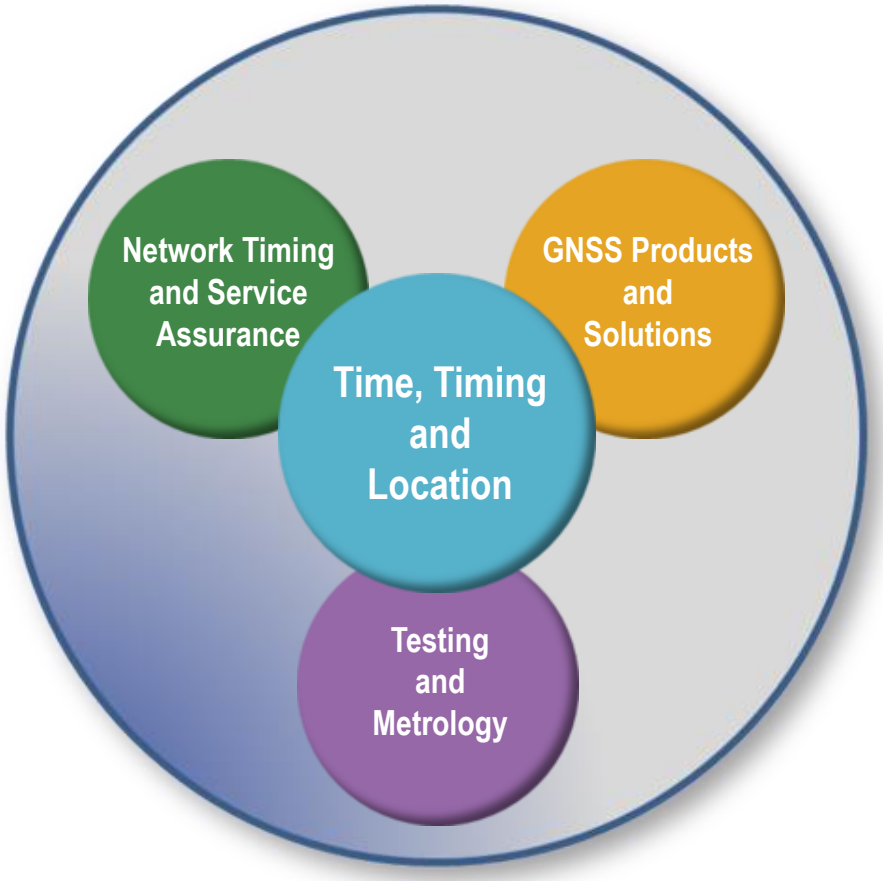
Monitoring Time at the Application Layer

Steve Newcombe MSc, MIET
Account Manager

Version 0.1

Chronos – Expertise



Time Delivery in the Network

Many Time Source Solutions

Microsemi®

MEINBERG

NPL
National Physical Laboratory

spectracom

Many Monitoring Solutions

TimeKeeper® Compliance

DOMAIN TIME II ™ Performance Series Time Synchronization

emagine

Corvil


Beyond the NIC?

Beyond the NIC - Members?

7.4 Application, Host and Wire Timestamps

- ESMA considers that **any** of these timestamps will be acceptable for members or participants to use
- Point of Capture MUST meet MiFID requirements
- Regardless of Application layer performance

Guidelines Regulatory technical and implementing standards – Annex I

28 September 2015

Beyond the NIC - Venues?

7.4 Application, Host and Wire Timestamps

- Trading Venues… …will likely require the use of application timestamps
- If the Reportable Event occurs at the Application Layer
- The Application layer MUST meet MiFID requirements

