



Network Intelligentizing for Future 6G Wireless Networks

How AI will Enable Network Intelligentizing?

Vision for Future Communications Summit, Lisbon, November 2019

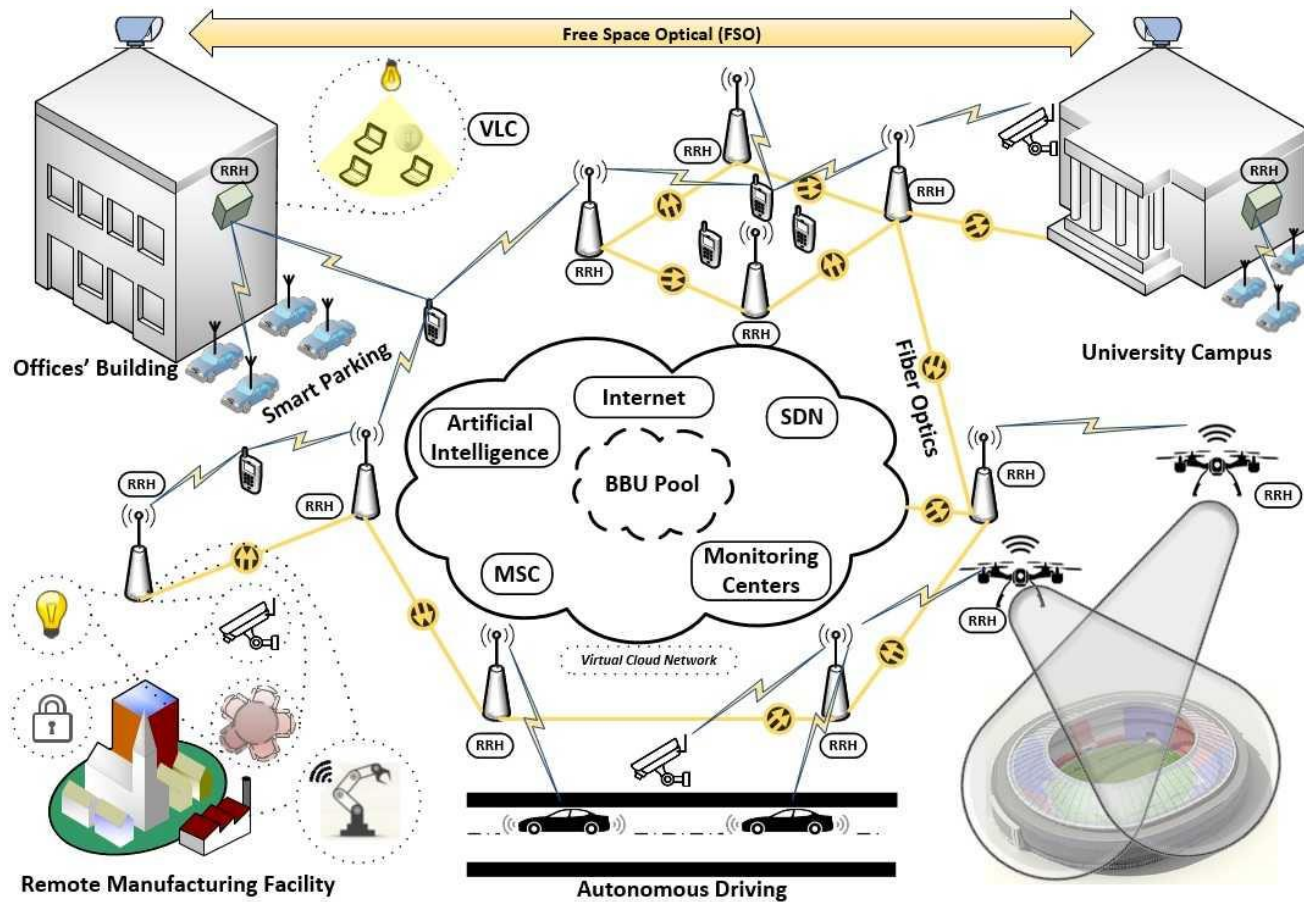
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Part I

Network Intelligentizing Aspects on Future 6G Networks

What will be the future 6G network?



*The future 6G network architecture which will cover everywhere with 6G connections.

