Alliance for IoT and Edge Computing Innovation

Brussels, 28 June 2024

AIOTI Views on the White Paper "How to master Europe's digital infrastructure needs?"

Comments

2. TRENDS AND CHALLENGES IN THE DIGITAL INFRASTRUCTURE SECTOR

2.1. Europe's connectivity infrastructure challenges

2.2. Technological challenges

The Alliance for IoT and Edge Computing Innovation (AIOTI) welcomes the European Commission's (EC) intention on addressing the technological challenges and future trends of Europe's connectivity infrastructure, therefore, we would like to recommend the following general actions:

- Focus on solving the computing continuum challenges, together with optimized energy consumption and resource utilization challenges.
- Identify what are the benefits of distributing computing anywhere on the Cloud-Edge-IoT-AI continuum and apply this only when the benefits on at least optimized energy consumption and resource utilization are significant; based on these benefits, criteria need to be defined on whether computing should be centralized or distributed.

2.3. Challenges of achieving scale in EU connectivity services

2.3.1. Investment needs

While we acknowledge the fragmentation of the European telecoms sector, it is our view that a consolidation of the European telecoms sector could stimulate massive investment in digital infrastructure across the European Union (EU) provided, however, that European consumers' welfare is duly protected as a result of further market consolidation. We invite European policymakers to strike the right balance between the need for market consolidation and the need to ensure that European consumers do not have to bear most of the burden of such changes.

In addition, we would like to propose to replace WiFi6 with "the latest available and future Wi-Fi technology", since on the one hand it is WiFi7 is being currently deployed and on the other hand the document should provide more future looking statements.

2.3.5. Sustainability challenges

We very much agree that modern digital technologies can contribute significantly to sustainability. In this context, AIOTI and many other EU organizations are supporting European Green Digital Coalition (EGDC) on doing research and developing the Quantification Methodology specified in ITU-T L.1480 specification, on how to measure the benefits of applying ICT solutions in order to reduce CO2 emissions in other Sectors (e.g., vertical industries).

Actually, ETSI Technical Committee Environmental Engineering (ETSI TC EE) and ITU-T Study Group 5 (ITU-T SG5) are working, in collaboration also with EGDC, AIOTI and United Nations Framework Convention on Climate Change (UNFCCC) on a new version of standard ITU-T L.1480 that will be published also as European standard and is expected to become the part of the EU Taxonomy rules.

In particular, we suggest that more focus is needed on verification and certification of the Quantified Methodology and Assessment, based on ITU-T L.1480, in order to quantify the benefits of applying ICT solutions in order to reduce CO2 emissions in other sectors. This activities will further stimulate ICT and digital innovation stakeholders to collaborate with vertical industry sectors in an efficient way in the context of the Green Transition.

Similarly, we would like to further refer to the importance of measuring the carbon emission intensity of an ICT network that focuses on the network energy consumption in relation to data traffic. This is relevant, since the amount of traffic will significantly increase, and it is necessary to define indicators to define the increased efficiency in terms of the Green House Gas (GHG) of an ICT network by linking the amount of GHG emitted to the services provided by the network. A methodology on measuring the carbon emission intensity of an ICT network is standardised in ITU-T L.1333, "Carbon data intensity for network energy performance monitoring".

We agree as well that an important role should be given to the deployment and adoption of more energy efficient technologies, such as (1) fibre/optical networks and as well (2) introduction of using Artificial Intelligence (AI) to optimize and automate ICT networking technologies to ensure they become more energy efficient.

2.4. Need for security in the supply and in the operation of networks

2.4.1. Challenge of trusted suppliers

Cybersecurity is becoming now more important than ever. Indeed, Member States do face challenges for greater harmonization of cybersecurity requirements across the European Union; on this note we would like to emphasize the need for EU wide standardization, homologation and security schemes based on technical criteria and certification reflecting international state of the art security standards. The EU must enable continued trust in the related technologies and applications. Trust needs to be based on facts, facts must be verifiable, and verification must be based on international, globally-recognized and common standards. Any measures to be effective, should address genuine, present and sufficiently serious threat to security.

Restricting or excluding technology suppliers and vendors without facts-based verification would also raise an instance of legal incompatibility with national, EU and WTO law.

