

MVNOs Series

2018

MAXIMIZING VALUE FROM
**DIGITALIZATION AND
VIRTUALIZATION**

**EXCLUSIVE
REPORT**

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MVNOs Series

We are living through an age of digital transformation. Since the development of the first digital computers in the middle of last century, the march of the byte - the basic unit of digital information - has been unstoppable, infiltrating virtually every aspect of human activity.

It is tempting to look around and see our lives as fully digitized, what with the prevalence of computers and laptops at work and in the home, smartphones and other mobile devices, the internet and the Cloud, and the perceptible shift of activities that once took place exclusively in the physical world into the virtual.

But all the signs are that we have perhaps only just reached the end of the beginning of the digital journey. The potential transformational impact of emerging technologies - the Internet of Things (IoT), artificial intelligence (AI), Big Data analytics, virtualized networks - could dwarf anything that has gone before. And the mobile industry has a central stake in all of them.

According to joint analysis from the World Economic Forum and Accenture, if the right opportunities are grasped in the right ways, the combined value-add of digital transformation to industry and society over the next 10 years stands at \$100 trillion. Such is its critical importance as enabler and carrier of digital progress, providing the "access, interconnectivity and applications" on which it is built, telecoms stands to benefit to the tune of \$2 trillion in additional value.

Put simply, connectivity is a vital ingredient in the joined-up digital world we are emerging into. Thanks to its ubiquity and scale, no technology is better placed to deliver than mobile.

In this report, we will seek to define two of the key terms used to describe the next phase of the digital journey, digitalization and virtualization. We will look at each in the context of what they mean to the mobile industry - how digitalization is creating brand new modes of operation and business models for mobile operators, and how network virtualization, in particular with the upcoming arrival of 5G, is shifting the paradigm in terms of what mobile can deliver and achieve.

As well as looking at the impact on the mobile industry, we will also open the discussion up to look at the broader role of mobile as digitalization continues apace across industries and in consumer lifestyles. We will assess what kind of services mobile players, and MVNOs in particular, are able to offer to support the increasingly digitised demands of both B2B and B2C markets, looking at areas such as IoT provision and over-the-top (OTT) value-added services as routes into brand new revenue streams.

We will also focus in on the potential for mobile companies to transform service levels as well as service types, redefining customer and end-user experiences in innovative, dynamic ways which tie in with the expectations of increasingly digitised audiences. Finally, we will evaluate the risks and rewards of all of this, the challenges MVNOs face in embracing what amounts to significant technological, operational and cultural change, and what they can do to maximise the benefit.

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UNDERSTANDING DIGITALIZATION: TRANSFORMING OPERATIONS AND BUSINESS MODELS

Defining the meaning of the term digitalization attracts some debate, a reflection of the fact that it is a relatively new concept where consensus and shared understanding is still emerging. Some of this controversy centres on whether the term should describe the use of digital technology to change/upgrade specific business operations or the creation of entirely new business models, and how it therefore relates to the concept of digital transformation.

Behind all the semantic wrangling, it is important to acknowledge that digital technology is having a significant impact on the mobile industry at both an operational and strategic level. Under pressure to keep up with consumer demand, to not be left behind in the digital arms race and to arrest the slide in declining revenues from traditional voice services, operators view digitalization as both a means of protecting margins by cutting costs and of creating new revenue streams with innovative services geared for new markets.

As well as these competitive pressures towards internal transformation, the mobile industry also has a special relationship with digitalization in the wider economy. As connectivity is widely accepted as an essential ingredient in delivering smart, integrated, hyper-networked digital systems, mobile has been described as the glue which can hold digitalized operations and services across all sectors together. The mobile industry therefore controls a resource that is critical to the entire concept of digitalization - a key part of the digitalization experience for mobile operators is therefore how they can cash in on that value.

DIGITALIZATION OF MOBILE

Another factor which muddies the waters when it comes to getting to grips with what digitalization means for mobile is the fact that, across many industries, digital transformation is often viewed as synonymous with cloud migration. If that were the case, then large swathes of the mobile industry, particularly MVNOs that operate as online-only, cloud-based businesses, meet the criteria for having already undergone digital transformation.

The Cloud is undoubtedly an important part of digitalization. Online-only MVNOs gain certain benefits from being based in the Cloud, such as lower overheads from having neither network infrastructure nor physical stores to burden them, plus the agility to get close to niche markets and respond rapidly to shifting demands. But should we define an online MVNO which is simply selling voice and data packages from a digital store - in other words, operating the same business model but via a different channel - as fully digitalized? Does that model maximise the full potential digitalization offers to mobile operators in terms of value?

