5G RESOURCE MANAGEMENT

BASED ON AN INTERVIEW WITH BERND PRÜSSING AND DARIA BATRAKOVA, SENIOR SOLUTIONS CONSULTANTS, FNT SOFTWARE

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UNIFIED RESOURCE MANAGEMENT ACROSS MANY LAYERS WILL BE CRITICAL TO 5G IOT

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As 5G roll-outs get under way in earnest in many markets, the business case challenges for operators are becoming very clear. In the build-up to deployment, there was heavy focus on developing a network platform that would support many new revenue streams, at a time when the traditional mobile broadband model was creaking under the weight of higher usage levels and stagnating growth in fees. The IoT was central to the quest to enable new revenues for operators, as well as new services for enterprises, which would allow them to accelerate their own digitalisation programmes.

However, this strategy requires a radically different network to the mobile broadband platforms of 4G. Those data pipes grew progressively fatter and more reliable, but were essentially there to support one function – carrying ever-larger volumes of data, especially video, but without being optimised for any particular application.

THE 5G IoT DEMANDS AN ENTIRELY NEW TYPE OF NETWORK:

To support enterprise and IoT applications effectively, a completely different approach to planning, deploying and managing 5G will be needed. A fast and efficient roll out of new technology is generally challenging, specifically for newcomers in the market or operators of campus networks. Yet that is precisely what is required with the heightened demands and expectations of digitalisation.

This is because every vertical sector, and even every large organisation, will have a different set of core IoT applications to support its growth, and each of those will have a different set of demands on the network. There will be a general need for greater capacity, better coverage and higher energy efficiency. But many use cases, especially in the IoT, will have more specific requirements too. Some will focus on critical availability; some on supporting vast numbers of sensors to feed AI-assisted analytics; some on ultra-high security; some on edge computing; some on integrating seamlessly with partners' technologies across a complex supply chain.

The upside for operators is that many enterprises will be willing to pay a premium for that optimised connectivity. However, that in itself will increase the pressure to deliver the best possible performance.

The only way for a single network to support a huge range of different functions is to become software-based and virtualised, so that it can be fully flexible and programmable; and to have enough coverage, capacity and quality of service (QoS) for the most demanding application. Many IoT use cases, for instance, require ubiquitous connectivity, even in very remote sites and underground, that was never supported for human voice and data. Virtualisation, while enabling for IoT, brings with it a whole host of new considerations. Behind the perceived easiness and agility of virtualised networks lies a complex, multidimensional network management model that is foreign to many operators.

HIGHLY COMPLEX 5G NETWORKS REQUIRE A SINGLE SOURCE OF TRUTH:

That results in a network in which cloud infrastructure and telecoms network functions are converged; and in which there are huge numbers of assets, both physical and virtual, including cell sites and edge data centres of all sizes and locations. Edge data centres, a relatively new piece of the network puzzle, warrant particular consideration as they increase the challenges related to virtualisation.

To optimise both cost efficiency and customer QoS across this complex platform, while constantly adapting the network for changing data patterns, requires a holistic view of every physical and virtual component of the network, across all its domains – passive infrastructure such as cell towers, access networks, core networks, backhaul and transport, plus the cloud platforms underpinning everything.

This holistic view cannot be achieved amid such complexity without a 'single source of truth', which is especially important due to the multi-vendor environment of such complex networks. This is a database of all the network assets across all its layers and domains, that supports the most foundational processes in network operations - resource, inventory and configuration management. That unified data set will then

provide accurate and consistent information to all the higher layer processes in network operations, management and orchestration.

With that unified, up-to-date and complete catalogue of assets, an operator can plan, adjust and reconfigure its network in response to the demands of new use cases and traffic patterns.

THE NUMBERS OF ELEMENTS WILL RISE EXPONENTIALLY:

This is no simple task, even in conventional networks. There can be many thousands of configuration parameters assigned to each cell site and each network domain, relating to active and passive equipment, different radio technologies, and many other variables.

One European operator, by no means atypical, has over 6,000 parameters for each network element in its configuration management database. FNT Software, a prominent provider of software for integrated management of telecoms, IT and data centre infrastructure, offers a flexible integrated data model that facilitates managing each element. In addition to the CIs, FNT's data model contains over 70,000 physical items to streamline adding and changing physical resources in the network.

It is not enough to track each element individually – a full visualisation of the network, including cabling, fibre and site locations, is necessary for optimal planning and management. 3D walk-throughs and geo-referenced map views of assets, which bring the data to life, are already supported by suppliers like FNT, and in the future the industry will move towards full digital twin capabilities. Maintenance, too, is reliant on a single database for optimal management. Something as simple as exchanging fibres or nodes can be cumbersome and error-prone without such a database.

