

The background of the slide features a grayscale illustration of a hand holding a smartphone. Numerous envelope icons, representing email or network messages, are shown floating in the air around the phone, suggesting a focus on digital communication and network technologies.

Enabling Technologies for Future Networks

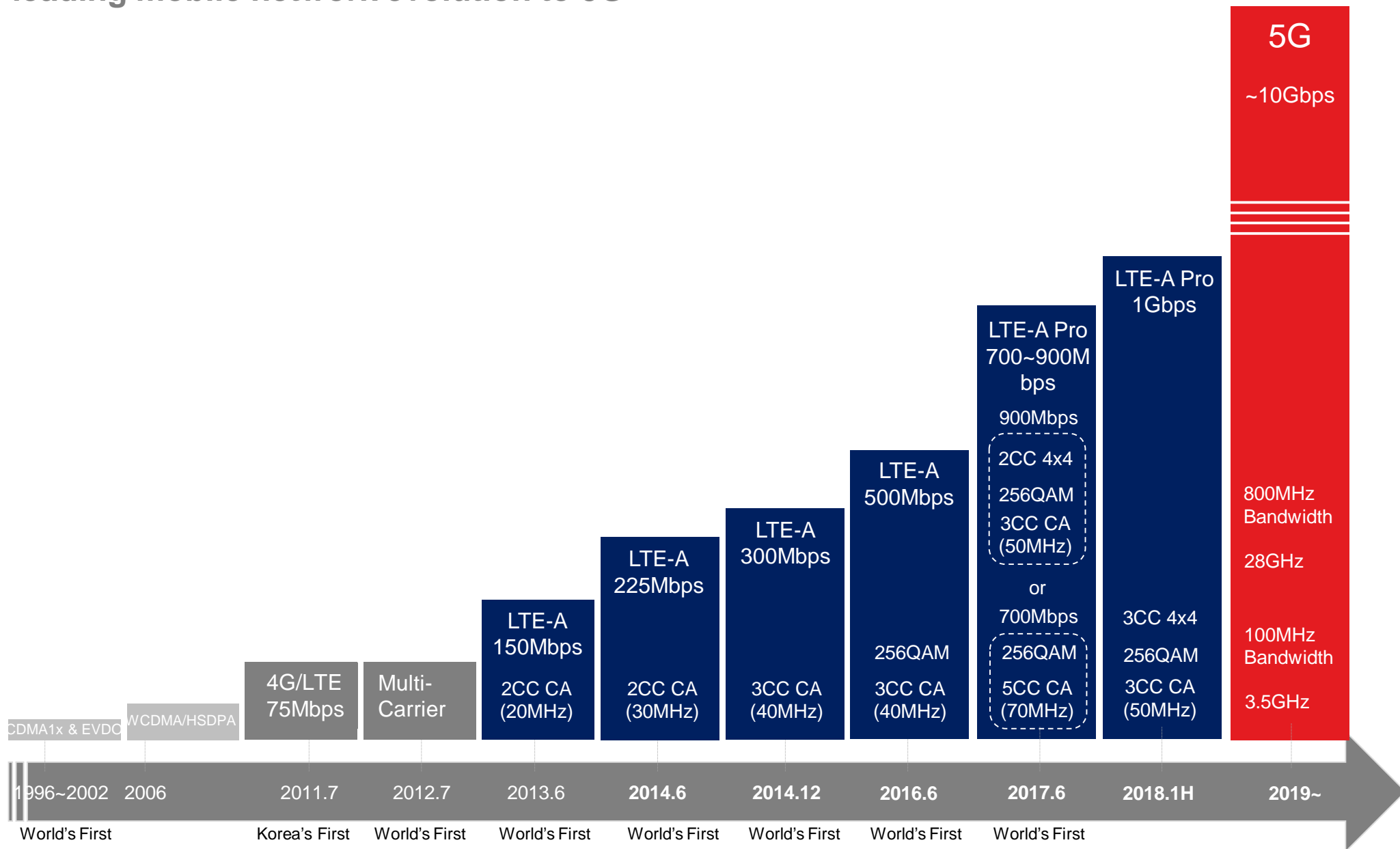
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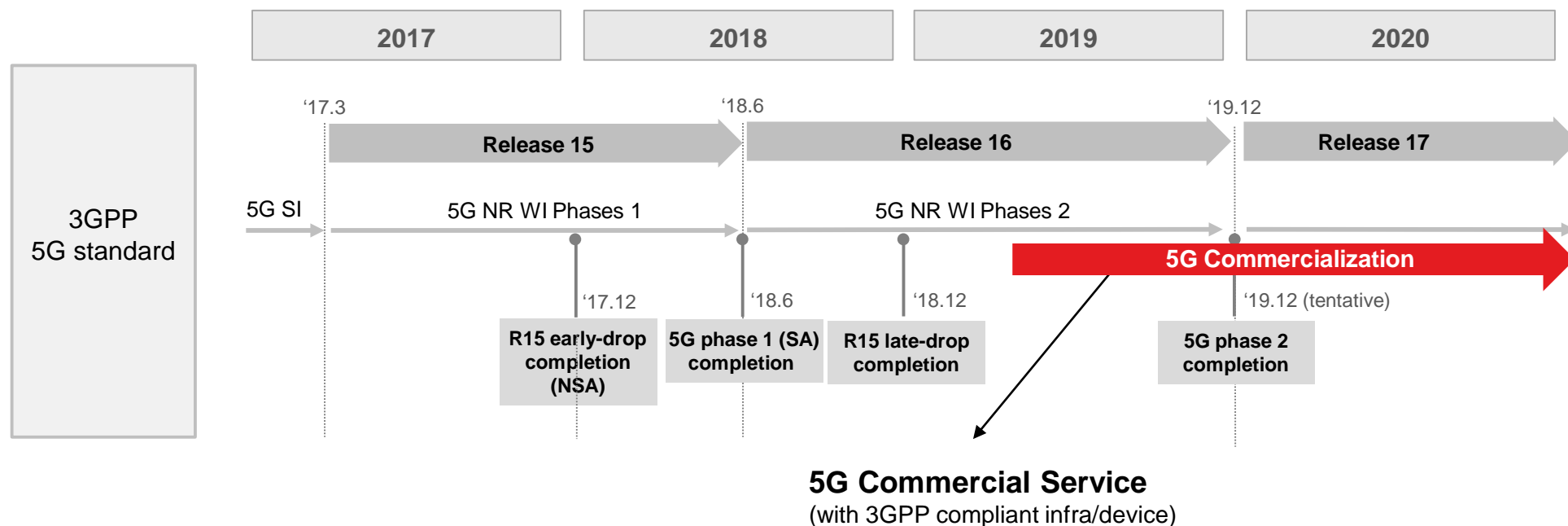
SK Telecom Mobile Network History and 5G

