2020:
The Ubiquitous Heterogeneous Network - Beyond 4G

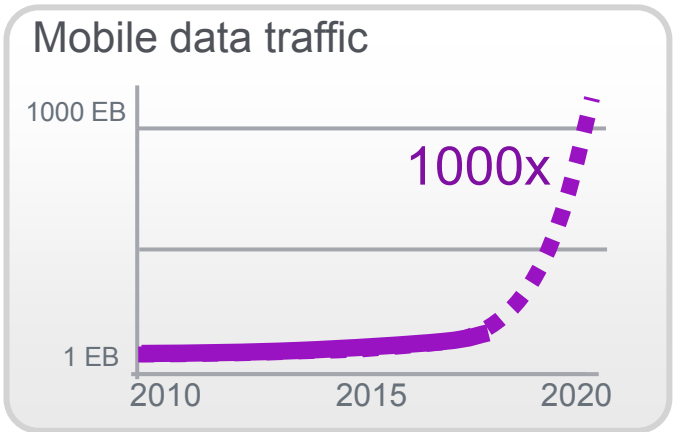
Rufus Andrew
Managing Director: Nokia Siemens Networks SA
ITU Kaleidoscope 2011 – Cape Town, South Africa

Nokia Siemens Networks

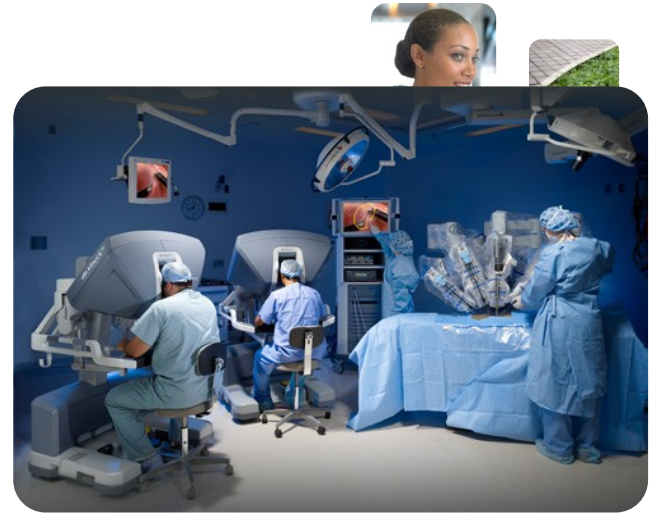
What will the world want from wireless by 2020?