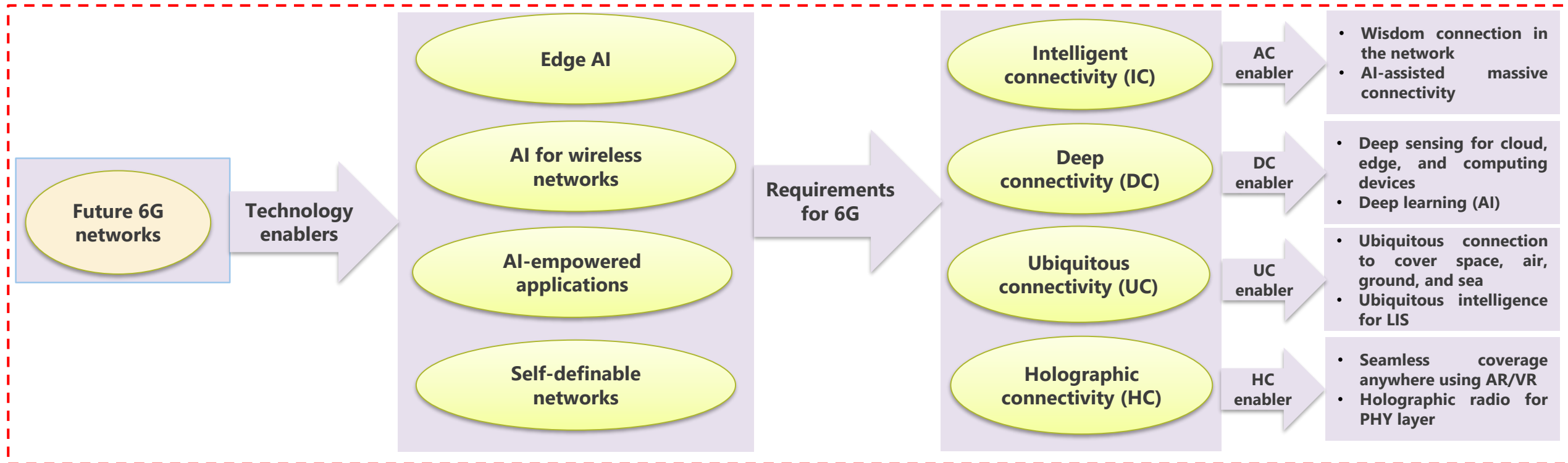
Smart connectivity of future 6G networks

- Remote radio heads (RRH)**
- Drones**
- Visible light communications (VLC)**
- Base stations (BSs)**
- Network equipments mounted on moving things e.g., autonomous smart vehicles**

