

Telecom Infra Project Response to BEREC Call for Input: 5G Value Chain

Question 1: Whilst for a number of years various studies and projects have anticipated a change in the ecosystem resulting in new players and new business-to-business relationships, who will form part or thrive in the 5G ecosystem is still an open question. Moreover, during the BEREC Workshop on 5G various stakeholders have mentioned the importance of partnerships.

a) What are your expectations in terms of the kind of partnerships that will be built? Why?

The entry of new actors into the 5G ecosystem will strengthen the overall telecommunications sector, especially through an increase in new partnerships on different levels. The adoption of open and disaggregated technologies is specifically important in this regard as it will allow for partnerships between new vendors, operators, software companies, cloud providers and system integrators.

Wide adoption of Open RAN technology across the European Union will also strengthen the partnerships and collaboration between vendors and operators, with multi-vendor approaches becoming a standard option in industry.

b) From current experience with early 5G commercial activities, and experiences with trials, what did you learn / gain from partnerships that were built? In your answer, please describe the use case and the role of different partners.

As the Telecom Infra Project's primary role is in testing and validating solutions for participants, we have run numerous trials and tests based on a collaborative framework. A key example of a project group running under TIP is the [Open Core Network group](#), which is working to develop an open, cloud-native, and converged core that is a collection of microservices implementing various core network functions ("open, flexible and extensible"):

- Running on standardized software and hardware infrastructure ("infrastructure agnostic")

- Supporting 3GPP 5G Core (5GC) and LTE Evolved Packet Core (EPC) for licensed, unlicensed (e.g. Wi-Fi), and shared spectrum (e.g., CBRS) networks (“access agnostic”)
- Enabling seamless migration from 4G EPC to 5GC in both Non Stand-Alone (NSA) and Stand-Alone (SA) modes.

The goal is to innovate on the packet core technologies across any access wireless networks operating on licensed, unlicensed and shared spectrum; develop microservice, orchestration and automation frameworks on OCN platform, and support an ecosystem of developers, OEMs, SIs, MNOs, and ISPs around OCN based solutions.

The deliverables under this project include:

- FWA Use Case & Technical Requirements Document v1.0- the document describes the FWA use case and requirements on OCN to support the use case. It can be easily converted to an FWA solution RFP to facilitate the vendor selection and procurement process.
- Open Core Network Private 5G Scenarios Whitepaper - the document describes four private 5G network scenarios which are addressed by OCN group. The goal is to facilitate the prioritization of two of them to drive the implementation.

Industry participants in the group have provided valuable insight and communicated how to best standardise and validate solutions.

c) What will be the most important change in the 5G ecosystem which must be taken into account by National Regulatory Authorities and Policy Makers? What are your experiences (with authorities) in this respect - lessons learned (both positive and negative, what worked, what didn't work)?

The proliferation of open and disaggregated networks has extreme potential to add new revenue streams, create new jobs and promote innovation to the European economy. European Union policymakers should prioritise the development and testing of Open RAN across member states, especially through creating standards and promoting trial runs.

We have provided some policy recommendations below that are applicable to disaggregation across the supply chain.

- Governments should consider ways to structure an ongoing dialogue with emerging vendors to ensure the regulatory regime continues to anticipate new technologies.
- Create public-private partnerships whereby industry takes a lead in innovation projects, supported by government, and government grows the ecosystem for open and disaggregated technologies, including by stimulating the demand side for OpenRAN.
- Facilitate new technologies going from trial stage to more advanced testing. Policymakers can, for example, consider frameworks for access to street furniture and public-sector estates to make it more predictable for those at different stages of trial. At the roll-out stage, local governments should consider ways to ensure the planning regime is hospitable to new network infrastructure (although this is not specific to Open RAN).
- Governments should also consider ways to incentivise mobile network operators' procurement from outside the established vendors. Having the right environment for this market to flourish is indispensable to gaining the advantages inherent in that diverse marketplace.
- Funding to support the development, interoperability testing, and deployment of new, open and disaggregated components.

For example, recent policy decisions and proposals on security and vendor choice by several EU countries have had a material effect on the economics of national networks and, while the move to OpenRAN is an essential vehicle to improve resilience of critical national infrastructure, and alleviate concerns surrounding high risk vendors, implementation is not straightforward and will need more support from policymakers in order to create a strong OpenRAN ecosystem in Europe and achieve widespread OpenRAN adoption.

An example of a successful [project](#) between TIP and local government is the Dublin (Ireland) Public-Private Partnership which focuses on [urban connectivity solutions](#). With the Dublin City Council we are deploying new smart poles and retrofitting existing street furniture to support LTE/5G/Wi-Fi connections, with the aim of supporting technologies with a sustainable and scalable business case.

