Lessons from Developing FPGA based Advanced Trading Systems for China's Capital Markets

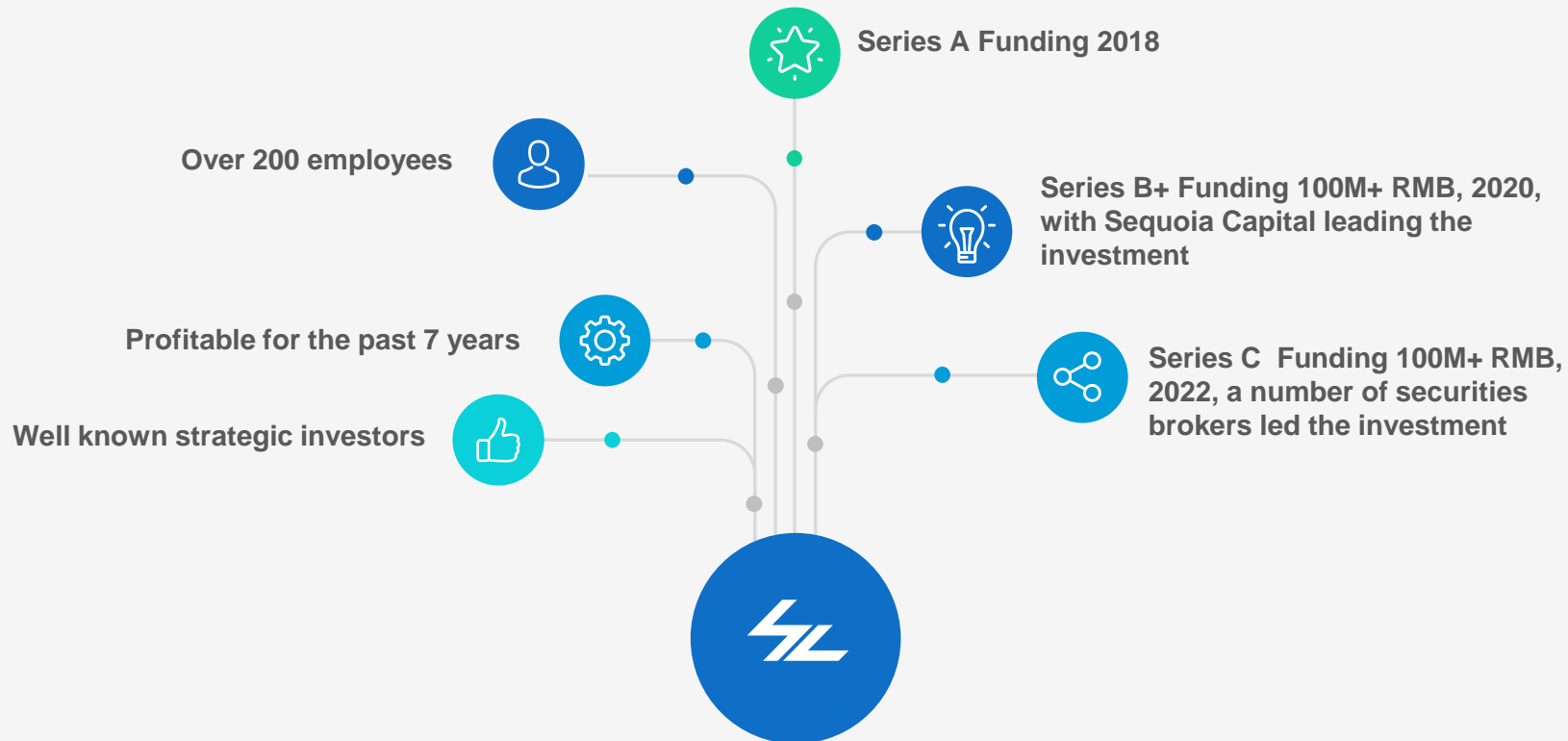Louis Liu, Shengli Technologies

Personal Profile

Louis Liu

CEO

- Serial entrepreneur, close to 30 years of industry experience

