Annex to the EC exploratory consultation on the Future of Mobile Networks

Cisco's Point of View on the Future of Mobile Networks

Preliminary note: In our responses to the consultation and in the present document, Cisco uses the generally approved terminology “Communications Service Providers” (CSPs) and “Over-The-Top” (OTTs) and “Content Application Providers” (CAPs) instead of “Internet Service Providers” (ISPs) and “Large Traffic Generators” (LTGs) mentioned in the questions of the stakeholders consultation.

General remarks
Cisco Systems, Inc. (Cisco), a B2B company with a hardware, software, and service portfolio used to create the Internet solutions that make networks possible, providing easy and secure access to information anywhere, at any time. Our entire focus as a company is to help our customers connect, secure, and automate in what is becoming a cloud-first world.

Cisco is fully committed to supporting the 2030 Digital Decade Targets. When looking at the first months of 2023 and the years ahead, Cisco observes transformation in how applications, connectivity, and security are delivered and consumed. It is an immersive future that needs to be “sustainable by default,” requiring new technologies built with new processes and in service to new business models. Exceptional, secure, reliable digital experiences are becoming the gold standard of business success.

Cisco has been working and partnering with Communications Service Providers (CSPs) in Europe and around the world to help them deliver the best experience for their customers. In the last decade, we have observed that telecoms regulation has significantly impacted the financial health of our CSP customers and their ability to invest in networks and new services to generate new revenue streams to compensate for flat to declining Average Revenue Per User (ARPU).

It is undeniable that in several parts of Europe, the poor deployment of broadband needs to be addressed. At the same time, CSPs also deserve fair investment conditions in the European market when it comes to commercial agreements.

While we defer to CSPs and hyperscalers to respond on the questions related to the direct payment mechanism, we respectfully ask the EU to carry out a thorough, independent assessment of the market situation and of the possible economic repercussions of a mandatory mechanism of direct payment or of a potential EU/national fund, especially in terms of increase to business costs and consumers bills, and the general impact on the whole Internet ecosystem, including net neutrality.

We recommend looking at the broader picture and at all the contributions from every stakeholder in the Internet ecosystem, including the need for a mix of connectivity technologies such as 5G networks, FTTH, Wi-Fi and satellites, but also the technologies supporting the ecosystem such as data centers, cloud solutions, etc. where all Internet stakeholders have been massively investing and contributing in a fair and proportionate way.
With the twin green and digital transformation underway, all Internet stakeholders have also been driving capital flows towards greening the ecosystem and enabling other industries to succeed in their Net Zero journey’s with the roll-out of sustainable networks and technologies.

Smart telecoms and emerging tech policies, including competition and state aid rules, also have an important role to play in fulfilling the Digital Decade objectives and developing an investment strategy for connectivity that are non-discriminatory and transparent, and respect the principle of technology neutrality. With a better leverage of the EU Resilience and Recovery plan, we also have an opportunity to create a truly connected Europe where everyone has access to the Internet and critical services no matter where they live.

Cisco is a strong believer that policies and innovation should be purpose-driven. We are on the edge of generational change that has become evident through the innovative use of technology. Responsibility, sustainability, equity, and inclusion are paramount, and they should be guiding themes when developing the policies and the solutions that power networks, hybrid worlds, responsible AI, and green businesses.

Therefore, Cisco welcomes the opportunity presented by the European Commission to provide comments on the Exploratory Consultation on the future of the electronic communications sector and its infrastructure, and would like to offer additional views to the responses we provided in the questionnaire:

1. Challenges and Opportunities for the Electronics Communications Sector

The impact of digitization on the sector will include the emergence of a new value chain connected with offering and consumer services via digital interfaces (i.e., application programming interfaces or APIs) as a way of optimizing and streamlining processes and supporting core competencies while relying on third parties for ancillary capabilities.

Cisco’s Strategy Office has identified several global trends that could help the EU to understand better the challenges and opportunities for the sector:

- The definition of ownership models for service level agreement (SLA) commitment when multiple partners are involved in the delivery, e.g., high-availability, resiliency, security - partnership with cloud providers, software/app providers that do not have the same level of resiliency as a CSP or different regulation obligations.

