RESPONSE FROM MICROSOFT CORPORATION

Swedish Ministry of Finance Public Consultation Fi2023/01693 on the Questions about current and future conectivity challenges

August 2023

Microsoft welcomes the opportunity to comment on the Swedish Ministry of Finance public consultation regarding current and future connectivity challenges. We hope the following comments can serve as a constructive contribution to further deliberations on the debate.

Introductory remarks

Microsoft's mission is to empower every person and every organisation on the planet to achieve more. We believe that in the world today, if there's a big problem, there is probably an opportunity for digital technology to be part of the solution. Given the type of technology Microsoft creates and the mission we pursue in serving others, we expect that an accelerated digital transformation will create new opportunities to further advance our mission.

We welcome Sweden's aspirations to have world-class broadband and be the best in the world at using the opportunities of digitalisation. Sweden is a model of connectivity success. It has accomplished widespread, high-speed, affordable internet connectivity, as shown in recent Digital Economy and Society Index (DESI)[1] figures, where Sweden is among the leading European countries. We recognize that the work is not finished, and there are additional goals for achieving EU Digital Decade objectives. We would also like to highlight a fact that fiber to the home (FTTH) coverage in the EU was higher than in the US or than the OECD average in 2021.[2] This is noteworthy as most data traffic traverses fixed broadband and Wi-Fi (70% for Microsoft services). This suggests that the policy levers to achieve next generation rollout already exist.

Efficient, ubiquitous, and affordable connectivity requires efficient and technology-neutral choices that make the best usage of all connectivity technologies, whether fibre, 5G, Wi-Fi, satellite or others, depending on the needs at hand, and does not impose disproportionate costs or unreasonable coverage obligations.

Sweden's continued path to success will best be accelerated by market-driven investments and collaborative partnerships among cross-industry participants.

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[1] Digital Economy and Society Index (DESI) 2022 | Shaping Europe's digital future (Link)

[2] ETNO, The State of Digital Communications report, (2022) (Link).

What will the overall need for connectivity look like in the coming years?

We recognize that there are important objectives to be accomplished for achieving the goals of Sweden's broadband strategy 'A Completely Connected Sweden by 2025' as well as the EU's Digital Decade 2030. At the same time, it is important to recognize that Sweden, has the second highest fiber penetration rate among the EU countries within the OECD, 79.56%. As highlighted in the introductory remarks, this is noteworthy as most data traffic traverses fixed broadband and Wi-Fi. This suggests that the policy levers to achieve next generation rollout already exist.

The electronic communication sector is diverse, ranging from traditional telco services to newer interpersonal communication services (ICS) enabled by internet and cloud players, satellites, and infrastructure providers. The impact of each technological development will vary by market segment. Traditional telco operators and cloud companies are natural partners and are increasingly collaborating to marry traditional fixed and mobile network services with cloud capabilities to lower costs, increase efficiency, and provide innovative features for their customers. Cloud and network virtualization will also ease the path for telco operators to enhance profitability through newly differentiated offerings targeting the enterprise market. New AI tools are available to help people communicate more efficiently, as well as to help network operators identify problems before they arise and manage their networks efficiently, with the potential to help mobile operators reduce RAN power consumption by up to 30 percent. These technological advances will provide the electronics communications sector with the opportunity to diversify their service offerings and enhance the way that they do business, delivering faster, more secure, and more resilient communications to end user consumers and businesses in Sweden and Europe as a whole.

What parts of societal development are important to take into account?

Sweden is best served by connectivity that is efficient, ubiquitous, and affordable. This requires technology-neutral choices that make the best usage of all connectivity technologies, whether fibre, 5G, Wi-Fi, satellite, or others, depending on the needs at hand.

In addition, affordable access to broadband is already ensured today, not only through market and consumer protection regulation and universal service funding, but also through local subsidies and state aid initiatives that can be used to finance investments where the market fails.

Lastly, focusing too narrowly on one segment of the ecosystem would threaten to disrupt efficiently operating markets that are producing highly favourable outcomes for European and Swedish citizens. In its 2016 Broadband Strategy, the Swedish government identified the need for goals in two areas: access to high-speed broadband in all of Sweden and access to reliable and high-quality mobile services and sates that by 2025 all of Sweden should have access to high-speed broadband. In addition, the EU Digital Decade sets an ambition of 75%

of EU companies using cloud, AI and / or big data, and seeks to double the number of EU unicorns. It also aims to have provision of public services be 100% online; and giving EU citizens better access to e-health and e-identity solutions. Achieving these goals requires data traffic and relevant content. Penalizing data traffic would therefore be negative to these digital ambitions overall and thus might impede societal needs. Against this backdrop, we welcome that Sweden, among several other EU Member States, recognizes that both the acceleration of the deployment of very high capacity and future networks as well as the relationship between platforms and telecom operators are complex issues of the digital transformation and are essential for the functioning of the internet.[3]

What are the challenges for the development of basic infrastructure?

