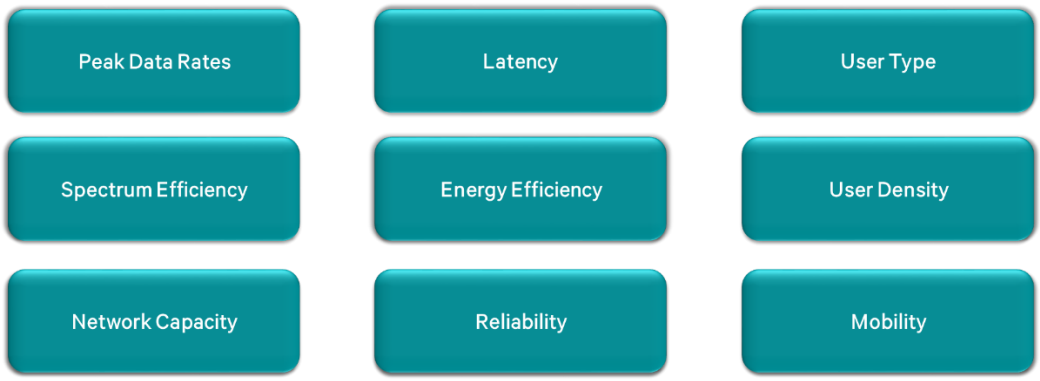
5G Spectrum Considerations

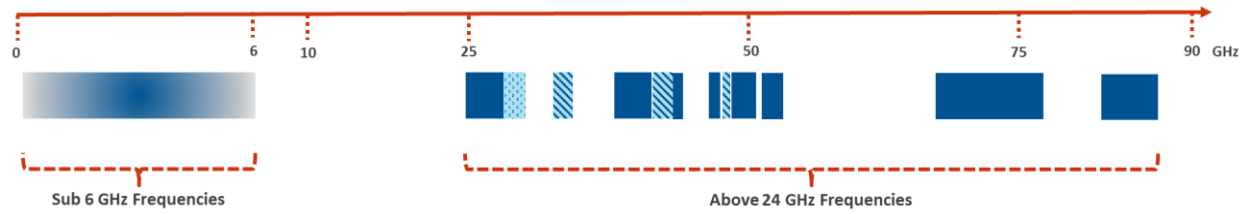
Spectrum will be the key ingredient for ensuring effectiveness of 5G services. Different use cases will dictate requirement of different frequency bands. There will be a requirement of both licensed and unlicensed spectrum to achieve a seamless system for providing desired QoS for consumers. In future the number of devices accessing the network is expected to increase due to the emerging applications of Internet of Things (IoT). Technologies such as beamforming, massive-Multiple Input Multiple Output (MIMO) will require higher frequencies due to shorter wavelengths. Some services would require wide and contiguous bandwidth to enhance data delivery efficiency. On network side, different types of network will be required to be planned based on the type of service. Cell size may get reduced (e.g. the order of some tens of metres) to provide larger area traffic capacity in dense areas.

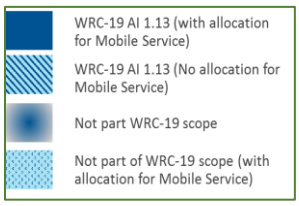
Key considerations for 5G spectrum are as shown in the figure below -