2.4.2. Security standards for end-to-end connectivity

We agree that one of the key challenge for the EU to lead the security standards for end-to-end connectivity is to ensure that such developments result in common and interoperable security standards for all key infrastructural elements underpinning sensitive communications infrastructures.

We propose that this challenge can be addressed by strengthening the EU engagement and cooperation with international standard organizations and associations. Moreover, also strengthening the EU participation in international common standards is to be fostered.

3. MASTERING THE TRANSITION TO THE DIGITAL NETWORKS OF THE FUTURE - POLICY ISSUES AND POSSIBLE SOLUTIONS

3.1. Pillar I: Creating the "3C Network" - "Connected Collaborative Computing"

3.1.1. Capacity building through open innovation and technology capabilities

We welcome the EC's intention on creating the "3C Network" - "Connected Collaborative Computing".

3.1.2. Way forward

We welcome the key step towards the 3C Network by proposing that several large-scale pilots that set up end-to-end integrated infrastructures and platforms and bring together players from different segments of the connectivity value chain and beyond are considered in forthcoming work programmes. It is very important that these are considered for funding under the Horizon Europe (HE) programme and its successors.

The new infrastructure-focused Important Project of Common European Interest (IPCEI), JEF-IPCEI initiative states that the R&D activities in EU infrastructures need to be intensified. Therefore, in addition to the new infrastructure-focused IPCEI, it will be helpful and efficient to start in parallel a Sensor Data and IoT Communication - infrastructure European partnership or at least envisage the topic in the next EU framework research programme and consider related activities to edge sensing/actuating, AI, intelligent connectivity and immersive technologies in the large-scale pilots in the HE programme and its successors.

Furthermore, to realise both the development and the deployment of "3C Network", we propose that:

- Standardisation (e.g., of "connect and collaborative compute" network interfaces) is needed through European and international joint innovation.
- Accelerate the creation and application of the "connect and collaborative compute" ecosystem and technologies, which will prevent fragmentation in "connect and collaborative compute" standardisation activities.

The large-scale pilot projects should serve as references for interdisciplinary innovation platforms using advanced computing and connectivity infrastructure. They should bring together experts from different technology fields (Telecom, IoT, AI) and various industrial sectors to focus on shared goals and challenges in using the shared computing and connectivity infrastructure. By creating these projects, collaborative efforts can be streamlined and more effectively directed towards innovative solutions that can improve and expand the performance of the network infrastructure (latency, data throughput). This will ultimately enhance the development and deployment of integrated technologies in the realm of IoT, edge computing, AI, and immersive environments.

3.1.3. Summary of possible scenarios

Pilar I- Scenario 1: end-to-end integrated infrastructures and platforms for telco cloud and edge

Scenario 1: The Commission may consider proposing large-scale pilots that set up end-to-end integrated infrastructures and platforms for telco cloud and edge. In a second step these pilot infrastructures would be used to orchestrate the development of innovative technologies and AI applications for various use cases.

We welcome the key step towards the 3C Network on proposing for consideration in forthcoming work programmes a number of large-scale pilots that set up end-to-end integrated infrastructures and platforms and bring together players from different segments of the connectivity value chain and beyond. These could be considered for funding under the HE programme and its successors.

Although the white paper already identifies three focus areas (5G corridors, e-health and smart communities) for the large-scale pilots, we strongly recommend relaxing any hard constraints that may exclude other potential domains of applications. This would allow room for possible demand drivers coming from other domains or spillovers spreading towards other domains.

We recommend that European Digital Innovation Hubs (EDIHs) are considered as key players in large-scale pilots, as they provide direct reach to end-users of digital technologies and can act as evangelists and aggregators of end-user demands and facilitators of future early adoption.

In this context, and in order to take advantage of the benefits of global technological development and deployment, the participation of a wide variety of "Connected Collaborative Computing" stakeholders in these large scale-pilots is needed. Such "Connected Collaborative Computing" stakeholders should represent the demand and supply side for telco cloud and edge, which may include large, small and medium telecom and computing/cloud providers and vendors. It should also include communities covering eco-system of cloud-edge-IoT continuum together with telco and cloud communities. Requirements for the immersive technologies applications should also be included in such development in order to support the forthcoming Virtual Worlds cPPP strategic agenda and provide link to it.