The real challenge at hand seems not to be the connectivity investments, but rather how the telecommunications sector can generate even higher returns on investments. To achieve that goal the focus should be on stimulating the demand side, rather than engaging in a debate that falsely depicts telecom operators and online players as adversaries. Europe needs both sectors in the digital ecosystem to contribute jointly to the region's digital transformation. The positive result from increases in data traversing telco networks is illustrated by the fact that the internet access segment has grown by approximately 11% over the past 12 years which is a similar growth figure to that of other software technologies (GSMA, Internet Value Chain report, 2022).

What conditions need to be met to meet connectivity needs?

The internet is a complex, interdependent ecosystem. The underlying infrastructure enabling the Europe's and Sweden's digital transformation involves many building blocks and many investors. While telco last-mile networks are important parts of the modern internet infrastructure, they are not its entirety. A diverse ecosystem of many industry participants contributes to the building blocks of the modern internet. Each segment of the internet value chain needs to contribute to digital infrastructure by sustaining its own investments. Microsoft identifies seven essential and interdependent pillars of the modern internet infrastructure:

- ***I.*** Content, Apps, and Services (e-government services, enterprise workloads, remote work, distance learning, tele-medicine, online payment and banking services, social media, streaming media, online gaming, etc.);
- ***II.*** Hosting Infrastructure (data centers, edge nodes, and content caches)
- ***III.*** Networking Infrastructure (telco last-mile networks, cloud provider networks, enterprise networks, community networks, content delivery networks, subsea cables, and satellite space-based and earth-based components)

[3] DK, EE, FI, DE, IE, SE and NL statement with call for careful process in the OTT debate, 19 July 2022 (Link)

- ***IV.*** Internet Resources & Assurances (IP addresses, domain names, unlicensed radio spectrum, cybersecurity, online safety, data privacy and data protection)
- ***V.*** Devices (phones, PCs, tablets, IoT devices, AR/VR devices, game consoles)
- ***VI.*** Digital Inclusion and Sustainability (affordability, accessibility, digital skilling, sustainability)
- ***VII.*** End Users (consumers, enterprises, small businesses, non-profit organizations, and the public sector)

There are a great number of stakeholders involved in the value chain, each with their own specific contributions and interdependencies. Therefore, digital transformation can only be accomplished based on efforts from all players within the internet value chain, each investing in their own operated segments within that value chain, and thus helping to meet overall connectivity needs.

Having a positive outlook, seizing technology and service opportunities is as relevant for electronic communications providers as for any other company, in any sector. Opportunities for innovation exist and have always existed. Providers can embrace new technologies and network architectures to provide customers with faster and more efficient services. Reorganizing their assets and delayering networks will make their capex more efficient. Providers can embrace new services such as cloud-based services, to meet the growing demands of customers. They can also collaborate with other providers to jointly offer services to attract or retain more customers. Providers can further embrace infrastructure sharing and can expand into new markets to increase their customer base and revenue streams.

What do different actors need to contribute?

Digital players of all types have shown they are contributing significantly, and in a fair and proportionate manner, to the costs of public goods, services, and infrastructures to the benefit of all consumers. Against this backdrop, it is crucial to consider all digital goods, services, and infrastructures jointly and holistically. Focusing on only contributions to or investments in one element of the digital value chain such as last-mile connectivity over other digital infrastructures, services, or goods, underestimates and undervalues the centrally important role that these other elements play in Europe's digital transformation. Specific funding or mandatory payment solutions risk dangers and do not consider the entirety of the digital value chain. Furthermore, mandatory payment obligations that consider only last-mile connectivity ignore the broader digital decade goals have too narrow a view of digital infrastructure and could end up harming the significant progress that has been accomplished and additional progress that is underway. It also is important to remember that ISPs also already are paid by their internet access customers, who are the generators of data traffic.

