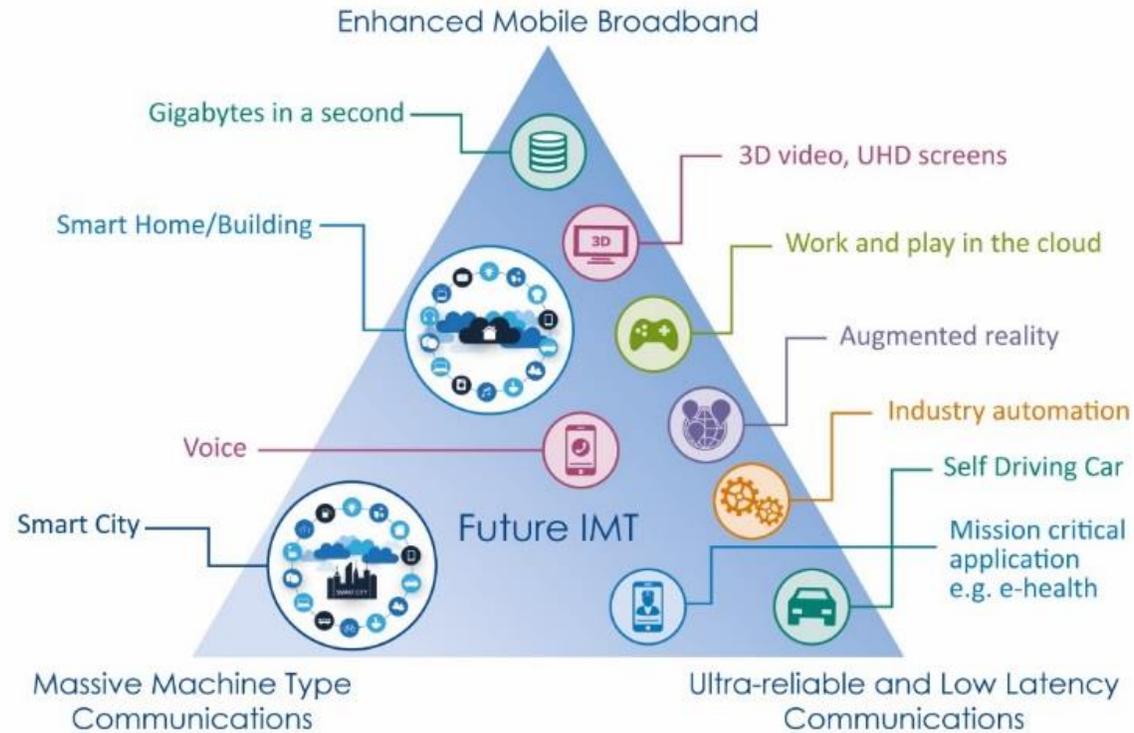




# 3GPP delivering the 5G promise

**Adrian Scrase**  
ETSI CTO & Head of 3GPP MCC

# What did we set out to achieve ?

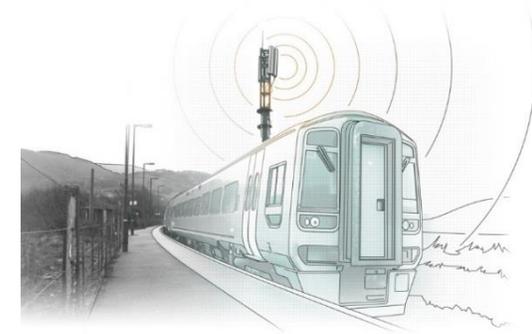


Source: ITU-R

# Which is more important?

## Evolved Mobile Broadband is important

- The main priority for some early operators
- Business models and revenue streams are well understood
- 5G Phase1 addresses very well this use case family



## ...but so are Ultra-Reliable Low-Latency Communications and Massive Machine Type Communications

- URLLC features are contained in 5G Phase 1
- URLLC and mMTC to be fully covered in 5G Phase 2



