



Industry developments

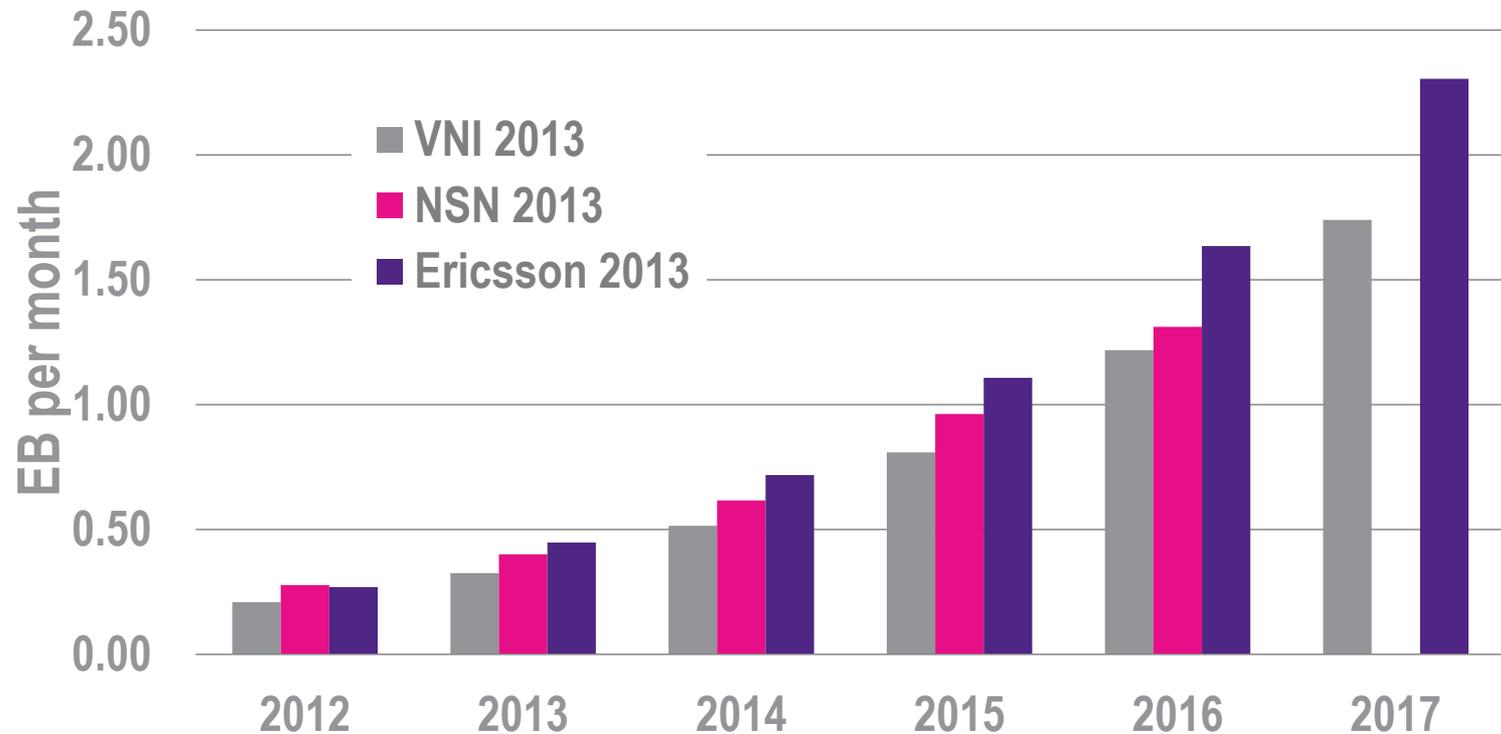
Tony Lavender
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Growth forecasts (1)

