HOT TOPICS LED BY ETSI - 5G AND IOT

ILNAS workshop

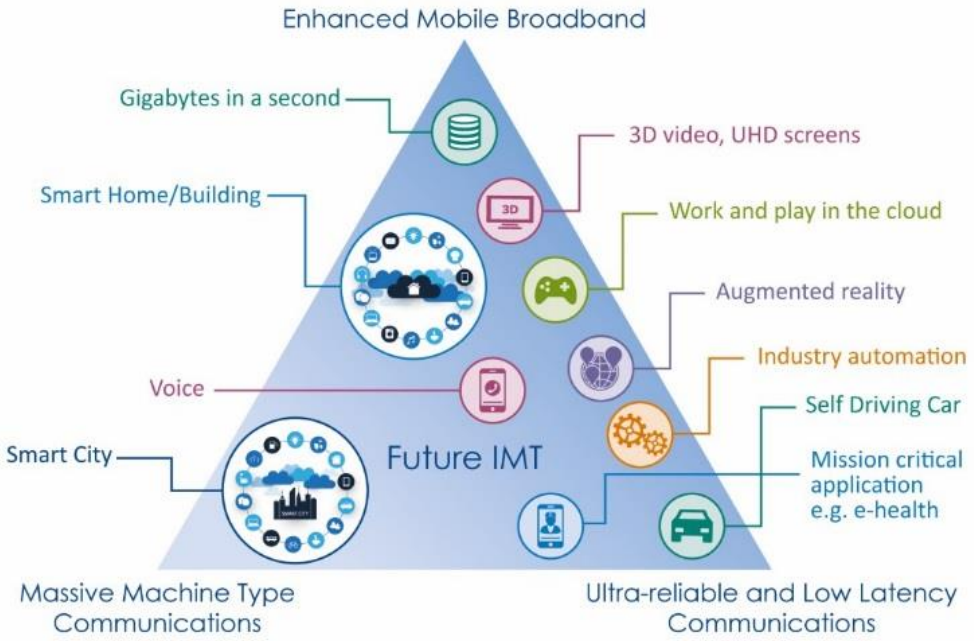
Luxembourg – 7 July 2017

AGENDA

- 5G and its building blocks
- IoT

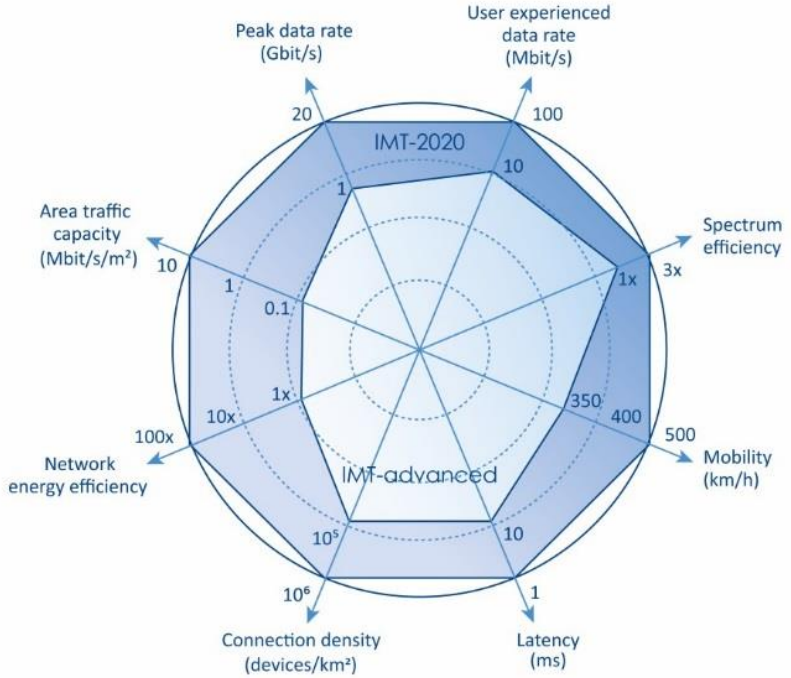
THE THREE HIGH LEVEL 5G USE CASE FAMILIES

- Enhanced Mobile Broadband
- Massive Machine Type Communications
- Ultra Reliable and Low Latency Communications

