NOVASPARKS™
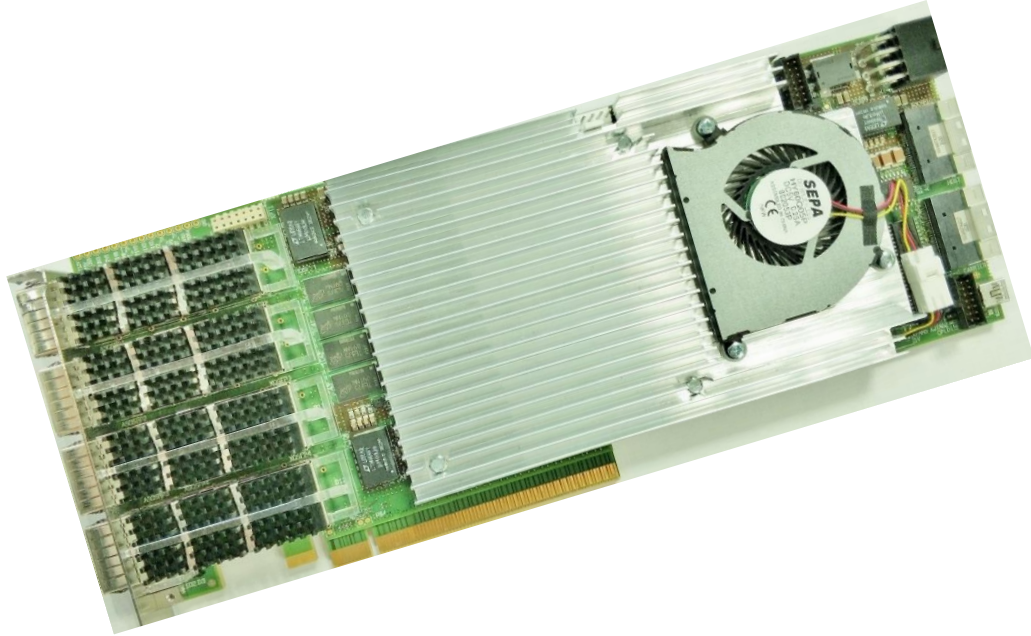
High Performance FPGA Market Data Solutions

Fully Featured Market Data with FPGA latency and scale

STAC Singapore - April 4th, 2023

Nicolas Karonis, Business Lead APAC

The NOV∆TICK PCIe Card

- ## Hardware Architecture
  FPGA (Xilinx VU13P) and QDR/DDR connection schemes same as Appliance FPGA Board

- ## Four Ethernet ports for market connectivity

- ## Enough QDR for to hold 250,000 instruments with full books

- ## 490ns to build a book*

*Not a STAC Benchmark

NOVΛTICK Ticker Plant Main Capabilities

- **Input:**
  - A/B arbitration
  - Wireless/Fiber Arbitration*
  - Retransmission and Recovery

- **Data Processing:**
  - Decoding and Parsing
  - Book Building
  - Filtering by Depth, Instrument and message Type

- **Output:**
  - Output option: L1, L2, L3 and full lot BBO
  - Normalized messages
  - Full market data API (SW and HW)
  - Snapshot book updates for late joiners
  - Ethernet Multicast as mainstream solution
  - PCIe DMA and FPGA (NovaLink) distribution options
  - Wireless Shaping/Conflation*
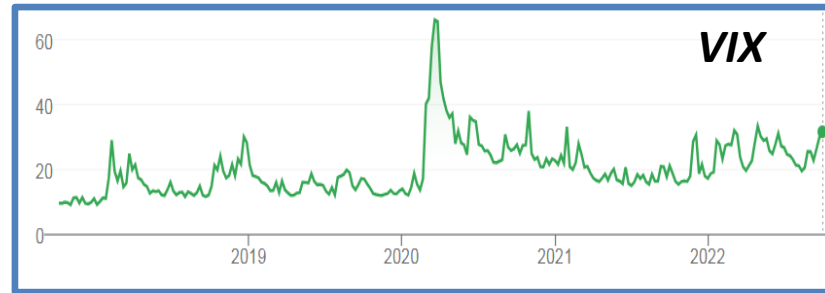 - PTP Time Stamping & Latency Measurements

