

Accelerating Innovation in the Telecommunications Arena

EXECUTIVE SUMMARY

Telcos operate in an environment characterized by accelerating and disruptive change. To prosper in this environment, they need a supporting ecosystem which provides them with rapid innovation, but the vast geographic and volumetric scale of telecommunications infrastructure creates barriers to innovation which, in turn, impacts the speed of innovation in the many ecosystems that depend upon it.

Softwarization is fundamentally changing the way that telecommunications infrastructures are constructed which creates significant new business opportunities for telcos and the dependent ecosystems while enabling participation by smaller, more innovative, suppliers in the supply chain.

To address the barriers which are outlined in more detail in this paper, we recommend a new approach to collaboration with technology suppliers which eliminates the barriers to participation by smaller more innovative players; for example by simplifying the onerous requirements for procurement, and putting in place payment systems that provide them with more certainties on revenue.

In addition, we recommend creating R&D partnerships with technology leaders in the dependent ecosystems, including digital service providers who may also be competitors, to identify innovations that will enable more efficient use of the underlying infrastructure, and to work together to jointly specify future capabilities, thereby reducing investment risk because the new capabilities are more likely to meet the needs of the dependent ecosystems.

Finally, we recommend that telecommunications infrastructure providers reverse the trend towards delegating standardisation to suppliers, and become far more active by deploying subject matter experts in the key bodies. This will have the added benefit of enabling telecommunications infrastructure providers to openly collaborate while avoiding perceptions of anti-trust.

We invite comment on the recommendations outlined in this paper and we plan to convene a follow-up on-line colloquium with participation by representatives from the leading dependent ecosystems to further define the problem space and identify the steps that need to be taken, and by whom, to implement the agreed way forward.

BACKGROUND

The telecommunications industry underpins all aspects of societal functioning by providing ubiquitous connectivity and access to the global internet. It follows that telecommunications infrastructure is an important enabler for innovation across many ecosystems that depend upon it, and as such, telecommunications must itself evolve through innovation and investment to keep pace with the needs of these dependent ecosystems.

The telecommunications ecosystem can be visualized as consisting of three ecosystem domains or layers with very different but co-dependent characteristics as depicted in Figure 1. At the foundation level is the physical infrastructure, fixed and wireless, which provides connectivity between geographically dispersed end points. Above the physical layer sits the digital network, typically consisting of access, transport and core nodes responsible for efficiently switching and routing packets between end points on the physical infrastructure. At the top, digital services are built using the connectivity services provided by the digital network, and functionality is dependent upon digital network capabilities and cost structure.

