



GSMA – PSC Europe Joint Collaboration Critical Communications IoT


**Mona Mustapha
IoT Technical Specialist**




The GSMA was founded in
1987



12
offices
worldwide



UNITING
750+
MOBILE OPERATORS




WITH
350+
MOBILE COMPANIES
In the broader mobile ecosystem



The GSMA represents the interests of mobile operators worldwide



The world's leading mobile industry events, Mobile World Congress, Mobile World Congress Shanghai, and Mobile World Congress Americas, together attract
192,000+
people from across the globe each year



8.8+ billion
mobile connections worldwide



Connecting Everyone and Everything to a Better Future

Scaling the IoT

OUR VISION: To enable the Internet of Things, a world in which consumers and businesses harness a host of rich new services, connected by intelligent and secure mobile networks.

CONNECT

Mobile IoT

Raise market awareness and support of commercial licensed spectrum LPWA Solutions.



CAPABILITY

Beyond Connectivity

Promote value added services including big data, machine learning, analytics, edge computing and distributed ledger technologies.



CUSTOMERS

Industry Engagement

Working with partners to align strategy and adopt new initiatives, specifically for connected vehicles and drones.



IoT SECURITY

Enabling a trusted IoT where security is embedded at every stage of the IoT value chain.

IoT POLICY & REGULATION

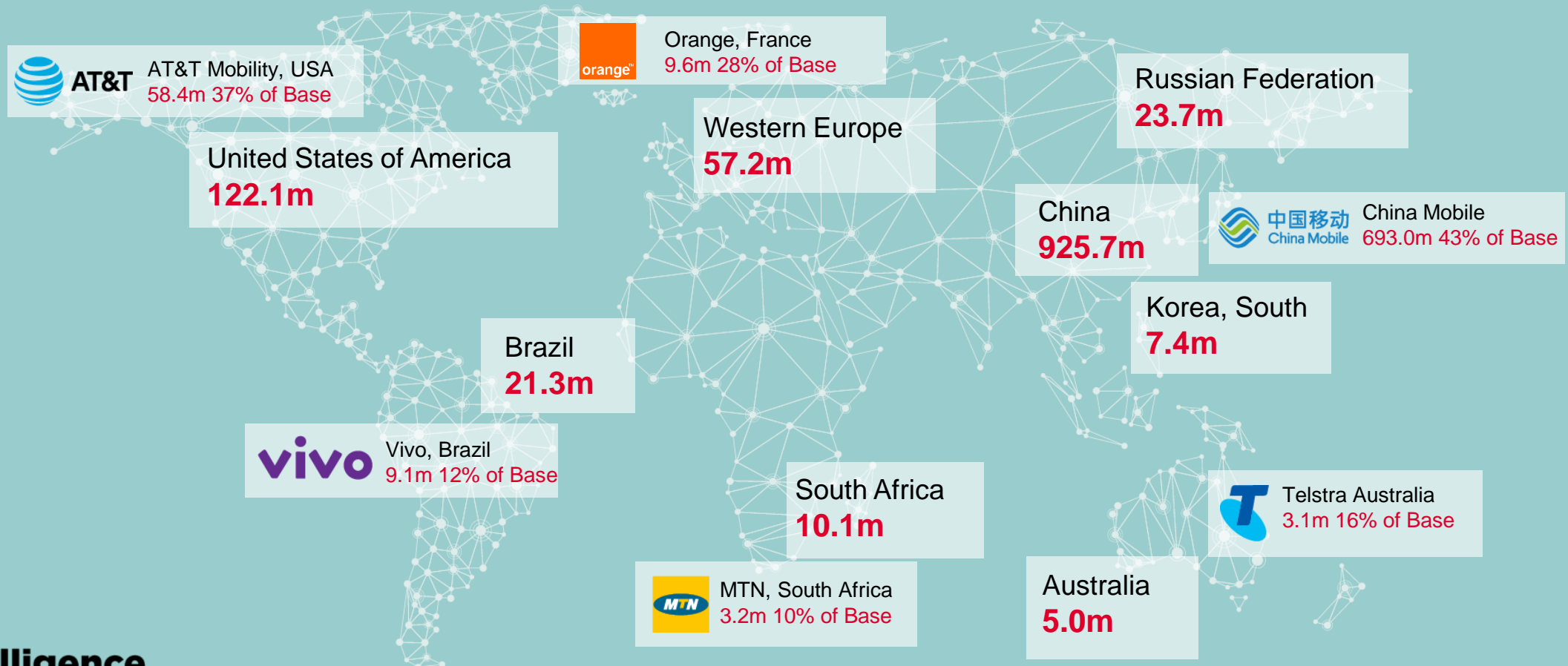
Creating a sustainable environment to support the successful scaling of the IoT.