CEPT mobile data traffic

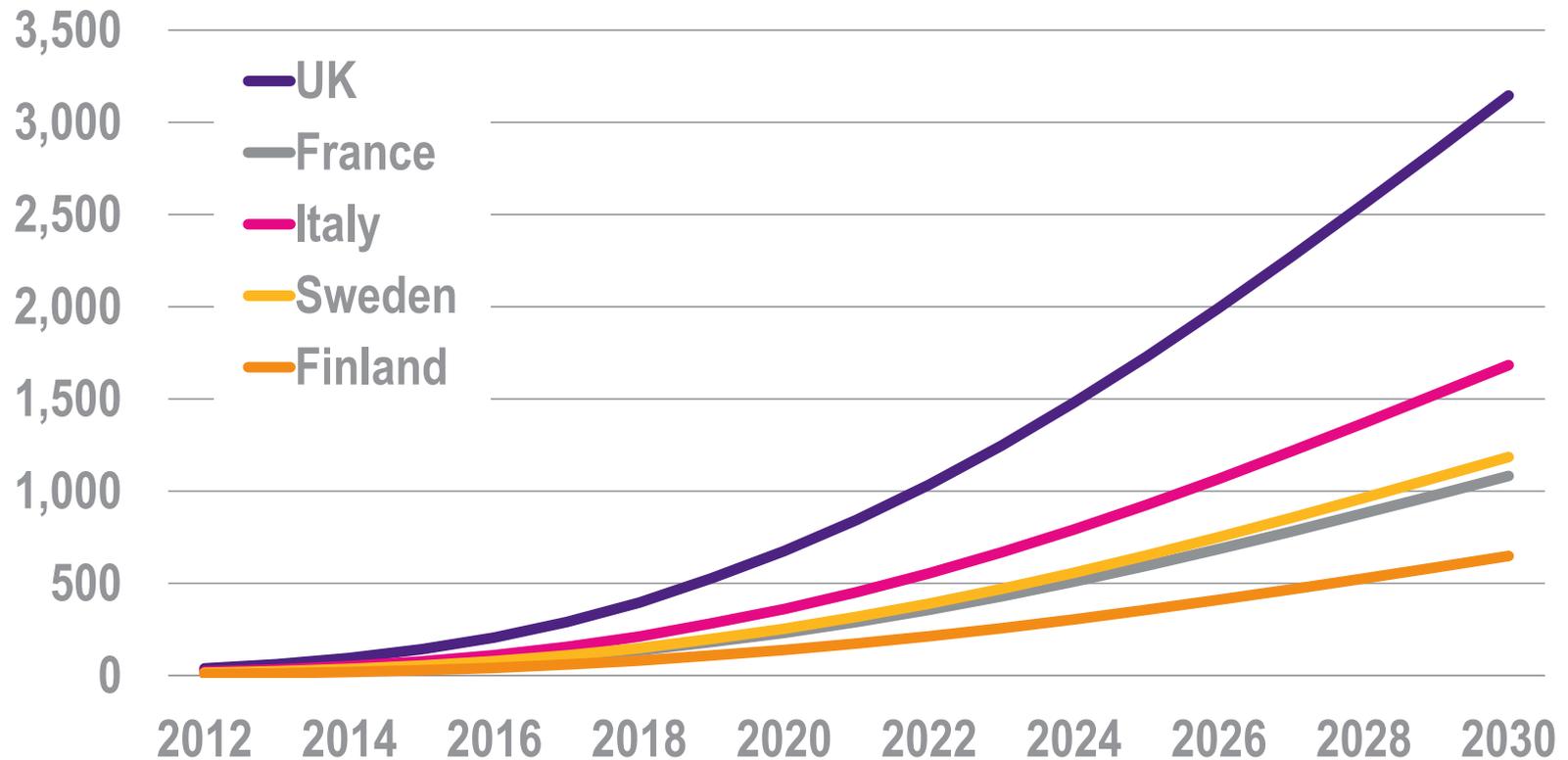


Estimated by assuming that relevant CEE represents the same percentage of Western Europe traffic as in Cisco VNI 2013

Source: Cisco, Ericsson, NSN, Plum Analysis

Growth forecasts (2)

Traffic projections (PB/month)



Source: Cisco, NRA, Plum Analysis

Traffic growth

- Traffic growth / need for more capacity can be addressed with
 - More spectrum
 - More efficient network design (e.g. more cells)
 - More effective technology (e.g. 4G)
 - In practice a combination of all of these
- Traffic growth has implications beyond the RAN
 - Backhaul needs to support capacity requirements (and changing network topologies)
 - Use of network sharing continues to grow
 - Mix of fibre and high capacity radio

Spectrum supply

Licensed

Today

2015-2020

Beyond 2020



Spectrum band
800 MHz
900 MHz
1800 MHz
2100 MHz
2600 MHz TDD
2600 MHz

Spectrum band
700 MHz
1400 MHz
2300 MHz
3400 MHz

Spectrum band
UHF below 700 MHz
More at 1400 MHz
2700 MHz
3600 MHz

Unlicensed

Spectrum band
5 GHz (Wi-Fi)