When asking what digitalization can achieve for mobile, industry insiders frequently refer to companies like AirBnB, Uber and Netflix to provide a yardstick. More than just adopting a cloud-based operational model, these are companies which have used digitalization as a defining strategic principle and have been so successful they have transformed entire sectors. From MVNOs' perspective, the lesson that these digital start-ups have managed to shake enterprise-sized incumbents out of their positions in the market should also not be lost.

For mobile operators, then, the Cloud represents an important first step on their digital journey, providing a platform for further change in terms of cost reduction, flexibility, technology adoption and service innovation. But if we were to write a recipe for 'full' digitalization for a mobile operator, a process strategically geared towards maximising the benefits, there would be plenty of other ingredients to add to the mix. Here are the staples:



STRATEGIES BUILT AROUND CONSUMER DEMAND

The reason why Cloud migration alone - old models in a new channel - does not amount to 'full' digital transformation is that the Cloud offers the freedom and the technology to do so much more. Mobile operators are now able to reshape services and customer experiences to deliver exactly what the customer wants, which logically should therefore be the centrepiece of strategy. In an industry where both customer acquisition costs and churn are high, giving a reason for loyalty through improved customer experiences carries a high value.

Gary Bunney, CEO of BSS and analytics service specialist MDS Global, says that the modern digital consumer, given so much choice and power in all other areas of retail and commerce, is no longer so inclined to accept fixed, off-the-shelf mobile packages. "We believe customers are demanding more control to create the plans they need," he said. "And they want this control across a range of different networks, services and applications. With this control comes the ability to action. To change, amend, add or terminate without contractual restriction."

APPLICATIONS AND PLATFORMS

The key to delivering on customer demand is software. Bunney talks about enabling customer control via a "self-service application". Amol Phadke, Accenture's MD of Global Network Strategy and Consulting, likewise describes the most innovative, disruptive digital MVNOs adopting a 'software-driven operating model' that is "dependent on automation, analytics and AI."

As we will discuss in more detail when we look at virtualization, software plays a key role in driving flexibility and value in mobile services by decoupling services from physical infrastructure. Moreover, as the sophistication of software increases, the cost of both development and delivery through the Cloud decreases, offering businesses and consumers alike more for less.

DATA

Of the three specific technologies Phadke names, automation and AI speak of the customer empowerment and 'self-service' control Bunney recommends, but also of efficient, fast convenient services. Analytics, meanwhile, gives digitalized MVNOs the opportunity to fully personalize service based on all the data that becomes available via applications and platforms. Jaco Fourie, Head of Product Management at BSS specialist Qvantel, says: "Digital solutions allow for more rapid shifting of data gathering tools. This enables more data to be collected and analysed ... and used to personalize the customer journeys in digital touchpoints automatically for superior customer experiences."

BESPOKE SERVICES

Fourie goes on to argue that analytics "paves the way for rapid and real-time offers and deals that can be tailored and modulated to match the trends and data that is being gathered on them." The marriage of software and data in a Cloud environment allows mobile operators to create dynamic customer experiences that adapt to changing demands. It also allows them to throw off the shackles of voice and pure data packages and innovate with new potential revenue streams from new services.

Federico Homberg, Head of Mobile Wholesale Business Development at Deutsche Telekom Germany, told us that he sees an increasing trend in virtual operators moving away from "branded reselling" to a "full MVNO" model. "With a full MVNO you have no constraints when it comes to building your own products," he said. This alludes to another significant trend in digital transformation for mobile players, the move towards DevOps operations, where programming and development skills are highly sought after to enable operators to build their own bespoke software and platforms.

MOBILE AS DIGITAL ENABLER

Through the blend of ingredients discussed above - the Cloud, advanced software, data and bespoke service development, all served up to suit the customer's tastes - digitalization is reshaping the relationship between mobile operator and consumer. But it is also opening up different opportunities, for virtual operators especially, in different parts of the value chain, allowing companies to position themselves as B2B enablers of mobile services rather than the traditional B2C retailers.

Gary Bhomer, Principal at industry consultancy Tel-Consult, makes the point that in the first place, digitalization is having a significant impact on the mobile industry's own wholesale ecosystem. "Digital MVNE / BSS platforms are available via an outsourced real-time cloud environment," he said. "This frees up the MVNO to focus on sales and marketing whilst having their technology needs delivered 'as a Service' and via a dedicated state of the art digital platform... MVNEs will be in a unique position to enable the level of innovation and differentiation necessary to succeed, in an agile and cost-effective manner."

