ITU-T F.751.1
Assessment criteria for distributed ledger technology (DLT) platforms

Wei Kai
Rapporteur Q22 of ITU-T SG16/CAICT

ITU-T FG DLT (2017-2019) ~ Spirit of collaboration

Functions of Standards

Function	Examples	Economic Impacts
Specify quality and reliability	■ Performance metrics, such as minimum quality levels ■ Procedures, such as equipment calibrations	■ Expand market share through performance assurance and reduction in transaction costs
Provide information	■ Measurement and test methods ■ Science and engineering data bases, standard reference materials ■ Terminology	■ Increased research efficiency through more accurate research inputs and verifiable research results ■ Higher productivity and quality through better process control ■ Reduced transaction costs and hence lower prices for new products
Assure Interoperability	■ Interconnection among system components ■ Portability of software across implementations of a computer system[5]	■ Achieve network externalities and thereby expand value/cost ratios ■ Facilitate open systems and thereby enable more competition at component and subsystem levels
Enable variety reduction	■ Microprocessor architecture, size of silicon wafers	■ Achieve economies of scale and compatibility across components

Source: Tassey, Gregory. The Economic Nature of Knowledge Embodied in Standards for Technology-Based Industries, ResearchGate, January 2015

Gaps in DLT Standards

Gaps in standards

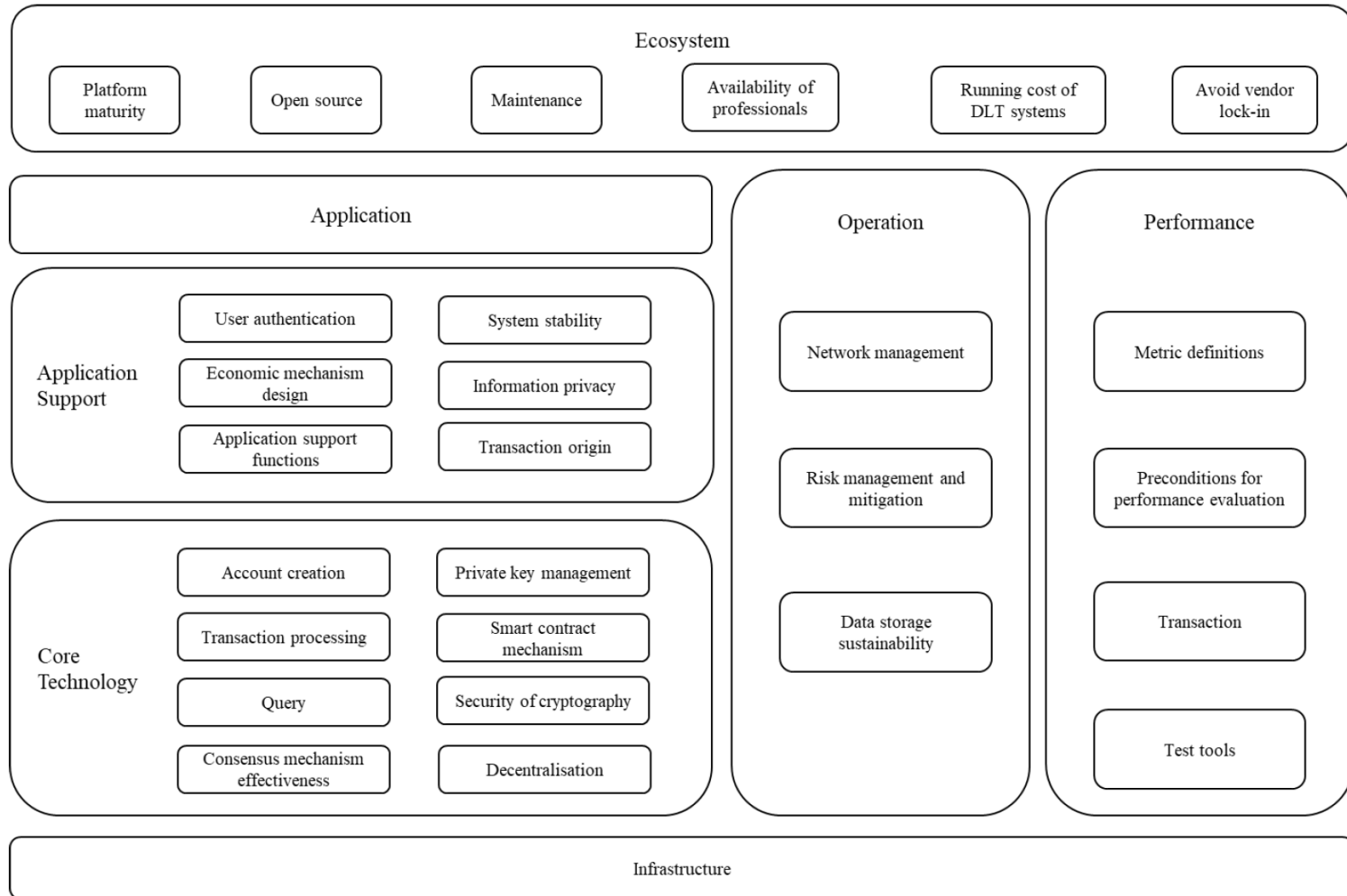| When to apply DLT	Core technical elements	DLT performance tests	Related verticals
Assessment of DLT usefulness	Off-chain networks (e.g. Lightning)	Taxonomy performance tests (e.g. technical, functional, user, stress, security tests) and how they might be performed	Education
Types of DLT – features and performance expectations	Consensus algorithms		Sustainable development
Functional risks	Functional structure (e.g. blockchain, DAG)	Performance test requirements	Construction management
Heuristics for cross-platform comparison	DLT interoperability		Rights management
			Land registries

