5G, Preparing the Future Network Society

19 January 2017

5G Requirements | Expectations from the New Network Society
Connect Everyone, Everything, Everywhere

Internet of Things

Telematics

Virtual Office

Augmented Reality

Cloud-based Services

Smart Cities

20 January 2017

5G Requirements | Expectations from the New Network Society
Connect Everyone, Everything, Everywhere

20 January 2017

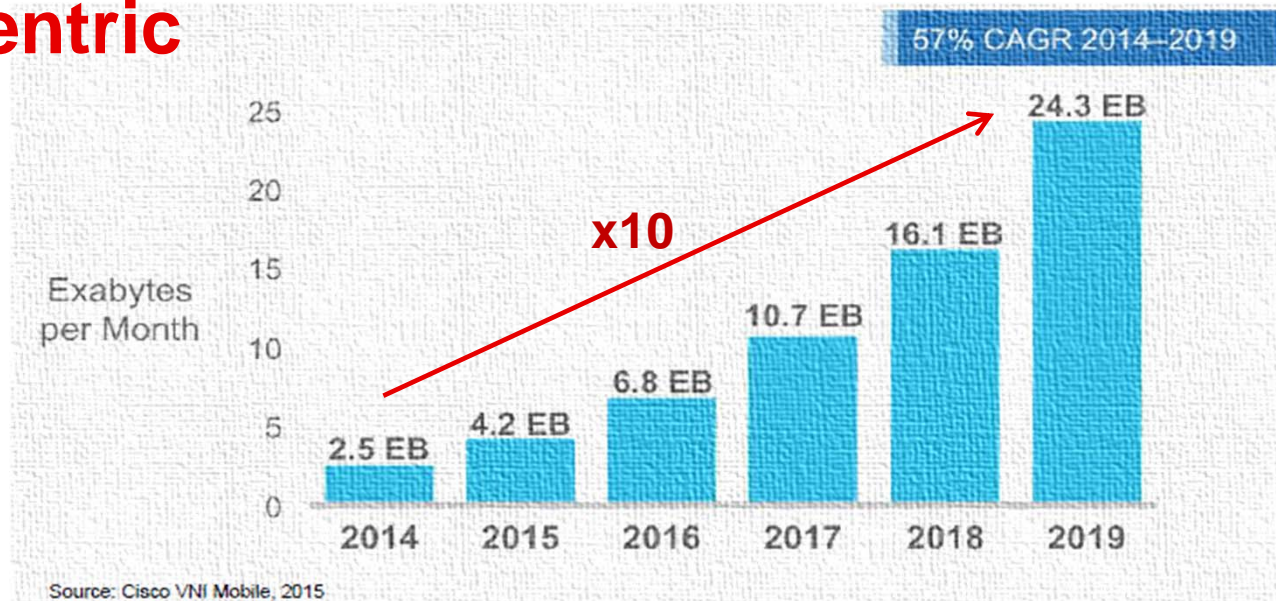# Background | Lessons learned from the past

- The Current Generation anticipates the basic needs of the next Generation
    - **2G**, voice focus, received GPRS data
    - **3G**, designed for voice & data R99, received HSDPA in a shared channel
    - **4G**, designed for very high Speed Data, received Carrier aggregation and Machine type communication with NB IoT

