



Vitrifi InfoBrief

Mastering the Wholesale Fibre Broadband Challenge with Open Access Optionality

Helping telcos create exceptional customer experiences, maximise interoperability and master the use of high quality actionable data

July 2024

Connecting Futures, Transforming Lives

Empowering telcos in their digital evolution: as a strategic partner in network transformation, we empower telcos to embrace a data-driven, digital-first future.

From the very start, we have worked towards full complex, intent-driven automation, leading to extraordinary outcomes for developer-friendly orchestration and monetisation at scale. As we work towards a data-centric autonomic networking future, our modular programmable services will enable operators to build their perfect solution, and ultimately create extraordinary customer experiences.

This InfoBrief delves into the evolving fibre broadband landscape and the changing dynamics of wholesale service provision. It highlights the challenges faced by Network Operators and Retail Service Providers, offering actionable steps to address persistent and critical pain points, create exceptional customer experiences, maximise interoperability and master the use of high quality actionable data.

To learn more about how we can help you, please contact: [Vitrifi | Contact](#)

www.vitrifi.net

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Introduction

The telco ecosystem of the future will see the complete eradication of the typical breakdown in the flow of data, rules, and instructions – where participants can truly collaborate and ultimately deliver on-demand, personalised, exceptional experiences to end-users.

It is clear that “Very High-Capacity Networks” (VHCNs) sit at the centre of supranational plans for digital development in the next decade and will be critical in ensuring the future success of FTTH/B uptake, as the copper switch-off continues.

The acceleration of copper switch-off towards a ubiquitous landscape of fibre broadband, alongside the emergence of 5G, artificial intelligence (AI) and machine learning (ML), edge computing, APIs, computer vision and network function virtualisation (NFV), has propelled the industry into a new era of innovation. Together, these technologies empower telco providers to adapt swiftly to emerging trends, create value-added services and meet the evolving demands of our digitally connected world.

To maximise this opportunity, telcos need to architect their infrastructure and applications in a way that is optimised for speed and quality. In a world where microseconds matter, telcos must ensure that their applications and services move as quickly and reliably as possible – on the microsecond – forever.

There is universal recognition that networks of today are insufficient for tomorrow’s needs, and networks need to swiftly adapt to meet user requirements. Every new AI application will generate more data, further accelerating demands on networks – which ultimately need to be adaptive, scalable, secure, sustainable, self-optimising and self-configurable.

As every subscriber, every person, every household, governmental and commercial entity experiences the digital universe in very individual ways, through their own collection of applications - the telco of the future will need to harness characteristics that represent a fundamental shift from a laggard organisation made-up of siloed business units to an agile entity in which digital-and-analytics DNA infuses everything the company does.

The Global Telecoms Industry is at a Critical Juncture

The global telecoms industry is at a critical juncture, as it is becoming extremely difficult for operators to differentiate themselves, leading to the commoditisation of connectivity and eroding margins.

In this challenging landscape, customer experience has become the primary competitive differentiator.

The rising demand for FTTP presents a significant opportunity for Wholesalers with a first-mover advantage in any given location. However, the need to deploy/upgrade a new network introduces additional challenges throughout the customer provisioning journey.

For FibreCos, the main goal is to increase tenancy on their networks, aiming to have as many households and businesses they pass, to subscribe to their services. Tenancy is emerging as a more important KPI than homes passed due to growing competition and pressure on margins and internal rates of return (IRRs). However, achieving high tenancy rates is just the beginning of an end-to-end provisioning journey, from initial contracts, and onboarding, to service activations, and ongoing service delivery.

Wholesalers must minimise disruptions, neutralise pain points and meet Retail Service Provider (RSP) expectations at every stage. Implementing a wholesale fibre business model requires careful adjustments to systems and processes to avoid the high costs that incumbent Communication Service Providers (CSPs) face as they attempt to simplify legacy technologies and systems, especially those compounded by mergers and acquisitions.

Many operators lack a comprehensive understanding of the dynamics and the necessity of developing a wholesale offering.

Wholesaler Success in a Competitive Market

Wholesale arrangements between Carriers and Service Providers have traditionally evolved using customised, black box solutions, involving extensive order and documentation exchanges, before moving into monolithic vendor lock-in scenarios.

For FibreCos, success hinges on exceptional product, price and service, which are equally critical for RSPs but have different implications at each layer. To win, Wholesalers must ensure that their offerings enable RSPs to deliver exceptional experiences to end-customers. By addressing Service Providers’ pain points, Wholesalers can differentiate themselves and succeed in this competitive market.

Vitrifi: A New Architectural Paradigm

As Vitrifi tools-up the industry with a new broadband operating system that enables a seamless control fabric for any network in the world, it will empower...

both Buy-side (Retail Service Providers) and Sell-side (Network Owners/ Operators) customers to modernise, transform, innovate, and better serve individuals, businesses and society as a whole.

We have removed the tangled myriad of systems capex and massively broadened capability and cost-applicability. And importantly, in being able to bring brand choice to subscribers across the plethora of disparate networks, this will make a revolutionary impact on the current patchwork telco landscape.

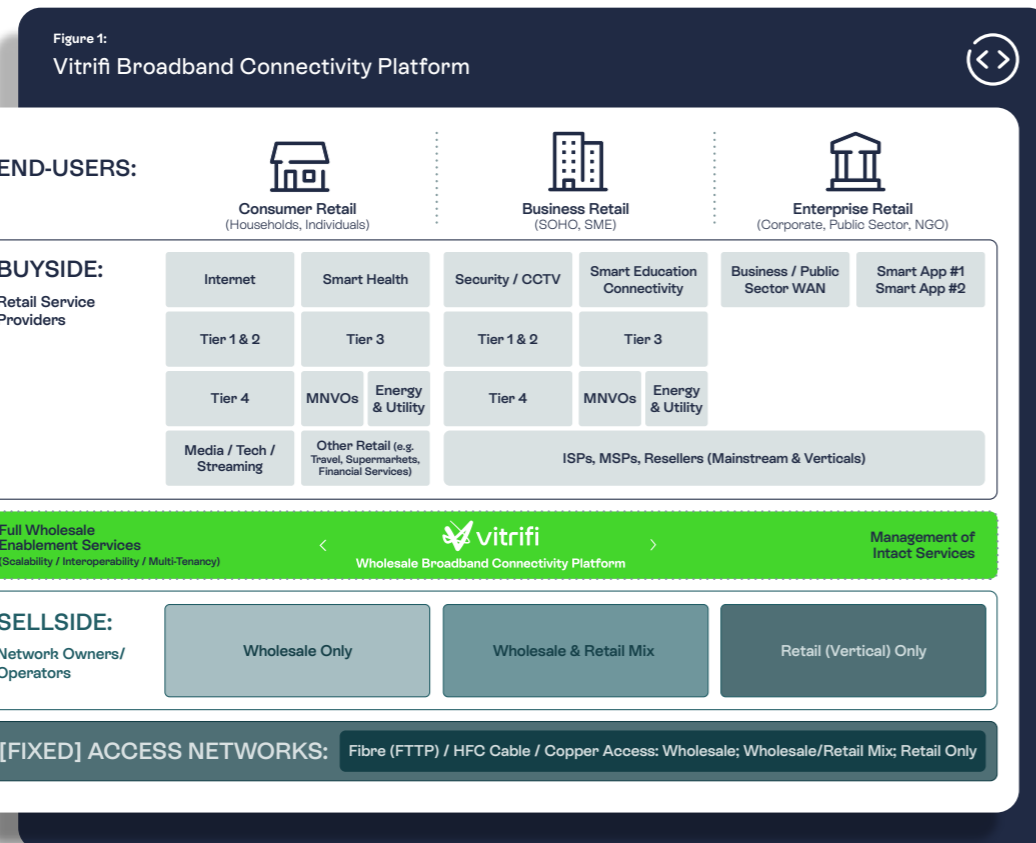
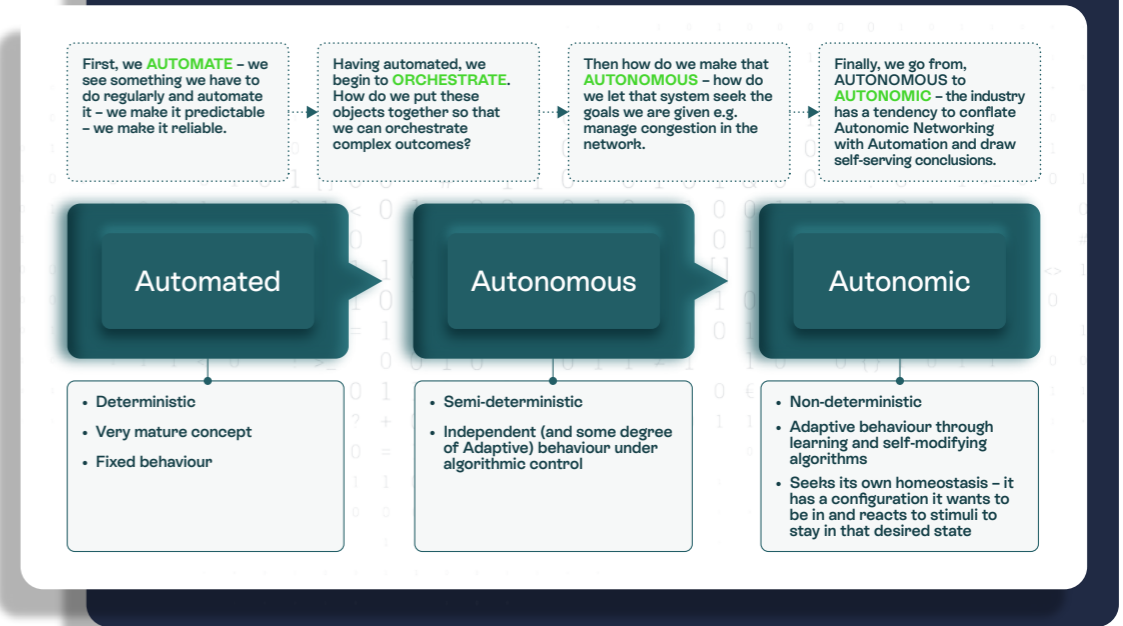


Figure 2: Automated-to-Autonomic



Our adoption of closed-loop, data-centric autonomic dynamics propagates a continuous feedback loop which enables broadband networks to continually adapt and optimise network resources to maintain performance and reliability.