Microsoft has more than 40 years of presence and experience in Europe and is committed to sustaining its cloud infrastructure investments in the region to support the 'A Completely connected Sweden by 2025', as well as the 2030 EU Digital Decade targets. Microsoft invests heavily in indispensable parts of the EU digital ecosystem, and performs extensive R&D in AI, quantum, and cloud optimization, incl. 5G virtualization. It invests in monitoring and protecting the cybersecurity of European data flows against cyberattacks. For example, worldwide Microsoft has over 20k peering connections and over 350k kilometers of terrestrial and subsea cables, not to mention significant CDN instalments across Europe. In terms of data center investment in Europe, during the past two years alone, Microsoft has made infrastructure investments in the EU exceeding $12 billion. This comprises 17 countries in Europe, including Sweden, with local datacenters that are built or under construction. In addition, Microsoft is a defender of the global internet through its global cybersecurity operations that contribute to the resilience of the internet. We have invested more than $1 billion in cloud security each year and announced in 2021 to quadruple the amount to $20 billion over 5 years. These extraordinary figures still do not represent the totality of Microsoft's investments which are often not broken down by region and which cover for example substantial research and development in technologies such as artificial intelligence, quantum computing, 5G virtualization and many other software elements. Microsoft is therefore a substantial contributor to the global internet infrastructure and a major capital investor in Europe's and Sweden's digital future, with continuous long-term commitments in the continent.

Good conditions for reliable and secure connectivity and an increasingly rapid digitization of society can have both positive and negative effects on the climate and efficient resource utilization. Describe a desired target image. What is needed to maximize the positive and minimize the negative effects?

Public reports recognize also that the energy consumption and emissions of data centers have not grown apace despite increasing traffic, a result traceable to efficiency gains and greater use of renewable energy. We see similar efforts on the network side. For example, a report[4] gathering data from European Telecom Network Operators (ETNO), shows that electricity consumption remained nearly constant (+1%) between 2015 and 2018, while data traffic increased by a factor of 3. Within this period, electricity consumption per subscription remained quite stable.

Furthermore, according to GSMA[5], the ratio of energy saved through use of digital services to the energy consumed in using digital services is 10:1. Both the telecoms and digital sectors have become more energy efficient, including through leveraging of AI and data

[4] Dag Lunden, Jens Malmodin, Pernilla Bergmark & Nina Lovenhagen, Electricity Consumption and Operational Carbon Emissions of European Telecom Network Operators (2022) (Link).
[5] GSMA, The Enablement Effect (2019) (Link)

analytics. Their global carbon footprint has been reduced over the past decade, despite the increase in data traffic and service usage.

Additionally, BEREC's Sustainability Report[6] outlines that the ICT sector stands for approx. 1.5-4% of the total GHG emissions, divided over digital devices, data enters and networks. While much attention has been paid to the energy consumption and emissions of data centers, they have not grown apace despite increasing traffic, a result traceable to efficiency gains and greater use of renewable energy. We see similar efforts on the network side. Migration to cloud and data center computing from private computing reduces IT energy consumption and related carbon emissions. Data centers also could help integrate renewable energy into local networks.

The Microsoft Cloud is up to 93% more energy efficient than traditional enterprise datacenters due to Microsoft's extensive investments in IT efficiency from chip-to-datacenter infrastructure and renewable energy. Azure for Operators' RAN analytics framework allows network operators to achieve power efficiencies, with the future potential to reduce RAN power consumption by 30%. More broadly, Microsoft has announced ambitious goals to shift to a 100% supply of renewable energy by 2025 and remove more carbon than we emit by 2030. By 2050, we will remove our historic carbon footprint and become carbon negative. The mechanisms for delivering data efficiently are evolving technologically.

In addition, in November 2021, Microsoft announced the launch of a sustainable data centre region in Sweden, with presence in Gävle, Sandviken and Staffanstorp. Microsoft's Sweden datacenter region is committed to cutting carbon emissions, achieving zero waste certification, and running on 100% carbon-free energy. Microsoft's Sweden datacenter region will be powered by 100% carbon-free energy with 24/7 hourly energy matching with partner Vattenfall. To support its operations, Microsoft has signed agreements for new renewable energy projects with bp, Enlight Renewable Energy, European Energy, NTR, Prime Capital and wpd. In addition, Sweden is Microsoft's first datacenter region in which backup generators will run on Preem Evolution Diesel Plus, the world's first Nordic Eco-labeled fuel, which contains at least 50% renewable raw material, and nearly an equivalent reduction in net carbon dioxide emissions compared with standard fossil diesel blends.

Indeed, both the telecoms and digital sectors have become more energy efficient, including through leveraging of AI and data analytics. Their global carbon footprint has been reduced over the past decade, despite the increase in data traffic and service usage. Migration to cloud and data center computing from private computing reduces IT energy consumption and related carbon emissions.

Regulations should not freeze in time that positive evolution. In addition, obligations regarding data delivery mode would unnecessarily limit content access providers' (CAPs) ability to manage its own data delivery in a manner that optimally combines high reliability, low latency, and energy efficiency.

[6] BEREC Report on Sustainability (2022) (Link)