

NOVA SPARKS[™]

*Pure FPGA Market
Data Solutions*

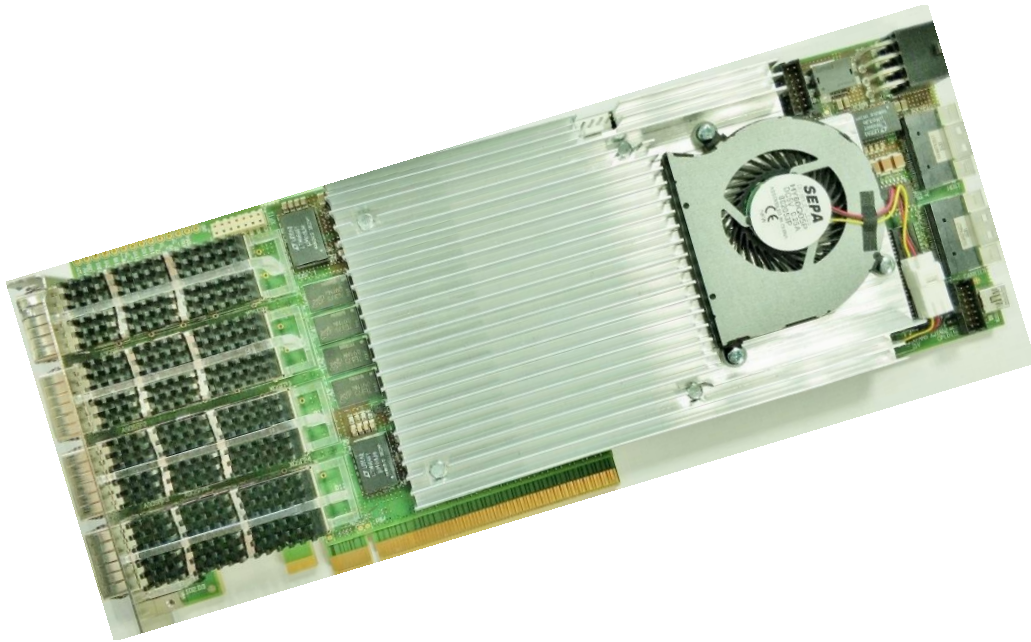
Tick-to-Trade w/ NOVATICK

“Let’s talk numbers!”

June 6, 2019



NOVATICK Appliance ... and now NOVATICK PCIe Card!

