

Indo-European dialogue on ICT standards & Emerging Technologies

(Growth, Profitability & Nation Building)
13-14th March 2014 • New Delhi, INDIA

IN THE FRAMEWORK OF

Project

SESEI

<http://eustandards.in/>



The importance of Spectrum efficiency
...and Many other things as well

Jan Färjh Vice President, Head of Standardization and Industry, Ericsson

wireless access generations

The foundation of
mobile telephony



Mobile telephony
for everyone



The foundation of
mobile broadband



The future of
mobile broadband



The Network
Society

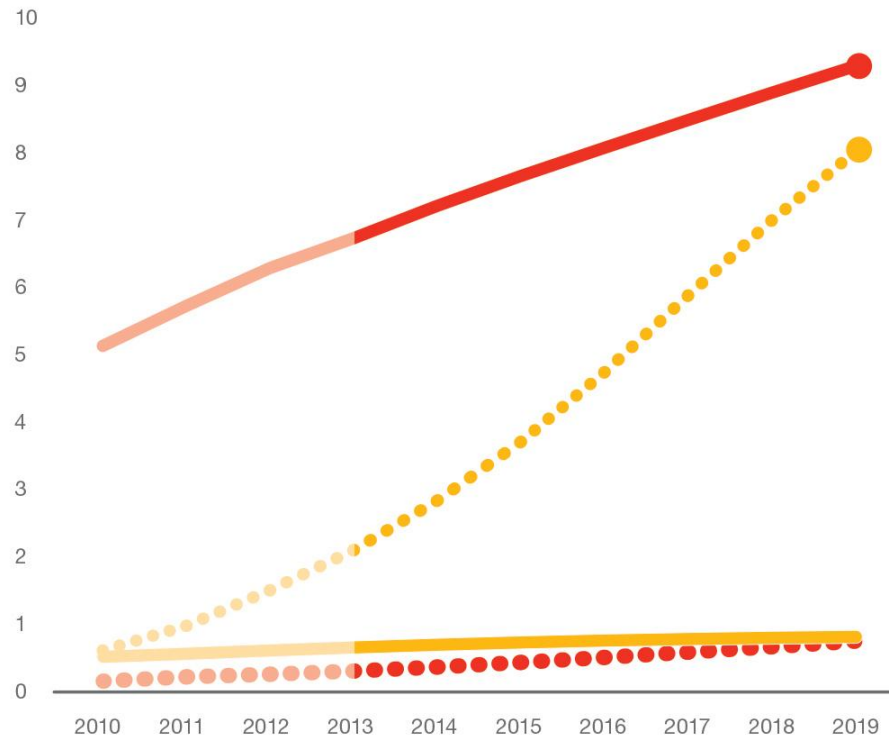


Unlimited access to information and sharing of data
available anywhere and anytime to anyone and anything



Fixed and Mobile subscriptions 2010-2019

Subscriptions/lines (billion)



9.3 BILLION

mobile subscriptions by
the end of 2019

- Mobile subscriptions
- Fixed broadband subscriptions
- Mobile broadband subscriptions
- Mobile PCs, tablets and mobile router subscriptions

Source: Ericsson (November 2013)

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Mobile subscriptions Q3 2013 - regional