In practical terms, this might involve algorithms that monitor network traffic, analyse performance metrics and dynamically adjust parameters such as bandwidth allocation, routing paths, quality of service (QoS), and quality of experience (QoE) settings to ensure optimal performance and efficient resource utilisation.

This adaptive behaviour helps to improve the overall user experience and maintain network stability even in the face of varying demands and environmental conditions.

From the very start, we have worked towards full complex, intent-driven automation, leading to extraordinary outcomes for developer-friendly orchestration and monetisation at scale. As we work towards a data-centric autonomic networking future, our modular programmable services will enable operators to build their perfect solution from start to finish.



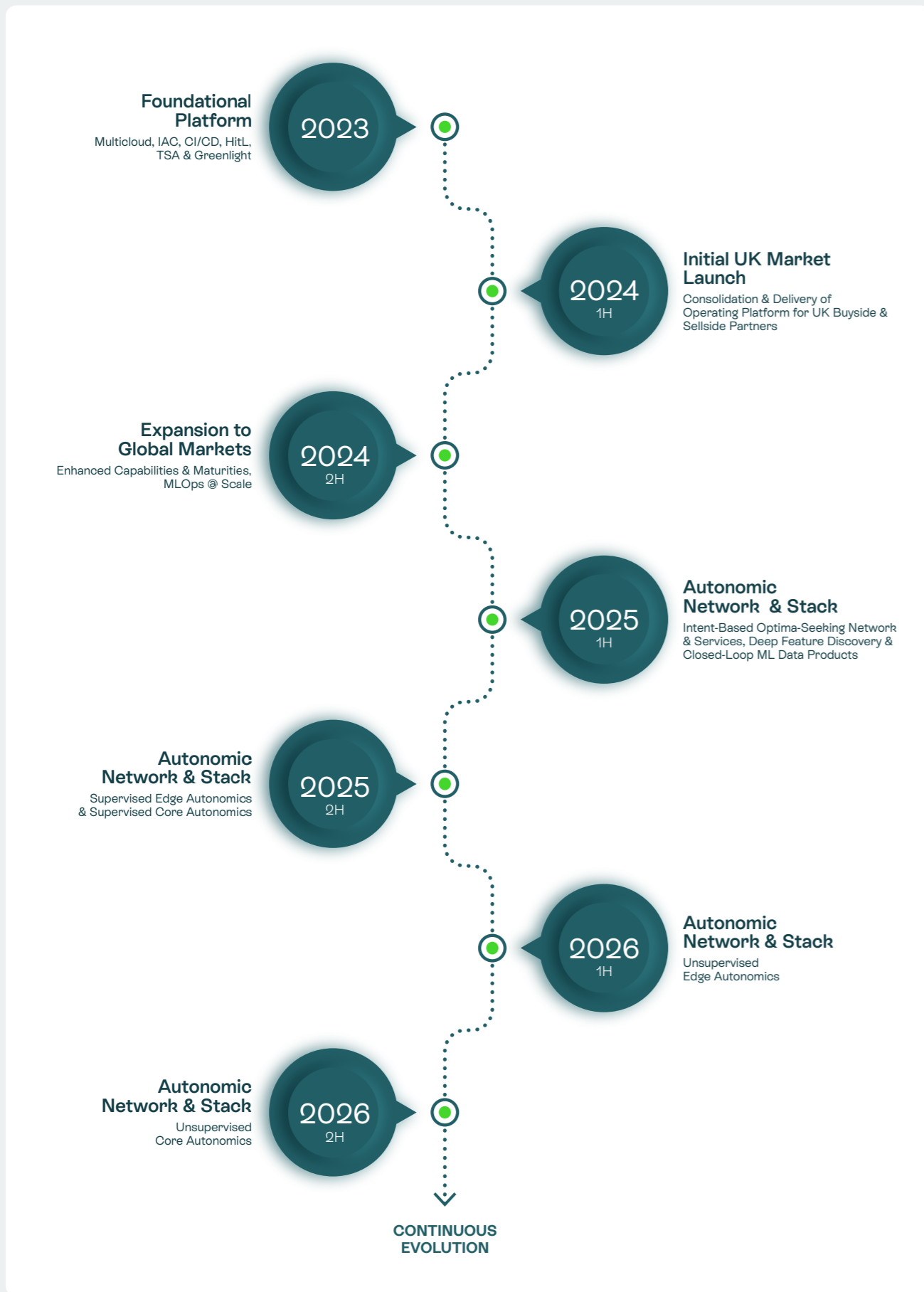


Figure 3: Vitrifi Market Evolution

Brain-Bending Elegance

It takes a new broadband operating system to orchestrate the complexities and mitigate the brittle nature of an archaic, complicated network infrastructure. Vitrifi's platform provides unmatched operational and financial benefits for fibre Network Owners/ Operators and Retail Service Providers (RSPs), improving customer experience and operational efficiency through its powerful suite of modular components – powered by VALERIE (Vitrifi Autonomic Lattice Re-Configuration Engine) – the “brain” behind our operating system.

Vitrifi's automated open access capabilities can be turned on-or-off, depending on the Network Operator's preference. If a Network Operator chooses to deploy a traditional closed access network (e.g. single ISP offering), the same automated provisioning will apply to other service offerings on the network. Open access optionality can be activated at a later stage as and when required.

The platform serves as a neutral host or aggregator, connecting fibre Network Owners/Operators with Service Providers.

This single point-of-platform contact will automate and orchestrate the entire lifecycle of orders and service provisioning.

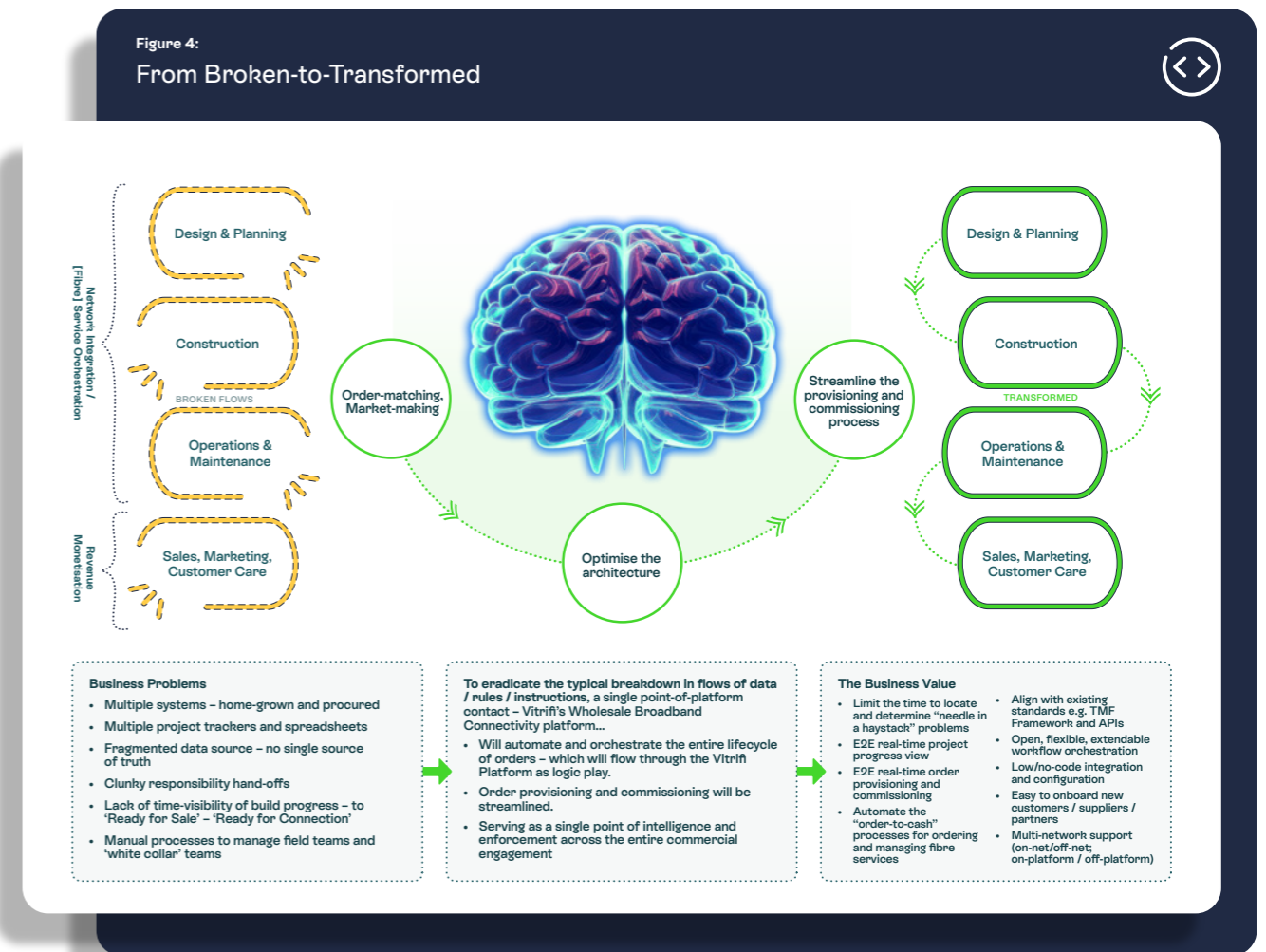
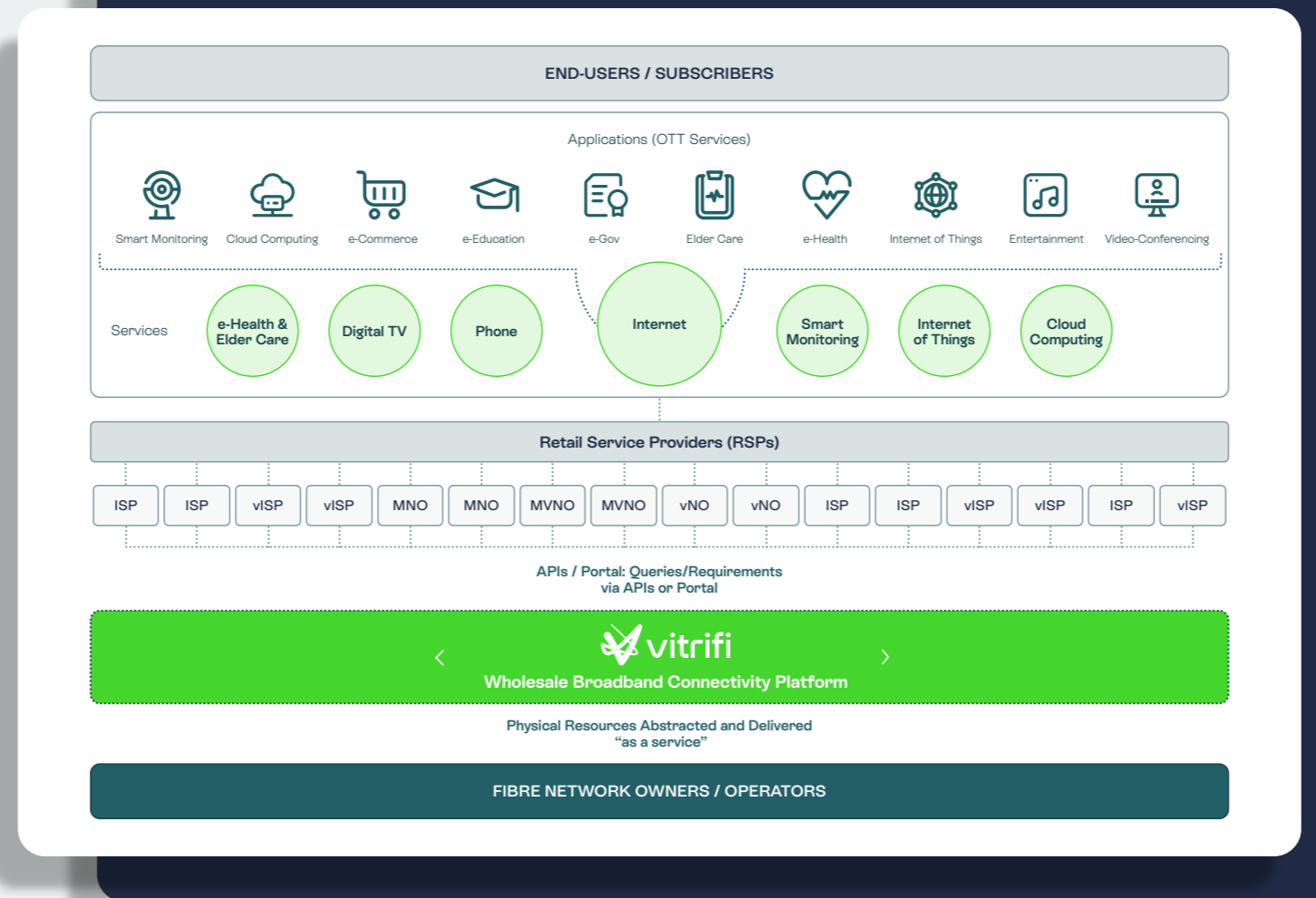