- Datek Online, Island ECN , ITCH/OUCH protocols

- Founder of Sonic Trading, acquired by BNY Mellon

- Previously MD of BNY Mellon
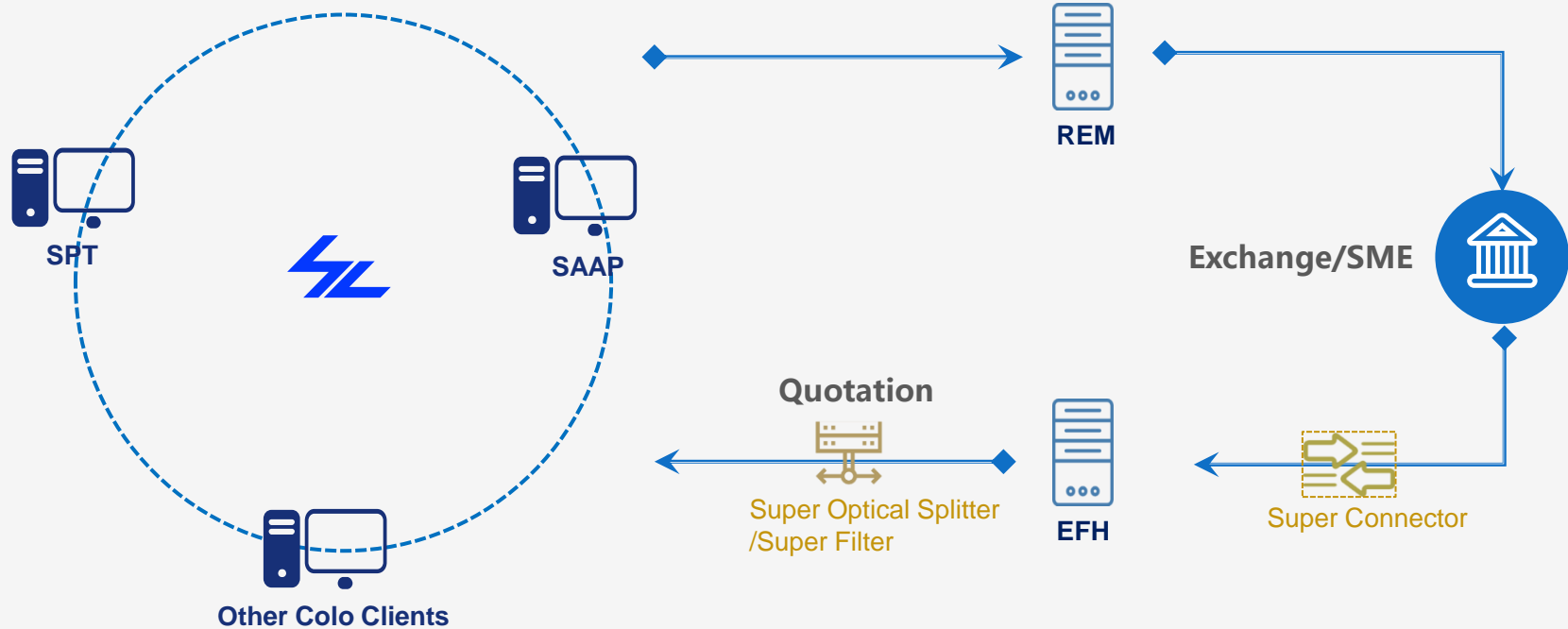
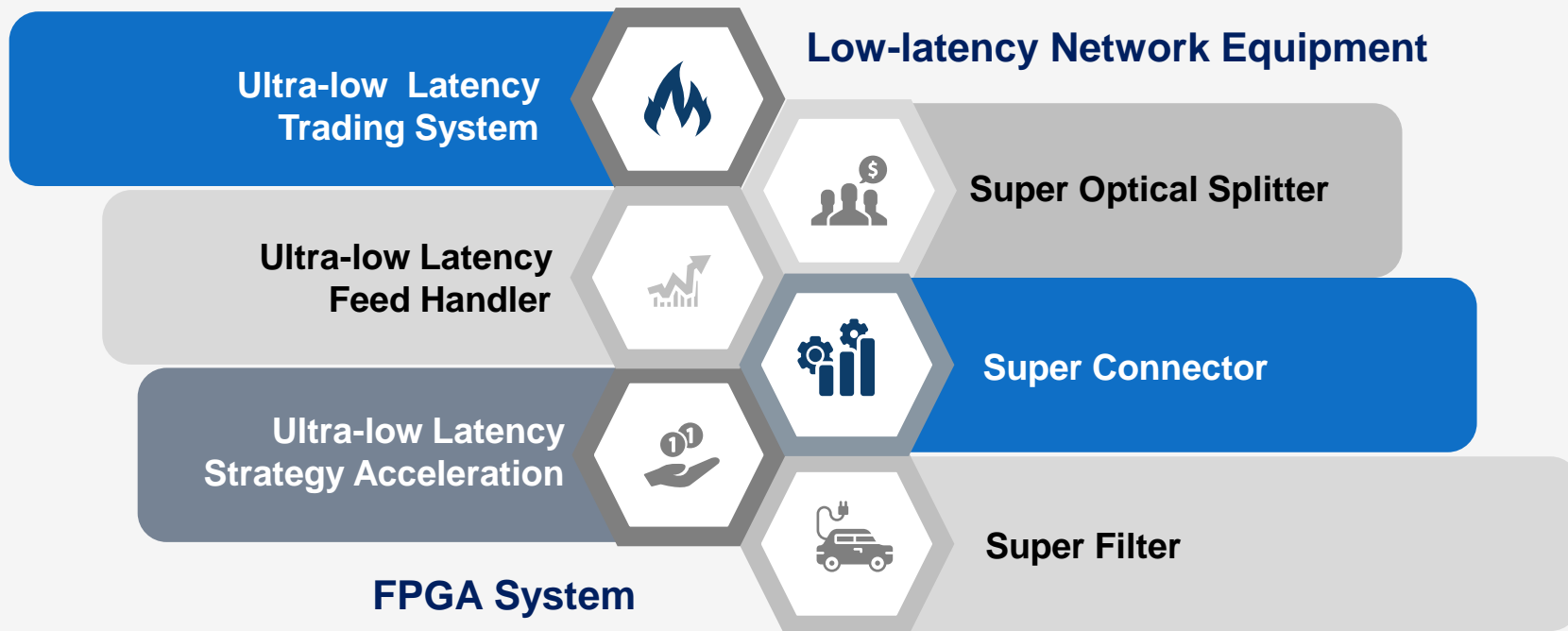- BA and MS from Columbia University

