

FIX Protocol Limited

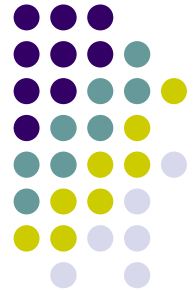


Introduction to FIX and the FAST Protocol

Rich Shriver

Jordan & Jordan (Singapore) Pte Ltd

Co-chair – FPL Market Data Optimization Working Group





Agenda

- FIX Protocol and FIX Protocol Ltd
 - FIX Protocol and its purpose
 - What FIX Does for You
 - The History and Evolution of FIX
 - FIX Association Collaboration
 - FPL Committee, Membership and Legal Structure
 - Active Working Groups/Initiatives
- MDOptWG and FAST Protocol
 - Role of Market Data in Electronic Trading
 - Challenges of Market Data Growth (OPRA, US Equities, etc.)
 - FIX Response to an Industry Problem
 - Market Data Optimization Working Group
 - Flexible, Scalable, Standards-based Architecture
 - FIX Adapted for STreaming (FAST)
 - Proof of Concept Framework
 - POC Phase 1a Reults
 - Next Steps



FIX Protocol

... and its purpose

Mission Statement

To improve the global trading process by defining, managing, and promoting an open protocol for real-time, electronic communication between industry participants, while complementing industry standards



What FIX Does for You

- Provides an industry standard means to communicate the information you wish to communicate electronically. This could be:
 - Indications of Interest
 - Orders and Order Acknowledgment
 - Fills
 - Account Allocations
 - News, E-Mail, Program Trading Lists,
 - Administrative Messages
- Connects you with an expanding list of buy and sell-side institutions
- Delivers information in real-time



The History of FIX

Global Adoption	
Pilot	December, 1993
Americas	January, 1995
Europe	June, 1996
Tokyo	October, 1998
Hong Kong	March, 2000

Other notable dates

Jan 2002 – FIX-Asian Publication

Oct 2002 – Membership Opened
Global Fixed Income &
Global Derivatives

Sep 2004 – New Web Site Launched

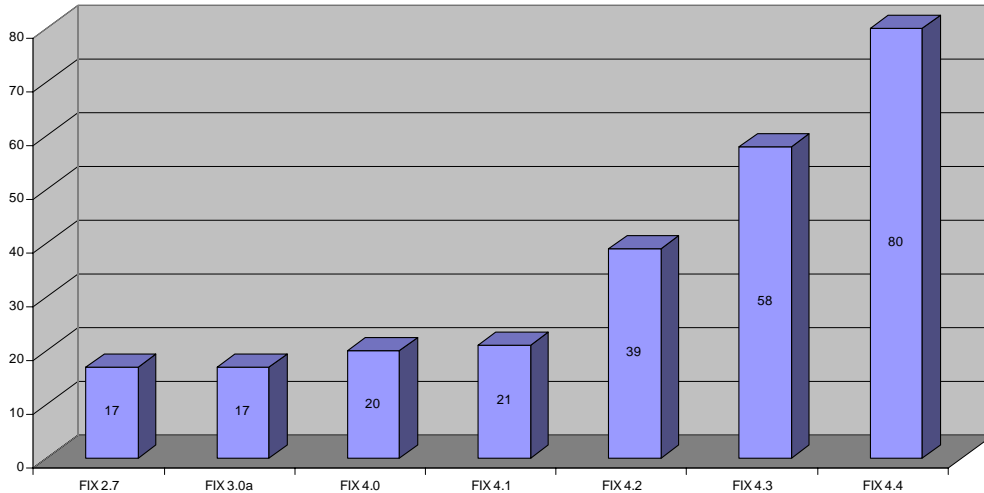
Jul 2005 – Global Foreign Exchange

Version	Release Year	Supported Asset Classes
FIX 2.7	1994	Equities
FIX 3.0a	1995	Equities
FIX 4.0	1996	Equities
FIX 4.1	1998	Equities Listed Derivatives
FIX 4.2	2000	Equities Listed Derivatives Forex
FIX 4.3	2001	Equities Listed Derivatives Forex Fixed Income
FIX 4.4	2003	Equities Listed Derivatives Forex Fixed Income OTC Derivatives