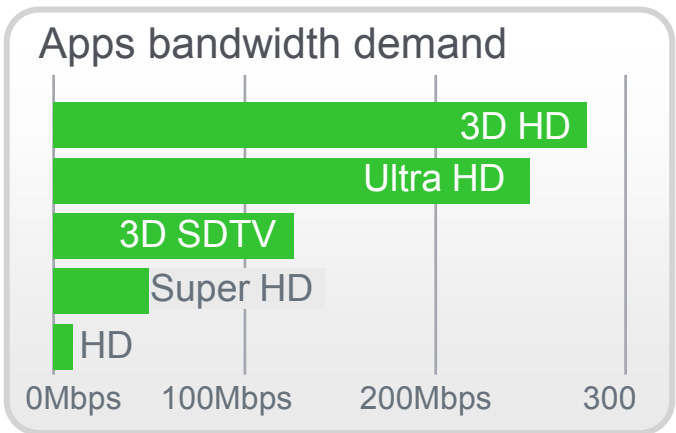
MOBILE BROADBAND

Support up to 1000 times more traffic



Rock solid, ubiquitous connectivity





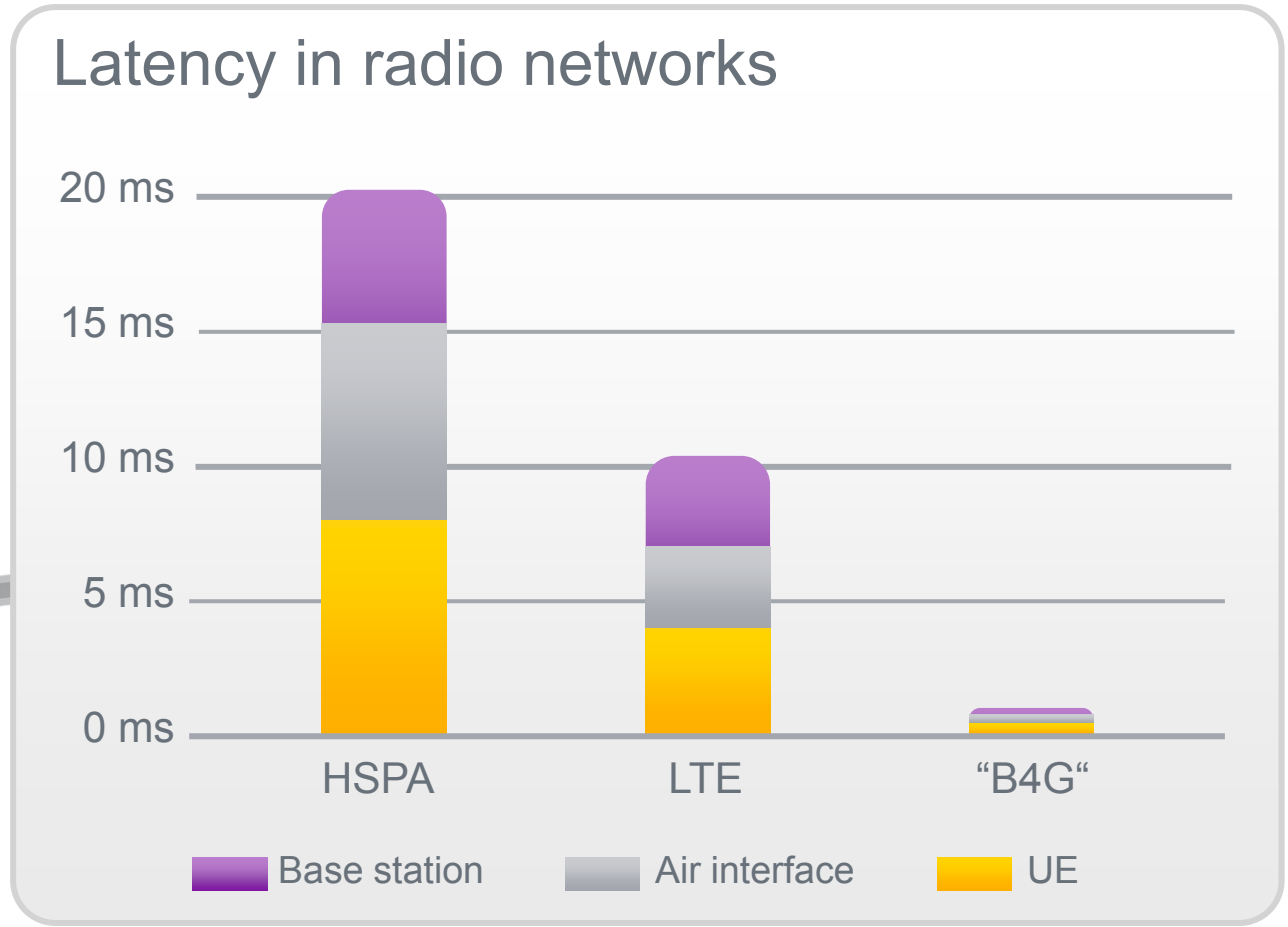
Gbps peak speeds

Millisecond latency for true “local feel”