Furthermore, in order to realize both the development and the deployment of "3C Network", we propose that:

- standardization (e.g., of "connect and collaborative compute" network interfaces) is needed through European and international joint innovation.
- the "connect and collaborative compute" ecosystem formation and technology application should be accelerated in order to prevent the fragmentation in connect and collaborative compute" standardisation activities.

Pilar I- Scenario 2: the Commission's Joint European Forum for Important Projects of Common European Interest (JEF-IPCEI), which is tasked with identifying and prioritizing strategic technologies

As stated for the JEF-IPCEI, there is need to intensify the R&D activities in EU infrastructures. Therefore, in addition to the new infrastructure-focused IPCEI, it will be helpful and efficient to start in parallel a Sensor Data and IoT Communication - infrastructure European data communication partnership and consider related activities to edge sensing/actuating, AI, intelligent connectivity and communication and immersive technologies in the large-scale pilots in the HE programme and its successors.

Pilar I- ***Scenario 3: Massive investments in connectivity capacity are required to support the creation of a collaborative connectivity and computing ecosystem.***

EC may consider different options in order to frame these investments into a simplified and coordinated support framework for a truly digital single market drawing on European and national, public and private investments.

We welcome the statement that massive investments in connectivity capacity are required to support the creation of a collaborative connectivity and computing ecosystem.

These investments could be targeted towards (1) existing connectivity capacity initiatives, such as the SNS JU and the Photonics cPPP/Photonics21 and (2) any possible new infrastructure initiatives.

As stated for the JEF-IPCEI, there is need to intensify the R&D activities in EU infrastructures. Therefore, in addition to the new infrastructure-focused IPCEI, it will be useful and efficient to start in parallel a Data Communication - infrastructure contractual Public-Private Partnership (cPPP) or at least envisage it in the next EU framework research programme and to envisage also such activities in the large-scale pilots in HE programme.

3.2. Pillar II: Completing the Digital Single Market

3.2.3. Authorisation

Regarding "*The application of a single set of rules based for instance on a 'country of origin' principle for core networks and core network services would enable EU core network operators to leverage the full potential of the internal market to reach critical size, take advantage of scale economies, and reduce capital expenditure and operating costs, thus solidifying their financial position, attracting more private investments and ultimately contributing to EU competitiveness.*"

We agree that the principle single set of rules based for instance on a 'country of origin' principle for core networks and core network services can bring advantages, but they can as well bring challenges to small and medium-sized core network providers, related to the protection of their existing investment, and as well to challenges brought by possible evolution of their existing deployed sites. Therefore, a careful balance between investment needs, availability and affordability of services for end users and protection of investment and investment attractiveness of Europe should be taken into consideration.

3.2.4. Addressing barriers to core network centralisation

We agree with the information mentioned in this section that "*In addition to the sector-specific regulatory barriers mentioned above, contributors to the exploratory consultation listed other regulatory barriers to the establishment of a true Digital Single Market such as different obligations across the EU with regard to network/service incident reporting or security vetting requirements, building lawful interception capabilities, data retention regimes, privacy and reshoring requirements or cybersecurity and reporting obligations.*"

In addition, core network centralisation can have an impact on following challenges:

- Cross-country network resilience:
  - Fault-rate of cross-country transmission is possibly higher than the fault-rate within national transmission;
  - Fault recovery and/or reliability challenge is more complex to be realized
- Cross–country Operation & Maintenance: O&M cross-country activities are more complex, which might require an increase in OPEX for core network providers.

3.2.5. Radio spectrum

We do acknowledge that Spectrum is a sovereign matter for each member state, that each country needs to plan and manage spectrum based on its digital economy development. Indeed, Spectrum auction mechanism is closely related to the market situation and economic structure of a country and is not suitable for unified management at the EU level.

The daily management of spectrum involves a large amount of coordination with neighbouring countries, including both EU countries and non-EU countries. Member States have accumulated a lot of coordination experience in the past decades. The regulatory bodies of each country are the most effective institutions to ensure the interests of each country. Globally, spectrum is regarded as a national affair.