leading mobile network evolution to 5G



5G Commercialization and Services

5G Commercialization will be initiated in 2019 1Q



Smart Factory



Virtual Education



Remote Surgery



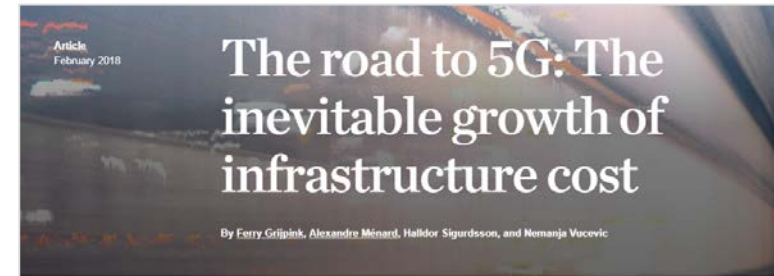
Autonomous Driving

Beyond 5G Technologies Requirement for Telecom Operators

The goal is to provide innovative services with less investment



Customer's satisfaction



Network cost could double as operators strive to meet demand for increased capacity and deploy 5G. How can they maintain their profits?

Each generation of technology opens new opportunities for telecommunications players. But when 4G launched in 2009, mobile operators didn't see the great returns they'd captured with earlier generations. Despite their investments in 4G infrastructure, revenues showed flat or tepid growth. In a few regions, including Europe and Latin America, revenues even dropped after 4G's introduction.

