

The Connecting Europe Facility – Digital (#CEF2digital) the EU tool to digitally connect citizens

Fields marked with * are mandatory.

Introduction

The Connecting Europe Facility – Digital (#CEF2digital) - the EU tool to digitally connect citizens

The achievement of the digital single market relies on universal access to reliable, affordable, high and very high capacity networks. The Communication on “Connectivity for a Competitive Digital Single Market – Towards a European Gigabit society” ([the Gigabit Society Strategy](#)) sets out strategic connectivity objectives for 2025, which Member States are working on.

With its proposed budget of 3 billion euro, CEF2 Digital will support the Member States during 2021-2027 to trigger the necessary digital infrastructure investments to reach these strategic objectives. The programme will contribute to a balance between rural and urban developments by complementing the support provided for the deployment of very high capacity networks by other programmes, in particular the European Regional Development Fund, and the InvestEU Programme.

The [draft CEF2 Regulation](#) has been subject to political agreement on its main substantive points between the European Parliament and the Council of the EU. In particular, CEF2 Digital, with grants with different co-funding rates, will enable the Commission to co-fund projects of common interest (PCI) in the area of digital connectivity infrastructure “that are expected to make an important contribution to the Union's strategic connectivity objectives and/or provide the network infrastructure supporting the digital transformation of the economy and society as well as the European Digital Single Market” (Art. 8), such as:

- uninterrupted coverage with 5G systems of all major transport paths, including the trans-European transport networks;
- the deployment of and access to very high-capacity networks, including 5G systems, capable of providing Gigabit connectivity in areas where socio-economic drivers are located;
- the provision of very high-quality local wireless connectivity in local communities that is free of charge and without discriminatory conditions;
- the deployment of new or significant upgrade of existing backbone networks including submarine cables, within and between Member States and between the Union and third countries;

- digital connectivity infrastructure requirements related to cross-border projects in the areas of transport or energy and/or supporting operational digital platforms directly associated to transport or energy infrastructures.

In order to ensure that the implementation of the CEF 2 Digital programme addresses the most urgent strategic needs in the Member States, the Commission seeks the views of all citizens and stakeholders regarding which investments in these different categories should be prioritised, as well as how the programme should best be designed to improve the business case for investments in digital infrastructure deployments, where relevant in synergy with other infrastructure investments.

The Commission is therefore interested in your views about possible strategic co-funding actions that should be supported with priority by CEF2 Digital in 2021-2027, in particular:

- 1. Cross-border 5G corridors along transport routes**
- 2. Connectivity for 5G smart communities in Europe**
- 3. Backbone networks of strategic importance (Terabit connectivity to HPC/ EU cloud federation / Submarine cables)**
 - 3.1 Terabit connectivity for High Performance Computing (HPC)*
 - 3.2 Energy efficient inter-connections of an EU cloud infrastructure federation*
 - 3.3 Submarine cables of strategic importance*
- 4. Synergy actions (Transport – Energy – Digital)**
 - 4.1 Operational Digital Platforms*
 - 4.2 Cross-sector programmes*

The Commission invites citizens, legal entities and public authorities to submit their answers by 11 September 2019. The Commission will assess and summarise the results in a report, which will be made publicly available on the website of the Directorate General for Communications Networks, Content and Technology. The results will also be reflected in a Roadmap for the Implementation of CEF2 Digital in autumn 2019.

Thank you for your contribution!

About you

- * I am giving my contribution as
- Academic/research institution
 - Business association
 - Company/business organisation
 - Consumer organisation
 - EU citizen
 - Environmental organisation
 - Non-EU citizen
 - Non-governmental organisation (NGO)
 - Public authority
 - Trade union
 - Other

* First name

* Surname

* Email (this won't be published)

* Organisation name

255 character(s) maximum

* Language of my contribution

- Bulgarian
- Croatian
- Czech
- Danish
- Dutch
- English
- Estonian
- Finnish
- French
- Gaelic
- German
- Greek
- Hungarian
- Italian
- Latvian
- Lithuanian
- Maltese
- Polish
- Portuguese
- Romanian
- Slovak
- Slovenian
- Spanish
- Swedish

* Organisation size

- Micro (1 to 9 employees)
- Small (10 to 49 employees)
-

Medium (50 to 249 employees)

- Large (250 or more)

Transparency register number

255 character(s) maximum

Check if your organisation is on the [transparency register](#). It's a voluntary database for organisations seeking to influence EU decision-making.

35167875358-33

* Country of origin

Please add your country of origin, or that of your organisation.

