ETSI The Standards People

Security Conference

6G - The Next Hyper-Connected Experience For All

Presented by: Erik Guttman, Samsung R&D Institute UK

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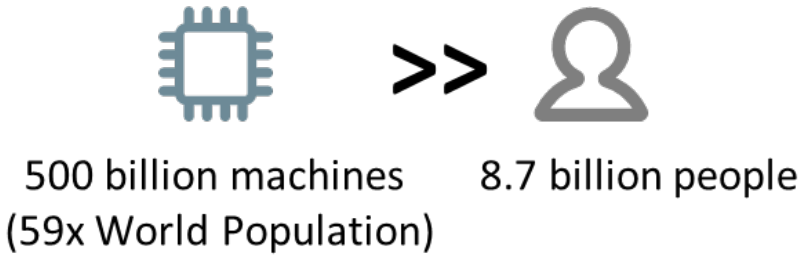
Megatrends towards 6G (1)

Connected Machines – Machines as Main Users

- New form-factor devices: AR glasses, VR headsets, and hologram devices
- 500 billion devices will be connected by 2030, including vehicles, robots, home appliances, etc.

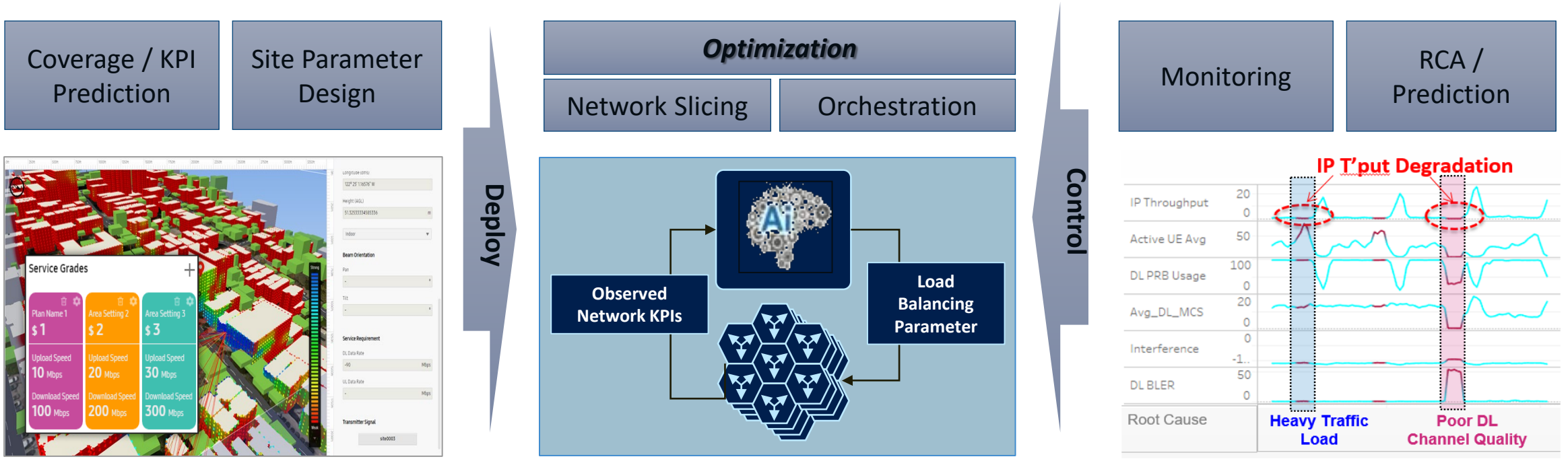


	Human	Machine
Maximum Resolution	1/150° (Smartphone display 290 ppi at 30 cm)	Exceeds Human Limitations!
Latency Perception	<100 ms	
Audible Frequency	250-20,000 Hz	
Visible Wavelength	280-780 nm	
Viewing Angle	Azimuth 200°, Zenith 130°	

Megatrends towards 6G (2)