Source : Forbes

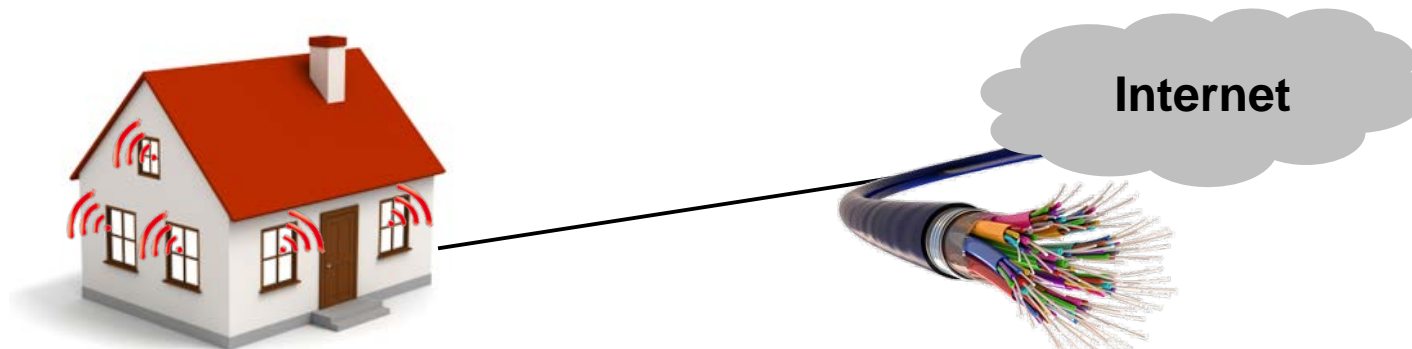
5G service may be expensive

Beyond 5G Technology Requirement

1. **Cost effective with better performance**
2. **Innovative Services**

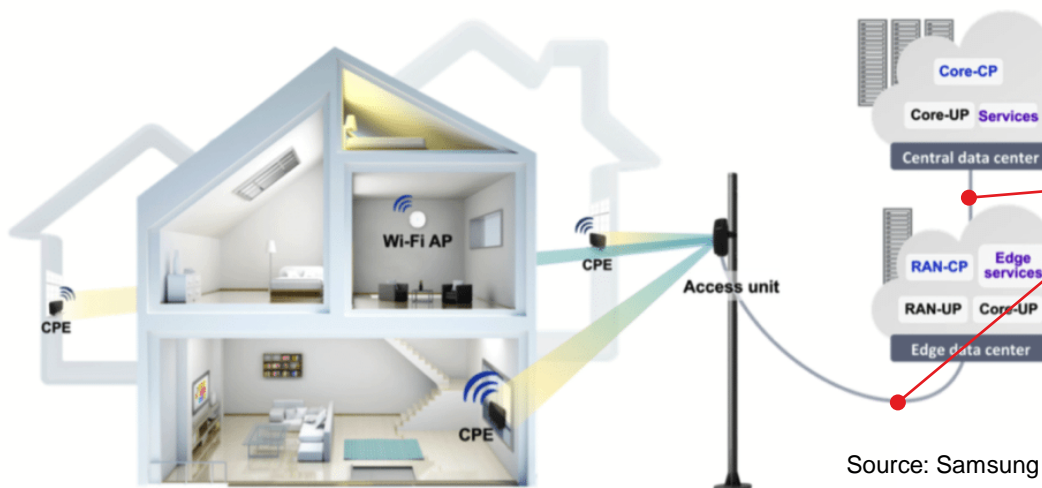
Fiber Optics to Wireless

The last wired network needs to be replaced with wireless networks with tera bps



Expensive for rent, construction, and management

**First version to wireless
FWA (Fixed Wireless Access)**



**Multi-10G Fronthaul/backhaul networks
→ Wireless terabit networks**