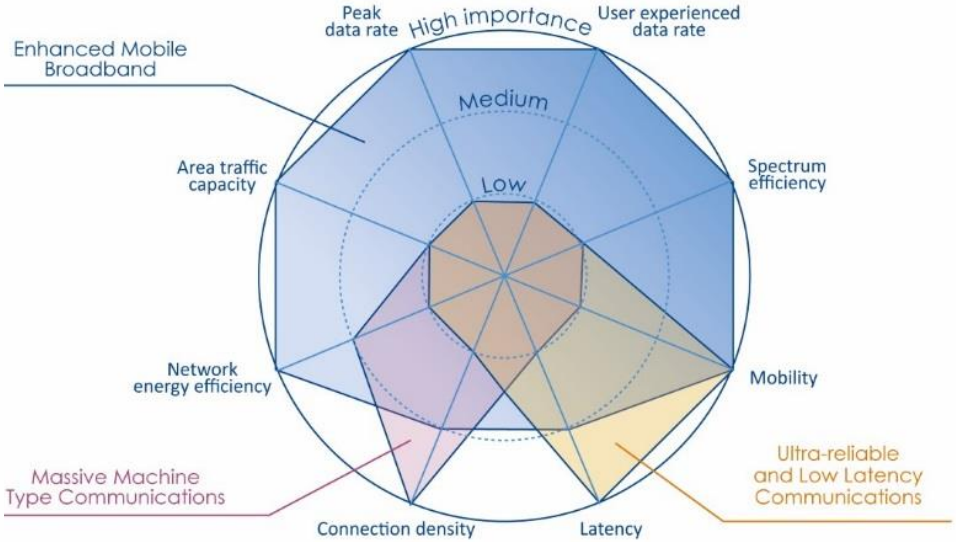


Source: ITU-R

PERFORMANCE REQUIREMENTS



Enhancement of key capabilities from IMT-Advanced to IMT-2020



The importance of key capabilities in different usage scenarios

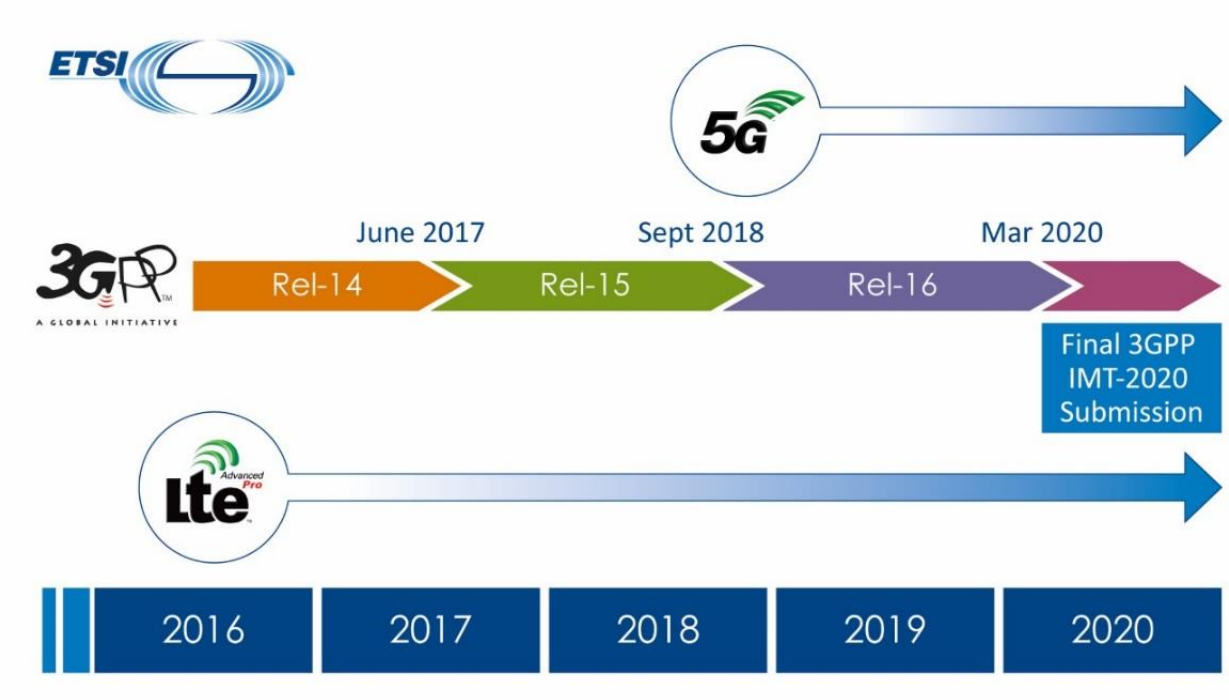
Source: ITU-R M.2083

5G CHALLENGES AHEAD

- New Radio Interface
  - Improved performance (speed / latency / efficiency)
  - Backward compatibility to legacy systems
  - Smooth evolution path from legacy systems
- Re-engineered Core network infrastructure
  - Dynamic E2E Network slicing
  - Enhanced TCP/IP performance
- Flexible, automated Network Management Capabilities, Self Optimization…
  - Zero Touch, Autonomous, Self healing/provisioning
  - Use of Artificial Intelligence, less human intervention

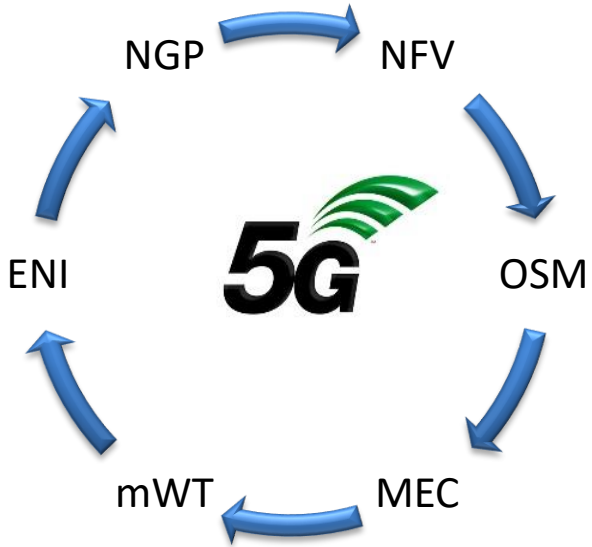
MEETING THE 5G CHALLENGE – 3GPP

- Phase 1 (Rel-15): most urgent features for early deployments
- Phase 2 (Rel-16): all features