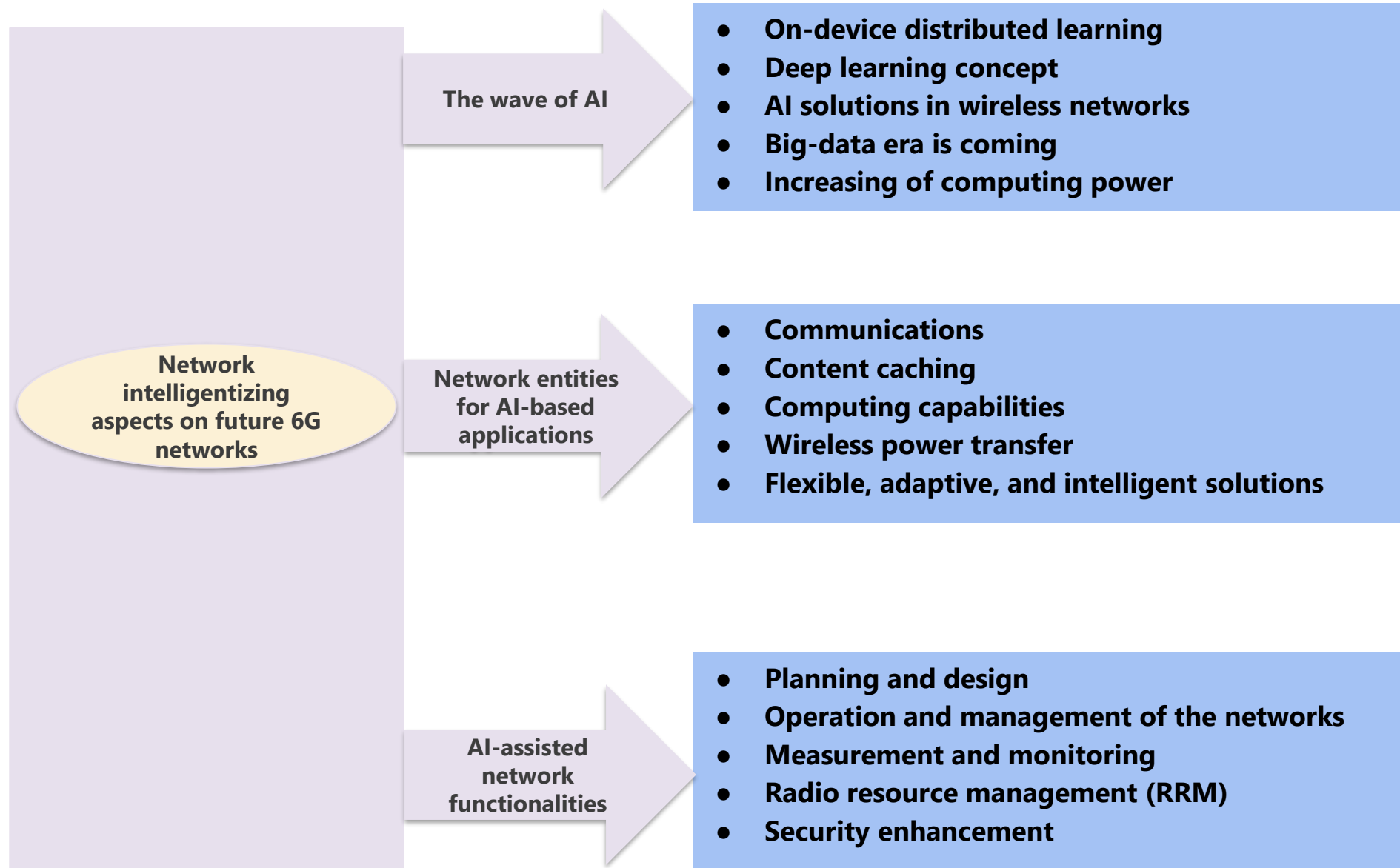
Network architecture of future 6G

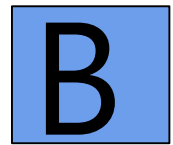
- Cell-free smart surfaces with ultra-high frequencies**
- Temporary hotspots served by drone mounted BSs**
- Network in a spray i.e., Air-duct/Water-duct**
- Using cars as fog/edge devices**
- Water duct communications**

The Vision of AI in Future 6G Networks



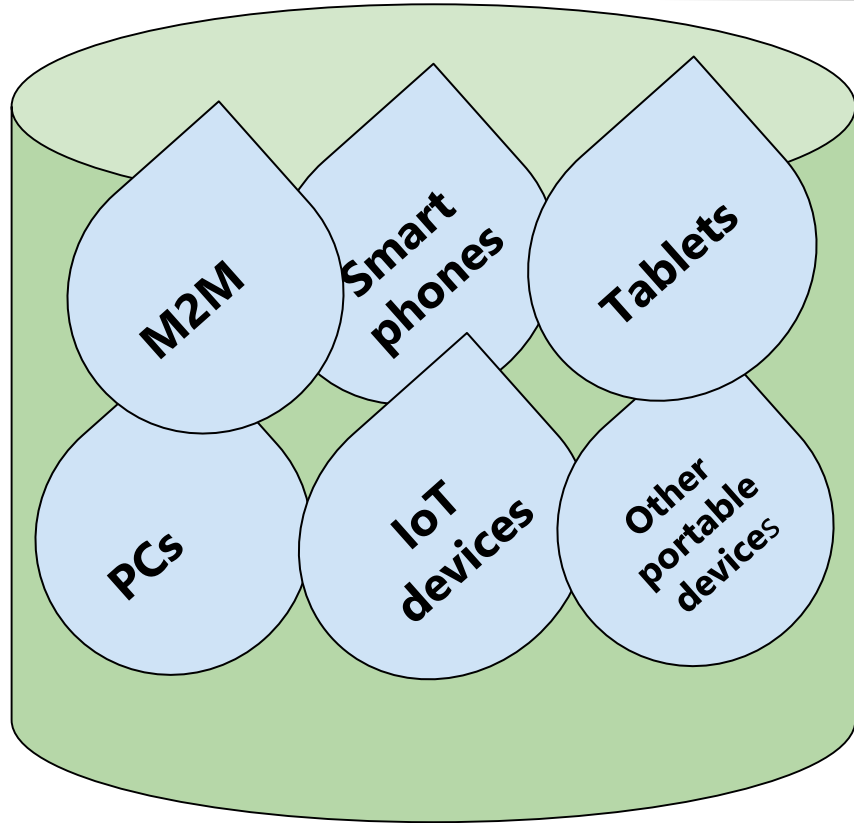
Network Intelligentizing Aspects on Future 6G Networks





