

NEW INTERNET PROTOCOL: REDESIGNING THE INTERNET WITH CHINESE CHARACTERISTICS?

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The radical idea of a New Internet Protocol (IP), replacing the prevalent TCP/IP (Transmission Control Protocol and Internet Protocol), was put forward together by Huawei, the Chinese Ministry of Industry and Information Technology, and the state-owned telecom service providers China Mobile and China Unicom to the Telecommunication Standardization Advisory Group (TSAG) of the International Telecommunication Union (Telecommunication Standardization Sector [ITU-T]) in September 2019.¹ The proposal stirred up a hornet's nest. Trying to champion this idea, Huawei proposed a new suit of network protocol for 5G and beyond to the ITU-T, highlighting the limitations of the existing Internet infrastructure to meet the specific requirements of bandwidth, latency and service assurance in the face of next-generation applications such as holographic tele-presence, industrial Internet, and autonomous vehicles.² It also made a demonstration to the Focus Group on Technologies for Network 2030 (FG NET-2030), convened under the Study Group-13 of the ITU-T and chaired by Richard Li, who also happens to be the Chief Scientist at Huawei's research and development (R&D) arm, *Futurewei* Technologies. The Focus Group, established soon after Richard Li made a call for it in July 2018 at an ITU 5G Workshop,³ is investigating the architecture that could meet the requirements and demands of forward-looking scenarios.⁴ The very idea of a New IP has faced sharp criticism especially from the Internet Engineering Task Force (IETF), the premier Internet *standards* organisation which remains an open international community of network designers, operators, vendors, and researchers who make voluntary contribution to the development of technical standards for the Internet. It has been termed "harmful", "threatening", and against the ethos of the Internet, questioning the very need of a New IP and the unstated intentions behind the idea.

The Internet of today is very different from what it was envisaged to be four decades ago, be it the utility, user base, scope, or its global spread. The metamorphosis of an idea conceived to allow the American military establishment to sustain communications in the event of a nuclear attack at the heights of the Cold War to a small network of a handful of universities and research institutions, and then to its present form where it touches the lives of 60 per cent of the world's population, has been an outcome of a unique collaborative effort and staunch belief in openness, trust, and shared responsibility. Standardisation of technology has further stimulated the global expansion and reach of the Internet. The TCP/IP, for instance, way back in 1983 standardised how data is transmitted between multiple heterogeneous networks. The never-ending quest for futuristic applications and the ever-increasing need for higher bandwidth and enhanced security, performance, and quality-of-service continue to expand the technology infrastructure underpinning Internet.

China's desire to be at the fore-front of the race in networking/communications technology, be it 5G or the Internet in this case, arises from its deep-rooted and enduring resentment with the present state of affairs. Having been left out from the development process of the present generation of networks, China often protests about the unfair allocation of IP resources and the inability to enforce a centralised control on the Internet. It basically had no say in the overall design and development of these technologies and their corresponding Standards. To overcome this handicap, China initiated state-backed research on next-generation networks, which includes telecommunication networks and the Internet, towards the end of the 1990s. The

flagship China Next-Generation Internet (CNGI) project spearheaded by the National Development and Reform Commission oversees the country's complete transition to an IPv6-based network and research on network security issues. The National Medium to Long-term Plan for the Development of Science and Technology (2005-2020) identified next-generation networks as one of the priority areas. The 12th Five-Year Plan recognised next-generation mobile communication and next-generation Internet as strategic emerging sectors, and 13th Five-Year Plan committed to push forward research in 5G mobile networks and the next-generation Internet.