Source: Samsung

Terahertz Band Communications

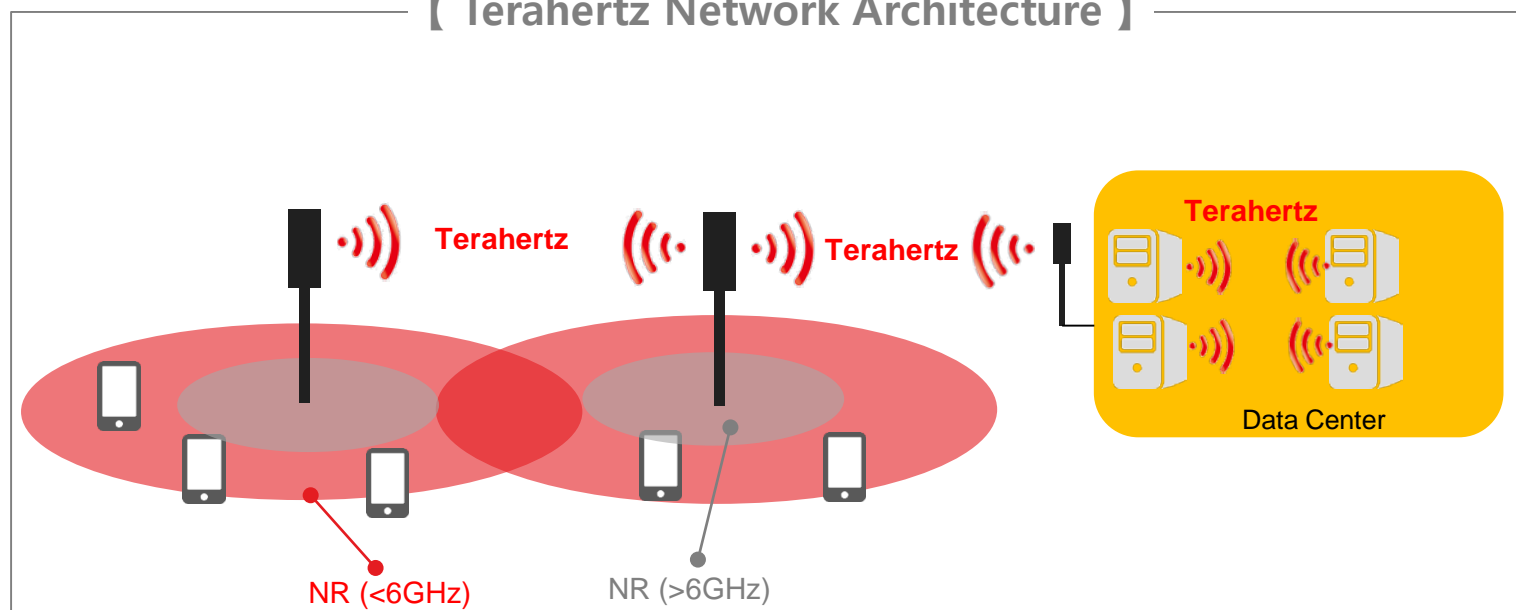
Terahertz band communications will play a key role for substitute for fiber optics



【 Characteristics and challenges 】

- Broad bandwidth
- Very small antenna
- Power consumption (DAC/ADC, RF/PHY)
- Short coverage

【 Terahertz Network Architecture 】



Cell-based to Cell-free Network Architecture

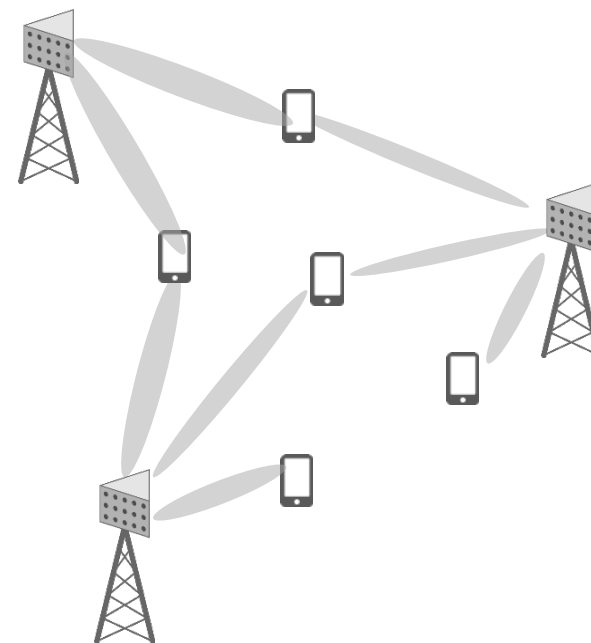
Cell-free network allows to maximize network performance with less investment