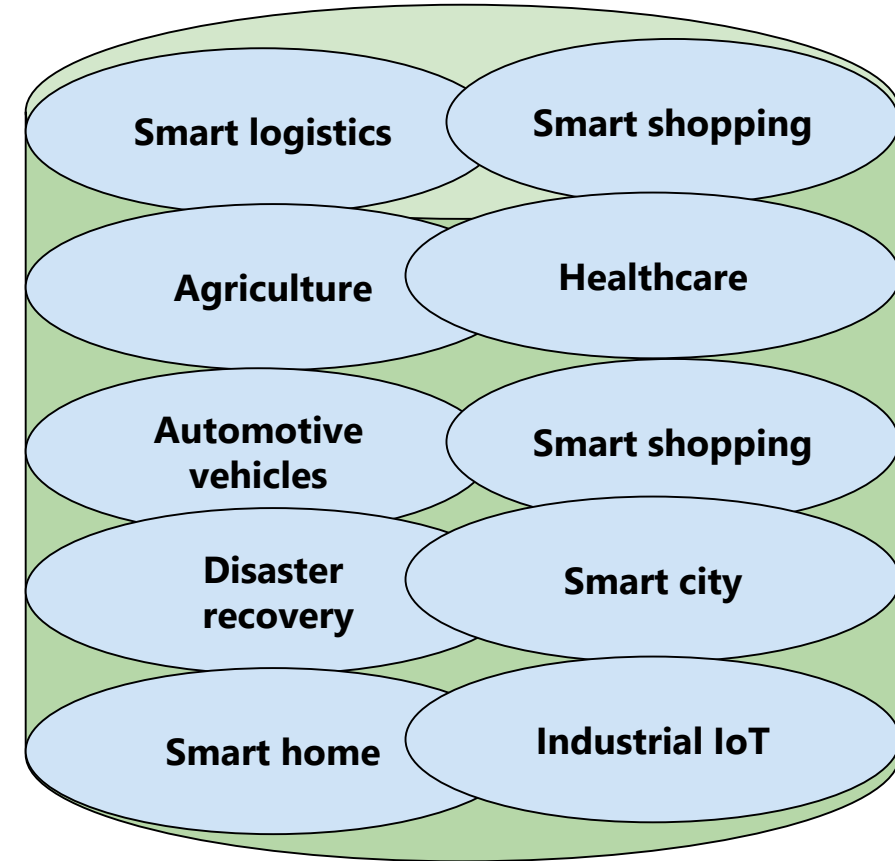
Part II

AI enabled network revolution



Massive growth of devices

In 2020, global IoT devices will grow to 50 billion, 6 times more than the device in 2011.



Massive growth of data

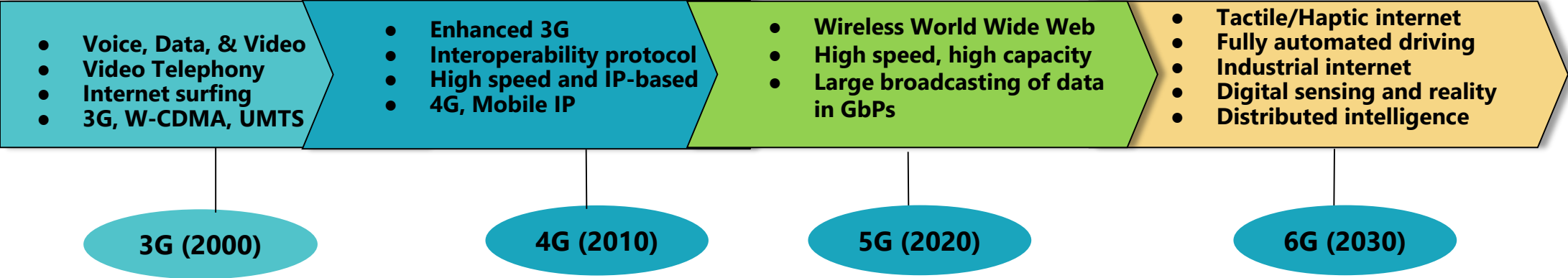
- In 2020, 35 EB per month data traffic will be generated as a mobile data traffic
- In 2020, global data amount will increase upto 40 ZB and it is 50 times more than in 2011