Question 2: New entrants

a) Which kind of new entrants could find their way in the 5G value chain?

The disaggregation of network infrastructure, with radio access networks being the most notable example, will allow for a plethora of new entrants into the 5G ecosystem. Vendors of semiconductors and RAN hardware (distributed units, RAN

Intelligent Controllers (RICs), small cells and radio units) will all have an increased and stronger presence in the value chain. The disaggregation of software from hardware will also allow for companies that develop Open RAN software to enter the market, with operators being able to choose from different developers.

The move of network features to the cloud is also an aspect that must be taken into consideration when discussing new entrants into the market. Cloud providers will therefore have an increased importance in the telecommunications sector.

A key feature of disaggregating network infrastructure is the ability for SMEs to enter and play a larger role in the 5G value chain. As the current state of the market is focused on a few large actors, more open and disaggregated technologies will allow smaller companies to propose their solutions to operators and other vendors. This will also help improve connectivity for verticals such as transport, energy and utilities. Inherent to the architecture of disaggregated RAN is the enhanced programmability of RAN functions and performance. We expect participation from very small vendors to established players that will create software that resides on RAN Intelligent Controllers to unlock unique value for the optimal delivery of 5G applications.

b) What are the challenges and opportunities that these new players face?

The current highly concentrated telecoms vendor market has enabled wide deployment of mobile networks and wireless connectivity. However, it has also resulted in certain rigidities in telecom equipment markets and in certain cases a lack of interoperability and lack of diversification in the market, which impose costs on mobile network operators (MNOs). This lack of diversification and concentration of the market is still the main challenge that new actors will have to face, with a lack of market competitiveness and possible distrust of companies that will be entering.

Although the challenges are apparent, new players will also have the possibility to further competition, which will unlock completely new areas for revenue, benefiting the whole ecosystem. Moreover, as new players will bring critical experience from other sectors into the 5G Value Chain, the potential for innovation is very high, which in turn will bring new capabilities and features for 5G systems.

c) How are legacy players expected to react to the changes in the 5G Value Chain which these new entrants will bring?

Open and disaggregated technologies bring new entrants into the telecommunications vendor sector in Europe to provide additional options to industry, including to MNOs and to incumbent 5G providers. Partnerships and collaborative platforms are essential for new technologies to be a positive change for the whole ecosystem. The Telecom Infra Project is a diverse group of hundreds of [participant](#) companies, which includes key European players such as Vodafone, Deutsche Telekom, Telefonica, BT and Nokia.

Question 3:

The following question is addressed to those entities which form part of the 5G supply chain.

5G is considered disruptive not just because it is the first generation of telecommunications system which has been designed with the intent of catering for the need of verticals and non-public networks[1], but also because of the changing dynamics in the supply-chain ecosystem.

[1] “A non-public network is a network that is intended for non-public use. Deployments of non-public networks in private environments (e.g. factories, enterprises) to provide coverage within a specific geographic area for non-public use is a key demand of emerging 5G applications and verticals. Non-public networks may be deployed as completely standalone networks or with the support of a PLMN. The 5G system supports non-public networks.”
Source: 3GPP TR 28.807 V17.0.0 (2020-12)

a) How will the adoption of these technologies impact the competitive landscape in the different markets and how should policy makers respond?

The adoption of these new technologies associated with 5G networks will not only boost competitiveness in the ecosystem, but also innovation, market growth and development. Private networks will increasingly span various industries and have the potential to immensely add to the economy. Policymakers should encourage more testing and validation and develop requirements to create European and global standards for private networks.

TIP currently has a [5G Private Network Solution Project Group](#) that is working to make 5G private networks accessible to a broad range of use cases and customers by transforming deployment from a bespoke special project to a standard product with an appropriate cost structure.

b) Is there a level playing field? How do advantages manifest further in supply chain? And how about disadvantages, for example for a new entrant?

As long as such newly developed technologies as Open RAN have a chance to play an important role in the supply chain, there will be a level playing field stemming from a high level of competition. On both wholesale and retail levels of the telco market, new entrants with effective business plans are widely welcome. TIP participants believe that the technical requirements (e.g. ETSI, 3GPP) as well as the market access regulations (delivered by both the Commission and NRAs) should be focused on an open Digital Market Idea, leaving a space for fair competition.

c) 5G is also disrupting the supply-chain economics in a market which has traditionally been dominated by a handful of suppliers. What are the challenges and opportunities presented by these nascent open and multi-vendor approaches?