Recommendation ITU-R M.2083 on IMT Vision

Higher and lower frequencies are both needed to meet all multiple 5G use cases –





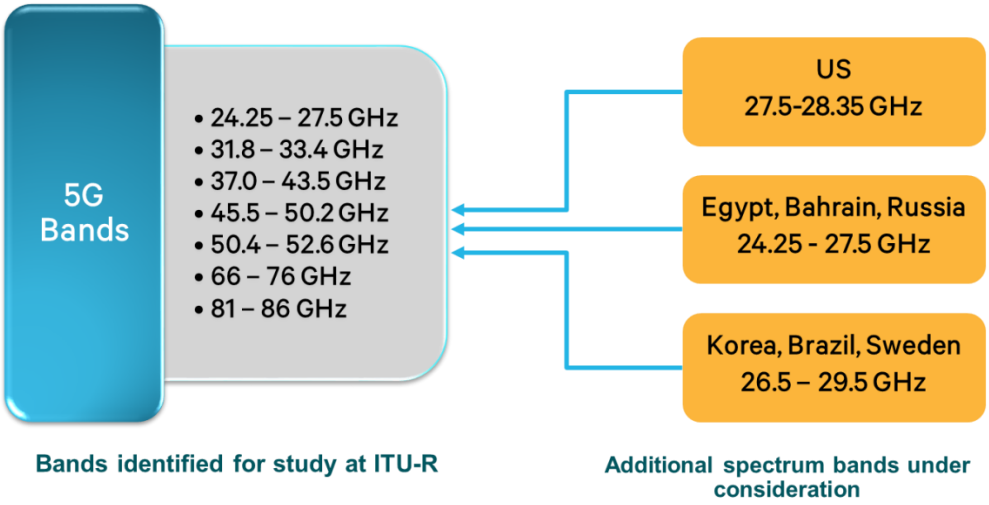
Sub 6 GHz Frequencies:

1. Full area coverage allowing cost effective delivery of mobile services
2. Bandwidths considerably wider (in the order of 100s of MHz) than those of today, providing a combination of capacity and coverage
3. New bands below 6GHz should be identified for 5G

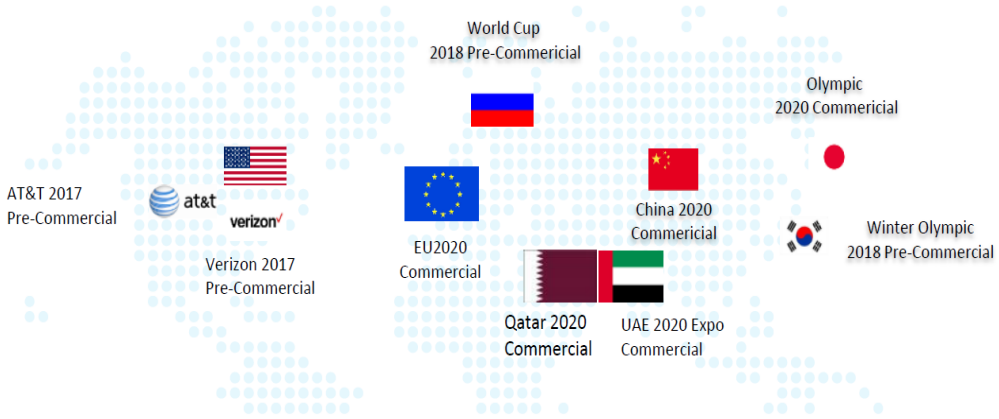
Above 24 GHz Frequencies:

1. Needed for applications requiring very high data rates
2. Will accommodate wider channel bandwidths (e.g. in the order of GHz per operator)
3. Propagation characteristics may facilitate sharing with existing services

WRC-15 decision (Resolution 238) for studying various frequency ranges for IMT-2020 (also commonly called as 5G) under Agenda Item 1.13 of WRC-19 and other frequency ranges under consideration are as shown in figure below –



There are some early commercial plans by some of the countries towards rolling out their 5G networks and most of these are linked with some triggers as shown below:



China: 3.4-3.6 GHz for 5G trial; consultation on 3.3-3.6, 4.8-5.0 GHz and 24.75-27.5, 37-42.5 GHz for 5G

Japan: 3.6-4.2, 4.4-4.9 GHz and 28 GHz for 5G trial (targeting commercial service in 2020 Summer Olympic)

Korea: 3.4-3.7 GHz and 26.5-29.5 GHz (for 2018 Winter Olympic 5G trial)

EU: 700 MHz, 3.4-3.8 and 24.25-27.5 GHz as 5G pioneer bands; working on 31.8-33.4 and 40.5-43.5 GHz

USA: 600 MHz, 27.5-28.35, 37.0-40.0 and 64.0-71.0 GHz