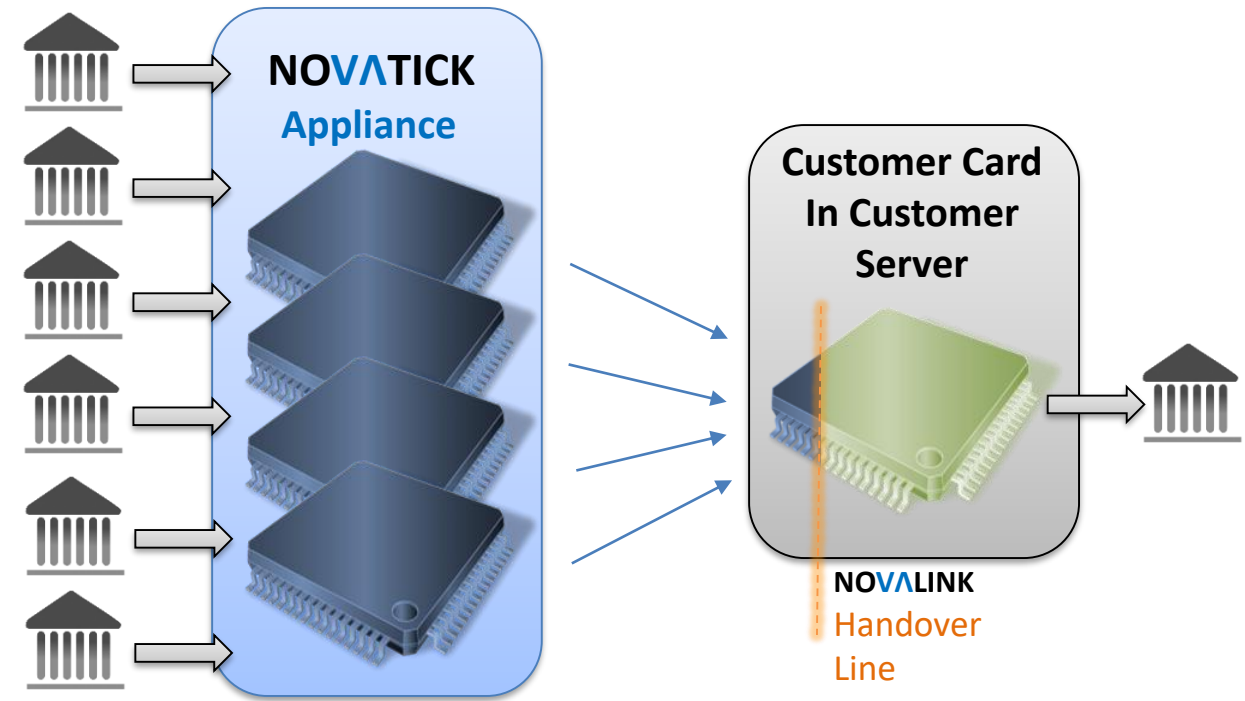


- Normalized Hardware Architecture
 - Same FPGA (Xilinx VU13P) and same QDR/DDR connection schemes as Appliance FPGA Board
- Four Ethernet ports for market connectivity
- 50% of logic and memory capacity available for user's applications
- Pre-compiled/Incremental FPGA compilation

Two Deployment Models

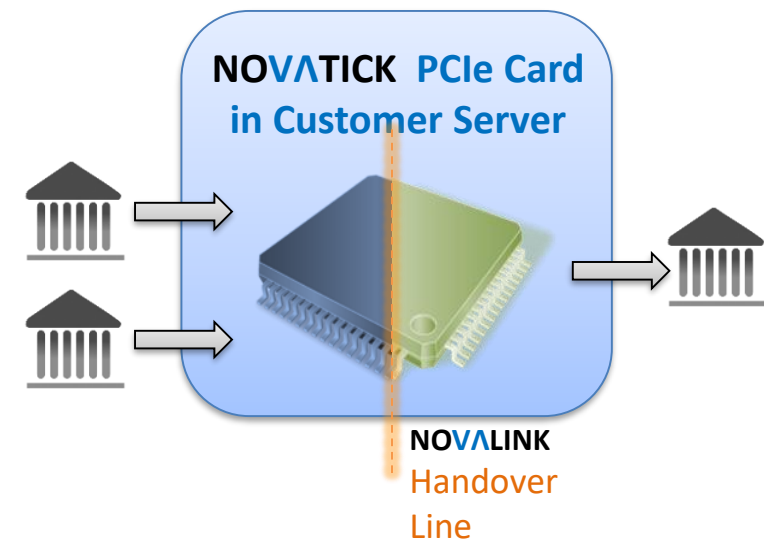
Appliance: $N + 1$ FPGAs

- External **NOVALINK**
- Scales to 100s of thousands symbols
- Scales to 60 feeds
- Deploy Trading Logic on Customers Preferred Equipment