The opportunities stemming from open technologies and multi-vendor approaches, as already mentioned above, will be seen in almost every sector of the 5G ecosystem – from new entrants, fresh revenue streams, new partnerships, boosted innovation to real market value. A [study](#) by Analysys Mason has shown that the global market of supplier revenues may be worth EUR 36.1 billion by 2026. Open RAN is also expected to double the economic benefits by 2030, which undoubtedly will support the European Commission's targets presented in Europe's Digital Decade communication.

A key challenge is to create industry-wide standards and requirements for open and disaggregated technologies. TIP has been working with like-minded industry partners since 2016 to test and validate new innovative connectivity solutions in open and disaggregated networks.

In some segments, market evolution and policy decisions have meant that there is actually less choice and less competition. Proposals such as OpenRAN address this issue but require significant support from policymakers in order to make Open Radio Access Networks a strategic priority. Europe's best opportunity to defend and grow its place in the global 5G and 6G industry lies with building a broad and deep OpenRAN ecosystem. OpenRAN creates opportunities for new and traditional providers to support these goals by helping to foster innovation across industries. This rapidly increases the choice of components, and therefore the potential to innovate and meet the demands for a fast-growing variety of different use cases and applications.

Question 4:

In order to facilitate a level playing field, BEREC would like to gain a better understanding about the supply chain and new bottlenecks that may arise.

Which new types of bottlenecks and dominant players do you foresee that the new business models of 5G might enable?

Adopting more open connectivity solutions will help diversify and promote more competitiveness in the market, rather than create new bottlenecks or congest the market to a few key actors.

Question 5:

5G is expected to bring disruptive change.

a) Where would you expect the largest growths/drops of value within the value chain?

With the advent of open technologies, the largest gains in value for specific parts of the value chain will most likely be seen in Open RAN services (such as testing, system integration) and RAN hardware. The value increases of these features would greatly benefit European actors, who have a strong presence and standing among key global industry players.

b) How do you foresee that you will be adapting or tapping into the new opportunities being presented by 5G?

The Telecom Infra Project is foremost dedicated to testing and validating new connectivity solutions based on open and disaggregated technologies. We work with interested industry actors to provide specifications for emerging solutions and trial new technology. TIP already has project groups deeply focused on new solutions presented by 5G networks, such as automation, private networks and connected cities, and we look forward to further cooperation with partners on 5G and future networks, whether these be use-case documents, trial runs or product requirement specifications.

c) Will 5G give you the opportunity to change your position in the value chain?

As a global community of companies and organizations we look forward to cooperation with like-minded members of the 5G ecosystem. TIP helps participants by taking early proofs of concept, products, and solutions into TIP Labs and testing environments to drive their validation and enable their commercial deployment.

Question 6:

a) What is your perception in terms of the interest from the vertical industry on the use of 5G?

TIP has seen strong interest from the vertical industry regarding 5G use cases, in particular for Private Networks. TIP supports the vertical industry by validating the solutions, through blueprints and more generally the test and validation process. For verticals, TIP would identify use cases common to different industry players, e.g. hospital, and validate all the components in one of the TIP Community Labs, so that this set can be easily taken by a service provider.

In that process, TIP is also committed to open competition as once the blueprint is defined, it can be validated for different equipment combinations. Through TIP Exchange, TIP shows the different validated configurations for a given blueprint, as well as documents that simplify the deployment process of the given solution.

We have further collaborated with industry to promote the usage of 5G in specific areas – recently TIP [conducted](#) the first 5G Private Network Field Trial at the largest hospital in Latin America.

Question 9:

What are the key opportunities/challenges in terms of new cost structures that players forming part of the 5G value chain must take into consideration?

A key opportunity regarding new cost structures is the diversification of the market, especially among vendors and suppliers of infrastructure and software elements. The emergence of new suppliers, which will drive competition, will provide more cost-effective solutions that were not available in the current market structure.

The disaggregation of network infrastructure will further influence the cost structures associated with developing connectivity solutions, with operators being able to choose between different companies and products.

Question 10:

What will be the main drivers of revenue streams?

From the perspective of open and disaggregated technologies, increased revenue stream will be especially seen in providing services needed to create better interoperability between hardware and software from different vendors, as well as validation and trial runs of new solutions. Software, hardware, microprocessor and cloud solutions for Open RAN will also see an increase in revenue streams.

TIP looks forward to supporting BEREC's work on the 5G Value Chain and together creating a fast, reliable, secure and ubiquitous connectivity ecosystem.

Yours sincerely,

Vishal Mathur

Global Head of Engagement

Telecom Infra Project