5G India 2020
(5G – Technology & Business Perspective)

"5G Standardisation"
Presented by Mr. Dinesh Chand Sharma

Agenda

- About Project SESEI
- 5G Standardization
  - 3GPP
  - ETSI: 5G building block

About Project SESEI

Project is a permanent presence in India

SESEI (**S**econded **E**uropean **S**tandardization **E**xpert in **I**ndia) *is a local face for the European standardization community in India: Dinesh Chand Sharma*

Why SESEI: India is a major trade partners for Europe, Increasing role of standards to gain market access and Evolving & complex nature of regulatory and standardization landscapes, Sharing best practices, work together

Sector: 1. ICT: M2M/IoT, Security, 5G, NFV/SDN, e-Accesibility, eHealth, eCALL… **2. Electrical equipment including Consumer Electronics**: Smart Grid, Smart Meter, LVDC, Micro- Grid, Lift Escalator… 3. **Automotive**: Connected Cars, ITS, e-Mobility… 4. **Smart Cities**: Mobility, Waste, Energy, ICT and other topics of mutual interests such as Machinery Safety, Cableways, Circular Economy, Railways etc.

www.sesei.eu , www.sesei.in , www.eustandards.in
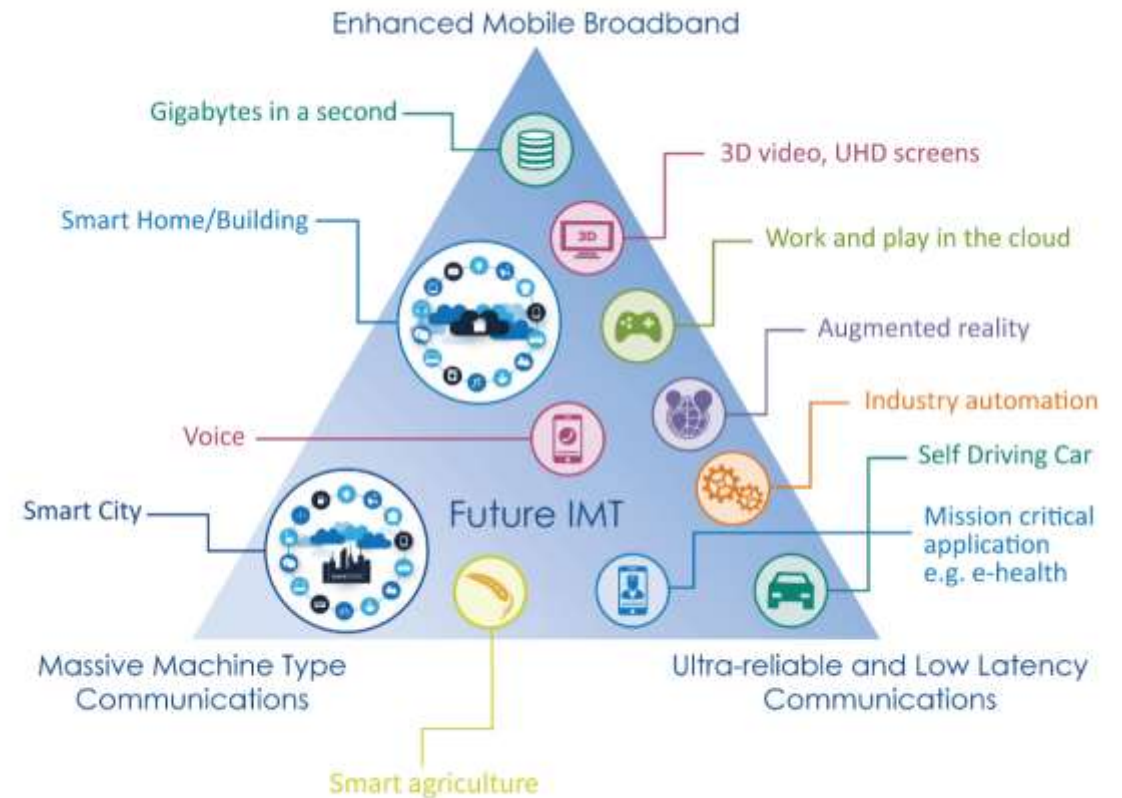
5G Standardization (3GPP)

5G – brings new growth

Perfect storm of technology trends:

- Availability of a reliable low latency radio and a fully flexible network
- Artificial Intelligence and Automation
- Device revolution for Augmented Reality and Virtual reality
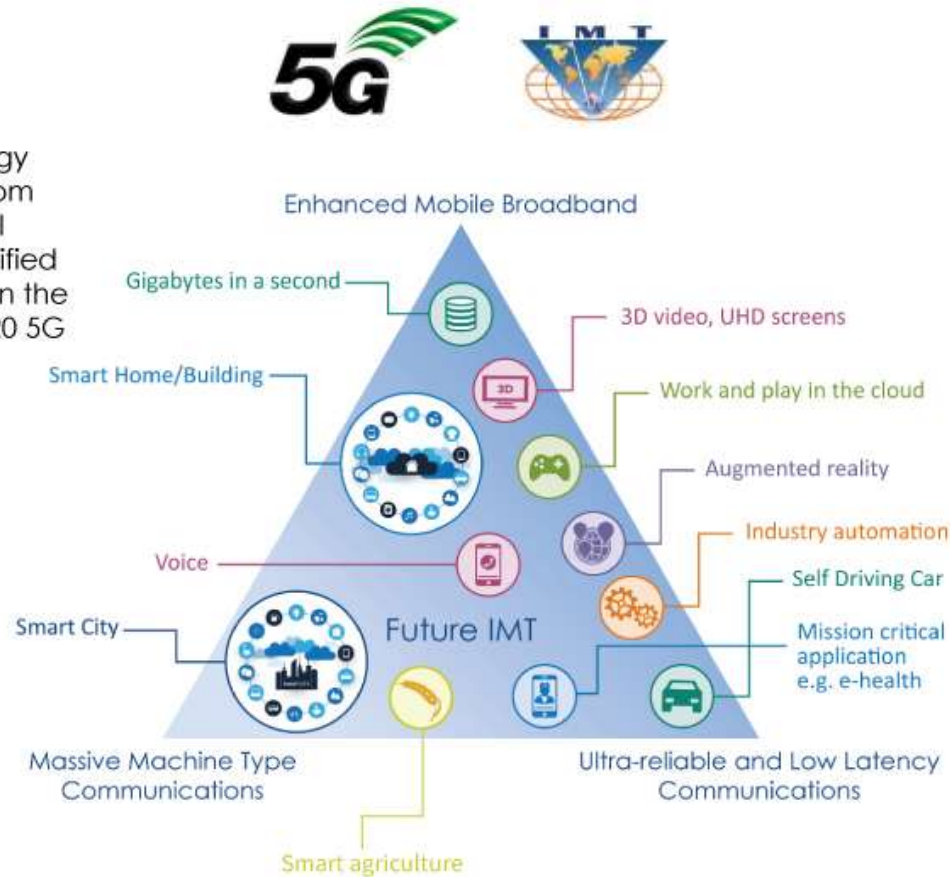- The Vertical industries going cellular

IMT-2020

IMT-2020

The 5G NR access technology and the 5G core network from 3GPP will meet the potential deployment scenarios identified during the ITU-R discussion on the requirements for the IMT-2020 5G system

3GPP 5G NR
- Operation from low to very high bands: 0.4 –100Ghz
- Ultra wide bandwidth (Up to 100MHz in <6GHz, Up to 400MHz in >6GHz)
- Set of different numerologies for optimal operation in different frequency ranges
- Native forward compatibility mechanisms
- New channel coding
- Native support for Low Latency and Ultra Reliability
- Flexible and modular RAN architecture: split fronthaul, split control- and user-plane
- Native end-to-end support for Network Slicing
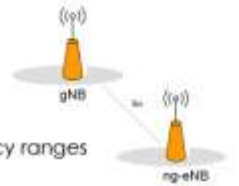
5G Core Network
- Functional entities → Services
- Virtual Core
- Internal Communication: APIs
- Harmonized protocols
- Function/service exposure
- CP / UP Separation
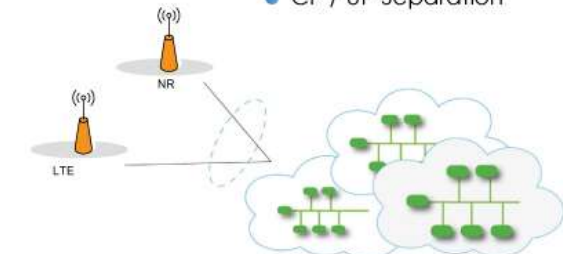
Feature rich 'Releases'

Release 15

- NR
- The 5G System – Phase 1
- Massive MTC and Internet of Things (IoT)
- Vehicle-to-Everything Communications (V2x) Phase 2
- Mission Critical (MC) interworking with legacy systems
- WLAN and unlicensed spectrum use
- Slicing – logical end-2-end networks
- API Exposure – 3rd party access to 5G services
- Service Based Architecture (SBA)
- Further LTE improvements
- Mobile Communication System for Railways (FRMCS)