- | | | | |
|---|---|--|--|
| <input type="radio"/> Afghanistan | <input type="radio"/> Djibouti | <input type="radio"/> Libya | <input type="radio"/> Saint Martin |
| <input type="radio"/> Åland Islands | <input type="radio"/> Dominica | <input type="radio"/> Liechtenstein | <input type="radio"/> Saint Pierre and Miquelon |
| <input type="radio"/> Albania | <input type="radio"/> Dominican Republic | <input type="radio"/> Lithuania | <input type="radio"/> Saint Vincent and the Grenadines |
| <input type="radio"/> Algeria | <input type="radio"/> Ecuador | <input type="radio"/> Luxembourg | <input type="radio"/> Samoa |
| <input type="radio"/> American Samoa | <input type="radio"/> Egypt | <input type="radio"/> Macau | <input type="radio"/> San Marino |
| <input type="radio"/> Andorra | <input type="radio"/> El Salvador | <input type="radio"/> Madagascar | <input type="radio"/> São Tomé and Príncipe |
| <input type="radio"/> Angola | <input type="radio"/> Equatorial Guinea | <input type="radio"/> Malawi | <input type="radio"/> Saudi Arabia |
| <input type="radio"/> Anguilla | <input type="radio"/> Eritrea | <input type="radio"/> Malaysia | <input type="radio"/> Senegal |
| <input type="radio"/> Antarctica | <input type="radio"/> Estonia | <input type="radio"/> Maldives | <input type="radio"/> Serbia |
| <input type="radio"/> Antigua and Barbuda | <input type="radio"/> Eswatini | <input type="radio"/> Mali | <input type="radio"/> Seychelles |
| <input type="radio"/> Argentina | <input type="radio"/> Ethiopia | <input type="radio"/> Malta | <input type="radio"/> Sierra Leone |
| <input type="radio"/> Armenia | <input type="radio"/> Falkland Islands | <input type="radio"/> Marshall Islands | <input type="radio"/> Singapore |
| <input type="radio"/> Aruba | <input type="radio"/> Faroe Islands | <input type="radio"/> Martinique | <input type="radio"/> Sint Maarten |
| <input type="radio"/> Australia | <input type="radio"/> Fiji | <input type="radio"/> Mauritania | <input type="radio"/> Slovakia |
| <input type="radio"/> Austria | <input checked="" type="radio"/> Finland | <input type="radio"/> Mauritius | <input type="radio"/> Slovenia |
| <input type="radio"/> Azerbaijan | <input type="radio"/> France | <input type="radio"/> Mayotte | <input type="radio"/> Solomon Islands |
| <input type="radio"/> Bahamas | <input type="radio"/> French Guiana | <input type="radio"/> Mexico | <input type="radio"/> Somalia |
| <input type="radio"/> Bahrain | <input type="radio"/> French Polynesia | <input type="radio"/> Micronesia | <input type="radio"/> South Africa |
| <input type="radio"/> Bangladesh | <input type="radio"/> French Southern and Antarctic Lands | <input type="radio"/> Moldova | <input type="radio"/> South Georgia and the South Sandwich Islands |
| <input type="radio"/> Barbados | <input type="radio"/> Gabon | <input type="radio"/> Monaco | <input type="radio"/> South Korea |
| <input type="radio"/> Belarus | <input type="radio"/> Georgia | <input type="radio"/> Mongolia | <input type="radio"/> South Sudan |
| <input type="radio"/> Belgium | <input type="radio"/> Germany | <input type="radio"/> Montenegro | <input type="radio"/> Spain |
| <input type="radio"/> Belize | <input type="radio"/> Ghana | <input type="radio"/> Montserrat | <input type="radio"/> Sri Lanka |
| <input type="radio"/> Benin | <input type="radio"/> Gibraltar | <input type="radio"/> Morocco | <input type="radio"/> Sudan |

- Bermuda
- Bhutan
- Bolivia
- Bonaire Saint Eustatius and Saba
- Bosnia and Herzegovina
- Botswana
- Bouvet Island
- Brazil
- British Indian Ocean Territory
- British Virgin Islands
- Brunei
- Bulgaria
- Burkina Faso
- Burundi
- Cambodia
- Cameroon
- Canada
- Cape Verde
- Cayman Islands
- Central African Republic
- Chad
- Chile
- China
- Christmas Island
- Clipperton
- Cocos (Keeling) Islands
- Colombia
- Comoros
- Congo
- Cook Islands
- Costa Rica
- Greece
- Greenland
- Grenada
- Guadeloupe
- Guam
- Guatemala
- Guernsey
- Guinea
- Guinea-Bissau
- Guyana
- Haiti
- Heard Island and McDonald Islands
- Honduras
- Hong Kong
- Hungary
- Iceland
- India
- Indonesia
- Iran
- Iraq
- Ireland
- Isle of Man
- Israel
- Italy
- Jamaica
- Japan
- Jersey
- Jordan
- Kazakhstan
- Kenya
- Kiribati
- Mozambique
- Myanmar /Burma
- Namibia
- Nauru
- Nepal
- Netherlands
- New Caledonia
- New Zealand
- Nicaragua
- Niger
- Nigeria
- Niue
- Norfolk Island
- North Korea
- North Macedonia
- Northern Mariana Islands
- Norway
- Oman
- Pakistan
- Palau
- Palestine
- Panama
- Papua New Guinea
- Paraguay
- Peru
- Philippines
- Pitcairn Islands
- Poland
- Portugal
- Puerto Rico
- Qatar
- Suriname
- Svalbard and Jan Mayen
- Sweden
- Switzerland
- Syria
- Taiwan
- Tajikistan
- Tanzania
- Thailand
- The Gambia
- Timor-Leste
- Togo
- Tokelau
- Tonga
- Trinidad and Tobago
- Tunisia
- Turkey
- Turkmenistan
- Turks and Caicos Islands
- Tuvalu
- Uganda
- Ukraine
- United Arab Emirates
- United Kingdom
- United States
- United States Minor Outlying Islands
- Uruguay
- US Virgin Islands
- Uzbekistan
- Vanuatu
- Vatican City