Looking beyond the 5G horizon, China has set its eye on the revamp of the Internet. The proposal made by Huawei at the September 2019 meeting of the TSAG argues that the current network was designed only for telephones and computers and it falls short in not just meeting the requirements of the future but also in connecting a diverse nature of networks such as space-terrestrial, Internet of Things and industrial networks. It claimed that the current network systems risk becoming "islands of networks" and sought a better security and trust model for the future networks.⁵ The proposal made a strong recommendation to the ITU-T that it should "consider designing a new information and communications network with new protocol system"; "pay more attention to the new future network research with New IP protocol system"; and "shoulder the responsibility of a top-down design for the future network". Huawei followed up with a detailed tutorial which delved into the requirements of space-terrestrial networks, intrinsic security, heterogeneous networks, and deterministic forwarding; shedding light on new research directions such as New IP, Diversity Addressing, Customised Request for Networks and New Transport Technologies.⁶

The IETF, its parent body, the Internet Society, and other entities and individuals involved closely with the development and maintenance of Internet Standards for decades have criticised the idea of a New IP, refuting most of the concerns raised in Huawei's proposal to the TSAG. A discussion paper from the Internet Society outright dismisses the case of New IP, contending that interconnecting heterogeneous networks is the core design goal of the evolution of Internet and the TCP/IP for that matter was built specifically to meet that purpose.⁷ There is nothing much novel about the research directions either, as a lot of the listed areas are already under research or under consideration at IEEE (Time Sensitive Networking Task Group), IETF (Deterministic Networking and Reliable and Available Wireless working groups), 3GPP, SG15 of ITU-T and the Internet Research Task Force.⁸

The IETF in its formal response opposed the monolithic nature and the top-down approach of the New IP, even calling it "harmful" from the point of view of interconnection and interoperability—quite contrary to the very first argument made in the support of the New IP. IETF reminded that it is already engaged in resolving issues related to latency as early as 1990s, and it has covered vast grounds in the integration of terrestrial and satellite networks, Transport Layer Security, Deterministic Networking, and Low Latency, Low Loss, Scalable Networks.⁹ The key point IETF emphasised on is that the requirements for extensions or modifications to IETF technologies, TCP/IP for instance, must be first discussed with the IETF, urging the ITU-T not to accept such proposals on which IETF has not deliberated on.¹⁰

The evolution and the subsequent success of the Internet as a technology are credited to the endless efforts made by voluntary groups in open platforms based on rough consensus. This working-model for the development of technology and governance of resources had never been experimented with earlier, and it continued to evolve and mature with time into what is now known as multi-stakeholder approach. China and the entities building futuristic scenarios might well be within their rights to pitch forward-looking ideas and advance research in that direction. It would also be inappropriate to stifle futuristic research and deem an idea to be a threat based solely on the country of origin of the entity proposing it. However, the organisations, structures

and approaches which have nurtured the Internet till date should not be tampered with. The ideas departing from the fundamental values of openness, transparency and user-centricity or detrimental to the ethos of the Internet should be resisted. The development of the Internet is a collaborative approach, and therefore, overlapping and duplication of efforts is completely unwarranted.

It is hard to ascertain whether the idea of a New IP is backed by technology vision or political ambitions. China's endorsement of a multilateral approach to Internet governance is well-known. Pursuing the idea of New IP at the ITU-T is completely in line with China's preference for a multilateral approach, and runs right opposite to the prevalent approach to the development of Standards. Being a multilateral body, the ITU is susceptible to political influences, unlike the IETF where decisions are made purely on technical grounds. Moreover, China's ambitions to reach the "commanding heights" in scientific and technological competition and to build "China into a cyber power" have been expressed time and again. The New IP essentially clears the way for China to finally "have a say" in the technical and governance matters pertaining to the Internet. China finds this an opportune time to mould the future networks aligned with its vision, values and ideology. It also gives the opportunity to incorporate security features which reinforce state control and censorship on the networks of the future.

All eyes are now on the World Telecommunication Standardization Assembly (WTSA-20), to be held from 23 February to 5 March 2021 in Hyderabad. Held every four years, WTSA defines the next period of study for ITU-T. Huawei's proposal has recommended to the ITU-T to include New IP in the next study period. China succeeding in either convincing or influencing the ITU to initiate research on the New IP has the potential to not just alter the status quo, but also splinter the Internet into "islands" which may not really be interoperable, as feared by the IETF in its response. In the meantime, the Department of Telecommunications of the Government of India floated a white paper on the New IP in the first week of October, calling for a non-public consultation to evaluate the ideas and technology solutions discussed in the New IP proposal vis-à-vis existing technology and standards.

Views expressed are of the author and do not necessarily reflect the views of the Manohar Parrikar IDSA or of the Government of India.

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