Figure 5:
Vitrifi Platform



Rapid Onboarding of Service Providers & Instant Provisioning

Vendor-Neutral

Enables you to seamlessly integrate with your preferred products and work with market-leading hardware (ONT, OLT, Switches, Routers, CPEs etc.) – to ensure best-suited hardware and software tooling, along with integration capabilities are deployed for various provisioning systems.

Software

Connects to all your essential products/ services and integrates to provisioning systems.

Hardware

Compatible with existing hardware from market-leading vendors.

At a glance, Vitrifi:

Has a set of platforms and tools that can solve a set of problems, accessed via a GUI; and more importantly, provide pathways to enhance journeys and pipelines.

Has built a system that allows Wholesale Open Access Broadband Operators to offer services to Retail Service Providers (e.g. ISPs), both on-net (within their own network) and off-net (outside their network).

In fact, there is no “on-net/off-net” as our platform presents itself as a series of overlays between disparate networks.

Single Pane of Glass:

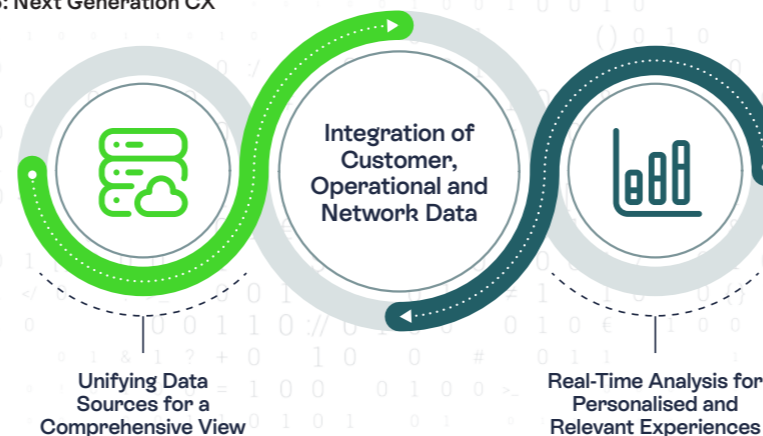
- RSPs can order and manage their subscribers’ fibre connections across multiple Wholesale Networks/NetCos in a single unified format;
- Network Operators and RSPs will look at data through an API Query or Portal – the source and/or type of query is irrelevant.

Our Event Engine – adopts a unified approach: for the recording and publishing of all events within an integrated system for consumption via APIs (e.g. orders submitted/completed/rejected/product(s) and services(s) activated etc.)

Our ‘data mesh’ philosophy and design that underpins our multi-cloud hyperscale architecture, transcends the traditional approach to data management.

Better data accuracy and utilisation leads to better planning, troubleshooting and monetisation. Our approach is centred around the pipeline that moves and processes data between systems, to ultimately eliminate data silos, support any data source, and make all data discoverable and searchable.

Figure 6: Next Generation CX



Can serve as an aggregator of RSPs and rapidly stand-up tenancies for Sellside NetCo/Wholesalers at scale, which means we can host any number of RSPs (e.g. ISPs/vISPs) and allow them to place orders on our NetCo/Wholesale customer networks.

Multi-Tenancy:

- Rapidly stand-up multiple tenancies at scale;
- Enforce static and dynamic roles and permissions via federated multi-tenancy.

Business Model-Agnostic:

- Supports any variant Wholesale model with logical and/or physical separation of persistent resources.

Has an API-first approach: everything accessed via a GUI can be accessed via an API Query or Portal;

Our role-based access control (RBAC) systems allow us to configure custom roles tailored to the needs of individual customers;

Governance and Security:

Strictly adheres to a UK TSA-level cyber security and governance model.

Benefits for Fibre Network Owners/ Operators

Connect your infrastructure and network with a broad range of RSPs. Our platform streamlines the integration process, offering end-to-end automation anchored by a state-of-the-art modular system, that can seamlessly serve multiple service providers – meaning quick and easy access for RSPs to tap into your network.

- Best-in-class technology and ecosystem
- Creation of exceptional customer journeys and experiences via one secure platform with all the information you need, to automate provisioning and service upgrading
- Rapid onboarding of new RSP tenancies
- End-to-end lifecycle management software
- Streamlining and acceleration of business-critical processes
- Maximise network utilisation
- Reduce cost to serve, cost of capacity and time-to-revenue

This enhances the value of your fibre assets, reducing cost to serve and time-to-revenue, whilst opening-up unlimited choice of services for end-users.

Benefits for Retail Service Providers

Smart product/service and customer management, rapid time-to-market and instant zero-touch provisioning.

Our platform helps create exceptional customer journeys and experiences, streamlining operations and enhancing service delivery - offering a competitive edge in a rapidly evolving market.

- Smart product and subscriber management
- Rapid onboarding
- Instant provisioning
- Carrier-grade experience
- Rapid time-to-market
- Reduce cost-to-serve and time-to-revenue timecycle

Operational Benefits

Optimise efficiencies and control by embracing automation, remote management, seamless integration, robust security and future-proof technologies.

- Fully integrated and unified control
- Rapid process automation
- Easy integration
- Robust security
- Future-proof

Financial Benefits

Enjoy 'predictable' financial outcomes with a focus on expanding business potential.

- Operational automation for financial profitability
- Reduce and predict costs for operations, investments and upgrades from one powerful platform

- Complicated systems are brittle, complex systems are not.
- When telco systems became brittle, they propelled the onset of a chaotic domain where telco started to breakdown.
- Vitrifi's technical innovation can extract and diminish the chaos, orchestrate the complexities, and deliver simplicity at scale, to deliver commercial intents that will ultimately drive the new economics of telco.



Figure 7:

Vitrifi's technical innovation can extract and diminish the chaos...

The Broadband Landscape

Broadband networks have developed exponentially since the first deployments in the early 2000s, evolving from networks offering hundreds of kilobits per second to today's fibre-based networks with a global average speed of 200Mbps.

In the last five years alone, the average broadband speed has increased by over 500%, and in some countries, such as China, by as much as 3,000%¹.

The events of the last few years have yielded unique insights into just how critical stable broadband access is and will continue to be. As a knock-on effect of the digital transformation and pivot from the pandemic, new internet devices and bandwidth-hungry applications, growing broadband penetration into developing markets, and shift of intelligence to the cloud, there is stronger demand than ever for digital products and services.

As of January 2024, there were 5.4 billion internet users worldwide, equating to 66.2% of the global population. With the global offline population decreasing from 2.7 billion in 2022, to 2.6 billion in 2023 – representing a 1.8% growth in new internet users (97 million new users) coming online for the first time during 2023² – we still have a long way to go, to connect the unconnected.

Demands on the underlying broadband networks are growing exponentially. Total international bandwidth now stands at 1,217 Tbps, representing a 4-year CAGR of 28%. Global internet usage continues to grow at a rapid rate, with global traffic now at over 33EB per day³, with users averaging 4.2GB per day, across the globe's 6.4 billion mobile and 1.4 billion fixed connections. The largest content providers continue to dominate with the top 8 brands generating more internet traffic than everyone else combined, driving 65% of all fixed traffic and 68% of all mobile traffic.

The exponential growth of data is undisputed, but the numbers behind this explosion - fuelled by IoT and the use of connected devices – are hard to comprehend, particularly when looked at in the context of one day.