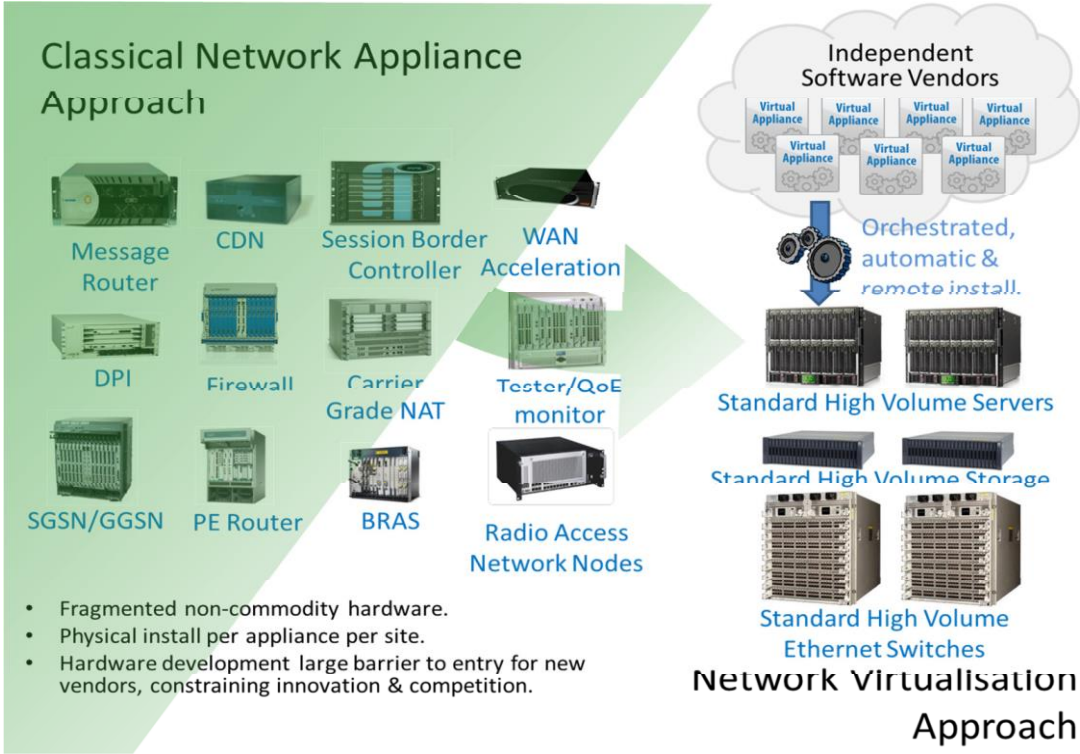
MEETING THE 5G CHALLENGE - ETSI

- Several of the enabling building blocks are being built in ETSI with the output being provided to 3GPP



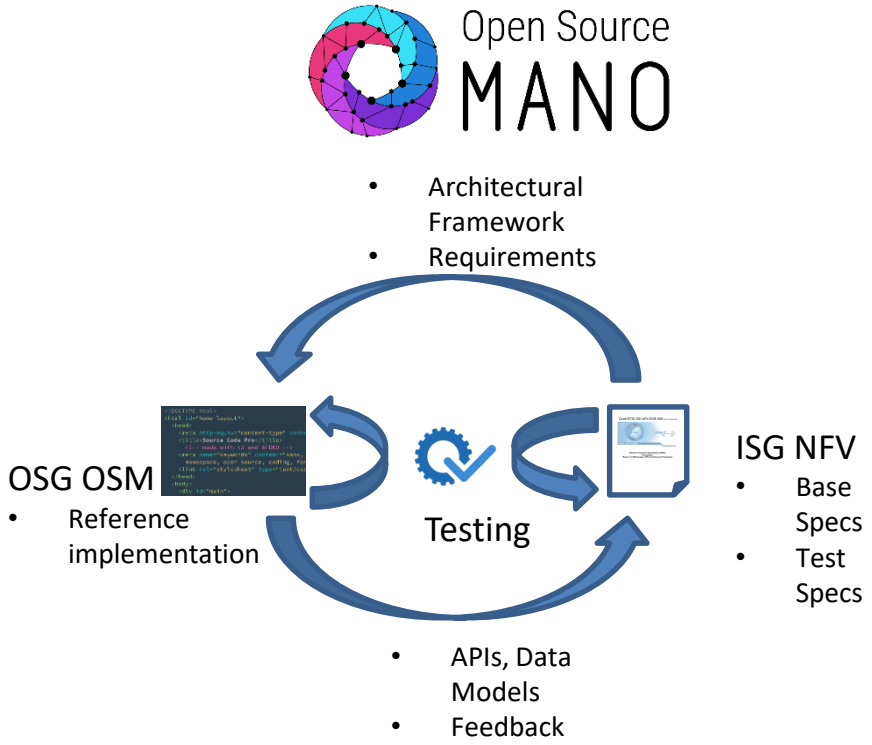
NETWORK FUNCTIONS VIRTUALIZATION

- Already working on Release 3 of specs
- Stress on Interoperability…
- … but also operations, security, multi-domain and multi-tenancy…
- … and the path to 5G!