The large numbers of components will explode further with 5G densification, and with the addition of more virtual network functions (VNFs) to the telco catalogue. With virtualisation comes the addition of detailed data on IT infrastructure – for instance, the space, power and cooling levels of an edge data centre supporting a virtualised baseband unit for a 5G network.

Nor is resource management on this scale a natural capability for most operators. A tower operator recently told a conference that, when it acquired a third party portfolio, over 25% of the assets in the inventory turned out to be in the sea. If precise location information is challenging for macro towers, imagine the leap that many operators must make to track hundreds of thousands of small cells and edge nodes, needed to support enterprise and IoT applications effectively.

FNT Software's senior solutions consultants, Bernd Prüssing and Daria Batrakova, point out that, for this reason, support for the location selection process, management of a location as well as the location data itself are key differentiators for their integrated resource management solutions. This is especially true given the fact that the number of locations required to sustain these networks will dramatically grow. As 5G networks densify to support environments such as smart cities and industrial campuses, operators will need to identify the best sites, which will mean engaging with a complex mix of stakeholders such as municipalities, regulatory bodies and landlords, and storing details of access processes, site restrictions and

many others. Identifying exactly the right sites to deliver the optimum experience, and managing all the associated processes, will be an important aspect of 5G commercial success.

UNIFIED DATA CAN SUPPORT IoT USE CASE FLEXIBILITY:

Densification is just one example of the unprecedented complexity of the new networks that will support the 5G-era IoT. Most operators are unused to managing IT and data centre assets in an integrated way with their networks. But now, not only are there multiple domains and network layers to configure and provision, but the network is likely to change more frequently than in the past, as use cases place shifting demands on capacity and coverage.

This is particularly true of operators which are in the early stages of supporting 5G and the IoT – in both cases, many do not have a fixed view of which use cases, and associated network priorities, will prove to be most important, and so flexibility is key.

To achieve a flexible, responsive network, operators are "merciless in their change requirements", according to FNT, and it is essential that every network component can be viewed, managed and updated in a single place. Only by tracking all changes in a unified way can operators' systems identify performance problems. Any changes to the network, even relatively simple ones such as rebuilds or rerouting of services for maintenance or fibre breaks, are complex when they involve equipment from several vendors. A holistic view of the network is needed to identify issues and suggest remedies – otherwise responsiveness can quickly turn into chaos and poor QoS.

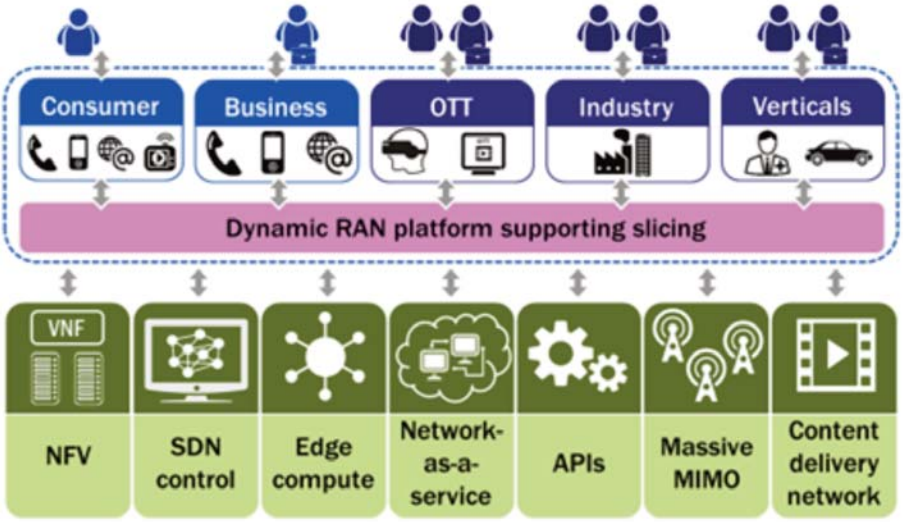

Figure 1. Operators are working towards a fully programmable, multi-layered 5G network which can support many use cases.
(Source: Analysys Mason).