Release 16

- The 5G System – Phase 2
- V2x Phase 3: Platooning, extended sensors, automated driving, remote driving
- Industrial IoT
- Ultra-Reliable and Low Latency Communication (URLLC) enh.
- NR-based access to unlicensed spectrum (NR-U)
- 5G Efficiency: Interference Mitigation, SON, eMIMO, Location and positioning, Power Consumption, eDual Connectivity, Device capabilities exchange, Mobility enhancements
- Integrated Access and Backhaul (IAB)
- Enh. Common API Framework for 3GPP Northbound APIs (eCAPIF)
- Satellite Access in 5G
- Mobile Communication System for Railways (FRMCS Phase 2)

Release 17

- NR MIMO
- NR Sidelink enh.
- 52.6 - 71 GHz with existing waveform
- Dynamic Spectrum Sharing (DSS) enh.
- Industrial IoT / URLLC enh.
- Study - IoT over Non Terrestrial Networks (NTN)
- NR over Non Terrestrial Networks (NTN)
- NR Positioning enh.
- Low complexity NR devices
- Power saving
- NR Coverage enh.
- Study - NR eXtended Reality (XR)
- NB-IoT and LTE-MTC enh.
- 5G Multicast broadcast
- Multi-Radio DCCA enh.
- Multi SIM
- Integrated Access and Backhaul (IAB) enh.

- NR Sidelink relay
- RAN Slicing
- Enh. for small data
- SON / Minimization of drive tests (MDT) enh.
- NR Quality of Experience
- eNB architecture evolution, LTE C-plane / U-plane split
- Satellite components in the 5G architecture
- Non-Public Networks enh.
- Network Automation for 5G - phase 2
- Edge Computing in 5GC
- Proximity based Services in 5GS
- Network Slicing Phase 2
- Enh. V2x Services
- Advanced Interactive Services
- Access Traffic Steering, Switch and Splitting support in the 5G system architecture

- Unmanned Aerial Systems
- 5GC LoCation Services
- Multimedia Priority Service (MPS)
- 5G Wireless and Wireline Convergence
- 5G LAN-type services
- User Plane Function (UPF) enh. for control and 5G Service Based Architecture (SBA)

These are some of the Rel-17 headline features, prioritized during the December 2019 Plenaries (TSG#86)

Start of work: January 2020

Full details of the content of Rel-17 are in the Work Plan: www.3gpp.org/specifications/work-plan

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Release Schedule

- Phase 1 (Rel-15) addresses the more urgent subset for commercial deployments

- Phase 2 (Rel-16) Completes the 3GPP IMT 2020 submission (ITU-R) and addresses all identified use cases & requirements...

- Massive effort to complete Rel-16 on time in 2020.

- E-meetings and COVID-19 have challenged the ability of the groups to meet the timelines (right)

- During TSG SA#89-e the TSG Chairs (CT, RAN and SA) confirmed that their groups will continue to study the situation, to arrive at the best common decision possible at the next Plenaries

- A firm decision on a delay to the freeze date of 3GPP Release 17 will be made in December 2020.
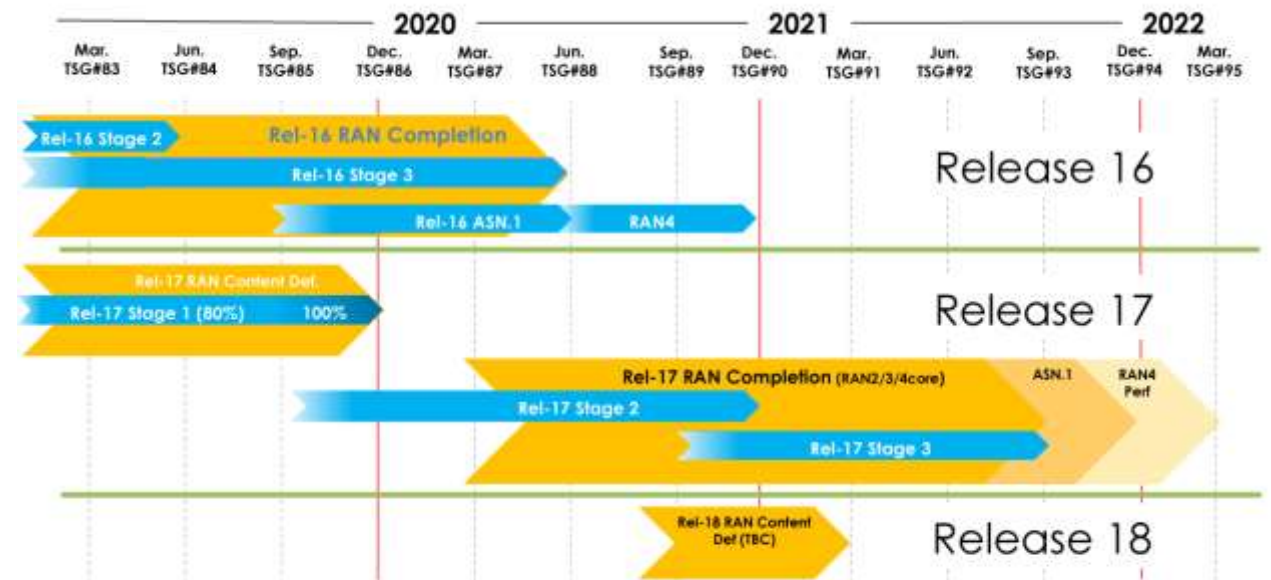
Source: 3GPP TSG SA#87e, 17-20 March 2020, e-meeting document SP-200222

