Why discussing 6G 'technology' deployment now is misleading

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Figure 1: China vs West on AI Regulations (source: www.corporatecomplianceinsights.com)

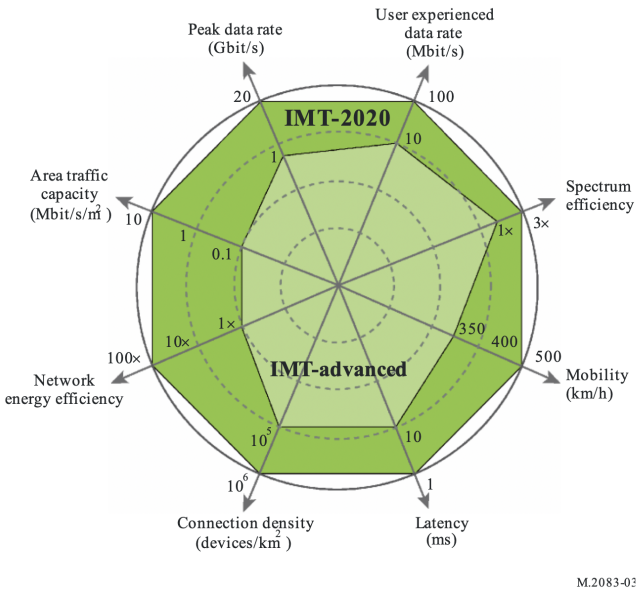
The current global race for technological advancement and to be the first to commercially introduce innovation resembles to some extent the cold-war activities between the United States and the then Soviet Union. Now the race seems to be mainly between China against the collaboration between the US and Europe.

The China-US-Europe race and controversies played out during the early commercial adoption of 5G, a technology defined by the 3rd Generation Partnership Project (3GPP). The development of 5G heightened the rivalry between the West and China to the extent that at the level of the International Telecommunications Union (ITU) there is still no agreement on ethical issues relating to artificial intelligence (AI). The trade war that arose between China and the US resulted in a tariff war and is part of a longstanding dispute between Beijing and Washington about the transfer of technology and the safeguarding of intellectual property rights. More fundamentally, China has edged ahead of the US and its allies in the development and roll-out of 5G technology.

The US has used "security concerns" as a basis for imposing a ban on the use of Huawei 5G technology, questioning the Chinese government's influence on Huawei and its alleged coercion into undertaking intelligence activities. This concern may be unfounded since governments may in general impose certain obligations on providers to provide back doors in their programmes/platforms that enable interception. The US and EU member states have the same arrangements with ICT manufacturers. The risk that arises in the context of 5G technology is no different from any other technology and requires the necessary technical and regulatory oversight. Technology innovation in AI applications is considered crucial to economic growth and global power or dominance . Therefore, it is still too early to be looking at a commercial application for 6G because current discussions are mostly an expression of foreign policy.

As indicated earlier, the current commercial deployment of 5G technology is mainly based on 3GPP definitions.

The 3GPP projects cover, among others, "cellular telecommunications technologies, including radio access, core network, and service capabilities, which provide a complete system description for mobile telecommunications ". Thus far, the ITU has approved three radio interface technologies (RIT)/set of radio interface technologies (SRIT), namely 3GPP (5G-SRIT and 3GPP 5G-RIT) containing Release 15 and 16 functionalities, and 5Gi by Telecommunications Standards Development Society India (TSDSI). The approval is based on the ITU International Mobile Telecommunications 2020 (IMT-2020) vision, specifically, the requirements outlined in the 20 November 2017 document ITU Report M.2410-0 (Minimum requirements related to technical performance for IMT-2020 radio interface(s)).