6.6 BILLION
mobile subscriptions
globally in Q3 2013



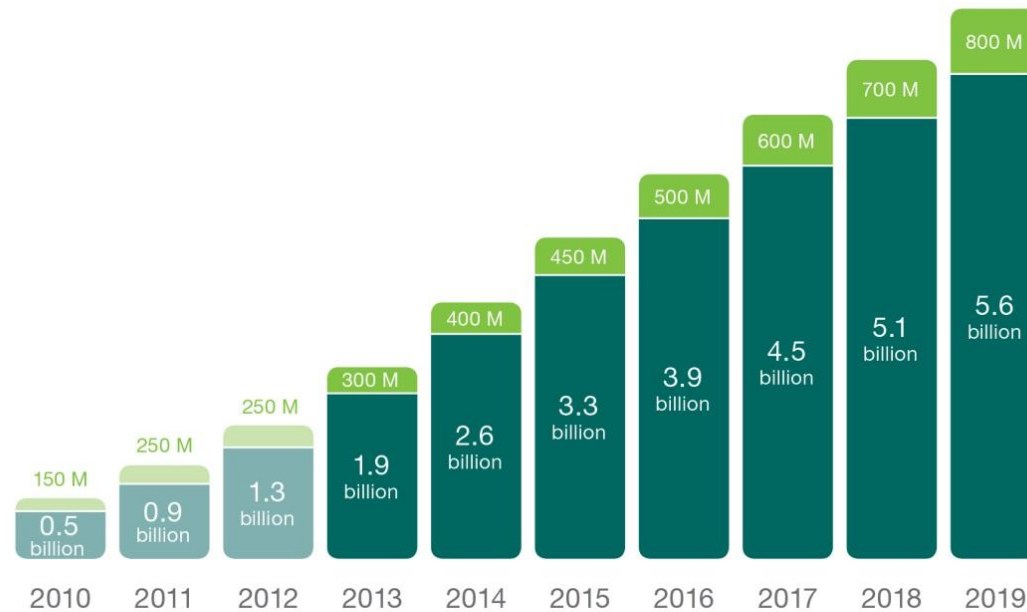
Mobile subscriptions (million)

Source: Ericsson (November 2013)



5.6 Billion smartphone Subscriptions end 2019

Smartphones, mobile PCs, tablets and mobile routers with cellular connection

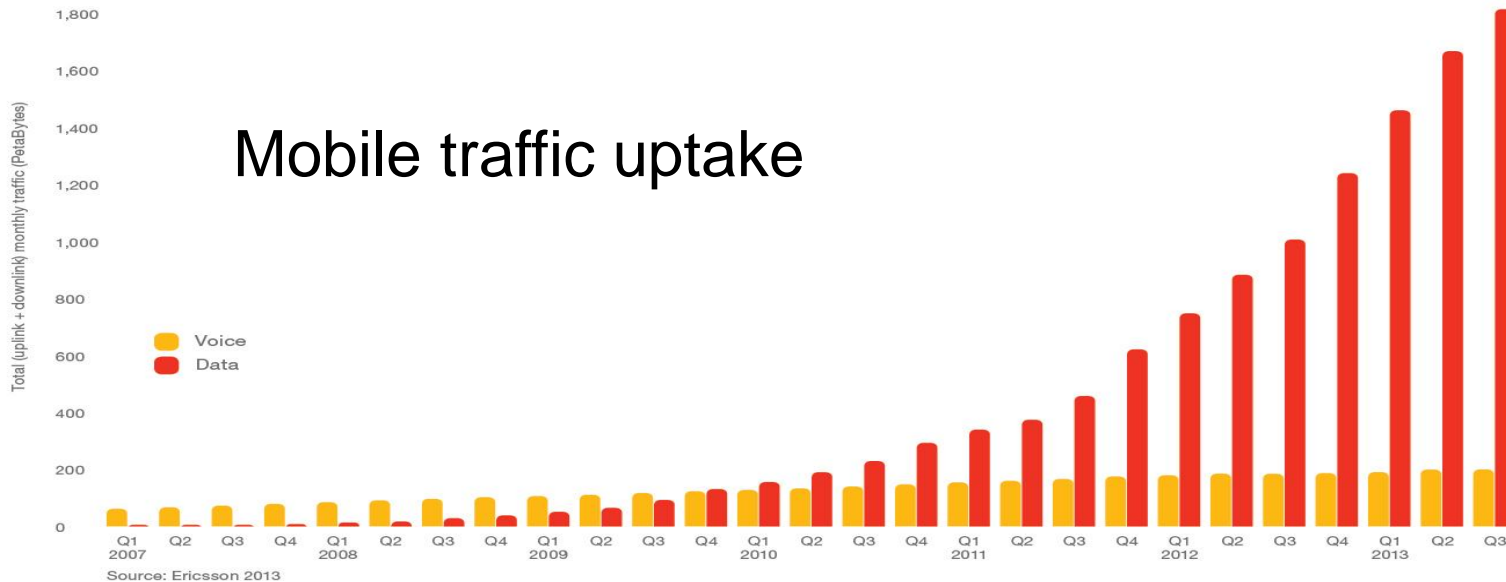


- Mobile PCs, tablets and mobile router subscriptions
- Smartphone subscriptions

Source: Ericsson (November 2013)