- | | | | |
|--|----------------------------------|---|---|
| <input type="radio"/> Côte d'Ivoire | <input type="radio"/> Kosovo | <input type="radio"/> Réunion | <input type="radio"/> Venezuela |
| <input type="radio"/> Croatia | <input type="radio"/> Kuwait | <input type="radio"/> Romania | <input type="radio"/> Vietnam |
| <input type="radio"/> Cuba | <input type="radio"/> Kyrgyzstan | <input type="radio"/> Russia | <input type="radio"/> Wallis and Futuna |
| <input type="radio"/> Curaçao | <input type="radio"/> Laos | <input type="radio"/> Rwanda | <input type="radio"/> Western Sahara |
| <input type="radio"/> Cyprus | <input type="radio"/> Latvia | <input type="radio"/> Saint Barthélemy | <input type="radio"/> Yemen |
| <input type="radio"/> Czechia | <input type="radio"/> Lebanon | <input type="radio"/> Saint Helena Ascension and Tristan da Cunha | <input type="radio"/> Zambia |
| <input type="radio"/> Democratic Republic of the Congo | <input type="radio"/> Lesotho | <input type="radio"/> Saint Kitts and Nevis | <input type="radio"/> Zimbabwe |
| <input type="radio"/> Denmark | <input type="radio"/> Liberia | <input type="radio"/> Saint Lucia | |

* Publication privacy settings

The Commission will publish the responses to this public consultation. You can choose whether you would like your details to be made public or to remain anonymous.

Anonymous

Only your type of respondent, country of origin and contribution will be published. All other personal details (name, organisation name and size, transparency register number) will not be published.

Public

Your personal details (name, organisation name and size, transparency register number, country of origin) will be published with your contribution.

I agree with the [personal data protection provisions](#)

Do you agree to be contacted by the European Commission services for possible follow-up questions to your response / information provided.

- Yes
 No

1. Cross-border 5G corridors along transport routes

Description of the action:

5G is expected to be a major enabler of connected and automated mobility (CAM) in Europe, for all forms of transport, including roads, railways and inland waterways. Thanks to its ultra-reliability and low latency for the critical exchange of data between any types of vehicles, mobile users, transport infrastructures and core networks, 5G will contribute to enhance road safety, reduce CO2 emissions and traffic congestion, as well as empower innovative digital ecosystems around vehicles. For these reasons, and considering as well the impact of 5G on the competitiveness of the telecom and automotive industries in Europe, the Commission's 5G Action Plan of September 2016 has set as a strategic connectivity objective the deployment of 5G infrastructure along main transport paths in

Europe by 2025. This is part of a broader CAM strategy for investment as part of the 2018 3rd mobility package.

The action foresees support for the deployment of 5G coverage along cross-border transport corridors (road, rail or inland waterways), allowing for 5G-connected mobility between EU Member States. In addition, CEF Transport will invest in automated mobility.

The maximum co-funding rate foreseen is 50%, for actions with a strong cross-border dimension. An additional 10% can be added to the EU funding rates in the case of cross-sector synergy projects (see below “Synergy actions” (Transport – Energy – Digital)).

The draft CEF2 Regulation recognises that actions implementing uninterrupted coverage with 5G systems of all major transport paths, including the trans-European transport networks are among the strategic digital projects of common European interest that can be supported by the programme.

1. Do you agree that the EU should prioritise financial support from the programme for efforts in Member States to improve the business case for investments in such strategic digital infrastructure deployments?

- Yes
- No

2. Are you interested in investing in this area, or otherwise directly involved?

- Yes
- No

3. In which geographic corridor(s) and by when (2021-2027) would your organisation be interested to intervene? Is the corridor on the list of Appendix V of the Regulation? With which role could you participate? How would your investment relate to investments in roads and/or railways under the transport section of CEF?

Nokia strongly believes that in this area, Europe needs to focus the investment on a very few large projects instead of many small projects distributed over many countries. This was also highlighted in the CCAM expert group meeting on Sept. 9th.

These projects should have a large scale and include communications infrastructure, connected road infrastructure and related appropriate management/data infrastructure as well as large numbers of appropriately equipped vehicles (cars, trucks, busses, ...potentially equipped even with after-market solutions) as well as VRUs to enable and verify deployment scenarios optimizing safety and traffic efficiency with a growing number of automatically driving vehicles.

Demonstrating true benefits in a very few large projects will later automatically trigger the transfer of the verified solutions to other areas without (or substantially reduced) additional funding. It is also important to include into such a large project a corridor and linked urban areas (city, harbor, transport hubs, ...) to enable real e2e scenarios.

