoring and Anomaly detection



TimeKeeper Modes

There are two operation modes for the TimeKeeper software:

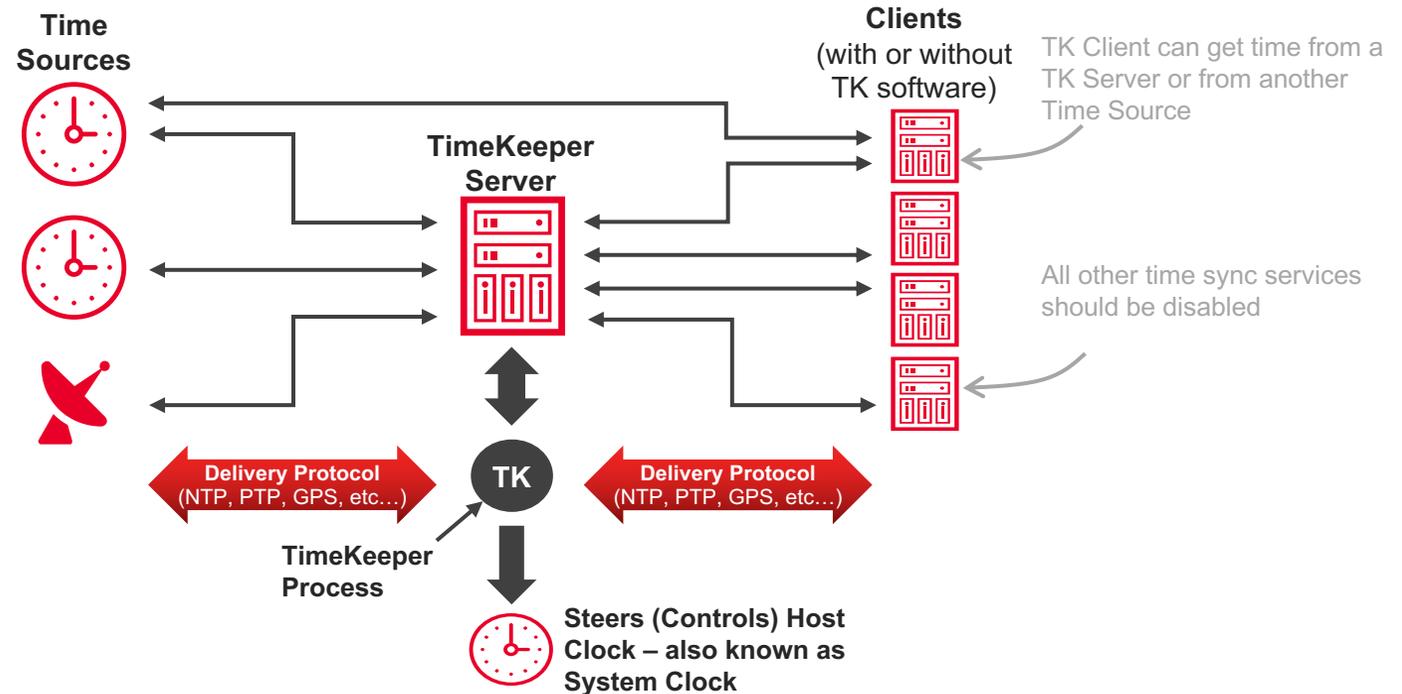
Client – Only Consumes Time



Options:

- i) Deploy on every single server that has mission critical applications or
- ii) Deploy on just one server per site - 'Canary' mode.

Server – Consumes and 'Serves' Time



Same Software Package for both Client and Server modes
Configuration option (no pricing difference)

Why TimeKeeper?

Accurate

- Learning clock models able to reject noise, steer the local clock
- Recognizes unique environment behaviors (“wild” differences between cloud systems)
- Predict and correct for errors before they’re introduced
- Model clock behavior for special cases of cloud hosts

Reliable

- Ability to monitor and track multiple time sources
- Alerts on problems and changes (possibly happening outside of one’s control., i.e. in cloud with hosts moving, time sources varying etc)
- Selects correct time (source) and rejects the bad ones
- Allows for mixing and matching network protocols to overcome some protocol specific errors in switches, networks in physical or cloud environments

Verifiable

- Software says “time is good”, but how do you know and show it to others”?
- Most OSS software just prints that things are good and stop there
- TimeKeeper provides the tools to cross-check time, record everything that happens and that it does.
- Allows tracing entire chain of custody to trace where time was coming from and how far off the clock was at any point in time