Wireless capability beyond traditional SW Ticker Plants

NOVATICK Ticker Plant: Some FPGA only Capabilities

- **Input:**
  - **10/25/40Gbs input and output**

- **Publication (low level features)**
  - **EOP** to reduce number of packets and bandwidth
  - **Cut Through** per msg publication (broadcast before EOP)
  - **Ethernet only** remove IP/UDP headers with only MAC address to route
  - Support of frames smaller than 64 bytes

- **Output:**
  - 10G: 32 multicast channels per output
  - PCIe: 16 circular buffers in SW
  - Instrument based distribution per channel (ie list of instruments)
  - Message type-based distribution per output channel (ie channel 1 can have L2 while channel 2 can have trades channel 3 anticipated book etc.)
  - Added value output with minimal latency (e.g.: ETF or Index calculator)

What we do in the highest volume market: US Equities

Since COVID started
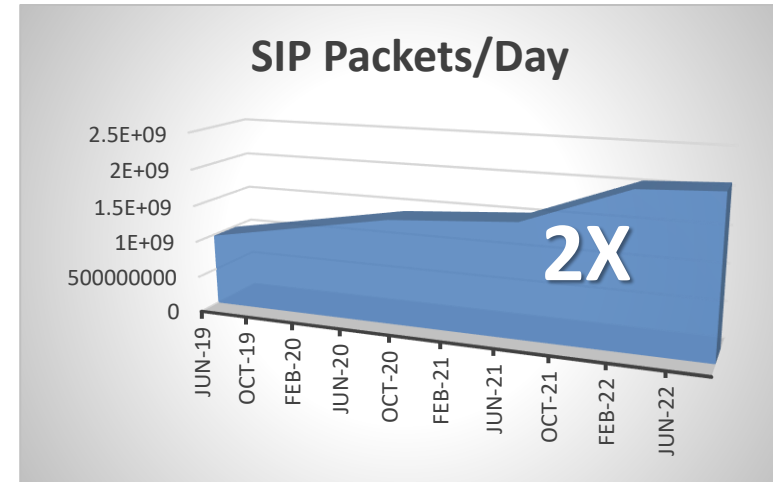*More Instruments...*
More Traders...
More Volatility...