MEMBERS OF THE IOT PROGRAMME STEERING GROUP:



Q2 2019 Cellular IoT Data

511 operators **195** countries **1.4** billion connections



What is the Internet of Things?



GSMA DEFINITION:

Internet of Things (IoT) describes the coordination of a network of physical objects that contain embedded technology to communicate and sense or interact with their internal states or the external environment.

DEVICES IN THE IoT:

These connected objects include everyday appliances and machines from many vertical industries such as vehicles, utility meters, tracking devices, vending machines, monitors and sensors, consumer electronics and wearable technology, as well as smart phones and tablets.



Communications needed to **achieve a specific mission**, for **public safety** purposes and **business-critical** functions

Communications that need **higher priority** over other communications in the networks, and require means to **enforce this priority**

From a confidentiality, integrity and availability perspective, the **requirements exceed those of other communications**

IoT from a Critical Communications perspective, applies to **connected objects** that fulfil a **public safety** or **business critical function**

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Critical Communications IoT Concepts





A potential fire is detected by distributed sensors (thermal, smoke, wind) deployed in communications towers

An alarm is sent to the control centre and to the drone

The drone hangar is opened automatically, the drone flies autonomously to the area and captures information with camera and sensors

The information is sent in real-time to the Control Centre

The drone flies autonomously back to the hangar where it is charged automatically



Paramedic in the field performs an ultrasound scan on a patient in an ambulance

Clinician remotely controls the ultrasound scanner position via haptic glove worn by paramedic, whilst seeing the images in real-time

Clinician uses a joystick to guide the paramedic's hands holding the scanner via haptic glove in real-time

Glove creates small vibrations that direct the paramedic's hand to where the clinician wants the ultrasound sensor to be moved



Assess IoT technology to assist with crowd safety and security management at Headingley Stadium

Use connected smart glasses to complement existing CCTV used

Smart glasses used by security personnel to share pictures and videos of potential incidents with control room


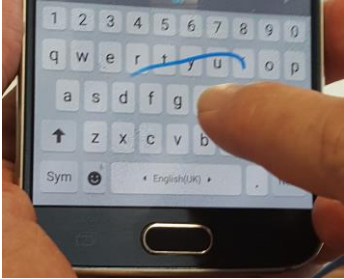
Smart glasses also allowed alerts and other messages from the control room to be displayed as a visual to the user






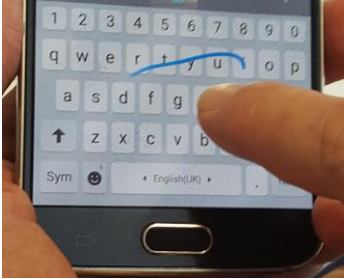
Analysis of Critical Communications IoT Use Case Service Levels



Physical keyboard vs Virtual keyboard	 <small>Source: Wikipedia</small>	
Can be used to type words	✓	✓
Can be reprogrammed	✗	✓
Disappears when not needed	✗	✓
Can support new functionality	✗	✓
Can switch to numeric pad	✗	✓

Advantages of virtual keyboard

- Performs the same function as a physical keyboard
- Can change behavior (e.g. *Swiftkey*)
- Only uses hardware resources (screen) when needed
- Keys can be added or removed
- Can be of different sizes