Nokia also believes that funding of investment into communications infrastructure must not be used at locations where one operator has already invested into the network and other operators use the funding to catch up. The focus should be either on reducing real white spots (places without any network coverage -to enable two network operators to close those gaps) or to upgrade two existing networks to increase capacity, reliability substantially. It requires the EC to do a careful analysis of the existing coverage maps of transport

corridors.

We would only consider a few corridors between the main car/truck manufacturing countries to enable scale. In order to support a general balance between the EU countries, other large scale solutions, e.g. related to public transport and connected intermodal mobility solutions could be funded in other countries, first. Another alternative for such countries could be connectivity projects for new agricultural solutions, instead of replicating project content in several countries we propose to focus on a few countries per solution group.

4. What are the actors whose involvement you consider essential for the participation in a 5G corridor project? What forms of cooperation among them do you anticipate? Upon completion of such project, under which business model would your entity participate in the value chain of a 5G corridor providing connected and automated driving? What project size do you expect?

Each project needs to involve at least: automotive/truck manufacturers, network and road operators as well as their appropriate suppliers. In addition, depending on the type of corridor and linked transport hub/urban area further stake holders like data service providers (e.g. Here, TomTom), port authorities, ...

Since Nokia proposes to focus on a very few projects they can be setup/supported with project specific agreements between the partners with a clear objective to convert the projects into normal deployments after 2-3 years – this would allow to adjust the business models based on gained experience (assuming the verification/tuning of business models is subject of the projects). Regulatory approaches may have to be considered to support (partial) cost coverage, e.g. increase of toll fees.

From a business model, open access / wholesale should be most suitable, as this opens more possibilities of usage of the infrastructure.

5. To what extent do you think that more than one network providing uninterrupted 5G services along cross-border sections of corridors could be necessary and can be expected, given that such areas are often rural and generally poorly covered?

Heavy transport corridors and link transport hubs (harbor, railways, ...) need to get highest reliability of communications. Consequently, at least two networks should support those transport paths.

6. Given that several national public authorities are imposing certain coverage obligations for major transport paths on telecommunication operators via the conditions of spectrum rights of use, how do you estimate the investment needs on the remaining parts/sections, which are not covered by such obligations? What are the most relevant frequency bands for those latter sections?

Coverage can be provided cost efficiently in low bands with large propagation ranges, i.e. below 1 GHz. With the decisions of the Parliament and Council on repurposing the 700 MHz band for Mobile Broadband until 2020 and earmarking it as a 5G pioneer band, Europe has a great tool to improve Mobile Broadband performance and bring low latency 5G services to wide areas. Available RF bandwidth in terms of MHz and consequently, achievable throughput in terms of Mbps to users, however, are limited. Nokia believes, that in cooperative approaches between Broadcast and Mobile Broadband additional downlink bandwidth can be opened in the frequency range 470-694 MHz to the mutual benefit of Broadcast and Mobile Broadband. Such proposals have been included as option to Member states in the decisions of the Parliament and

Council on re-purposing the 700 MHz band and been detailed e.g. by DIGITALEUROPE in a white paper. Thus, Nokia recommends studying such options within the expected UHF review towards World Radiocommunication Conference of 2023 and the planned European UHF review until 2025.

7. Which category of use cases or digital services enabled by 5G networks along transport paths do you expect to be most used in the 2021-2026 period?

The initial focus should be on increasing traffic safety and traffic efficiency by supporting the appropriate use cases including VRUs and enabling dynamic e2e traffic management. As the vehicles start supporting higher levels of automated driving the appropriate use cases need to be added. It would also include road-side sensor technology and related analytics/AI to support safety and automated driving, map updates,

2. Connectivity for 5G smart communities in Europe

Description of the action:

Europe must seize the countless opportunities offered by the digital transformation everywhere. This requires investing in future-proof infrastructure, including 5G networks, as a prerequisite. An early 5G deployment in urban centres and along the major transport routes are important objectives. However, Member States also need to ensure that digital services become a means to close territorial divides and that all European citizens and business, including those living in rural and remote areas, have equal opportunities to participate in the Digital Single Market and to benefit from modern public services.

Indeed, communities all around Europe consider digital networks as enabling an array of new innovative services that will transform mobility, healthcare, the use of energy, and many other services and sectors, bringing them into the era of the internet of things. Ubiquitous connectivity of 100 Mbps upgradable to Gigabit is therefore increasingly recognised by citizens and businesses as a pre-condition to thrive in the digital future, wherever they live.

Given that the business case for investment in networks depends on economic factors such as population density and income levels, it is imperative to ensure Gigabit connectivity in the first place to all socio-economic engines of digital growth, regardless where they are located (this includes public services, such as schools and hospitals, as well as digitally intensive enterprises, etc.). The availability of such networks will stimulate the use and take-up of innovative online services.