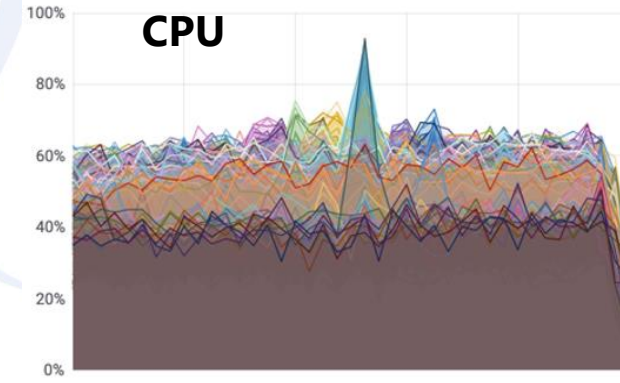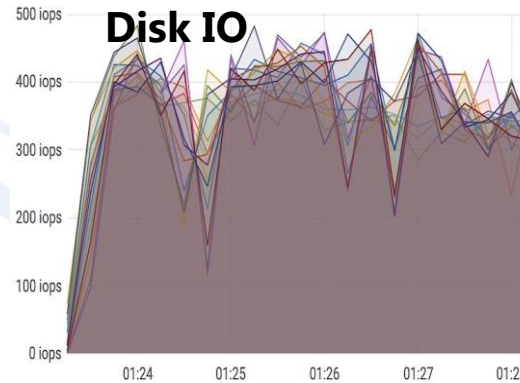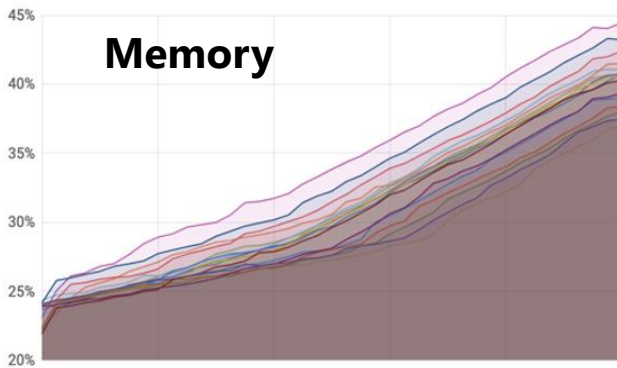Source: Global Standards Mapping Initiative: An overview of blockchain technical standards WHITE PAPER, October 2020
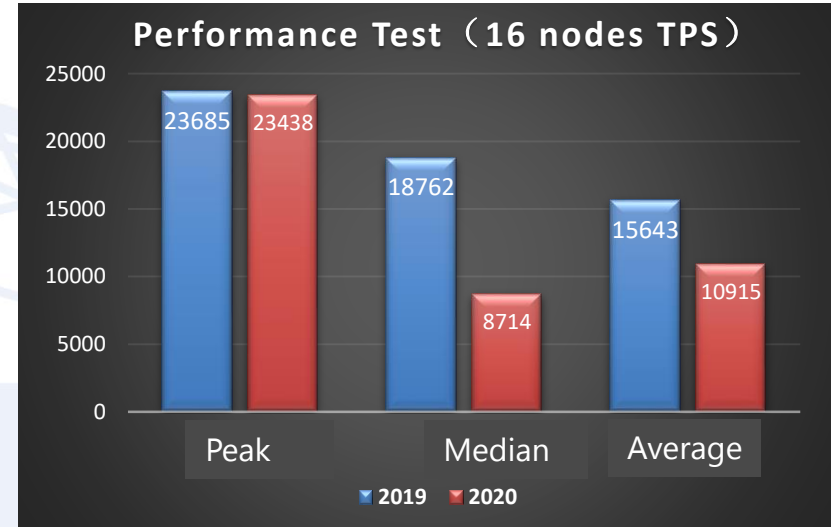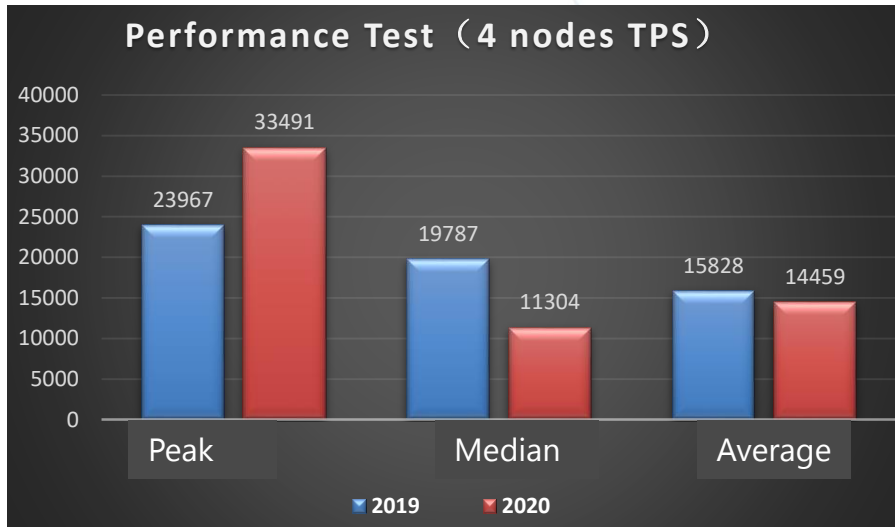
ITU-T F.751.1