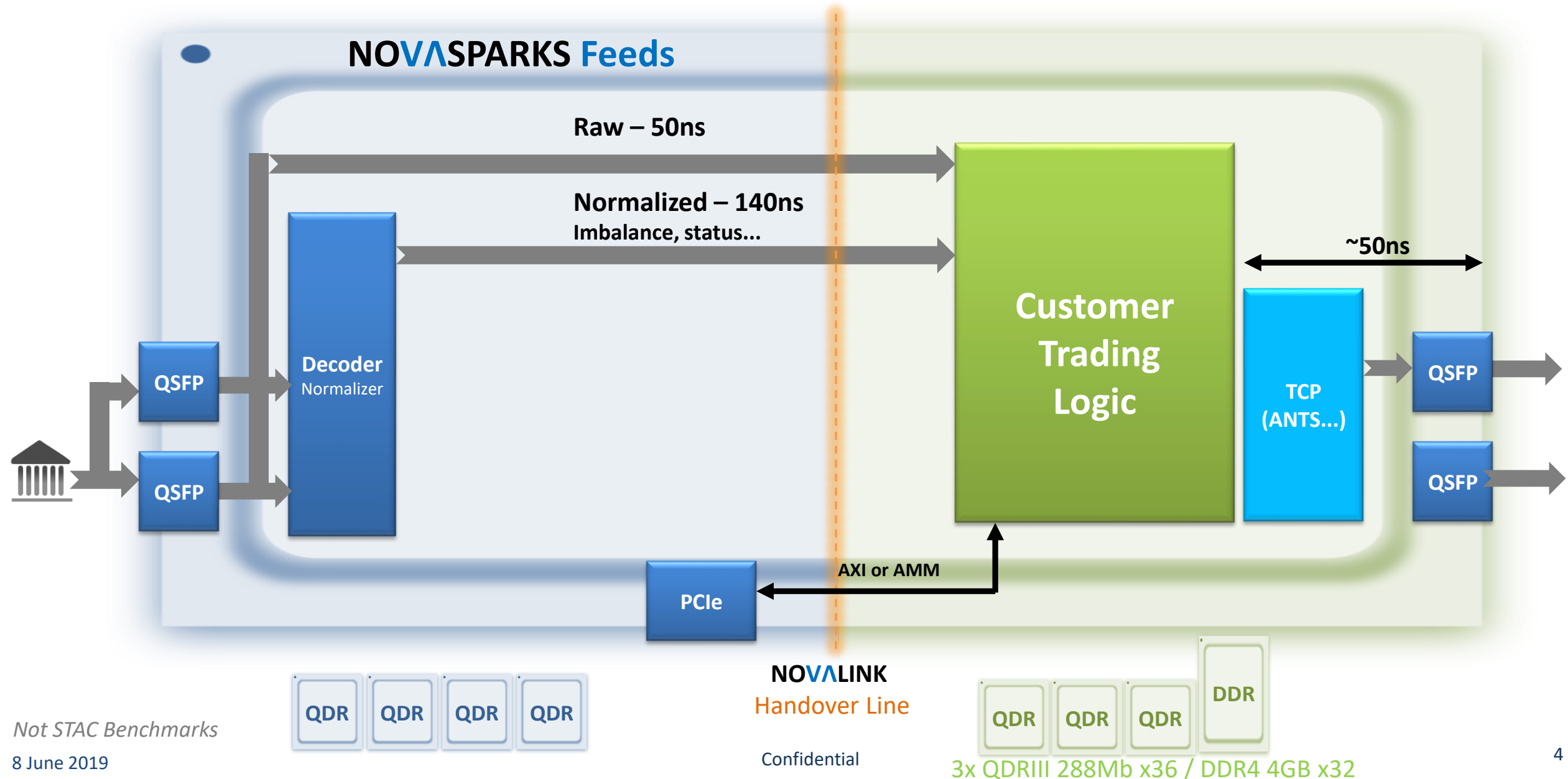


PCIe Card: **1 FPGA**

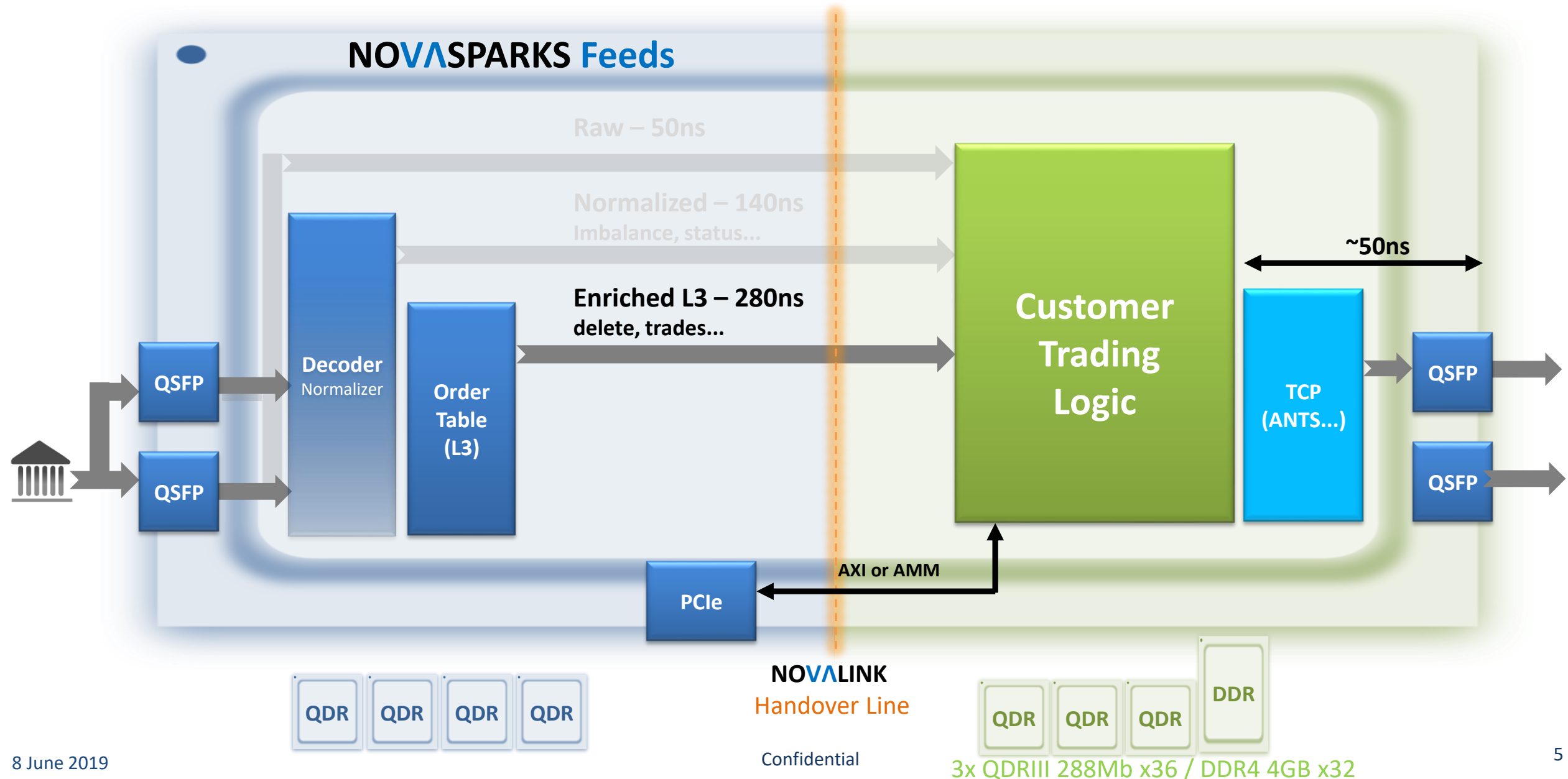
- Internal **NOVALINK**
- Provides the lowest latency possible
- Allows for multiple market data consumption modes (L1, L2, L3, Decoded raw data)