1. Wholesale Broadband Association Report (Next Generation Broadband Roadmap 2023 to 2030)

2. The State of Broadband (Broadband Commission) 2023 Report

3. Sandvine's 2024 Global Internet Phenomena Report

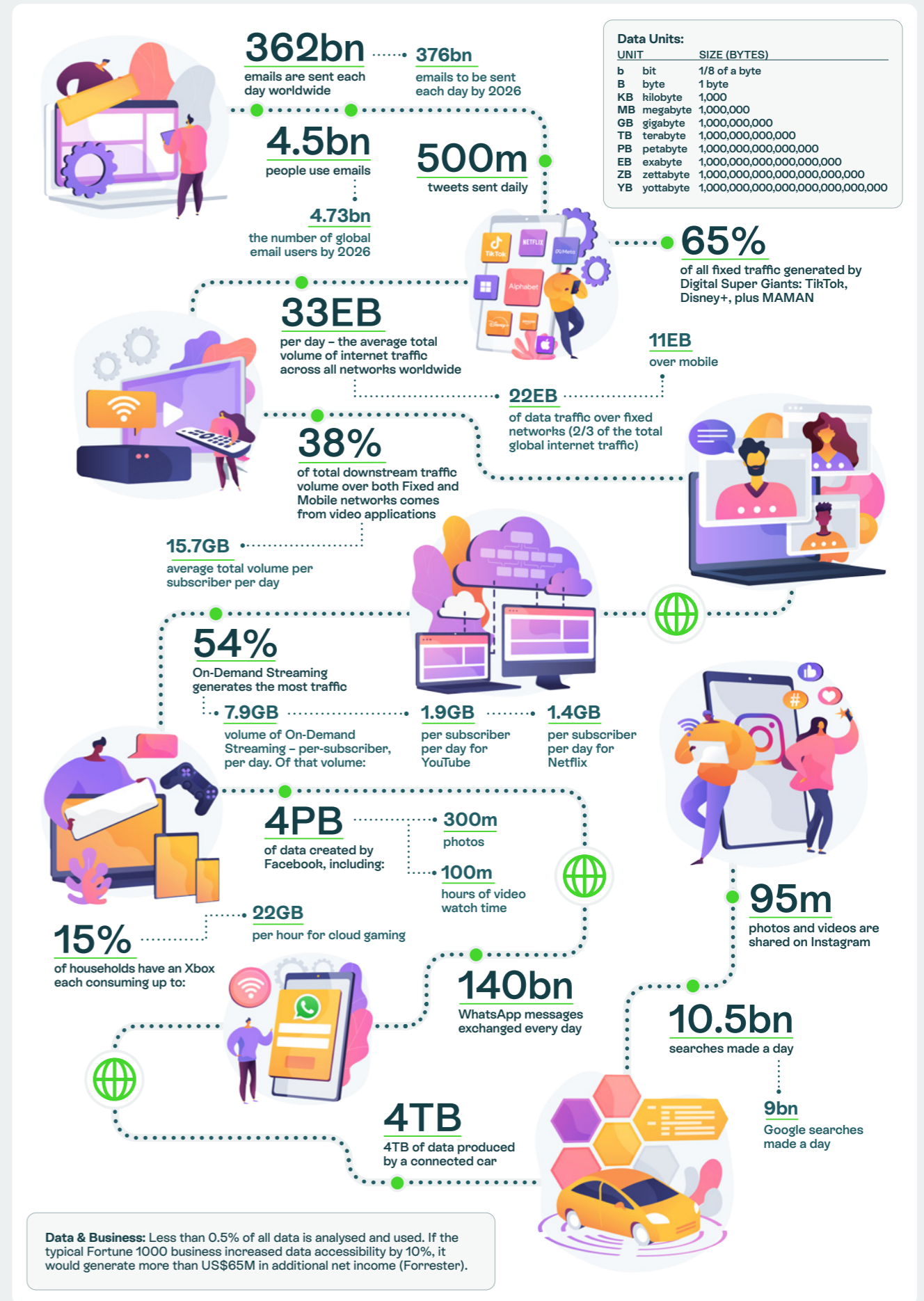


Figure 8: A Day in Data

High speed is no longer the only important network KPI as consumer and enterprise applications are also demanding ultra-low latency and high levels of reliability and service consistency.

Networks will be expected to operate with a high level of autonomy, have awareness of their surroundings through greater sensing technology, and be highly secure and sustainable.

At a time when broadband connectivity has never been in more demand or more critical to our day-to-day lives, investment in the deployment of multi-gigabit fibre

networks continues at pace across cities and rural areas.

According to broadband market intelligence firm, Point Topic - as of Q3 2023, the number of global fixed broadband connections reached 1.42 billion, with fibre-to-the-home or building (FTTH/FTTB), making up 68.3% of connections. This reflects a growth rate of 1.6%, compared to the previous quarter.

Furthermore, research⁴ predictions indicate that the global FTTH market size is projected to grow at a compound annual growth rate (CAGR) of 11.6% from 2023 to 2030.

Figure 9: Global Fixed Broadband Subscriber Growth Trends (Source: Point Topic)

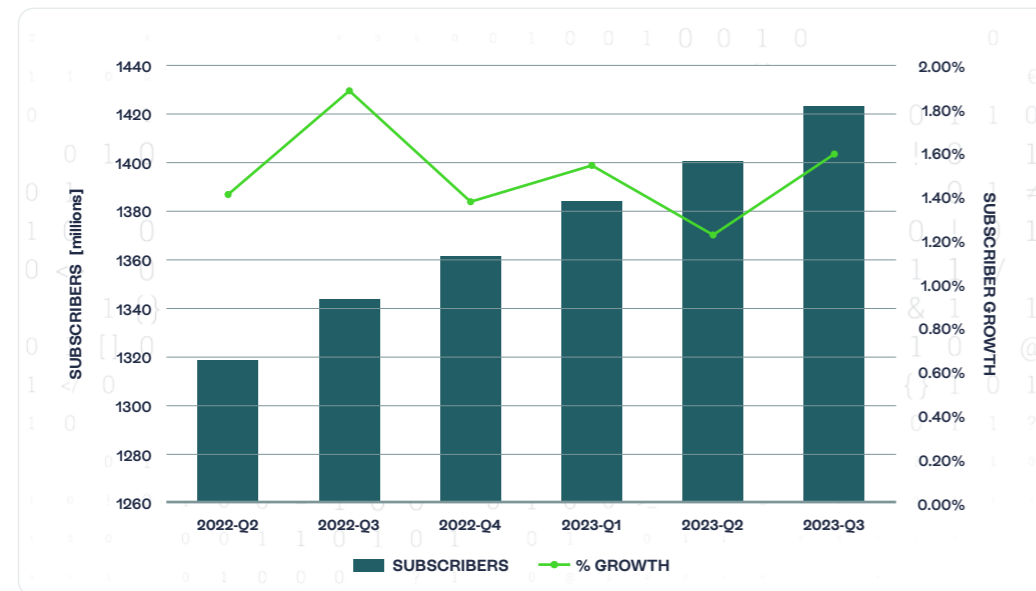


Figure 10: Changes in Broadband Technology Market Share (Source: Point Topic)

Broadband Technology	Q2 2023	Q3 2023	Difference
Cable	15.4%	15.26%	-0.14%
Copper	7.48%	7.19%	-0.29%
FTTH/B	67.63%	68.25%	0.62%
FTTx	7.13%	6.96%	-0.16%
Satellite	0.25%	0.25%	0.00%
Wireless	1.69%	1.68%	-0.01%
Others	0.42%	0.41%	-0.01%

4. Grand View Research Market Analysis Report – FTTH Market Size and Share 2023-2030

The changing shape of Fibre Broadband and Wholesale Service Provision

Structural shifts within the fixed access market are reshaping the broadband landscape, driven by a surge in private investment in FTTP and other fibre infrastructures.

This trend has loosened the traditional ties between infrastructure and service provision, fostering a more dynamic and commercially vibrant wholesale market.

Operational autonomy for Retail Service Providers (RSPs) historically necessitated significant investment in active network equipment and physical infrastructure.

However, the virtualisation of networks onto software platforms has introduced a transformative “Network-as-a-Service” paradigm. This approach, akin to “Infrastructure-as-a-Service”, enables autonomy and agility without the heavy capital expenditure traditionally associated

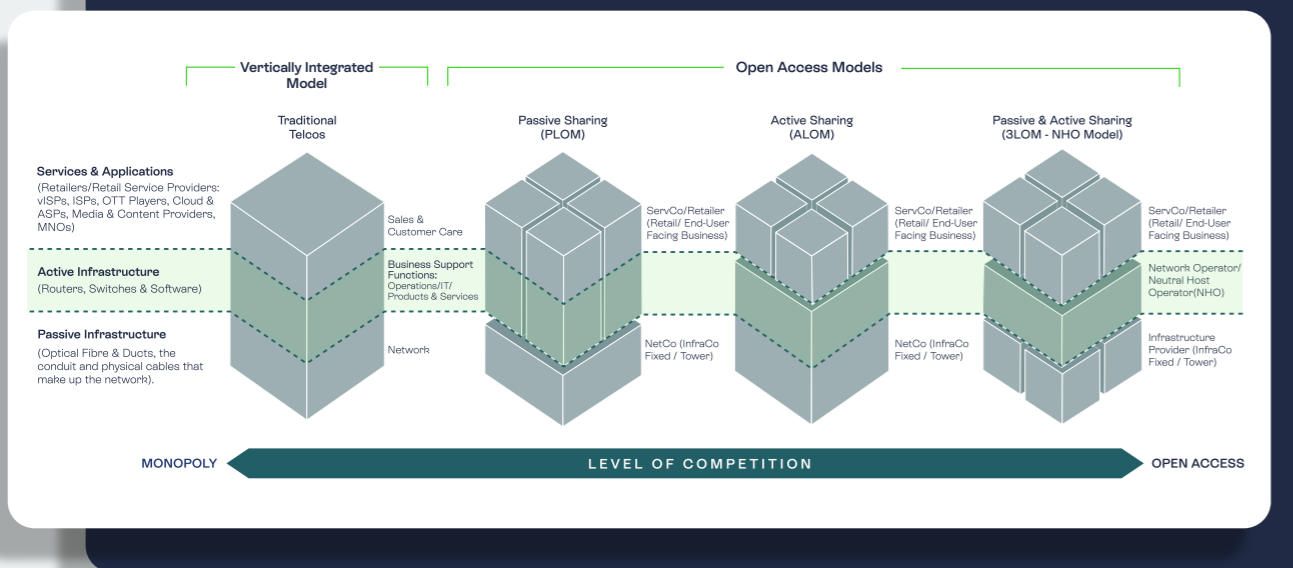
with infrastructure investments. As a result, RSPs can now access sophisticated network functionalities and capabilities without the burden of escalating capex intensity.