A guideline for DLT platform assessment and information disclosure of a certain DLT platform product

ITU-T F.751.1 in the real world

Mapping F.751.1 to Trusted Blockchain Initiatives(TBI) testing 2020

Mandate items for TBI testing   Optional items for TBI testing

ITU 751.1	9.3 Data storage sustainability	8.4.1 Secure transmission	7.4.1 Data consistency	7.4.1 Data consistency	7.7 Security of cryptography	7.4.1 Data consistency	9.2 Risk management and mitigation	7.6.2 Lifecycle management of smart contract	8.5.2 User interface for smart contract	7.6.4 Smart contract data access control	8.2.1 Stability for management	7.2 Transaction Processing	7.1 Account Creation	8.1 User authentication	7.5.1 Software wallet	8.5.3 Multi-language software development kits (SDKs)	9.1.1 Node status monitoring	9.1.2 Multi type nodes	9.1.1 Node status monitoring	7.6..1 Monitor ability of participants' status	7.4.2 BFT/CFT	9.1.3 Node configuration modification		9.3 Data storage sustainability	7.7 Security of cryptography	7.6.3 Security of smart contract	9.1.3 Node configuration modification	8.2 System stability	9.1.4 Network fairness	8.2.6 Stability for concurrency	8.4.3/8.4.2 Information privacy/Restricted data access	8.2.2 Stability for cross-chain operation	9.2.3 Avoid single point of failure	7.5.2 Hardware wallet
SUT A																					CFT	hot												
SUT B																					CFT	cold												
SUT C																					CFT	cold												
SUT D																					BFT	hot												