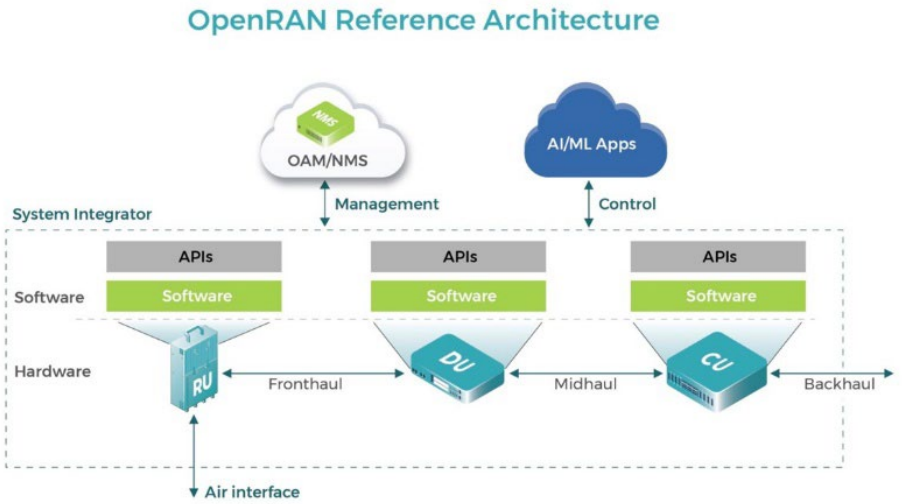
AI/ML – New Tool for Wireless Communications

- Reduces capital expenditure (CAPEX) and operational expenditure (OPEX)
- Improves overall performance, such as network optimization, reduction of network energy consumption, massive data processing, etc.



Openness – Open Source and Open Interface

- Software-based implementation of networks thanks to performance improvement of CPUs & GPUs
- Wider utilization of open source-based SW and development of open interfaces among network entities



The Next Hyper —— Connected Experience for All.

Truly Immersive XR

* eXtended Reality

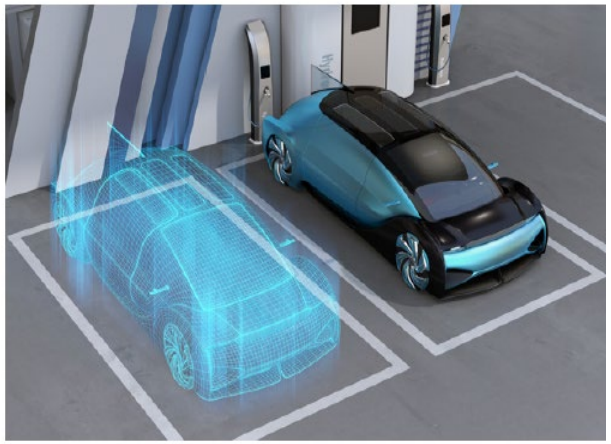
- Sufficient wireless capacity to be secured for higher data rate to realize Virtual Reality, Augmented Reality, Mixed Reality, etc.

Ultra high density IoT

- Sensors, actuators and smart components abound, offering new and highly available operations in the user's environment.

