

T7 – Latency Roadmap

OpenDay
2023

Sergej Teverovski

21 September 2023



Topics

- 1** Why do we care about latency?
- 2** Status Quo
- 3** What are the challenges?
- 4** How do we address them?

1

Why do we care about latency?

Status Quo

What are the challenges?

How do we address them?

Our motivation

- Low and deterministic latency means reduced risk for our customers
- Our target: constant low latency especially in high load situations (aka bursts)
- Our customers are constantly getting faster and send us more transactions in sharper peaks
→ requires higher throughput on our side
- Being prepared for further all-time-highs
- Working with bleeding edge technologies



2

Why do we care about latency?

Status Quo

What are the challenges?

How do we address them?

T7 – Highlights

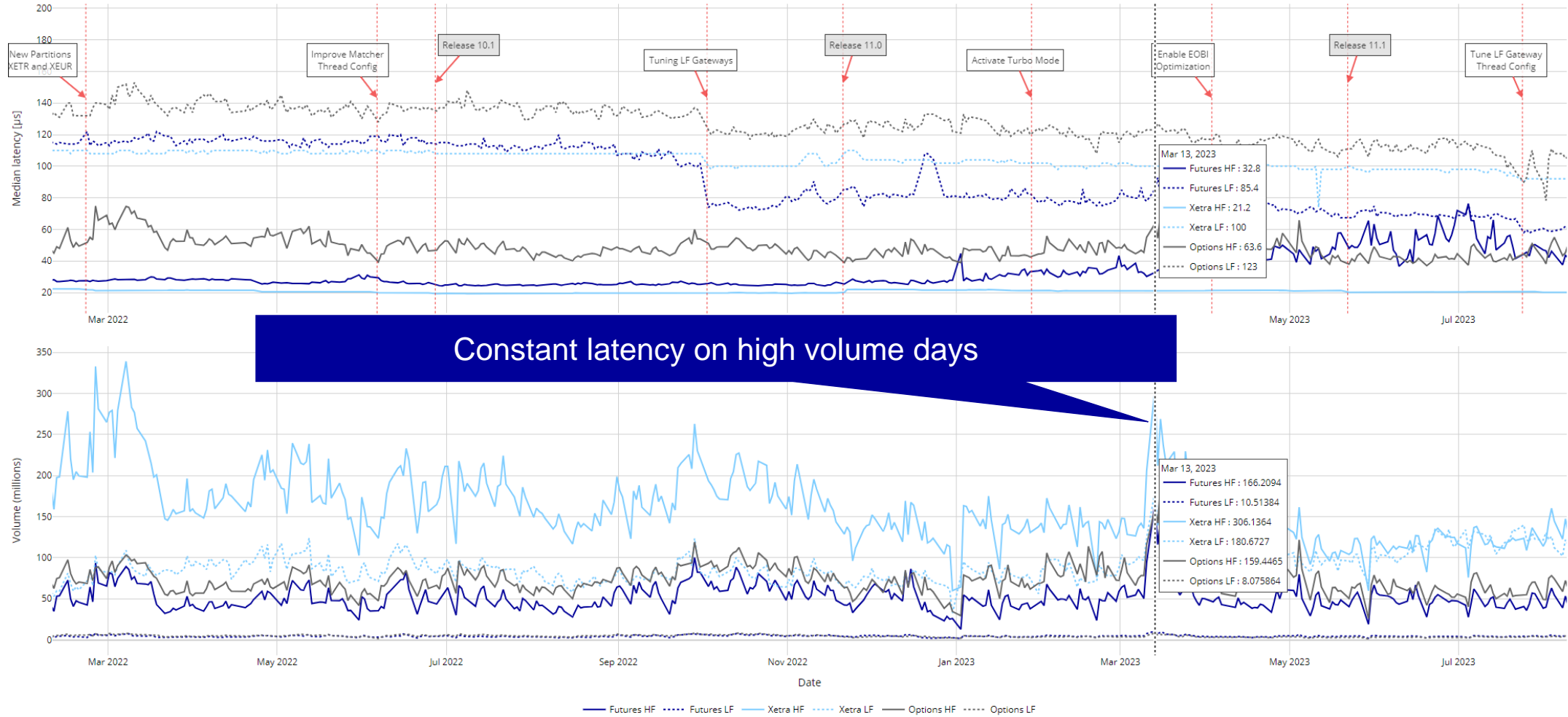
Type	Date	Value															
Daily Requests (T7®)	13-Mar-2023	857 Million															
Daily Requests (Eurex)	15-Mar-2023	348 Million															
Daily Requests (Xetra)	13-Mar-2023	487 Million															
RTT Latency (t_3n to t_4 in µs)	04-Aug-2023	<table border="1"> <thead> <tr> <th></th> <th>Eurex HF</th> <th>Opt HF</th> <th>Fut HF</th> <th>Xetra HF</th> </tr> </thead> <tbody> <tr> <td>Average</td> <td>381</td> <td>575</td> <td>117</td> <td>25</td> </tr> <tr> <td>Median</td> <td>52</td> <td>56</td> <td>44</td> <td>20</td> </tr> </tbody> </table>		Eurex HF	Opt HF	Fut HF	Xetra HF	Average	381	575	117	25	Median	52	56	44	20
	Eurex HF	Opt HF	Fut HF	Xetra HF													
Average	381	575	117	25													
Median	52	56	44	20													
Market Data (EOBI) Latency (t_3n to t_9, µs)	04-Aug-2023	<table border="1"> <thead> <tr> <th></th> <th>Eurex</th> <th>Options</th> <th>Futures</th> <th>Xetra</th> </tr> </thead> <tbody> <tr> <td>Average</td> <td>637</td> <td>997</td> <td>101</td> <td>22</td> </tr> <tr> <td>Median</td> <td>54</td> <td>72</td> <td>29</td> <td>18</td> </tr> </tbody> </table>		Eurex	Options	Futures	Xetra	Average	637	997	101	22	Median	54	72	29	18
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Peak Input Rate per second (T7®)	26-Apr-2023	137 kHz															
% of Non-persistent Orders	04-Aug-2023	98.6% (Order Entry)															