In order to ensure that such services are available locally, CEF Digital will support network deployments to 5G smart communities in Europe by offering targeted co-funding for:

- Gigabit network deployments in areas where socio-economic drivers, such as educational and medical centres, public administration buildings, transport hubs or business parks are located, but where they would only be partly delivered by the market and where they are needed as prerequisite for the deployment of 5G to support innovative smart communities' applications;
- Wireless equipment (Wi-Fi and 5G small cells) in areas with a risk of lagging behind in terms of 5G coverage, to provide communities local free of charge very high quality internet access (e.g. via Wi-Fi networks) and to support the rollout of 5G-based innovative smart communities applications. Local connectivity indeed often relies on the installation of many small wireless access points/small cells.

The maximum co-financing rates for this action range from 30% to 75%: whereas the default rate for connecting households is capped at 30%, deployments to socio-economic drivers can be funded up to 75%. Moreover, specific actions, in continuation of the Wifi4EU programme, can be funded up to 100% when implemented via low value grants. Cross-sector synergy projects can benefit from an additional 10% compared to the maximum applicable funding rate (see below “Synergy actions” (Transport – Energy – Digital)).

The draft CEF2 Regulation recognises that actions supporting the deployment of and access to very high-capacity networks, including 5G systems, capable of providing Gigabit connectivity in areas where socioeconomic drivers are located, as well as the provision of very high-quality local wireless connectivity in local communities that is free of charge and without discriminatory conditions, are among the strategic digital projects of common European interest that can be supported by the programme.

8. Do you agree that the EU should prioritise financial support from the programme for efforts in Member States to improve the business case for investments in such strategic digital infrastructure deployments?

- Yes
- No

9. Are you interested in investing in this area or otherwise directly involved?

- Yes
- No

10. Which other socio-economic drivers – in addition to schools and hospitals – would you prioritise for receiving Gigabit connectivity and why (benefits of services, quality of life, job creation, gaps in your region / country, etc.)?

Other socio-economic drivers should include urban safety, culture and tourism, Research & Development and urban mobility.

The challenges which need to be overcome with CEF2digital are in particular in rural areas, or in other words underserved areas, where CSPs do not move in because their business case is unlikely to be positive, at least not for many years. Here financial and other aid is needed to create the missing links. And the risk is that small- and medium-sized companies (of which many are located in rural areas) will lose out if investments into 5G and fiber are not taking place or are delayed. It can seriously undermine their connectivity needs and digitization efforts and lead to a decrease in global competitiveness.

Connecting rural areas can slow down urbanization, which is a challenge not only for larger cities but for the rural areas as well, as people move away.

Reference projects for the CEF2 Digital, should support programs to create synergies in the network deployment to enable connectivity in rural or underserved areas (e.g. connectivity for smart farming).

Rural areas have the biggest need for support in this respect, and to apply deployment synergies, both fixed and mobile access strategies should be combined and rolled out at the same time. This will reduce the overall end to end deployment cost (see research done by the FTTH Council) and support a mixed technology solution in that area, fulfilling the needs of all users. In addition this will make areas outside of cities more attractive for business as well as for citizen to live in. Possible solutions: deployment of IP/optical networks to support the backbone needs to the rural areas, 5G, fixed network access like GPON or fixed-wireless access.

11. Under which circumstances would you consider that stand-alone deployments to socio-economic drivers (i.e. not involving also deployments for the respective surrounding areas) would be economically reasonable and should be supported from CEF Digital?

12. What are in your view the most appropriate safeguards that should be put in place to avoid market distortion, while aiming at quick project selection and deployments of networks that would underpin smart IoT and/or 5G enabled services across EU territories?

13. What would be the optimal size of network deployment projects (e.g. in terms of areas, households, number of socio-economic drivers or others) to underpin smart community projects and what will be the most important challenges to ensure availability of digital services on these networks? What project size do you expect?

Projects should be of different sizes. In many cases, sizeable projects are needed. But this should not lead to the effect to leave important smaller projects behind (including deployments projects typically in less densely populated areas, should not need to group themselves together just to be able to fulfill the project-size requirements).

14. What business model do you anticipate will be the most prevalent for the deployment of 5G networks supporting the digital transformation of local communities and what barriers / obstacles do you expect for such 5G deployments?

15. What would be the best way, in your view, to ensure synergies and complementarity with other sources of public funding, whether from Member States and/or EU programmes?

3. Backbone networks of strategic importance (Terabit connectivity to HPC/ EU cloud federation / Submarine cables)

3.1 Terabit connectivity for High Performance Computing (HPC)

Description of the action:

The exponential growth of data, combined with increased networking and computing resources and new algorithmic paradigms, such as Artificial Intelligence, is today one of the major drivers of

innovations and productivity gains in the global digital economy. Europe's scientific capabilities, industrial competitiveness and sovereignty depend critically on continuous access to world-leading HPC and data technologies and infrastructures to keep pace with the growing demands and complexity of the problems to be solved.

We need a secure digital infrastructure of world-class computing, data and connectivity capacities consistent with the economic importance of Europe, underpinning our Digital Single Market, and making it trustworthy, attracting investments and stimulating economic competitiveness. This infrastructure is essential for processing in Europe the data produced by EU research and industry, with top of the world HPC capabilities that ensure that strategic know-how for innovation and competitiveness stay in the Union.