Digital Replica

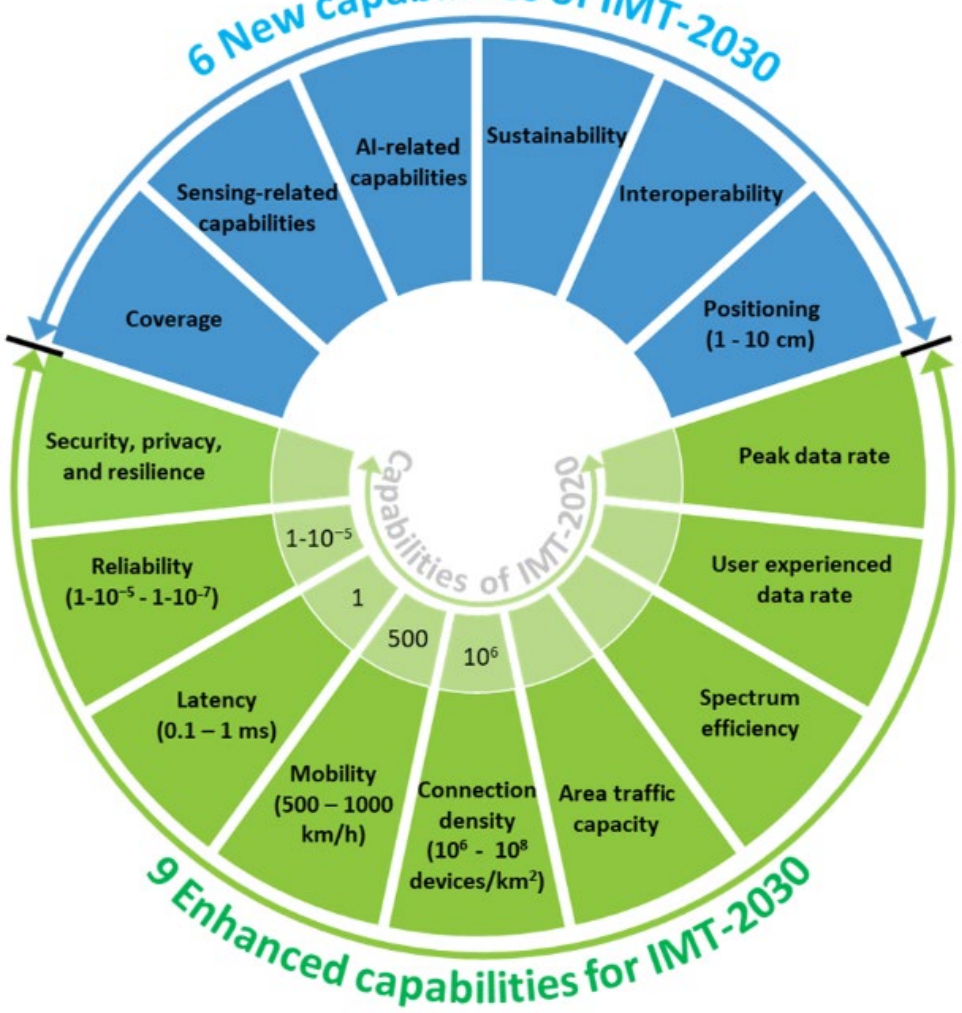
- Replicate physical entities and interact with them in a virtual world without temporal or spatial constraints



☐ Performance Requirements

- Advanced multimedia services require substantial computing power, higher density of communicating devices, highly precise positioning and ultra-low latency

- Positioning: 1-10cm
- Density: 10^6 to 10^8 devices/km^2
- Latency: 100 µsec (1/10 of 5G)



6G Requirements (2)