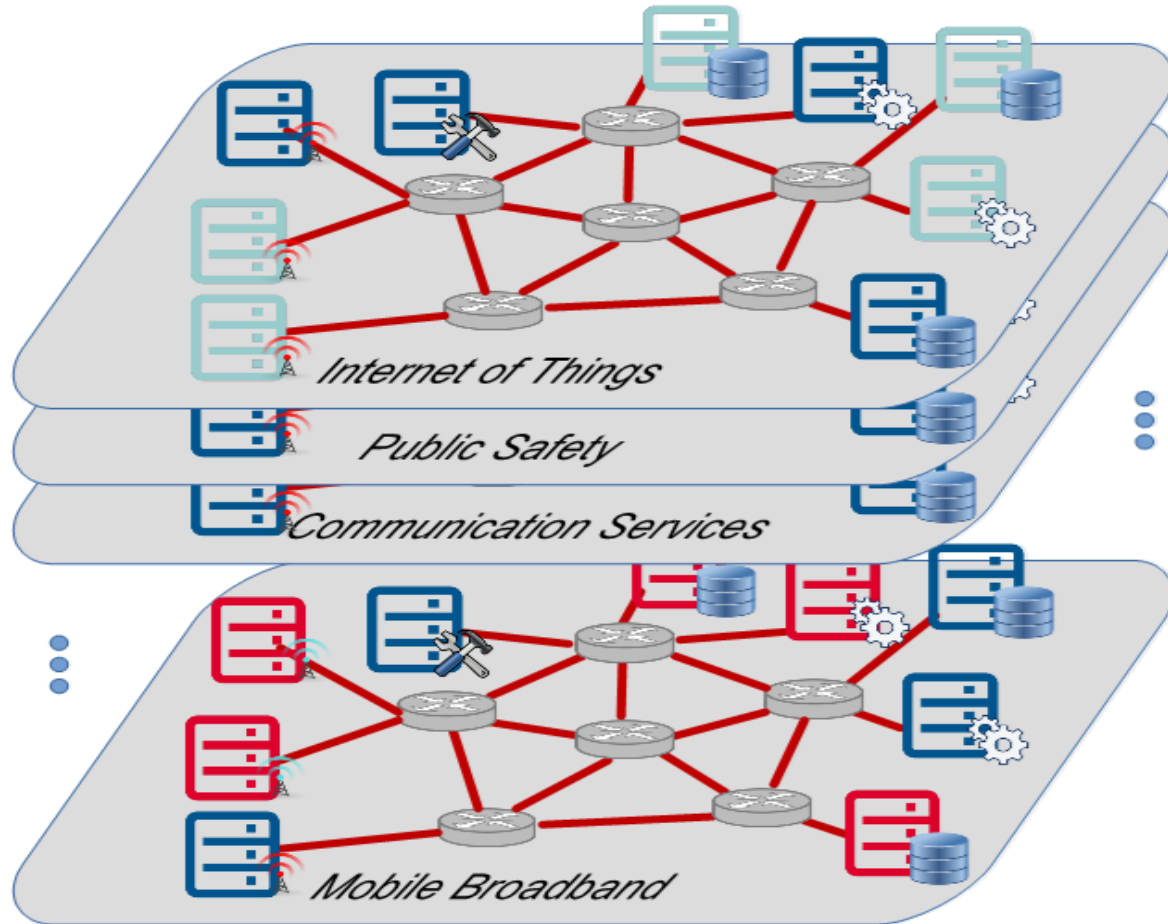
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Network Function Virtualisation	Separating network functions from the hardware they run on
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