Traffic Trend In Mobile systems



Summary of trends

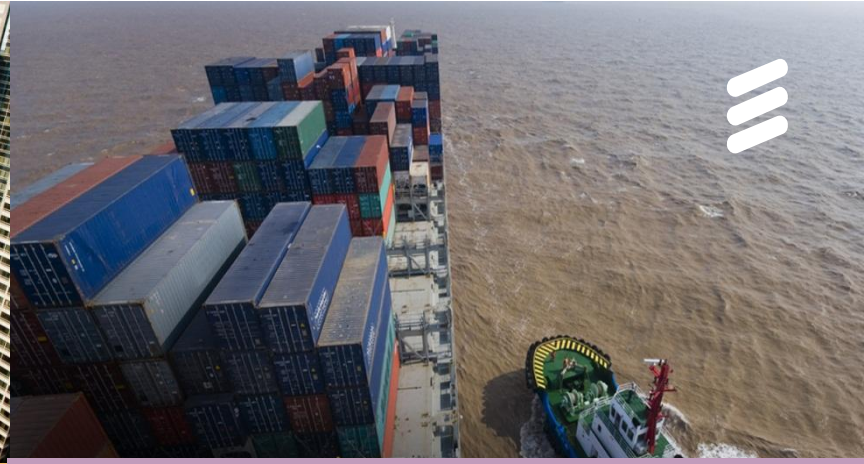
- › More subscribers
- › More smartphones
- › More traffic