Furthermore, fuelled by new market entrants and technologies – in response to new digital market dynamics and an investor preference for focused businesses – many integrated telcos have started to structurally separate the division that operates the network (NetCo) from the end-customer facing entity (ServCo).

The goal is to refocus the business on either the end-customer or infrastructure to increase business agility and efficiency, and in turn, multiply their respective value in the market.



Figure 11:
Access Models



The Changing Shape of Wholesale Service Provision

FTTP is rapidly becoming the principal fixed access infrastructure worldwide. Take-up on these networks has increased to the extent that FTTP has become the de facto choice of infrastructure. Amidst this rapid expansion, a race is underway among new infrastructure providers and investors, who are progressively claiming larger shares of the overall deployment.

These new FTTP Infrastructure Providers come from a variety of backgrounds:

- New investments often in partnership with one or more established retail anchor tenants
- Utilities leveraging their existing distribution infrastructure to deploy fibre
- Operators expanding their enterprise or transport fibre capabilities into access networks
- Cable operators upgrading or supplementing their legacy HFC (Hybrid Fibre-Coaxial) networks
- TowerCos branching out into fibre access infrastructure

These providers have a mix of commercial models ranging from vertically integrated operators, who monetise their networks only through their own retail channel, to

wholesale-only, and some with a mix of retail and wholesale.

Some of the larger players, including incumbent operators, have carved out some or all of their access infrastructure and taken on a co-investor to accelerate build.

The headlong rush into fibre has witnessed competitive dynamics turned on their head. In markets such as the UK, it spawned the arrival of “altnets” – alternative network operators focused on delivering FTTH. They secured billions of dollars from banks and private investors to build networks where BT’s wholesale arm, Openreach, had either not arrived or was slow in building out fibre. However, due to slow subscriber take-up alongside the current dynamics in the financial markets, a growing number of these altnets are facing financial challenges, meaning consolidation in this space is now inevitable. Whilst the presence of an open access element is a common thread among many of the circa 100 altnet players, it is crucial that the final market structure includes genuine competition at an infrastructure level and at a national scale to ensure the UK does not lag behind the rest of the world.

In other countries, smaller mobile operators began challenging incumbents by investing in fibre. Many large incumbent operators also set-up dedicated fibre network businesses as joint ventures with private investors.

Many different funding models can be used to finance the rollout of broadband infrastructure:

Operators need to assess whether they can finance rollouts alone; an alternative option is to partner with other players to finance rollouts. Fibre carve-outs, where the operator splits off its current and/or future FTTP network into a separate subsidiary where ownership of the asset may be shared between the operator and the third party, have become common. Pure public financing and public-private partnerships also have an important role to play in financing the rollout of broadband infrastructure.

Against the backdrop of an increasingly competitive wholesale FTTP sector, new investment in FTTP worldwide is stronger than it has ever been, and in many cases new emerging market operators serve end-users that have not previously had any form of fixed broadband.

Investors and Owners/Operators of broadband infrastructure have many options when choosing a business model:

Including adopting a vertically integrated model with a single Retail Service Provider (RSP) or using a wholesale-only business model. Whilst vertically integrated models with no wholesale access offer the potential for the highest ARPUs, they risk lower subscription take-up, and the pitfalls associated with a closed anti-competition-anti-innovation model. Furthermore, it may not match with the provision of public funding for broadband infrastructure deployment.

The US had been slow to adopt wholesale open access as North American broadband markets have tended to be characterised by a multitude of vertically integrated operators.

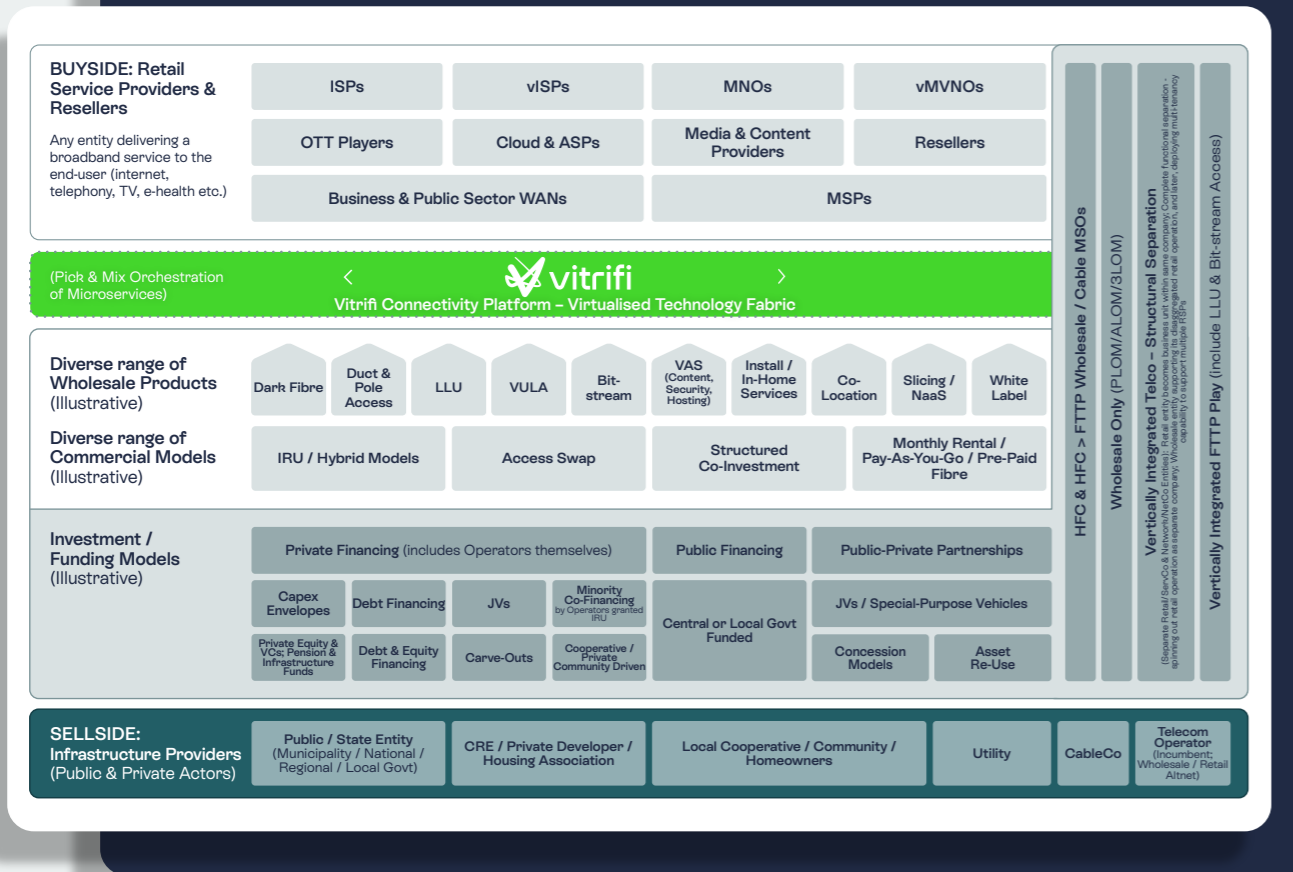
However, various local open access networks (for example - Intrepid, Ubiquity, SiFi, Utopia, Meridiam, Tillman and Underline) have developed in recent years, normally starting off with an anchor tenant before opening-up to multiple ISPs. Gigapower, is an example of this type of approach. In May of 2023, AT&T and Blackrock came together to announce a joint venture, called Gigapower. AT&T’s idea was to build a 1.5 million wholesale open access fibre network in the US which could leverage the financial strength of BlackRock and the operational/brand strength of AT&T. The JV is taking shape with AT&T as the anchor tenant. Whilst AT&T will be the first selling into the network, it is being built as an open access network, on the basis that this is a better way to drive-up network utilisation and to reach segments that AT&T might not be able to reach.

Community and Municipal broadband networks, once associated with popularity in parts of Northern Europe, is gaining prominence around the world. In the US, there are now 450 municipal broadband networks in operation serving over 700 regional communities – these include conduit-only networks, institutional networks, open access and municipal FTTH networks.

This landscape of new investment has created an increasingly diverse and complex value chain in broadband access.

It is important to note that the composition of the retail broadband access market is changing less dramatically than the infrastructure side. Through fixed-mobile bundling, the shape of the retail fixed broadband market is intrinsically tied in many markets to retail mobile. Cable operators’ enduring influence in TV distribution also acts as a drag.

Figure 12:
The Diversifying Broadband Value Chain



The move to Fast, Fair and Open

The history of telecom and cable monopolies has contributed to delays in infrastructure development for Open Access fibre networks. Historically, most operators have been reluctant to “share their infrastructure”. While tower sharing has existed for decades and RAN sharing has seen some success, the idea of Open Access networks on fibre has only really taken shape at scale in the last few years.

One of the most effective tools for ensuring internet openness is competition. Competition promotes efficient pricing, technical progressiveness, consumer protection and private investment.

An Open Access approach is designed to unlock the full potential of broadband networks, leading to rapid services

development, and driving rapid growth in subscriber take-up.

Subscriber empowerment is key to this growth, with the Wholesale Open Access platform providing the freedom to pick and choose whatever services subscribers want through a powerful and intuitive multi-service and support interface – all in one place.

With Open Access networks, predominant broadband services (e.g. Internet, telephone and streaming TV) will be joined more prominently by a wide range of new and innovative services. These will include Online Health Services, Distance Learning, Smart Home, Private Clouds, Smart Grid, Smart Transport, Emergency Communications, the Internet of Things (IoT), Smart City Applications, to name a few. There are no limits to how many more new applications and services can be introduced.