Nokia Siemens Networks

By 2020 – radio can reduce latency 10x

MOBILE BROADBAND



Radio latency can be pushed to 1 ms by 2020 by using a shorter frame length

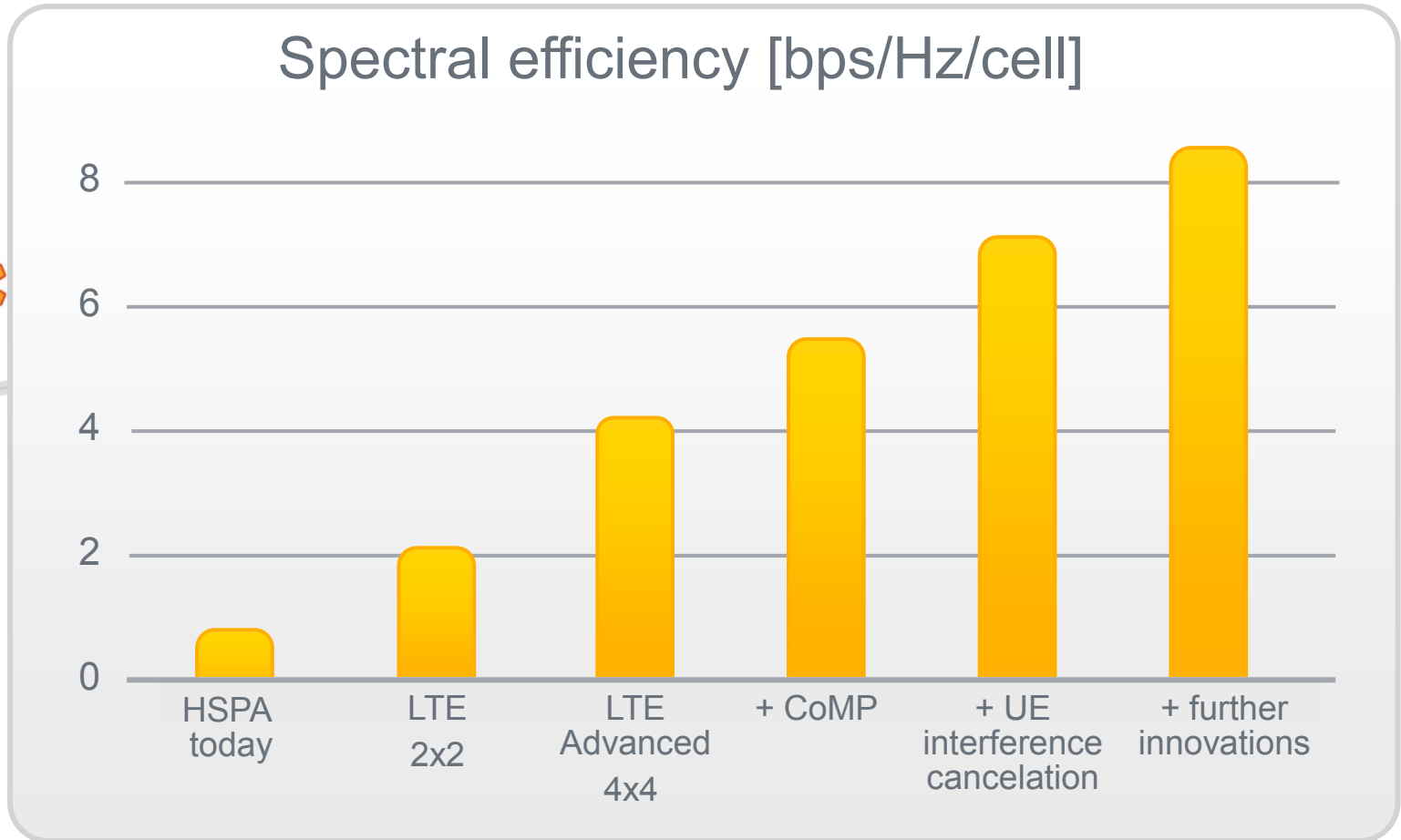
The main benefit is realized when content is close. 1 ms limits fiber length to 100 km.

Enable low-latency M2M solutions

Nokia Siemens Networks

By 2020 - radio can improve in spectral efficiency 10x

MOBILE BROADBAND



Spectral efficiency can be improved by managing inter-cell interference.

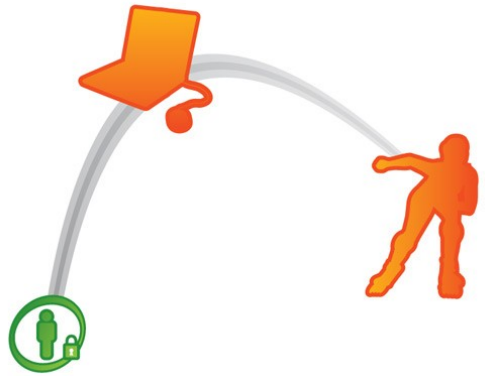
Efficiency is not limited by Shannon law but by inter-cell interference.