5G use cases



Extremely Fast



Massive machine Communication



WORKS IN A CROWD

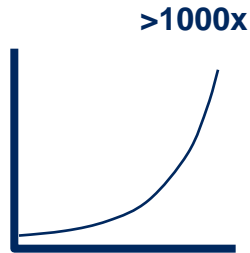


SUPER REAL-TIME AND RELIABLE



5G – Key Challenges

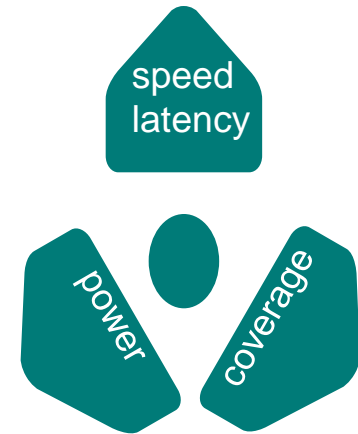
Massive growth in
Traffic Volume



Massive growth in
Connected Devices



Wide range of
Requirements & Characteristics



Affordable and sustainable



5G – Key Challenges

Massive growth in
Traffic Volume

Massive growth in
Connected Devices

Wide range of
Requirements & Characteristics

It is not only about
Bigger and better
Mobile broadband



power

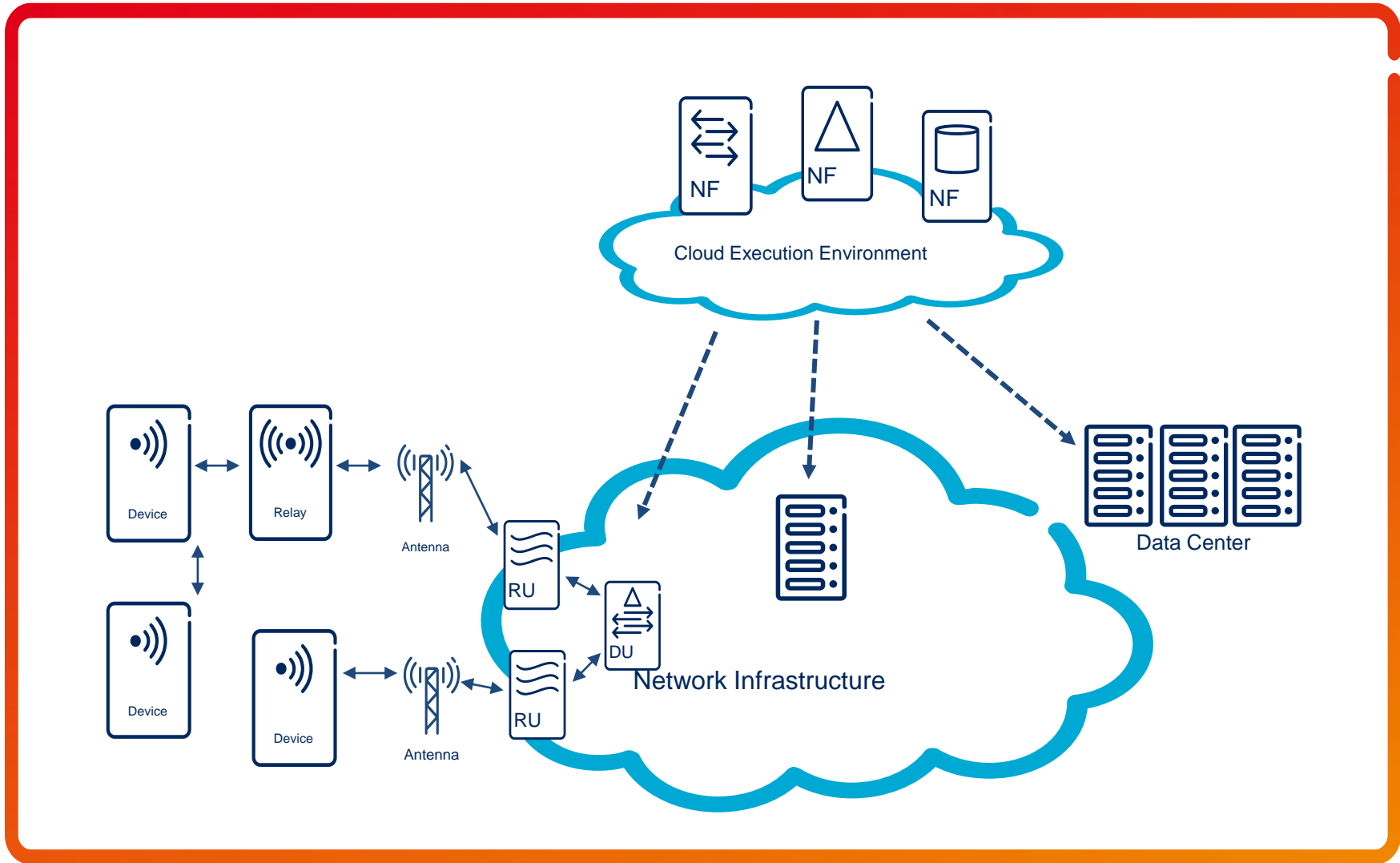
coverage



Affordable and sustainable

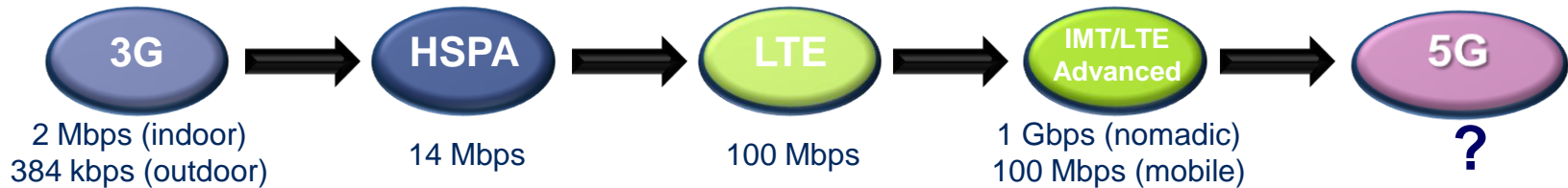


5G systems



Data rates

Higher data rates have been the “flying flag” for each technology step!