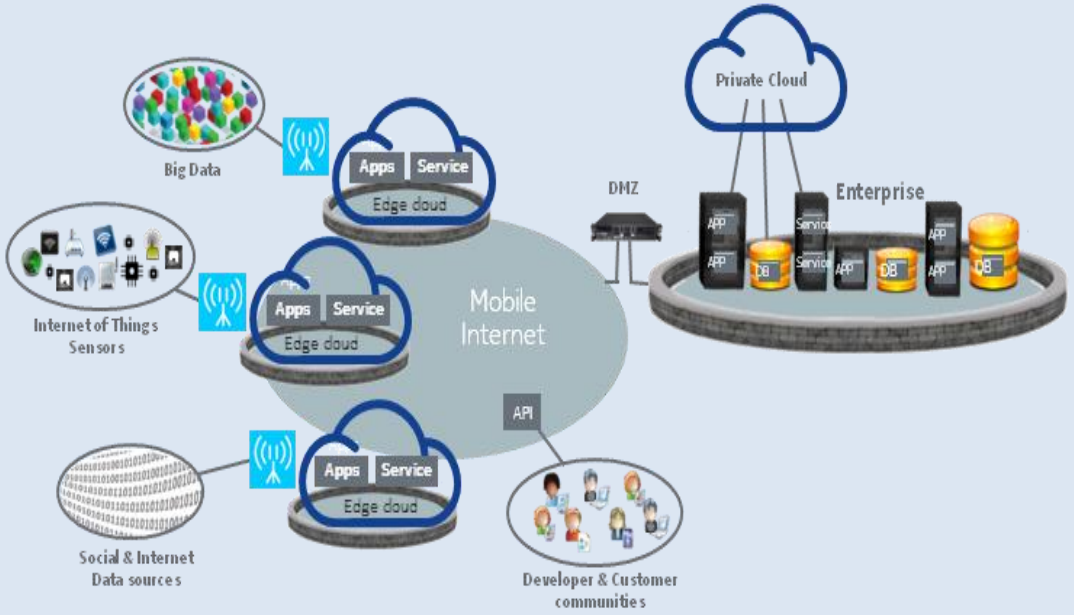
OPEN SOURCE MANO (OSM)*

- Defines a framework to facilitate the software development of a reference implementation of ETSI MANO
- OSM complements the work of NFV
  - OSM provides an opportunity to capitalise on the synergy between Standardization and Open Source approaches by accessing a wider availability of contributors and developers than would normally be possible
- Releases ZERO, ONE and TWO ready



* Open Source Mano (OSM) is not an ISG, but a special Open Source Group

MULTI-ACCESS EDGE COMPUTING (MEC)



Can be leveraged by applications to create value

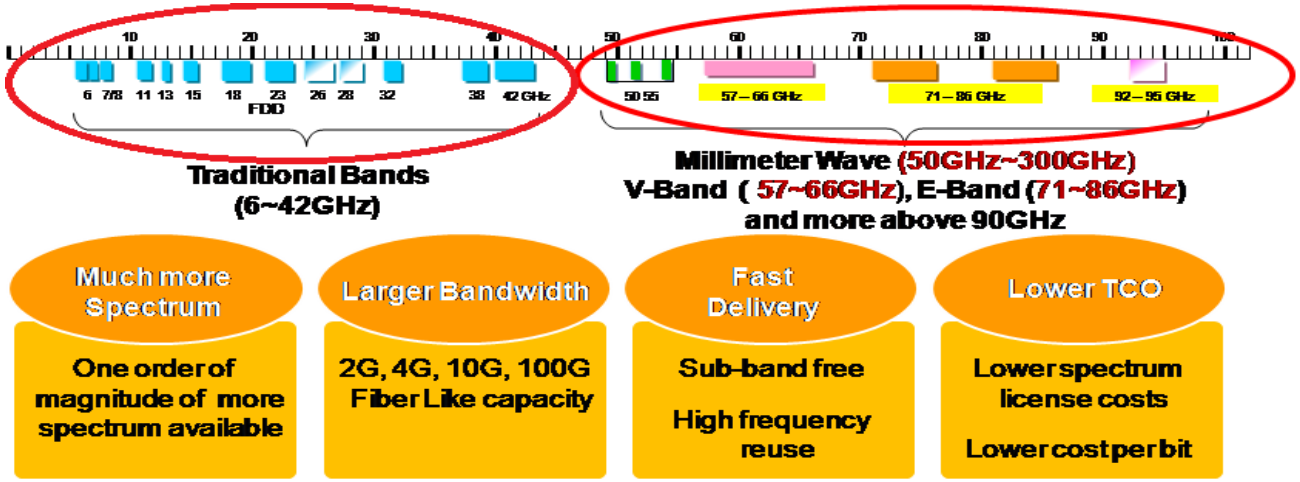
Offers applications and content providers **cloud-computing capabilities** and an **IT service environment at the edge of the mobile network**

This environment is characterized by:

- **Proximity**
- **Ultra-low latency**
- **High bandwidth**
- **Real-time access to radio network and context information**
- **Location awareness**

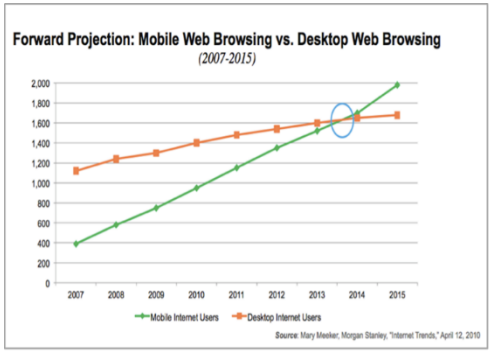
MILLIMETRE WAVE TRANSMISSION (MWT)

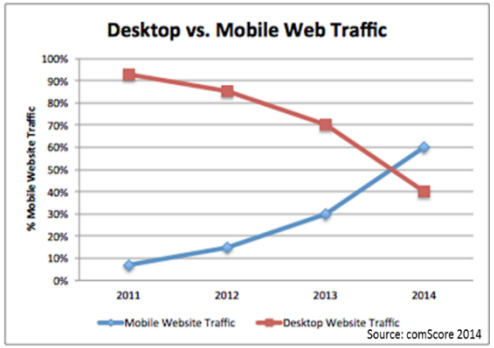
- Facilitate the use of millimeter-wave **(50-300 GHz and above)** by:
  - Sharing technical information (i.e. on trials aimed at propagation channel model verification, Interference simulation,..)
  - promoting cooperation and technical progress
  - Influencing standards for the deployment of the products
  - Enhancing the confidence of all stakeholders and the general public in the use of millimetre wave technologies