Cell edge data rates improve twice as much

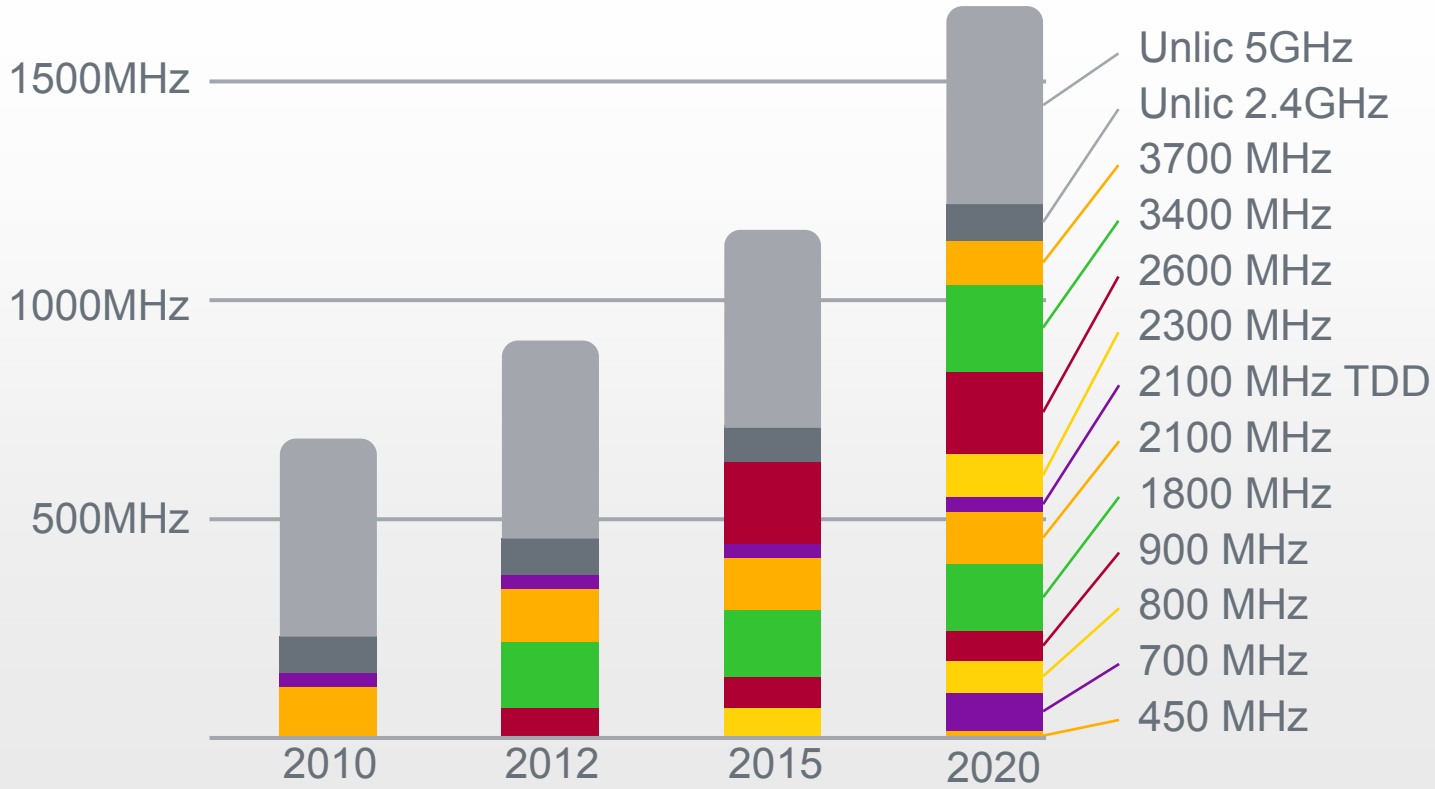
Nokia Siemens Networks

By 2020 - there can be 10x more spectrum available

MOBILE BROADBAND



Evolution of available radio spectrum



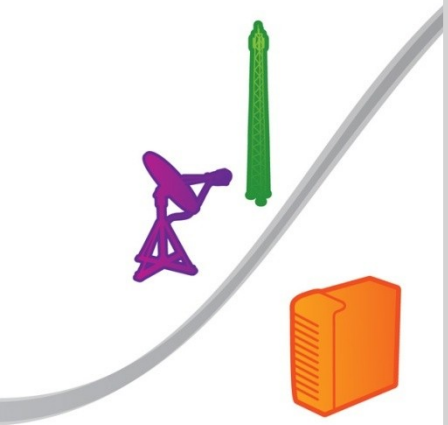
10 times more spectrum can be made available if we drive for it.