t_3n – PS Gateway In timestamp taken by the network card

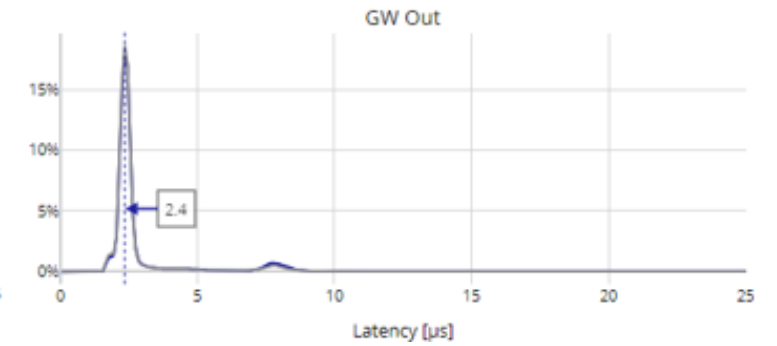
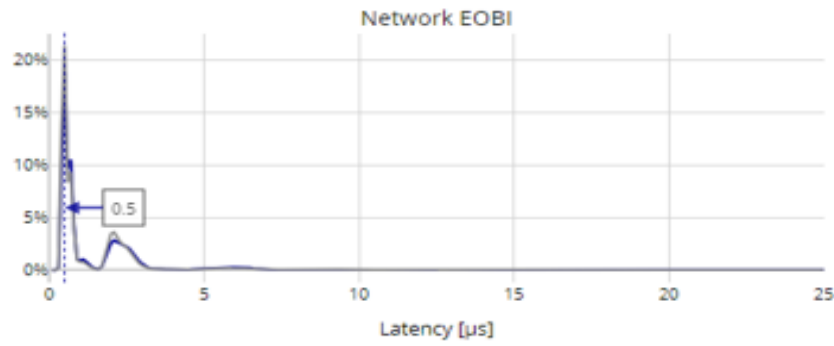
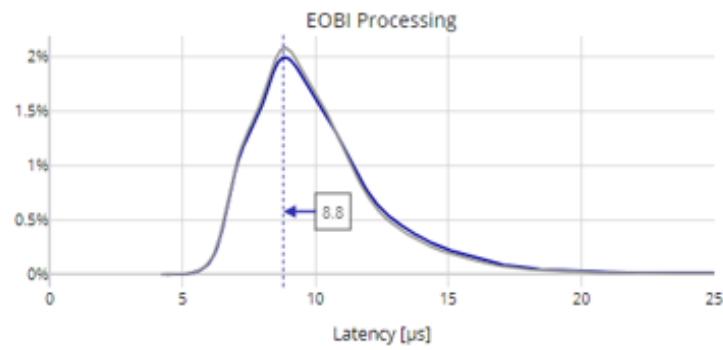
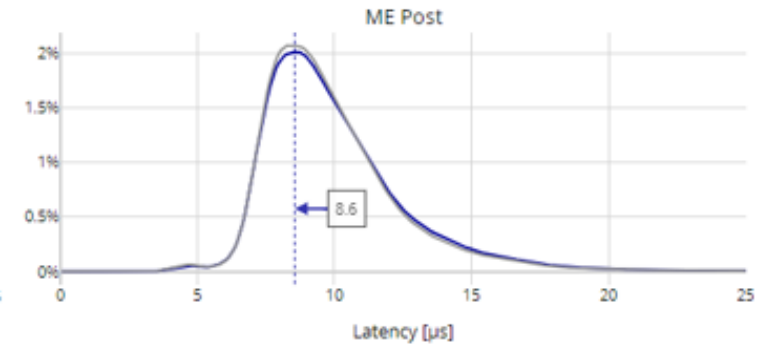
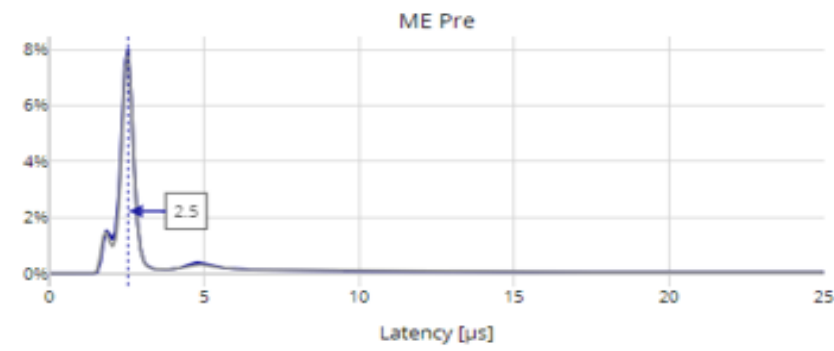
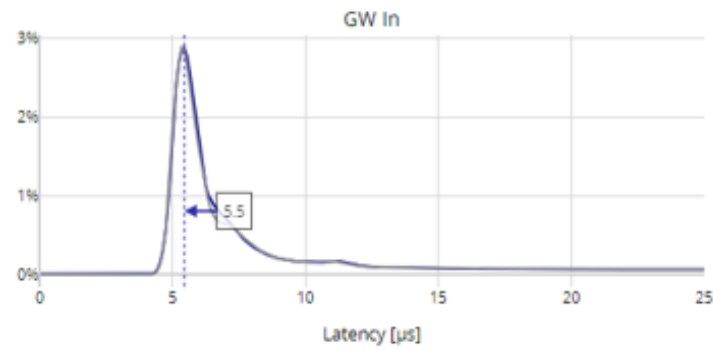
t_4 – time taken by the ETI gateway when a response/notification is written to the socket