Digitalization is also creating opportunities for mobile companies to market these kinds of services to much broader B2B markets, not just to other mobile operators. Businesses of all sizes, from enterprises to SMEs, are increasingly viewing communications and connectivity as another part of the IT stack, and want the convenience of bundled services which deliver Cloud computing, security and mobility all in the same package. By adopting fully digitalized 'as-a-Service' business models, mobile operators can play the role of enabler to meet these demands.

Similarly, IoT is creating another enormous potential B2B market for agile, innovative mobile service providers who are prepared to respond to demand. Here, the flexibility and cost efficiency of the Cloud come into their own, as operators look to maximise value from an

enormously diverse market characterised by high volumes and low margins.

All in all, these emerging B2B opportunities reflect the fact that digitalization is a process taking place across virtually every industry, and that mobile has a key role to play in providing the connectivity that holds it all together. The term digital ecosystem has emerged to describe the complex web of connections that emerge when businesses across industry verticals and horizontals interact with each other and their customers via a wide range of different digital technologies, be it for transactional, communication or collaboration purposes.

Recognition of the importance of getting to grips with how digital ecosystems function is on the rise - Accenture suggests 27% of senior executives see digital ecosystems as changing the way they deliver value. According to Thandi Demanet, Business Analyst at TMForum, MVNOs in particular are ideally placed to capitalise on this shift in value accretion that digitalization is driving.

"MVNOs intrinsically possess capabilities that are valuable in this new ecosystem era," she said. "While providing connectivity over which to run complex digital services may seem the obvious role for a communications service provider, the MVNO can and should also leverage other capabilities and strengths it has including looking at agility and its current customer base.

"IoT and value ecosystems comprise a complex value stack consisting in connectivity, of course, but also, device management, data gathering and processing, security and privacy assurance, charging, billing and settlement, customer experience management, digital platform provision and management, APIs, OTT applications, etc... Many innovative MVNOs are already looking at designing and adopting new business models and actively seeking innovative partners to develop new services and commercial opportunities."

UNDERSTANDING VIRTUALIZATION: A NEW KIND OF NETWORK

Network virtualization mirrors a process that has already reached an advanced stage in IT system architecture. Put simply, virtualization involves the process of replacing hardware components in a system with software components. The hardware is still there, but the functionality each component previously managed and enabled is now handled by an additional software, or virtual, layer that sits on top of it.

The most obvious example is in data centres, where the functionality of physical servers has now been taken over by virtual machines, or VMWare. You still need the physical server as a base, but the VMWare utilises resources much more efficiently, increasing capacity and greatly expanding the number of services that can be run from a single server. Virtualization is the back-end technology that has enabled the emergence of Cloud computing, so it is therefore no surprise that it is also associated with cost savings and increased flexibility.

In mobile, network virtualization is the process of replacing function management and service delivery via physical infrastructure components with a new, software-based virtual layer. The key technologies are:

- **Software-Defined Networking (SDN):** A software-based architecture that separates network control from the underlying infrastructure. This means that network functions can be managed remotely and on any kind of computing device.

- **Network Functions Virtualisation (NFV):** This replaces hardware elements in a network, such as switches and gateways, with virtualized software equivalents that are then used to build communications services.
- **Cloud RAN:** A Cloud-based solution for managing access to networks.

One of the most significant changes network virtualization could bring about is making many expensive, specialist hardware components obsolete. Instead of having to commission and replace costly equipment such as switches and gateways, carriers can run their virtual equivalents on generic, low-cost computing devices. So although in the short term the initial CAPEX costs of virtualization are high, in the long term it is estimated that it will vastly decrease TCO for network operators. This is supported by the fact that maintenance and management of the network becomes much easier and cheaper - instead of having to send out engineers to install new hardware to add capacity or repurpose bandwidth, it can all be done remotely via a laptop.

While the process of virtualization has already begun with core network LTE infrastructure, the full impact will arrive with 5G. In order to meet the enormous new capacity, speed and low latency standards that 5G has set out to achieve, it is being built around a fully virtualized architecture. That means that as carriers build their 5G infrastructure, they are also building the virtualized networks of the future.