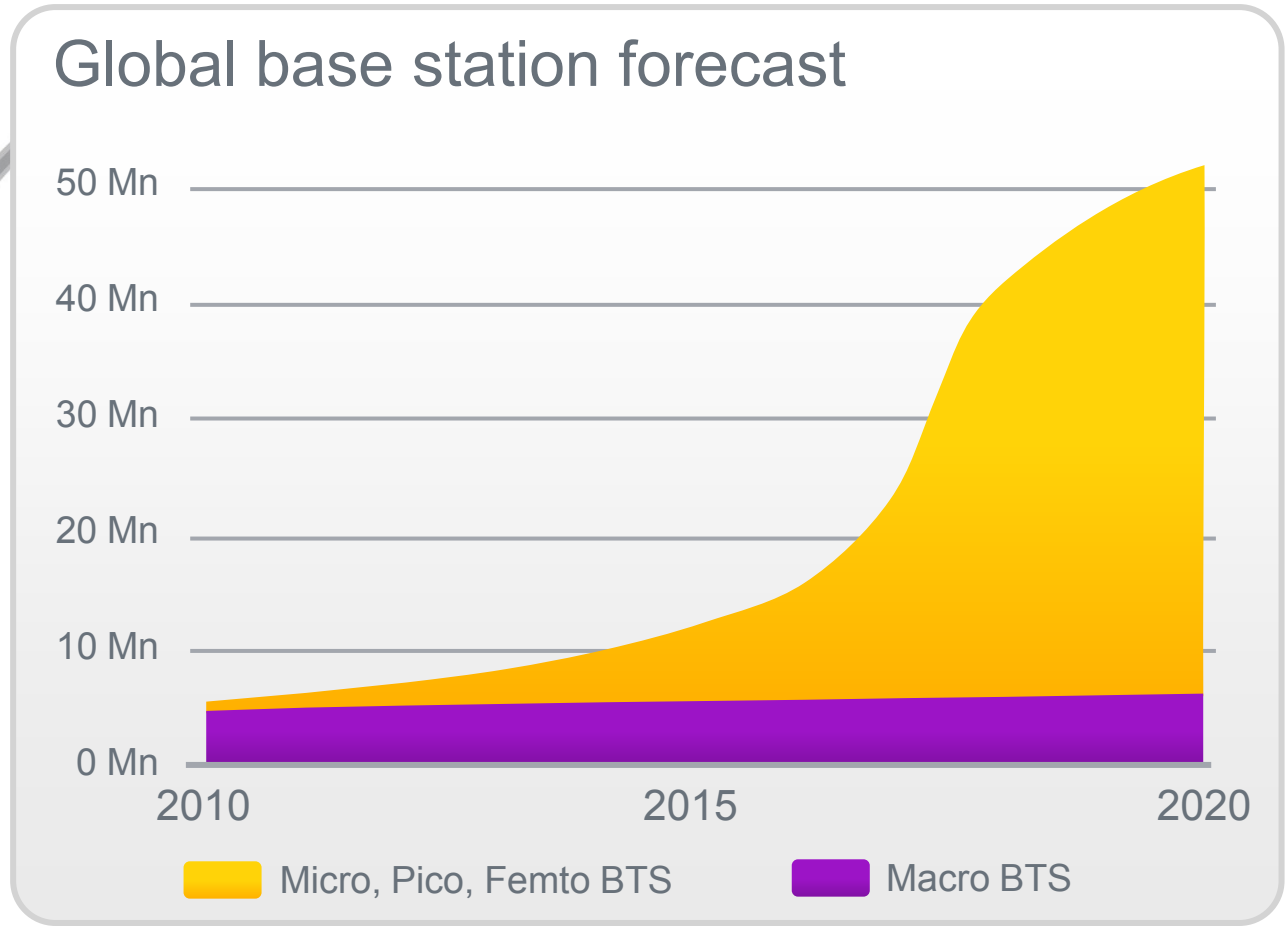
Cognitive radio enables optimized spectrum usage over multiple operators