Within these pillars, there is however a room for Spectrum allocation rules to possibly strengthen the capacity of the mobile operators to offer pan-European services, while complying with Member States' legal competence regarding spectrum allocation in accordance with EU Treaties.

We invite EU policymakers to consider harmonised timelines for spectrum auctions in order to provide for both investment and legal certainty. We recommend the adoption of auction processes which avoid artificial spectrum scarcity and unnecessarily high spectrum fees, and further to use the proceeds of auctions to incentivise mobile operators to invest in national communication network infrastructures.

It is our understanding that the commercial viability of direct-to-device (D2D) satellite connectivity has not yet been fully proven. Hence the capability of D2D satellite communications in effectively complementing European mobile communication networks is as yet uncertain. In this regard, it is recommended to follow-up the results of studies by 3GPP and towards WRC-27 on D2D satellite connectivity and spectrum.

As regards the topic of spectrum sharing, we recommend that co-channel spectrum sharing should be considered on a case-by-case basis and subject to cost-benefit analysis. Spectrum sharing should only be adopted if the net economic efficiency of multiple systems operating co-channel is greater than the economic efficiency of each system operating in the band on a standalone basis. This might be the case, for example, where the said systems are subject to adequate geographic separation or radio isolation, thereby avoiding mutual harmful inter-system interference.

3.2.6. Copper switch-off

We welcome the EC's intention to consider the deployment of fibre networks as a key process to facilitate the transition towards the new connectivity ecosystem and contributes to the EU's green objectives.

Some of the possible steps that could be taken in this area, are: (1) promoting innovative solutions, (2) focus on legislation to simplify the processes to facilitate fiber deployment in buildings and indoors and (3) support EC funded research, e.g., in the context of Photonics cPPP/Photonics21, focusing on the next generation of optical communication technologies.

3.2.7. Access policy in a full fibre environment

We welcome the EC's intention to accelerate investments in both 5G and FTTH roll out across the EU. While the recent adoption of the Gigabit Infrastructure Act constitutes a step in the right direction, one must acknowledge that the EU is still far from achieving the objectives pursued by the EU Digital Decade. Thus, we recommend to supplement FTTH coverage with 5G and 5G Fixed Wireless Access (FWA), especially in remote rural areas and along transport corridors (railway, highways).

Furthermore, we invite EU policymakers to consider encouraging – together with the wider industry ecosystem – the adoption of criteria for FTTH indoor coverage and in-home broadband experience with a view to stimulating FTTH take-up.

More specifically, we recommend to revise the Digital Policy Programme Implementing Decision in order to provide for such criteria when measuring the progress of Member States towards the Digital Decade's objectives. FTTH coverage needs to be accompanied by FTTH take-up in order to ensure for sustainable investments.

3.2.8. Universal service and affordability of digital infrastructure

We very much agree with the statement that the adequate broadband internet services, of the quality that is needed to perform basic tasks on-line, such as eGovernment services, social media, browsing or performing video calls, should be available throughout the EU, to various groups of end users, including end users that are located in certain areas such as rural/remote areas) or to end users that cannot afford the price of some services.

In this context, a key enabler can be the transition to IPv6. IPv6 would enable different groups of end users to have an address on the public internet, being able to publish on the World Wide Web its own content as well as to access the IoT devices in its own premise, with no dependence from Social Medial or other proprietary centralized platform. Moreover, IPv6 enable full market competition for new operators and service providers, where at present they are not able to get any more IPv4 public addresses.

New public infrastructure or infrastructure where public founding is used, are proposed to be fully compatible with IPv6, without mandating the IPv4 compatibility. Like-minded countries like USA are mandating IPv6 Only in the public infrastructure, for more information, please see here.

3.2.9. Sustainability

We very much agree that modern digital technologies can contribute significantly to sustainability. In this context, AIOTI and many other EU organizations are supporting European Green Digital Coalition (EGDC) on doing research and developing the Quantification Methodology specified in ITU-T L.1480 specification, on how to measure the benefits of applying ICT solutions in order to reduce CO2 emissions in other Sectors (e.g., vertical industries).

