Cost Accounting for Next Generation Networks

Key Challenges and Considerations

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Network operators are migrating to next generation networks (NGNs) to streamline their infrastructure, transform their operations and unlock new capabilities. Whilst most attention is on changes in technology and service delivery, the impact on cost accounting should not be underestimated. Key questions include how to account for the costs and benefits of a network migration, and how to attribute network costs to services in a next-generation world.

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Introduction

Cost attribution in the telecoms sector is anything but simple. Years of investment in successive generations of technology have created a complex web of networks supporting scores of services.

Yet the ability to accurately attribute costs to products and services is essential, for both commercial and regulatory purposes. On the commercial side, network operators need a means of understanding costs – by service, customer and location – to determine the profitability and plan accordingly.

From a regulatory perspective, accounting obligations are commonly applied to firms with market power to facilitate activities such as:

- Setting charge controls;
- Monitoring compliance with cost-orientation obligations; and,
- Detecting anti-competitive behaviour (e.g. margin squeeze).

The popularity of cost-orientation as a means of regulatory charge control can be seen in Figure 1, using data from European countries. The chart shows that cost accounting is used to set rates for many wholesale services, and hence it plays a role in the competitive dynamics of the entire market.

![Figure 1. Charge Control Methods Used by Countries in Europe, by Market (2014)](chart)

Source: BEREC

Given its importance for both commercial and regulatory purposes, it is critical that cost accounting accurately captures the underlying relationships between assets and services. Whilst never simple, assuring the quality of accounting frameworks is becoming more...
difficult as operators transform their networks to use next-generation technology. This viewpoint discusses some of the challenges posed by next-generation networks (NGN) and next-generation access (NGA) on cost modelling and cost allocation.

**Network Transformation**

The transformation to next-generation network technology is impacting all network operators. In their core networks, fixed and mobile operators have deployed (or are in the process of migrating to) NGN infrastructure. Whilst in the access network, demand for ever higher broadband speeds is driving fibre deployment in NGA networks.

The benefits of NGN to operators are many. As Figure 2 shows, NGNs enable multiple services to share a single core network. This approach is more flexible and of lower cost than service-specific, legacy infrastructure. NGNs can integrate fixed and mobile networks and facilitate the technical integration required to deliver converged services.

The efficiency of NGNs stems from their use of a common IP network to transport the multiple services. Being packet-based, IP networks enable services to flexibly share resources as their demand ebbs and flows throughout the day. This is in contrast to legacy networks which required network capacity to be dedicated to services whether it was needed or not.

**Figure 2. NGNs Decouple the Services from the Transport Layer**

![Diagram of Discrete Legacy Networks vs. Next Generation Network](source)

Use of this packet-based approach to networking drives the need of new accounting methodologies which are beyond the simplistic approach of counting circuits.

**Implications for Cost Accounting**

As network operators transform their networks, it is essential that the cost accounting framework keeps pace with the changes. In this section we focus on three specific issues that require consideration:
1. Attribution of costs incurred in network transformation
2. Methodologies for apportioning core network costs in NGNs
3. Methodologies for apportioning access network costs in NGAs

The first issue concerns how best to attribute the costs incurred due to investment in NGN transformation. The challenge here is reconciling the costs incurred and benefits delivered, with the added complication of a relatively long (and potentially uncertain) implementation schedule.

Figure 3 below depicts an illustrative cost curve for an operator when transitioning from a legacy network to NGN. The chart shows that costs increase during the NGN deployment phase, and then fall back to a level above the initial baseline during a period of parallel running of both infrastructures. Eventually, once the legacy assets are decommissioned the total costs decline to a level below that of operating the legacy networks.

![Figure 3. Typical Cost Profile of Network Transformation](image)

During such network transformations, accountants face two main challenges:

1. In the build phase, costs are incurred but benefits are not realised immediately. As shown in the figure, the full benefits are only achieved later once the legacy network is decommissioned.

2. In the parallel running phase, services will be migrated in turn from the legacy network to the NGN. The temporary reduction in economies of scope for each network may cause unit costs to rise.

These challenges are compounded by the uncertainty of realising the expected benefits in the long run, as the operator’s strategy may change in-flight due to market pressures or technical feasibility. The sheer length of time over which the investment is made and
recovered is also problematic. In extreme cases, the network infrastructure may be fully depreciated before services are migrated onto it.

All of the above issues can be reflected in a single overarching question: How should networks costs be attributed to services during the phases of a network transformation programme?

In answering this question, accountants and regulators may need to consider:

- What are the primary drivers for the transformation?
- What are the benefits to each of the services in the operator’s portfolio?
- At what point in time do benefits accrue to the individual services?
- What investment signals are desirable from a competition and public welfare perspective?

The second issue to consider arises once multiple services are being transported on the NGN: namely, how to fairly apportion the NGN costs between these services. For legacy networks, cost attribution has been a relatively straightforward affair. Legacy networks consist of static circuits of fixed capacities which lend themselves to simple counting and arithmetic. In contrast, the capacity of packet-based NGNs is assigned to services dynamically. To account for this fluid nature, a new approach is required.

Whilst it is possible to use network probes and management tools to measure the utilisation of NGN capacity by service, this may not give a representative view for cost apportionment. The key questions are what to measure, where in the network, and when. As the utilisation of each service will have its own demand profile, and that the busy routes of specific services may differ, there is a risk that discrete measurements may fail to tell the full story. Furthermore, some services may be prioritised over others using QoS (quality of service) attributes, further complicating the attribution process.

Finally, in terms of the third challenge, the revolution in the access network is driving fibre ever closer to customer premises. However, as with the migration to NGN in the core of the network, it is normal to have a period of parallel running in which both copper and fibre are used to deliver services. This period of parallel running can stretch for years or even decades, with copper and fibre cables sharing the same duct network.

From a cost allocation perspective, the key question is on what basis to attribute ducts costs between copper and fibre cables. One approach would be to use some derivation of duct capacity, for example using the cross-sectional area of the cables. Whilst this is simple and has a basis in the physical world, it does not consider the value of services being transported (with fibre having greater bandwidth, and therefore capacity for revenue). There are also the questions of which cable type is now the principle driver of new duct cost, and also – from a business or regulatory policy perspective – whether it is desirable to apportion significant costs to legacy infrastructure/services, rather than the next generation.
Conclusion

Operators are transforming their networks to enhance the capacity and capability for new services. In doing so, the introduction of new technologies creates challenges for cost accounting.

Accountants and regulators need to carefully think through how to attribute costs within the new access and core infrastructure, in terms of the basis for apportionment and the data and methods that are required to support this. Additional policies may be required during the transformation programme to cope with costs incurred ahead of benefits, and temporary inefficiencies created by parallel running.

It is important that these issues are factored in by finance teams whilst planning their network transition. A proactive assessment of the implications of NGN and NGA will avoid the need for a change of approach later on.
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Cartesian has deep experience in assisting network operators and regulatory authorities achieve their objectives. We have supported clients in cost allocation, reviewing cost accounting methodologies and building business cases for next-generation network. Cartesian also has practical experience of executing large-scale network transformation projects including PSTN decommissioning and copper-to-fibre migration.

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