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2022 Edition

Connecting the Unconnected

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An IEEE 5G and Beyond Technology Roadmap

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ABSTRACT

Connecting the Unconnected or under-connected (CTU) is the holy grail of transforming the lives of over 3 billion people around the globe with wireless Internet who are yet to experience its value in multiple ways. If this could be accomplished, its impact on the society would be enormous.

This white paper from the IEEE Future Networks CTU Working Group endeavors to highlight the need to consider the CTU requirements in 5G and B5G networks in the standardization process, in the development of the use cases, and affordable solutions. In its Vision 2030 SDG (Sustainability Development Goals) the United Nations has proclaimed access to Internet as basic human right and has said that these goals cannot be achieved without affordable access to Internet by everyone on this planet.

While there are numerous projects and initiatives ongoing around the world, these are fragmented and lack the critical mass and coordination to be able to impact the future standards, product development, and cost of deployment otherwise achievable by volume. Although difficult to pin down, to define a threshold for basic connectivity for all is important. But it would need to be flexible to adapt to changing times. It is the goal of the CTU group to create an open platform where the experts can bring their ideas, solutions, and potentially collaborate to create large global projects and influence the network service providers, manufacturers and their governments. This white paper defines the CTU working group's charter, scope, and provides a brief overview of the relevant stakeholders and linkages between them. Then the paper goes into the current status of the CTU landscape and where we want to reach to accomplish the vision of connecting everybody, especially those living in rural and remote areas. We present the various standards and industry fora and how they are interlinked. While technologies are available today, they need to be customized and optimized at the systems level to bring down the cost of the network in order to be affordable. In addition, the content needs to be relevant and in local languages to be useful, not to mention the need to offer innovative human computer interaction (HCI) solutions (that are not text based) so that people who are not literate or are digitally disadvantaged can easily use the devices and consume services. Another important area is that of flexible spectrum allocation regime at the lower range of the spectrum to increase reach and coverage. Use of renewable energy sources will enable deployment in remote areas where there is lack of power grid, or it is intermittent. Thus, this white paper identifies a number of technology gaps to be filled in by 5G and B5G networks, such that access is affordable and content and services are actually consumed by the targeted set of users. Technology aside, the need to develop innovative business models is a must to be commercially sustainable in the long-term. A number of such models, especially designed for the rural population, are proposed, such as Village Level Entrepreneur (VLE) Freemium (Free + Premium), revenue sharing among the chain of service providers, subsidized billing by USOF (Universal Service Obligation Funds). Finally, the white paper presents a 10-year roadmap starting from the current state to 3 years, 5 years and 10 years.

Key words:

Digital Divide, 5G, B5G, CTU, SDG, IEEE Future Networks, Rural and remote connectivity, United Nations, Societal impact of ICT, Network slicing, Spectrum management, content management, HCI, IoT, TV white space, Satellite, Community networks, VLE, InfoInternet, Internet Lite, Business models.

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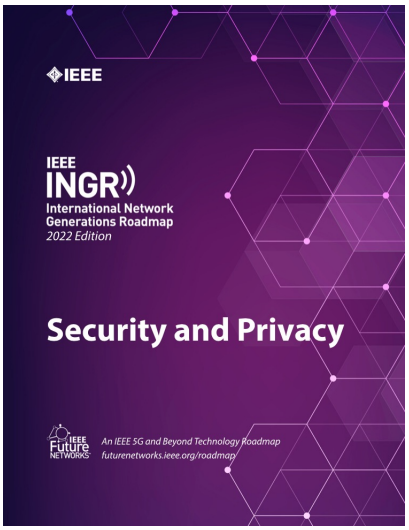

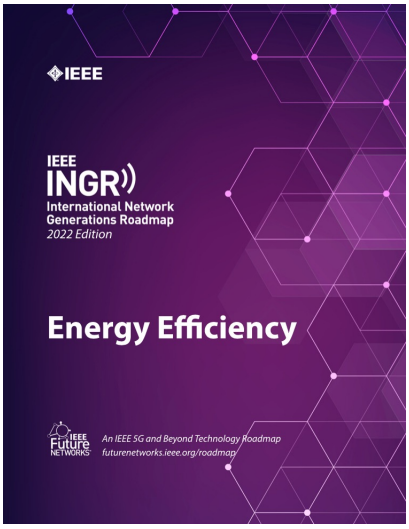

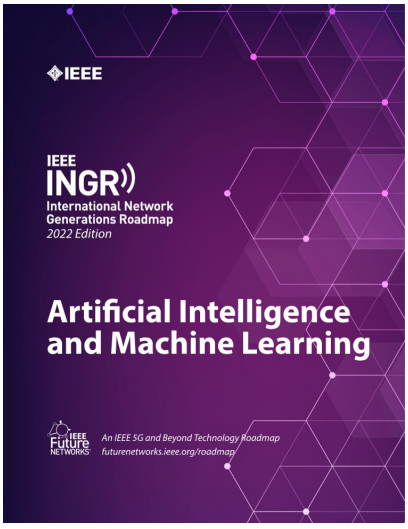

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