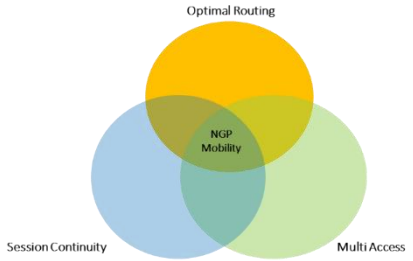


NEXT GENERATION PROTOCOLS (NGP)

- Rethinking TCP/IP
- Evolving communications and networking protocols to provide the scale, security, mobility and ease of deployment required for the connected society of the 21st century
- Prepare the case for the Internet community's engagement in a complementary and synchronised modernisation effort



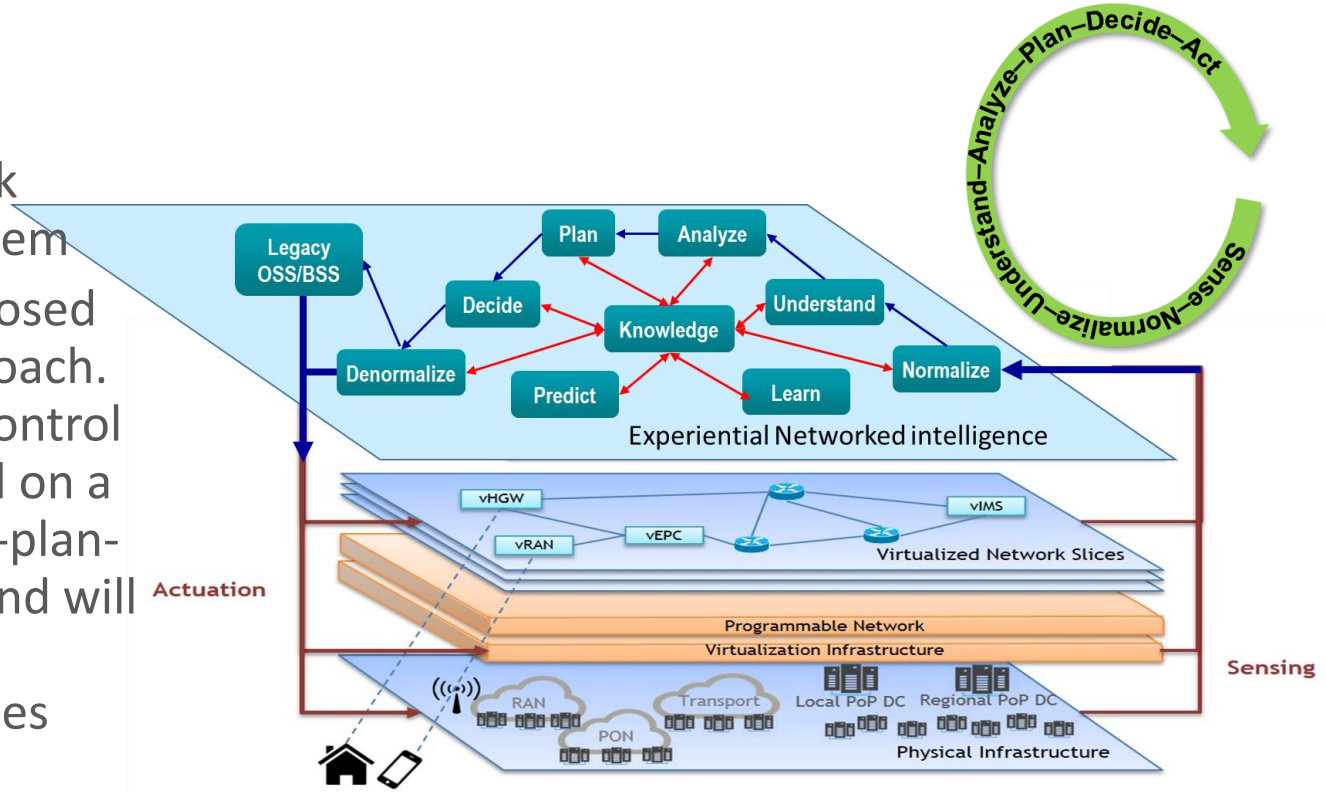




Three Criteria of Mobility

EXPERIENTIAL NETWORKED INTELLIGENCE (ENI)

- Purpose: develop standards for a Cognitive Network Management system
- Incorporating a closed loop control approach. The closed loop control approach is based on a "monitor-analyse-plan-execute" model and will be enhanced by learning capabilities



SUMMARIZING ON 5G

- ETSI is preparing significant 5G building blocks:
  - Network Functions Virtualization (ISG NFV)
  - Open Source MANO (OSG OSM)
  - Mobile Edge Computing (ISG MEC)
  - Millimetre Wave Transmission (ISG mWT)
  - Next Generation Protocols (ISG NGP)
  - Experiential Network Intelligence (ISG ENI)
- 3GPP specifying a complete 5G system

Key takeaways

There will be many contributors to the 5G standard, it cannot all be done in one place

ETSI is already developing significant building blocks which will form cornerstones of 5G

3GPP is specifying a *complete* 5G system description, using building blocks from other SDOs where appropriate

INTERNET OF THINGS

CONNECTING EVERYTHING

ETSI World Class Standards

Energy

Healthcare

Residential

Transport

Enterprise

Pubic Services

Other

Industry

Services Layer

oneM2M

ETSI

Network Layer

3GPP A GLOBAL INITIATIVE

ETSI

2 LAYERS FOR THE IOT IN ETSI

- Radio Access
  - Basically relying on 3GPP's work
  - Though also worked in LTN (Low Throughput Networks, was an ETSI Group Specification and is now TC ERM TG28 LTN TR and TSs)
  - Also in ULE (Ultra-Low Energy, an evolution of DECT for the IoT)
  - And in Weightless technologies (through ERM TG28)
- Services layer
  - Under the umbrella of oneM2M
  - But also contributing from ETSI through SmartM2M – e.g. SAREF is a direct ETSI contribution…
  - … and others may be coming