In the future

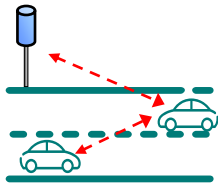
- › 10 Gbps in specific scenarios
- › 100 Mbps generally available in urban/suburban scenarios
- › High-quality (Mbps) connectivity essentially everywhere



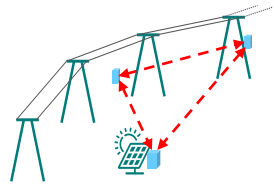
Latency / reliability

LTE radio-interface latency sufficient in most cases

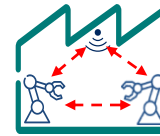
Very low latency may be required by some "new applications"



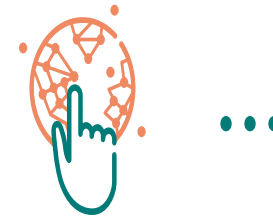
Traffic safety/control



Smart grid



Industrial application



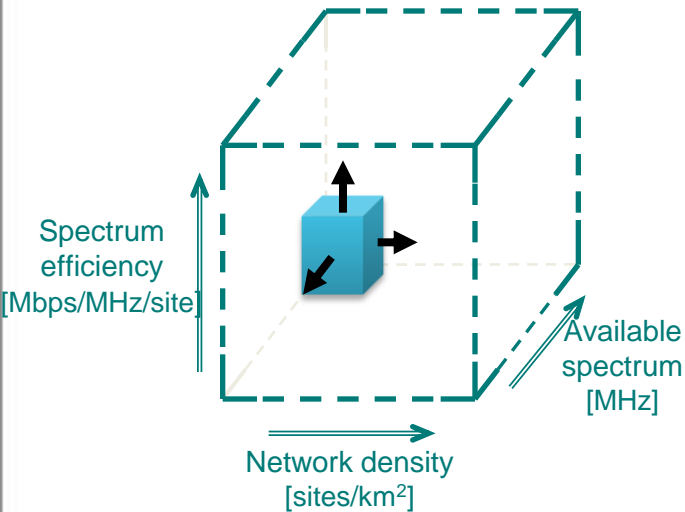
"Tactile Internet"

Target for the future

Possibility for sub-ms latency with very high reliability



Traffic capacity



$$\text{Traffic capacity [Mbps/km}^2\text{]} = \text{Available spectrum} \times \text{Area spectrum efficiency}$$

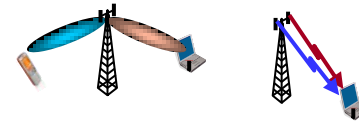
Area spectrum efficiency = Network density × Spectrum efficiency

- › More spectrum – extending into higher bands including mmW band
- › More dense networks – including more extensive antenna configurations
- › Smart cooperation between network nodes

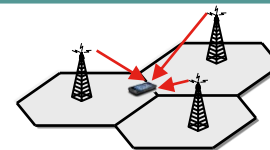


Enhanced spectrum efficiency

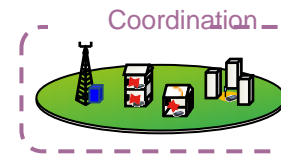
Multi-antenna transmission/reception



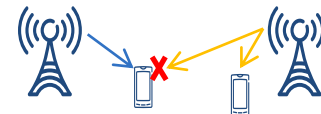
Multi-site transmission/reception



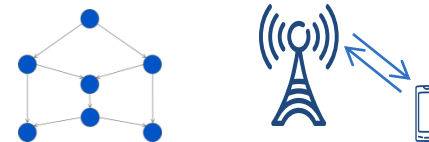
Multi-layer coordination



Interference suppression



Full duplex, network coding, ...



