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

Three use case categories

Eight Key Capabilities

- Enhanced Mobile Broadband
  - 3D video, UHD screens
  - Gigabytes in a second

- Massive Machine Type Communications
  - Self Driving Car
  - Work and play in the cloud

- Ultra-reliable and Low Latency Communications
  - Augmented reality
  - Industry automation

- Future IMT
  - Smart City
  - Voice
  - Mission critical application, e.g. e-health

- Peak Data Rate
  - High Importance

- Area Traffic Capacity
  - Medium

- Network Energy Efficiency

- Connection Density

- Latency

- Spectrum Efficiency

- Mobility

- Ultra-reliable and low latency communications
5G supports a wide range of services

NGMN: 5G Use Case Families and Use Case Examples

<table>
<thead>
<tr>
<th>Broadband access in dense areas</th>
<th>Broadband access everywhere</th>
<th>Higher user mobility</th>
<th>Massive Internet of Things</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pervasive Video</td>
<td>50+ MBPS Everywhere</td>
<td>High Speed Train</td>
<td>Sensor Networks</td>
</tr>
<tr>
<td>Extreme real-time communications</td>
<td>Lifeline communications</td>
<td>Ultra-reliable communications</td>
<td>Broadcast-like services</td>
</tr>
<tr>
<td>Tactile Internet</td>
<td>Natural Disaster</td>
<td>E-Health Services</td>
<td>Broadcast Services</td>
</tr>
</tbody>
</table>

See the NGMN 5G White Paper for a detailed list of all NGMN use cases

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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 ≥ 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