Cell-based Network

- Inter-cell interference at cell edge
- Same investment for areas with a few mobile users

Less Investment & Better Performance

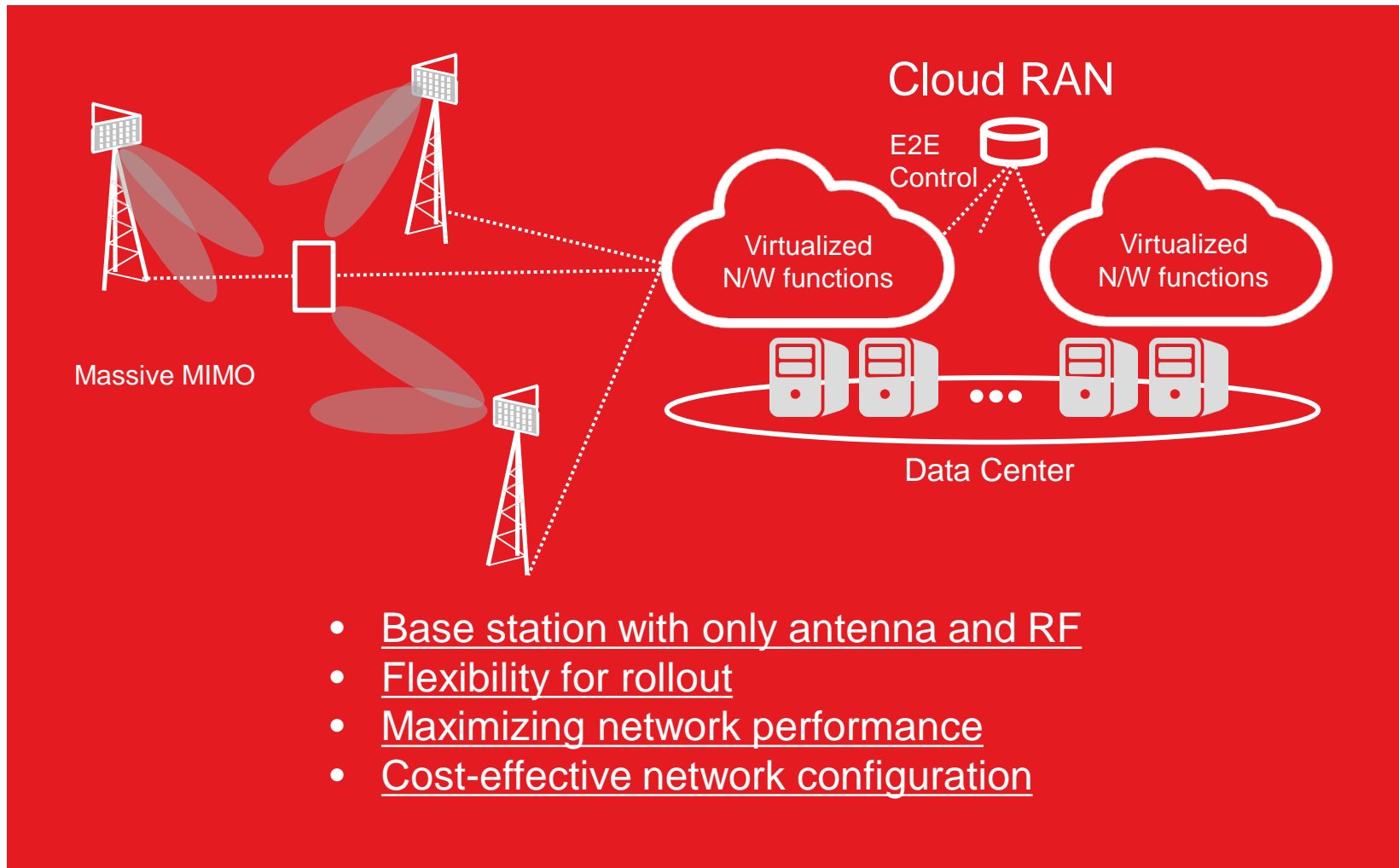


Cell-free Network

- Low interference due to user centric coverage
- Less investment using cooperative beamforming