Nokia Siemens Networks

By 2020 - there will be 10x more base stations

MOBILE BROADBAND





Number of cellular base stations grows to over 50 Million

80% will be microcell or smaller

Additionally more than 500 M WiFi APs

Nokia Siemens Networks

Up to 1000 times more capacity

MOBILE BROADBAND

10x
Performance

10x
Spectrum

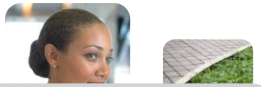
10x
Base stations

=

1000x
capacity

How about the “old” radios in 2020

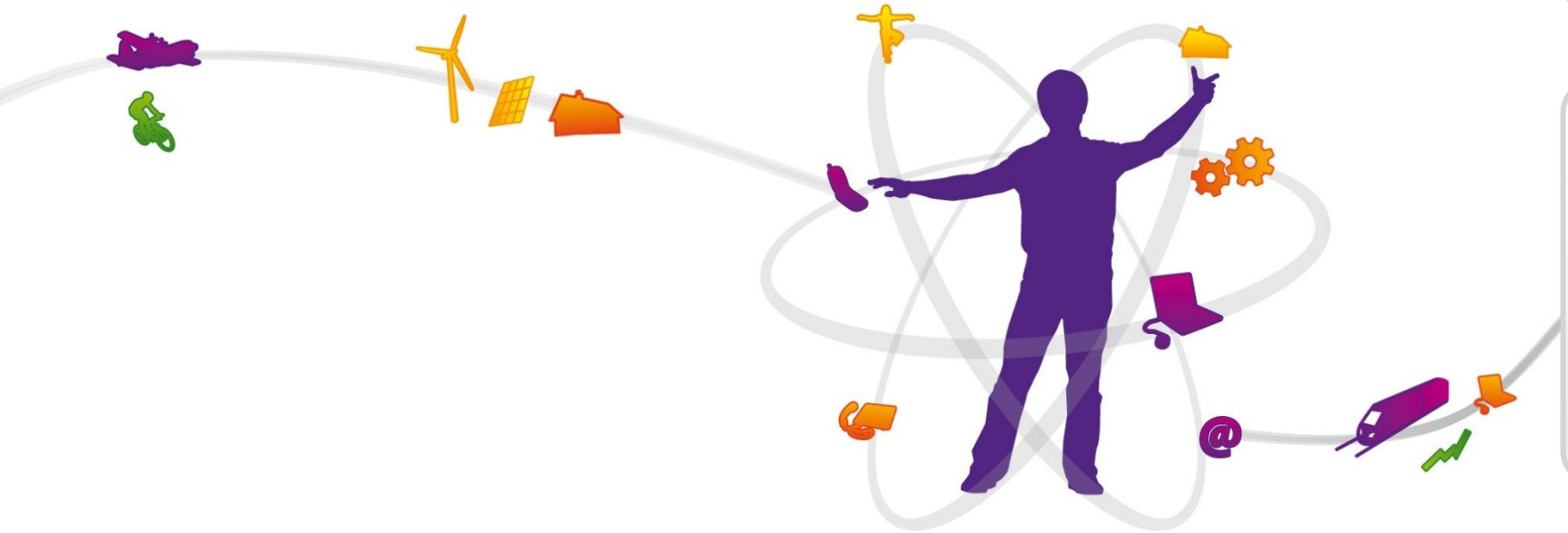
MOBILE BROADBAND

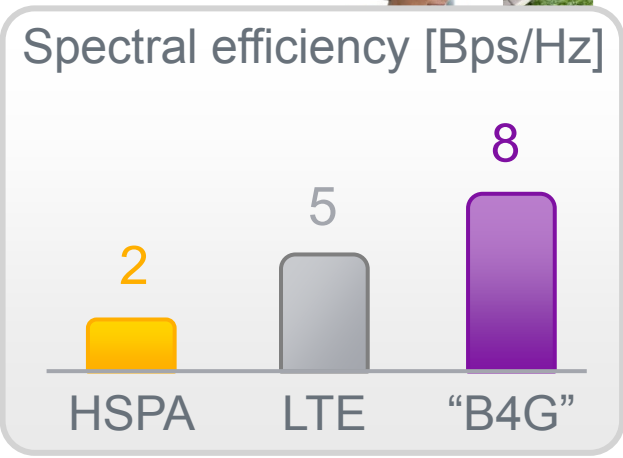


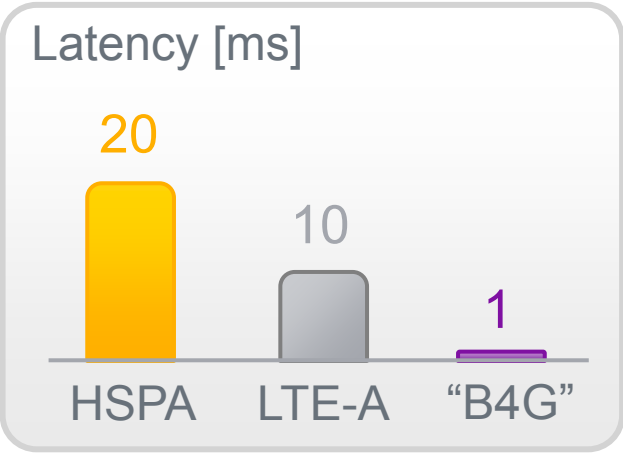
GSM will still be around driven e.g. by installed M2M base and billions of legacy devices

HSPA and LTE networks will deliver the ubiquitous mobile broadband experience.

Carrier WiFi will carry up to 50% of total traffic .



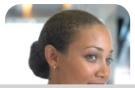




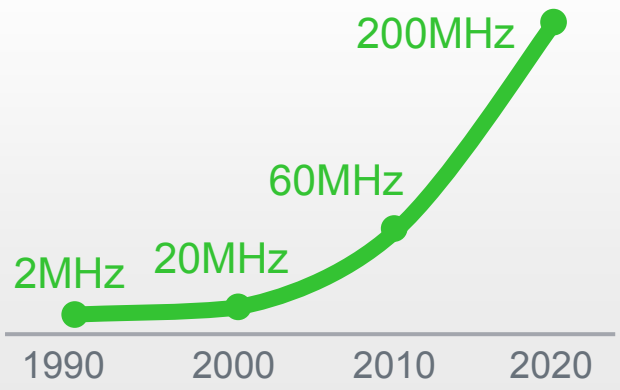
Nokia Siemens Networks

How can we build this?

MOBILE BROADBAND



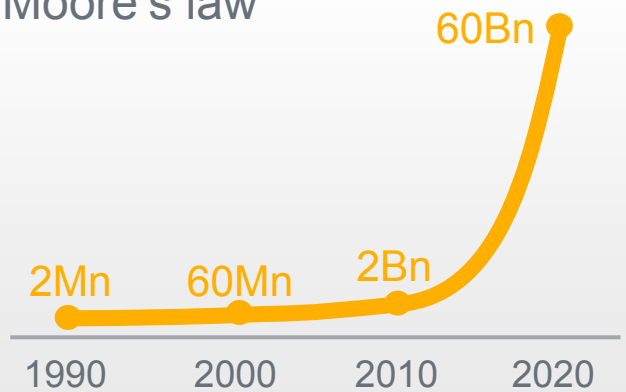
Radio frequency bandwidth capability of basestations



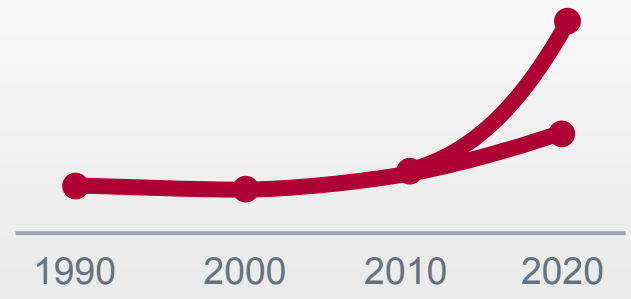
Switched mode power amplifier, high-voltage GaAs HBT and GaN technologies for wideband radios with multicarrier capabilities

System on Chip enables small radios, low power consumption & integration of intelligent functions. SDR is no problem for digital processing!