- Every 10 years a new Telecommunication Technology emerge and **5G** is the Next generation
    - **Will be Designed for Extreme Data Speeds, Massive Machine Type Communication and Mission Critical**
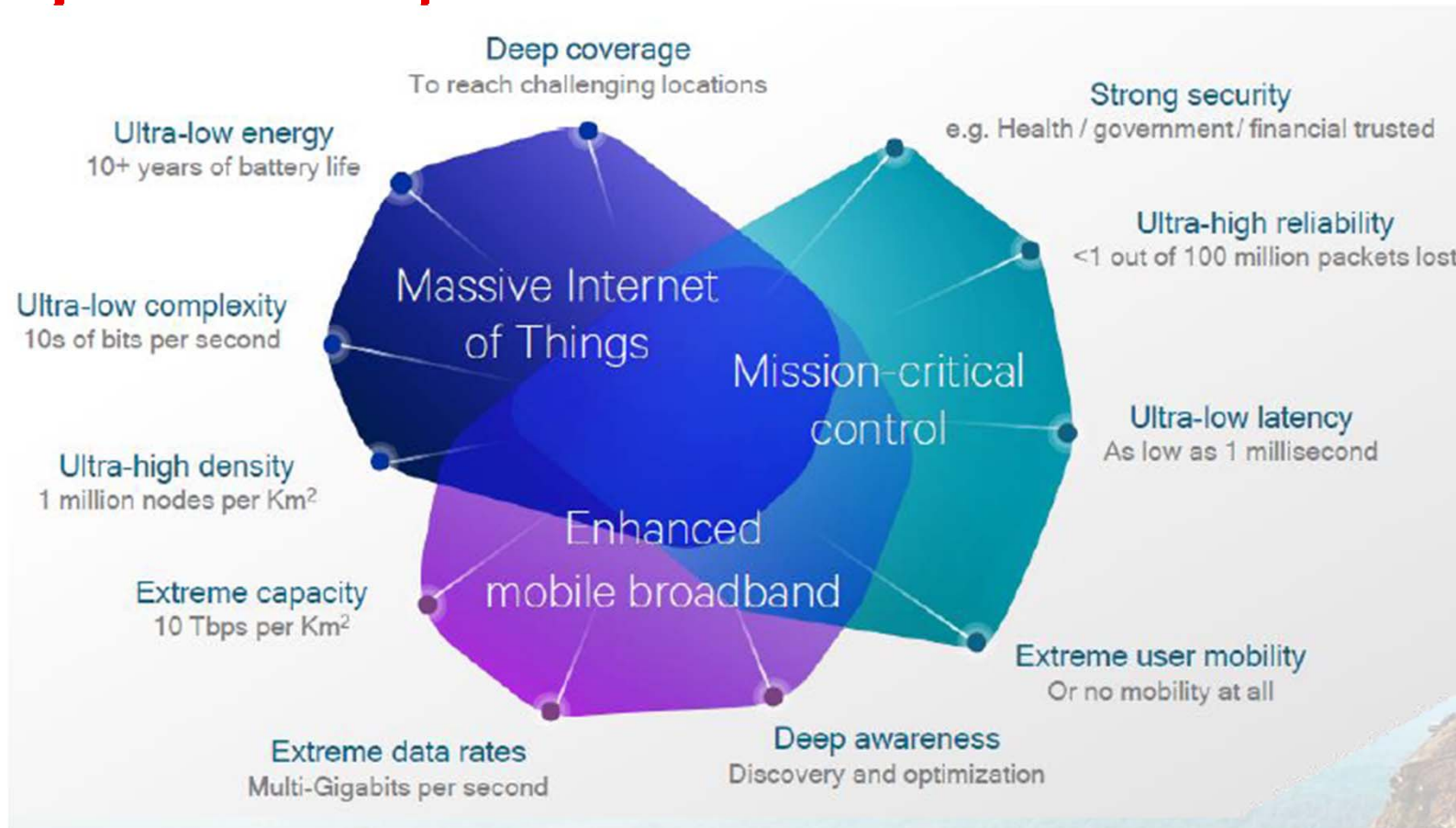   - ## Data will be in Everything and Everywhere

5G Growth Projections

Moving from Men Centric to Machine Centric

57% CAGR 2014–2019

x10

24.3 EB

16.1 EB

10.7 EB

6.8 EB

4.2 EB

2.5 EB

Exabytes per Month

2014 2015 2016 2017 2018 2019

Source: Cisco VNI Mobile, 2015

Nearly a tenfold increase over 2014
Accommodating this growth is an industry challenge!

5G Requirements | Main Pilars

5G is requesting for everything!!
Could 5G deliver it?