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THE IMPACT ON **MOBILE OPERATORS**

With ongoing LTE virtualization and then the arrival of 5G, it won't just be front-end mobile service that are run in the Cloud. The entire infrastructure, the entire ecosystem will be Cloud-based, so you could say that virtualization will complete the process of digital transformation for the mobile industry at large.

According to the World Economic Forum, virtualization could add \$220bn in value for MNOs and equipment vendors over the course of a decade, mainly due to a sharp reduction in CAPEX technology costs and huge increases in energy efficiency. As owners and guardians of the network, it makes sense that carriers should stand to get the most direct financial benefits from virtualization. Analysys Mason predicts that investment in SDN and NFV technology will increase by CAGRs of 59% and 38% respectively between 2017 and 2021, driven by the expectation of cost savings and much greater agility in new service development.

There are numerous potential benefits for MVNOs, too, especially in terms of increased agility and flexibility. For one, virtualized networks are a natural fit for cloud-based, fully digitalized MVNO business models, and many insiders agree that virtualization could encourage growth in MVNO numbers. Cam Cullen, for example, Global Marketing VP at network equipment vendor Procera Networks, believes that the unlocking of geographical boundaries offered by Cloud RAN will benefit operators and MVNOs alike. "Can you imagine a world where operators are unlimited by their coverage areas and differentiate themselves based on their capabilities, service distinctions, target markets and use cases instead of their infrastructure footprint?" he said.

Eve Griliches, a program director at IDC, makes a similar point about 'services decoupled from infrastructure', pointing out that the additional efficiencies offered by a virtualized network mean operators will be able to host multiple MVNOs on the same network - much as multiple cloud operators can share a single data centre. "[V]irtualisation means carriers can support multiple services on a single network infrastructure - multiple MVNOs sharing same resources, better scalability for multi-play services, MVNEs becoming completely virtualized businesses, slicing pieces of their network share to scale for multiple offers, and selling it through the cloud," she said.

"Virtualization brings a new paradigm where sharing the infrastructure, engineering, technologies and maintenance of the network actually brings disparate groups together on a common platform... If multiple networks can operate securely on one platform, this clearly will have an impact on the overall organization in real and positive ways." You could say virtualization ushers in a new kind of digital mobile ecosystem.

The decoupling of services from infrastructure also opens the door to much greater levels of innovation, both in the types of services themselves and in service levels. This encourages new players to reach into new markets, matching expertise to demand and scaling up distribution without restrictions. As a system built on software assets, there is the opportunity for operators to follow the lead of Cloud IT developers and open up their application planning interfaces (APIs) so that any business can build their own bespoke solutions to be provisioned on their network.

Wolter Lemstra, associate professor at the Strategy Centre of Nyenrode Business University, believes this will be critical for both the evolution of the MVNO model and the successful implementation of 5G. "Today's MVNOs can take advantage of niche markets but the service they offer is only what the mobile operator can provide," he said. "If you give them access to APIs in 5G they can tweak and bundle mobility with IT services and therefore offer more. I think this is a way to create leadership and stimulate the take up of 5G. MVNOs have access to different markets and are able to do lots of specialisation. Mobile operators can never go that deep".

As well as providing flexibility and better access to network for virtual operators, virtualization can also help mobile digitalization achieve its full potential by delivering the efficiency, speed and capacity service innovation needs. Whether it is OTT, analytics, business services or IoT, multiplying the applications available to run on networks will only further fuel the surge in connected devices and data consumption that is driving towards a new paradigm of 1000x capacity demand. 5G/virtualized networks are therefore critical in allowing value-added new services and business models in mobile to get off the ground.

GOING OVER THE TOP: ADDING VALUE WITH SERVICE INNOVATION

As Analysys Mason points out, mobile operators looking to diversify with new services is nothing new. With ARPUs from voice and data on a long decline, there is no lack of awareness of the need to generate new revenue streams in new areas. One of the ironies is that, while mobile companies have been held back in their attempts at innovation by the restrictions of a physical network, agile web-based companies have stepped into their territory offering OTT services for voice, messaging, video and more, ramping up the competitive pressure and starkly illustrating the advantages of digitalisation.

Now, with cloud-based business models evolving and network virtualization progressing, perhaps mobile service providers have the chance to redress the balance.

We have already noted that the mobile industry sits in a unique position as an enabler of digitalization across all sectors of the global economy. As an indicator of the kind of value service innovation could deliver to the industry, the World Economic Forum estimates that the telecoms industry could derive more than \$10 trillion in value from supporting digitalization in just five key sectors - media, electricity, logistics, automotive and e-commerce.