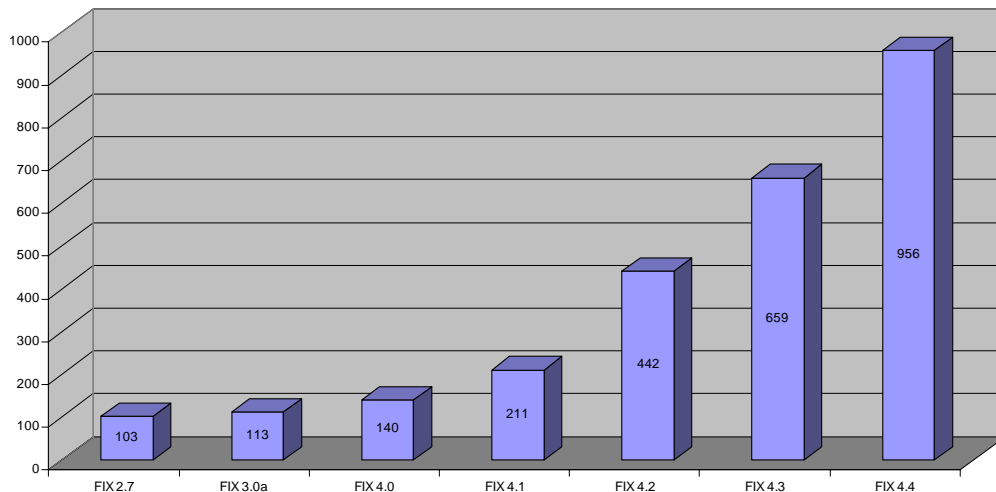


Evolution of FIX

Number of Application Messages



Number of Fields (Data Items) in FIX



FIX 4.4 Message Categories

- Pre-Trade
- Indications
- Event Communication
- Quotation
- Market Data
- Security Definition/Status
- Market / Session Status
- Trade
- Orders
- Crossing Orders
- Lists (Basket Trading)
- Multileg Orders
- Post Trade
- Allocation and Ready to Book
- Collateral Management
- Confirmations
- Trade Reporting
- Settlement Instructions
- Position Maintenance and Reporting
- Registration Instructions



Associations / Statements of Understanding

The Bond Market Association	1999	Support standard electronic trading of fixed income products
SWIFT	2000	Support development of the ISO 15022 XML standard
Futures Industry Association (FIA)	2003	Encourage adoption of FIX within the listed derivatives market by providing expertise and direction to FPL from the FIA Standards Working Group
International Swap & Derivatives Dealers Association (ISDA)	2003	Provide interoperability and support for the Financial Products Markup Language (FpML) used for OTC derivatives
International Primary Market Association (IPMA)	2005	Encourage adoption of FIX within the new issue market place
TWIST	2005	Collaborative initiative between FPL, ISDA and TWIST to develop and use a common industry protocol for the Foreign Exchange markets



Committee Structure

Global Steering Committee

Regional Steering Committees

Americas

Europe

Japan

*Asia
Pacific*

Global
Education &
Marketing
Committee

Global
Fixed Income
Committee

Global
Derivatives
Committee

Global
Foreign
Exchange
Committee

Global
Technical
Committee

Asia Pacific Regional Committee

Grace Lin – Citigroup

George Molina – Franklin Templeton Investment

Business Practices

Education & Marketing

Technical



Membership Structure

- Regional Committees and Product Committees
 - Open to any firm
 - \$8,000.00 per annum
- Global Technical and Global Steering is by appointment only
- Global Membership
 - All Committees
 - \$25,000.00 per annum



Legal Structure

Move from UK Limited to a Trust

- Tax Certainty
- Support for membership structure
- Minimize liability to member organizations



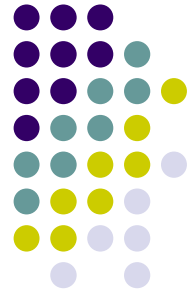
Active Working Groups/Initiatives

- Market/Membership Response
 - Algorithmic Trading
 - Market Data Optimization
 - China Markets
 - South African Markets
 - FPL FpML Collaboration
- Regulatory Response (Europe)
 - MiFID
 - Giovannini Report Response
- FIX Specifications
 - FIA Extensions (Collateral)
 - MD Extensions
 - FX Extensions
- FPL Infrastructure
 - Repository
 - Web Services