SUT E																					BFT	hot												
SUT F																					BFT	hot												
SUT G																					BFT	hot												
SUT H																					BFT	hot												
SUT I																					CFT	hot												
SUT J																					CFT	cold												
SUT K																					CFT	hot												
SUT L																					CFT	hot												
SUT M																					CFT	cold												
SUT N																					BFT													
SUT O																					CFT													
SUT P																					BFT													
SUT Q																					BFT	cold												
SUT R																					CFT	hot												
SUT W																					CFT	hot												
SUT T																					CFT	hot												
SUT U																					BFT	hot												
SUT V																					CFT	hot												
SUT W																					BFT	hot												
SUT X																					CFT	cold												
SUT Y																					BFT	cold												
SUT Z																					CFT	hot												
SUT AB																					BFT	cold												
SUT AC																					CFT	cold												

Pass ▮ Fail ▮ Not Test ▮

Source: CAICT, Dec 2020

The performance of DLTs

Performance Test（4 nodes TPS）
- Peak: 2019 = 23967, 2020 = 33491
- Median: 2019 = 19787, 2020 = 11304
- Average: 2019 = 15828, 2020 = 14459

Performance Test（16 nodes TPS）
- Peak: 2019 = 23685, 2020 = 23438
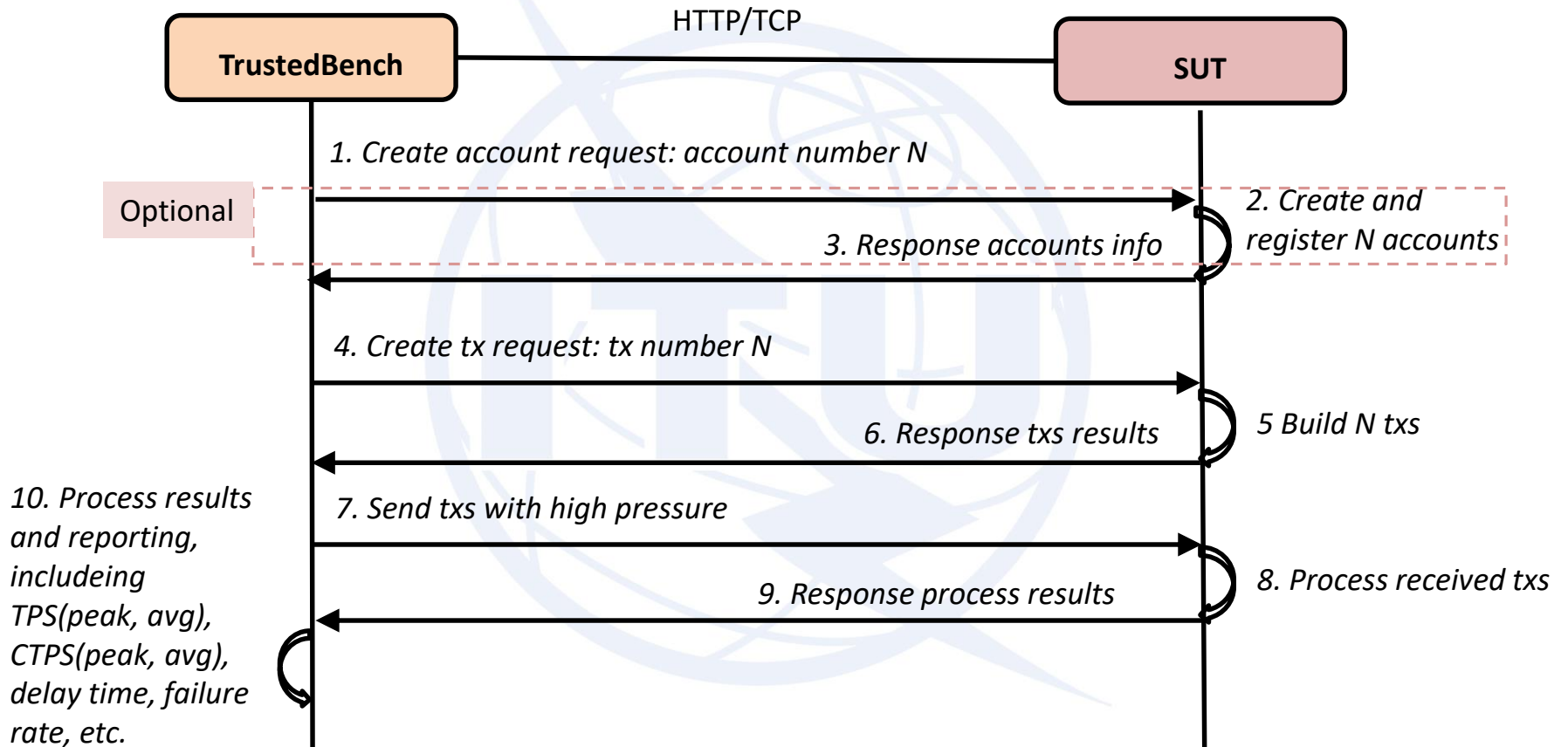- Median: 2019 = 18762, 2020 = 8714
- Average: 2019 = 15643, 2020 = 10915