Many retail-only alternative FTTP operators will shift to a wholesale model over time, not only because of the continuing market power of the major players in the retail market, but also because of the opportunity to increase monetisation by developing channels with smaller players. The model they choose is likely to be an open access one, where the RSP becomes the anchor tenancy, before opening up the network to other RSPs. In addition, it is already clear that some cable operators will, should they upgrade from HFC to FTTP, shift to a wholesale plus anchor tenancy model, adding to the burgeoning number of wholesale fibre plays.

The mix of services that wholesale-oriented players offer is currently diverse, ranging from duct access through Layer 1 fibre unbundling, the various flavours of bitstream (VULA, aggregated Layer 2, and Layer 3) to pure resale.

Investors in broadband infrastructure need to be aware of the key metrics that will help to determine the business case and how these metrics can vary depending on particular rollout circumstances. On the cost-side, investors must consider costs per premises passed (and more importantly – connected – and “ready-for-service”), and on the demand-side, subscription take-up rates and ARPUs. For investment profitability, investors can assess metrics such as return on investment, net present value, and payback period.

All stakeholders should assess the many ways in which the viability of investment in broadband infrastructure can be improved. Broadly speaking, stakeholders can analyse measures that can help stimulate demand for broadband, initiatives that seek to reduce network rollout costs, operational best practices, policy and regulatory measures, and financing innovation.

Figure 13:
Wholesale Open Access Operator Roadmap for RSP Customers (Illustrative)



Subscribers are firmly in charge of how they use their fibre broadband network and will be able to switch between Service Providers and plans as quickly as their contract terms allow. In fact, switching between Service Providers or provisioning new services onto the network can be automatically activated within seconds of a subscriber making their choice. This subscriber empowerment forces Service Providers to up their game when it comes to the quality of service and support.

With automated virtualisation, subscribers will be able to slice their broadband connections into multiple private networks independent of their Service Provider.

Users can decide on the fly, whether they want to access a service over the public internet or over a private network for security, privacy or quality of service reasons. Imagine being able to establish a secure private connection for online banking transactions or a private network between a home and a local school.

This approach also unlocks a whole raft of Smart Grid and Smart City applications that cannot currently run over the internet due to privacy and security concerns. All these constraints are removed with a “true” Open Access model for broadband networks.

In Summary:

Digital transformation can be fully realised if access to high speed, robust and reliable communications networks and services are made available for all. An Open Access network infrastructure provides for a much healthier business ecosystem, one that is focused on improved service levels. This drives companies to innovate and compete with a wide range of applications and leads to rapid growth in subscriber uptake. When all of these things are combined, costs can be driven down.

With access to the best state-of-the art technology and services, both individuals, businesses and communities can thrive and realise their full potential.

Some of these new providers are selling direct to consumers and businesses while some are working with a wide range of RSPs (e.g. ISPs - Internet Service Providers) who provide the fibre service to their end customers.

But what happens after the gold rush? Will the cheapest price be the main reason why a customer/subscriber decides to select one fibre offer over another? Also, it's a safe bet to say that there will be consolidation. Some providers will build-up a customer base only to find themselves taken over by a larger player, and some providers will struggle and find themselves “consolidated”. Who will be the winners and losers when the post gold rush market conditions start to appear will be dependent on the decisions that are taken today as new operators, incumbent operators and RSPs select the platforms and systems on which to build and grow their business.

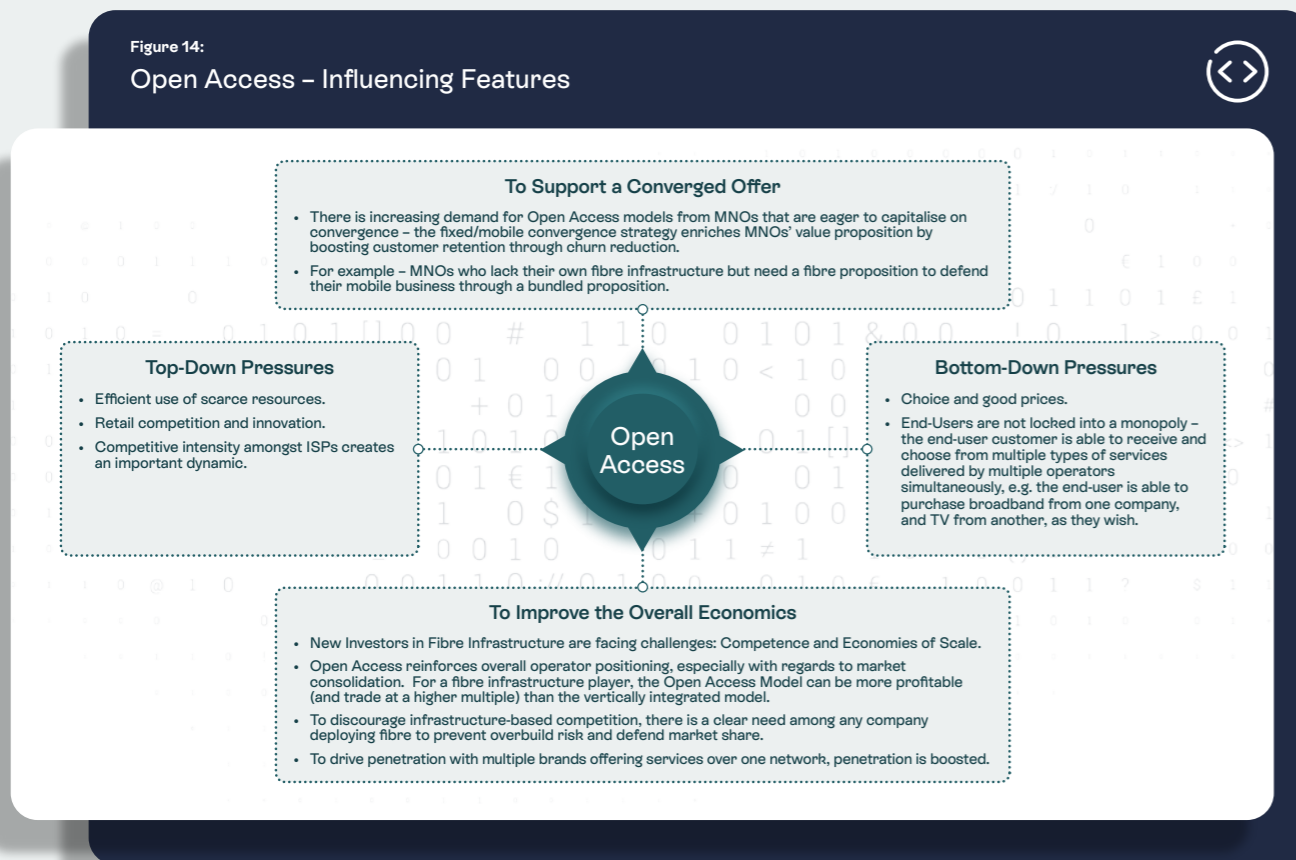
What happens after the gold rush?

The current rollout of fibre networks has been compared to a gold rush. The demand for data is increasing, the availability of funding is increasing, and in many countries, governments have an open policy that encourages competition to give customers a choice. This combination of demand, funding and open competitive policy is creating the gold rush.

Governments and equity firms are pumping billions into new fibre networks in order to ensure fast and fair broadband access for all. New fibre network providers are advertising faster broadband speeds at lower costs than the incumbent operators.

By working with systems that focus on customer experience, business agility and end-to-end automation, fibre providers will be able to take advantage of the resulting outcomes that will enable them to grow their business and differentiate when the initial fibre growth curve starts to level off.

Figure 14:
Open Access – Influencing Features



Neutralising Pain Points and Delivering Exceptional Customer Experience

The global telecoms industry is at a critical juncture, as it is becoming extremely difficult for operators to differentiate themselves, leading to the commoditisation of connectivity and eroding margins.

In this challenging landscape, customer experience has become the primary competitive differentiator.

The rising demand for FTTP presents a significant opportunity for Wholesalers with a first-mover advantage in any given location. However, the need to deploy/upgrade a new network introduces additional challenges throughout the customer provisioning journey.

For FibreCos, the main goal is to increase tenancy on their networks, aiming to have as many households and businesses they pass, to subscribe to their services. Tenancy is emerging as a more important KPI than homes passed due to growing competition and pressure on margins and Internal Rates of Return (IRRs). However, achieving high tenancy rates is just the beginning of an end-to-end provisioning journey, from initial contracts, and onboarding, to service activations, and ongoing service delivery.

Wholesalers must minimise disruptions, neutralise pain points and meet Retail Service Provider (RSP) expectations at every stage.

Implementing a wholesale fibre business model requires careful adjustments to systems and processes to avoid the high costs that incumbent Communication Service Providers (CSPs) face as they attempt to simplify legacy technologies and systems, especially those compounded by mergers and acquisitions. Many operators lack a comprehensive understanding of the dynamics and the necessity of developing a wholesale offering.

Wholesale arrangements between Carriers and Service Providers have traditionally evolved using customised, black box solutions, involving extensive order and documentation exchanges, before moving into monolithic vendor lock-in scenarios.

For FibreCos, success hinges on exceptional product, price and service, which are equally critical for RSPs but have different implications at each layer. To win, Wholesalers must ensure that their offerings enable RSPs to deliver exceptional experiences to end-customers. By addressing Service Providers' pain points, Wholesalers can differentiate themselves and succeed in this competitive market.