t_9 – time taken by EOBI publisher before the first respective UDP datagram is written to the UDP socket

T7 – Latency and Volumes



Futures Latency (HF sessions only)



T7 – Lab



For further details please check out our presentation

Insights into Trading System Dynamics

Updated in May 2023

3

Why do we care about latency?

Status Quo

What are the challenges?

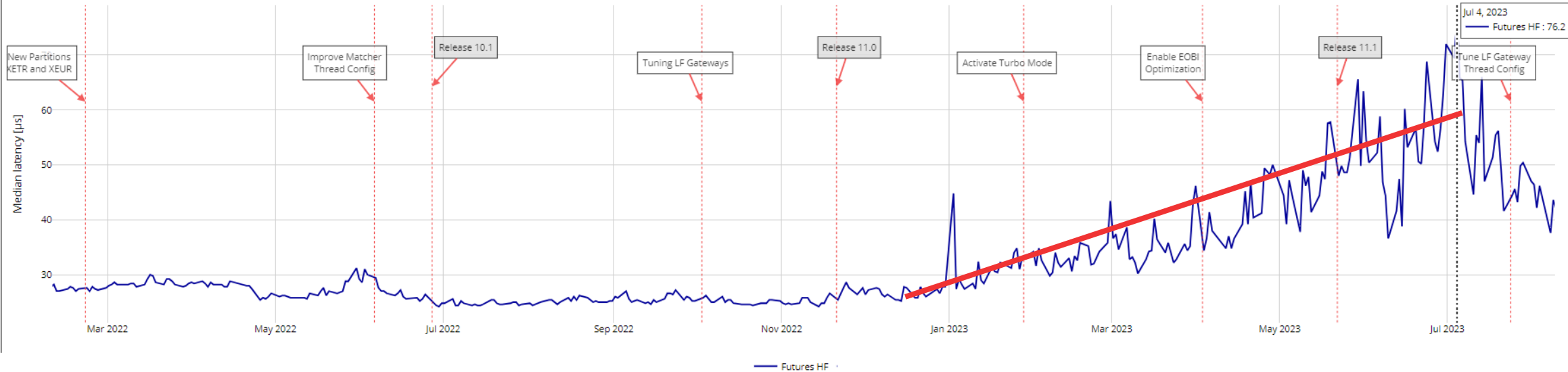
How do we address them?

Challenges

- Many types of customers with different requirements
- Continuously evolving functionality of T7
- Growing computing power on the customer side
- Sharper bursts
- T7 is scalable down to a product level
- All latency and throughput related low-hanging fruits have already been collected