U.S. Experience

- SOES, SelectNet

- SuperDot

- SuperMontage

- Order Handling Rule- ECNs

- NYSE and NASDAQ buying ECNs

- REG NMS

China experience: Shengli

Series A Funding 2018

Over 200 employees

Series B+ Funding 100M+ RMB, 2020, with Sequoia Capital leading the investment

Profitable for the past 7 years

Series C Funding 100M+ RMB, 2022, a number of securities brokers led the investment

Well known strategic investors

Shengli Trading Ecosystem

Products

Ultra-low Latency Trading System

Low-latency Network Equipment

Super Optical Splitter

Ultra-low Latency Feed Handler

Super Connector

Ultra-low Latency Strategy Acceleration

Super Filter

FPGA System

Solutions

Securities Brokers

- REM Ultra-low Latency Trading System
  - Securities Edition
  - Option Edition (Market Maker)
- EFH Ultra-low Latency Feed Handler
- RiskGuard
- Super Optical Splitter
- Super Filter
- Customized HPC

Futures Brokers

- REM Ultra-low Latency Trading System
  - Futures Edition
- EFH Ultra-low Latency Feed Handler
- Super Optical Splitter
- Super Connector
- Customized HPC

Trading Firms

- SAAP Hardware-based Program Trading System
- Trading Simulator
- SPT Program Trading Platform
- Customized HPC

Partners & Clients (partial list)