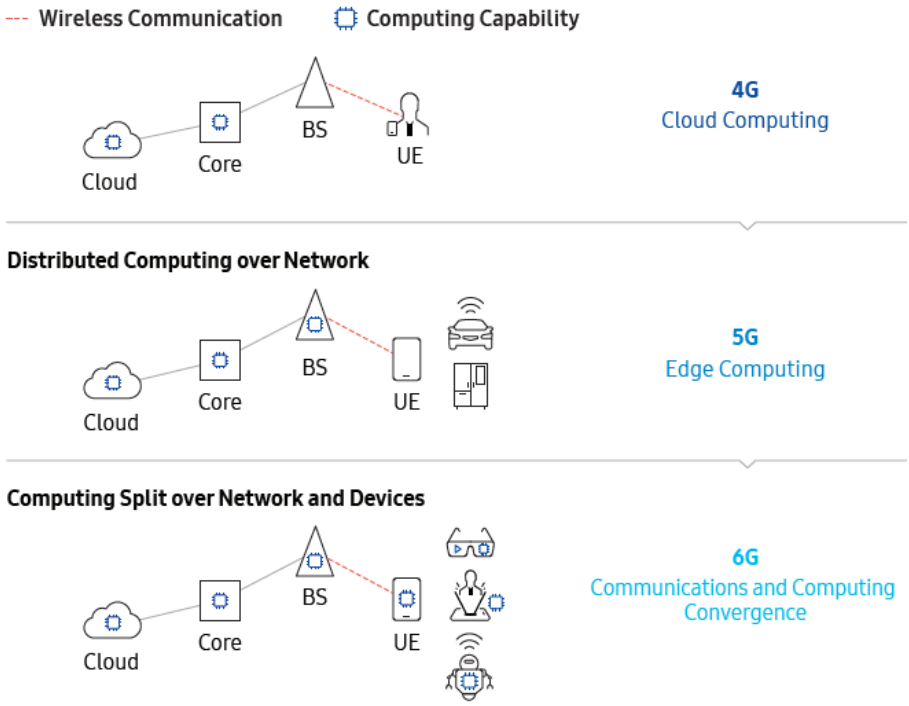
☐ Architectural Requirements

- Communications and computing convergence

  - Split computing, native AI, etc.

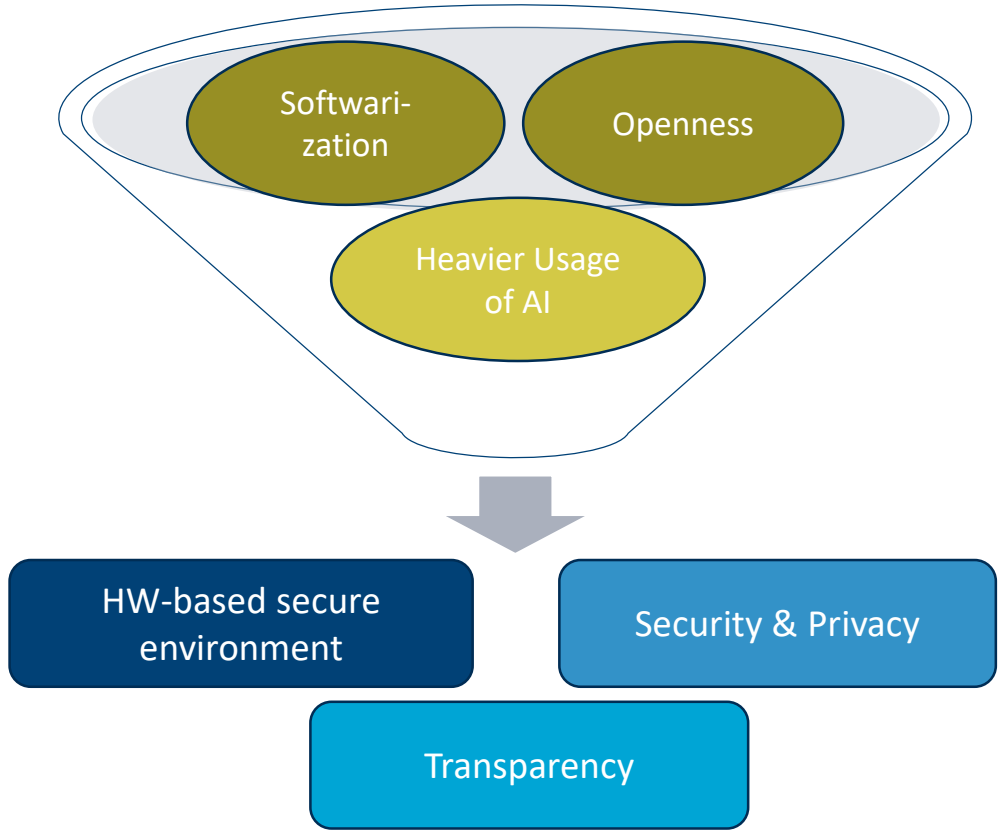
- Support of new network entities - Satellites, HAPS*