- Increasing wireless usage is an opportunity for regulators to develop spectrum sharing and coexistence regimes and create incentives for the development of new sharing technologies.

- The rise of cloud computing has enabled companies to store and process data more efficiently, reducing costs, and improving performance.

- With increased connectivity and data sharing, the risk of cyber attacks and data breaches also increases. Ensuring cybersecurity will be critical for maintaining trust in the electronic communications sector. Demand for digital products and services is
booming and making businesses a greater cyber-target. Nearly 8 in 10 companies experienced at least one cloud data breach.

- Supply chain issues, workforce changes, and other unexpected events are challenges organisations need to anticipate and respond to via smart connectivity and predictive networks.
- Transition to net-zero will be as disruptive as the industrial revolution with the support of digital techs (AI/ML, sustainable networks, data-driven solutions, PoE, etc.). Incentives should be granted to accelerate the roll-out of more sustainable networks.
- Regulatory compliance, lack of harmonization and difficulties to scale up solutions remain a huge issue across Europe. Businesses – small or big – are all trying to keep up with a never-seen-before amount of regulations on the digital and environmental side, including on data sovereignty and governance. Smarter regulations, a true single market and the provision of tools to businesses to succeed in this industrial transformation should be the ultimate goal.

2. Technological developments

One segment of the market that has proved particularly difficult for CSPs is in IT services. As enterprises embrace cloud-based applications and different digital platforms to transform how they operate and engage with their customers, CSPs struggle in this new and different landscape to replicate their earlier success of selling traditional connectivity services. Consequently, today, just around 6% of a typical CSP’s revenue comes from IT services – the rest is from core connectivity, voice and consumer services, and wholesale.

Some of the challenges that CSPs have faced in selling IT services have extended to operational technologies (OT) too – but many CSPs have thrived in enabling different IoT-enabled applications for logistics, for example.

All of this means that there has been a drastic shift in CSPs’ position in the market. In 2010, the telecoms industry represented 50%+ of the EUR 2.64T revenue from the digital ecosystem. By 2021, the digital economy has more than doubled to EUR 5.47T+, but the telecoms industry has captured less than 2% of that growth.

Below are some technological opportunities that could respond to the challenges CSPs face:

- as-a-Service ("aaS")
CSPs are changing the way they acquire and consume software and infrastructure. The broad-based adoption of network automation and analytics over the last few years is resulting in huge leaps in agility, flexibility, and security. Network-as-a-service (NaaS) is a trend with big potential to reshape the industry over the next 3-5 years. The main benefit from aaS is the flexibility to assume business challenges with ease and as necessary to achieve profitability.
Edge Cloud

Edge Cloud solutions provide a new architecture for content delivery to services providers to create network capacity to scale for less and offer quality content faster from the edge.

The majority of Internet traffic is centered around video content from the Over-the-Top (OTT) players, and the caching and distribution of such content can both ease the strain on the backbone of the Communications Service Provider (CSP)’s network, and such required infrastructure at the edge can be effectively funded by the Content Application Providers (CAPs), who in-turn improve their user’s experience, providing a mutually beneficial model. In the case of Qwilt, the CAPs pay a certain fee per GB of traffic that they inject into Qwilt’s Open Caching solution, which over time fully funds the server and networking infrastructure needed to run the solution embedded in the CSP’s network. This content is now closer to the consumer, improving the responsiveness and quality of experience of a Disney+ service for example, and they do not have the operational burden of having to build out such caches themselves. The CSP benefits from reducing the amount of long-hauling of such heavy traffic across their national infrastructure, de-clogging Internet Peering points, while not adding to its infrastructure investments. Video might one day be eclipsed by Metaverse/Augmented Reality or Volumetric Video applications, etc., where latency becomes even more important, and where this model would become even more relevant.