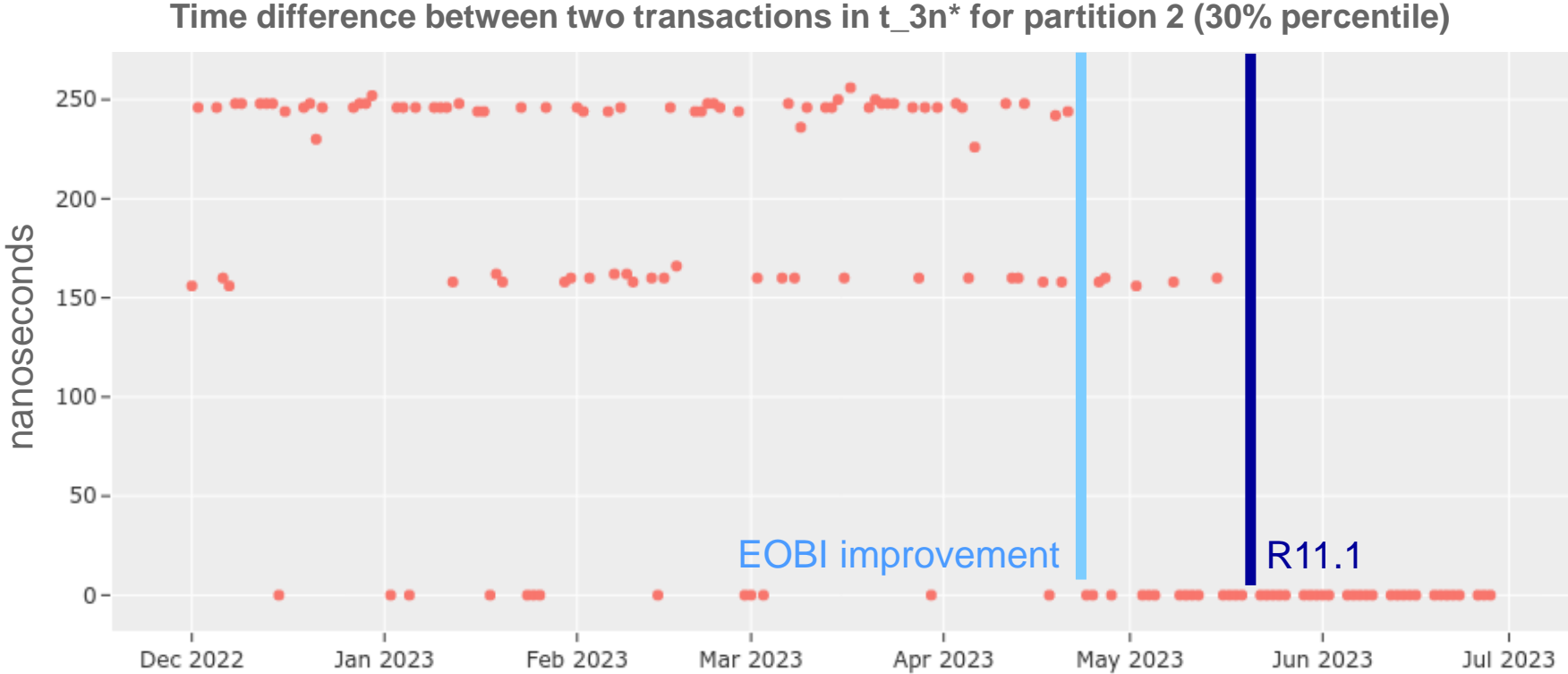
Challenges

Latency & throughput is influenced by our customers' behavior

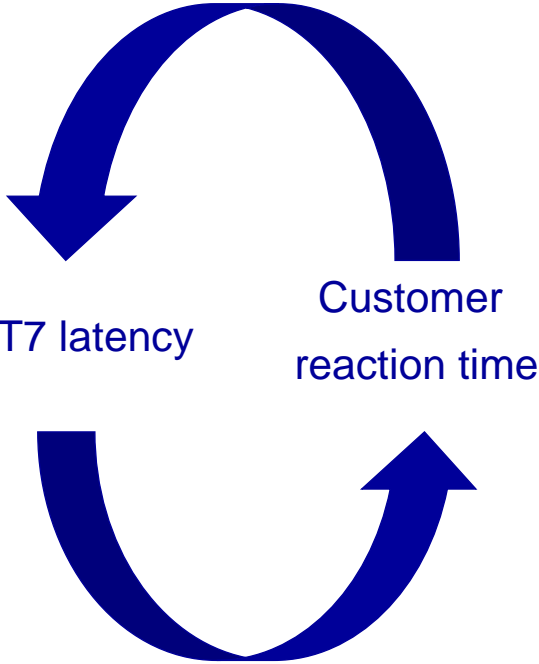


Challenges

Latency and performance improvements in T7 have an impact on the speed of incoming transactions



*PS Gateway In timestamp taken by the network card



4

Why do we care about latency?