Market Data Optimization Working Group

FIXPROTOCOL
INDUSTRY-DRIVEN MESSAGING STANDARD™

FAST Protocol – a solution to
increasing bandwidth requirements
for market data



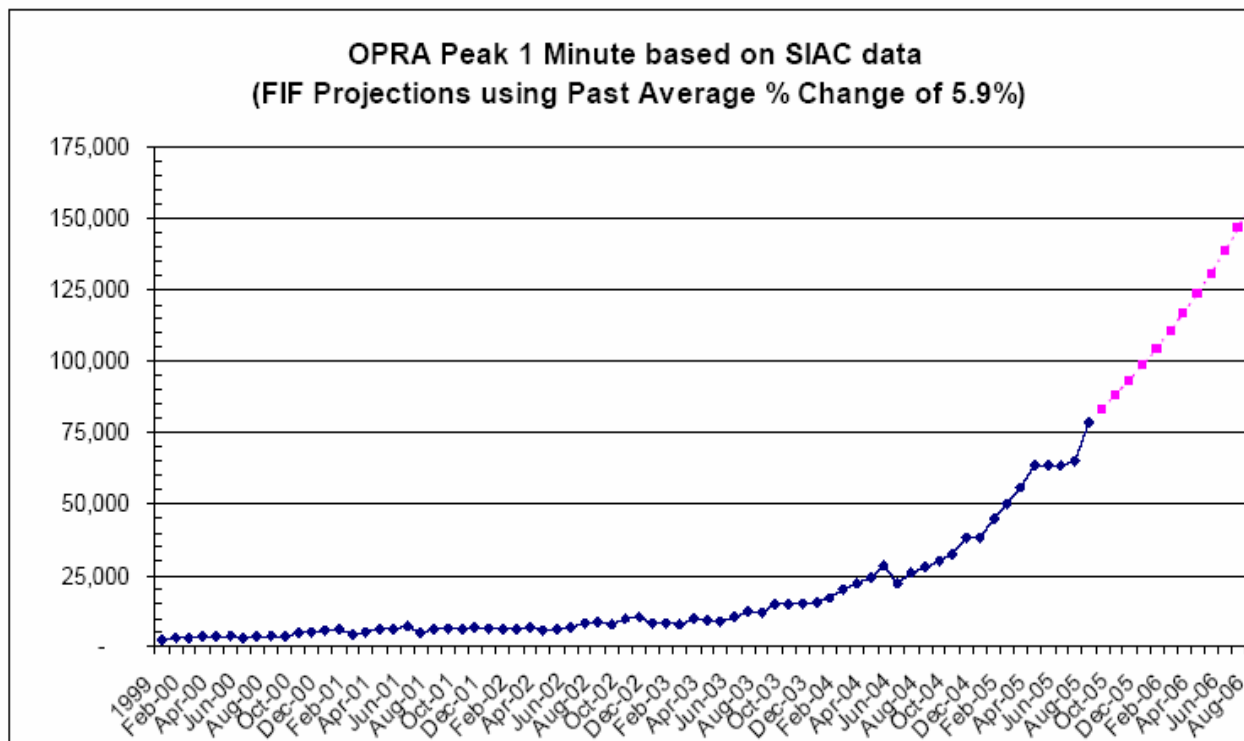


Role of Market Data in Electronic Trading

- The trend toward electronic trading is creating an explosion in market data volumes and peak message rates which present a challenge for even the best technology
 - Improved and ubiquitous trading technology is responsible for the rapid upward spiral in market data volume
 - Broader use of standards have created a “quick and easy” way to connect to the market
 - Market participants around the world make critical decisions on real-time information
 - Without timely market data a trader is at an extreme disadvantage
 - The pervasiveness of electronic trading is a tremendous stride forward but it also presents equally tremendous challenges