Cisco has recently partnered with Qwilt to deliver ever-increasing volumes of media and web content without overwhelming their networks. Based on a CAPEX-free model combined with a direct revenue share, our global content delivery platform with cache nodes inside the CSP network enables CAPs to maximize operational efficiency with very little business or financial risk while participating more actively in the content delivery value chain.

Industry Stratification

The telecoms industry should also see more stratification of Digital Service Companies (SerCo) and Network Infrastructure Companies (NetCo) as a result of structural separation of vertically integrated CSPs.

“NetCos” will be subject to M&A and consolidation dictated by economy of scale and will also benefit of Public-Private Partnership models, tapping into stimulus funds and recovery funds as appropriate.

Open Networks, Network Disaggregation and Open RAN

Open Radio Access Network (Open RAN) creates opportunities for new and traditional providers to support the development of an open and secure 5G ecosystem and the uptake of European tech leadership by supporting collaboration between new and traditional vendors by helping to foster innovation across industries.

---

Open RAN is built around increased virtualization and modularity in the network. That means that there is a significant flexibility around how the networks are architected and where increasingly intelligent functions will sit. This rapidly increases the choice of components, and therefore the potential to innovate and meet the demands for a fast-growing variety of use cases and applications.

Ultimately, the disaggregated and modular models will create many opportunities by driving openness, creating a larger ecosystem of vendors and open-source projects that will accelerate innovation, create potential cost savings for operators and consumers, and lead to potentially faster deployment as it takes minutes instead of days to configure a tower remotely.

- **Non cellular Technologies**
  As recognised in the final political text adopted for the 2030 Digital Decade Targets, Wi-Fi and fixed technologies are also crucial technologies to achieve gigabit connectivity for all.

According to the 2022 Digital Economy and Society Index (DESI), Internet access at home continues to be provided mainly via fixed technologies at 98%. Very high capacity fixed networks covered 70% of EU homes in 2021, up from 60% in the previous year. Wi-Fi is an affordable technology, easy to deploy within homes, and provides low latency and very high throughput.

Furthermore, over 90% of European data usage takes place indoors, and Wi-Fi ensures that billions of connected devices make the most of their broadband service. 92% of European broadband traffic is relayed via Wi-Fi once it enters a building. Even mobile devices rely heavily on Wi-Fi. More than 80% of mobile device traffic originates or terminates indoors on Wi-Fi. As a result, Wi-Fi traffic has doubled every 3 years, and the existing 2.4 GHz and 5 GHz Wi-Fi bands are quickly becoming congested, putting at risk Europe’s technological leadership and the ability of European citizens to take advantage of their high-speed fiber connections.

- **Post-Quantum Cryptography**
  As we prepare for the next phase of digital transformation and a quantum world, cybersecurity and new future-proof innovations remain top-of-mind for Europe to ensure secure connectivity.

We anticipate quantum-safe encryption to start rolling out widely to protect Internet transmissions, data centers, IoT, autonomous cars, and 6G. Quantum-safe encryption

---

4 Dynamic Spectrum Alliance presentation, “6 GHz Band for Wi-Fi: Source of value for consumers, industry, GDP and social impact” (June 2022)
includes hardware-based post-quantum cryptographic algorithms as well as newer, lower cost and longer reach Quantum Key Distribution techniques being investigated today.

- Managed Services
 According to a report from Canalys, managed services in security present the strongest opportunities for CSPs to bring value on their existing infrastructure. Relationships with vendors are growing both organically and through M&A. We expect the innovation in cybersecurity to deliver positive returns through a framework that includes quantum encryption, AI, zero trust access, visibility to protect the infrastructure, end-points and data in transit, processing and at rest.

In addition to the technological developments mentioned above, Cisco expects that a huge amount of CAPEX will be invested to connect AI training Clusters (AI/ML cluster networking), both within Hyperscalers Data Centers but also, with democratization of AI, as managed networking offer to enterprises.

Finally, we would like to refer to ETSI’s main technology trends published in a recent white paper.