More sPECTRUM

Up to ≈ 2020 – *Extended spectrum availability up to ≈ 6.5 GHz*



More sPECTRUM

Beyond 2020 – *Extension beyond 10 GHz*

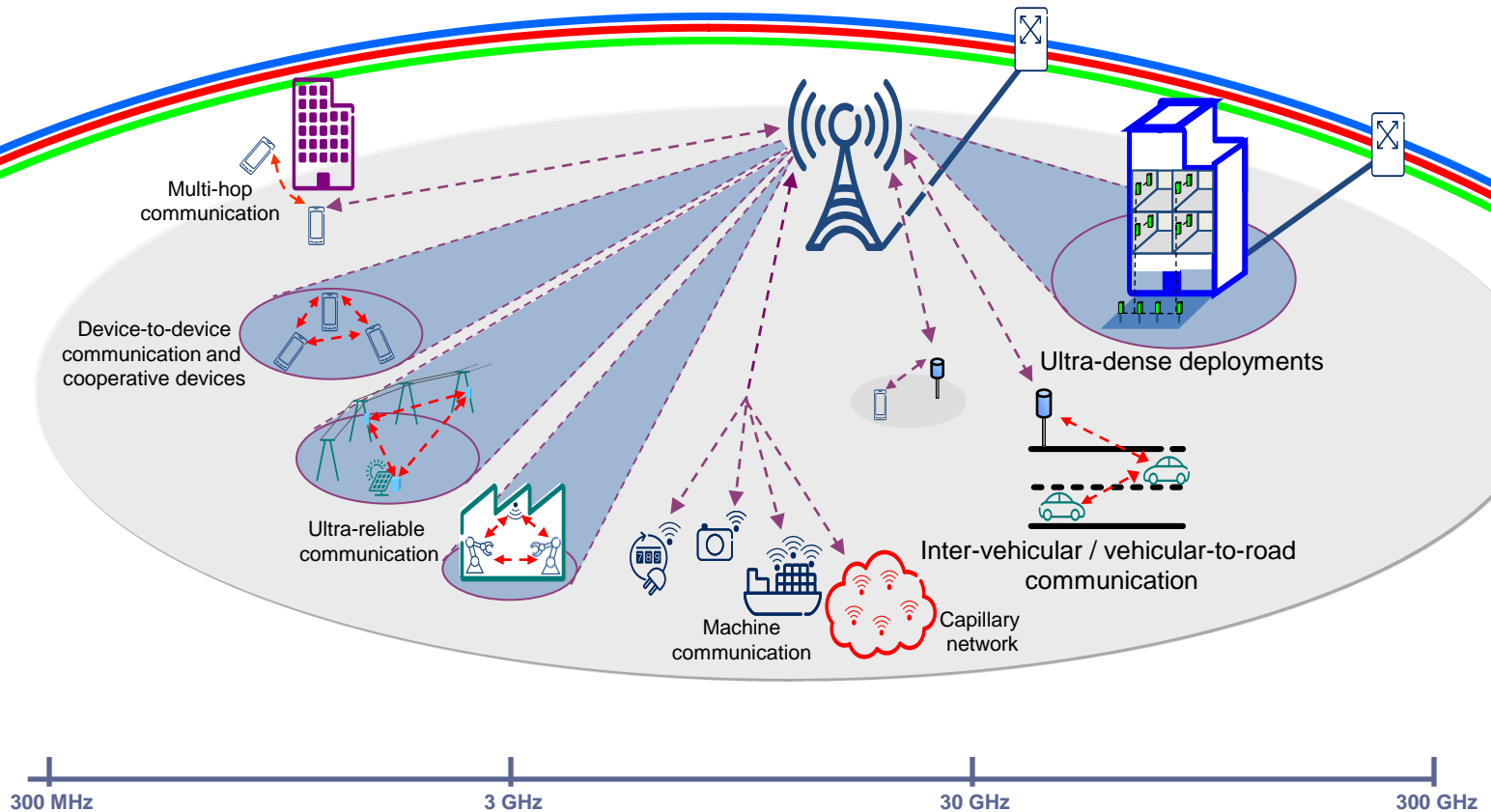


- › Large amount of spectrum available ⇒ Further massive increase in traffic capacity
- › Potential for very large bandwidths ⇒ Enabler of extreme data rates
- › Small wave length ⇒ Enabler for massive antenna solutions



Future Wireless access

In the networked society



Thank you!