Continous growth of computing power with Moore‘s law



Laws of physics determine antenna size



For same performance, antenna size does not get smaller. Size even increases if beamforming is required

Nokia Siemens Networks

What will a macro site look like?

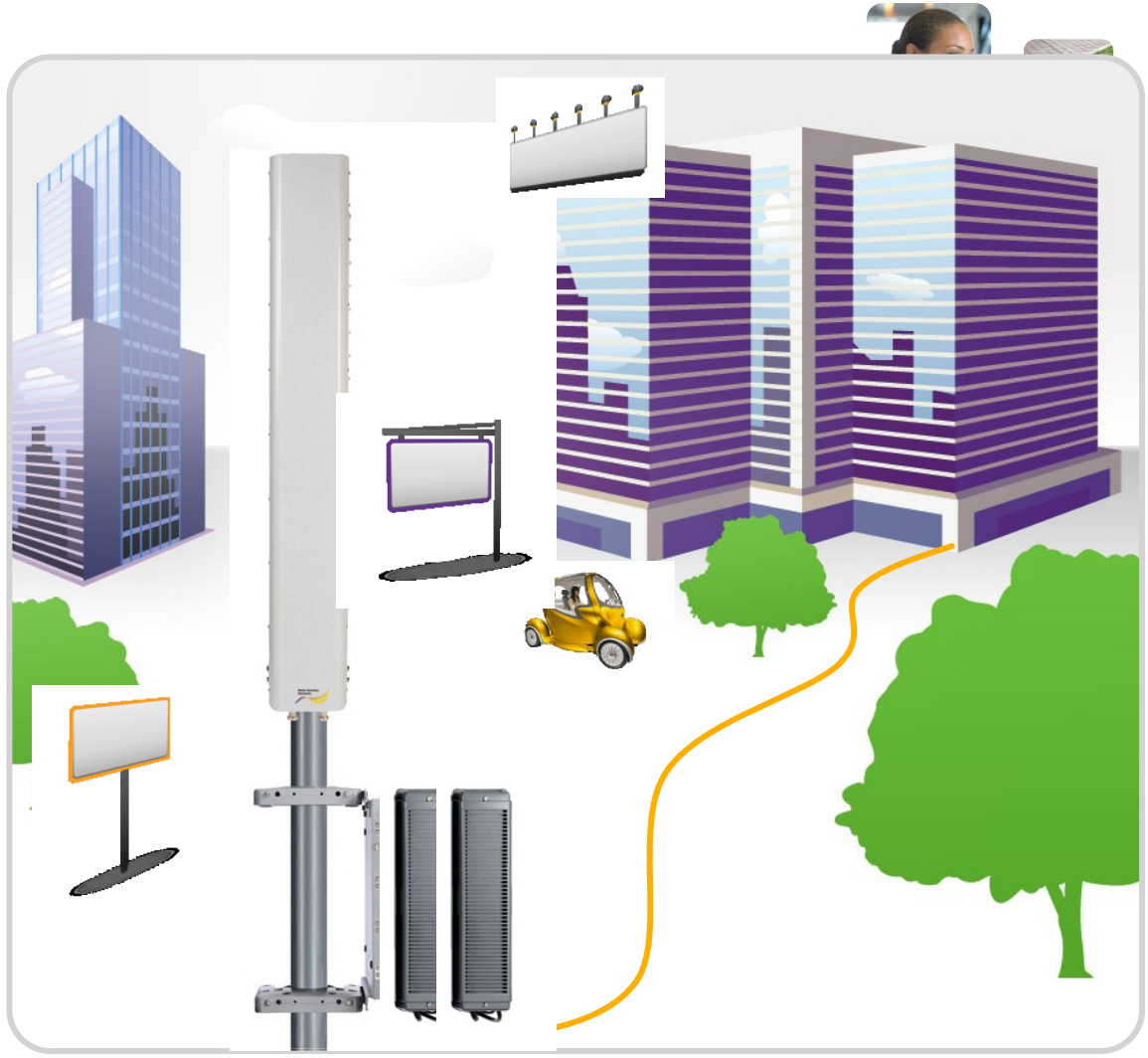
MOBILE BROADBAND

Bulky shelters have disappeared - base stations installed on mast tops

RF module is integrated with the antenna

Baseband processing is integrated with the antenna, or pooled at central site

New antenna form factors emerge: panels, arrays, irregular shapes



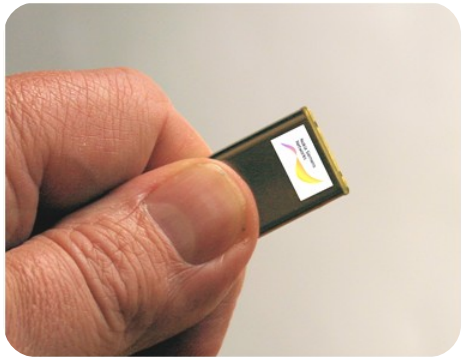
Nokia Siemens Networks

What will a small base station look like?

MOBILE BROADBAND

Pico/Micro size is dictated by required antenna performance

Femto module shrinks to finger tip size