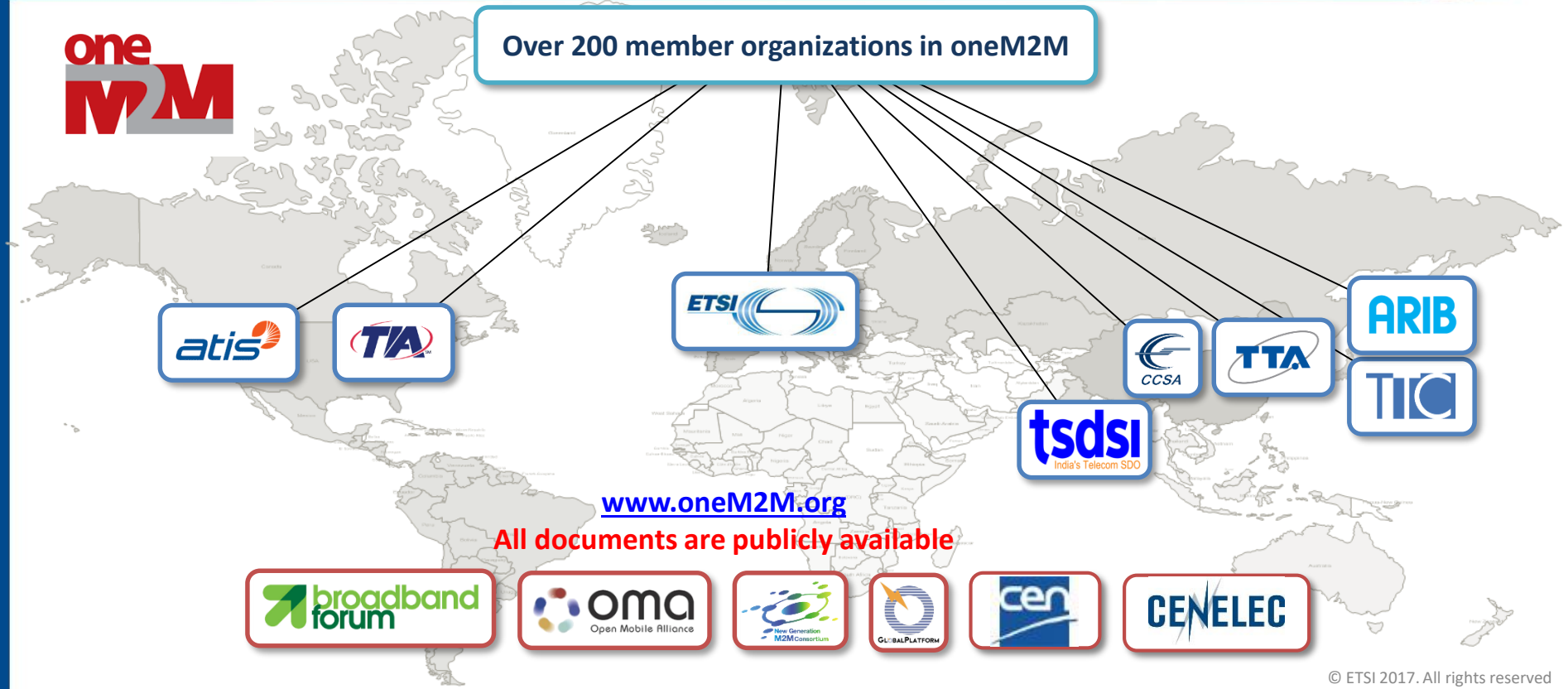
3GPP STANDARDS FOR THE IOT, BEFORE 5G

- In Release-13 3GPP has made a major effort to address the IoT market
- The portfolio of technologies that 3GPP operators can now use to address their different market requirements includes:
  - eMTC - Further LTE enhancements for Machine Type Communications, building on the work started in Release-12 (UE Cat 0, new power saving mode: PSM)
  - NB-IOT - New radio added to the LTE platform optimized for the low end of the market
  - EC-GSM-IoT - EGPRS enhancements which in combination with PSM makes GSM/EDGE markets prepared for IoT
- Freeze of the protocol specifications achieved in Q2-16