Guidelines Regulatory technical and implementing standards – Annex I

28 September 2015

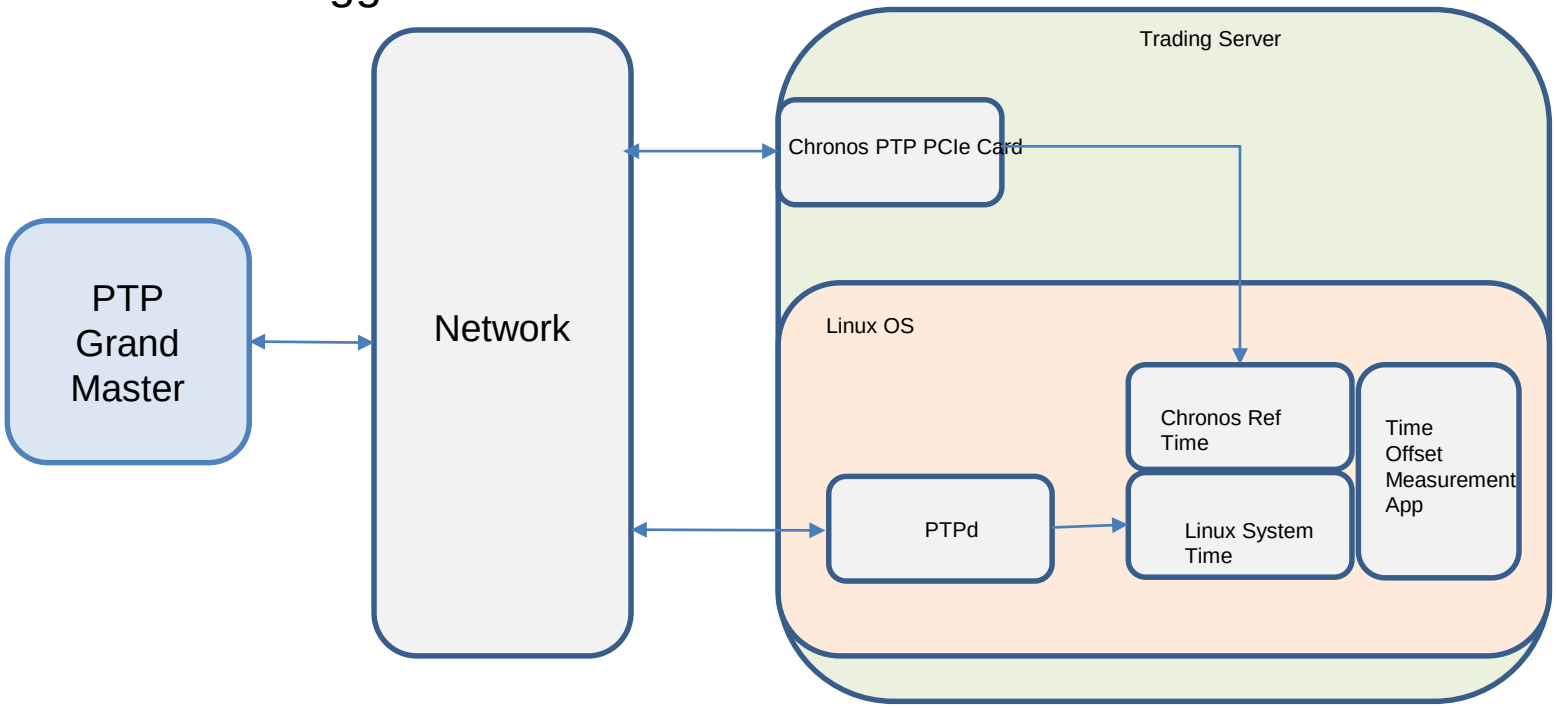
PROOF OF CONCEPT

Get Inside the OS – Update

- Microsecond timing at the NIC
  - Hardware Time Stamping
  - Optimised Network Design
  - Resilient Time Design
- Frittered away in the Linux stack!
  - Linux System Clock inaccuracies
  - API calls suffering bridge / bus latency
    - NIC time very accurate but…
  - Virtualisation!

