

Industry Input

Role of 5G in Future Wireless Cities

NSF Future Wireless Cities Workshop

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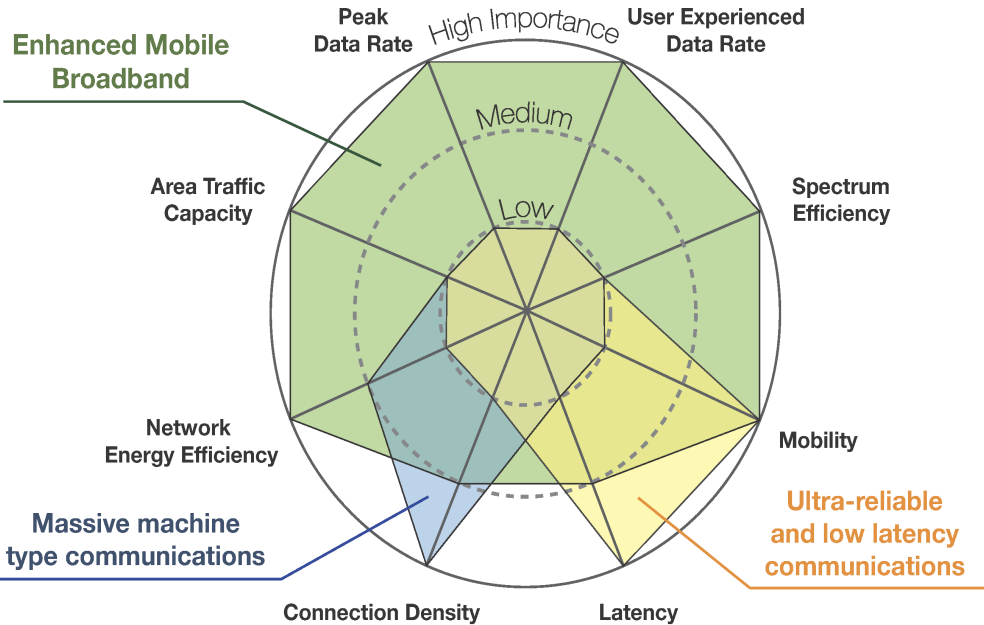
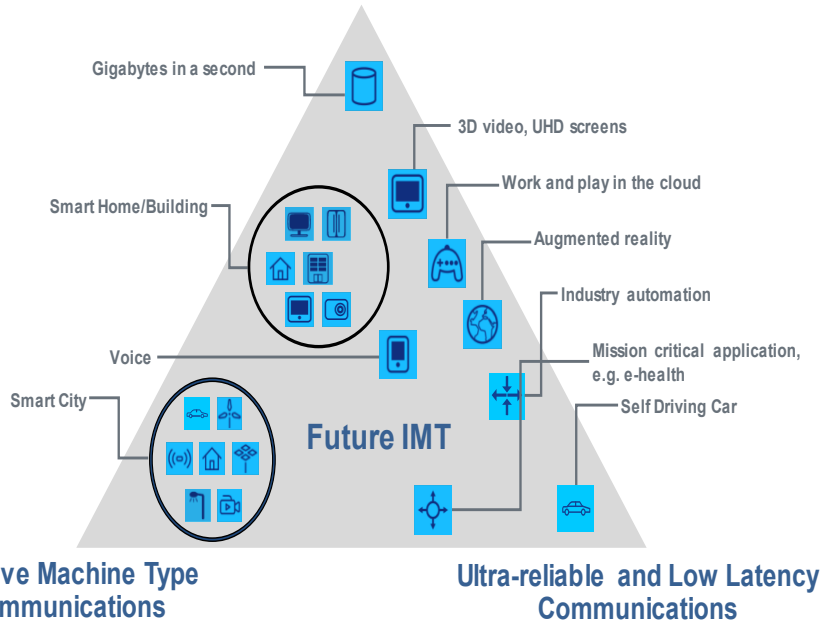


Future Wireless Cities

- Key Components:
 - Connect - via a cost-effective and scalable communication infrastructure
 - Collect real time data
 - Analyze for timely action plan and decision-making
- Application Areas (Examples)
 - Metering (e.g., gas, energy, and water),
 - Lights management,
 - Environmental monitoring (e.g., pollution, temperature, humidity, noise)
 - Vehicle traffic control
- Extremely high density of devices (sensors) with different characteristics and different communication needs

ITU-R vision for IMT-2020 and beyond

Enhanced Mobile Broadband



Three use case categories

Eight Key Capabilities

5G supports a wide range of services

NGMN: 5G Use Case Families and Use Case Examples

Broadband access
in dense areas

PERVASIVE
VIDEO



Broadband access
everywhere

50+ MBPS
EVERYWHERE



Higher user
mobility

HIGH SPEED
TRAIN



Massive Internet
of Things

SENSOR
NETWORKS



Extreme real-time
communications

TACTILE
INTERNET



Lifeline
communications

NATURAL
DISASTER



Ultra-reliable
communications

E-HEALTH
SERVICES



Broadcast-like
services

BROADCAST
SERVICES



5G Use cases & Requirements

- **Broadband everywhere**
 - Peak data rate > 10 Gbps
- **High user mobility**
 - High speed train
- **Pervasive HD video communications (dense urban environments)**
 - Context awareness
- **Massive IoT**
 - Scalability, low cost
- **Real-time communication**
 - ETE response time
- **Mission critical**
 - High reliability

Almost all of the use cases will be applicable to future wireless cities

5G - Key Architecture Principles

- **Evolution from 4G (LTE/LTE-A), not replacement**
- **SDN/NFV**
 - Programmable network/network slices
- **Scalability**
- **Separation of control and data plane in the core network**
- **More intelligence at the edge**
 - Centralization vs. de-centralization of functions based on latency requirements
- **Spectrum - licensed, shared, and unlicensed bands**
 - Low band < 6 GHz and high band \geq 6 GHz
- **Front haul/backhaul complexity simplification**
- **Energy Efficient**
- **Convergence for various types of use cases**

Future Wireless Cities - Studies & Trials Needed

- Network capabilities and interworking framework to serve all the future wireless cities use cases
- Role of 5G
- Varying characteristics of devices, communication, processing, and storage needs
- Different communication infrastructure architectures suited for future cities segmented on various criteria
- Performance, reliability, and security
- Role of NFV and SDN
- User experience, value, and cost
- An integrated View – scalability as the focus