* High-Altitude Platform Systems



☐ Trustworthiness Requirements

- Guaranteed security and privacy in the open network environment



Towards comprehensive & native AI for intelligent 6G

- AI will be utilized in all the layers of NW elements
  - Including layers 1 and 2 of radio interface between BS and UE

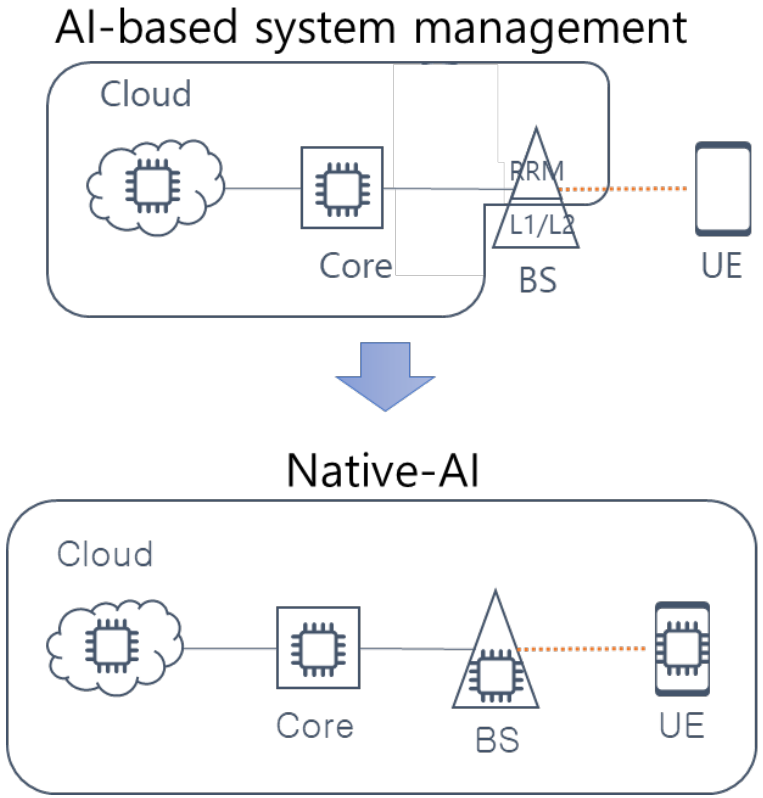
As-Is

AI utilized in system management & optimization

To-Be

Extended usage of AI in all the layers and nodes

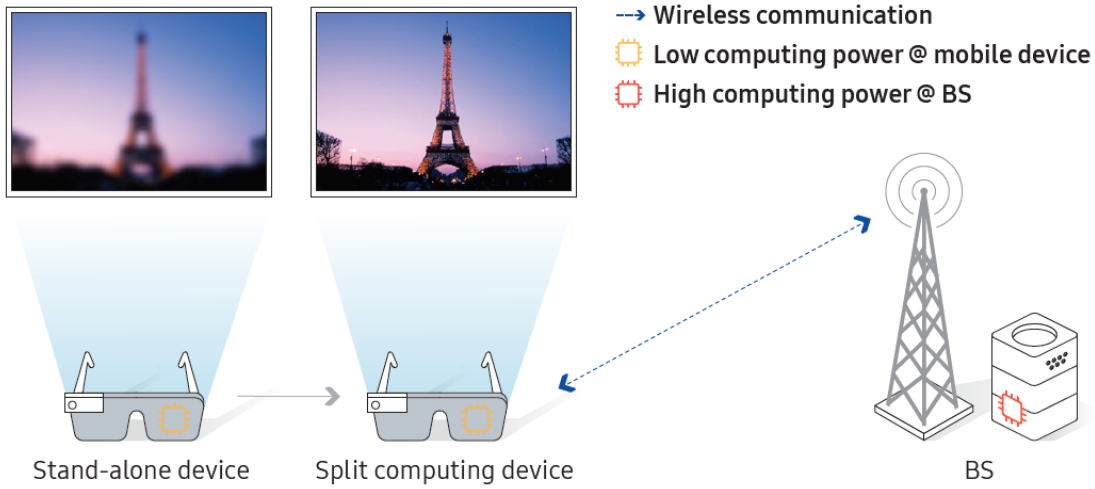
(AI applied to enhance performance of radio interface)