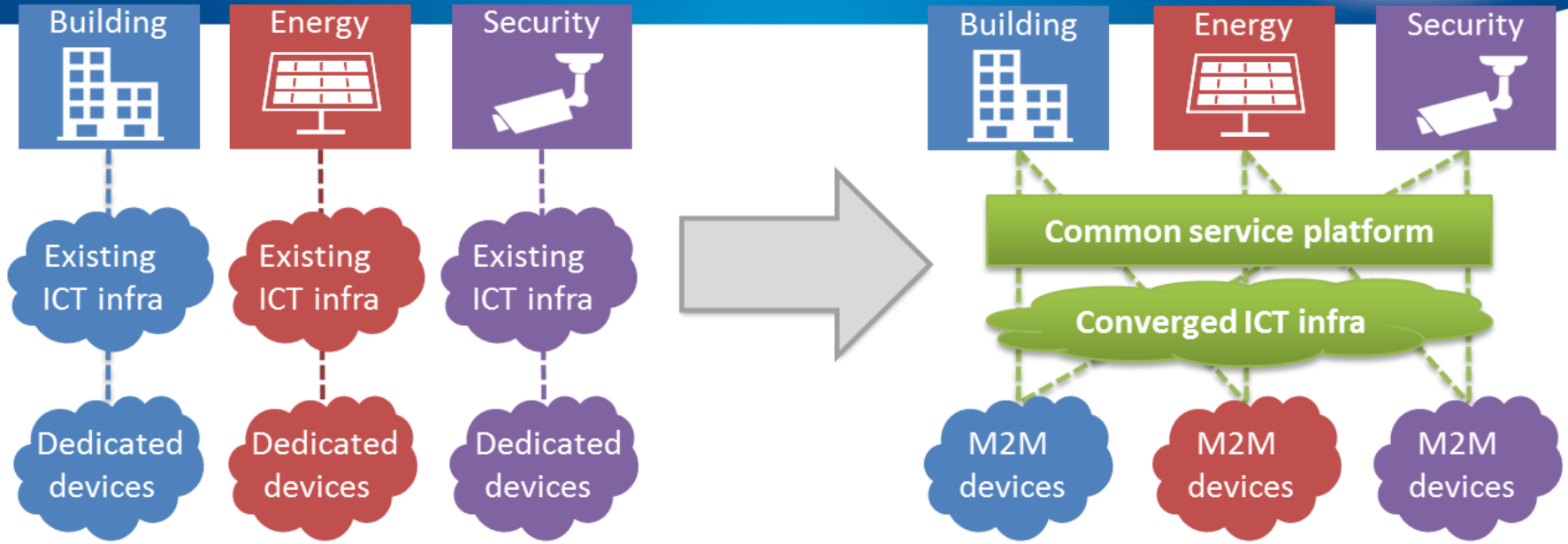
TC SMARTM2M

- **ETSI SmartM2M:**
  - Developed two releases of M2M specifications.
  - **Used as one of the initial baseline proposal for the oneM2M initiative**
- **ETSI SmartM2M is currently working on:**
  - Supporting the European industry and institutions on the identification and adoption of standards, in particular regarding the oneM2M framework
  - Bridging the European needs in the area of M2M/IoT towards **oneM2M**
  - Smart Appliance REFerence ontology SAREF / oneM2M IoT Semantic Interoperability

ONEM2M PARTNERSHIP PROJECT



ONEM2M OBJECTIVES



Without oneM2M

- Fragmented market and vendor-specific applications
- Reinventing the wheel: Similar services developed multiple times
- Each silo uses its own technologies
- No interoperability

With oneM2M

- End-to-end platform: common service capabilities layer
- Interoperability at the level of communications and data
- Allows seamless interaction between heterogeneous applications and devices

M2M COMMON SERVICE LAYER IN A NUTSHELL

- A software “framework”
- Located between the M2M applications and communication HW/SW that provide connectivity
- Provides functions that M2M applications across different industry segments commonly need (eg. data transport, security/encryption, remote software update...)
- Like an “Android” for the Internet of Things
  But it sits both on the field devices/sensors and in servers
  And it is a standard – not controlled by a single private company

COMMON SERVICE FUNCTIONS

- Registration
- Discovery
- Security
- Group Management
- Data Management & Repository
- Subscription & Notification
- Device Management
- Application & Service Management
- Communication Management
- Network Service Exposure
- Location
- Service Charging & Accounting

ONEM2M RELEASE 2 FEATURES

Industrial domain enablement

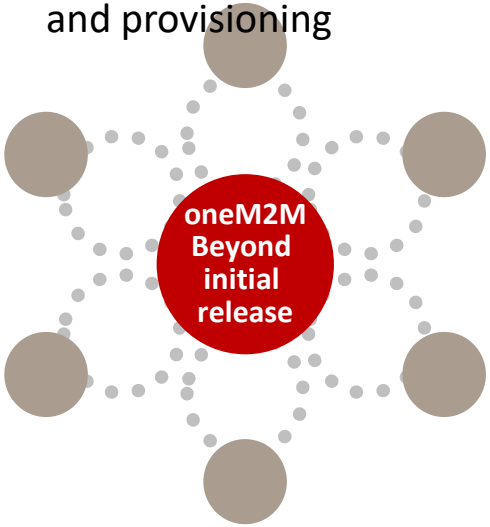
- "Real-time" data collection
- redundancy and fault tolerance
- enablers for analytics

Semantic interoperability

- base ontology, link to domain specific ontologies
- semantic descriptions
- semantic discovery