# Is 5G just higher data rates ?

IMT2020 detailed performance targets are being set by ITU-R as follows:

- Peak data rate [Downlink: 20Gbit/s, Uplink: 10Gbit/s]
- **Peak spectral efficiency** [Downlink: 30bit/s/Hz, Uplink: 15bit/s/Hz]
- User experienced data rate [Dense Urban Downlink: 100Mbit/s, Uplink: 50Gbit/s]
- 5<sup>th</sup> percentile user spectral efficiency [Indoor Hotspot, eMBB scenario: Downlink: 0,3bit/s/Hz]
- Average spectral efficiency [Indoor Hotspot, eMBB scenario: Downlink: 9bit/s/Hz/TRxP]
- Area traffic capacity [Downlink indoor hotspot (eMBB scenario): 10Mbit/s/m<sup>2</sup>]
- **User plane latency** [4ms for eMBB, 1 ms for URLLC]
- **Control plane latency** [Minimum 20ms, ideally 10ms]
- **Connection density** [eMTC scenario, 1 000 000 devices per km<sup>2</sup>]
- Energy efficiency [no values at this stage]
- **Reliability** [URLLC scenario: 1-10<sup>-5</sup>]
- **Mobility** [Up to 500 Km/h (Rural eMBB)]
- Mobility interruption time [eMBB and URLLC scenarios: 0ms]
- Bandwidth [Minimum 100MHz, Maximum 1GHz]

# Where did our work begin?

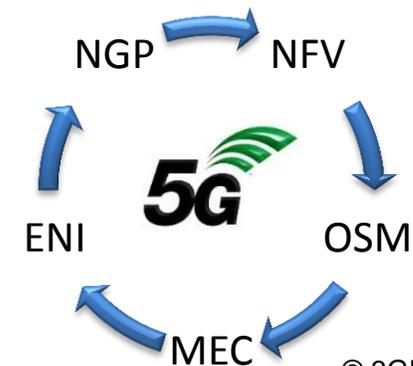


## 3GPP consultative workshop: Phoenix, September 2015

- 550 experts from industry, government, regulators, research and academia
- Agreed to split 5G Standardization into two phases:
  - **Phase 1** (new radio and core network) to be delivered by **mid 2018** (to address a more urgent sub-set of commercial needs)
  - **Phase 2** to be delivered by **end 2019** (to address all identified use cases and requirements)
- Agreed that 5G standards must address 3 major use case families: **eMBB, mMTC, URLLC**
- Intention was to enable new industry sectors to benefit from 5G (e.g., **Automotive, Health, Energy, Manufacturing ...**)

## ...but 5G building blocks were already being defined in ETSI, e.g.:

- ETSI ISG Network Functions Virtualization (NFV): started work in 2013
- ETSI ISG Multi-Access Edge Computing (MEC): started work in 2014

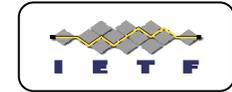


# Who is doing what?



A GLOBAL INITIATIVE

Developing internet protocol specs



Developing Mobile application specs



3GPP Market Partners



3GPP  
A GLOBAL INITIATIVE

Specifying a complete 5G system description

5G

Referring to specs

Cross reference

Requirements

Terminal certification based on 3GPP specs



Cross reference of specs



Partners referring to 3GPP specs for the local use

Developing Recommendations



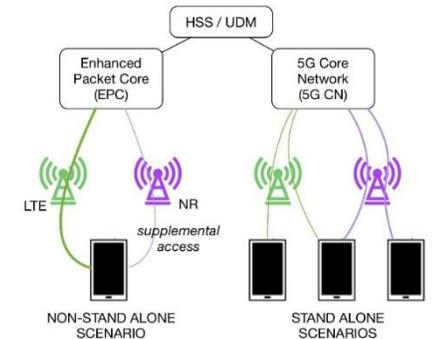
Reference to 3GPP specs



# Where are we now?

## 5G NR (new radio) completed ahead of schedule

- The specification of 5G NR completed in December 2017, **6 months ahead of schedule**, at the request of those players that wished to deploy 5G early (in non-standalone mode)
- The remainder of 5G Phase 1 (including Next Generation Core Network) on schedule to be completed by June 2018 (enabling deployment in standalone mode)



