5GIF Vision for Indian Leadership in the 6G Ecosystem

Every ten years the world takes a generational leap with mobile broadband technology evolution, and the journey towards 6G has now begun. 6G is expected to play a key role in the evolution of the society towards the 2030's, as the convergence between the digital, physical, and personal domains, will increasingly become a reality. 6G technologies are likely to become viable and impactful over the next ten years and will probably be a truly mobile broadband network to support ubiquitous instant communications, pervasive intelligence, and the Internet of things & senses. In addition, 6G will be designed to enhance drastically the energy efficiency of connectivity infrastructures to cope with major traffic growth.

Several types of foundational technologies will collectively drive the core development of 6G.

- Expanding network capacity to approach or even to try and go beyond the Shannon's and Moore's limits will be required for radio themes
- Smart optical transport connectivity will allow the network to be always available, intrinsically secure, green, and with flexible scaling
- Advances in photonic integration will pave the way for a raft of new IT and networking devices in which optical, radio frequency, and digital electronic functions, can be combined
- Modern security and reliability paradigms ("security by design"), as well as the application of modern software technology, will guarantee the dependability and trustworthiness of the system
- New electronic technologies, components, and devices, including processors, memories, analogue, radio frequency, digital access and cross-connect systems and analogue to digital converters antennas, packaging, and optical components, will be required
- The exploitation of properties from quantum mechanics needs to be explored to understand their potential for unprecedented performance in quantum sensing, communication, security, and computing.

These trending technologies will form the basis for human-centric services as well as a key enabler towards addressing Sustainable Development Goals (SDGs) such as greening the economy and supporting digital inclusion. To make this happen, ambitious R&D programs have started across institutions worldwide, supported by industry forums to extend their coverage. Worldwide institutions are very keen to extend their advantage in 5G, into 6G. This would happen at a time when Indian 5G deployments happen in a large scale. There is therefore a need to support the Indian ecosystem in pursuing a coordinated strategy for 6G technology development, standardization, and usage in India. Companies will need considerable support in identifying new business opportunities, obtaining maximum benefit from state-of-the-art technology, and building knowledge-based capital for the radically renewed 5G operational environment. 5GIF will act as a nodal point to carry out technology and system studies and ensure the timely relevant wireless expertise availability for industry needs to enable economic growth via early adaption of critical smart societal technologies.

Vision Objectives

The 5GIF Vision for 6G is for India to emerge as a global leader and desired partner for 5G adoption across industry verticals and 6G technology co-creation. Over the next decade we envision defining a 6G-enabled digital world towards 2030, aligned with the UN SDGs, where the physical and virtual worlds meet, and wireless connectivity expands to all areas of life. We will coordinate with industry in defining the use cases and help creation of technology across the public and privately funded research groups identified within India for the creation of 6G technology. We will collaborate in supporting the

standardization efforts within the 3GPP and help develop global harmonious standards that would incorporate fundamental 6G technology components, novel wireless solutions, and business approaches in following research areas (but not limited to) - wireless connectivity, devices & circuit technologies, distributed intelligent computing, computing & communication convergence, and sustainable human-centric services & applications.

Over the past several months, we have been coordinating our efforts with leading industry and standard bodies including the GSA, GSMA, IAFI, TSDSI and COAI in creating 6G mindshare within the country. We aim to increase the impact of the 5G-driven society into building expertise around critical verticals and in developing those ecosystems further, both in co-operation with the existing ecosystems and by promoting new forms. We have made several contributions to the ITU-R WP5D in aligning the timeline, vision, and technology trends for the 6G architecture and radio interface technology, which the ITU-R will standardize through external cooperation for defining IMT for 2030 and beyond.

The 5GIF will participate in technical sharing studies for spectrum through the structures created by the WPC including NWG, NPC, etc. We will collaborate with academia in supporting their research, training, and evaluating programs. We also intent to help create early expertise on 6G by supporting interns in the development of technology blocks as part of the 6G radio interface technology evolution.

Overall, we intend to position 5GIF as the trusted partner for the research community, the regulators, and to companies representing both ICT development and a broad range of ICT user fields for knowledge dissemination, training and know how on 6G. We are keen to work closely in national 6G programs, within India and elsewhere, to establish and drive the 6G Mission of India.