Challenge of Market Data Growth - OPRA



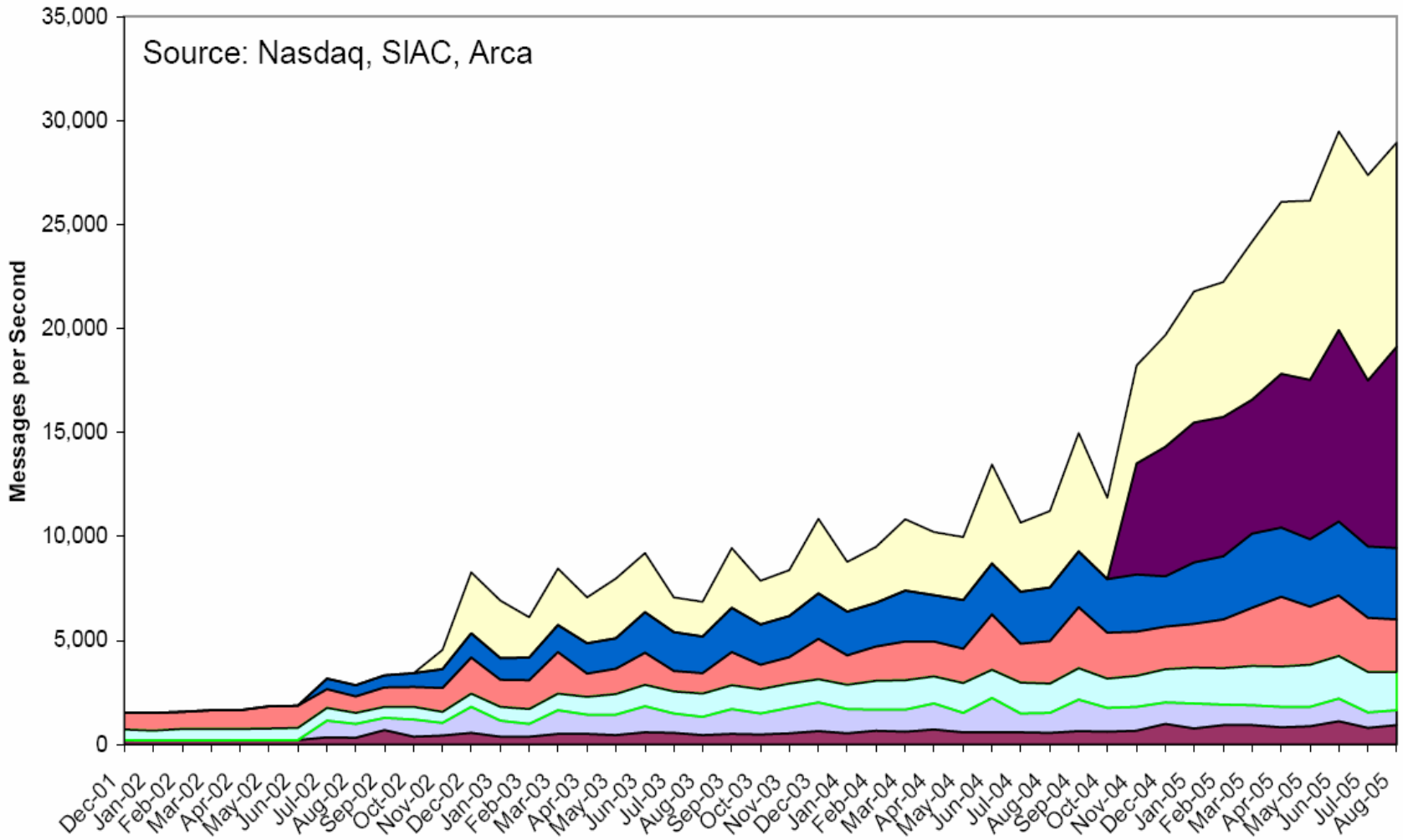
2005	1 Minute Peak	% Change
Jan-05	44,677	16.8%
Feb-05	50,078	12.1%
Mar-05	55,829	11.5%
Apr-05	63,675	14.1%
May-05	63,417	-0.4%
Jun-05	63,352	-0.1%
Jul-05	65,136	2.8%
Aug-05	78,385	20.3%
Sep-05	82,978	5.9%
Oct-05	87,840	5.9%
Nov-05	92,987	5.9%
Dec-05	98,436	5.9%
Jan-06	104,204	5.9%
Feb-06	110,310	5.9%
Mar-06	116,773	5.9%
Apr-06	123,616	5.9%
May-06	130,859	5.9%
Jun-06	138,527	5.9%
Jul-06	146,644	5.9%
Aug-06	155,237	5.9%