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5G Standardization (ETSI)

ETSI: 5G building blocks

Network Functions Virtualization (NFV)

Multi-access Edge Computing (MEC)

Millimetre Wave Transmission (mWT)

Non-IP Networking (NIN)

- While much of the **5G standardization work will be done in 3GPP**

- Several ETSI's TBs and ISG provide input to 3GPP and/or collaborate with 3GPP
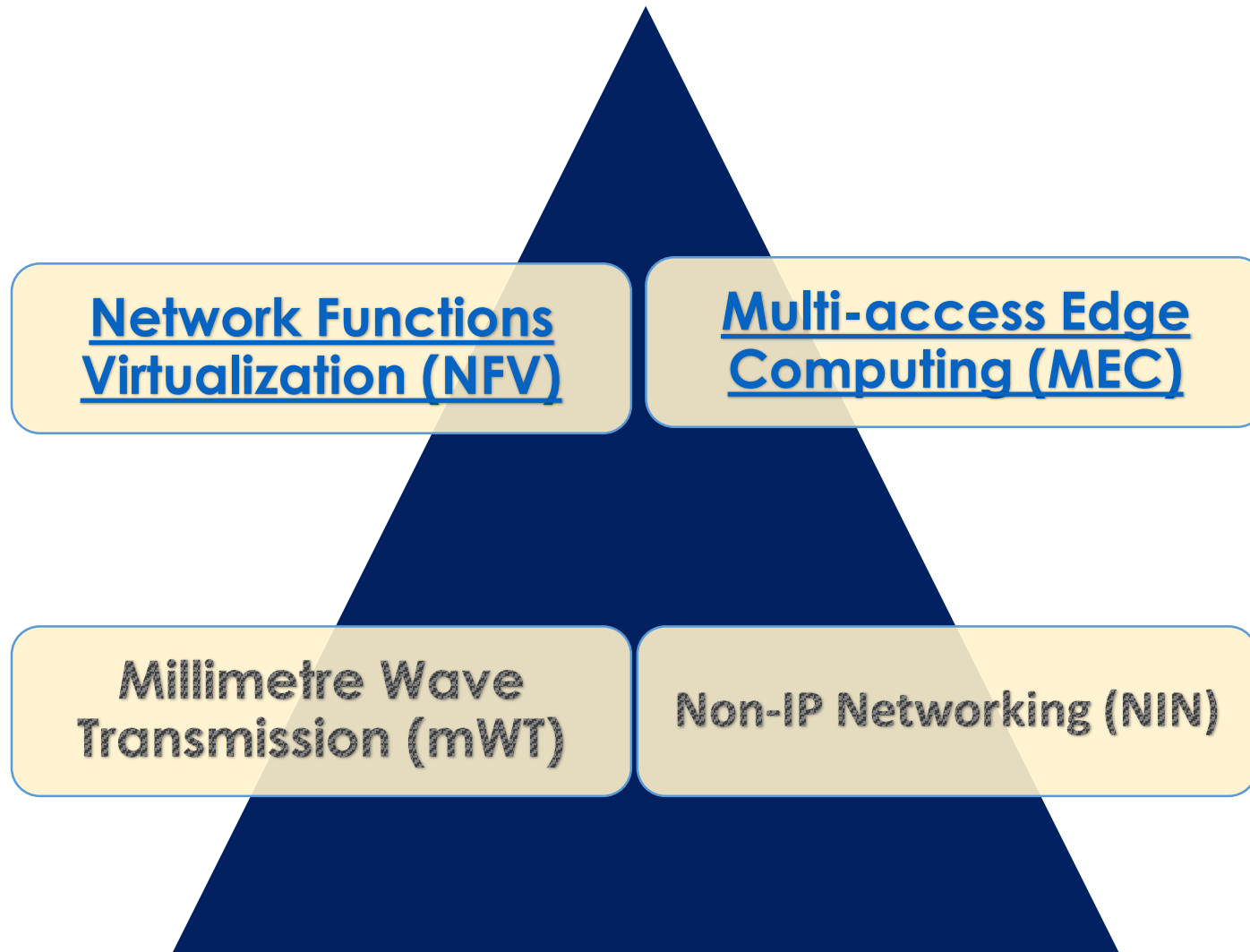
Network Functions Virtualization (NFV)

