



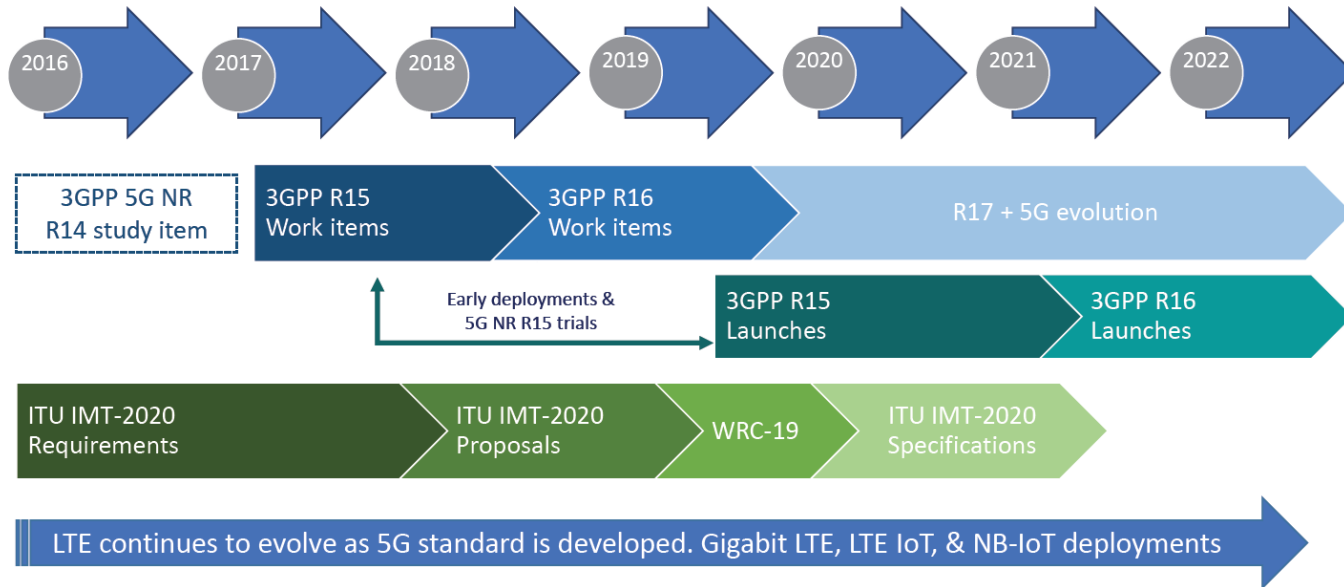
# **5G Revolution & Service security in Korea**

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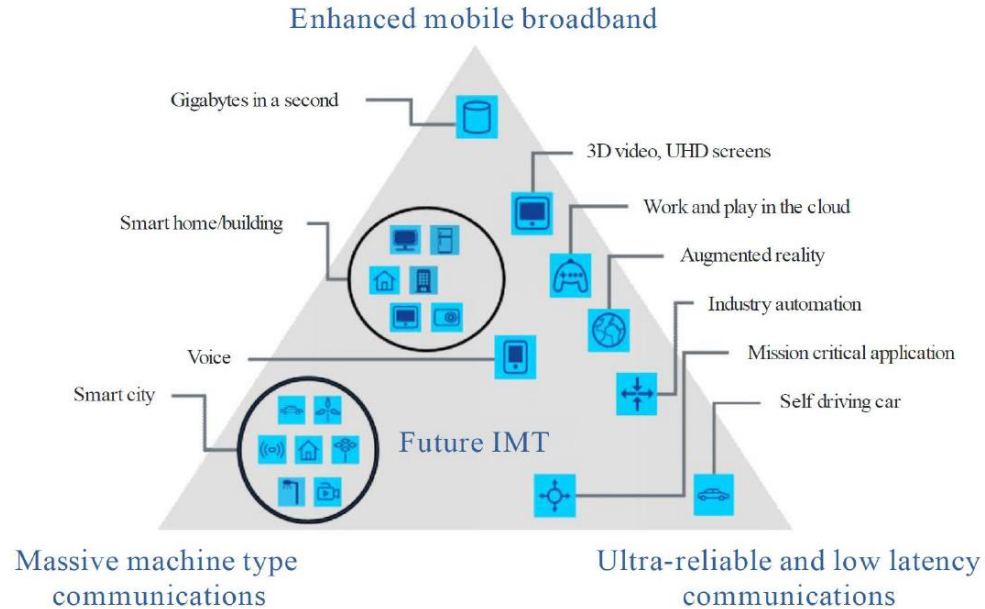
# 5G Standardization timeline