SHENGLI TECHNOLOGIES

华泰证券 HUATAI SECURITIES	中国银河证券 CHINA GALAXY SECURITIES	中金财富 CICC Wealth Management	国信证券 GUOSEN SECURITIES	兴业证券 INDUSTRIAL SECURITIES	湘财证券 XIANGCAI SECURITIES	光大证券 EVERBRIGHT SECURITIES	国泰君安证券 GUOTAI JUNAN SECURITIES
浙商证券 ZHESHANG SECURITIES	东兴证券 DONGXING SECURITIES	中泰证券 ZHONGTAI SECURITIES	东方财富证券 Eastmoney Securities	招商证券 CHINA MERCHANTS SECURITIES	东方证券 ORIENT SECURITIES	华鑫证券 CHINA FORTUNE SECURITIES	财达证券 CAIDA SECURITIES
UBS	粤开证券 YUEKAI SECURITIES	CICC 中金公司	华创证券	广发证券 GF SECURITIES	中信证券 CITIC SECURITIES	东吴证券 SOOCHOW SECURITIES	长城证券 GREAT WALL SECURITIES
安信证券 ESSENCE SECURITIES	财通证券 CAITONG SECURITIES	德邦证券 Topsperity Securities	甬兴证券 YONGXING SECURITIES	申万宏源证券 SHENWAN HONGYUAN SECURITIES	开源证券 KAIYUAN SECURITIES	麦高证券 MYGUIDE SECURITIES	上海中期期货 SHANGHAI CIFCO FUTURES
中信期货 CITIC Futures	海通期货 HAITONG FUTURES	华泰期货 HUATAI FUTURES	东证期货 ORIENT FUTURES	光大期货 EVERBRIGHT FUTURES	兴证期货 INDUSTRIAL SECURITIES FUTURES	国泰君安期货 GUOTAI JUNAN FUTURES	银河期货 GALAXY FUTURES
鲁证期货 LUZHENG FUTURES	国信期货 GUOSEN FUTURES	广发期货 GF FUTURES	申银万国期货 SHENYIN & WANGUO FUTURES	中信建投期货 CHINA FUTURES	南华期货 NANHUA FUTURES	方正中期期货 FOUNDER CIFCO FUTURES	五矿经易期货有限公司 MINMETALS & JINGYI FUTURES co.,LTD
华闻期货 HUAWEN	宝城期货 BAOCHENG FUTURES	新湖期货 WWW.XINHU.CN	CMF 招商期货	瑞达期货 RUIDA FUTURES	浙商期货 ZHESHANG FUTURES	美尔雅期货 www.mfc.com.cn	大有期货 DAYOU FUTURES
山金期货有限公司 SD-GOLD	广州期货 GUANGZHOU FUTURES	金瑞期货 JINRUI FUTURES	财信期货 CHASING FUTURES	东兴期货 DONGXING FUTURES	建信期货 CCB Futures	长江期货 CHANGJIANG FUTURES	中州期货 ZHONGZHOU FUTURES
天风期货 TF FUTURES	中银国际 BOC INTERNATIONAL	宏源期货 HONGYUAN FUTURES	中融汇信期货 ZHONG RONG HUI XIN FUTURES	弘业期货 HOLLY FUTURES	国元期货 GUOYUAN FUTURES	国富期货 GUO FU FUTURES	Hicend 海证期货
金元期货 GOLDSTATE FUTURES	云财富期货	招金期货 ZHAO JIN FUTURES	华西期货 HUAXI FUTURES	国盛期货 GUOSHENG FUTURES	恒泰期货股份有限公司 HENGTAI FUTURES CO.,LTD.	ITG 国贸期货	平安期货

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System Functions

01 Business Management

02 Risk Management

03 Operation and Monitoring

04 System Configuration

FPGA Hardware Technology

Mature Technology

Ultra-low Latency

High Availability

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EFH

Shengli Extreme Feed Handler（EFH）is the first, revolutionary product, built on cutting-edge FPGA technology to provide market data handling and distribution in China.
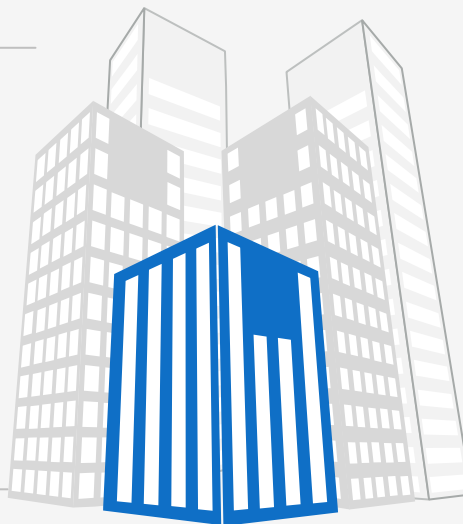
01.Shanghai Stock Exchange