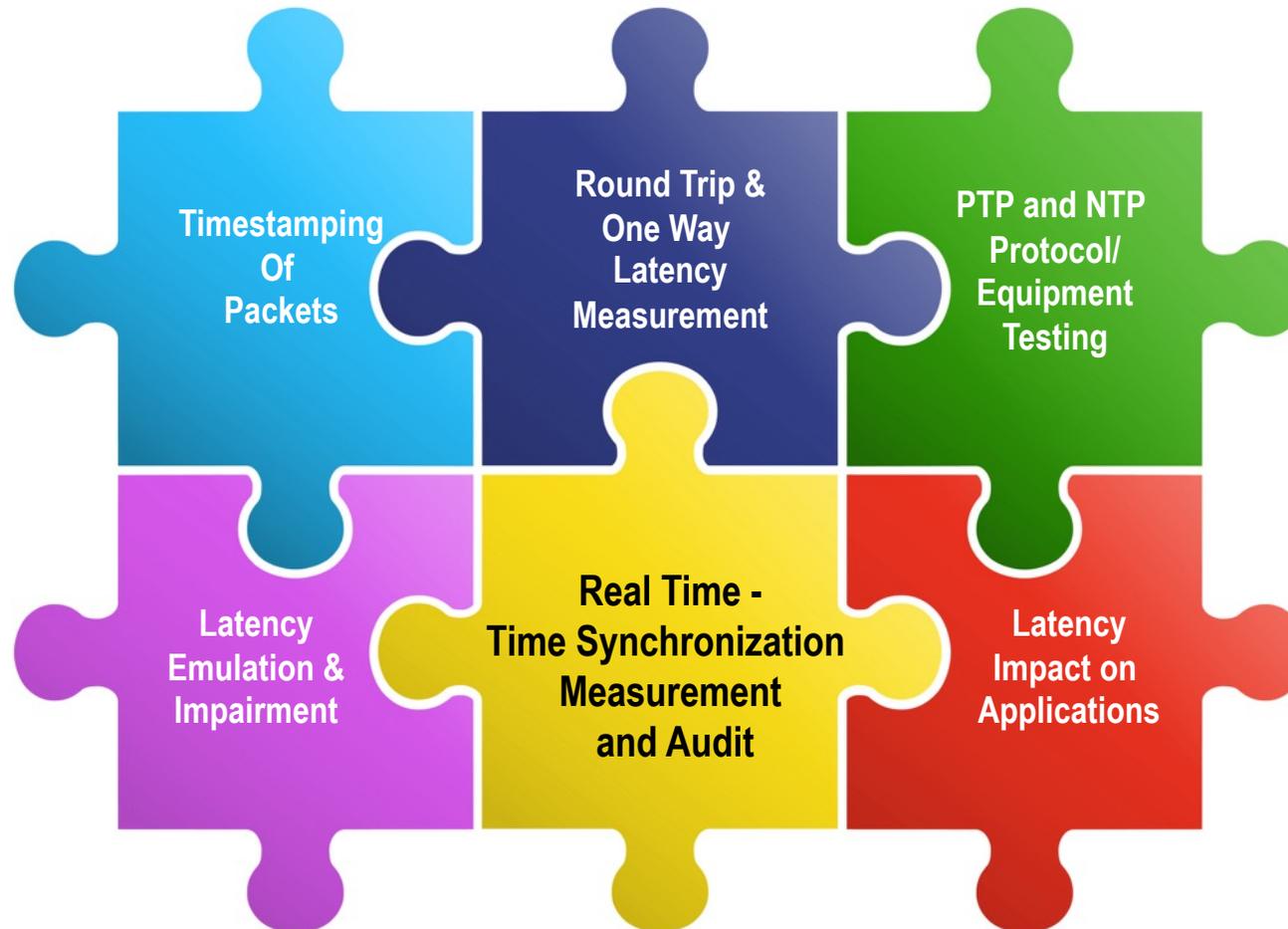


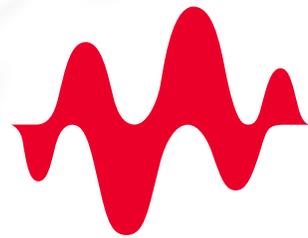
TimeKeeper Benefits

- Financial Trading
 - Avoid multi million compliance fines and reputational damage
 - Optimize effectiveness of algo trading by ensuring accurate time
 - Fix time synchronization issues faster
- Cyber Security
 - Ensure data logs have accurate time stamps to support effective breach forensics
 - Detect attacks on timing infrastructure as they occur
 - Comply with Government advice on time monitoring
- Database application synchronization
 - Minimize data replication issues due to lack of accurate time

“TIME FOR KEYSIGHT” PORTFOLIO

LEADERS IN TIME/LATENCY INFRASTRUCTURE TESTING AND SYNCHRONIZATION





KEYSIGHT
TECHNOLOGIES