Guidelines for Mobile Communications Industry on the Use of the Term "Fifth Generation" or "5G" (the "Guidelines")

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Purpose

practical This provides document guidance to telecommunications licensees other of and members the telecommunications industry on how they may use the term "fifth generation" or "5G" when describing, promoting or marketing their networks, systems, services, devices, products or applications.

International Mobile Telecommunications - 2020 ("IMT-2020")

2. The term International Mobile Telecommunications ("IMT") is the generic term used by the International Telecommunications Union ("ITU") to designate broadband mobile systems. ITU has formulated international standards for the development of new generations of IMT mobile technologies. The initial set of IMT standards as approved by ITU was **IMT-2000** which has become the international standards for third generation ("3G") technology since 2000. In 2012, **IMT-Advanced** was developed and defined by ITU as the fourth generation ("4G") mobile technology and it is being deployed worldwide. **IMT-2020** will be the international standards for 5G mobile technology which enables new capabilities of IMT that go beyond those of IMT-Advanced.

3. In ITU-R Recommendation M.2083 published in 2015, ITU provides the guidelines on the framework, capabilities and the overall objectives for the future development of IMT for 2020 and beyond. The capabilities of IMT-2020 as identified by ITU in the Recommendation aims to make IMT-2020 more flexible, reliable and capable than previous IMT for provision of diverse services in three specific usage scenarios, including enhanced mobile broadband ("eMBB"), ultra-reliable and low-latency communications ("URLLC"), and massive machine type communications ("mMTC"), for which contiguous and broader channel

bandwidths than currently available for the existing IMT systems would be needed¹.

4. In the eMBB usage scenario, the peak data rate of IMT-2020 under ideal conditions is expected to reach 10 to 20 Gbps while the user experienced data rates may vary depending on the environments where the mobile devices are located (e.g. user experienced data rate of 100 Mbps and 1 Gbps for wide area coverage and indoor hotspot locations respectively). IMT-2020 is expected to provide 1 ms over-the-air latency to support services with very low latency requirements for URLLC usage scenario and a connection density of 1 million devices per km² in the mMTC usage scenario. Actual performance experienced by users depends on various factors, including but not limited to mobile network coverage, frequency bands of operation, available bandwidth and number of concurrent users at a particular location, etc.

5. To realise the key features defined by the ITU for IMT-2020 radio interface(s), ITU will evaluate the proposed radio interface technologies for IMT-2020 submitted by various organisations and finalise the detailed specifications by the end of 2020.

3GPP Releases for IMT-2020 Requirements

6. The Third Generation Partnership Project ("3GPP") is an industry standards organisation which has developed technical specifications on 3G, 4G and more advanced mobile technologies.

7. For standardisation of 5G technologies, 3GPP has released technical specifications for 5G core network ("5GC") and radio access network based on new radio interface technology called 5G New Radio ("NR"). The first phase of the 5G specification in Release 15 was completed in June 2019 and was designed to accommodate early commercial deployments while the second phase specification in Release 16 is targeted to be finalised in Q3 2020.

¹ The Communications Authority released a total of about 4 500 MHz of spectrum in 2019 to the market for the provision of 5G services. The related press release is available at <u>https://www.coms-auth.hk/en/media_focus/press_releases/index_id_1824.html</u>.

8. There are two network architectures defined by 3GPP for implementation of 5G networks, which are Standalone ("SA") and Nonstandalone ("NSA") architectures. As specified in the 3GPP Release 15, NSA architecture enables dual connectivity for connection to radio base stations enabled with 5G NR radio access technology ("5G NR radio base stations") and 4G Long Term Evolution ("LTE") radio base stations to provide radio access and integrates the radio base stations with either new 5GC or existing Evolved Packet Core ("EPC") used in LTE networks. SA architecture refers to the use of new 5GC and 5G NR radio base stations only for signalling and user traffic. Both NSA and SA architectures adopt the 5G NR as the radio access technology. Mobile network operators ("MNOs") may adopt NSA or SA architecture for their 5G networks.

Need of Guidance on Description of "Fifth Generation" or "5G"

9. While IMT-2020 is the evolution of the IMT family of standards for 2020 and beyond, it is expected that the network infrastructures based on older generations of IMT family will continue to be used for providing 3G/4G services in the foreseeable future. Depending on the network architectures used for 5G deployment (see paragraph 8 above), some MNOs may make use of their 4G network infrastructures to provide 5G services in the initial stage of commercial deployment.

10. Having regard to the latest developments for 5G, OFCA considers that there is a need to provide the local mobile industry with clear guidance on how the term "Fifth Generation" or "5G" may be used in Hong Kong.

Guidance on Use of the Term "Fifth Generation" or "5G"

11. From a technical point of view, the difference between a 5G network and older generations of mobile networks can be discriminated by way of the technologies adopted in deploying the network systems. It is considered that any mobile network/system comprising of new 5GC(s) or EPC(s) that support 3GPP Release 15 or any later release and radio access network(s) built with 5G NR radio base station(s) can be regarded as **"5G network / system"**. Any device that is equipped with the capability to support radio connection and interwork with the 5G NR radio base station(s) can be regarded as **"5G device"**. A telecommunications service provided by radio connection between a 5G

network/system and a 5G device can be regarded as a "5G service". Those products and applications that are designed to implement the new usage scenarios, features and capabilities as defined in the IMT-2020 with the support of "5G network/system", "5G service" and "5G device" may be regarded as "5G products" and "5G applications".

12. In summary, no matter which network architecture is adopted, the connection to 5G NR radio base stations² is a prerequisite for the network, system, service, device³, product or application to be regarded as "5G" capable. MNOs may utilise the new radio spectrum made available by OFCA and refarm the existing spectrum currently used for provision of 4G services for the provision of 5G services. They may also deploy techniques such as dynamic spectrum sharing for efficient use of the spectrum to provide 4G/5G services and adopt inter-band carrier aggregation to provide 5G services of higher speed and throughput.

For the avoidance of doubt, the use of the description of "5G" 13. for specified network, system, service, device, product or application does not imply a certain level of performance (such as speed, latency, coverage scale, of connection) for the concerned network/system/device/service/product/application. Having said that, MNOs are expected to provide a satisfactory level of performance of their 5G networks/systems/services for interworking with 5G devices/products/applications so that users could enjoy the benefits of 5G.

14. Although radio spectrum in some designated frequency bands such as 3.3 GHz, 3.5 GHz, 4.9 GHz, 26 GHz and 28 GHz bands are expected to be used for the initial launch of 5G services in Hong Kong, MNOs may under the technology neutral principle refarm their existing radio spectrum at other frequency bands for provision of 5G services based on their commercial decisions.

15. In view that there are various approaches in implementing a 5G network, the performance of the same types of services developed for a particular usage scenario (i.e. eMBB, URLLC or mMTC) may vary from one network to another. MNOs, mobile virtual network operators and other mobile service providers should make it clear to the public the

² This connection refers to user plane connection.

³ Subject to the design of individual 5G mobile devices, "5G" icon/network indicator may be displayed on a device if the device is connected to a 5G NR radio base station or there is a high probability for the device to be covered by 5G NR radio base stations as accordingly reflected in the settings of the mobile network which supports NSA architecture.

performance of their offers of 5G network, system, service, device, product or application in their marketing campaigns and advertising materials for promotion purpose.

16. In view of the on-going technology and market developments for 5G, OFCA will closely monitor the concerned developments and update the Guidelines as and when necessary.

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