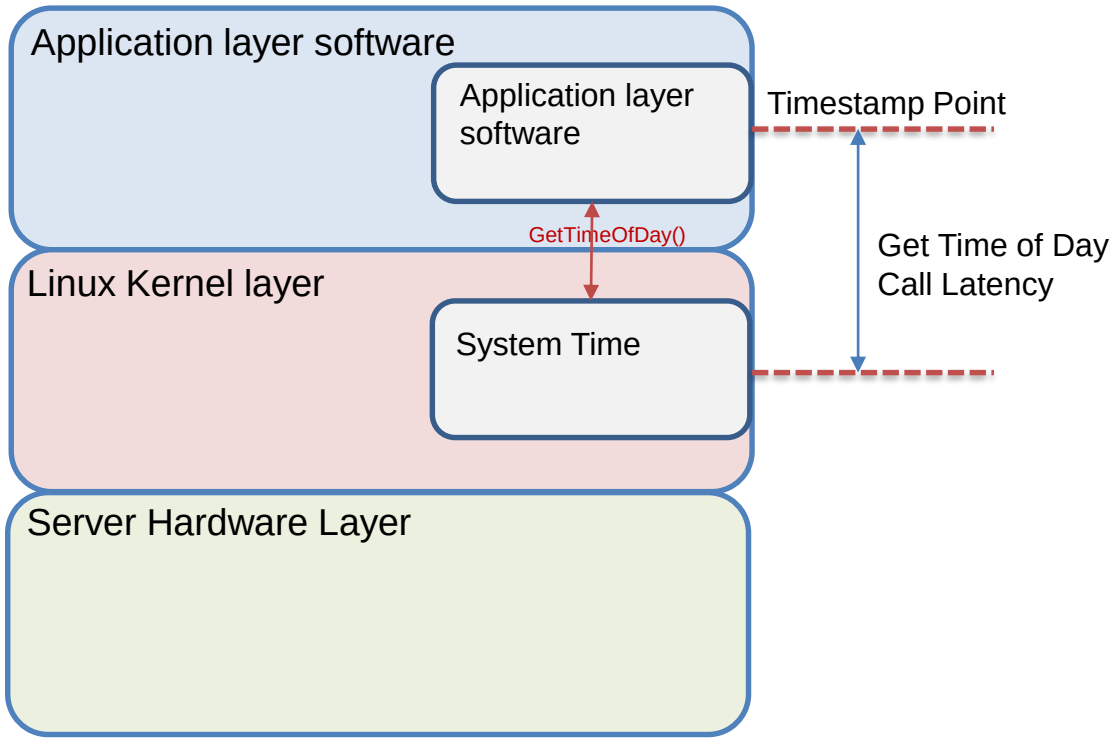
Test System Setup

- Precision PTP system delivers measurement reference time so the performance of the system time available to the apps can be monitored
  - Tuned and measured for accuracy
- Standard Linux PTPd running on Trading Server.
- Load placed on processors to emulate trading algorithms
- Time error between Linux System Time to software app and ‘true time’ recorded and logged



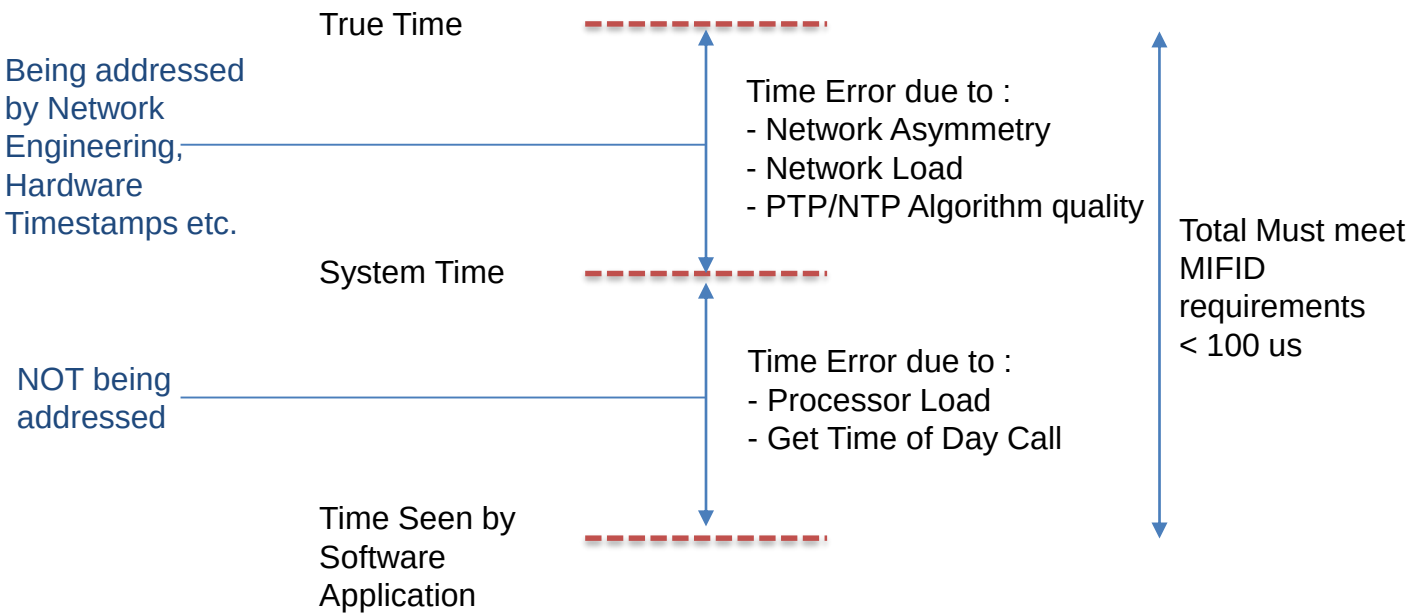
Software Time Error Sources

- Timestamp point mandated by MIFIDII is in the application layer software
- Accuracy of the timestamp is affected by many factors