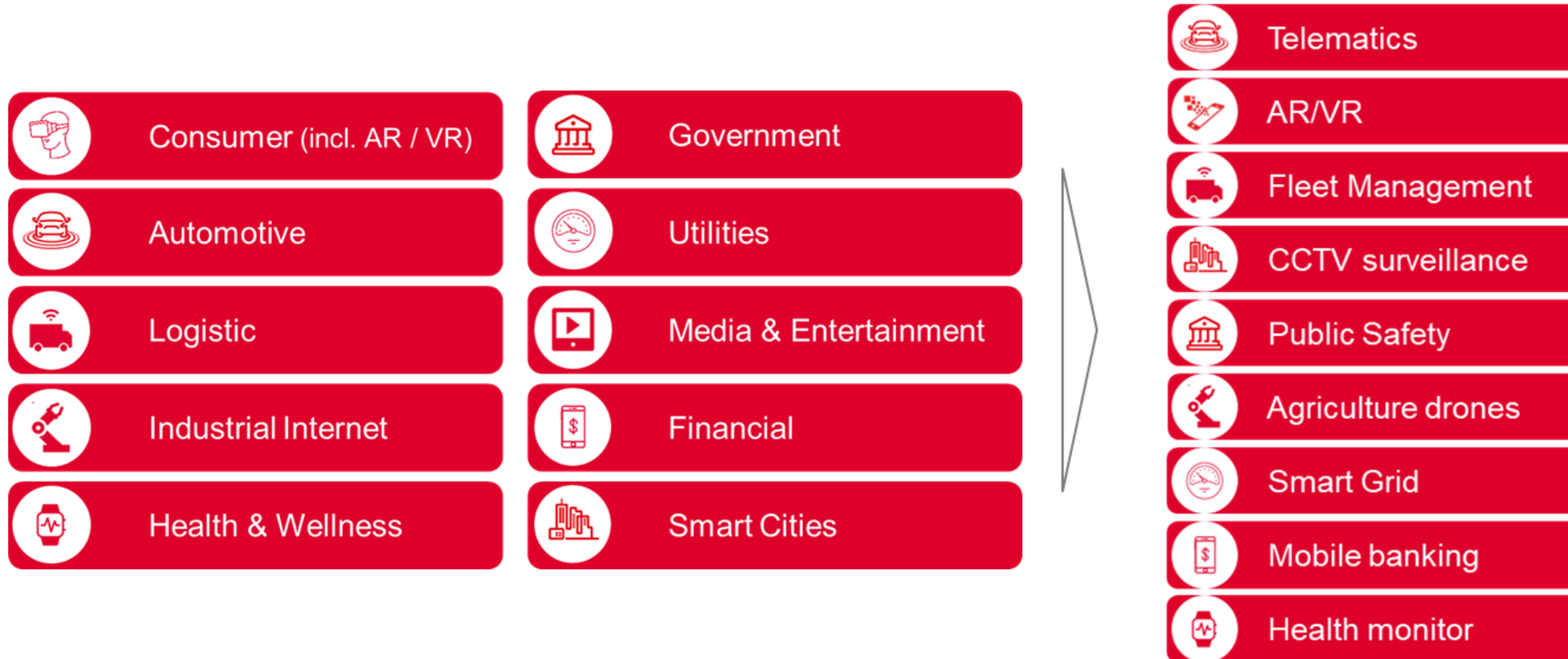
Software Defined Networks	Set of techniques to program, orchestrate control and manage network resources
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Network slicing concept