What Makes 5G the next release

- **New Architecture – Cloud networks**
  - Flexible and scalable
    - Easy to Grow on density and incorporate new traffic cases
  - Ultra-lean networks
    - Decoupled control/user plan
  - Slicing architecture
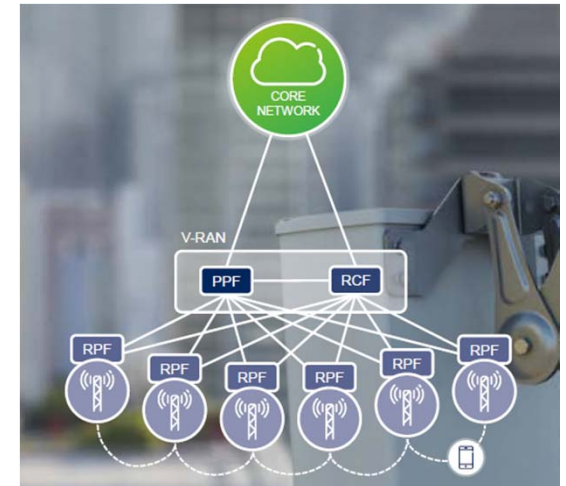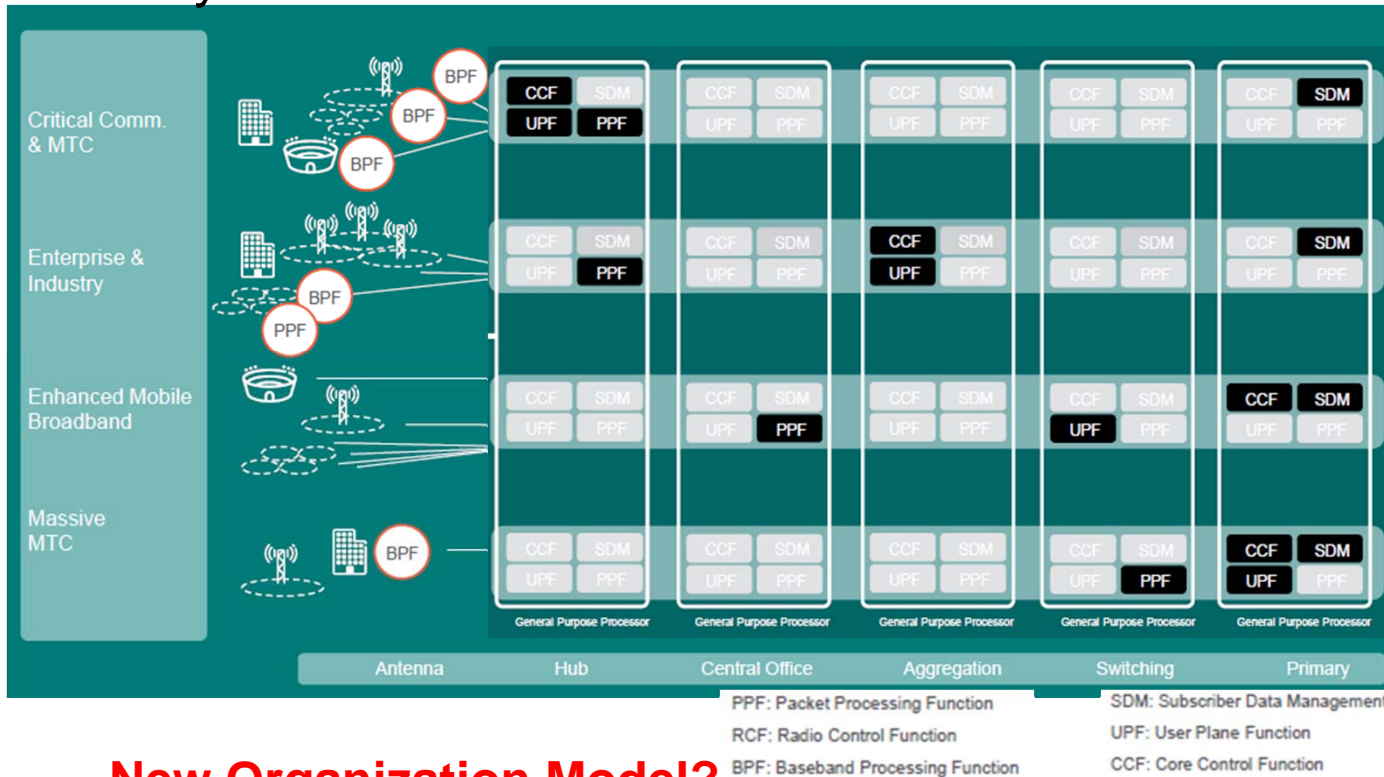   - Dedicated logical networks supported by NFV and SDN

