



# IEEE 802 EC 5G/IMT-2020 SC draft report

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# 5G SC report


# Philosophy

- **Include and describe all options**
  - That are derivatives of the four requested cases
- **Expand cost/benefit for each**
  - In a prioritized manner
- **SC conclusion recommended**
  - Consensus preferred on preference
    - not required
    - Worst case straw poll preference
  - Recommend way forward for preference (s)

# What are “costs and benefits”?

- **This is a cost-benefit analysis**
  - But without monetary cost, only relative costs
  - A quantitative pros vs cons
  - Strengths, Weaknesses, Opportunities and Threats
- **Brainstorm all costs and benefits**
  - E.g., resource cost, standards development cost, installation cost, operational cost, energy cost, etc.
  - Are there unexpected costs?
  - Are there unanticipated benefits?
- **Estimate value relative to a baseline**

# Proposed Table of Contents

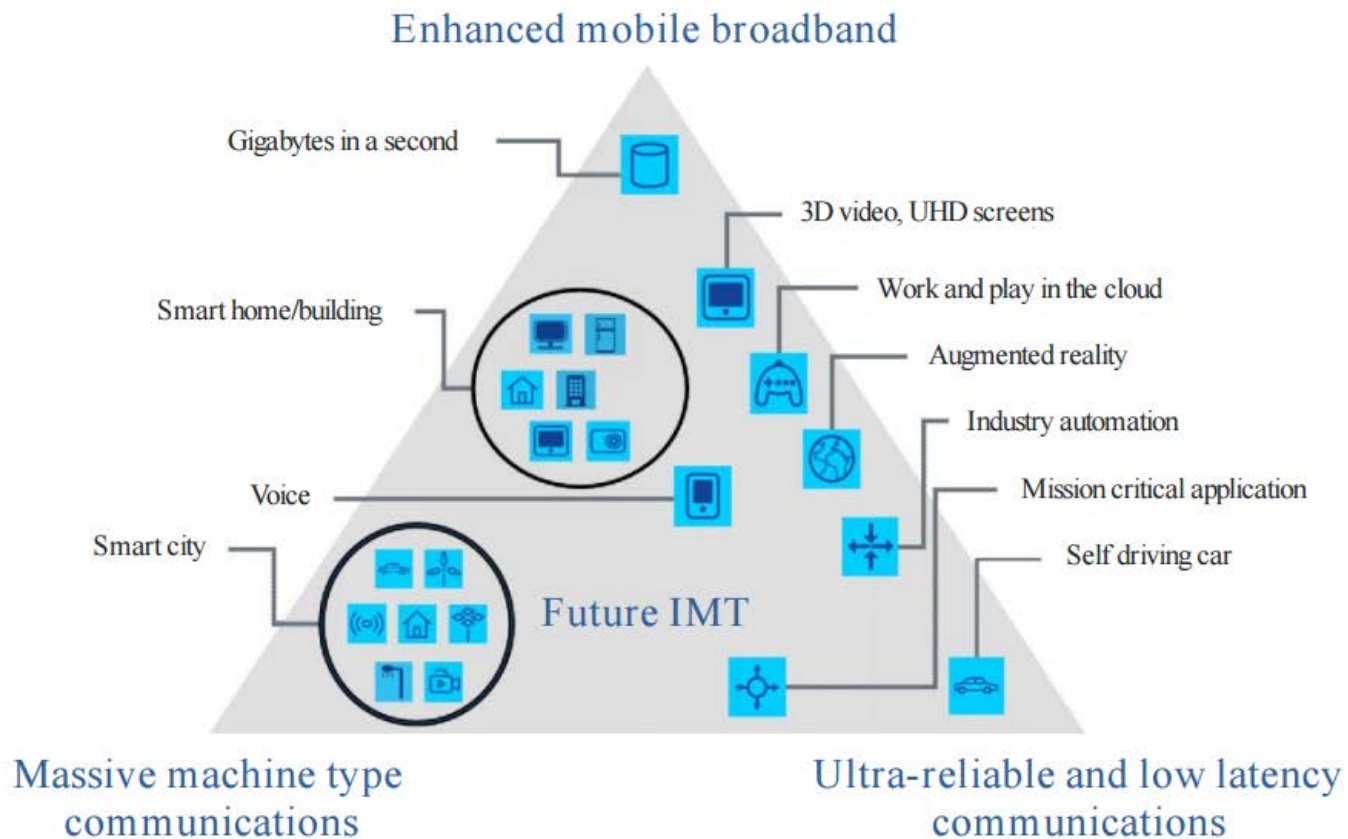
- **Introduction**
    - IEEE 802 5G related projects
  - **Options Considered**
    1. **IEEE 5G**
      - Description
      - Benefits
      - Costs
    2. **IMT-2020 – single technology**
      - Description
      - Benefits
      - Costs
    3. **IMT-2020 – set of technologies**
      - Description
      - Benefits
      - Costs
    4. **IMT-2020 – external proposal**
      - Description
      - Benefits
      - Costs
  - **Conclusion**
- 
- **802.1**
    - P802.1CF – OmniRAN architecture
    - P802.1CM – TSN for Fronthaul
  - **802.3**
  - **802.11**
    - P802.11ax – high aggregate throughput. High density of users.
    - IEEE Std 802.11ad – high individual throughput, short range.
    - P802.11ay – next generation of 802.11ad.
    - P802.11ah - <1 GHz for IoT requirements
  - **802.15**
    - P802.15.3d
    - 100Gb/s THz project
    - P802.15.7 REVa, Optical Wireless Communications,
    - P802.15.4 family.
  - **802.16**
    - 802.16.1
  - **802.21**
    - P802.21.1