Elsewhere, the WEF also identifies 65 examples of digital innovation across six sectors which it believes are offering significant value to both business and society. It is instructive that mobile has a significant stake in the majority of these, for example:

- In the automotive industry, the WEF picks out examples such as infotainment, usage-based insurance, connected service and maintenance, the automotive data marketplace and assisted driving. All of these depend on connected car technology, with mobile connectivity via e-SIM providing the telematics and content services to drive all of these.
- In the utilities industry, IoT smart meter connections are supporting services such as smart energy management, smart asset planning, real-time supply and demand platform and real-time network controls. The WEF believes connectivity services will help the industry achieve \$170bn in cost savings for consumers in a decade.

- The media industry is benefitting from personalised content, personalised advertising, OTT and OTT 2.0, services for which mobile devices represent a significant market.
- Examples from the consumer sector include e-commerce, hyper-personalization in goods, data privacy and data to improve customer experiences, which again involve significant targeting of the smartphone sector.

The key for mobile operators is how not to be marginalised from the revenue streams in services that are essentially operating in their own backyard. To this end, there is a distinction between the first two items on this list and the last two. Connected cars and smart utilities represent relatively new applications of traditional mobile connectivity services, ones where mobile operators have been able to get in on the ground floor and forge valuable partnerships with car manufacturers, IT specialists and digital service providers. An example is Cubic Telecom, which delivers connectivity services for Audi smart cars.

In media and consumer markets, however, mobile operators have often been left with only low value indirect revenue from apps being used on their data plans. Indeed, the WEF makes a direct link between the evolution of OTT services and declining operator incomes. That is why it advocates telecoms companies looking 'beyond the pipe' and diversifying into areas beyond pure connectivity, regardless of the fact that it is the network that gives it such an important stake in digitalization.

It suggests that operators will need to "move up the stack" and themselves become the service providers in order to retain or even regain a position in the value chain. According to the WEF, a quarter of global operators expect digital services, in both consumer and enterprise markets, to account for 25% of total revenues by 2020.

Digitalization and virtualization give mobile providers the platform to do this. A critical point might be where they find the expertise to, for example, develop new value-added applications. This is where the importance of strategic partnerships becomes obvious, as seen in the example of connected cars.

B2B SERVICES - A SHIFT IN FOCUS?

One consequence 'moving up the stack' to find new revenue streams in service provision could be that we see more and more mobile players shift focus away from B2C retailer operations towards B2B service provision. This does not necessarily mean existing MVNOs will stop selling voice and data plans and look to enter business markets overnight. But it could mean that, as time goes on, we see more and more new virtual operators emerge in the B2B space.

The principles behind developing business services are just the same as those for consumer services - the first step is understanding what the customer wants. Daniel Neill, CEO of Kajeet, an MVNO which provides wireless services to education establishments in the US, told the MVNOs World Congress 2018: "I believe the essence of being a B2B MVNO, or a connectivity solution provider to a particular enterprise, is founded on understanding the customer's business and their problem. And not assuming you know what it is they're trying to achieve. So, a great deal of investment must be made in understanding what the problems are. What the challenges are. What the pain points are of the customer you've decided to target."

Whereas consumers tend to prioritise cost, convenience and flexibility in mobile, with innovative added features a bonus, business customers want, on top of value, reliability, customised solutions and control. They are the ideal market for the 'as-a-service' cloud business model as more than just voice and data, many companies are looking for value-added managed services which add value by helping them run their business better.

Let's take a closer look at two areas where mobile operators are already successfully making the shift into business services.

APPVNO

The AppVNO model can be viewed as virtual operators striking back against the OTT players. AppVNO providers follow the precedent set by the likes of Skype and then WhatsApp - offering calls, messaging and video via an app, with no charge per communication other than whatever data you might use if connected to a cellular network.

In the best tradition of MVNOs, AppVNOs target their services at very specific niches. B2B services are popular as businesses are more inclined to pay a subscription charge for secure, reliable communications solutions. Chris Michael, CEO of UK-based AppVNO Swytch UK, said: "We are trying to get rid of the need to carry a second work phone, or for employees to have to use their personal number for work purposes. A company can sign up and within a few minutes, they will have an account. Employees download the app and gain access to up to five mobile numbers".

One area where the AppVNO model can potentially maximise revenue streams is by linking in communication with other additional services. Dime Global might be described as an 'AppVNE', providing the platform that operators can use to deliver their own voice, messaging and video apps and connect to other services.