- **New Radio Access Technology**
  - New and more Spectrum, New Radios

Slicing – from Node Functions to Virtualization

Dynamic allocation of Core and Radio functions

PPF: Packet Processing Function
RCF: Radio Control Function
BPF: Baseband Processing Function

SDM: Subscriber Data Management
UPF: User Plane Function
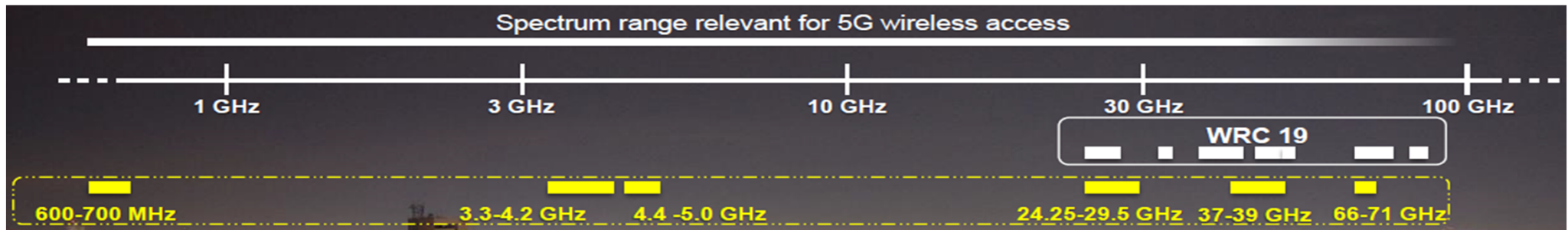CCF: Core Control Function

New Organization Model?
　　　Transversal Engineering teams?
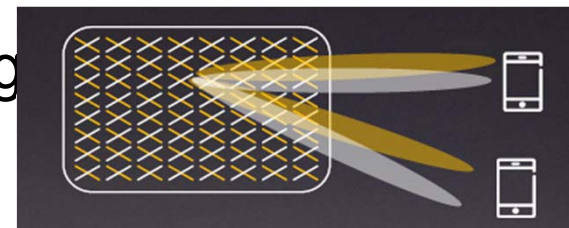　　　General processor board dimensioning and management?

Radio Access Technology

➢ New wider spectrum in high bands

➢ Massive MIMO, MU-MIMO, Beam Forming
  ▪ 64T 64R active antenna system (TDD)

➢ Heterogeneous Networks – small cells

9

Vodafone Group Contributions | Towards Future Network Society
Press Communications

- **Actively Testing and Deploying new Radio Technologies**
- **Actively testing NFV since the past 2 years**
- **Spectrum Refarming**
- **Success record on M2M**
- **All Vodafone Base Stations will support NB IoT by 2020**

Vodafone 5G Network Deployment | Towards the Future Network Society

- **First 5G call as soon as Standards are closed**

- **5G Network Rollout Challenges**
  - **Deployment Speed dependent on:**
    - **Strong Investment needed**

      Spectrum, Site assets, R&D, New Radios, New Core
    - **5G Use Cases takeover – Ecosystem approach**

      Low revenue vs Massification

2020 Digital Society will require contributions from all Society Sectors to Make 5G a reality to all in the shortest time

Summary

- **New Spectrum – hundreds of MHz – New Radio deployment for extreme high Tputs**

- **Massive MIMO – New Active Antenna to be deployed**

- **TDD will be implemented – time and Phase Sync need to be deployed**

- **New Architecture virtualization – Slicing – New Organization Model**

- **New Access Technology – ultra lean – New SW**

Thank You