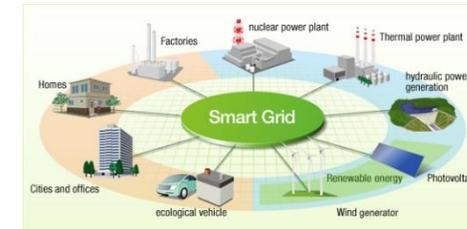
## ...but how was that possible?

- 3GPP Working Groups saw a large increase in experts participation (more than 600 experts present in some working group meetings)
- During 2017, 3GPP processed 100 000 input contributions during 75 000 delegate/days of meetings
- This represents an **unprecedented** effort from the whole industry....

# Is it just the same old faces?

## 3GPP Members now include, for example:

- **Agricultural** machinery manufacturers (e.g., John Deere, Husqvana, etc)
- **Automotive** manufactures (e.g, Volkswagen, Volvo, Toyota)
- **Rail** (e.g., Internationale Union of Railways)
- **Factory Automation** companies (e.g., Siemens)
- **Energy Sector** (e.g., Legrand)
- **Environment** (e.g., Veolia)
- **Broadcasting** Community (e.g., EBU, BBC, TDF)
- **Satellite** Community (e.g., ESO, Inmarsat)
- **Aerospace** (e.g., Lockheed Martin, BAE)
- **Retail Sector** (e.g., Alibaba)
- **Social Media** (e.g., Facebook)
- **Advertising** (e.g., Google)



Full listing available here:

<http://www.3gpp.org/about-3gpp/membership>

# Is it really an International Standard?

Participation in 3GPP, 569 member companies in 43 countries from:

- Africa
- Asia (especially China, India, Japan and Korea)
- Australia
- Greater Europe
- North America



# What will the economic impact be?



🌐 Accenture report (Jan 2017) estimates :

- U.S. GDP boost of **\$500 billion**
- Creation of **3 million** new jobs

*“5G-powered smart city solutions applied to the management of vehicle traffic and electrical grids alone could produce an estimate of \$160 billion in benefits and savings for local communities and their residents. These 5G attributes will enable cities to reduce commute times, improve public safety and generate significant smart-grid efficiencies.”*

[https://newsroom.accenture.com/content/1101/files/Accenture\\_5G-Municipalities-Become-Smart-Cities.pdf](https://newsroom.accenture.com/content/1101/files/Accenture_5G-Municipalities-Become-Smart-Cities.pdf)

## 5G Is Expected to Benefit All Community Sizes

	 <b>Saratoga, CA</b> 29,900 Pop.	 <b>Beaumont, TX</b> 118,000 Pop.	 <b>Metro Chicago, IL</b> 9,472,000 Pop.
<b>Jobs Created</b>	<b>300</b>	<b>1,000</b>	<b>90,000</b>
<b>GDP Growth</b>	<b>\$50M</b>	<b>\$180M</b>	<b>\$14B</b>



# So what next?

- **Completion of 5G Phase 1 (Rel15)**
  - Scheduled for June 2018
- **Agree contents of 5G Phase 2 Rel16)**
  - Studies already underway
  - Definitive plans and priorities to be set
- **Continue to work with different industry sectors and encourage their active participation in standards setting**
- **Release 16 will be the beginning of 5G, not the end!**

## For more Information:



[info@3gpp.org](mailto:info@3gpp.org)



[www.3gpp.org](http://www.3gpp.org)

Search for WIDs at <http://www.3gpp.org/specifications/work-plan> and [http://www.3gpp.org/ftp/Information/WORK\\_PLAN/](http://www.3gpp.org/ftp/Information/WORK_PLAN/) (See excel sheet)