## *Standards development & deployment*



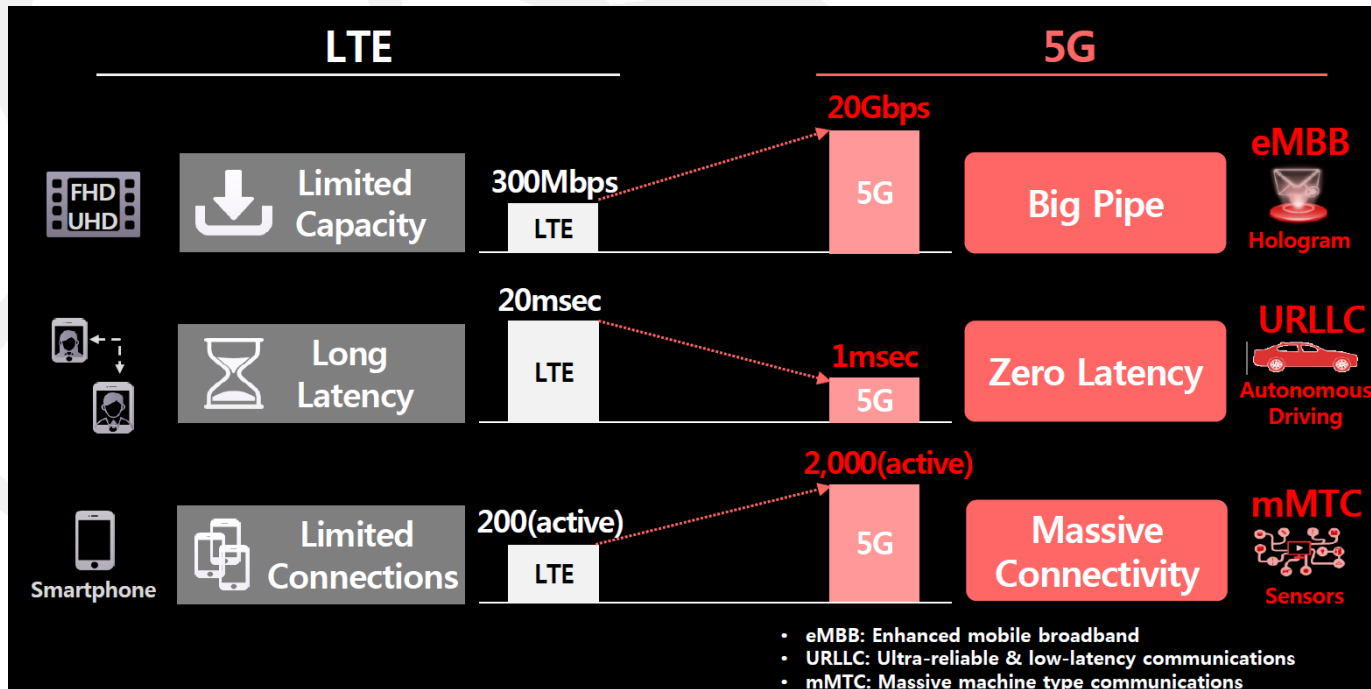
Source: IHS

# Usage scenario for 5G (ITU-R)



Source: ITU-R M.2083