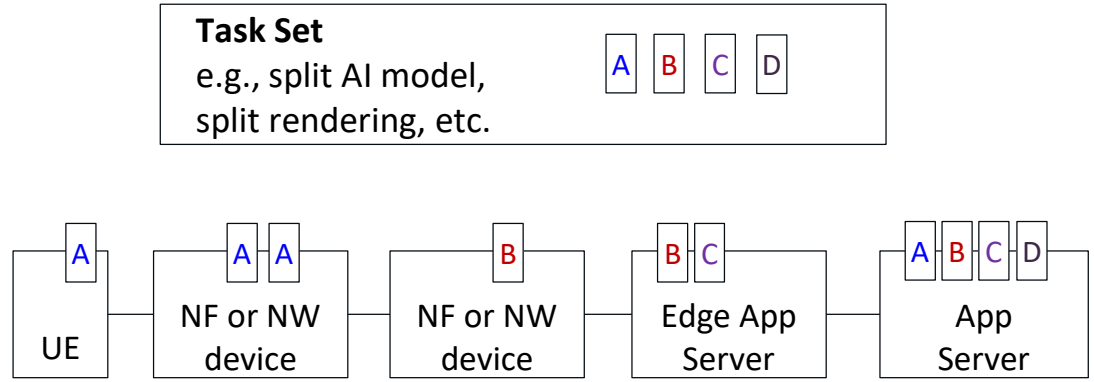
Computing & Networking Integration

Computing-integrated network actively participates in computing

- A promising way to deal with throughput, latency, and computing requirements of 6G applications
- Fully utilizing the capabilities and benefits of cloud-based, programmable 6G network



Split Computing



In-Network Computing

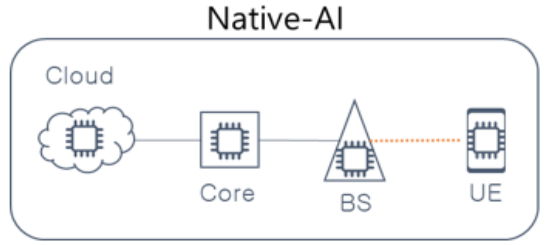
Trustworthiness being a very essential requirement of 6G

- 6G has to adopt the following security solutions against new threats:

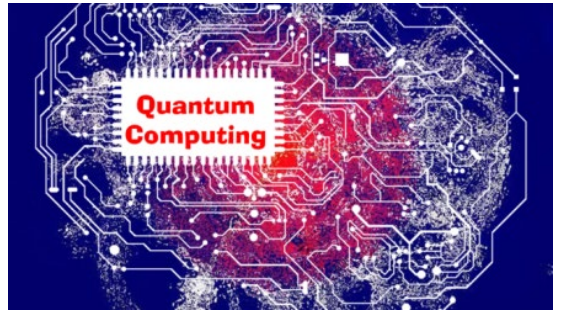
Technology trends	Security threats	Solutions
Network openness	Unauthorized access in open interface	PKI and ZTA*
Open-source SW	Undetected vulnerability	SW governance
Utilization of user information	Exposure of user information	Trusted execution environment
Native AI	Adversarial machine learning	Trustworthy AI
Quantum computing	Unsecure public key algorithm	Post-quantum cryptography (PQC)