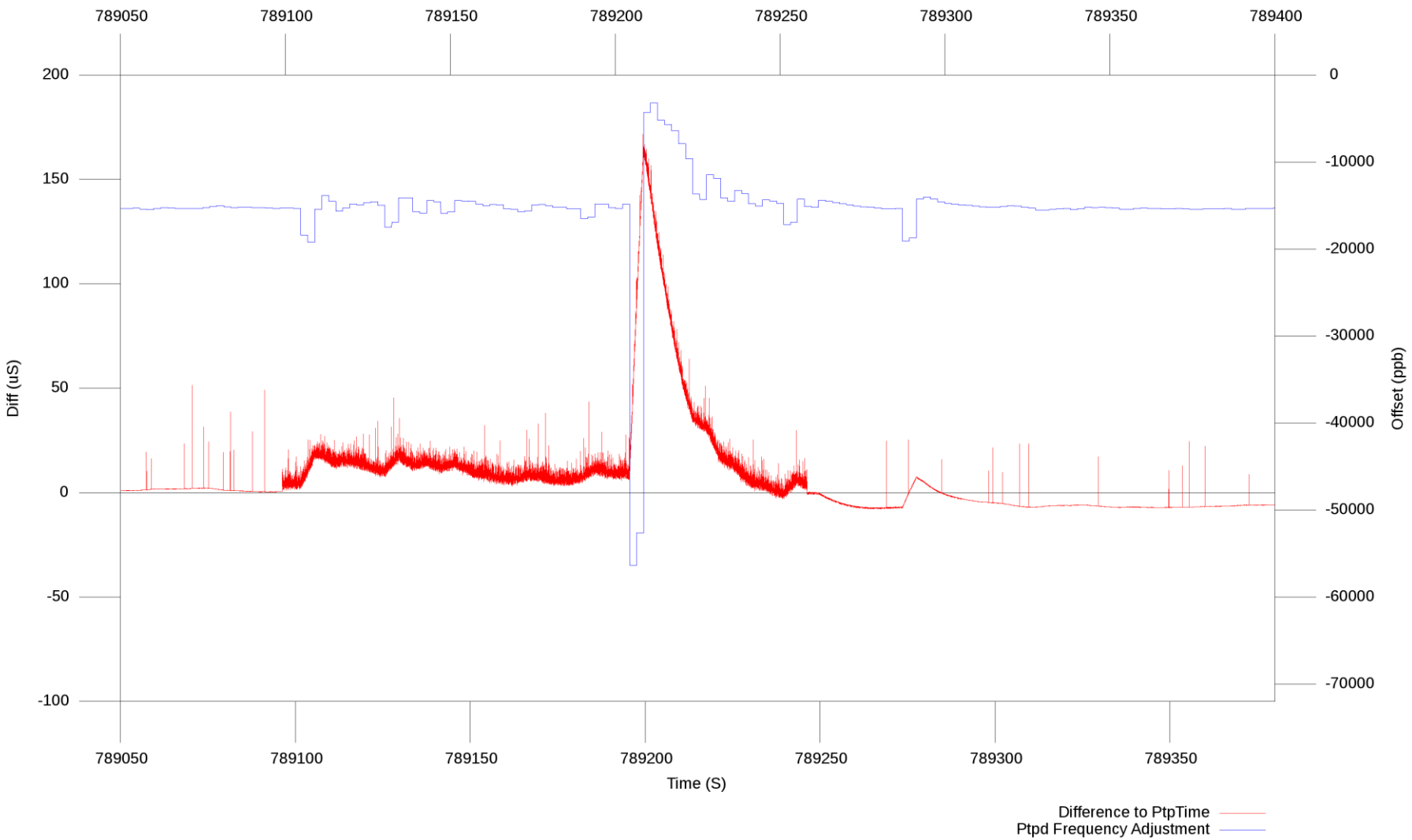


Software Time Error Sources

- Error in application timestamp from true time driven by
  - GetTimeOfDay() call latency and jitter
  - Accuracy of System time recovery
  - GetTimeOfDay() latency and jitter can be a large proportion of error



Software Time Error over Time and Processor Load



The Way Forward

- Update Chronos PTP Client Hardware
  - PCIe
  - USB
- Additional Data Gathering from App
  - Demonstrate Validity of Method
- Develop Dashboard Application
- Recruit Alpha Testers