*Source: Comp TIA, CISCO

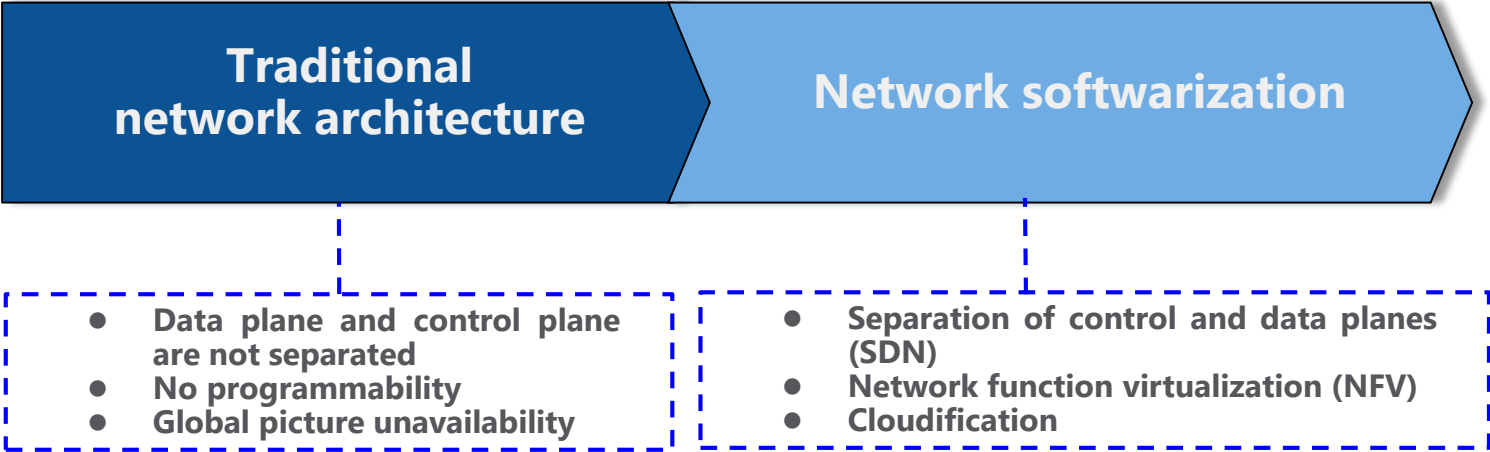
Challenges on the Wireless Communication Industry [2/2]