How can we deploy, commission and maintain all the radios, frequency bands and layers?

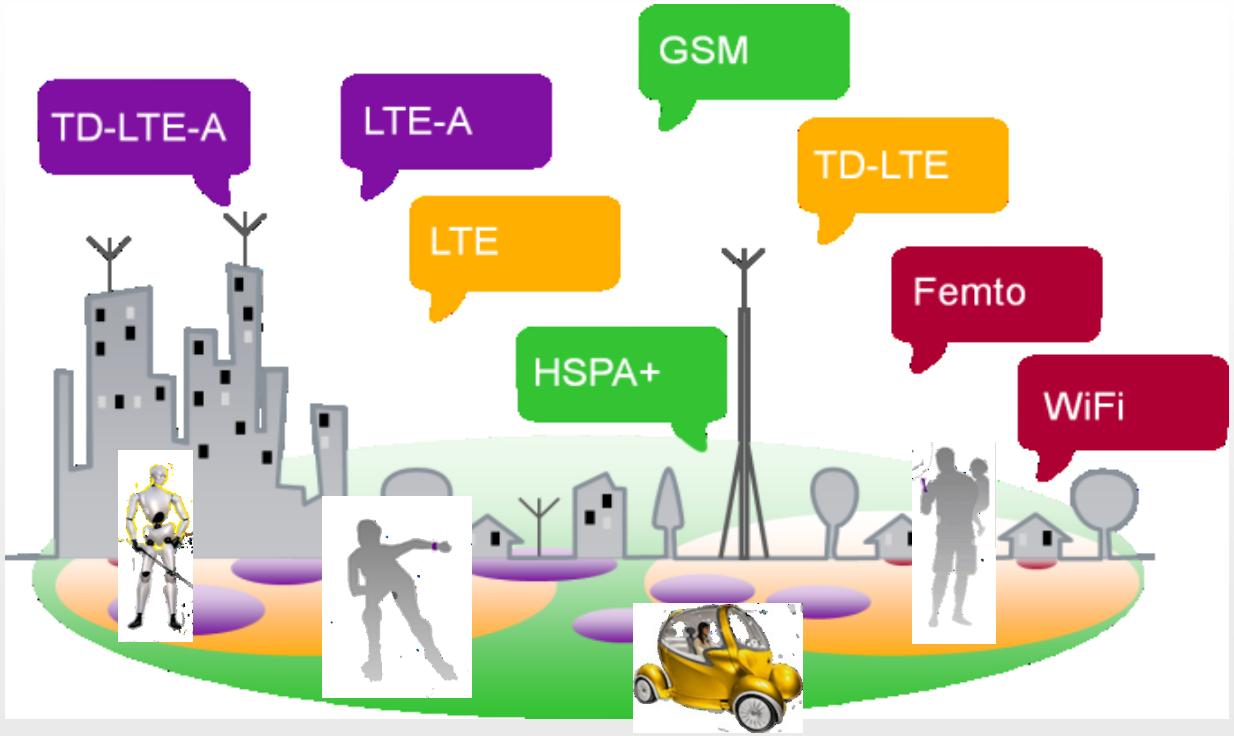
MOBILE BROADBAND

All cells and frequency layers automatically managed by advanced SON

All spectrum under unified RRM for instant capacity and coverage optimization

Cognitive networks will reduce errors, improve quality and lower operation and energy costs

Virtually one ubiquitous connectivity



Nokia Siemens Networks

Gigabit Experience
Reliable, Efficient and Personal

MOBILE BROADBAND

Ubiquitous Connectivity

Unified Radio Resource Management

Cognitive Networks

Active Antennas

Wideband Multiradio

Liquid Radio

Multi-Carrier

Multi-Standard

Heterogenous Networks

Self Organized Networks

Nokia Siemens Networks

Thank you!

Nokia Siemens Networks