Dime Global COO Sebastiano Galantucci said: "Dime is a new concept blending new services and partnering with operators and services providers. It's a collaboration platform which values the community concept. For users it is about connectivity, for MVNOs and operators it is about added value service and sharing, managing, and having more interaction with the community too."

"Apps are now everywhere and they can be linked to basic services which add value to the MVNO. There's music options, finance and many others that will help position them in the market. Recently there's been a lot of conversations around data and security, that's another element that MVNOs can look into. There's plenty that can be done for those users who value an additional security level - encrypting calls, texts etc."

This kind of enabling service extends beyond assisting would-be AppVNO providers, too. There is growing interest in all types of companies offering digital services to include communication capabilities in their apps as an added-value service. For existing AppVNOs (or their enablers) with the know-how to deliver these services, there is a market opportunity to act as 'communications-as-a-service' providers.

INTERNET OF THINGS

Recognised as perhaps the key growth market for mobile services in the years ahead, competition in the IoT space is expected to become fierce despite low ARPUs. With anything between 20 billion and 46 billion connected IoT devices predicted worldwide by the start of the next decade, the sheer scale of the industry is ensuring operators are investing in IoT networks and MVNOs are emerging to deliver bespoke services.

Given the size and the diversity of IoT, Analysys Mason argues that network virtualization is essential to give mobile companies the agility as well as the capacity to capitalise on demand. IoT connectivity represents a very different proposition to traditional voice and data services for mobile phones, nevermind creating margins when data rates are very low. But connectivity is nonetheless essential for IoT, and with the right kind of service innovation, digital mobile operators can still hope to generate significant value.

Areas such as network security, remote device provisioning and analytics all represented value-added opportunities for IoT MVNOs. Verizon is certainly confident that data management and analytics will be in high demand from IoT operators. It has created its own Cloud-based IoT management platform to market to MVNOs, confidently predicting that the PaaS market in IoT will be worth over \$1bn by 2020.

Similarly, German carrier Deutsche Telekom has invested in its own IoT platform. Federico Homberg, Head of Mobile Wholesale Business Development, said: "For M2M/IoT we have created a centralized platform, the 'MISP' (Multi-IoT Service Platform). This platform supports all layers from global connectivity to device & service management and further into analytics, vertical applications and the integration into business processes. All of our local entities can use this IoT production plant with either standardized products for mass market approach - but also for IoT products that are tailored to the needs of specific customers and/or verticals."

It isn't just the big operators focusing on the IoT opportunity. Tel-Consult's Gary Bhomeer sees MVNEs recognising the demand from MVNOs for solutions they can market to IoT players. Indeed, the world's biggest MVNE, Plintron, has a global IoT-focused operation. "Traditional MVNEs are also launching IoT capabilities which opens up a new and fast-growing market for them and their customers," said Gary. "The IoT market is likely to be much more fragmented than traditional telecommunications, and a huge area for growth where MVNOs can deploy innovative and targeted service offerings in a flexible and innovative manner."



NEW HORIZONS IN CUSTOMER EXPERIENCE

If digital services represent a new era of opportunity for mobile operators, service levels are the key to maximising their value. But nowadays much of the talk is not just about excellence in customer service, it is about designing and implementing holistic customer experiences that drive conversions and encourage loyalty.

We said earlier that the first step to digitalization should be building strategies around what the customer wants. To paraphrase the WEF, we can view this as representing a “shift from simply selling products and services to creating unforgettable experiences”. The way to achieve this is through highly differentiated, personalised offers and seamless, instant on demand access for ultimate convenience.

Tel-Consult’s Gary Bhomer suggests that the mobile operators who perform best on customer experience “put the customer in

control where they can personalise their own plans, set their own spend limits, change tariffs in real time and share balances with other users. They are less reliant on pre-defined plans that may not be suitable for an individual’s unique and changing needs. Customers are also in a much better position to service themselves directly, or via social channels, rather than being subjected to “cookie cutter” customer service models.”

For mobile operators, digitalization and virtualization are key to developing the experiences customer want and increasingly expect. With the decoupling from physical network resources virtualization offers, MVNOs get full control to design and develop complete end-to-end services and experiences to maximise impact. Digital touchpoints, through apps, web portals, social media and more, give customers the convenience and flexibility to access services as and

when they want. And the ease of integrating advanced technologies like analytics and AI into cloud-based digital platforms means operators can deliver richer, value-added experience, using data to personalise and AI to offer convenient self-service option.

