

What is 5G? Why 5G does really Matters

Background

1. **5G** is the fifth generation of wireless technology. But users will know it as one of the fastest and most robust technologies the world has ever seen. 5G is an opportunity to create an agile, purpose built network tailored to the different needs of citizens and the economy.
2. 5G wireless technology is meant to deliver higher multi-Gbps peak data speeds, ultra-low latency, more reliability, massive network capacity, increased availability, and a more uniform user experience to more users. 5G for consumers means not just faster mobile internet, but mainly internet connectivity in many more objects than what you see today.
3. Bhutan Telecom Limited and Tashi Infocomm Limited are currently conducting 5G trials in the country to study its performance on ground considering factors like geographical landscape, population density and vegetation.

Types of 5G Implementation Architecture

1. There are two types of 5G Architecture namely the Standalone (SA) and Non-Standalone (NSA).
2. NSA is a 5G service that does not 'standalone' but is built over an existing 4G network and anchors the control signaling of 5G Radio Networks to the 4G Core. SA, on the other hand, allows completely independent operation of a 5G service without any interaction with an existing 4G core. The SA scheme connects the 5G Radio directly to the 5G core network, and the control signaling does not depend on the 4G network at all.
3. The NSA will be easier to implement as 4G networks are already available in the country. In addition Bhutan would be implementing 5G mainly for eMBB (enhanced mobile broadband) which would provide massive download throughput. This architecture would deliver high-speed connectivity to consumers with 5G-enabled devices and help network operators maximize their existing LTE infrastructure while providing enterprise and users with faster and more reliable communications.

Radio Spectrum Ranges

1. There are three types of 5G spectrum band. **Low-band 5G** (coverage) which is about 20 percent faster than 4G LTE and has a frequency band lower than 1 GHz. **Mid-band 5G** which is spectrum in the 1 GHz - 6 GHz range and it is considered ideal for 5G because it can carry plenty of data while traveling significant distances (coverage with capacity). **mmWave high-band 5G** delivers super-fast speed over a short distance and has a frequency band above 24 GHz.
2. The 5G development around the world is gaining momentum, with this trend, the Authority in Bhutan supports 5G trials in the country by making the following spectrums available for 5G trials in Bhutan.
3. The frequencies range from **3.4 GHz to 3.6 GHz** were assigned to Bhutan Telecom Limited and Tashi Infocomm Limited for the 5G trials.

Why 5G?

1. Since 4G wireless network services were introduced, people were able to experience broadband services with the mobile devices. In Spite of such advanced 4G wireless network technologies, it is hard to provide mobile services that require high speed, rapid response, high reliability and energy efficiency. Therefore, in the 5G era, it has made a network to provide instantaneous cloud services, tactile internet, enhanced internet of things (IOT) and communications by guaranteeing quality of experience to mobile users. It is an opportunity for industry, society and individuals to advance their digital ambitions, with 5G a catalyst for innovation.
2. By deploying 5G in Bhutan. Users will experience greater speed up to 20Gbps in the transmissions and a lower latency of ten times less than in 4G providing greater capacity for remote execution. With 5G, the number of devices that can be connected to the network will increase greatly to the millionaire scale per square kilometer and the possibility of implementing virtual networks (network slicing) in order to provide connectivity across the country. 4G can support about 4,000 devices per square kilometer, whereas 5G will support around a million devices. People can enjoy seamless live streaming connectivity with 5G hotspots like Samuh. Smart applications can be enhanced.

3. 5G offers greater speed than 4G where the 4G base station supports approximately 150 subscribers with the peak data rate of 1 Gbps downlink and 500 Mbps uplink, and suppose if 5G base station supports the same number of subscribers with peak data rate of 20 Gbps downlink and 10 Gbps uplink. However, practically 4G has achieved the speed of 6.6 Mbps downlink and 3.3 Mbps uplink whereas 5G could deliver 133 Mbps downlink and 66 Mbps uplink. Therefore, it is always better to upgrade for better technologies than to cling on to the older technologies like 3G and 4G.
4. With a minimum speed of 133 Mbps downlink, it will facilitate efficient and cost-effective transport networks by replacing fiber connectivity requirements at homes and businesses. This will give opportunities to relook the current tariff structure of charging per Mb to per Mbps, where telcos can look into selling dedicated internet speed with no data caps especially for fixed devices.
5. As mobile network users increase congestion occurs and degrades quality in terms of latency and throughputs. 5G networks will facilitate decongest 4G networks with more 4G users migrating to 5G.
6. In the future, 5G will enable machines to communicate without human intervention like smart parking to holographic conference calls which we call the Internet of Things (IoT), capable of driving a near endless array of services. Since 5G has the capacity of very negligible delay between sending and receiving communications (latency), it will offer improved access to medical treatment, reliably connecting patients to doctors all over the globe including online surgeries.

User device supported (IOS and Android)

Currently the following list of mobile handset devices in the market would support 5G network considering the hardware supporting the 5G radio spectrum bands.

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1.	IPhone 12 (Mini, Pro, Pro Max)
2.	IPhone 13 (Mini, Pro, Pro Max)

3.	Samsung Galaxy S10 5G
4.	Samsung Galaxy Note 20 Ultra
5.	Samsung Galaxy S21 series
6.	Samsung Galaxy S21 Ultra
7.	Samsung Galaxy Fold
8.	Huawei Mate X
9.	OnePlus 5G Phone
10	Xiaomi Mi 11 series, Xiaomi Mi Mix 3
11	LG V50 ThinQ
12	OnePlus 9 Pro

With the release of patches supporting Bhutan's 5G spectrum and network, all the 5G supporting mobile devices can be used in Bhutan as two telecom operators are currently working with the handsets manufacturer for the patches. However, with development of the whole 5G ecosystem the handset prices are expected to drop and become affordable.