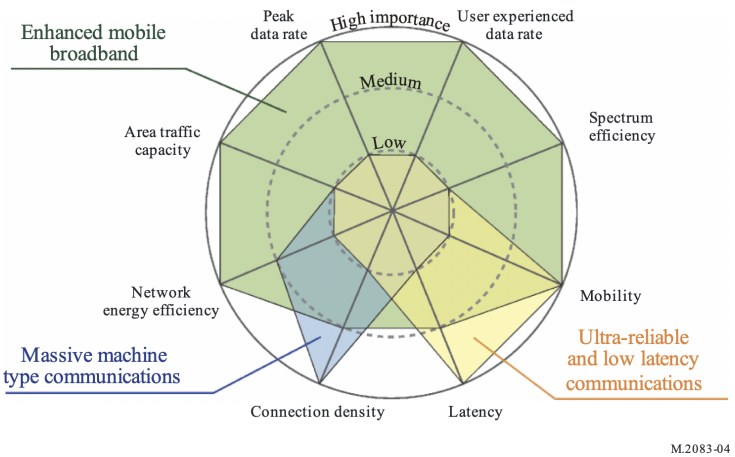


Figure 2: Enhancement of key capabilities from IMT-Advanced to IMT-2020 (Source: Rec. ITU-R M.2083-0)

Figure 3: The importance of key capabilities in different usage scenarios (Source: Rec. ITU-R M.2083-0)

The regulatory perspective requires understanding the role of the ITU and bodies such as the 3GPP and TSDSI. The latter bodies define technology suites within the scope of their projects. The ITU does not provide specific descriptors of mobile technologies but provides IMT standards for which technology performance is measured against. "[IMT] standards define which technical parameters a technology would be expected to provide in a corresponding timeframe – such as peak data rate, latency, or spectrum efficiency, for example". The ITU IMT standards process is as follows:

1. Definition of an evaluation process
2. Standard development
3. Global adoption of the system, linked services, and capabilities. Global harmonisation and implementation are crucial to economies of scale, international roaming, etc.

Currently, the ITU has a framework for the following IMT standards: IMT-2000 (3G), IMT-Advanced (4G) and IMT-2020 (5G).

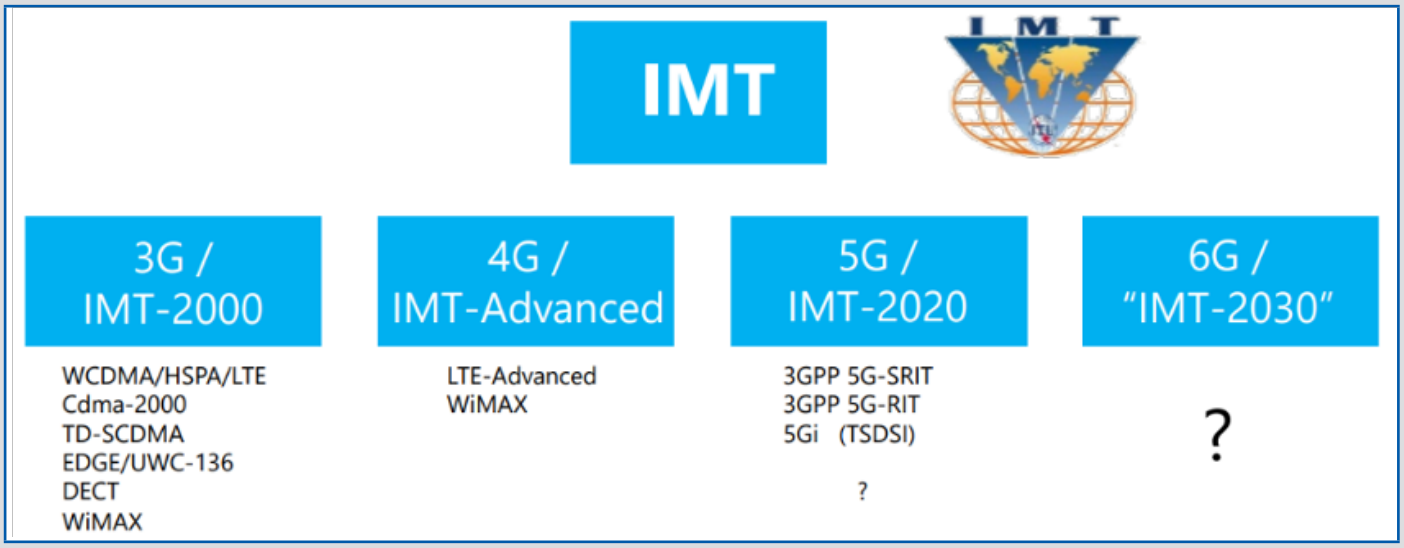


Figure 4: ITU IMT Standards and corresponding technologies (Source: ITU-APT)

