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Executive summary

Supporting progress towards the Commissions' 2025 Targets, with a focus on target #3

1. Connectivity is essential in the “new normal” but despite widespread network coverage, barriers to Internet usage still exist

In this era of a global pandemic and social-distancing inspired lockdowns, **network connectivity has become a critical** – and sometimes, the only – means of providing essential services such as healthcare and education, and of keeping businesses running.

In the past decades the mobile industry has made tremendous progress in providing connectivity, and mobile broadband networks (3GPP) today cover close to 95% percent of the world population, with this number to exceed 95% by 2025. Ericsson estimates that global 4G (LTE) population coverage was around 80% in 3Q 2019 and is forecast to reach over 90% in 2025 (Ericsson Mobility Report, 2020).

However, regardless of the massive progress in network coverage, today, over 40% of the world's population, around 2.6 billion people, still do not use the internet. These were the findings of the 2019 World Economic Forum edition of Ericsson's “Enabling internet for all” report, all of which is based on Ericsson Mobility Report data. Clearly there is a big gap between those having mobile network coverage, even 4G, and those actually using the coverage for internet access.

Whilst improving capacity and extending coverage of existing networks is a priority, it alone cannot address the problem of digital inclusion mentioned above. Key studies from GSMA and McKinsey highlight some of the key barriers to internet usage that are not related to network coverage. For example, McKinsey report points out that to address the “usage gap”, there are three key conditions. First, the internet needs to be made more relevant with localized content. Second, services and access need to be affordable from a device ownership and data plan perspective. Lastly, many countries need to attend to low levels of both linguistic and digital literacy in order to reduce the Internet usage gap.

GSMA also highlights that the key concern to close the usage gap does not relate to technical limitations but rather economic challenges in its 2019 report. Especially from end-user perspectives in low and middle-income countries, financial constraints, low level of literacy and digital skills,

together with a lack of appreciation for connectivity, safety and security concerns are key barriers to internet usage.

In short, driving digital inclusion goes beyond the provision of network coverage. With relevance, affordability and accessibility as key barriers for potential users. Addressing these is critical to reduce the usage gap and drive digital inclusion.

2. Broadband is central to increasing access to education and breaking down barriers to digital inclusion

Digital connectivity is the dominant force of the 21st century economy and improving access to the Internet will drive inclusion and create broad future benefits for society. Digital connectivity can lead to powerful outcomes across education, training, employment, and entrepreneurial opportunities not only for young generations but also for local businesses and communities.

The COVID-19 crisis has highlighted the significant consequences of the lack of Internet usage in the world hit by the pandemic. Experts predict that, with the high contagion risks, volatile time and production capacity factors in developing and distributing a proven vaccine, COVID-19 is poised to be a long-term catastrophe. The global shutdowns and health crisis exacerbate already challenging realities for lower-income countries. With the under-developed infrastructure needed to facilitate essential services and distant learning, beyond the human tragedy, the world's most vulnerable populations are trapped in both short-term impacts such as loss of income, poverty and long-term impacts such as lack of education and infrastructure deterioration. Therefore, it is critical to accelerate immediate Internet access to enable economic stimulus, online education and other initiatives for those communities.

For an example, as of June 15th 2020, some 1.2 billion children are out of school due to nationwide school closures during the outbreak. As a result, education has changed dramatically, with the distinctive rise of e-learning, whereby teaching is undertaken remotely using digital platforms.

Schools and communities without connectivity can put education and the economy at risk. **We argue that increasing broadband usage in community-based institutions, particularly focusing on schools as the first step, can be an effective way to increase broadband usage.**

Connecting educational institutions and utilizing them as a locus for people's learning and local community activities has tremendous potential for enhancing the quality of digital literacy especially in remote areas. Schools are an ideal starting point because they represent a tangible and measurable success indicator. Particularly, as per the GIGA initiative (<https://gigaconnect.org>), schools are used to identify the demand for connectivity both in schools themselves and their surrounding communities around the world. In today's world where digital skills are becoming increasingly essential for both life and work, communities need to come together and support its members, especially young people, to ensure learning happens continuously.

