

4G EVOLUTION AND 5G SPECTRUM POLICY

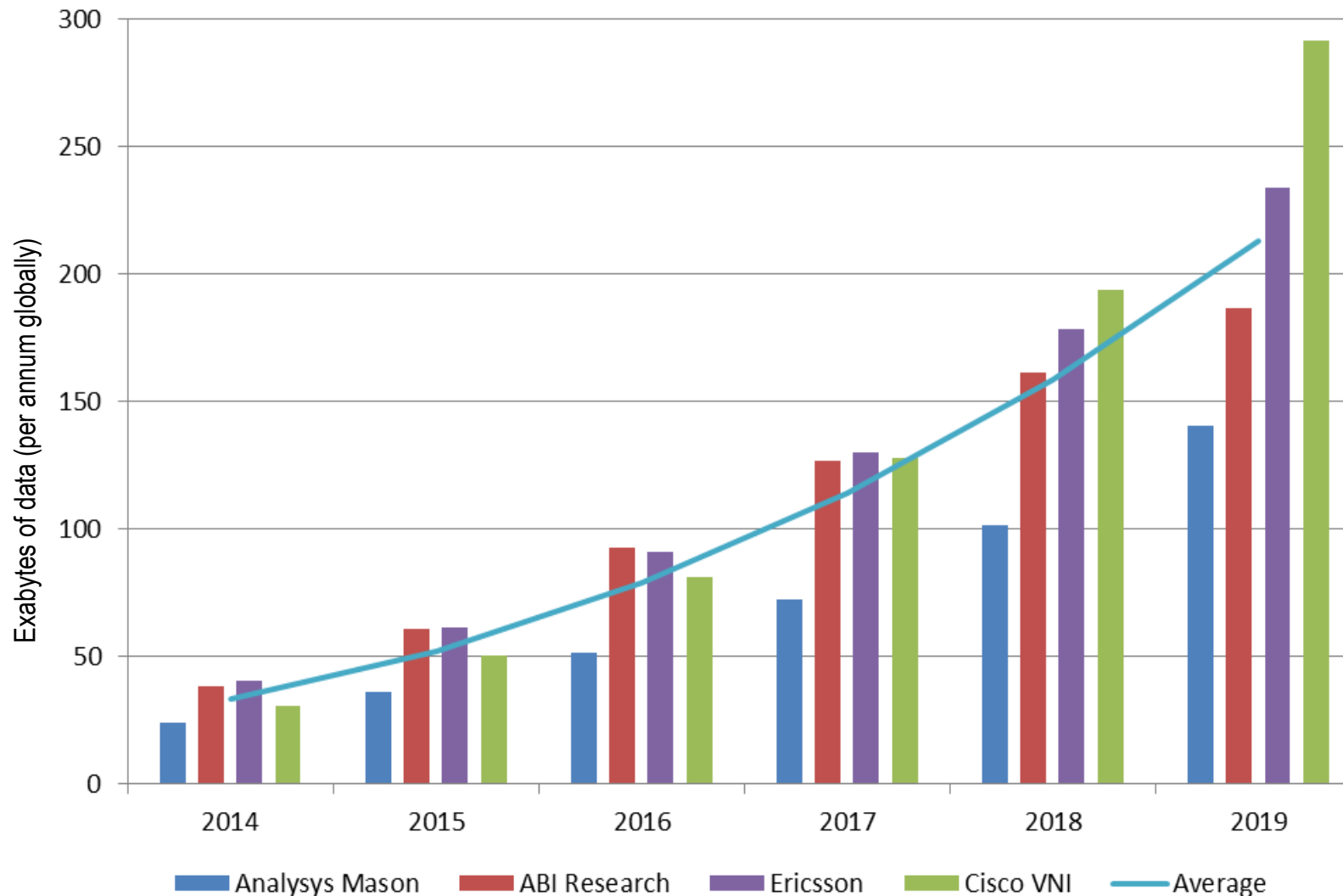
Creating a sustainable future for mobile broadband

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DATA GROWTH EXCEEDING EXPECTATIONS