SYSTEMS MUST SUPPORT WIDER VARIETY OF OPERATORS AND SUPPLIERS:

Another challenge is that 5G-era networks will often involve equipment and software from a wider variety of vendors than in the past. An important goal for 5G deployment, for many operators, is to escape proprietary lock-in by large network equipment providers. The migration to a cloud-based, software-defined network is seen as a way to move to a more open, multivendor architecture. But that introduces increased complexity because each supplier's products will come with their own interfaces and descriptions. Another big push for a multi-vendor strategy is that it is required by operators to balance prices for hardware. It is standard for operators to have second and third vendor scenarios to engage in price negotiations. FNT's 70,000 vendor component library helps operators easily overcome this challenge in both scenarios.

Batrakova is one of many people who believe that true open multivendor networks will not be achieved overnight because of the move to the cloud. In fact, virtualisation makes the situation worse. Every network will have many VNFs, from multiple suppliers, executed on different NFVI platforms, and managed by different applications. There will be the need to certify different VNFs to work together, and to document a wider variety of hardware and software. Open source specifications will live alongside those from standards bodies, with different definitions in each layer.

In this fragmented landscape, openness will be needed in processes not just equipment, to achieve interoperability. Vendor-agnostic documentation and resource management will be critical to avoid fragmentation and chaos, and FNT sees this as one of the most compelling arguments for their solution, which documents equipment and software from any supplier in the same way in order to provide its single point of truth.

It also supports open application programming interfaces (APIs) so that operators can easily add new items, or can customise the systems themselves. FNT's solutions offer the REST API, which is self-extending for new entities and offers full access to the data model. These key functionalities are instrumental in not only helping providers extend the data model, but also to integrate FNT's solutions into their OSS landscape.

This is another important aspect of the flexibility that goes with 5G and IoT networks. Some operators will want to model every layer in great depth, while others will only require a few layers or a limited amount of data on each. Some will want to customise heavily and integrate the database with a host of other network management, optimisation and orchestration applications. Others will want an out-of-the-box solution that is quick and simple to implement and allows them to start supporting 5G and IoT services rapidly and cost-effectively.

This is a significant point, given that there are expected to be far more service providers in the 5G IoT era, including enterprises, cities and utilities which decide to roll out their own networks, or specialist operators serving specific industries or locations. These smaller and newer companies are likely to want a far simpler approach to resource management than the national telcos, yet their requirement for accuracy and flexibility to deliver the right network performance for each use case is just as business-critical as for the large operators.

CONCLUSION:

Whatever the size and business model of the service provider, they all have some goals in common for deployment of 5G networks and IoT use cases. High levels of automation, increasing virtualisation, better cost-efficiency, open platforms, and support for a very broad range of use cases with different network requirements – these were the top five business goals for enterprise/IoT 5G, cited by a wide range of operators surveyed in the fourth quarter of 2019 by Analysys Mason. All five objectives have at least one thing in common – their reliance on a unified, integrated and vendor-agnostic view of the multi-layered network as it is rolled out.

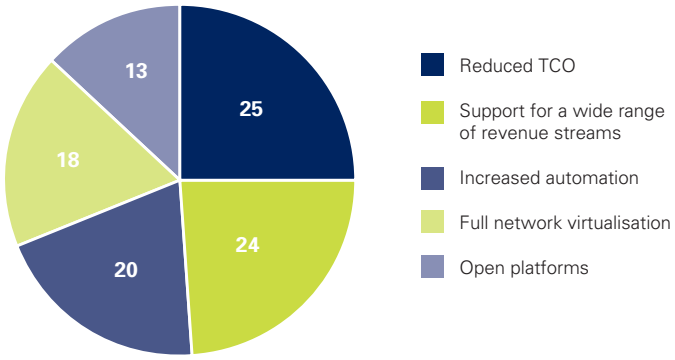

Figure 2. Top 5 commercial goals for deployment of IoT-optimised 5G network (survey of 76 mobile and converged operators by Analysys Mason, Q4 2019. Note, respondents initially listed all their key goals. The five most-cited were extracted and they selected the most important to their business model).

ABOUT FNT SOFTWARE:

FNT is a leading provider of software solutions that simplify resource documentation and planning to enable integrated management of telecommunications, IT and data center infrastructure.

Its solutions support the migration to cloud-based 5G networks because they provide a unified, holistic view of all the operator's assets across the IT and networking domains.

This enables operators to document, visualise, plan and manage complex infrastructure to support important 5G opportunities such as Industrial IoT and smart cities. A single data model includes all elements, from the physical layer to the business applications, and from end-to-end in the network. This enables efficient location awareness, preventative maintenance, new service delivery and future planning, greatly enhancing the impact of the MNO's operations support system (OSS) on its overall return on investment.

Headquartered in Germany, FNT has over 500 operator, enterprise and government customers and works with a wide range of partners and system integrators.