Overnight, the COVID 19 crisis changed the way schools operate. As schools closed the only way for the learning process to continue was for students and teachers to connect digitally. The definition of educational institutions now extends well beyond the physical school walls and into the homes of the students whom they serve. Broadband access at both school properties and private houses of teachers and students has shown to be indispensable infrastructure in providing equal access to education for all. However, the crisis has highlighted that access to Internet, even for educational purposes, is not equal and that there is a great risk that the 'usage gap' will hinder the ability for many children to continue their learning when they are out of school.

Addressing these challenges, governments, civil society organizations and actors in ICT industry need to collaborate to enable communities to access affordable mobile internet. Tackling the issue of connectivity for schools has become a key issue within the United Nations, with agencies like ITU, UNICEF and UNESCO combining forces through the GIGA initiative to bring about substantial change.

3. Way Forward

As pointed out there are many barriers to Internet usage that are not related to network infrastructure. But despite widespread mobile network coverage, there are still improvements that can be made to improve network capacity and reach that in turn will grow Internet usage. This study focuses on solutions that leverage on existing network infrastructure and assets to increase internet access.

The objective is to support target #3 in Broadband Commission's 2025 targets – “connecting the other half”.

Particularly, by 2025, broadband-Internet user penetration should reach:

- a. 75% worldwide
- b. 65% in developing countries
- c. 35% in Least Developed Countries

By 2024, mobile broadband networks will cover approximately 95% of the world's population (Ericsson Mobility Report, 2020). That means there will be more installed base rolled out as a result of such network expansion. In rural areas, FWA together with institutional coverage can help us to maximize the infrastructure to increase broadband-Internet user penetration. This target put a special focus on developing and least developed country populations who have the widest coverage gap mentioned in section 2.

We also focus on solutions that provide internet access to community-based institutions, such as schools and libraries, where teachers, students and community members can stay connected, continue teaching and learning despite nationwide closures or local shutdowns.

Besides, Ericsson's proposed solution also supports target #4 - by 2025, 60% of youth and adults should have achieved at least a minimum level of proficiency in sustainable digital skills. Internet access, its benefits and digital skills together produce a virtuous circle - people need digital literacy to access, use and benefit from internet access; which subsequently drive demand for higher internet penetration. In order to fully support target #4, cross-sector collaboration is required to bring not only connectivity but also digital content available in local vernacular.

4. Proposed solution

- i. Deploy Fixed Wireless Access (FWA) using 4G/5G

To close the usage gap, we advocate the deployment of Fixed Wireless Access (FWA) that leverages on existing network infrastructure and assets for community-based institutional coverage.

In this case study we define FWA as a connection based on IMT/3GPP technologies that provide broadband access through a mobile network enabled customer premises equipment (CPE). This

includes various form factors of CPEs, such as indoor (desktop and window) and outdoor (rooftop and wall mounted). It does not include portable battery-based Wi-Fi routers or dongles.

Fixed wireless access (FWA) connections are forecast to grow threefold and reach close to 160 million by the end of 2025, accounting for 25% of total mobile network data traffic globally (Ericsson Mobility Report 2020) .

There are three main factors that drive the FWA market and the uptake of connections.

First, demand from consumers and businesses for digital services continues, driving the need for broadband connectivity. The rollout of FWA maps to this need and supports operator's revenue growth goals of expanding in new markets.

Second, FWA delivered over 4G or 5G is an increasingly cost-efficient broadband alternative in areas with limited availability of fixed services such as DSL, cable or fiber. Increasing capacity – allowed by greater spectrum allocations and technology advancements for 4G and 5G networks – is driving higher network efficiency in terms of the cost per delivered gigabyte. Because it is based on standardized technologies it has tremendous benefits of scale for the users. The technologies are anchored in global standards, they come with the economic and social benefits of scale – from lowered cost of coverage for the marginalized in low-population density areas and cheaper devices to roaming and interoperability to long-term investment assurance for manufacturers, network operators and others in the ecosystem.