The evolution on wireless networks

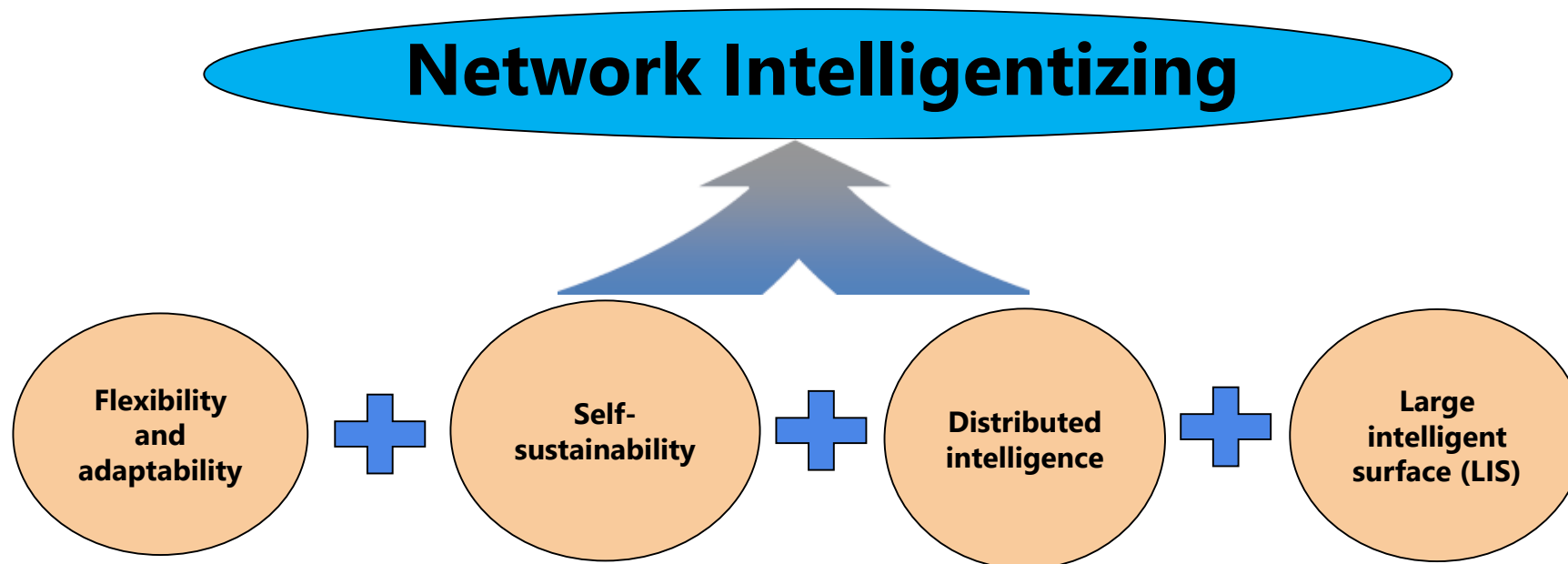


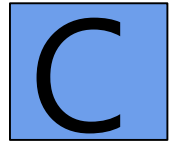
The trend of network architecture evolution



Importance of intelligentizing the future 6G networks

- ❑ Influence advanced wireless communications and mobile computing technologies
- ❑ Enable AI-enabled applications at different edge devices of the networks with limited computational capability and energy resources
- ❑ Scaling up distributed training and inference over the cloud, network edge, and end devices
- ❑ AI-enabled security enhancement
- ❑ AI could adaptively adjust and optimize the networks
- ❑ Realize fully end-to-end automated network architecture