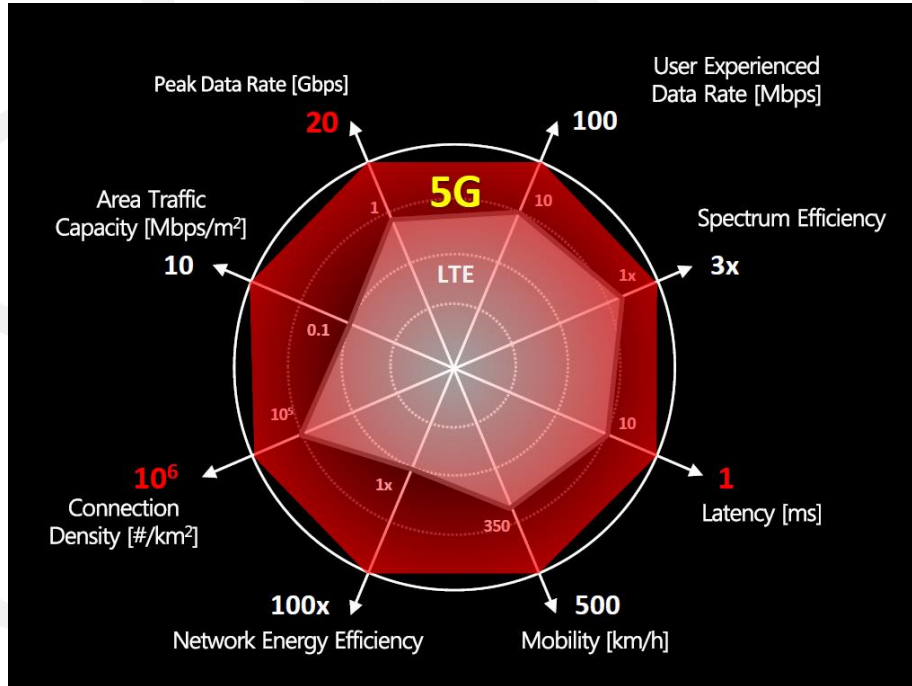
# Potential opportunities of 5G



# One network, multiple industries



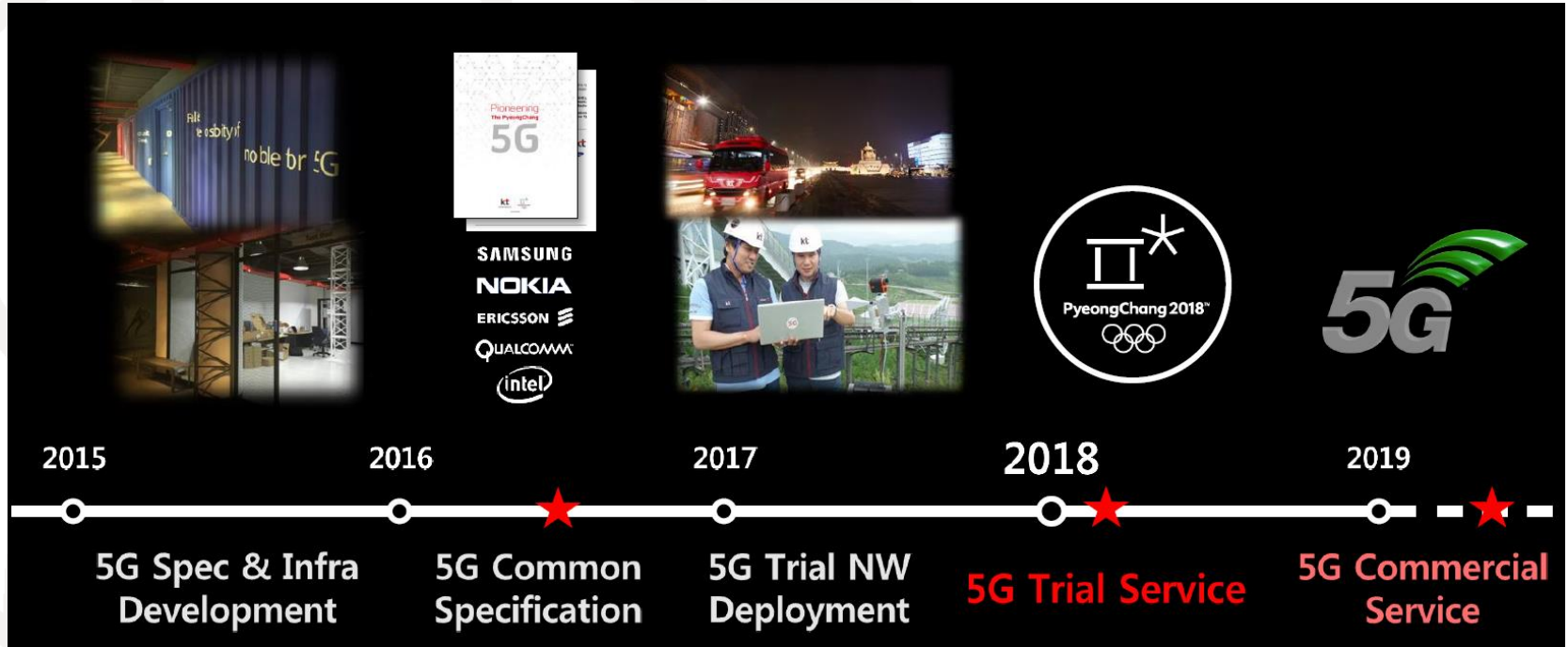
# 5G Requirements (ITU-R M.2083)







