Why 5G is such a Big Deal.

The public discussion of 5th generation (5G) mobile telephone service has been seen by many - perhaps most in the United States as just another step in the evolution of mobile communications, a remarkable scientific and commercial development that has wrought a wide range of benefits world-wide over the preceding quarter century.

More recently, the focus has shifted to 5G as a proxy for the U.S.-China trade and technology rivalry. The Trump administration's effort to change the terms-of-trade with China has brought the subject of commercial and international trade consequences of the proliferation of advanced technologies into sharp relief. The U.S. efforts to extradite the chief financial officer of the Chinese telecommunication equipment developer and producer, **Huawei** from her detention in Canada for export control violations have added a geopolitical spin to what has become an increasingly tangled issue. These aspects of the story, while true, do not begin to describe why 5G is such a big deal.

The technologies of 5G communication will create a backbone technology for high speed low latency telecommunication. It will serve as the basis for the global internet-based "Internet of Things" (IoT) with fundamental changes in how goods and services of every imaginable types (and many, perhaps most not yet imagined) can be developed, employed, supported, and replaced.

The importance of new technologies is not their ability to do what existing technology can do now, only faster, better, and cheaper even though that is a likely consequence. In the case of 5G, its ultra-low latency (potentially hundreds of times faster than current 4G LTE) produced by its vast bandwidth that allows users to do things that previously could not be done by any practical application of existing technologies.

The enormous scale of capital expenditure involved in rapidly bringing 5G technology to market - $325 billion by 2025 - to develop and produce the hardware and software needed to deliver early 5G capabilities is unlike any other infrastructure project. Reflecting its national commitment to 5G, nearly half of the world-wide investment in 5G development and employment will be made by China.

The extraordinarily low latency of 5G will allow services such as augmented and virtual reality and an immersive and tactile internet that cannot be delivered by 4G or earlier technology. 5G technology also inverts the classic paradigm of computational scarcity at the network's edge (e.g. the mobile device) and computational abundance at the center. With computational abundance now at the network edge, the employment of computationally intense emerging technologies (e.g. AI, quantum computing and cryptography, facial recognition) can be performed by mobile devices throughout the network.

5G as part of China's belt-and-road initiative

While Western governments have tended to see 5G as an important but incremental extension of existing telecommunications services, China has recognized the value of 5G technology with its belt-and-road initiative (BRI). That effort is China's $1 trillion global infrastructure project to expand its economic presence and support for its interests on a global scale. China sees it as a key step in becoming the world's leading economic power by 2049, the 100th anniversary of the founding of the Communist state.

The project has several components, one of which has become known as the "digital road." It anticipates projecting the deployment of China's 5G telecommunication infrastructures over the dozens of countries now affiliated with the initiative. The 5G telecommunications network would be integrated with another Chinese project, its Beidou ("Big Dipper") precision navigation and timing system (now in the latter stage of fielding) to displace the U.S. Global Positioning System enabling China's telecommunications and PNT system to dominate the future IoT and other in areas affected by China's belt-and-road project.

5G as an instrument of China's international security policy

China's global security ambitions overlap its economic aspirations. The 19th Congress of the Communist Party of China, the belt -and -road initiative and its associated activities were incorporated in the Chinese Constitution at the 19th CPC. In that context belt and road is a project of the Party, and not the State which significantly elevates its security role and importance to its national leadership.

The BRI creates a global economic presence that has become a combination of commercial enablers for its "Maritime Silk Road" and forward air and naval installations for China's armed forces. These include air and naval facilities in Djibouti in the Horn of Africa, Jiwani, Pakistan (approx. 80-km west of its large commercial port at Gwadar, and a naval base in Sri Lanka (Hambantota, which China acquired in a debt-for-sovereignty swap when Sri Lanka could not service its BRI debt to China). China's switch from a regional to an aspiring global power reflects its aspirations that have shaped the CPC's rule since Mao: the deconstruction the old-world order in favor of one which gives China its rightful place at the zenith of a new international order.

The incorporation of the technology 5G telecommunication and Chinese controlled PNT parallels a trend in US military practice. DoD military communications, like China's is moving to a wireless, mobile, and cloud-based IT systems built around 5G technology. China's convergence of its 5G, BRI presence (military and civil), PNT and dominant role in the BRI member states are aimed at becoming the world's leading economic and military power by the 100th anniversary of the founding of the Communist State in 2049.

5G is both an enabler and product of China's remarkable economic growth since 1979 and is likely to become a central element of China's economic and military power for the 1st half of the 21st century.

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