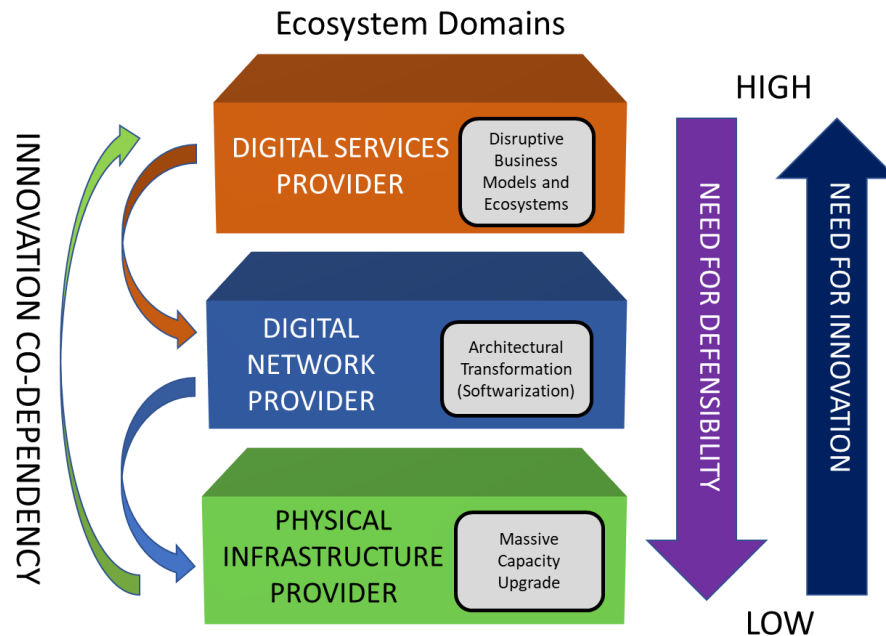


Figure 1: Telecommunications Ecosystem Domains, Defensible Assets and Innovation

In terms of defensibility, physical infrastructure takes years and billions of dollars to build out, and once established, is far less likely to be subject to like-for-like competitive threats (i.e. overbuild). But without competitive threats, a key driver for innovation (and cost control) is absent, a seemingly unavoidable reality that government regulators tend to be fixated on. Conversely, in the digital services domain, dominated by cloud, competitive pressures are intense, scale deployment to millions of users can be achieved in weeks or months, and this has driven the unprecedented era of innovation in applications and services we observe today.

THE CO-DEPENDENCY CONUNDRUM

The ecosystem domains depicted in Figure 1 are co-dependent because each domain influences the capability and economics of the other domains. For example, if the physical infrastructure has low bandwidth, many applications we take for granted today would not be technically feasible. Similarly, if the number of users reached by the physical infrastructure is too small, mass market service propositions which require scale economics would not arise. For scale economics to apply, physical infrastructure connectivity must be ubiquitous which implies vast geographic scale which inevitably takes years to build-out. And capital investment commitment is measured in billions of dollars with payback measured in years, if not decades. Moreover, there is a conundrum for physical infrastructure providers because applications – which are typically unknowable in advance, will not arise until the physical infrastructure has reached mass market proportions, making payback for the physical infrastructure provider very uncertain. Hence, the response of physical infrastructure providers is to focus investment dollars on incremental upgrades and to “sweat” existing assets as far as possible, much to the frustration of the digital service provider ecosystem which relies upon it.

As applications and services innovation is so heavily dependent on the infrastructure layers, it is worthwhile to consider if innovation is being unduly constrained by the slow pace of innovation in the infrastructure domains, and if so, how, and what could be done about it.

THE TELECOM REALITIES

As has been amply demonstrated during the SARS-CoV-2 pandemic, telecommunications infrastructures underpin the economies and well-being of societies and as such, are viewed as critical national infrastructures. Hence, government involvement in telecommunications tends to be more pervasive than for many other industries. Societal expectations include:

- Ubiquitous service availability commensurate with the demands of government and commerce.
- Very high availability to support the needs of law enforcement and public safety.
- Resistance to attack by malevolent actors including nation states and criminal networks.
- Ability to interoperate with national and trans-national peer networks.
- Service persistence through successive waves of technology obsolescence.

In the face of these onerous expectations, telecommunications infrastructure providers tend to have a conservative mindset and exhibit behaviours which, of necessity, tend to be very different from those in the highly competitive digital services domain. These behaviours create barriers to innovation that are very difficult to overcome.

Barriers to Innovation

Massive geographic and volumetric scale of telecommunications networks leads to investment cycles measured in years, if not decades, which tends to favour large systems vendors with global reach. Moreover, the global nature of telecommunications requires interoperability between national and international peer networks and between technology suppliers which, in turn, puts a strong emphasis on global standardisation which may slow innovation. This is a topic we will return to later.

Decommissioning obsolete telecommunications infrastructure is very difficult due to massive scale, cost and market expectations for service persistence. Even a minor technical change in service operation when migrated to a new infrastructure may result in service outages or instability which deters infrastructure decommissioning. The result is persistence of obsolete systems well beyond their design life resulting in increased operational complexity and cost, compounded by diminishing hardware and software lifecycles.

In an effort to accelerate and incentivise product innovation, telecom operators continuously engage with suppliers to share their business requirements and to obtain suppliers' views on the art of the possible. This is time consuming and resource intensive for suppliers given the global scale of the industry and variability of business environments. Moreover, it is a considerable challenge for suppliers to aggregate all the requirements coming from different network operators in order to define a product portfolio with minimum variants that can be sold to all of them. In addition, suppliers are motivated by economics and time-to-market considerations to build upon existing products and existing competences which results in product portfolios that may not optimally meet the needs of any of the network operators.

Historically, these barriers have proven to be a serious deterrent for smaller, more innovative suppliers, especially when there are more attractive opportunities elsewhere. If smaller suppliers are involved at all, it is generally in partner relationships with a handful of large suppliers who are willing to invest for the long term. As a result, these large suppliers wield immense influence on the potential for innovation in the telecommunications industry and continually seek opportunities for lock-in which in turn disincentivises innovation.