Exceptional Customer Experience: requires a holistic end-to-end customer journey approach

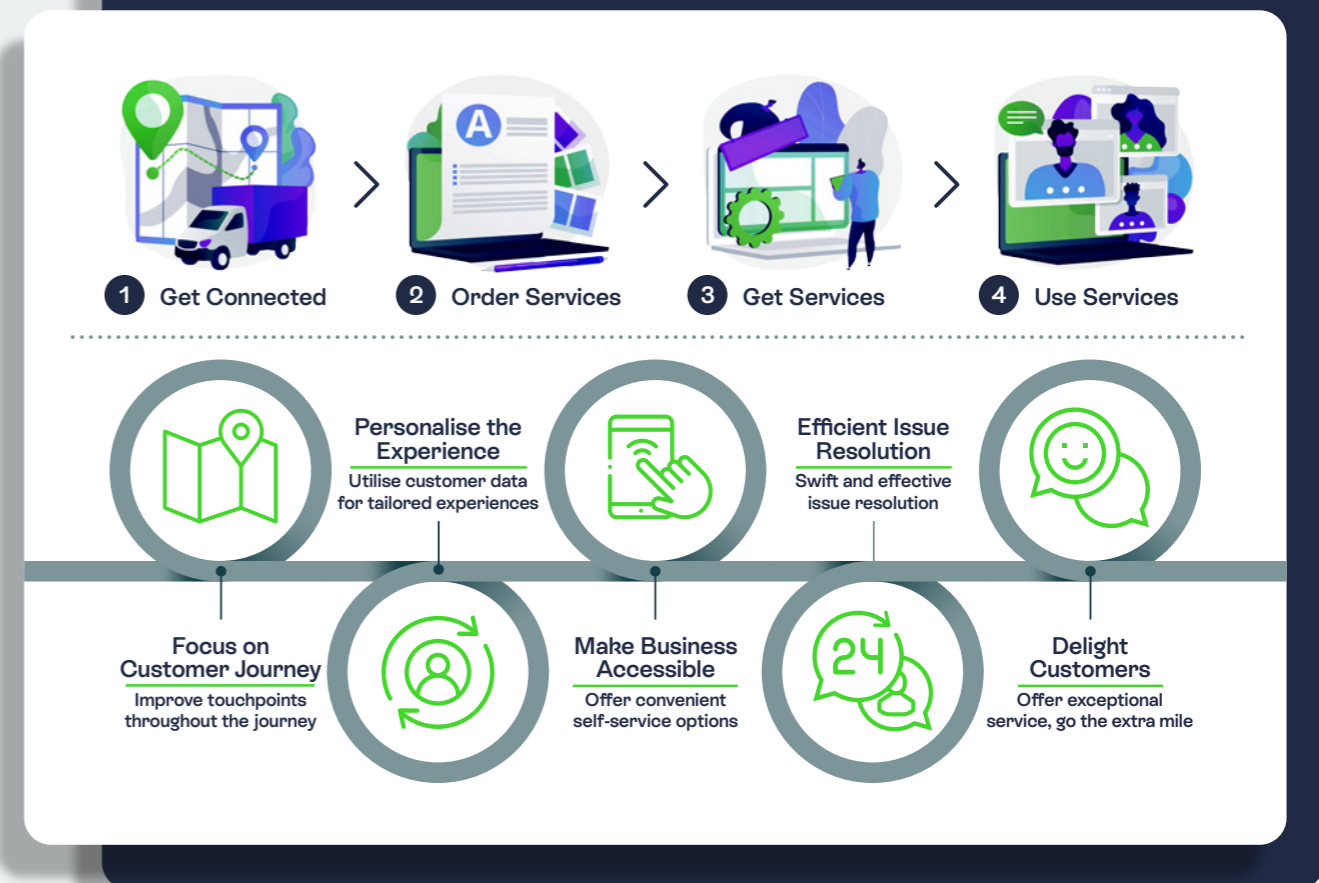
This is a significant pivot for many incumbent telco operators. Telcos commonly focus customer experience (CX) efforts either on re-tooling and optimising a digital friendly front-end, or on digitising the back-end. However, they rarely link the two effectively because many things can “get in the way”.

To create an entirely customer-centric organisation, these journeys must be enhanced end-to-end, leveraging data

and analytics to identify and eliminate customer pain points and create an experience that meets the promise of simple, predictive and proactive CX.

End-to-end, customer-led CX transformation encompasses all customer-facing, back-office and support functions, engaging each to orient the organisation toward a customer-first mindset.

Figure 15: Improving Customer Experience



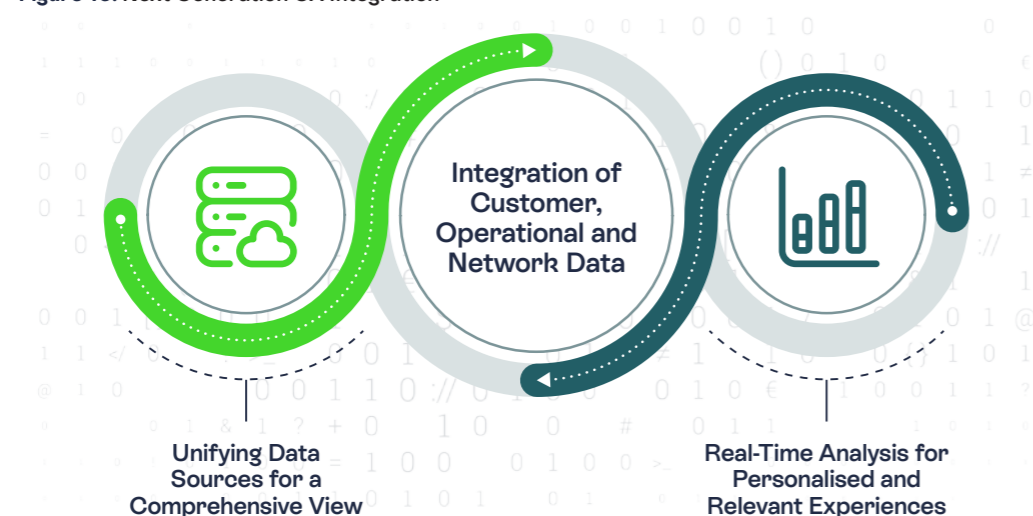
Creating the “extraordinary moments” needed to win

Traditionally, telcos have sought to improve CX through reactive interventions. They have used data to conduct research on customer experience, then assessed that data and adjusted their approach over time, with the goal of reducing customers’ call frequency.

Next-generation CX replaces this slow and reactive approach with one that

is simple, predictive, and proactive in order to create genuine service differentiation. This involves combining customer, operational, and network data to create highly personalised, relevant experiences in real time. By using data to predict customers’ needs, operators can proactively address issues and create “extraordinary moments” across all channels and at each step of the customer journey, offering the same quality of experiences as digital natives.

Figure 16: Next Generation CX Integration



Feeding the CX Predictive Engine

To enable the predictive and proactive support that is critical for next-generation CX success, an AA ‘brain’ uses a range of data inputs to create new insights about the customer. Vitrifi’s discovery capability seeks out interesting “haystack shapes”, beyond the ability to locate “needle-in-a-haystack problems”.

For example, whilst there are signs of progress in leveraging AA on network data to drive operational insights, network teams can potentially increase impact from this data significantly by combining them with customer insights. For example, can propensity to churn models improve precision by incorporating recent network KPIs as inputs? Similarly, can KPIs go beyond network focus into measuring customer experience by combining data from devices, service touchpoints and network operations?

Examples of such inputs include the following:

- **Customer demographics**
 - + Age, address, occupation
- **Household lines and products**
 - + Lines, products, contracts, service history (including trouble tickets/faults)
- **Billing data**
 - + Monthly bill, size/frequency of top-ups, people-sharing products, acquisition cost
- **Engagement data**
 - + Marketing history, call centre data, browsing activity
- **Usage data**
 - + Consumption of voice/data/SMS/TV/VAS (value added services)
 - + Split by time, direction, source, cluster
- **Advanced data**
 - + Geospatial displacements, off-site browsing data, friend-circle behaviours, contact preferences (type/timing)
- **Network and device data**
 - + Site registries, network performance, device performance, CX, connection fails, upcoming maintenance tasks
- **Current channel performance**
 - + Opex by channel, CSAT (Customer Satisfaction) by channel, volumes by channel

Digital-first for all customers

Providing customers with a digital experience and real-time visibility of the status of orders, installations and interactions represents a significant upgrade to the traditional wholesale experience. RSPs should be able to obtain real-time information on what products and services are available in a specific location, order products/services, get connectivity and customer and network insights via a partner portal, and/or interface via APIs.

A digital-first approach for Sales, Marketing, Customer Care and Service works best, and should cover app-based and web-based channels.

Providing an app to give consumers easy access and control over everything from scheduling/rescheduling installation visits to upgrading services or, for example, “referring-a-friend”, can be quickly provided. This approach should not be restricted to consumers. All too often, business customers still need to go through call centres. This costs business customers (especially SMEs) time and revenue, and drives higher customer acquisition costs for the operators. All fibre end-customers – e.g. consumers, businesses, landlords and government customers – should be served by digital-first channels, which are proven to deliver the best customer experience.

New business insights enabled by data and analytics

Underpinning this change is a new level of data-led insights powered by advanced analytics (AA) and artificial intelligence (AI).

While operators may already collect many forms of data, much of it is underutilised or fragmented. The tendency has been to focus on sales and retention, rather than holistic CX improvement, meaning a substantial amount of CX value is not realised.

With enhanced data and advanced analytics, operators can create a series of “propensity models” to determine which individual customers are likely to call (or be so frustrated, they don’t even call) in reaction to an incident affecting that single customer or the whole network. Operators can conduct thorough root cause analyses to fully understand the whos, whens, and whys around these calls, and in doing so, anticipate looming problems remotely, before the customer has noticed, and communicate using the quickest, most efficient channel.

By using AA to identify customers who are likely to report certain issues, telcos can shift their operating models towards resolving certain issues predictively, before the customer reports or even notices them, and others proactively, by reaching out to customers before they call to complain.

The predictive engine also gives the operator valuable insights into its own operations, as anything discovered for predictive or proactive work can be then synced into reactive channels. Call centre agents equipped with these tools and information will be more effective when it comes to informing and assisting customers.

Whilst embedding AA throughout an organisation is time-consuming, it is possible to capture a series of meaningful, quick wins early in the process. Quick wins can immediately generate substantial savings, allowing the effort to become at least partially self-funding. They can also serve as proofs-of-concept, to convince the broader organisation of the value of data and analytics.

Once relevant information is able to flow freely among different stakeholders (customers / subscribers, call centre agents, technicians), problems can be resolved more effectively. And when it is necessary to book broadband technician appointments, these can be booked in a fully automated way, with no agent interaction. This will ultimately lead to increased customer satisfaction and lower churn.