3. Universal Fund and a potential future EU or national fund for gigabit connectivity
 Cisco fully concurs with the Digital Decade 2030 targets to ensure all Europeans have gigabit connectivity and with the European Declaration on Digital Rights and Principles which states that all digital players benefiting from the digital transformation should contribute in a fair and proportionate manner to the costs of public goods, services and infrastructures to the benefit of all people living in the EU. The Internet is a critical lifeline to jobs, education, and socialization for many people. Yet today, about half of the world’s population remains unconnected.

However, achieving gigabit connectivity for all requires a toolbox of complementary policies and initiatives, including market-based solutions, public-private partnerships as well as approaches that stimulate both the demand and supply side of broadband.

Universal service or a future EU or national fund for gigabit connectivity may be one such complementary tool, under certain conditions. These include consideration of existing public funding such as the EU recovery and resilience fund that remains untapped and a targeted approach for specific projects in unserved areas (e.g., rural areas) where there is a market failure.

---

Other tools to achieve the 2030 targets are described in our point 5 below and include spectrum policies, removing red tape to access public funding, additional incentives such as connectivity vouchers and tax credits, and the development and adoption of relevant applications and services which encourage take-up.

In any event, a universal fund or potential EU/national fund should avoid distortions of competition and should be anchored in technology neutrality principles.

4. Sustainable Networks, Green for IT and IT for Green
As a vendor, one of the most pressing issues for our CSPs and enterprises customers is to address new sustainability requirements. Improving efficiency, reducing costs and becoming more circular are the three main contributions digital technologies and connectivity can bring, for example:

- Digital Twins can be used to optimize performance and reduce maintenance costs by analyzing the behaviors of the digital replicas.
- IoT is the enabler of the monitoring of energy usage with real time data.
- 5G, LTE and distributed Field Area Networks are built to provide secure and reliable real time monitoring of the grid and connectivity for field assets.
- Artificial Intelligence data produced by the sensors and IoT can be analyzed, to optimize energy usage in a multi-energy-source system, predict the demand and fluctuations, and deliver predictive maintenance to installed assets.

According to a recent IDC-Cisco Infobrief, 62% of companies worldwide believe investments in IT are very or extremely important to reach their sustainability goals. Energy management is the top sustainability priority across key vertical markets, whether ins utilities, healthcare, retail, financial services or manufacturing, with 55% of companies worldwide viewing energy management and decarbonization as their primary area of focus. Last year, 22% of companies surveyed for the Infobrief indicated that IT is already taking the lead role in formulating ESG and sustainability strategy and ensuring progress toward goals — compared with 13% in 2021.

In a recent study commissioned by industry association GSMA, it has been observed that the electricity usage of CSPs during the COVID pandemic in the last 2 years remained fairly stable despite an increase of data traffic of 50% in the networks. A similar pattern can be observed for the period 2015-2018 where electricity consumption increased only about 1% while data traffic exploded by 300%.

Thanks to automation and technologies such as edge cloud, chips and AI, the tech industry has continuously improved the bandwidth delivered through fixed and wireless networks with much better energy performance.

---

8 Ibid.
9 GSMA, Lundén et. al., Electricity Consumption and Operational Carbon Emissions of European Telecom Network Operators. Sustainability 2022
Today, our products are the foundation of most of the digital operations happening around the world, whether it is in a data center, in mobile network infrastructure, in administrations, offices, or stores, there are some Cisco technology to deliver secure and efficient connectivity. Over 90% of Cisco’s carbon footprint is driven by emissions associated with the use of our products.

We realize that the way we design our products and packaging directly impacts our customers’ ability to achieve their own sustainability goals. Through our circular design strategy, we are advancing how we can support our customers and meet our own objectives and aspirations.

For example, when designing our latest technology for the future Internet, we developed a chip at the heart of a networking system that uses 96% less electricity than its predecessor, while supplying 35% more bandwidth. Furthermore, we condensed 2,300 elements into this single computer chip. Its much smaller size allows us to significantly reduce the packaging needed and energy required for shipping it to our customers.