# Trial service & commercial service





# 5G use cases (I)

- Enhanced Mobile Broadband
  - Extending cellular coverage into a broader range of structures
  - Improving capacity to handle a significantly greater number of devices using high volumes of data, especially in localized area.
- Massive Internet of Things
  - Enabling the scale of MIoT
- Mission Critical Services
  - Supporting applications that require high reliability, ultra-low latency connectivity with strong security and availability

# 5G use cases (II)

- Enhanced Mobile Broadband (Big Pipe)
  - Enhanced indoor wireless broadband coverage
  - Enhanced outdoor wireless broadband
  - Fixed wireless broadband deployments
  - Enterprise teamwork / collaboration
  - Training / education
  - Augmented and virtual reality (AR/VR)
  - Extending mobile computing
  - Enhanced digital signage



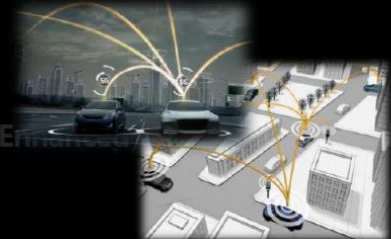




# 5G use cases (III)

- Massive Internet of Things (Massive Connectivity)
  - Asset tracking
  - Smart agriculture
  - Smart cities
  - Energy / utility monitoring
  - Physical infrastructure
  - Smart homes
  - Remote monitoring
  - Beacons and connected shoppers

# 5G use cases (IV)

- Mission Critical Services (Zero Latency)
  - Autonomous vehicles
  - Drones
  - Industrial automation
  - Remote patient monitoring / telehealth
  - Smart grid

# Commercialization - Services

Enhanced Mobile Broadband	Mission Critical Services	Massive IoT
<p data-bbox="330 390 600 421"><b>Hyper-Realistic Media</b></p>  <p data-bbox="392 762 539 792"><b>All Wireless</b></p> 	<p data-bbox="875 390 1056 421"><b>Connected Car</b></p>  <p data-bbox="867 713 1064 743"><b>Remote Control</b></p> 	<p data-bbox="1321 390 1449 421"><b>Home IoT</b></p>  <p data-bbox="1503 547 1638 577"><b>Smart City</b></p>  <p data-bbox="1306 718 1441 749"><b>Smart Grid</b></p> 

# 5G security framework

## Flexible and scalable security architecture

- Virtualization and dynamic configuration for 5G promotes new dynamic and flexible security architecture
- Security for RAN signaling could be located close to the access (e.g., virtualization) with a higher degree of independence to the user plane security, allowing more robust security (key distribution, key isolation, etc.)

## 5G radio network security

- Attack resistance of radio networks to threats such as Denial of Service from potentially misbehaving devices
- Adding mitigation measures to radio protocol design
- Utilize available trusted computing technologies

## Virtualization security (ETSI NFV SEC)

- Network virtualization with high assurance of VNF isolation to simplify the handling of diverse security requirements in common infrastructure
- Use existing trusted computing tools (TCG) and concepts for Virtualized Platform Integrity
  - root of trust
  - remote attestation
  - device integrity monitoring
  - secure storage
- Cloud-friendly data encryption (homomorphic encryption, allowing operations on encrypted data).

## Identity management 5G open identity management architecture

- Billions of heterogeneous end-devices, sensors, network nodes with variable security capabilities, device attributes, and policies
- Allow enterprises with an existing IDM solution to reuse it for 5G access.
- New ways to handle device/subscriber identities with network slicing, enabling different IDM solutions per slice

## Energy-efficient security

- Most constrained, and battery-dependent devices with a long life time might be separated in specialized energy-efficient lightweight network slice
- Need to compare energy cost of encrypting one bit vs. transmitting one bit and consider hardware acceleration benefits

## Security assurance

- Deployment of heterogeneous hardware and software components creates greater need for security certification
- System state attestation needs to be communicated between entities to provide assurance in platform integrity
- Multi-layer security certification scheme is needed to efficiently create and traverse certification records

# Application security aspect for 5G

- New trust model and Identity management
  - Hybrid authentication management
    - Combination of device identity and service identity
    - From device-based management to user-based management
- Service-oriented security
  - Build E2E Security
    - Flexible security architecture to support-security attributes for different network slices
    - A uniformed security management framework for multi-vendor environment
  - Open Up security capabilities, and provide security as a service
    - Isolate virtual network slices





Thank you