As Analysys Mason points out, the main benefits for mobile operators are a reduction in churn, cost savings from creating more efficient service streams and the potential to grab market share by providing better service than competitors. That is why, it argues, major carriers such as AT&T, Telstra and Veon are prioritising investment in customer experience in their digital transformation plans.

Whether they are shopping for groceries or upgrading their mobile plan, consumers want the convenience of being able to do whatever they want in the here and now. It is an expectation that has been created by the digitalization of everyday life, via the internet, smartphones and, indeed, mobile connectivity.

Qvantel’s Jaco Fourie argues that the way digitalization has changed consumer behaviour is forcing mobile operators “to seek radically more efficient methods of doing business to serve customers according to their new needs and expectations.” He points, for example, to analysis from Forrester Research which suggests that self-service and automated conversations are two of the key trends in customer service, simply because people would increasingly rather resolve issues themselves than go through an agent or speak to a sales clerk face-to-face in a store.

Analysys Mason predicts that mobile operator investment in automated attendant solutions will grow at a CAGR of 67% up to 2021.

Operators which have already embraced this technology include US MVNO Ultra Mobile, which says that the introduction of AI-powered chatbots into its customer service operations has helped it to increase first-call resolutions to 80% and led to a rise in its net promoter score. One of the key benefits it has seen is reducing the amount of time agents spend handling routine, basic queries, meaning they can focus attention on more complex issues.

Fourie also argues that the e-SIM, if and when it takes off in consumer devices, will provide another means for mobile operators to deliver more convenient and flexible services to customers. “An eSIM will replace the current system where an operator must issue a chip to a new customer in order to on-board them to the

AT-A-TOUCH CONVENIENCE

network, with a digital system on the device that fulfils the same function,” said Fourie. “This will be updateable remotely and will allow easy operator switching. To properly utilize this system – something that is highly in demand – digital sales channels are vital. In the future world where customers can even more easily change their operators, the operators with the best, leanest and most customer-oriented digital processes will win.”

One company with an innovative take on providing seamless provisioning and accessibility services via e-SIM is Idemia. The company uses what it calls an ‘augmented identity’ solution to offer self-registration for mobile services using biometrics. The idea is to completely remove barriers from customer acquisition and access - users do not even have to register or sign in, everything is controlled by biometrics to offer the ultimate in speed and convenience.



SERVICE PERSONALIZATION AND DIFFERENTIATION

One very visible way in which digitalization is helping to usher in personalization of mobile service is the emergence of online MVNOs offering 'Build Your Own' call and data packages. Companies such as Simyo in Spain and Yodo in Malaysia let customers choose the data and minutes they want and provide a customised price for the plan.

Yodo also offers add-ons such as 20GB ring-fenced data usage for services like Facebook, WhatsApp and YouTube. The whole service is available via an app, through which you can manage plans, order and activate SIMs and make payments.

On a much broader scale, businesses of all types are increasingly looking to personalize services by making use of customer data. Mobile operators sit in a position of power in the growing trend towards hyper-personalization simply because of the enormous volumes of data that can be collected from a subscriber's phone. Personal information, location data, browsing, mobile usage data and even financial data all add up to a valuable resource which other organisations want access to. As well as simply selling this data, mobile operators can create revenue streams by bundling in analytics services, or by monetising direct access to their subscribers, for example by triggering advertising alerts based on location data.

Another key issue is how operators can differentiate services dynamically for they can service multiple

markets at once. Mobile services have traditionally been differentiated through coverage, tariff structures and pricing, but each model has had to be supported by separate infrastructure with little opportunity to cross-pollinate opportunities from one to the other. MVNOs, despite the advantages of size and perhaps digital-only operations affording them some level of agility, have still been straightjacketed in how they respond to market opportunities by the infrastructure provided to them.

By allowing multiple operational models to be run on a single infrastructure, virtualization breaks the shackles. One exciting development to come out of this is automated policy management, which will lead to dynamic pricing and resource allocation. Cam Cullen of Procera Networks explains: "[Operators] want management solutions based on more granular information, such as user plans, device types, applications and behavior, to transform congestion management and optimize their infrastructure. Virtualization of policy control functions enables this transformation."

Throughout the mobile ecosystem, this approach means everyone, from wholesale through retail to the end user, could pay for what they used. Network resources can be optimized according to demand across multiple services, leading to huge efficiency gains and a much improved end user experience. It would also give MVNOs greater opportunity to differentiate their services for specific niches at a much more refined level, adopting more of a 'full MVNO' model.

