FEATURE

ADVENT OF 5G ERA: PROMISES & CHALLENGES

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Fifth generation mobile network technology or 5G offers several improvements over existing 4G and the older 3G and 2G technology. With bold claims such as the ability to power self-driving cars and stream virtual reality, the promise of 5G in Malaysia has captured the imagination of both tech-geeks and casual internet surfers.

But even the basic promise of 5G being 20 times faster than 4G alone should be reason enough to get excited, which is why we welcome news that the Malaysian Government is committed to implementing 5G within the next 2-3 years.

2G network was designed and built mainly for voice and short messaging service (SMS). Then came 3G which primarily improved the web browsing experience introduced during the 2.5G enhancement. Both 2G and 3G were based on time division multiplex (TDM) and worked on 64kbps timeslots.

4G was a full internet protocol (IP) technology designed to improve video streaming experiences and for high-speed data applications. These 3 network configurations work on relatively low frequency spectrum at 700MHz to 2.5GHz, depending on the spectrum availability of individual countries.

The 5G wireless network promises 3 types of broad services: Enhanced mobile broadband (eMBB), ultra-reliable and low latency communications (URLLC) and massive machine type communications (mMTC).

The initial phase of 5G deployment focuses on eMBB which provides greater data-bandwidth complemented by moderate latency improvements. This is mainly achieved through deployment of 5G Non-Standalone (NSA) on 4G LTE and 5G NR (New Radio) network. As a result, service providers can develop existing mobile broadband use cases such as AR/VR (augmented reality/virtual reality) contents and applications, ultra HD (UHD) video streaming and many more which require large bandwidth transfer.

mMTC standard has been developed for low power wide area technology which include narrow-band Internet of Things (NB-IoT) which can be supported by 4G LTE network. Typical use cases are remote utility meters, remote generator set monitoring, smart traffic light and street light management and many more applications. Applications that require larger bandwidth or speed with ultra-reliable low latency will require the 5G Core (5GC) deployment for full end-to-end latency improvement.

Mission critical applications which are latency-sensitive such as autonomous cars will also require wide and contiguous coverage which is highly unlikely to happen in early 5G deployment since it requires heavy investment by service providers.

Despite the promises of 5G network technology as described above, service providers are facing challenges and uncertainties in rolling it out. Some challenges which require much consideration are use cases and business case, spectrum availability, high capex investment and operating costs.

Lack of demand and a clear business case for 5G network rollout are likely to slow its adoption and deployment. Use cases that can be translated into new revenue for 5G investments, are limited for the time being. Most of the use cases for early 5G services are related to increasing the bandwidth and capacity of existing 4G networks of service providers.

Even though there are more bandwidth hunger applications such as AR/VR and UHD video streaming, there is no new money to be made since the new packages will either offer higher usage capping or even unlimited usage. Therefore, service providers will find it difficult to justify for capex and opex investments for 5G network rollout in the next 2-3 years.

Spectrum is key in rolling out a 5G network in any country. The 3 spectrum bands identified for this are divided into 3 broad categories: Low band of sub-1GHz, mid band 1 to 6 GHz and upper band of 6GHz and above.

Low band is suitable for IoT services deployment and to extend mobile broadband coverage to rural areas. This is because the propagation properties of the spectrum enable 5G to cover very wide areas and to penetrate deep inside buildings for better indoor reception.

The mid-band spectrum offers a good mix of coverage and capacity for a 5G network. There are a few spectrum slots available in many countries, typically 2.3GHz, 2.6GHz, with the most popular being 3.5GHz. Most of these spectrum slots in mid-band have been allocated to mobile service providers for 4G rollout and 3.5GHz is being used for VSAT service. There is a need to

review and potentially to re-farm these spectrums for 5G network.

Spectrum in the upper band offers significant throughput since there are very large spectrum bandwidths which can be allocated for mobile broadband. This band is also called millimeter wave band with much smaller cell size for every site and is subjected to blocking when there is wall at the user site.

There are a few sets of spectrums available for service operators to suit their use cases for 5G rollout. Their choice will depend on geographical location, use cases to be rolled out, spectrum band availability, inter-operability, availability of chipset as well as end users' device availability and entry cost.

5G network operators are expected to incur significantly higher capital expenditure to rollout a similar network coverage of 4G because 5G is using far more small cells to cover the same area. This is expected if operators plan to achieve optimum throughput and low latency connectivity throughout the network. This higher number of cell sites translates to higher costs from site rental and backhauls to connect to the operators' core network. Operators are also expected to invest heavily to get the right spectrum band and bandwidth to support their business plan.

5G promises to improve user experience when compared to existing mobile services and the introduction of new use cases that can be enjoyed by the public. These promises come with a set of challenges that need to be addressed by service providers to ensure that whatever investments made will provide reasonable returns. It will be interesting to observe the announcement by the regulator and industry players in the next few months before we can really enjoy 5G services in Malaysia. ■

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