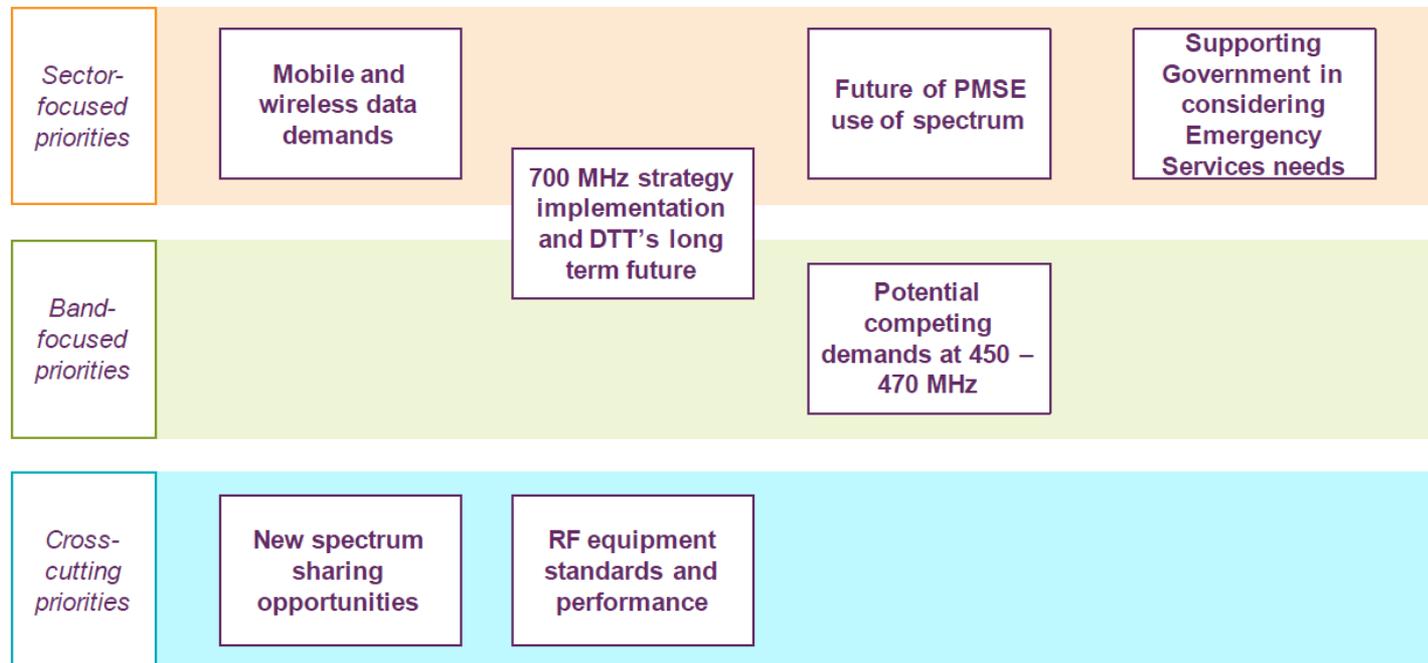
Decisions at WRC15 and WRC 18 and through European Commission

Public sector release programme

- Release of 190 MHz of MOD spectrum at 2.3 GHz and 3.4 GHz
 - TDD band plan
- The award was originally being run by MOD but now being run by Ofcom
 - Consultation / call for inputs (October 2013)
 - Subsequent consultation (February 2014) on technical coexistence
- The 2.3 GHz band is being harmonised in Europe and it is already appearing on devices elsewhere in the world
- The 3.4 GHz band is allocated by the ITU for fixed, mobile, fixed satellite and radio location
 - Decision 2008/411/EC and now looking at amendment to original technical conditions

Ofcom and spectrum management

- Ofcom published its consultation on Spectrum Management for the next 10 Years in October 2013
 - Attempts to identify the issues (for all spectrum use managed by Ofcom) and to set some priorities (see figure below)
- Also Government is working on a national spectrum strategy (being run by DCMS) and a draft is expected in the spring



Source: Ofcom

Small cells and heterogeneous networks



Source: Ericsson

- Mix of macro to small cells laid out to provide capacity where and when required
 - Macro cells for coverage
 - Small cells for traffic capacity
- Needs suitable spectrum
- Channel aggregation and other network developments plays role
 - LTE Advanced (LTE-A)
- Backhaul engineering
 - How close does fibre come to cells?
 - Use of high bandwidth radio backhaul
- Network management
 - Dynamic management of traffic, network resources and spectrum

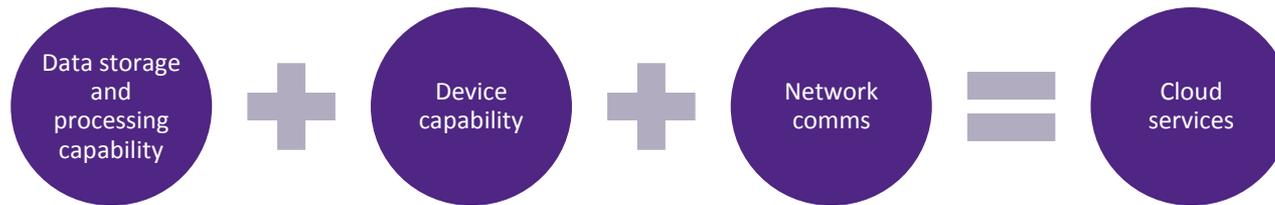
And then comes 5G



- Already lots of discussion and programmes underway
- Moves even more to definition of a communications system rather than an air interface
 - Abstraction of applications and communications layers
 - Need for even more sophisticated network management
- Demand attentive networks
 - “Creating the perception of unlimited bandwidth in an untethered fibre-wireless world” – *Source: the IET*
- Realistically standards by 2020?

Mobile cloud

- Most apps are supported by the cloud in some way



- Use of cloud for delivery of consumer and enterprise services is growing
 - Can either be hosted by the network operator or by third parties
- Service innovation taking place outside of the mobile network
 - New revenue and profit models
 - Challenges for network operators with traffic growth

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