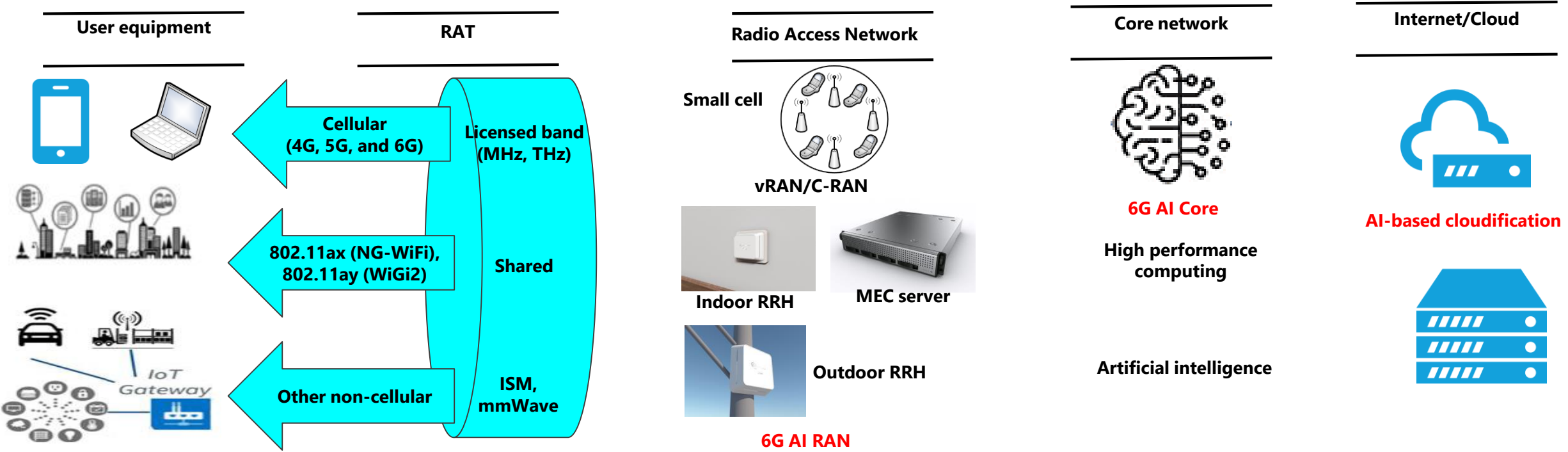




Part III

Roadmap on network intelligentizing

Potential of AI in Future 6G networks

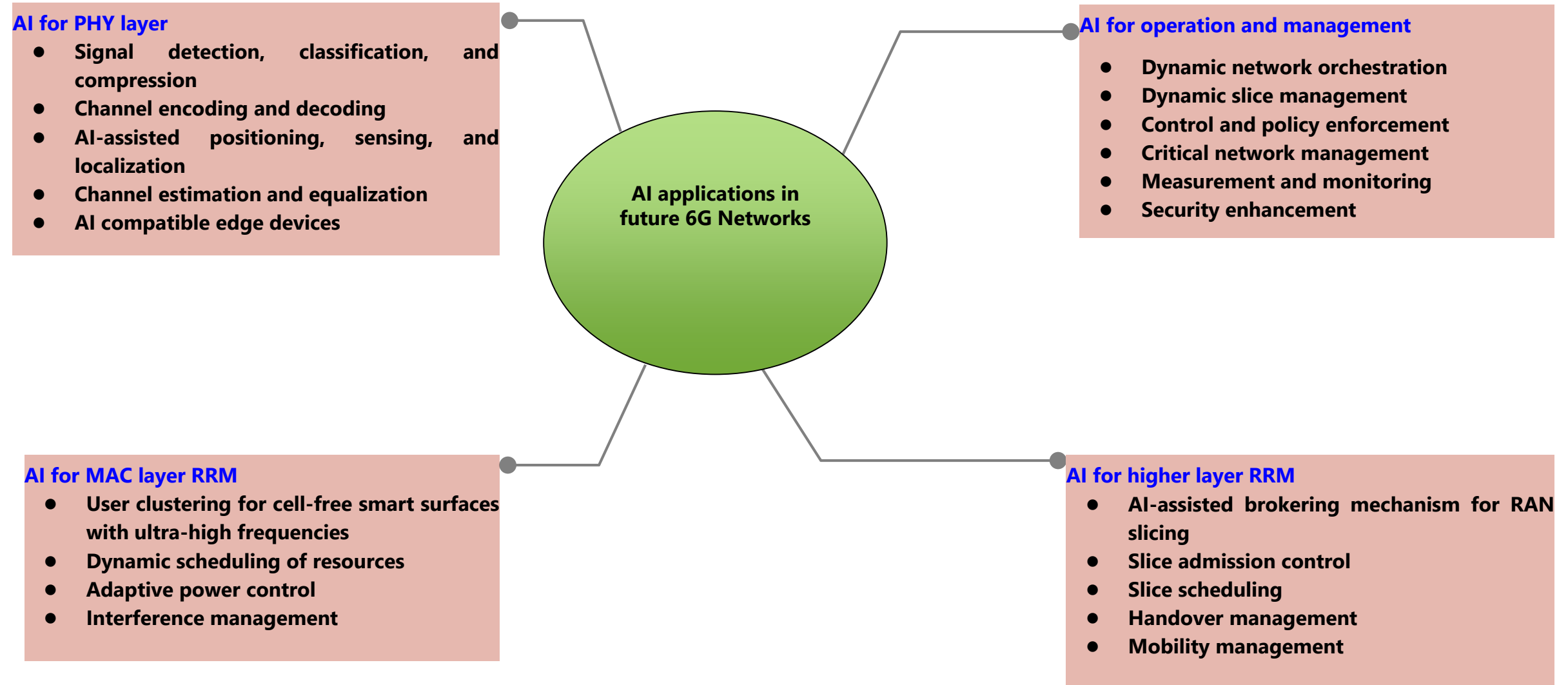


Large-scale intelligent surface

- ### AI for radio access network optimization
- AI-assisted PHY layer
 - AI for network/MAC radio resource management

- ### AI for Operation and management of the networks
- Network design and planning
 - Critical network management

Application of AI in future 6G networks



Open question: How AI will enable network intelligentizing?



- ❑ **AI will enable network intelligentizing based on the following aspects:**
 - ❑ Real-time conversations amongst the network entities
 - ❑ Combination of AI-designed underlying network topologies and AI-driven SDN
 - ❑ Intelligent operation and management of the networks
 - ❑ AI in RAN to optimize the network resources
 - ❑ AI-based mobile applications
 - ❑ Intelligent wireless communication
 - ❑ Proactive maintenance



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