Status Quo

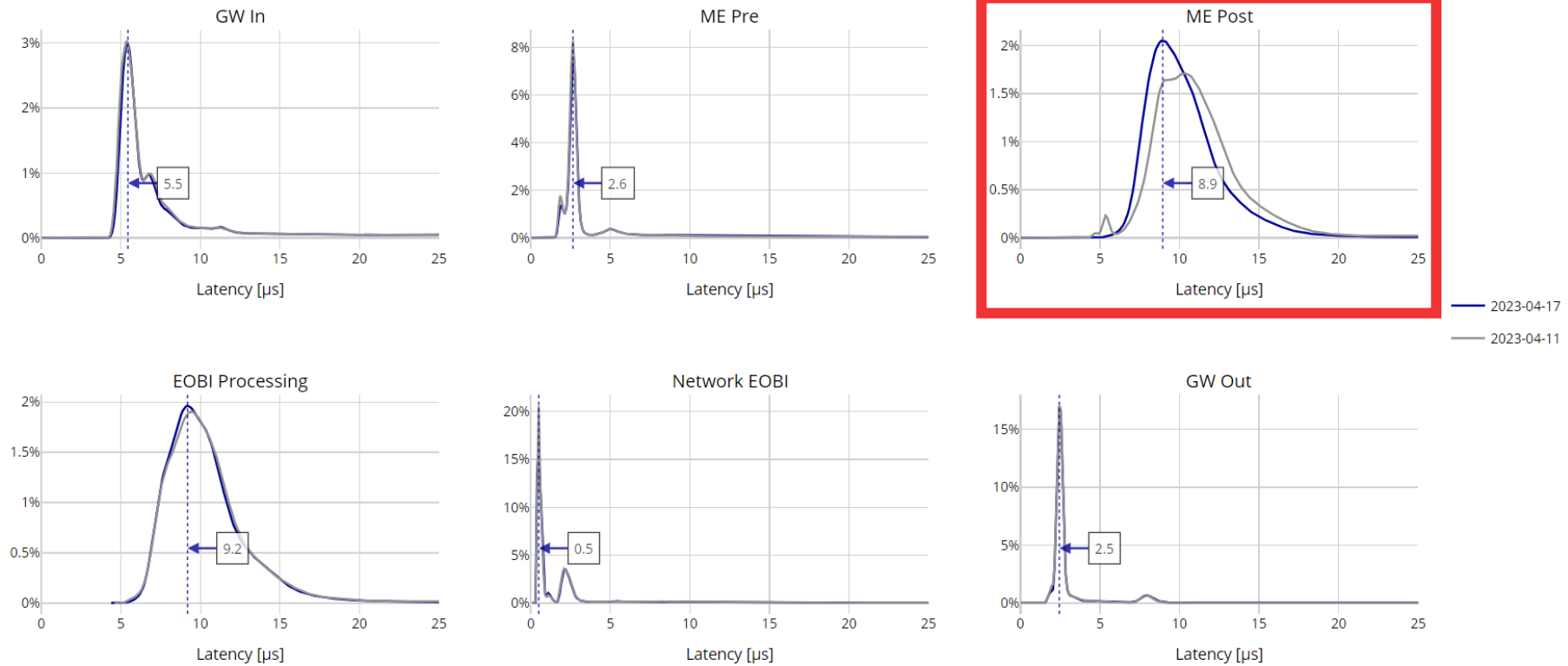
What are the challenges?

How do we address them?

T7 – Latency Roadmap

R11.0

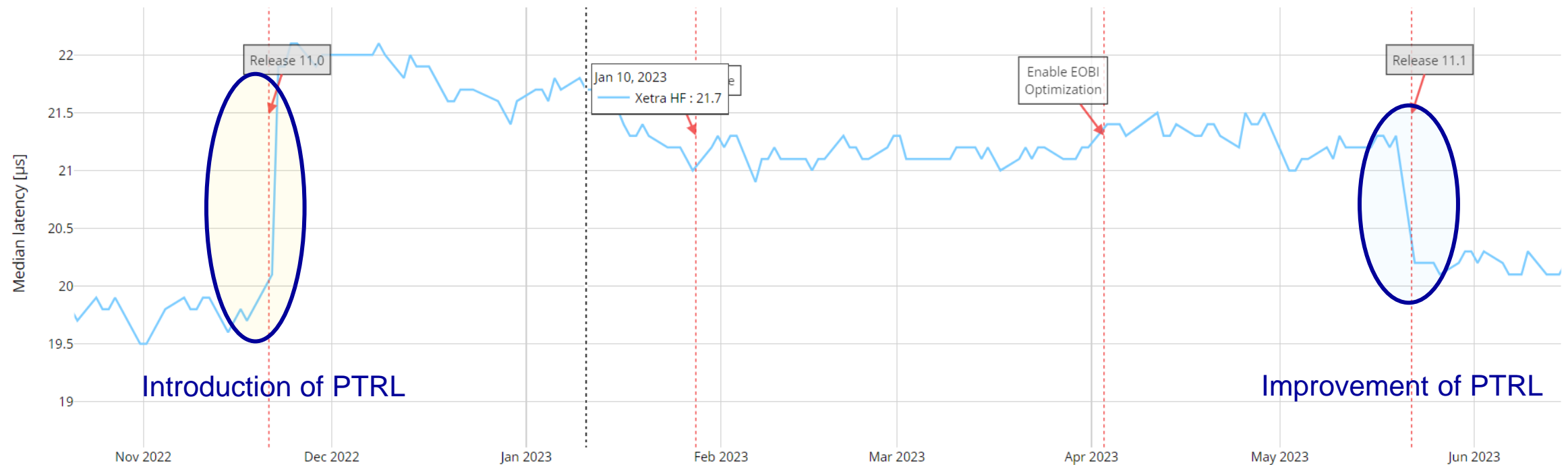
✓ Feb - Apr 2023 – Improved round-trip-time for Futures due to improved EOBI processing