The EuroHPC Joint Undertaking (EuroHPC JU) has been established to address this situation. The EuroHPC JU gathers the Union and 28 European countries (with the support of two private associations on HPC (ETP4HPC) and Big Data (BDVA)) in a strategic instrument to foster leadership in HPC and in the global digital economy. The EuroHPC JU mission is to develop, deploy, extend and maintain in the Union an integrated world-class supercomputing and data infrastructure and to develop and support a highly competitive and innovative High-Performance Computing ecosystem, for the next generation exascale supercomputing era and beyond. This world-leading infrastructure will be deployed across many Member States, and the most advanced and high-speed connectivity capabilities will be critical to fully maximise its huge computing potential.

CEF Digital support will complement European high performance computing resources with adequate terabit-capacity connections where these would not be provided on time, or at all, by the market. Eligible actions include the deployment of new or significant upgrade of existing backbone networks, within and between Member States.

The maximum co-funding rate is 30% for actions within a Member State and 50% for cross-border actions. An additional 10% can be added to the EU funding rates in the case of cross-sector synergy projects (see below “Synergy actions” (Transport – Energy – Digital)).

The draft CEF2 Regulation recognises that actions supporting deployment of new or significant upgrade of existing backbone networks, including submarine cables, within and between Member States and between the Union and third countries, are among the strategic digital projects of common European interest that can be supported by the programme.

16. Do you agree that the EU should prioritise financial support from the programme for efforts in Member States to improve the business case for investments in such strategic digital infrastructure deployments?

- Yes
- No

17. Are you interested in investments in this area or otherwise directly involved?

- Yes
- No

18. Which investments in high-speed data networks are required beyond the current state-of-the art to reap the benefits of the future European HPC infrastructure and ecosystem?

5G and optical fiber networks are required to provide the high connectivity requirements for HPC. HPC and many use-cases built around artificial intelligence, and/or offered in real-time, require very high-capacity and ultra-fast networks with low latency (edge computing).

Current data centers and high-performance computing (HPC) systems have motivated the need for developing novel interconnection networks solutions to meet the growing need for data transmissions across all levels of the infrastructure. This leads to an enhanced optically connected network architecture featuring advanced photonic functionalities to support a wider class of bandwidth-intensive traffic patterns characteristic of cloud computing systems.

Main field for investment to cope with such requirements lead to the implementation of a high capacity links (current deployment is 400-600Gb/s per wavelength) assuring best performances in terms of latency.

It is required as well that photonic resources can be allocated on-demand to optimize communications between various applications within the data center. This leads to an infrastructure based on a fully non-blocking photonic switching architecture that can be automatically managed via a dedicated controller.

All technology options should be considered. In some cases the deployment of new networks are unavoidable. In other cases, it may be much more cost-efficient to upgrade existing networks. Certain C+L band DWDM Optical technology allows to approx. double the total capacity per fiber optic backbone link. Considering the cost to the EU Member states of leasing private fiber optic links for securing private backbone connectivity and capacity this C+L technology can help to ensure that all Member States have adequate connectivity to access high performance computing resources.

Advanced Probabilistic Shaped Optical Modulation Technology can enable to extract maximum capacity and reach from Member States Submarine Cable Assets and able in some cases to remove the need for costly optical regeneration at Submarine Cable landing Station sites.

A key issue for the Member States to consider may be the security risks posed to strategic EU Submarine cable landing stations becoming targets for possible terrorist attack. Such attacks could risk damaging Member State critical infrastructures. It may therefore be important for the EU Member States to identify any such risks and to put in place clear strategies to minimise all such risks through careful planning, capacity protection and capacity supply diversity strategies.

Non-financial support from the EU is needed, to make sure that regulations are set right to actually enable and support these projects.

19. What is the need and level of EU support (to address market failure) and what form should this support take (grant, loan, anchor customer, etc...)?

Individual entities cannot invest in an isolated manner in such complex and strategic project. EU-level support and coordination is required. Also individual MS budget are limited. The overall investment from EU (grants) would be above 100 m€.

20. What would be the main characteristics of the investment project in which you would be interested in co-investing, in terms of project size and cost, capacity, network segments, location (cross-border, or national access backbone), timing, connection of commercial data centres to HPC, etc.?

Nokia would participate to any/all connectivity projects (like IP and WDM), including backbones and Data Center Interconnection, within EU Member States and between Member States, at any time and for any project size. Nokia co-investment could be in form of providing equipment.

We are also looking at replicating projects as Megalis / Gigalis in France which are National Research Education Networks, that also become regional networks for multi-usage purposes.

Data volumes are increasing and this across borders. There is an interesting challenge today, considering villages close to the border with another EU Member State, which are not connected. In some cases it might be that backbones are closer to villages on the other side of the border. But as there is a border in-between, it is difficult to access these networks. However, in theory, it could be relatively cheap for a link to be built. A program here could help with regulations and legal issues, leading to new network link developments, as well as access networks built after the connection has been established. This should be a true topic for the EU. Possible solutions again: deployment of IP/optical networks to support the backbone needs to the rural areas, 5G, fixed network access like GPON or fixed-wireless access.