Dynamic authorizations and end to end security

- device onboarding and provisioning



Application developer APIs and guidelines

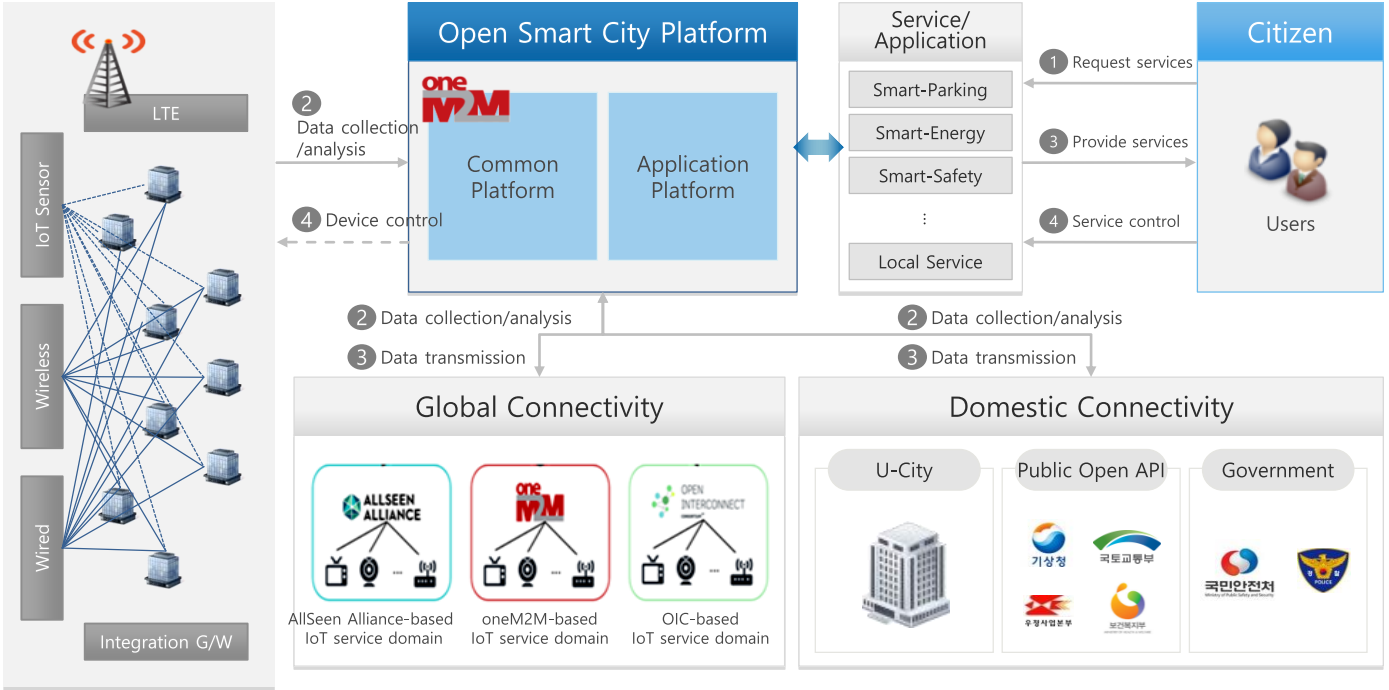
Home domain enablement

- Home appliance information models
- ontologies and mapping to existing standards

oneM2M as generic interworking framework

- AllJoyn/AllSeen
- OIC
- LightWeight M2M (LWM2M)

SMART CITY DEPLOYMENT EXAMPLE - BUSAN



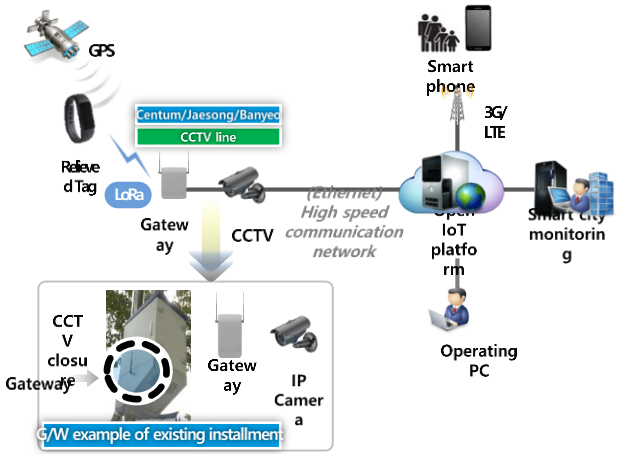
Source: SKT

Source: oneM2M

SMART CITY BUSAN USE CASE EXAMPLES

Safety service for Children and the old

✓ A Smart location management and a service of smart education supporting which are based on the free communications for the disadvantaged people such as the demented elderly, disabled people, children, infants

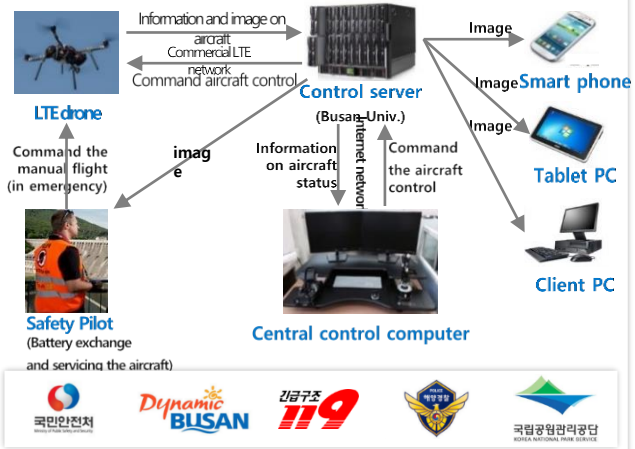


Cost saving due to the first utilization of service based on LPWA(LoRa)

Provision of Integrated service CCTV image, health check with location service

Smart marine safety based on drone

✓ In order to prevent coast and marine accidents, a drone with device of video transmission and automated pilot devices based on LTE controls the site in real-time.



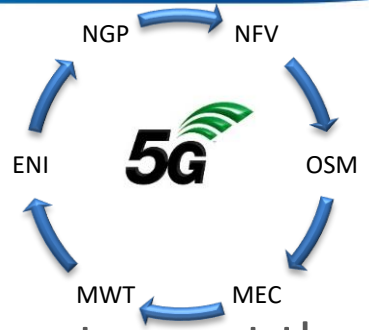
Application of auto pilot control with only domestic technology

The national first unmanned marine surveillance /Implementation of control system

Source: SKT

SUMMARY

- ETSI is preparing 5G building blocks



- 3GPP is moving forward rapidly on 5G standardization to meet the ambitious schedule

- oneM2M, 3GPP and ETSI working on IoT radio access and services layer