Actually, ETSI Technical Committee Environmental Engineering (ETSI TC EE) and ITU-T Study Group 5 (ITU-T SG5) are working, in collaboration also with EGDC, AIOTI and United Nations Framework Convention on Climate Change (UNFCCC) on a new version of standard ITU-T L.1480 that will be published also as European standard and is expected to become the part of the EU Taxonomy rules.

In particular, we suggest that more focus is needed on verification and certification of the Quantified Methodology and Assessment, based on ITU-T L.1480, in order to quantify the benefits of applying ICT solutions in order to reduce CO2 emissions in other sectors. This activities will further stimulate ICT and digital innovation stakeholders to collaborate with vertical industry sectors in an efficient way in the context of the Green Transition.

Similarly, we would like to further refer to the importance of measuring the carbon emission intensity of an ICT network that focuses on the network energy consumption in relation to data traffic. This is relevant, since the amount of traffic will significantly increase, and it is necessary to define indicators to define the increased efficiency in terms of the Green House Gas (GHG) of an ICT network by linking the amount of GHG emitted to the services provided by the network. A methodology on measuring the carbon emission intensity of an ICT network is standardised in ITU-T L.1333, "Carbon data intensity for network energy performance monitoring".

We agree as well that an important role should be given to the deployment and adoption of more energy efficient technologies, such as (1) fibre/optical networks and as well (2) introduction of using Artificial Intelligence (AI) to optimize and automate ICT networking technologies to ensure they become more energy efficient.

3.2.10. Summary of possible scenarios

Pilar II- Scenario 4: In order to address the converged electronic communications connectivity and services sector and to ensure that its benefits reach all end-users everywhere, the EC may consider broadening the scope and objectives of the current regulatory framework to ensure a regulatory level playing field and equivalent rights and obligations for all actors and end-users of digital networks where appropriate to meet the corresponding regulatory objectives; given the likely global magnitude and impact of the technological developments and of any possible regulatory changes, a reform of the current framework needs to be properly assessed in terms of the economic impact on all actors as well as debated broadly with all stakeholders.

We agree that the principle single set of rules based for instance on a 'country of origin' principle for core networks and core network services can bring advantages. However, they can as well bring challenges to small and medium-sized core network providers, related to the protection of their existing investment, and as well to challenges brought by possible evolution of their existing deployed sites.

We agree with the information mentioned in section 3.2.4 (Addressing barriers to core network centralisation) that "In addition to the sector-specific regulatory barriers mentioned above, contributors to the exploratory consultation listed other regulatory barriers to the establishment of a true Digital Single Market such as different obligations across the EU with regard to network/service incident reporting or security vetting requirements, building lawful interception capabilities, data retention regimes, privacy and reshoring requirements or cybersecurity and reporting obligations."

In addition, core network centralisation can have an impact on following challenges:

- Cross-country network resilience:
  - Fault-rate of cross-country transmission is possibly higher than the fault-rate within national transmission;
  - Fault recovery and/or reliability challenge is more complex to be realized
- Cross–country Operation & Maintenance: O&M cross-country activities are more complex, which might require an increase in OPEX for core network providers.

Moreover, regarding the legislative proposals on "broadening the scope and objectives of the current regulatory framework to ensure a regulatory level playing field and equivalent rights and obligations for all actors and end-users of digital networks", we suggest to involve relevant stakeholders in such discussions based on the possible or actual social, environmental and economic impacts of such legislative proposals, and to find regulatory solutions that comply with the principles of proportionality.

Pilar II - Scenario 5: In order to address technological and market developments and the resulting need to change the regulatory paradigm and ensure less burden for companies and more efficient service delivery, while continuing to protect vulnerable end-users and promote territorial coverage, the EC may consider:

- Measures to accelerate copper switch-off (such as a target in 2030, aligned to the Digital Decade target for Gigabit connectivity, and support for copper-fibre switch-over from 2028);
- A change to access policy in view of full fibre environment, by proposing a European wholesale access product and recommending no markets for presumptive ex ante regulation while maintaining a safety net for NRAs to keep regulation if the "3 Criteria Test" is met (reverse burden of proof). In the alternative, only markets for civil infrastructure might be considered for regulation ex ante (as the most persistent bottleneck), combined with the implementation of lighter access regulation (no price regulation or pricing flexibility) along the lines of the recently adopted Gigabit Recommendation.
- Some of the possible steps that could be taken in this area, are: (1) promoting innovative solutions, (2) focus on legislation to simplify the processes to facilitate fiber deployment in buildings and indoors and (3) support EC funded research, e.g., in the context of Photonics cPPP, focusing on the next generation of optical communication technologies.