- Projection shown is based the monthly average percent difference from January 2000 to currently available data. FIF subscribers should also consider impending business events in determining capacity plans.
- Peak highlighted in yellow, projections italicized

Source: Financial Information Forum, Market Data Capacity Committee



Challenge of Market Data Growth - US Equities





FIX Response to an Industry Problem

- December, 2004 – Global Derivatives Committee and the Global Technical Committee jointly sponsored the formation of the Market Data Optimization Working Group (building on Implicit Tagging proposal)
 - Working Group Co-chaired by:
 - Matt Simpson, Associate Director of Electronic Trading Systems Architecture CME, co-chair FPL Global Technical Committee
 - Rich Shriver, Jordan & Jordan



MDOWG Charter & Objectives

- What are the challenges of engineering a new Market Data Solution?
- Develop a comprehensive solution that will mitigate exponentially increasing market data volume across all industry sectors
- Re-engineer Market Data so that it is no longer the weak link in the trading cycle
- Provide real-time, low-latency feeds that can be effectively delivered to the average subscriber
- Shrink the gap between trading technology and market data technology
- Plan for advances in bandwidth capacity but hedge your bets
- Create a common, flexible, straightforward solution that will reduce integration costs



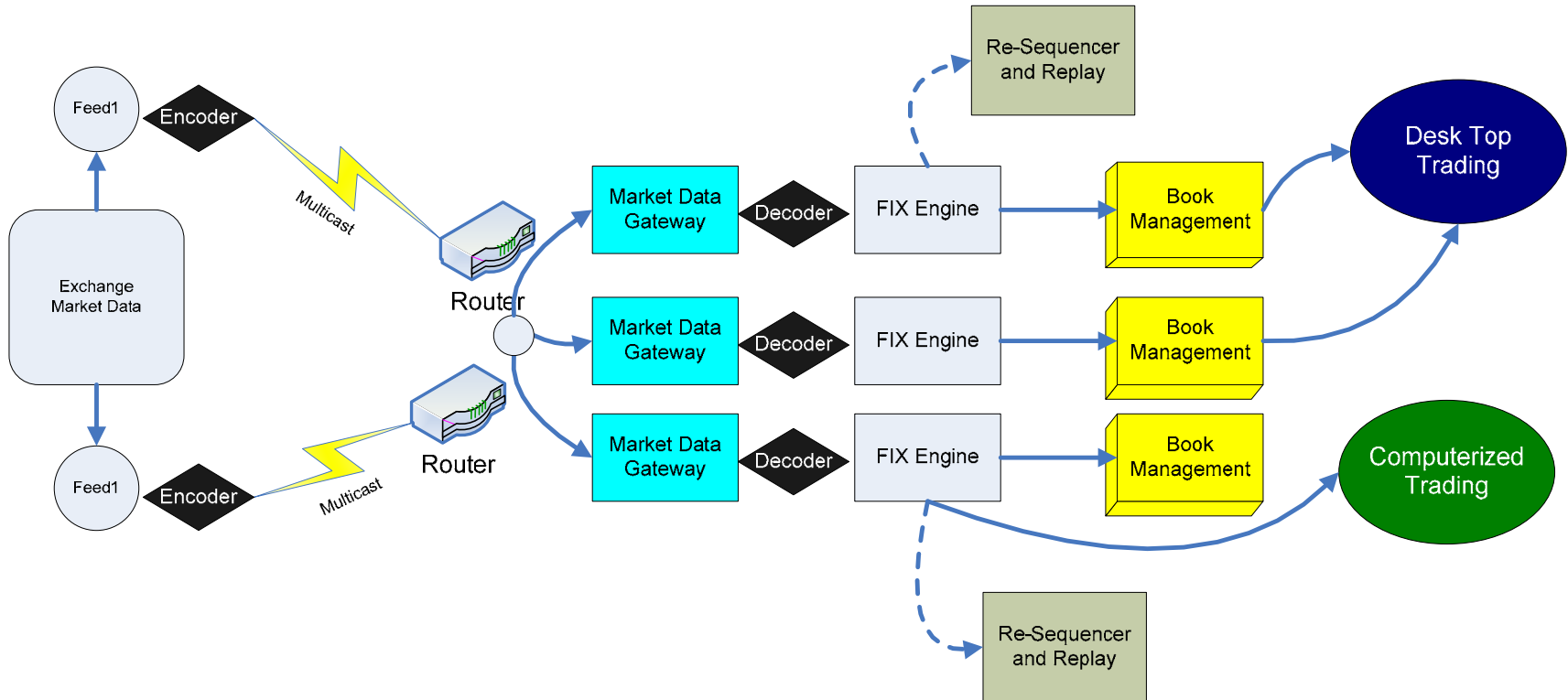
MDOWG Accomplishments (to date)