5. General Policy Recommendations
Policies that promote network investment foster networks that can keep pace with rising consumer demand for data. We respectfully suggest the following recommendations:

- **Address market failures:** New digital infrastructure should primarily be paid for through the private sector, incentivised by the right regulatory framework, including facilitating network sharing. That said, it should be recognised that the EU will not achieve full coverage of highspeed, high capacity and reliable networks without some level of public funding as it is unlikely that there will be a strong case for private investment in rural or other white areas.

- **Remove barriers to Investments:** The main barrier to deploying fiber in the Member States is due to the lack of return on investment for the private sector. Indeed, deploying fiber is very labor intensive and has a very long-term return on investment. ARPU is flat and in some cases even going down while consumers expect more bandwidth for same or lower prices. While public funding in white/rural areas may exist, CSPs report complex and long process to tap into these funds.

- **Consider a more flexible regulatory framework:** The Commission should consider reducing red tapes and complexity in line with the spirit of the Gigabit Infrastructure Act. It should support CSPs to tap into the existing public funding, as well as tax credits, notably in line with sustainability objectives. In addition, European regulators might want to become lighter on some regulations like net neutrality. Too much interference is working against the creativity of CSPs tapping into new use cases to increase or find new ARPU streams.

- **Provide more incentives (e.g., connectivity vouchers, tax credits) for:**
  - Connecting the unconnected (e.g., white/rural areas);
  - Replacing copper with a more sustainable infrastructure;
  - Adopting the end-user’s necessary terminal equipment for a safe and secure access to the Internet and the cloud.
• The process to match the end-users with the providers should be technology neutral, non-discriminatory, transparent, allowing for competition between the various eligible providers.

• **Adopt a technology neutral approach:** We strongly advise to ensure that the future policy framework will continue to promote the take-up of a mix of technologies based on the needs. For example, we recommend incentivizing fiber rollout as future mobile networks need more fiber to handle density of use and to provide backhaul for increased traffic.

• **Seek a harmonized, forward-looking EU radio spectrum policy programme.** Spectrum availability, award procedures (including costs) and the right conditions attached to licenses all fundamentally impact incentives to and cost of investing in networks. Spectrum policy also significantly impacts and shapes market structures and competition. Therefore, we suggest the following recommendations:
  
  o **Make sufficient licensed and unlicensed harmonised spectrum available in a timely manner;**
  
  o **Harmonize the use of the 3.1-3.4 GHz, 3.4-3.8GHz and 3.8.-4.2 GHz bands for local 5G networks;**
  
  o **Maintain a no-change position regarding unlicensed spectrum in the 6 GHz band at WRC-23;**
  
  o **Accommodate new spectrum requirements for IoT and digitisation of the verticals without discriminating between business models and leave it a market choice to build your own network or purchase as a service;**
  
  o **Incentivise fibre rollout as future mobile networks need more fiber to handle density of use and to provide backhaul for increased traffic.**

• **Enable new business models for network rollout** including co-investments and infrastructure sharing.

• **Keep treating enterprise networks as private networks** even if offered as a service by an operator.

• **Recognize the global dimension of network security,** where regulatory requirements should be appropriate to the risk, recognize the international nature of cyber security and the constant evolution of the technology.

• **Review the EECC:** We commend BEREC for organizing an upcoming workshop with national telecoms regulators to take stock of the implementation of the EU Electronic Communications Code (EECC) and to prepare for its review. We have noticed during the implementation some divergences of national approaches on the application of definition, general authorisations, security of networks and services, quality of service, access to emergency services and public warnings.

  While we appreciate the work that has been done by the Commission and national Member States, we believe that there would be merit to further harmonise provisions that are in the code.

• **Measure the impact:** Finally, it is important to measure the outcomes following the adoption of these new guidelines against the objectives adopted in the EU 2030 Digital Decade and Digital Compass to assess the effectiveness of the rules in place.
We are looking forward to working with the European Commission and Member States on a telecoms infrastructure policy that fully benefits the European Union.

For more information, please contact