- **In Nov 2012 - Service providers came together and formed ETSI NFV ISG**
  - NFV Major Benefits: Network on demand, "network elasticity"
  - develops NFV standards, proofs-of-concept and conducts its research in two-year phases.
  - Six working groups: TST, SOL, REL, IFA, EVE, and SEC and more than 100 publications have been produced since its formation.

- **Scope of the 5G-related activity**
  - ETSI ISG NFV has defined the reference architecture which is used as baseline architecture for 5G
  - Strong collaboration with other SDOs, open-source projects, and industry forums to ensure NFV delivers deployable solutions for 5G

- **NFV Achievements**

  - Release 1 (2013 – 2014), Release 2 (2015 – 2016), Release 3 (2017-18) & Release 4 (2019-20)

    Published NFV specifications are available here>>

Multi-access Edge Computing (MEC)

- MEC offers application developers and content providers cloud-computing capabilities and an IT service environment at the edge of the network.

- **Scope of the 5G-related activity:**
  - MEC is a key enabler for a significant number of 5G use cases
  - MEC is well positioned as a key contributor to fixed-mobile integration
  - Like NFV, MEC also defines architecture and APIs for management of MEC compute infrastructure.
  - Additionally, MEC also defines APIs for several services such as Radio Network Information Service (RNIS) and Location Service

- **MEC Achievements:**
  - Foundation for Edge Computing created – Fully standardized solution to enable applications in distributed cloud created by ETSI MEC + 3GPP

ETSI MEC published related specifications are available here>>

Millimetre Wave Transmission (mWT)

- ETSI established **mWT ISG** to provide a platform and opportunity for companies and organizations involved in the microwave and millimetre-wave industry to address the challenges involved in using this spectrum

- **mWT** concerns the use of millimetre wave spectrum for radio transmission, which lies in the 30GHz to 300GHz range (with wavelengths from 10mm to 1mm).

- **Scope of the 5G-related activity:**
  - Facilitate the use of the V-band (57-66 GHz), E-band (71-76 & 81-86 GHz) and in the future higher frequency bands (from 50 GHz up to 300 GHz) for large volume applications in the back-hauling and front-hauling to support mobile network implementation.
    - Wireless backhaul and front-haul serving the requirements of 5G in terms of capacity, topology, latency and any other technical or network feature
- **mWT achievements:**
  - **ETSI GR mWT 012 , mmWave Semiconductor Industry Technologies: Status and Evolution**
    - **Latest publications** are available **here**

Non-IP Networking (NIN)

- ISG on NIN has been set up recently to standardize a digital communications technology fit for the 21st century.
  - Standardize the concept of a flow, control plane protocols for managing flows, and appropriate packet formats.
  - It has identified several technical issues with the current (TCP/IP-based) technology which prevent it delivering the required levels of service without excessive complexity or, in some cases, at all.

- The new protocols will provide:
  - virtual elimination of delays in forwarding real-world signals: not only audio and video but also tactile feedback and the position of vehicles or industrial robots
  - multicasting of live content (such as sports events) to an unlimited number of subscribers
  - more efficient use of spectrum and of processing power
  - better security, both privacy and resilience to denial-of-service
  - better performance when accessing remote content such as web pages
  - ways of guaranteeing network service sustainability
  - extensibility: packet formats do not have to be the same throughout the system, and introducing new features such as a new kind of addressing only affects the control plane messages

Conclusions

- 3GPP is industry driven - Standardization of interfaces enables an interoperable, multi-vendor approach to deployment

- 5G new radio (nr) remains high focus for RAN groups

- Release 17 focus will continue to expand towards new use cases and new sectors…with particular progress on IoT

- 5G will be a multi-Release technology (beyond Release 17)

- While much of the 5G standardization work will be done in 3GPP, Several ETSI's TBs and ISG provide input to 3GPP and/or collaborate with 3GPP
  - NFV, MEC, mWT, NIN etc.

![thank you!]

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