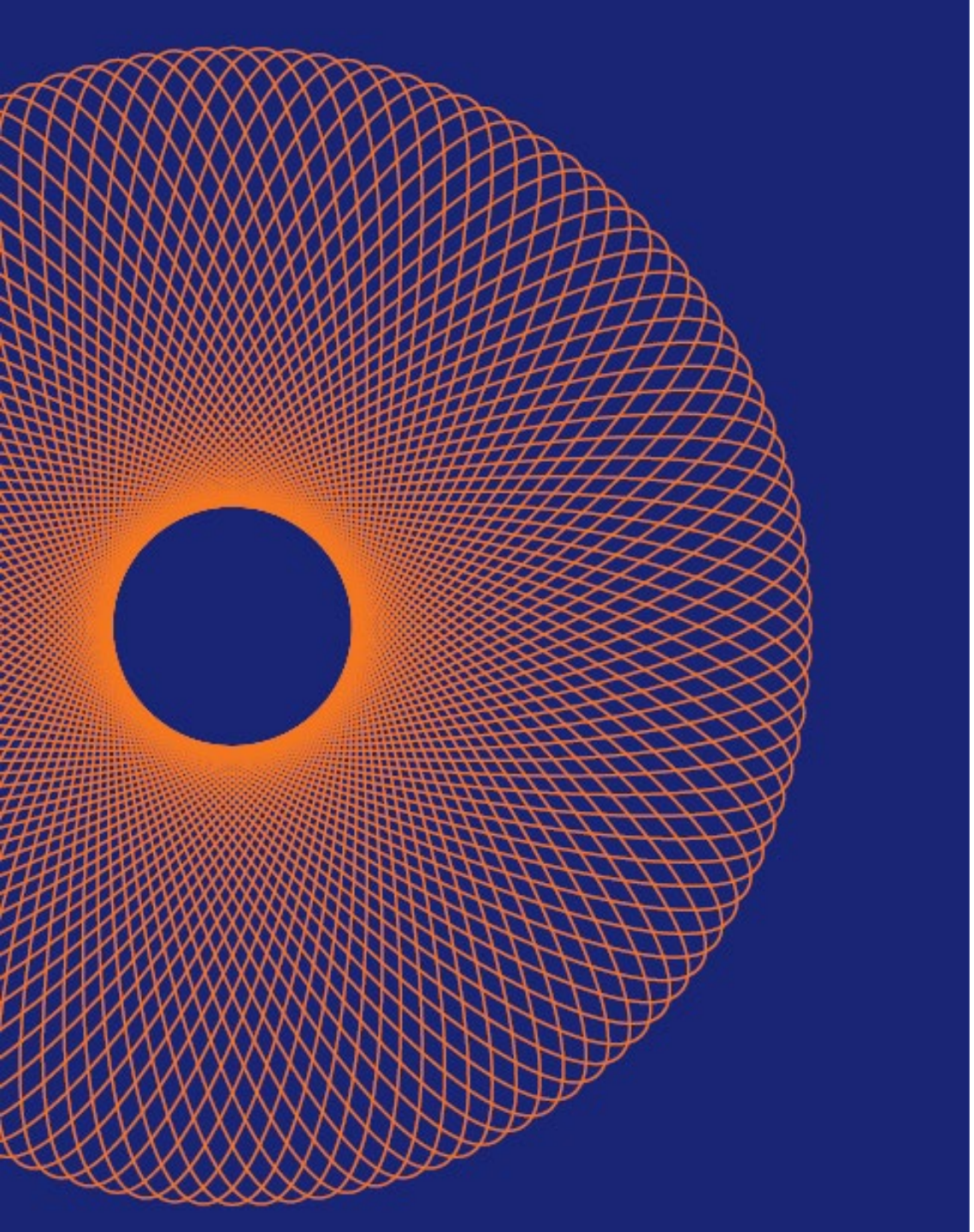
* ZTA: Zero Trust Architecture

Network openness & Open source SW



Quantum computing





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Thank you

erik.guttman@samsung.com

Samsung 6G White Paper

https://cdn.codeground.org/nsr/downloads/researchareas/6G%20Vision.pdf

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