- We welcome the EC's intention to accelerate investments in both 5G and FTTH roll out across the EU. While the recent adoption of the Gigabit Infrastructure Act constitutes a step in the right direction, one must acknowledge that the EU is still far from achieving the objectives pursued by the EU Digital Decade. Thus, we recommend to supplement FTTH coverage with 5G and 5G FWA (Fixed Wireless Access), especially in remote rural areas and along transport corridors (railway, highways).
- Furthermore, we invite EU policymakers to consider encouraging – together with the wider industry ecosystem – the adoption of criteria for FTTH indoor coverage and in-home broadband experience with a view to stimulating FTTH take-up.
- More specifically, we recommend to revise the Digital Policy Programme Implementing Decision in order to provide for such criteria when measuring the progress of Member States towards the Digital Decade's objectives. FTTH coverage needs to be accompanied by FTTH take-up in order to ensure for sustainable investments.

Pillar II- Scenario 6: In order to facilitate the single market and building scale for activities of all players, the Commission may consider:

- A more integrated governance at Union level for spectrum that would allow, where necessary, for greater harmonisation of spectrum authorisation processes and thereby create the conditions for market scale necessary for pan-EU operators to attain larger investment capacity; the Commission may also consider solutions for more aligned authorisation and selection conditions, or even single selection or authorisation processes, for terrestrial and satellite communications and other innovative applications that make clear cases for fostering the development of the single market;
- A more harmonized approach to authorisation (through the possible establishment of "country of origin" principle for certain activities less connected to consumer retail markets and local access networks

Regarding the spectrum:

- We do acknowledge that the spectrum is a sovereign matter for each member state, that each country needs to plan and manage spectrum based on its digital economy development. Indeed, Spectrum auction mechanism is closely related to the market situation and economic structure of a country and is not suitable for unified management at the EU level.
- The daily management of spectrum involves a large amount of coordination with neighbouring countries, including both EU countries and non-EU countries. Member States have accumulated a lot of coordination experience in the past decades. The regulatory bodies of each country are the most effective institutions to ensure the interests of each country. Globally, spectrum is regarded as a national affair.
- Within these pillars, there however space for the spectrum allocation rules to possibly strengthen mobile operators' capacity to offer pan-European services, while complying with Member States' legal competence regarding spectrum allocation in accordance with EU Treaties.

- We invite EU policymakers to consider harmonised timelines for spectrum auctions in order to provide for both investment and legal certainty. We recommend the adoption of auction processes which avoid artificial spectrum scarcity and unnecessarily high spectrum fees, and further to use the proceeds of auctions to incentivise mobile operators to invest in national communication network infrastructures.

Regarding a more harmonized approach to authorisation:

- We agree that the principle single set of rules based for instance on a 'country of origin' principle for core networks and core network services can bring advantages, but they can as well bring challenges to small and medium-sized core network providers, related to the protection of their existing investment, and as well to challenges brought by possible evolution of their existing deployed sites.

Pilar II- Scenario 7: The Commission may consider facilitating greening of digital networks through promoting the timely switch-off of copper networks and the move to a full fibre environment and a more efficient use of networks (codecs) throughout the Union territory.

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About AIOTI

AIOTI is the multi-stakeholder platform for stimulating IoT Innovation in Europe, bringing together small and large companies, start-ups and scale-ups, academia, policy makers and end-users and representatives of society in an end-to-end approach. We work with partners in a global context. We strive to leverage, share and promote best practices in the IoT ecosystems, be a one-stop point of information on all relevant aspects of IoT Innovation to its members while proactively addressing key issues and roadblocks for economic growth, acceptance and adoption of IoT Innovation in society.

AIOTI's contribution goes beyond technology and addresses horizontal elements across application domains, such as matchmaking and stimulating cooperation in IoT ecosystems, creating joint research roadmaps, driving convergence of standards and interoperability and defining policies. We also put them in practice in vertical application domains with societal and economic relevance.