- Multi-asset class requirements review
- Book Management Recommended Practices
- Multicast Transport Recommended Practices
- FIX Extensions (Draft) for Market Data
- FAST Serialization and encoding specifications
- Initiated a FAST proof of concept (POC)
- September 2005 – Published POC Phase 1a Results



Flexible, Scalable, Standards-based Architecture

Standardized Market Data Architecture





FIX Adapted for Streaming (FAST)

- Implicit tagging
 - Removes the need for the “tag=” portion of “tag=value” without imposing the constraints that fixed-length protocols do.
 - Requires specifying message templates
- Field encoding
 - Reduces data volume by leveraging the data affinities between messages
 - If I don’t send you a value for Symbol on this Exec Report, use the value from Symbol on the previous Exec Report I sent you
 - If I don’t send you a TimeInForce on this Order, use the default value of “0” (day) from the template
- Serialization
 - Applies binary encoding to the data
 - Uses continuation bit encoding instead of explicit separators
 - Uses a presence map to indicate which fields are present, and which ones are not
 - Special bytes in the header contain the template identifier, so that the other side can deserialize and decode appropriately
 - Also considering adding a start-of-frame delimiter or message length to facilitate reading



Proof of Concept (POC)

- Phase 1a (Sep, 2005)
 - ARCA
 - CME
 - OPRA
 - NOREX
- Phase 1b (Dec 2005)
 - LSE
 - SGX
 - SEB
- Phase 2 (TBD)

Sponsors (to date)



**sponsorships are currently
being solicited for phase 2**



Proof of Concept Framework

- Data sets provided by POC sponsors (selected for high volume days where possible and type of data feed)
 - Top of Book – OPRA
 - Full Depth – ARCA, NOREX
 - Aggregate Depth – CME
- Measurements pre-defined and coded into test harness
- Preliminary testing to determine optimal field encoding
- Strict version control of the code base enforced
- Data sets were redundantly and reciprocally tested by two separate engineering teams
 - primary and secondary responsibility assignments
 - primary results were compared to secondary
 - results checked for uniformity; discrepancies researched
 - test results correlated and re-run until identical results
- Code base changes resulted in re-testing



Professional Services Engaged for POC

About



- A Stockholm based software company providing advanced products for building and monitoring transaction systems.
- Founded in 1999 by Rolf Andersson, Anders Furuhed and Ola Arvidson who have significant Financial Services background including the design and development of the SAXESS trading system.
- Primary products: Transaction Framework used for building highly reliable, high performance transaction systems and Service Analyzer used for monitoring transaction systems.

About



- A Chicago based software company formed to respond to the need for standardized market data in the financial services marketplace.
- Founders Mike Kreutzjans and Daniel May combined have extensive background in the Financial Services Industry Experience.
- Technology Enabler for FIX, and other real-time market data standards.
- Focus is low latency, high message per second applications.
- Primary product the “Market Information Server” (MIS), is a data appliance that directly processes real-time exchange feeds.