Binary market data
Level-1, Level-2 book, ETF options market data

02.Shengzhen Stock Exchange

STEP market data
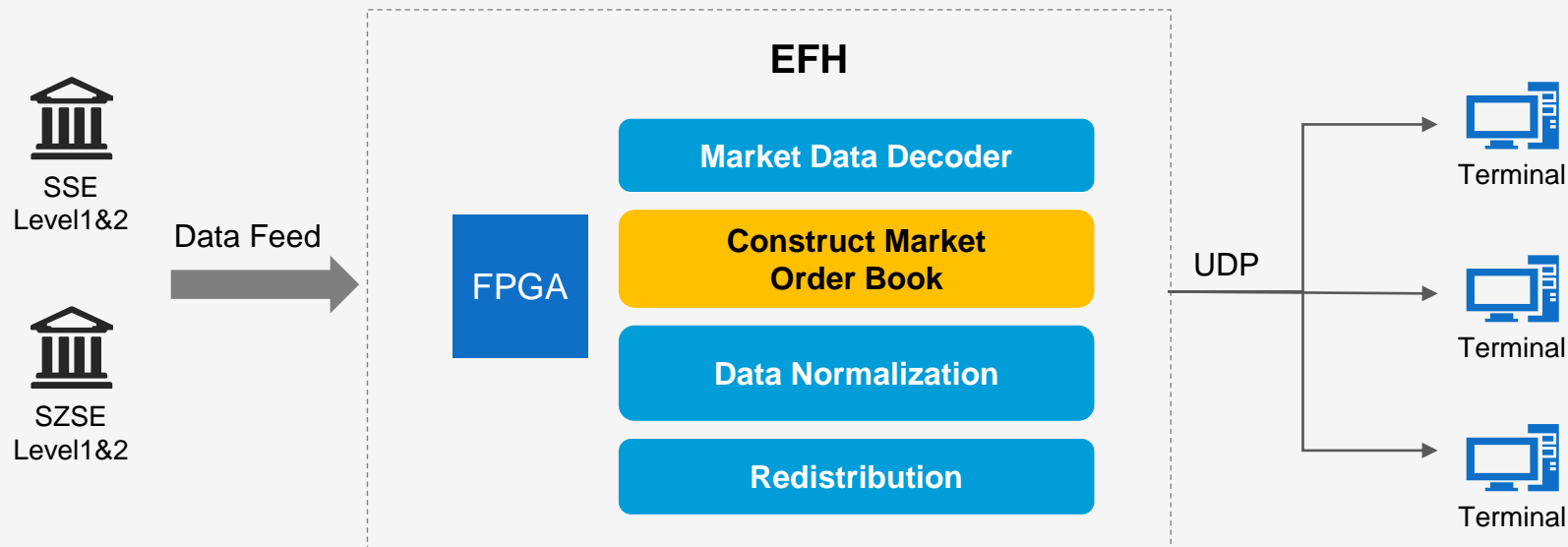Level-1, Level-2 book, ETF options market data

03.Build full order book

Based on tick-by-tick data

04.Indices market data

05.Bond market data

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Shengli Network Equipment Series

SLink_41016_L

SLink_31016_L

SLink_5X036_L

SLink_3X048_L

SLink_32112_L

Model Type	Data Channel	Switching Delay	Total Latency	Data Rate	Product Characteristics	Weight
SLink_41016_L	16	0.25-3ns	<3ns	1G/10G/25G/40G/100G	• Low latency, flexible application and almost no performance jitter • No additional cabinets and power supply are required • It can be directly inserted into the server	170g
SLink_31016_L	16	0.25-1ns	<1.3ns	1G/10G/40G	• Low latency, flexible application and almost no performance jitter • No additional cabinets and power supply are required • It can be directly inserted into the server	180g
Slink_5x036_L	36	<2ns	<4ns	1G/10G/40G	• 1U Standard, supporting 40G • Almost no performance jitter	8.25kg
SLink_3x048_L	48	0.25-1ns	<3ns	1G/10G	• 1U Standard, almost no performance jitter • Implement topology between switches • Multiple switches are cascaded to form with more ports	8.95kg
SLink_32112_L	112	<2ns	<4ns	1G/10G	• 2U Standard with up to 112 physical ports • Almost no performance jitter	10.65Kg