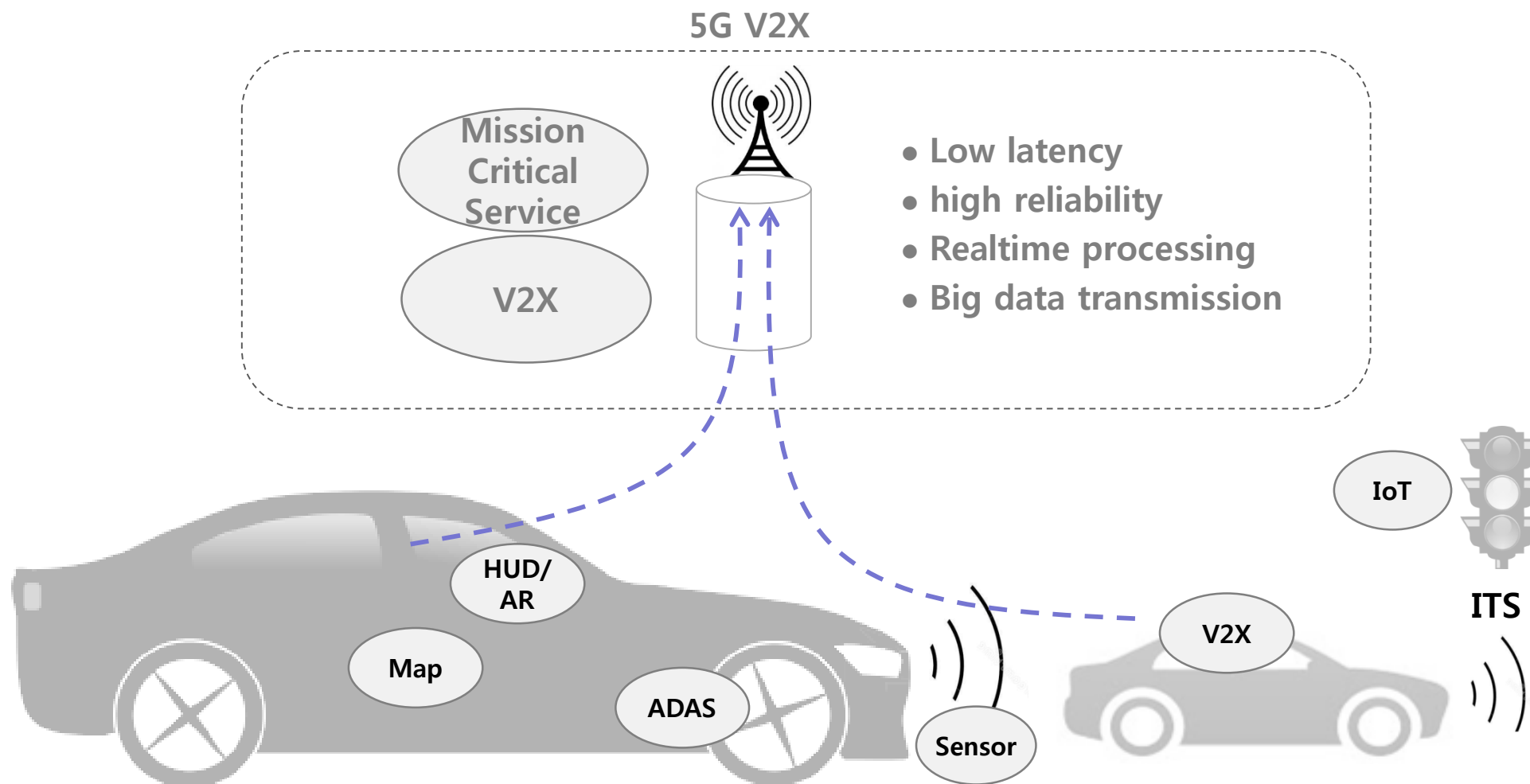
Massive MIMO and RAN Virtualization for Cell-free Network

