5G (IMT-2020) vs. 4G (IMT-Advanced)

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1. Peak Data Rate

5G: 20Gbps.

4G: 1Gbps.

1) High-definition video(4K/8K), VR or AR: these application scenarios require very high bandwidth and extremely fast transmission speeds, so 5G is more suitable.

2) Daily mobile phone using, social media: 4G is sufficient to meet the needs. The peak rate of 5G will not significantly improve the user experience in this low-bandwidth demand scenario.

2. User Experienced Data Rate

5G: Up to 100 Mbps in urban areas.

4G: Typically, 10-30 Mbps.

1) High-density places (stadiums, concerts, commercial areas): A large number of users using the network at the same time will cause congestion. 5G provides a higher experience rate. In a high-density user environment, the rate of 4G drops significantly.

2) Daily use with low user density, the 4G experience can meet most needs.

3. Latency

5G: As low as 1 ms.

4G: Typically, 10 ms or higher.

1) High real-time requirements (autonomous driving, industrial automation, remote surgery): 5G's ultra-low latency ensures that information is transmitted with almost no delay, meeting the needs of these applications with high real-time requirements.

2) General real-time applications (video calls, online games): 4G can provide a good user experience. But 5G can further enhance the experience.

4. Connection Density

5G: supports 1 million devices per square kilometer.

4G: usually around tens of thousands of devices per square kilometer.

1) Internet of Things (IoT), Smart Cities: The high connection density provided by 5G can support a large number of sensor devices and IoT terminals in smart cities.

2) In common user scenarios: 4G can meet the connection needs of most devices.

5. Spectrum Efficiency

5G: 3 times higher than 4G.

1) Urban core areas with limited spectrum resources and high user density: The higher spectrum efficiency provided by 5G means that more data traffic can be provided with the same spectrum resources.

2) In areas with low density and sufficient spectrum resources: 4G can provide a good network experience.

6. Mobility

5G: supports mobile speeds of 500 km/h.

4G: usually supports speeds of around 350 km/h.

1) High-speed mobile scenarios (high-speed trains, airplanes): 5G can provide a more stable connection, ensuring that passengers can continue to use the network while moving at high speeds.

2) Daily travel (driving, cycling, walking), 4G is sufficient to support stable connection of devices.

7. Energy Efficiency (Energy consumed per bit transmitted)

5G: Energy efficiency is 100 times that of 4G

1) IoT devices and low-power applications: 5G has outstanding energy efficiency and can support more low-power devices to work for a long time.

2) <u>Daily mobile phone use</u>: 4G's energy efficiency can already meet the needs.

8. Cost

1) 5G: For application scenarios that require high bandwidth and low latency, 5G is a better choice; although the initial cost is high, the long-term profit potential is great.

2) 4G: For everyday mobile phone users, low bandwidth requirements and mature markets, 4G is a better choice, with relatively small cost burdens for operators and consumers.

Cost	5G (IMT-2020)	4G (IMT-Advanced)
Infrastructure	<u>High</u>: Requires more base stations and fiber upgrades due to higher frequency and density demands.	<u>Low</u>: Already mature and widespread, minimal expansion needed.
Operational	<u>High</u>: Increased energy consumption and more frequent maintenance due to a larger number of smaller, complex base stations.	<u>Low</u>: Established technology, fewer maintenance needs, and relatively lower power consumption.
End-User Device	<u>High</u>: Early 5G-enabled devices are expensive due to advanced components, but prices may decrease over time.	<u>Low</u>: 4G devices are mass-produced and affordable, with a mature supply chain.
Spectrum	<u>High</u>: Spectrum auctions for 5G, particularly in high-frequency bands, can be very costly for operators.	<u>Low</u>: 4G spectrum has already been allocated and usage costs are stable and predictable.
Long-Term	<u>High</u>: Potential for large-scale industrial applications, providing strong long-term revenue growth.	<u>Stable</u>: Well-established in the consumer market, generating continuous but limited growth potential.