VIX

Packets:
+300% at peak, +100% on average

Live Orders:
+250% at peak, +150% on average
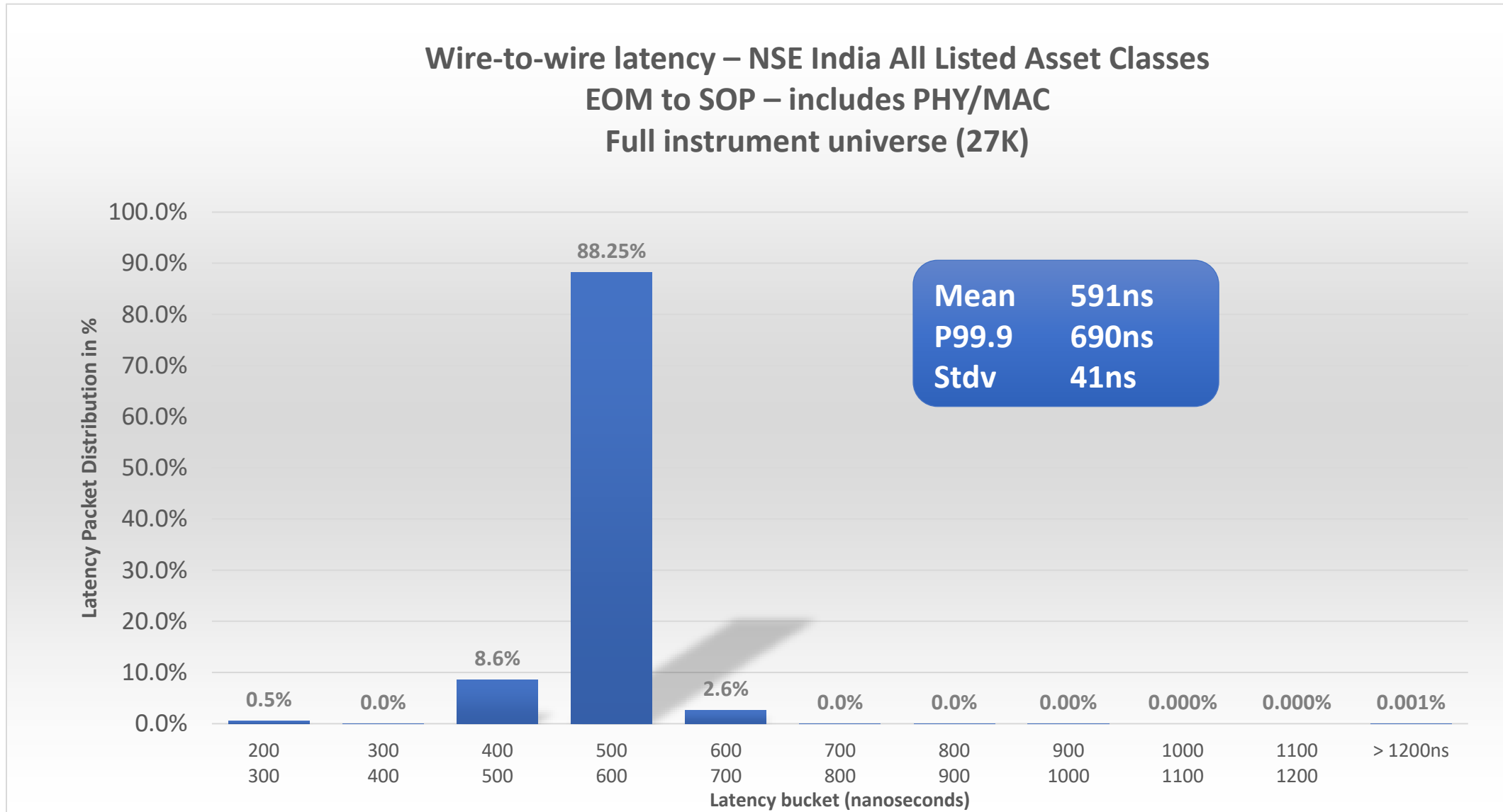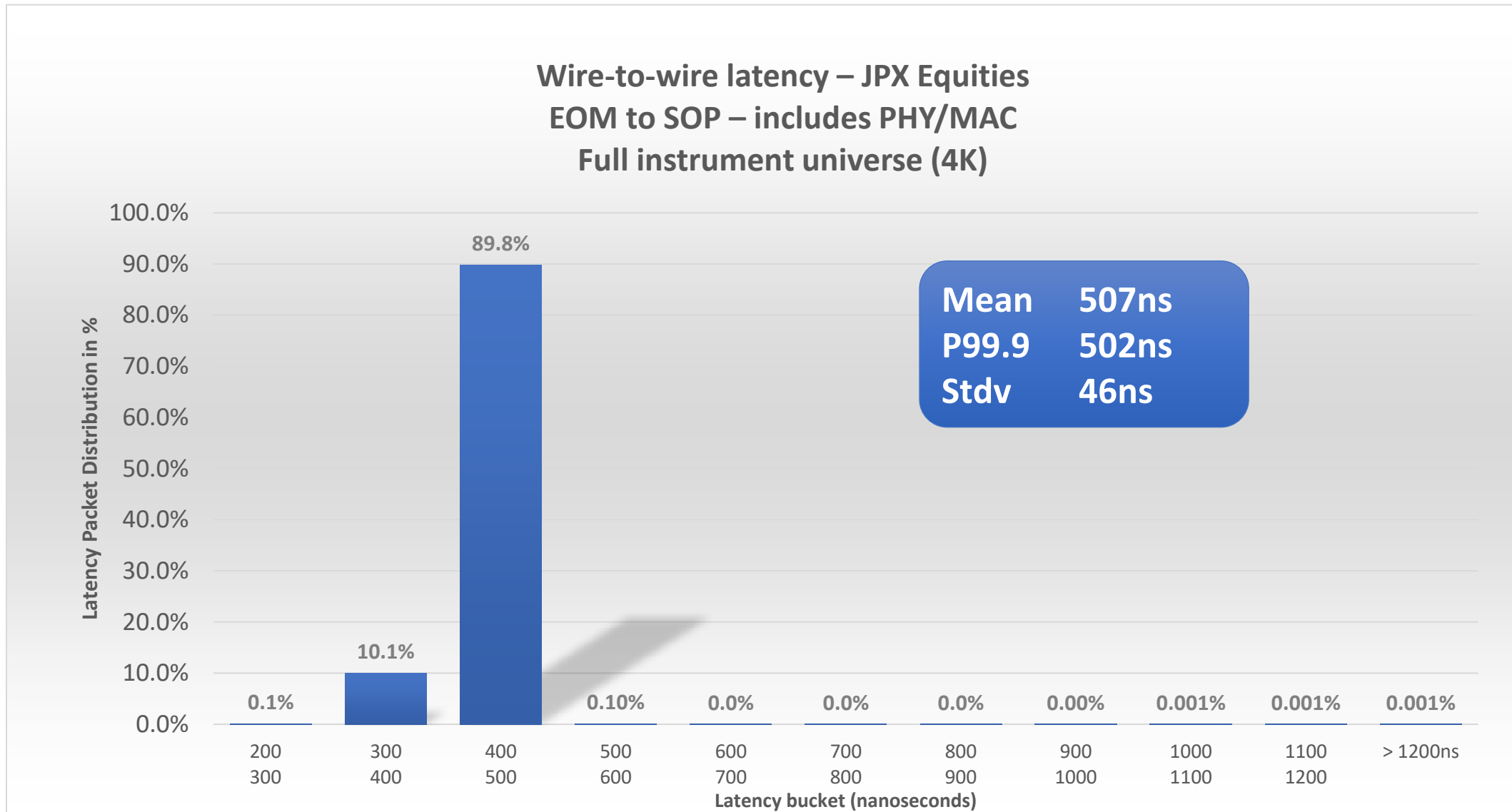
SIP Packets/Day

2X

UTP

CTA

10% Latency Reduction: January 2020 **580ns** -> January 2023 **490 ns**

US Equity Market Aggregation: All 16 Exchanges on a box

NSE India Latency

Wire-to-wire latency – NSE India All Listed Asset Classes
EOM to SOP – includes PHY/MAC
Full instrument universe (27K)

Mean	591ns
P99.9	690ns
Stdv	41ns

Latency Packet Distribution in %

Latency bucket (nanoseconds)	Value
200-300	0.5%
300-400	0.0%
400-500	8.6%
500-600	88.25%
600-700	2.6%
700-800	0.0%
800-900	0.0%
900-1000	0.00%
1000-1100	0.000%
1100-1200	0.000%
> 1200ns	0.001%

JPX Equities Latency

Wire-to-wire latency – JPX Equities
EOM to SOP – includes PHY/MAC
Full instrument universe (4K)

Mean	507ns
P99.9	502ns
Stdv	46ns

NOVASPARKS™
Pure FPGA Market Data Solutions

Check the NovaSparks box on your card
if you would like to learn more about
our platform