Fully virtualized RAN with Massive MIMO supports cell-free network



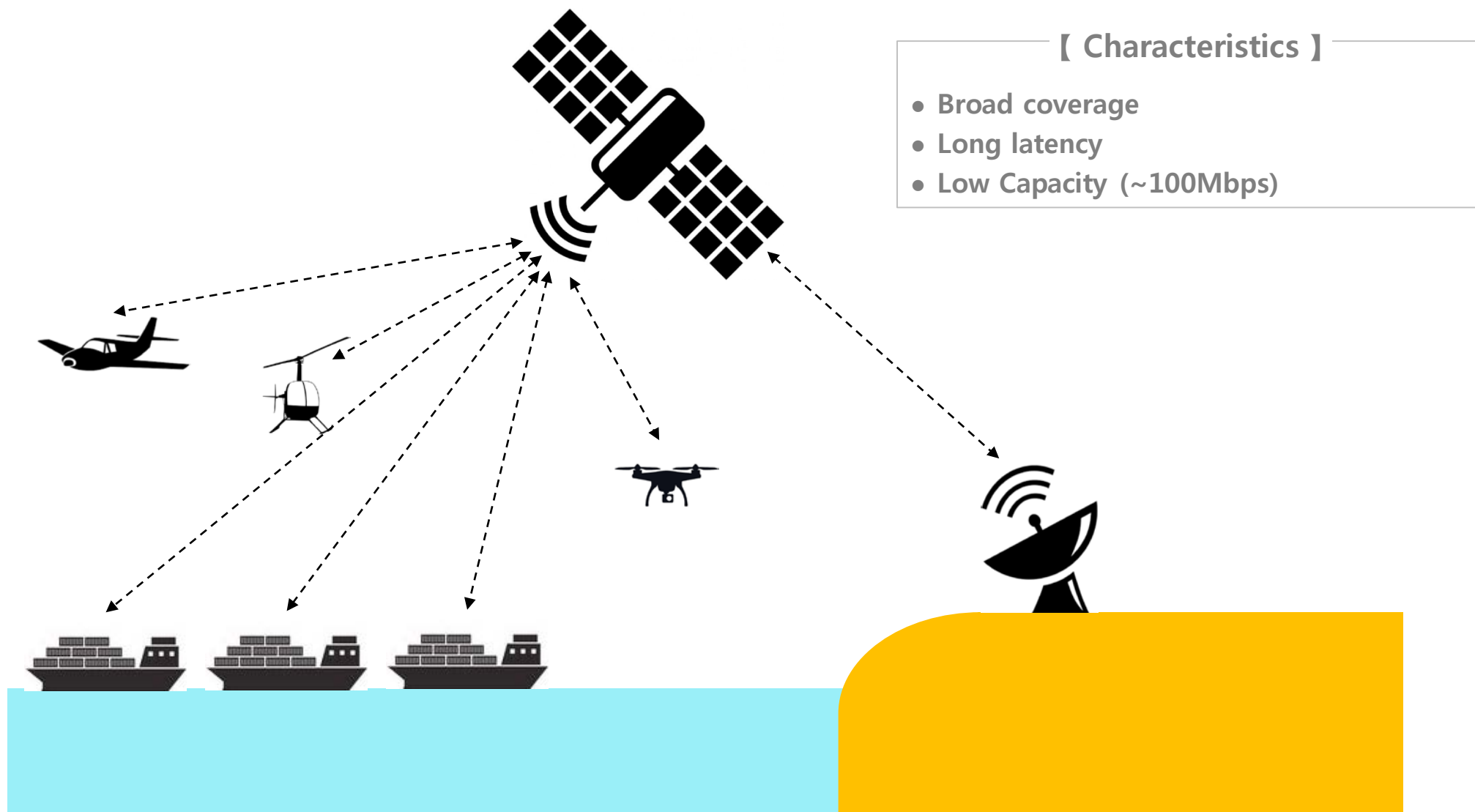
5G V2X for Autonomous Driving

V2X using 5G RANs is currently being standardized for autonomous driving



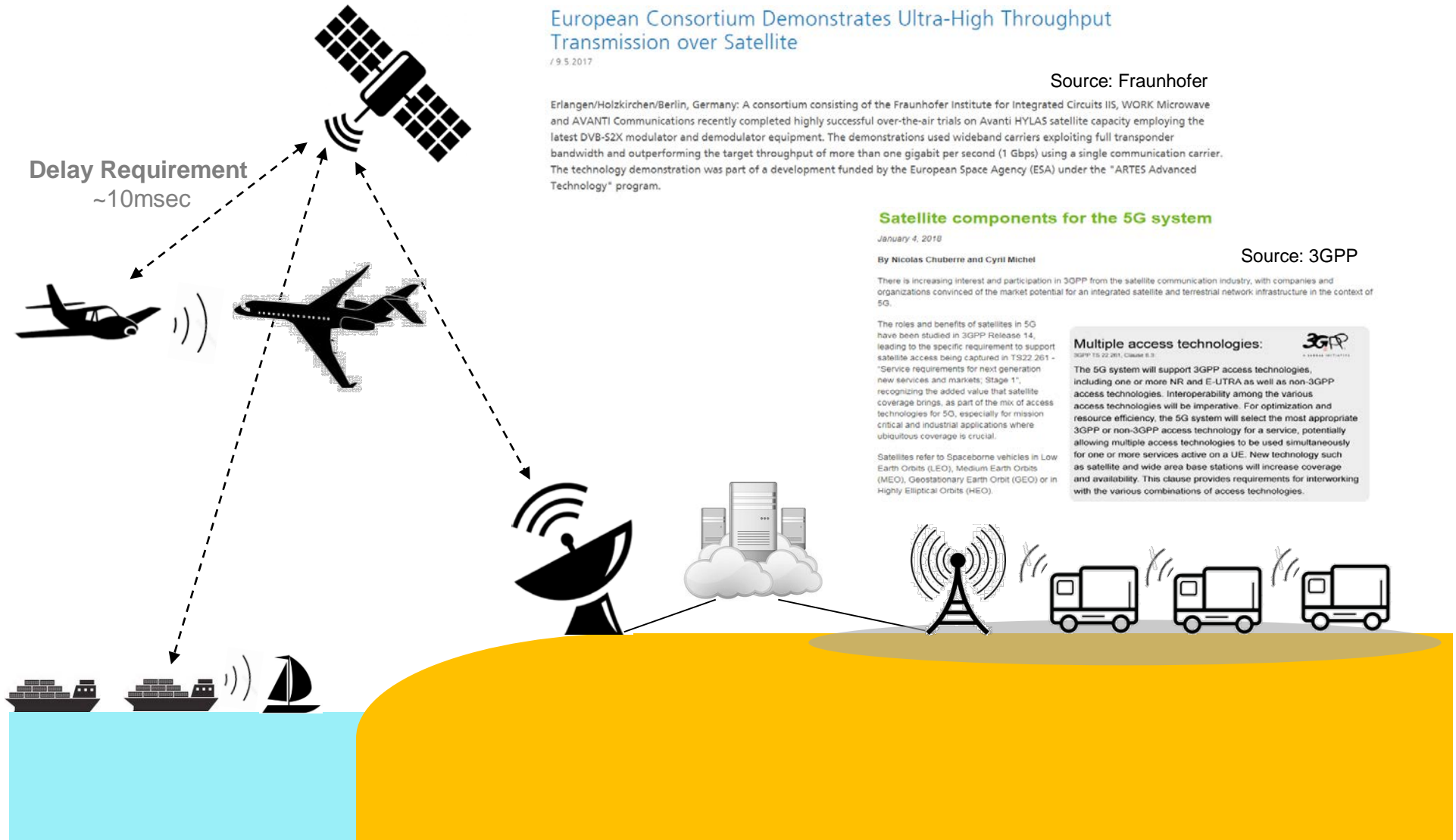
Non-Terrestrial Networks for Autonomous Flight/Voyage

NTNs^{Non-Terrestrial Networks} with extremely broad coverage are essential for autonomous flight in the sky and autonomous voyage at sea in the future



Evolution of Non-Terrestrial Networks

Ultra-high throughput NTN with low latency become a fundamental technology in the future where everything moves freely on its own



1. Terabit Communications with Tera Hertz Waves
2. Full RAN Virtualization with Massive MIMO for Cell-free Networks
3. Ultra-high Throughput Non-Terrestrial Networks with Low Latency for Autonomous Flight/Voyage