Not STAC benchmarks

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Shengli Solution - RiskGuard

SHENGLI TECHNOLOGIES

➢ RiskGuard is an ultra-low latency pre-trade risk control system developed by Shengli's team based on FPGA technology. The system is built entirely around preventing abnormal transaction risks.

➢ The system is deployed at the network link level, and customers are directly connected to the exchange gateway. It not only prevents quantitative investors and member companies from being warned or punished by regulatory agencies due to abnormal transactions, but at the same time can achieve ultra-low latency performance.

System Features
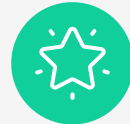
<500 ns average latency

System load capacity exceeds 1 million messages per second
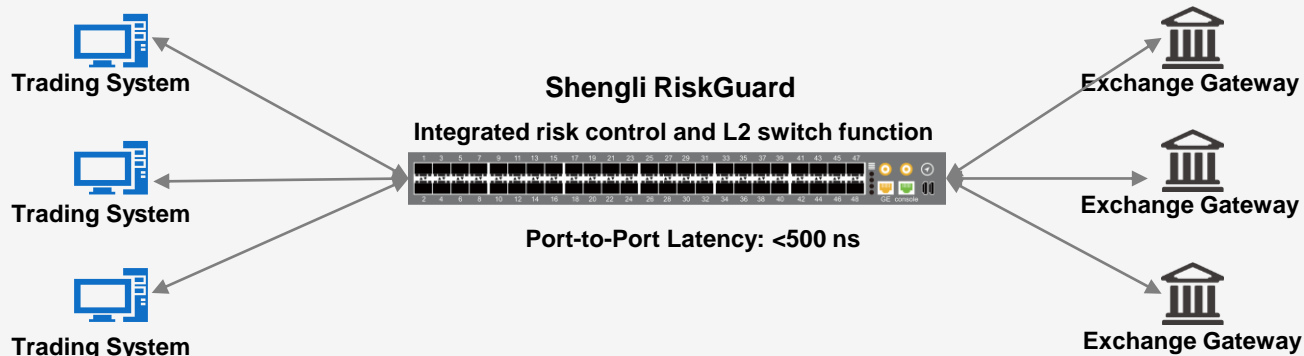
Risk checks are completely performed in hardware

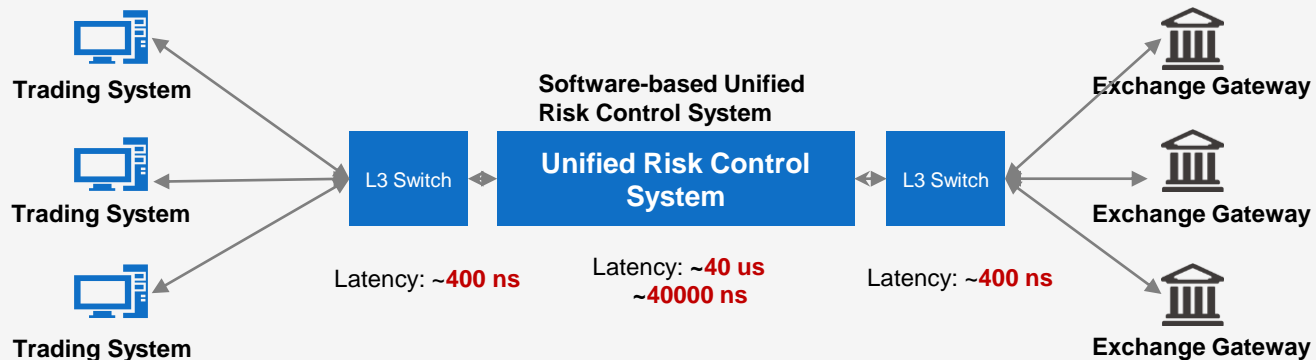**Over 20 transaction compliance checks**

