GPS & precision timing’s role in the financial services sector

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The FSS who we are

The business challenges

The need for precision timing

The risks and challenges ahead
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The Business Challenges

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The risks and challenges ahead
Scale of the business

- The total market cap of all listed companies is over $55 Trillion. Compared to country GDPs, that would make the sector the largest economy in the world.

Largest Economies by GDP (in Trillions of $)

- US - $15T
- China - $7.5T
- Japan - $5.8T
- Germany - $3.6T
- India - $1.9T

$55 Trillion Market Cap
Real money

• DTCC clears, settles over:
  - $24 quadrillion dollars per year
  - $24,000,000,000,000,000
  - One US bank alone transacts over $35 Trillion dollars a day
  - NYSE averages over $15B in the first 2 minutes after the open
400+ years of rapid technology adoption

And a rich history of technology innovation in markets

• First stock ticker to disseminate data (1867)
• First telephones on the trading floors (1878)
• First electronic ticker display board (1966)
• Wireless handheld devices on Trading floors 15 years before iPad invented (1995)
• Industry’s first private network offering global connectivity
• Industry’s private network exceeds 1TbS

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FSS challenges

Regulatory Model is Driving Change
- Requirement for long term retention of data
- Requirement to archive meta data
- Real time risk management is now required
- Requirement for precision timing
- Increasing focus on cyber security

FSS is Evolving to a Commodity Industry
- Time to market must be faster
- Product life time is shorting
- Margins are reducing driving OPEX reduction
- Regulation is increasing the cost of business

Technology Adoption is Accelerating to Meet Accelerating Business Needs
- Technology is a strategic weapon
- Fueling the race to the triple crown of technology (0 cost, 0 latency, 0 time to market);
  Bandwidth demand continues to grow at 30% - 50% per year.
- Comprehensive management and orchestration of the data center

Business model continue to evolve
- Exchange trading floors continue to fade away
- Machine assisted trading dominates
- Heuristic trading based on hyper-contextual information is growing
Next challenge – Heuristic based trading

Market data feeds

News feeds

Social feeds

Streaming news video

Heuristic Processing

Heuristic Processing

Heuristic Processing

Heuristic Processing

Historical Data Base

Heuristic Processing

Heuristic Processing

Human Oversight and control

Execution Venues

Ticker Plant

Trade Plant

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A few use cases

• Elimination of a out of band timing plant
  • Transitioning from classic BITS to in band timing distribution
  • Driven by the need for components in the DC to have accurate time
  • Cost savings

• Precision operational analytics
  • Key to reliable operations
  • Core to all data center KPI’s

• Trading algorithms
  • Need vast sums of information but also when the information was created

• Market transparency
  • Did all market participants have fair and equal access
  • Are all the markets seeing information at nearly the same time

• Regulatory compliance
  • Now requiring time stamping of ALL financial transactions
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The FSS who we are

The Business Challenges

The need for precision timing

The risks and challenges ahead
Technology challenges

• Developing a timing solution accurate to 1µS per transaction across a data center
• Developing a uniformed epoch across the industry
• Developing the ability to time stamp every transaction
• Developing analytics to measure the performance of the transaction environment at 100’s millions transaction per second
• Securing the authoritative timing references
Solutions ahead

• Transitioning from BITS to in band timing distribution
• PTP replaces NTP
• Secure and stable GPS augmented by terrestrial base timing references will be developed.
Thank You!