SUMMARY: MAKING THE MOST OF THE OPPORTUNITY

There is no shortage of benefits in terms of what the progress of digitalization and virtualization in the mobile industry might achieve. At the start of this report, we stated that the WEF calculates that digitalization could deliver \$100 trillion in additional value to the global economy over the course of the next decade. We have explained how, with connectivity an important ingredient in the digital project, the mobile industry sits right in the middle of that value pool, justifying the WEF's assessment that there is \$2 trillion in value up for grabs for the telecoms industry.

The switch to digital business models built on virtualized networks promises to drive efficiency, drastically reduce infrastructure overheads, and provide mobile service providers with much greater agility. Freed from the shackles of physical networks, both in terms of geography and available resources, operators will be able to provide services anywhere, at any scale, in direct response to demand, and with vastly reduced time-to-market.

They will be able to enter new markets and innovate with new services, both B2C and B2B, to create new revenue streams. They will also be able to prioritise the customer experience, meeting expectations for at-a-touch, in-the-moment convenience and hyper-personalization with dynamic differentiation on pricing and provision.

There will of course be challenges in achieving all of this. Qvantel's Jaco Fourie suggests that, due to their complexity, digitalization projects have a high failure rate. "Some of the most common challenges that companies face are the overwhelming complexity in existing legacy systems, lack of internal expertise for driving major transformation, employee resistance to change, a lack of support from 3rd party suppliers, budget constraints and a lack of courage to drive a real change in the business, not just in IT systems," he said.

MDS Global's Gary Bunney agrees. "Many service providers fail because it involves not just a system change but also to change in skills, resources, processes, culture, structure and shared values," he said.

So what can mobile operators, and MVNOs in particular, do to make sure their digitalization efforts don't fall by the wayside and they can maximise the benefits available? In terms of network virtualization, of course, MVNOs are dependent on the infrastructure transformation projects undertaken below them, and may have to wait several years for 5G to reach critical mass. But here are five takeaways to keep in mind as key principles for digitalization:

FOCUS ON THE CUSTOMER

The customer sits at the heart of the digitalization process. Largely thanks to the the smartphone, the digitalization of our personal lives has happened in advance of transformation in business. Companies are now playing catch up to meet the expectations of their customers.

Digital strategies should be designed and developed from a customer first-approach. The key things that can be achieved through digital business - personalized service, frictionless

access, at-a-touch convenience and layered added-value services - will ultimately help to reduce churn and raise ARPU's.

MITIGATE RISKS

One of the key benefits of digitalization, especially in the context of adopting cloud-based operations, is cost reduction. Not only does this have benefits in terms of reducing overheads from physical equipment and infrastructure, it also means switching from CAPEX to OPEX expenditure. As Gary Bunney argues, this is helpful for MVNOs who are looking to innovate with new services and business models - if your suppliers are cloud-based 'as-a-service' providers, you can mitigate investment risk by spreading the costs via OPEX subscriptions.

COLLABORATE

For operators looking to enter new markets with new services, one of the major challenges is relevant expertise. For example, for an MVNO to adopt a DevOps approach and to start custom building solutions for customers, it needs access to programming skills. Rather than go to the trouble and cost of recruiting directly, another approach would be to seek strategic partnerships with software house that could provide the necessary expertise.

Many in the industry believe, that with the era of open APIs on software-defined networks approaching, the future of the industry will depend on abandoning the 'walled garden' approach and instead see players look to share value across a much more collaborative digital ecosystem.

ENGAGE

We have already said that focusing on customer needs is important for reducing churn. A further way to cement this is to actively seek to engage customers in your brand. Even with all the innovation in tariffs and billing you can muster, when it comes purely to selling voice and data, there is little to differentiate one operator from the next except for price. That gives your customers little incentive to stay if they see a better deal from a competitor.

Their way to make customers 'stick' is through added-value services. Whether it is through content, financial services, roaming or so on, the digital operator should be thinking of ways to make their brand an unforgettable first choice.

INNOVATE

Finally, digitalization is all about innovation, and its spirit should pervade throughout any transformation project. As Deutsche Telekom's Federico Homberg suggests, innovation is about more than just looking at new products, it means innovating with business models, with processes and with the structure and culture of a business itself.

In other words, it means being bold and embracing the exciting digital future wholeheartedly.

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