- Network slicing enables to **dynamically** configure the virtualised network element
- The network need not be designed for a specific service / use case
- Each slice has its **own properties** and is logically separated from other slices
- Operator can create multiple slices on demand serving different needs (IoT, eMBB...)

How to describe the characteristics of a Network Slice?



GSMA created a common way to describe the technical features of a slice:
Generic Slice Template

Network Slice Attributes – related to use cases defined

Group Communication Support

- MBMS
- SC-PTM

Mission-critical capability support

- Inter-user prioritization
- Pre-emption
- Local control

Mission-critical service support

- MCPTT, MCVideo
- MCData
- IOPS
- interworking with LMR

Isolation Level

- Physical
- Logical

User data access

- Internet
- Private network
- Local

Slice QoS Parameters

Number of terminals

Terminal Density

Downlink and Uplink Throughput per UE

Defining Network Slice attributes – how the values were determined



Use case

- Define different use cases
- E.g. residential house fire



Analyse IoT communication characteristics

- Types of data used: e.g. sensors
- Throughput per firefighter
- Characteristics of network slice



Populate generic network slice template:

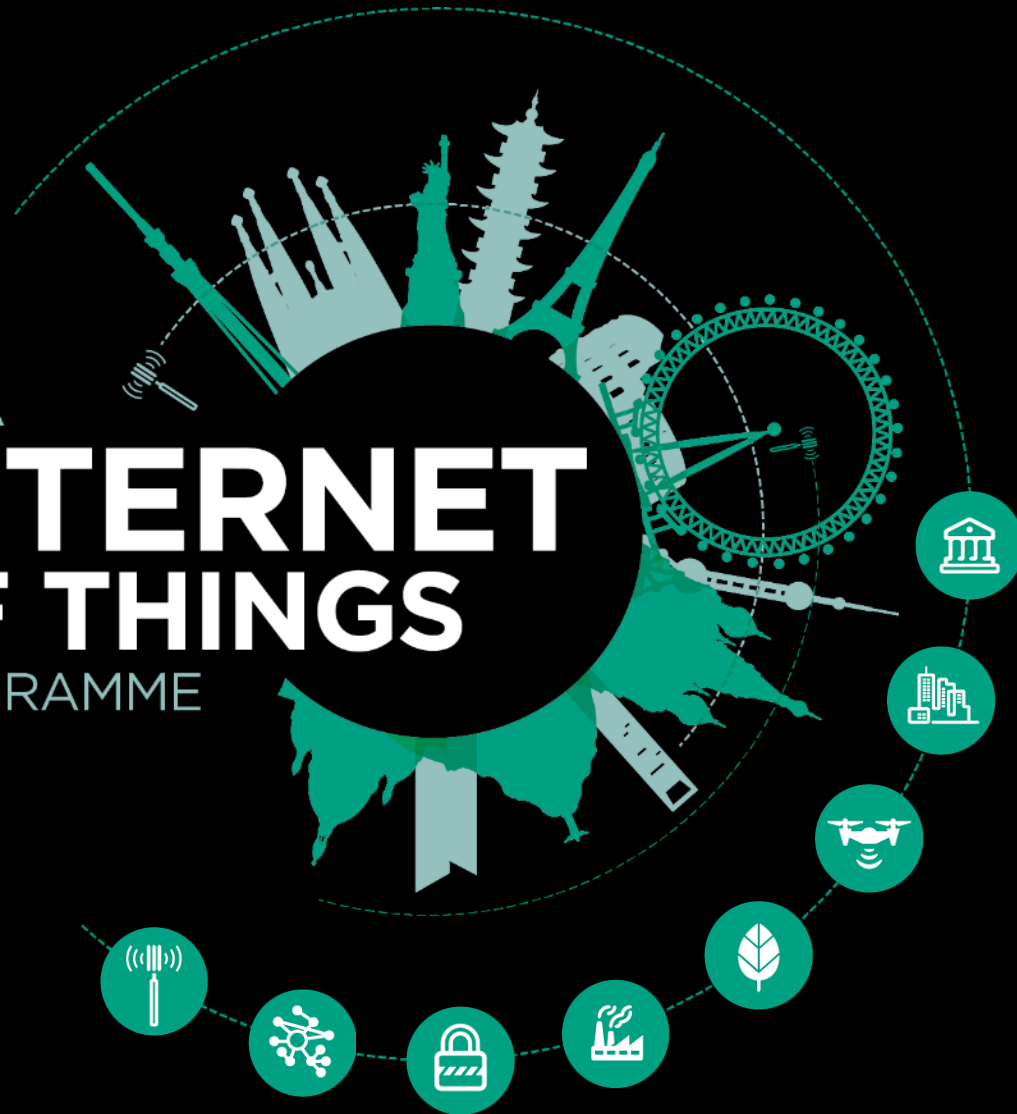
- Isolation level
- Mission critical support
- QoS parameters
- User data access
- etc.



GSMA

INTERNET OF THINGS

PROGRAMME



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gsma.com/loT

GET IN TOUCH:
iot@gsma.com

FOLLOW ON LINKEDIN:
www.gsma.at/loT