Third, governments are fueling broadband connectivity through programs and subsidies, as it is considered vital for digitalization efforts and economic growth. Examples include the Federal Communications Commission's Rural Development Opportunity Fund in the US and Australia's National Broadband Network (NBN).

ii. Invest in a FWA network that utilizes existing radio network and spectrum assets

An existing mobile radio network, normally designed for voice and mobile broadband, is an excellent base for offering an FWA service. By taking advantage of existing network infrastructure and assets which serve 92% of the world population, broadband connectivity can be provided in an economical and practical way. This is key success factor for a higher capacity and large-scale offering using FWA. The fact that no new site, tower, excavation nor construction works are required, this solution is much less resource intensive compared to fiber builds.

A key re-usable asset is spectrum that has been already acquired in auctions but is still generally undeployed in suburban and rural areas. The geographical fit for FWA is excellent, since FWA targeted areas are often suburban and rural, where unused spectrum is most prevalent. Utilizing undeployed bands and adding radios for them is a natural next step to cater for FWA, if utilizing previously deployed bands is not sufficient to meet FWA ambitions.

Depending on the radio network starting point and the operator's ambitions for FWA, there are choices available to make the network capable of handling a combination of voice, mobile broadband and FWA in combination.

These choices can be summarized as utilize the existing radio network assets, add radio network capabilities, and densify the radio network grid. A well-planned mix of these choices should be deployed to meet the particular needs of each local situation. For further information we refer to the [Ericsson Fixed Wireless Handbook](#).

iii. Focus on connecting community-based institutions

Leveraging existing assets can be a cost-effective roadmap to enable institutional coverage facilitated FWA. By institutional coverage, we refer to facilities like schools, libraries, community centers etc. which serve their local communities. Taking schools as an example, we see that the boundary of a school goes beyond its physical boundaries and extends into surrounding buildings. Therefore, with all the above reasons, the growing FWA ecosystem can benefit rural areas

Passive infrastructures such as sites, towers, electricity, etc. which is largest component of network deployment cost, is already available at institutional common places. This supports upgrading to 4G/5G and extending coverage with less demanding deployment. **By leveraging the existing network assets and infrastructure not only can schools be connected but improved connectivity can be shared with the surrounding homes and communities. For example, network capacity that is used during the school day can be re-purposed during the evenings for home use when schools are closed.**

iv. Case Study Example: Australian National Broadband Network (NBN) rolling out fixed wireless services in remote and regional areas with Ericsson

Together with Australian NBN, we launched bitstream ethernet services in 2015 covering more than 580 000 premises in regional and remote areas where fixed line technologies are economically challenging. Previously, poor internet coverage has impacted Australian remote communities. Some refer to it as “data drought” which limited their access to information and opportunities to learning, developing and managing their businesses.

The solution is to optimize LTE for fixed wireless delivering broadband directly to businesses and homes as part of NBN’s Multi-technology Mix (MTM) strategy.

In this case, affordable and high-performance broadband services to less densely populated areas have closed the digital division between rural and urban. Communities benefit from better speeds, higher data allowances and better values and can enjoy connectivity and access to opportunities across education, business and entertainment.

As a result, Australian NBN and Ericsson’s fixed wireless footprint covers more than 270,000 homes and 47,000 community-based premises.

5. Summary and recommendations

In summary, neither spectrum nor technology are barriers to broadband internet access. The key challenge is are primarily anchored in socio-economic. Proven broadband technology and solutions connecting rural areas need to scale with sustainable business models. Increasing demands for digital services, cost-efficient broadband alternatives delivering higher network efficiency and subsidies from governments fueling broadband connectivity are key factors for FWA to connect communities from remote areas in the upcoming years.

We recommend regulators and policymakers to back increased coverage for institutions like schools by supporting requirements of coverage when licensing spectrum, financial support for rural sites that cover schools, and regulative support with e.g. site permits. This set up not only utilize the underutilized infrastructure but also under deployed spectrums in rural areas.

One additional recommendation is to rewrite Universal Service Funds mandates to prioritize broadband services, whereby technologies like FWA can also enable voice services using VOLTE or IP telephony solutions