Memory

Disk IO

CPU

Machine: Dell R730 &ThinkServer RD450, CPU 24-core, 128G RAM; Network: 10G Ethernet

Source: CAICT, Dec 2020
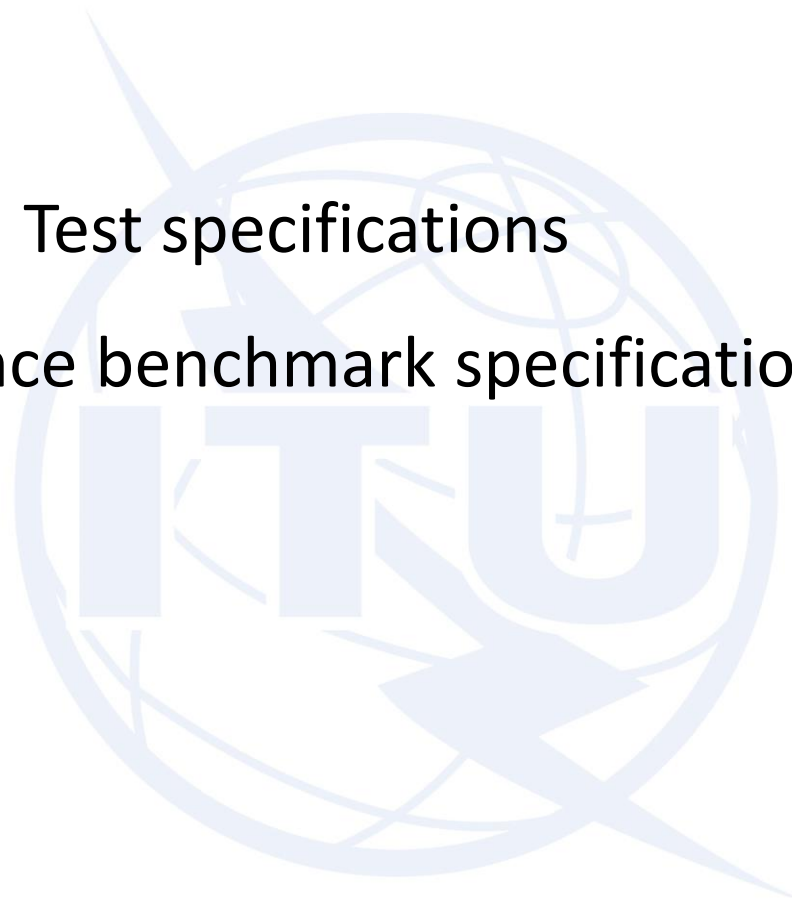
TrustedBench flow

The way forward…

1. Functional Test specifications

2. Performance benchmark specifications

Thank you!

weikai@caict.ac.cn
Rapporteur Q22 of ITU-T SG16/CAICT