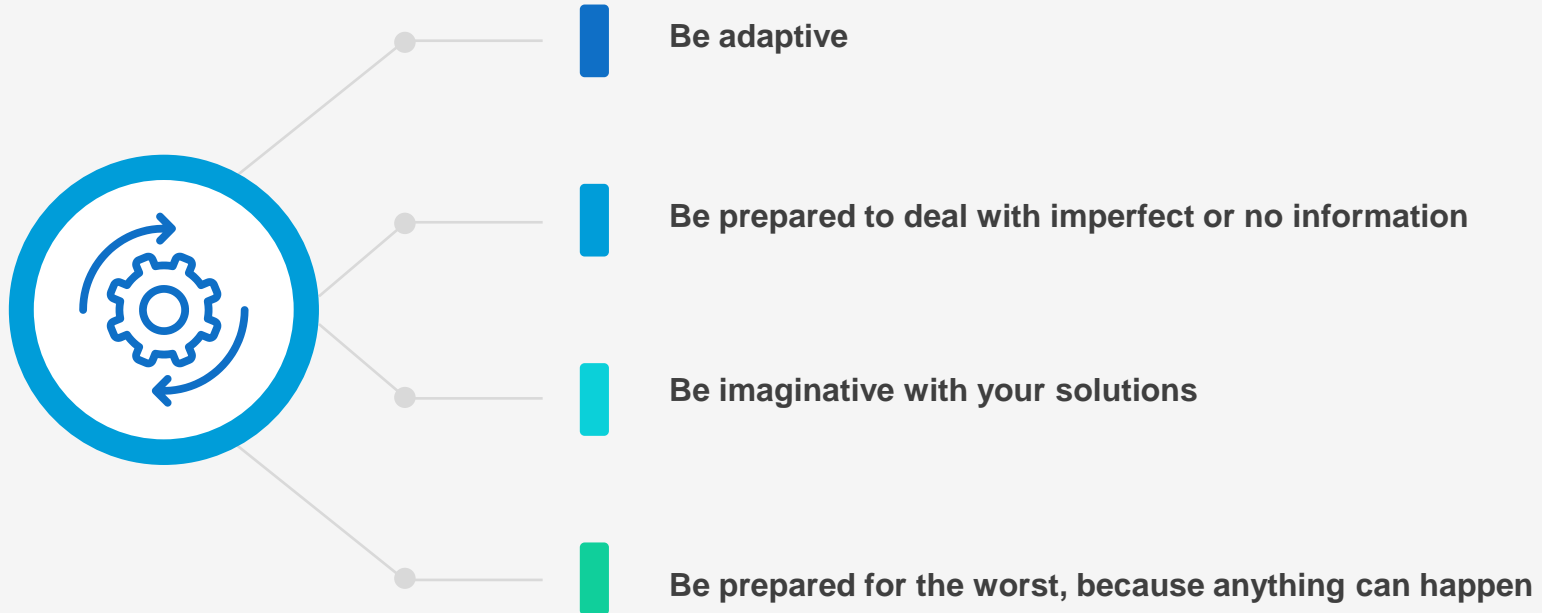**Rapid deployment without affecting the current business**

Technical Highlight 4: Improve Performance and Simplify Deployment

Trading System

Trading System

Trading System

Shengli RiskGuard

Integrated risk control and L2 switch function

Port-to-Port Latency: <500 ns

Exchange Gateway

Exchange Gateway

Exchange Gateway

VS

Trading System

Trading System

Trading System

Software-based Unified Risk Control System

L3 Switch

Unified Risk Control System

L3 Switch

Exchange Gateway

Exchange Gateway

Exchange Gateway

Latency: ~**400 ns**

Latency: ~**40 us** ~**40000 ns**

Latency: ~**400 ns**

Not STAC benchmarks

Lessons

Be adaptive

Be prepared to deal with imperfect or no information

Be imaginative with your solutions

Be prepared for the worst, because anything can happen

THANKS! – TRADE WITH EDGE