21. What would be the business model/rationale that would make your organization interested in applying for co-investing in such a project (collateral benefits, opportunities for new services, etc.)?

Nokia (global innovation leader and technology provider in these areas) would mainly be interested in collateral business, references of very large and at the edge of state-of-the-art projects, as well as new services to be implemented.

3.2 Energy efficient inter-connections of an EU cloud infrastructure federation

Description of the action:

The imperative to sustainably and strategically manage ever-growing energy-hungry data flows across the EU in the policy context of the Free Flow of Non-Personal Data EU Regulation and the impacts of the ‘US Cloud Act’ on the European economy and society call for targeted European strategic investments. The growing demand for highly specialised and tailor-made cloud products and services from European industrial sectors to enhance their competitiveness in the digital age and the critical role of cloud infrastructures to enable a swift roll-out of novel technologies such as AI, blockchain and IoT, reinforce this investment imperative.

European investments are thus of utmost importance to foster the deployment of a competitive, energy efficient and secure European supply of interconnected cloud infrastructures (the ‘Federation’). It will support companies to operate at scale across the whole European single market, enable responsible free flow of data and, ultimately, contribute to building the ‘next generation’ European competitive advantage in digital infrastructures in the global economy.

Finally, companies and public entities are not yet fully taking advantage of the socio-economic potential that cloud computing offers as an enabler. Cloud uptake is at an average of 26% among European companies, with large discrepancies among Member States, companies and sectors of the economy, with the public sector using in average 4 times less cloud computing than the private sector. EU strategic investments should thus also stimulate cloud uptake among the public sector to deliver better services of general public interest across the EU. This can be achieved by investing in interconnecting existing cloud infrastructures of public administrations across the EU territory.

The action therefore foresees support for pan-European, energy efficient, cross-border interconnections of European cloud infrastructures of strategic importance through backbone networks and middlewares to provide the necessary scale to foster the competitiveness of European companies; optimise energy consumption deriving from data flows and enable a swifter cloud uptake among the public sector.

The maximum co-funding rate is 50% for cross-border actions. An additional 10% can be added to the EU funding rates in the case of cross-sector synergy projects (see below “Synergy actions” (Transport – Energy – Digital)).

The draft CEF2 Regulation recognises that actions supporting deployment of new or significant upgrade of existing backbone networks including submarine cables, within and between Member States and between the Union and third countries, are among the strategic digital projects of common European interest that can be supported by the programme.

22. Do you agree that the EU should prioritise financial support from the programme for efforts in Member States to improve the business case for investments in such strategic digital infrastructure deployments?

- Yes
- No

23. Are you interested in investing in this area or otherwise directly involved?

- Yes
- No

24. The scope of the action only targets the interconnection of cloud infrastructures that are cross-border across the EU territory to achieve economies of scale and energy efficiency of data flows. Is there any other rationale to support this action in a cross-border setting?

25. Which are the three most accurate key performance indicators to measure energy efficiency of cloud data flows in the context of this initiative?

EU Standard (EU Norm) published in January 2019: EN 303 471 V.1.1.1. It provides key metrics.

- Virtualized Network Functions resource efficiency, which assesses the useful output versus the resources used, including consumption of CPU, memory, storage and network.
- Network Functions Virtualization Infrastructure (NFVI) Energy Efficiency rating (EER), which measures the useful output of VNFs relative to the power consumed by the VNFs (for instance, it can be Subscriber / watt, or BHCA/Watt, etc)
- A more network-level oriented analysis and metrics development will also be needed to complement these cloud based systems metrics

26. Who should be the main beneficiaries of the grant? What project size would do you expect? Could you provide a cost breakdown over the 7 years?

27. Which aspects and/or indicators would you consider most suitable for assessing the activity's performance against completed tasks?

3.3 Submarine cables of strategic importance

Description of the action:

Adequate and future oriented digital connectivity throughout the territory of the EU is one of the prerequisites for a fully functional Digital Single Market and for Europe-wide economic and social cohesion and strategic autonomy.

Submarine cables are the essential element in ensuring high capacity and high performance (resilience, security, redundancy, latency) connectivity throughout the territory of the European Union, including island states, outermost regions, overseas countries and territories, or international connectivity of strategic importance between the EU and specific international hubs.

CEF will support “the deployment of new or significant upgrade of existing backbone networks, including submarine cables, within and between Member States and between the Union and third countries”.

The objective of the action is to fill in the missing links contributing to increased capacity, resilience and redundancy of the EU digital communications infrastructure.

The maximum co-funding rate is 50% for cross-border actions. An additional 10% can be added to the EU funding rates in the case of cross-sector synergy projects (see below “Synergy actions” (Transport – Energy – Digital)). Specific co-financing rates of up to 70% may apply for actions located in outermost regions.