T7 – Latency Roadmap

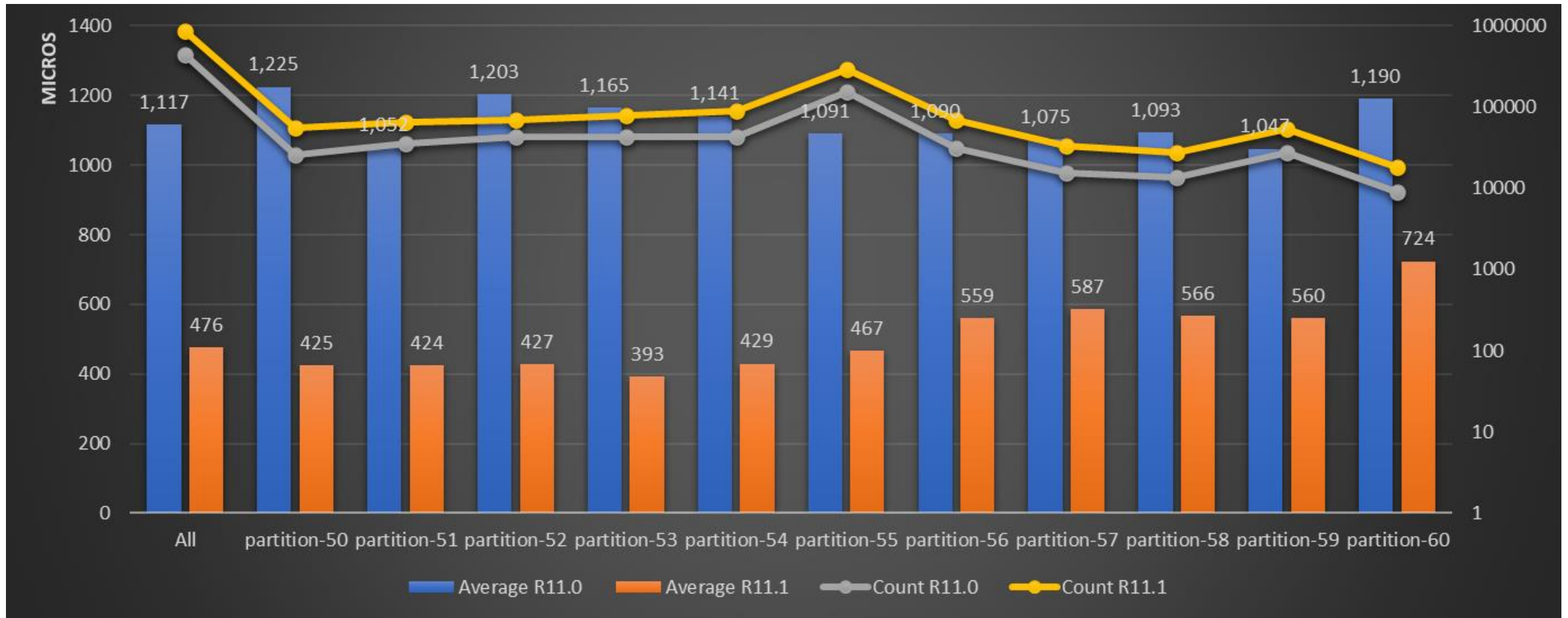
R11.1

☑ May 2023 – Improvement: Pre-Trade Risk Limit activation on the next day



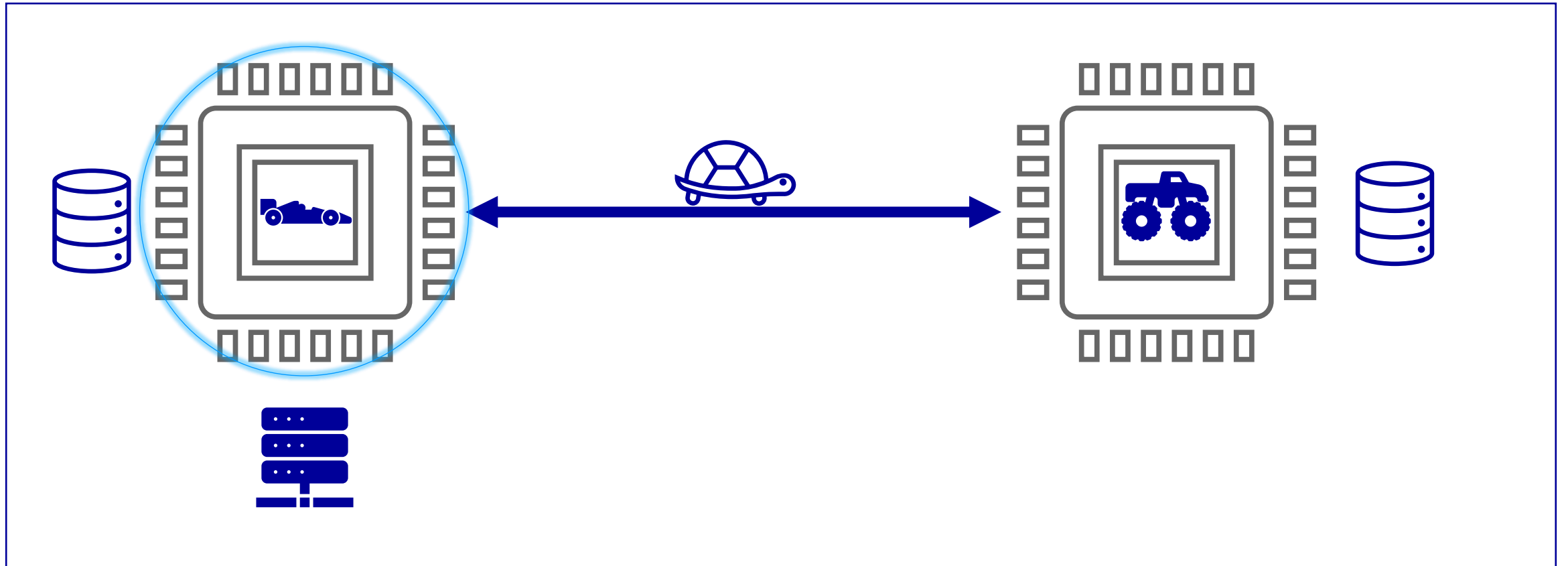
T7 – Latency Roadmap

Xetra – R11.0 vs R11.1 Trade Broadcast Delay



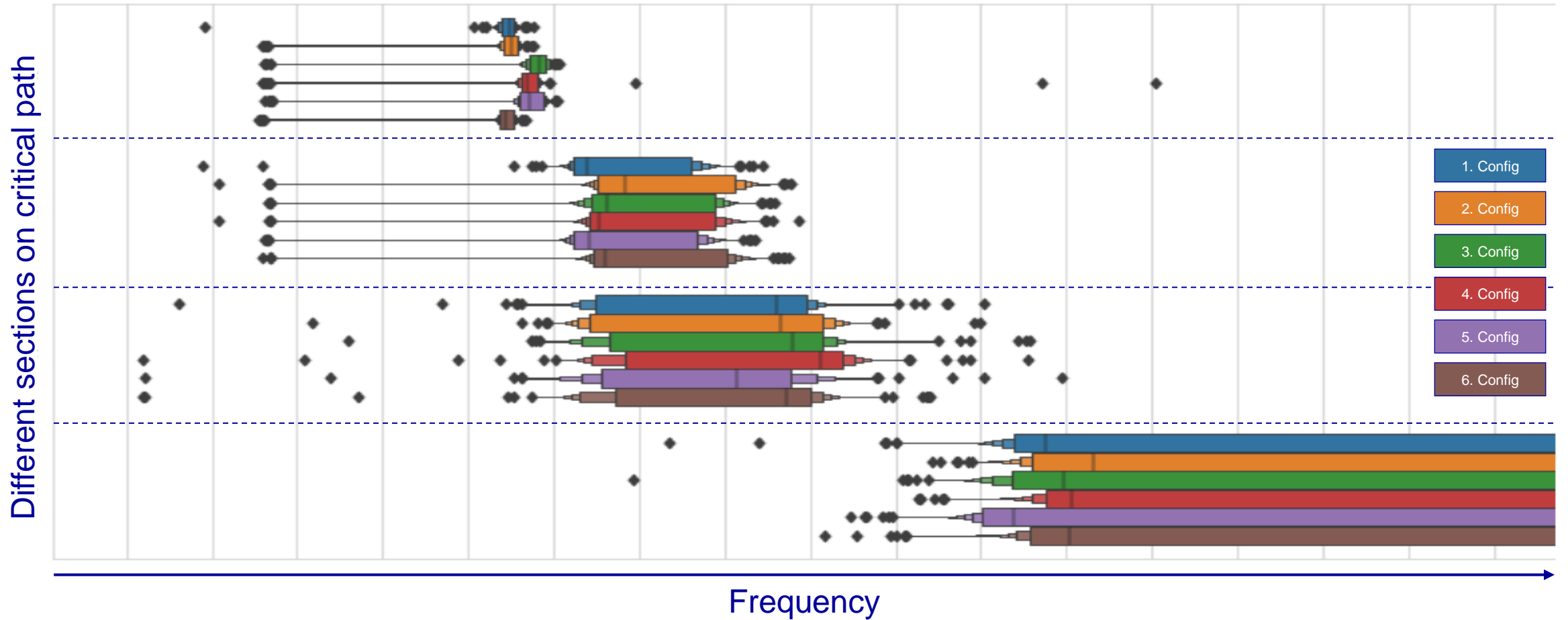
T7 – Latency Roadmap

Improve memory handling



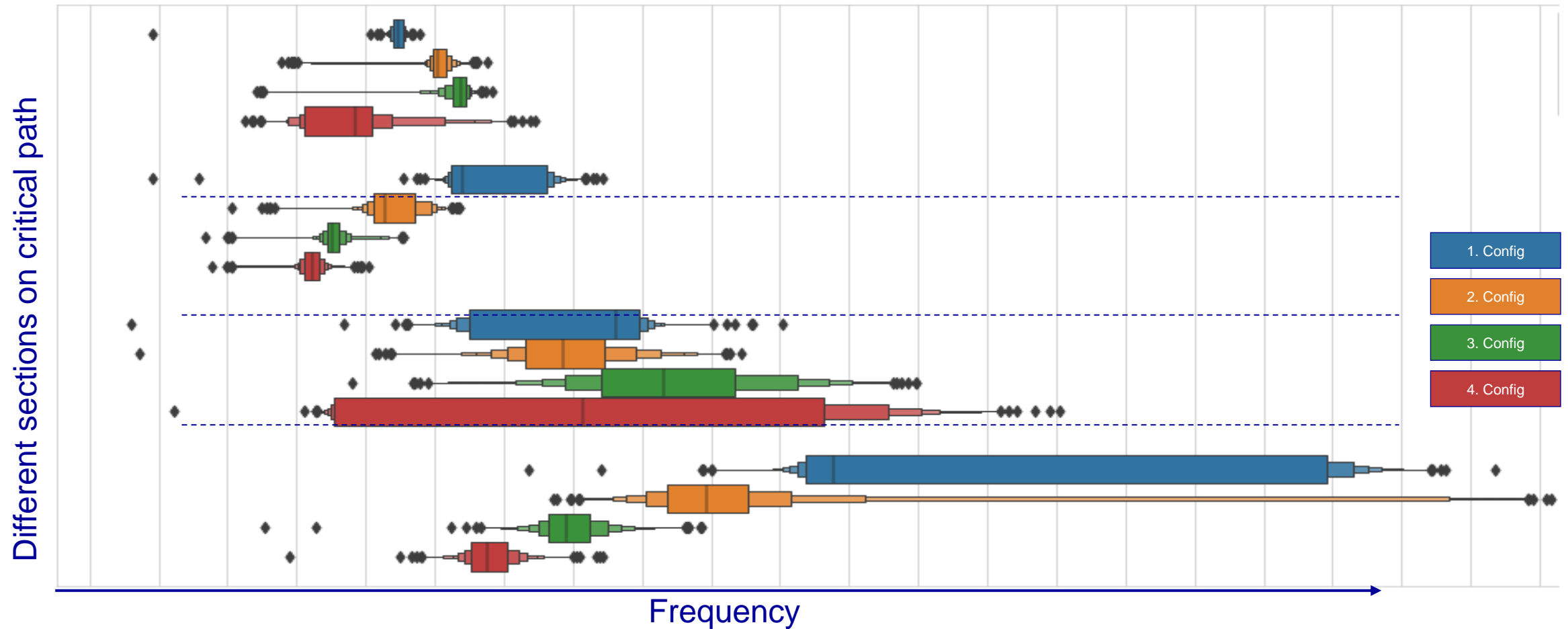
T7 – Throughput Tests

Test results of different configurations