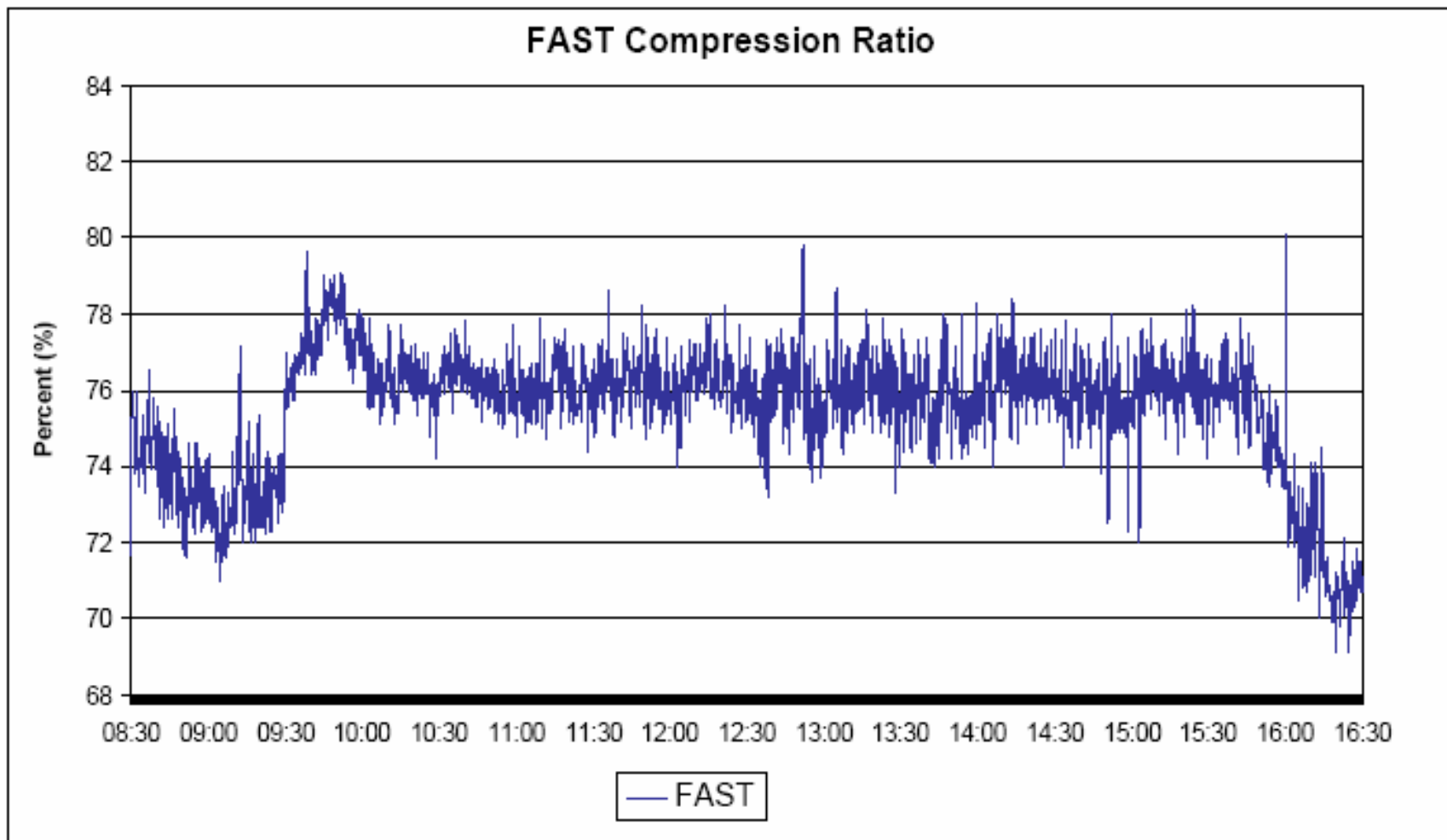
POC Phase 1A Results Summary

Executive Results Summary

Exchange Feed	Native Message Size	FAST Message Size	FAST Protocol – Peak Compression Rate	FAST Protocol – CPU Utilization per message (µs = microseconds)
ARCA ArcaBook	38.04	9.05	79%	1.4 µs
OPRA	67.0	16.81	78%	1.8 µs
CME Globex	195.93	38.56	81%	3.4 µs
NOREX	113.0	17.26	89%	1.7 µs