100X DATA GROWTH IN PART OF 4G'S LIFETIME

TRAFFIC IN 2019 ABOUT 6-10X THAT OF 2014

TRAFFIC IN 2019 ABOUT 100X THAT OF 2010

AS WE'LL SEE THIS IMPACTS SPECTRUM

ITU'S SPECTRUM ESTIMATES BASED ON ONLY 44-80X DATA GROWTH FROM 2010-2020

ANALYSTS INCREASING THEIR NUMBERS

ANALYSYS MASON & ABI RESEARCH JUST REVISED 2019 PREDICTIONS UP BY 30%

PREDICTIONS MAY BE UNDERSTATED

WE FOUND SAUDI ARABIAN DATA TRAFFIC WAS 2.6X HIGHER THAN CISCO'S VNI ESTIMATES

Sources

Analysys Mason, Global Mobile Network Traffic, Oct 2014

ABI Research, Mobile Data Traffic & Usage, Oct 2014

Cisco VNI Mobile Forecast, Jan 2015

Ericsson Mobility Report, Feb 2015

SUPPORT MASSIVE CAPACITY GROWTH



GLOBAL MOBILE DATA TRAFFIC IS EXPECTED TO GROW 10X FROM 2013-2019

HARMONISE D SPECTRUM

- Regulators can license more spectrum to mobile operators
- Must be globally harmonised spectrum and under technology neutral licences

DRIVE SPECTRUM EFFICIENCY

- Ensure all spectrum users are using this precious public resource efficiently
- Help free up spectrum for those who need it most

ITU WRC-15

- Regulators must work together internationally to agree new mobile allocations
- Happen at the World Radiocommunication Conference in 2015 (WRC-15)

ENCOURAGE INVESTMENT IN NETWORKS



THE WORLD'S MOST DEVELOPED MOBILE MARKETS SUPPORT NETWORK INVESTMENT

LIGHT TOUCH REGULATION

- Avoiding over-regulation encourages healthy mobile markets & investment
- Right regulatory framework will drive high quality, good value, widespread services

CLEAR SPECTRUM LICENSING

- Operators need a stable, transparent regulatory environment to invest in networks
- Fair auctions aimed at improved services, long licences, clarity on renewal etc

LONG-TERM PLAN AND ROADMAP

- Guarantees and clarity surrounding long-term regulatory plans is essential
- To make long-term investments operators need plenty information

SPECTRUM POLICY CONSIDERATIONS FOR 5G



NO CLEAR AGREEMENT ON 5G SO IMPOSSIBLE TO ACCURATELY PREDICT SPECTRUM NEEDS, BUT...

■ **Spectrum discussions need to begin given long timeframe to free spectrum**

- Agreeing a dedicated WRC-19 agenda item at WRC-15 will be a vital first step
- Identifying additional (and harmonised) spectrum bands for mobile broadband (IMT) at WRC-15 as an important milestone for the mobile industry

■ **5G likely to require significant additional capacity spectrum**

- Spectrum above 6GHz is a good target as very wide bandwidths are more commonly available
- 1-6GHz (inc. refarmed IMT spectrum) provide capacity but can also cover wider areas and suit macro base station use cases

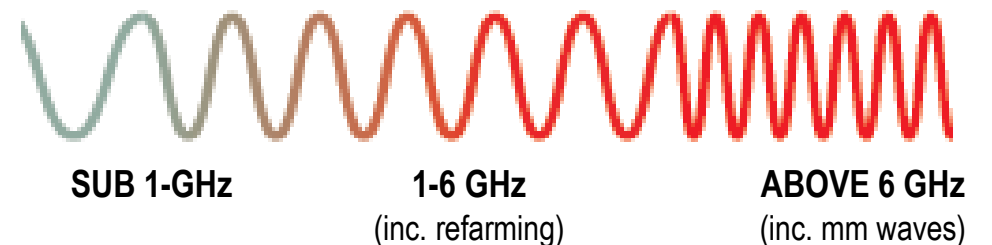
■ **5G will require coverage spectrum to provide nationwide services, not just urban hotspots**

- Sub-1GHz spectrum is vital for digital inclusion, in-building penetration and also low-power Internet of Things applications

■ **Wider range of mobile licensing regimes are possible with 5G**

- Exclusive licensing: Essential to guarantee QoS and encourage network investment
- Flexible shared licensing: Higher 5G frequency ranges suit sharing as small coverage areas mean more manageable interference

**FREQUENCY RANGES
TO BE EXPLORED FOR 5G**



THANK YOU