The draft CEF2 Regulation recognises that actions supporting deployment of new or significant upgrade of existing backbone networks including submarine cables, within and between Member States and between the Union and third countries, are among the strategic digital projects of common European interest that can be supported by the programme.

28. Do you agree that the EU should prioritise financial support from the programme for efforts in Member States to improve the business case for investments in such strategic digital infrastructure deployments?

- Yes
- No

29. Are you interested in investing in this area or otherwise directly involved?

- Yes
- No

30. Which challenge should be addressed with EU support as a priority in the area of submarine cables (ex. resilience, fast connectivity for all EU citizens, solve

backbone connectivity bottlenecks, decrease latency, lack of competitive pricing, etc)? Please explain in detail.

Submarine cables are more reliable compared to terrestrial links because they are less exposed to human activities pending properly conducted marine surveys. Such a survey will prevent the cables to be routed through dense fishing areas or in areas where ship anchoring could be taking place.

The armoring of the cable and the strength of the cable will also drive the reliability of the overall link.

Proper burial of the cable is a key factor to protect the cable itself against human aggression like dredging, fishing or anchoring.

A new strategic concern was identified regarding the location of submarine cables and the possibility for foreign entities to create severe traffic disruptions by cutting purposefully submerged cables leading to the possible complete isolation of areas such as islands.

A key topic for delivering submarine routes consists of obtaining in due time the right to land cables and to route submarine cables in otherwise protected undersea areas. Facilitating submarine permitting is key to accelerate the delivery of submarine routes as well as achieving the most optimum routing between two end points.

31. What would be the main characteristics of the investment project in which you would be interested in co-investing, in terms of project size and cost, capacity, network segments, location (cross-border, or national access backbone), route(s), timing, connectivity shortcomings addressed by the project)?

32. What type of public support would be needed (anchor customer, grant, loan, equity etc. or a mixture of the above)? Please explain in detail.

33. Which aspects and/or indicators would you consider most suitable for assessing the project's performance?

4. Synergy actions (Transport – Energy – Digital)

4.1 Operational Digital Platforms

Description of the action:

Support operational digital platforms directly associated to transport or energy infrastructures.

Operational digital platforms are physical and virtual ICT resources that support the flow, storage, processing and analysis of transport or energy infrastructure data, e.g. an EU platform connecting cross-border data centres and the smart grids, a renewable energy availability platform, a cybersecurity platform for CAM, etc. These platforms operate on top of the communication infrastructure. They include hardware (sensors, actuators, servers, storage subsystems, and networking devices like switches, routers and firewalls) and software (e.g. data bases, analytics, simulation tools).

The maximum co-funding rate is 50% for cross-border actions. An additional 10% can be added to the EU funding rates in the case of cross-sector synergy.

The draft CEF2 Regulation recognises that actions implementing digital connectivity infrastructure requirements related to cross-border projects in the areas of transport or energy and/or supporting operational digital platforms directly associated to transport or energy infrastructures, are among the strategic digital projects of common European interest that can be supported by the programme.

34. Do you agree that the EU should prioritise financial support from the programme for efforts in Member States to improve the business case for investments in such strategic digital infrastructure deployments?

- Yes
- No

35. Are you interested in investing in operational digital platforms contributing to the digitalisation of energy or transport or otherwise directly involved?

- Yes
- No

4.2 Cross-sector programmes

Description of the action:

The future needs for decarbonisation and digitalisation of the European Union economy will imply a growing convergence of the transport, energy and digital sectors. Synergies between the three sectors should thus be harnessed to the full extent, maximising the effectiveness and efficiency of EU support. The ongoing CEF programme has shown that several potential synergies among the three sectors exist but that a systematic framing and inclusion in the financing work programmes has not been done. Synergies have been exploited by projects by default, but they have not been programmed by design. In order to capture those synergies and provide them with adequate funding for the necessary intervention, the newly proposed CEF has a dedicated 'synergy pillar'.

CEF Digital is particularly apt to be part of synergies activities due to its pervasive and underpinning nature. Examples of synergy areas include connected and autonomous mobility, clean mobility based on alternative fuels, energy storage and smart grids, cross-border cooperation in the area of renewable energy, green ICT, including data centres. This will support, among other priorities, all connectivity aspects serving the projects of common interest identified in this pillar as well as the cybersecurity-specific aspects related to the security of critical infrastructures.

Actions contributing simultaneously to the achievement of one or more objectives of at least two sectors shall be eligible to receive Union financial assistance under this Regulation. An additional 10% can be added to the EU funding rates in the case of such cross-sector synergy projects.

Furthermore, within each of the transport, energy or digital sectors, actions may include synergetic elements relating with any of the other two sectors, provided that the cost of these synergetic elements does not exceed 20% of the total eligible costs of the action, and allow to significantly improve the socio-economic, climate or environmental benefits of the action.

40. Do you agree that the EU should prioritise financial support from the programme for efforts in Member States to improve the business case for investments in such strategic digital infrastructure deployments?

- Yes
- No

41. Are you interested in investing in synergy projects or otherwise directly involved?

- Yes
- No

Contact

EC-CEF2digital@ec.europa.eu