# What is 5G?

# There are two contexts for 5G

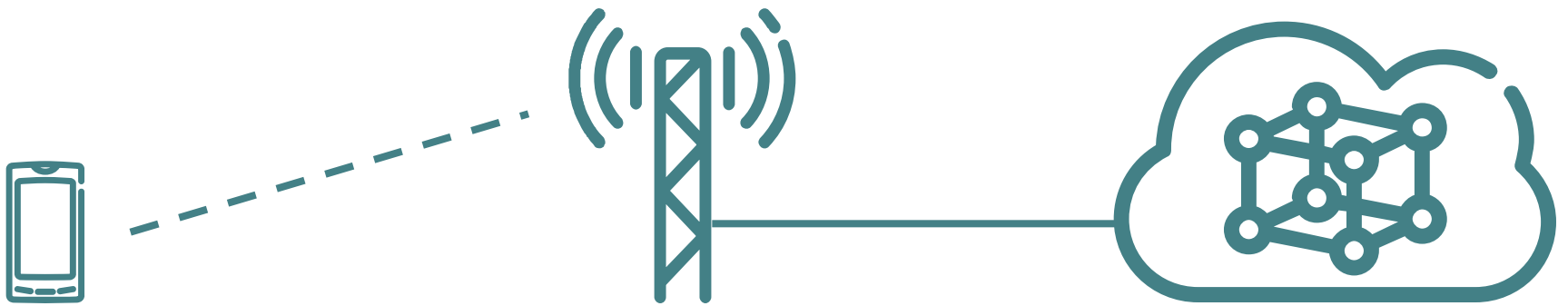
- **IEEE 5G**
  - Some sort of description will be required
  - This may include use cases and requirements
- **IMT-2020**
  - **Usage scenarios (as defined by ITU-R M.2083)**
    - Enhanced Mobile Broadband (eMBB)
    - Ultra-reliable and low latency communications (UrLLC)
    - Massive machine type communications (mMTC)
  - **Capabilities (as defined by ITU-R M.2083)**
    - Peak Data rate, User experienced data rate, Latency, Mobility, Connection density, Energy efficiency, Spectrum efficiency, Area traffic capacity

# IMT-2020 (per ITU-R M.2083 - Figure 2)





# 5G architecture



... simplified

What are all the derivatives  
of options?

# 1. IEEE 5G

- **Description**
  - **Cost/benefit analysis does not include submission to IMT-2020**
  - **At least simplified architecture , but likely more**
  - **A combination of multiple IEEE standard technologies, profiled in a single standard**
- a) IEEE 802 wireless 5G**
  - i. 802.11 only**
    - a. P802.11ax – high aggregate throughput. High density of users.
    - b. P802.11ay , IEEE Std 802.11ad – high individual throughput, short range.
    - c. P802.11ah - <1 GHz for IoT requirements
    - d. 802.11p - wireless access in vehicular environments
  - ii. 802.15 only**
    - a. P802.15.3d
    - b. 100Gb/s THz project
    - c. P802.15.7 REVa, Optical Wireless Communications,
    - d. P802.15.4 family.
- b) “All IEEE 802” 5G**
- c) IEEE 802 5G plus others**
  - i. 3GPP 5G**
- d) “All IEEE” 5G**
  - i. IEEE 802 and ComSoc projects**
- e) IEEE 5G plus others**

## 2. IMT-2020 - single technology

- **Description**
  - Just radio interface of simplified architecture . Single or multiple singles...
  - IMT-2020 proposal by IEEE
- a) **eMBB(<6GHz)**
  - i. IEEE 802.11ax
  - ii. IEEE 802.11ac
  - iii. IEEE 802.11n
- b) **eMBB (>6GHz)**
  - i. IEEE 802.11ay
  - ii. IEEE 802.11aj
  - iii. IEEE 802.11ad
- c) **UrLLC– IEEE 802.11p**
- d) **mMTC – IEEE 802.11ah**
- e) **eMBB**
  - a) P802.15.3d
  - b) 100Gb/s THz project
  - c) P802.15.7 REVa, Optical Wireless Communications,
- f) **mMTC - P802.15.4 family.**

# 3. IMT-2020 - set of technologies

- **Description**
  - At least radio interface of simplified architecture , but likely more
  - A combination of multiple IEEE 802 standard technologies, profiled in a single standard
  - IMT-2020 proposal by IEEE
- a) **IEEE 802.11**
  - i. eMBB (<6GHz) – IEEE 802.11 ax,ac,n
  - ii. eMBB (>6GHz) – IEEE 802.11 ay,aj,ad
  - iii. UrLLC– IEEE 802.11p
  - iv. mMTC – IEEE 802.11ah
- b) **IEEE 802.11 with 802.1/3**
- c) **IEEE 802.15**
  - a) eMBB
    - a) P802.15.3d
    - b) 100Gb/s THz project
    - c) P802.15.7 REVa, Optical Wireless Communications,
  - b) mMTC - P802.15.4 family.
- d) **IEEE 802.11 with 3GPP 5G**
  - i. LWA
  - ii. LWIP
  - iii. New?

## 4. IMT-2020 - external proposal

- **Description**
  - Part of a complete architecture
  - A combination of IEEE 802 standard technologies with other technologies (e.g., 3GPP)
  - IMT-2020 proposal by external party (e.g., 3GPP)
- a) **IEEE 802.11 with 3GPP 5G**
  - i. LWA
  - ii. LWIP
  - iii. Release 16?

# Next Steps

# Contributions requested

- **Derivative options**
  - Expand list
  - Prioritize list
  
- **Report content**
  - Indicate which option
  - Expand costs and benefits