The remainder of this paper outlines approaches that could be taken to improve the speed of telecommunications innovation to more closely align with the trajectory of innovation in the dependent ecosystems.

A WAY FORWARD

We have shown why network operators currently have little choice but to choose from a relatively limited menu of products from a small number of large systems suppliers and there are significant investment challenges that are very hard to overcome. More recently, geopolitical pressures have negatively impacted the supplier ecosystem and created another layer of uncertainty, hence, reconfiguration of the telecommunications supply chain to create more diversity is urgently required.

Softwarization of the infrastructure (i.e. NFV, SDN, cloud) has, in theory, created opportunities for smaller, more innovative players, to participate in the telecommunications supplier ecosystem, but there remain significant barriers to their participation, including the systemic ones identified above.

Overall, we recommend the industry transitions to a more collaborative model with network operators working more closely with suppliers and customers, including digital service providers, throughout the product development and deployment lifecycle. We acknowledge that to some degree this is already happening, for example in open source, but suppliers are stretched by the need to work with multiple network operator partners in multiple markets, and network operators are struggling to keep up with customer demands. To address this, network operators should collaborate more closely with each other to identify the commonalities of target solutions, even if the ultimate operational configuration is customised by each network operator. And where applicable, they should share technical insights arising from deployment and operations experience to accelerate learning across the ecosystem.

R&D Partnerships

We recommend creating R&D partnerships with technology leaders in the dependent ecosystems (e.g. digital service providers) to identify innovations that will optimize application performance and enable more efficient use of the underlying infrastructure. This would reduce risk and make it more likely that the solutions will meet the needs of the dependent ecosystems.

Improving the Standards Process

It is vitally important to improve the telecommunications standards process. The industry is wholly reliant upon standards, including de-facto and open source, for interoperability and to ensure a diverse supplier ecosystem. But the pace of standards development has not kept up with the demand for innovation; it is resource intensive and too slow, and too many parallel activities have emerged in most areas. In part this is because network operators progressively scaled back their involvement in standards and ceded responsibility to suppliers who often block progress through delay and obfuscation. These behaviours are well known, but network operators have not been able to effectively challenge the suppliers, in part because of lack of subject matter expertise, but also because of low resourcing priority.

We recommend that telecommunications infrastructure providers reverse the trend towards delegating standardization to suppliers, and become far more active by deploying more subject matter experts in the key bodies. As an additional benefit, the standards environment enables network operators to pool expertise and share operational experience while avoiding perceptions of anti-trust.

NEXT STEPS

We do not claim unique insights in this paper; our intent is merely to seed a broader debate. We

encourage the industry to initiate a collaborative dialogue involving key stakeholders to identify the barriers to innovation and investment, agree solutions, and initiate actions to implement them. The objectives are to identify a common vision for a healthy telecommunications ecosystem and to identify the commonality of processes for innovation. We recognize that while the industry is global, local markets are different, hence we would expect each organization to customise the process and apply it their circumstances.

An on-line colloquium is being organized with invited key influencers from the stakeholder industries to review and critique the rationale and approaches outlined in this introductory paper. The outcome of this colloquium will be documented in a follow-up paper as a “call to action” with specific targets and timescales. Questions to be addressed include the following:

- What does innovation mean in the telecommunications infrastructure context?
- What are the barriers to innovation and how can they be overcome?
- How can investment risk be reduced?
- What are the ways to encourage, support and de-risk end-to-end supply chain innovation?
- To what extent can innovation tools and techniques be made common to all telcos to create scale for tools and technology suppliers?
- Etc.

We invite comments by email to the authors of this paper:

- What did we miss?
- What did we get wrong?
- Other ideas to move the needle on innovation in the telecommunications industry?

CONTACTS

Please send feedback or enquiries with your affiliation and email contact details to the following:

Caroline Chappell, Analysys Mason, Caroline.Chappell@analysismason.com

Don Clarke, Telecom Foresight Consulting, don@telecomforesight.com

Mark Cummings, CTO Orchestral Networks, mark@orchestralnetworks.com

Diego Lopez, Telefonica, diego.r.lopez@telefonica.com

Klaus Martiny, Deutsche Telekom, klaus.martiny@telekom.de

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