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Test results of different configurations



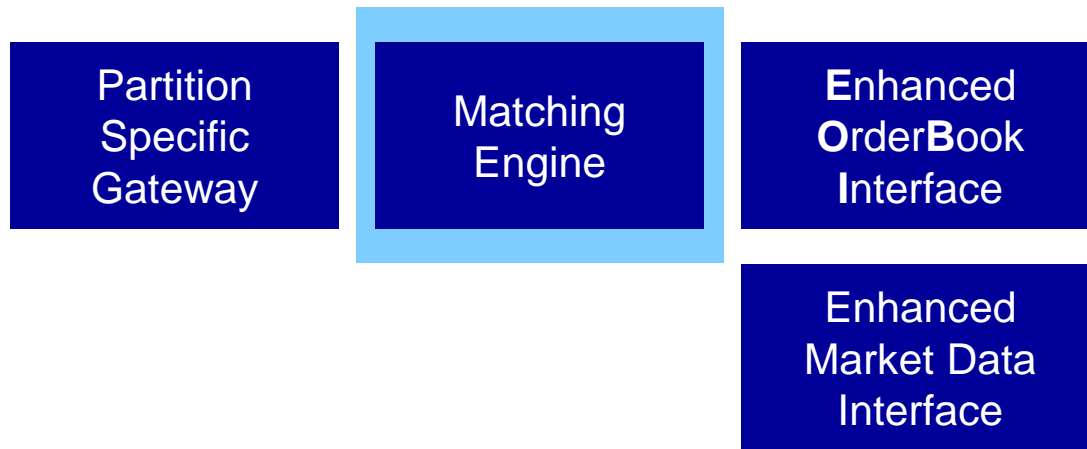
T7 – Latency Roadmap

R12.0

Further consolidation of partition processes

Reducing complexity

→ less possible failover scenarios



More deterministic data distribution via EMDI

Rollout is planned in Q1 2024

→ Integration of EMDI in the Matching Engine

T7 – Latency Roadmap

R12.0

- Avoid delay of Quote Activation processing if there are no quotes in the book
- Allow combination of Quote Inactivation and Quote Deletion in one request
- New DSCP flag for EOBI: LastQty > 1

T7 – Latency Roadmap

2024

- Hardware upgrade & migration from InfiniBand to Ethernet
- Cable equalization in Colo 2.0
- Colo 2.0 network hardware upgrade

Thank you!

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OpenDay 2023



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