Taking into consideration the context outlined above, the lack of agreed ITU standards supports discussing a commercial application for 6G as premature. It is also important to note that 5G as technology is yet to sufficiently mature and subsequently enable mass adoption of massive machine-type communications, and ultra-reliable low latency communications linked services. The anticipated 5G maturity trajectory has led several developed countries to put in place strategies that will enable the commercialisation of the full scope of 5G capabilities in different usage scenarios from 2025, targeting universal deployment by 2030. As illustrated in Figure 5, IMT-2030 (6G) is anticipated for initial implementation in 2030 and unlike 5G, 6G technology will require a paradigm shift in network design. According to some scholars, spectral efficiency is not only a factor but so also is energy efficiency (5G to 6G requires extended design dimensions). 6G will incorporate intelligence and sensing (i.e., AI integration to manage energy efficiency). Figure 5 outlines the activities and their corresponding timeframes.

Current discussions at ITU Study Group 5D (IMT Systems), are on the scope of standard as contained in the *preliminary draft new RECOMMENDATION ITU-R M. [IMT.VISION 2030 and Beyond].*

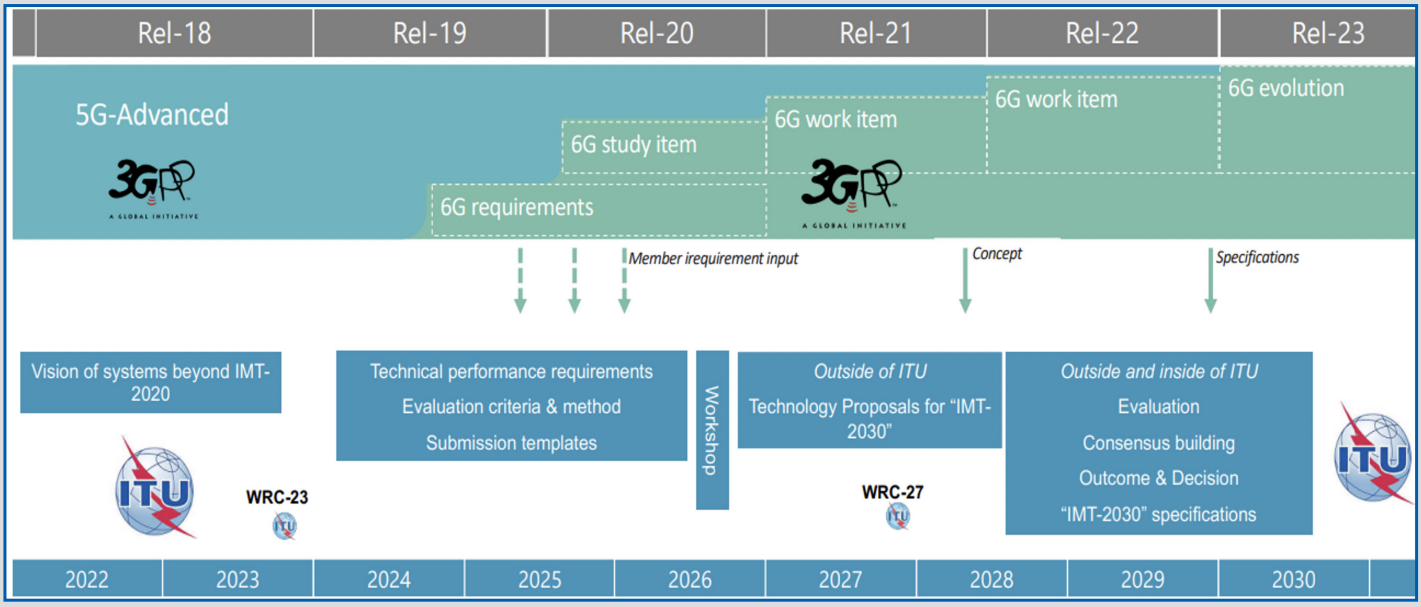


Figure 5: 3GPP vs ITU-R IMT 2030 timelines (Source: ITU-APT)