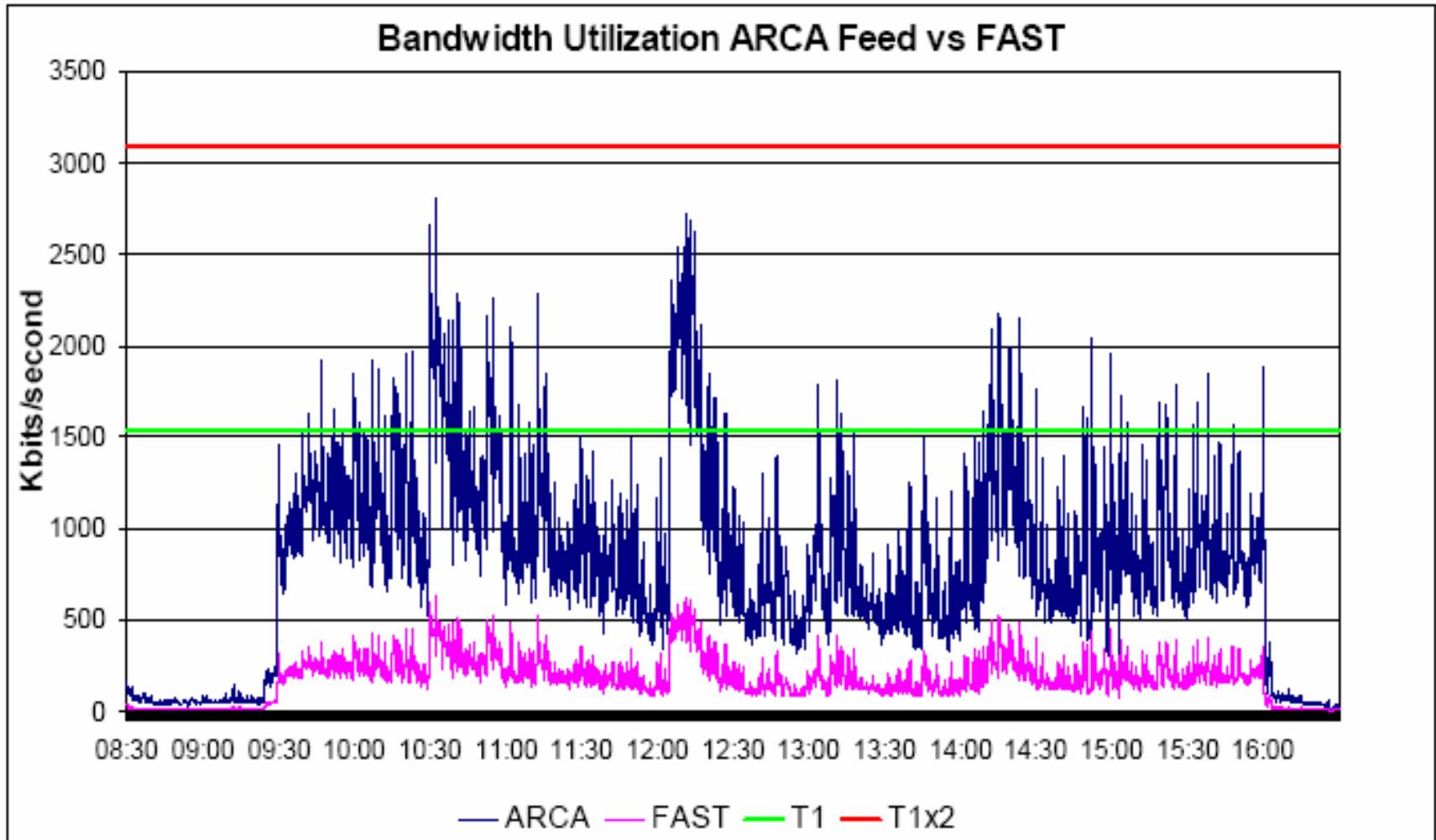


FAST – ARCA Compression Ratio





FAST vs. Native ARCA Bandwidth Utilization





POC Next Steps

- FAST Technology Summit (October 31, 2005)
- Early Adopters Panel (FPL Conference in NY, Nov 2005)
- Complete Phase 1b
 - Results of LSE, SGX and SEB data sets
 - Reference implementation
 - White papers and documentation
- Phase 2
 - Template management and other topics
 - Additional “live” data sets
- Begin work on FAST Session Layer