

# Agenda of the Workshop: Understanding 5G and Its Evolution

**Duration:** 1 to 1.5 hours

---

## 1. Introduction and Welcome - 10 minutes

**Objective:** To set the context of the workshop and define the objectives.

**Topics:**

- Quick overview of wireless communication technology in layman's terms.
  - Importance of 5G in modern connectivity and impact on industries.
  - Workshop structure and expected outcomes.
- 

## 2. Generations of Wireless Communication - 30 to 40 minutes

**Objective:** Provide the basics necessary to understand how wireless communication has evolved from 1G to 5G.

**Topics:**

- 1G (First Generation): Analog voice, large mobile devices, limited range.
- 2G (Second Generation): Digital voice, text messaging, and encryption.
- 3G (Third Generation): Mobile internet, video calling, and better voice clarity.
- 4G (Fourth Generation): High-speed data, HD video streaming, and gaming.
- 5G (Fifth Generation):
  - Speed: 10 to 100 times faster compared to 4G.
  - Low latency: Very critical for real-time applications.
  - High capacity: It will support IoT and huge device connectivity.
  - Enhanced reliability: Mission-critical services, such as autonomous vehicles.

**Interactive Element:**

- A comparative table or graph showing key metrics like speed, latency, and capacity for each generation.
  - Hands-on activity: Using speed test apps to show 4G vs. 5G (where 5G is available).
- 

## 3. Key Features of 5G - 20 minutes

**Objective:** To go more in-depth into the technical and practical aspects of 5G.

**Topics:**

- Architecture of 5G Networks:
  - Core network and RAN (Radio Access Network).

- mmWave and sub-6 GHz frequency bands.
  - Beamforming and MIMO (Multiple Input, Multiple Output).
- Applications:
  - Enhanced Mobile Broadband (eMBB): Ultra-HD streaming, VR/AR.
  - Ultra-Reliable Low Latency Communication (URLLC): Autonomous vehicles, robotics.
  - Massive Machine-Type Communication: Smart cities, IoT.
- Challenges: Cost of deployment, interference, and coverage issues.

### **Interactive Element:**

- Live demo of some beamforming animation or 5G application video.
  - Group discussion on 5G's potential impact on participants' daily lives.
- 

## **4. Future of 5G and Beyond - Optional, 15 to 20 minutes**

**Objective:** Give a glimpse of the changes that will arrive, including 6G research.

### **Topics:**

- 6G Vision: Terahertz communication, AI-powered networks, and holographic telepresence.
  - Sustainability in 5G: Energy efficiency and green networks.
  - 5G in Emerging Technologies: Integration with AI, Blockchain, and AR/VR.
- 

## **5. MATLAB for 5G Simulations - 20 minutes**

**Objective:** To introduce MATLAB as a tool for simulating and visualizing 5G concepts.

### **Topics:**

- Overview of MATLAB's capabilities for wireless communication.
- Demonstrating basic 5G concepts using MATLAB:
  - Frequency spectrum analysis: Show 4G vs. 5G spectrum ranges.
  - Beamforming visualization: Simulate antenna arrays focusing signals.
  - Signal modulation and latency comparisons.
- Practical demonstration of a pre-built MATLAB script for 5G waveforms.

### **Interactive Element:**

- Participants can watch and interact with MATLAB simulations.
  - Discuss how MATLAB simulations correlate with real-world 5G systems.
-