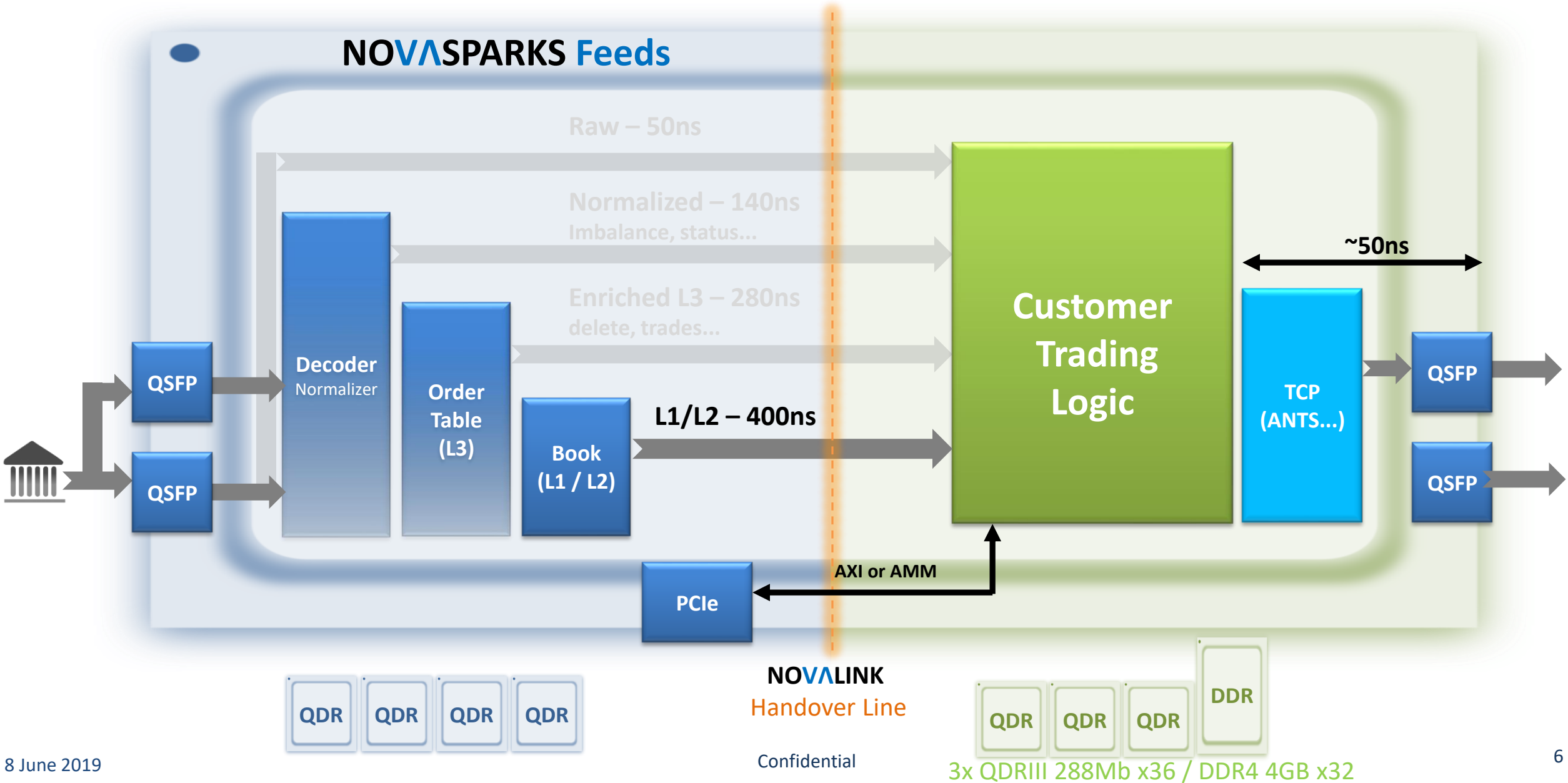
Raw or Normalized Data: 50ns or 140ns



Enriched L3 Data: 280ns



L1/L2 Data: 400ns



Advantages of NOV\SPARKS Tick-to-Trade Development Platform

- Full suite of 60 enterprise ready market data feed handlers with books
- Full Tick-to-Trade on a single chip
- Use right sized feed handler for your application
- 50% of FPGA logic capacity and PCIe card memory available for user
- Order Injection components
- Utilizes ANTS from Solarflare allowing easy integration with software managed exchange session
- Data latencies between 50ns and 400ns depending on publication levels