Well-equipped agents in assisted channels, as well as chatbots and banners in digital channels, can leverage all available data to personalise and expedite customer resolution based on a deep understanding

of the customers' needs. This enables better First Call Resolution (FCR) Rates and reduces the number of times customers must be transferred between departments and call-handlers. Critically, this outcome requires upskilling Service Teams and moving away from a "widget mindset" towards a "service-first mindset" that also improves employee engagement.

In cases where predictive and proactive service is not possible, and the customer does not need to initiate contact, the same data can be leveraged to create a "white glove" responsive service experience.

Refined commercial model to capture CX-generated value

Historically, some operators have prioritised financial investment based on easier to quantify metrics such as Weighted Average Cost of Capital (WACC) and Return on Investment (ROI) rather than CX, which can be relatively difficult to link clearly to top-line growth or cost prevention.

End-to-end CX transformation requires changing this mindset based on a clear

assessment of both long-term and short-term benefits, and refining commercial models accordingly. Ultimately, predictive CX and ROI should be mutually reinforcing, making the portfolio of initiatives designed to drive CX largely self-funding.

Confusion matrix-based analysis is useful when evaluating decisions around proactive and predictive customer care. By examining recall, precision and accuracy rates, operators can optimise their customer segmentation for proactive versus reactive treatment, while minimising cost to serve.

Determining which customers can benefit from (or do not require) proactive service

A confusion matrix, visualised as a table with four different combinations of predicted and actual values, is a useful construct for determining whether customers should be approached proactively with an outbound call. Iterative tuning of the model parameters improves predictive power over time.

- **True Positive (TP): model accurately predicts a positive data point.**
+ Model prediction was accurate. An inbound call was correctly expected, and proactive intervention made financial sense and improved CX.
- **True Negative (TN): model accurately predicts a negative data point.**
+ Model prediction was accurate. The customer did not call in, as predicted. No proactive intervention was made, resulting in net-zero cost.
- **False Positive (FP): model predicts a positive data point incorrectly.**
+ Model prediction suggested an inbound call, which did not occur. Unnecessary cost was generated through a proactive intervention that did not pre-empt any inbound interactions.
- **False Negative (FN): model mis-predicts a negative data point.**
+ Model prediction suggested an inbound call would not occur, but it did. This was a missed opportunity, as proactive intervention could have prevented the call and been more cost effective.

		Actual	
		Inbound Call	No Inbound Call
Predicted	Inbound Call	True Positive (TP)	False Positive (FP)
	No Inbound Call	False Negative (FN)	True Negative (TN)



Using AA, operators can calculate Customer Lifetime Value (CLV) and use this as a basis for decision-making. CLV takes into account the mid-to-long-term value that each customer generates for the business, combining: a) longevity; b) revenues generated by specific telco services; and c) cost to serve.

CLV modelling enables rich scenario planning by assessing how certain actions and events impact customer value for each individual customer in the long run. This approach allows operators to quantify the value from such non-commercial events and prioritise those actions, holistically generating maximum uplift in value and user experience.

Ultimately, the goal is to bring sales and service recommendations together, forming one always-on "next best action engine."

This allows for constant CLV optimisation: operators can delay up-selling and cross-selling activities until after value-destroying service issues are resolved, while also knowing which customers do not need such proactive care. This is only possible when the decision-making engine knows exactly who needs to be contacted, how, and when; leveraging all household-level insights, channel preference predictions, and reach-rate optimisation models.

Broad cultural transformation and investment in frontline customer experience capabilities

Prime customer experience begins with employees, and how you engage with your partners and suppliers.

Cultural transformation is an underpinning of end-to-end customer journey redesign. To truly create "exceptional moments" for customers, cross-functional teams with a variety of skill sets must work in sync. Customers must be recognised across multiple channels, any necessary handoffs must be as seamless as possible, and decision-making should be agile and responsive.

While many telcos have started experimenting with pockets of agility and cross-functional teams, these practices are still not the industry-wide norm. Breaking beyond business unit silos remains a substantial challenge for operators, but enhanced transparency and dissemination of customer experience outcomes (predicted and actual) across all departments can accelerate cultural change.

To achieve success, squad members should focus on driving the vision by seeking to create value and to learn as much as possible through rapid, iterative deployments.

To be effective, squad members must be free to act within clear boundaries and be rewarded for results. This requires a broader cultural shift, away from a mindset that values risk-averse, safe, and protocol-driven habits and toward one that prioritises innovation, courage, and a willingness to take on challenges. Team members' incentives must be aligned through clearly defined targets and refreshed on a regular basis.

Budgeting processes should be updated to reflect these new ways of working. In agile delivery, it is common to fix time and budget and prioritise granular scope packages within these fixed limits.

In accordance with this, telcos would budget tribes, rather than projects or epics.

Cultural transformation requires a different approach to talent. Employees should be well-rounded professionals. They should be able to creatively problem solve and innovate, adapt to changing technologies, and bring a broader range of expertise. Of course, such talent is difficult to find, recruit and retain, particularly in the current environment. However, fostering a healthy culture built on empowerment, encouraging an entrepreneurial mindset, and delegating decision-making to an operative level where appropriate, are important first steps toward success.

Neutralising pain points in the customer journey; Operator challenges and recommended steps

Any hiccups in the customer journey, which starts with an order or enquiry, and ends with the first bill arriving in the customer's inbox, risk losing or delaying a sale and revenue coming into the business.

In today's fast moving fibre market, where tenancy is everything, delivering a strong customer experience is essential. Wholesale Operators may face limited competition today from other Wholesalers in specific

cities, towns or communities, but as more fibre is built out, consumers will have more choices. RSPs will go with the Wholesaler most attuned to their business requirements to deliver a reliable, predictable level of service to their customers.

In the quest for the perfect end-to-end customer journey, fibre operators need to look at the customer journey holistically and establish an end-to-end process to manage and utilise data effectively. It is important that Wholesalers review their RSP customers' processes to identify opportunities for automation, ensuring that the use of technology advances rather than masks inefficient processes.

Figure 17: Customer Journey (Illustrative)



The initial network build is of critical importance and its important for operators to consider the entire network deployment journey, starting with the design of the network and continuing all the way to implementation and optimisation.

It is important to consider the use of a zero-based-design approach to reimagine the entire deployment journey, weaving together disparate legacy tools, tactical process robotics and ML use cases to significantly reduce the overall deployment time.

However, once the build is complete, operators need to pivot from building the network to operating it. To operate efficiently at scale, the network needs to be viewed as an enabler of exceptional customer experience (irrespective of whether the operator is a vertical operator selling services direct to the end-user, or a wholesale open access operator providing broadband services via RSPs). It needs to shift from black-box cost centre mentality to that of a genuine change agent and leverage the fact that the network asset is in fact the richest source of data that generates key customer insights.

Given that all customer services have to pass through the network in one form or another, the network collects a trove of valuable information on the end-customer.

By leveraging AA techniques on this data, operators can start tapping into rich insights to which they previously did not have access to.

CIOs and CTOs should collaborate with their revenue-generating counterparts (e.g. Sales, Marketing, Customer Care and Success) to take full advantage of these insights.

Going beyond the network:

While operators are already making progress in leveraging AA on network data to drive operational insights (such as predictive maintenance models), network teams can potentially increase impact from this data significantly by combining them with customer insights.

For example, can propensity to churn models improve precision by incorporating recent network KPIs as inputs? Similarly, can KPIs go beyond network focus into measuring customer experience by combining data from devices, service touchpoints and network operations?

Cross-functional engagement:

Getting the most value from analytics use cases would require engaging cross-functionally with other relevant teams to ensure there is a holistic view of value and there are robust approaches to execute.

Operators should consider whether the current engagement model (e.g. ways of working) across their Network teams and others, such as Marketing, Customer Service and Finance teams, are enabling or hindering such cross-team collaboration and what might be needed to knock down organisational silos.

Data architecture:

Bringing data from multiple sources (e.g. network, organisational, customer data) requires a scalable, cohesive data strategy and architecture to enable use case deployment at scale. In an environment dominated by budget constraints, functional teams should critically evaluate their data strategies to ensure that they optimise value from existing investments, and that there is a clear link between the architectural roadmap and business value.



Pain Points in the Wholesale Customer Journey to Service Activation

Wholesalers have to neutralise potential pain points and meet RSP's expectations at every stage of the journey, from initial contracts to individual service activations.

Having to negotiate with multiple infrastructure providers if FTTP build is fragmented geographically is a major overhead and pain point for RSPs

Creating a common connectivity platform across differently-owned infrastructures would be one way to mitigate this problem without the additional burden of corporate consolidation.

Disconnected Processes

Consider the entire network deployment journey starting with design of the network and continuing all the way to implementation and optimisation.

Use a zero-based-design approach to reimagine the entire deployment journey, weaving together legacy tools, tactical process robotics and ML use cases to significantly reduce the overall deployment time.

Flexibility of commercial terms

Depending on their scale, RSPs need varying financial/commercial models, pricing and contract length. This presents a larger opportunity where incumbents have some constraints due to regulation.

Marketing and Demand Aggregation

While consumer and business demand for FTTP is increasing, RSPs often want Wholesalers to help pave the way for retail sale activity, and perhaps even share some of the overhead cost and effort of marketing FTTP such that end-users understand both they want and need it. Sharing the cost of demand aggregation at local level is also important.

Rapid onboarding and right-first-time installation and activation

In a retail environment dominated increasingly by online reviewing, this matters even more. A digital-first approach for Sales, Marketing, Customer Service and Success - using advanced digital provisioning and self assurance tools is an effective way of reducing the number of end-user touch points and the number of truck rolls.

Providing RSPs with a digital experience and real-time visibility of the status of orders, installations and interactions represent a significant upgrade to the traditional wholesale experience. RSPs should be able to obtain real-time information on what products and services are available in a specific location, order products/services, get connectivity, and customer and network insights via a partner portal and/or interface via APIs.

All fibre end-customers e.g. consumers, businesses, landlords and public sector customers should be served by digital-first channels, which are proven to deliver the best customer experience.

<> Premium Installations

Whole-home coverage is a major differentiator for RSPs, and many may want installation of in-home networks as well as installation of the line and ONT.

<> Dealing with property owners

Getting permissions from landlords to enter properties and install lines is a recurrent pain point (the failure rate can be as high as 50%) and the existence of a reliable centralised system for converting RSPs' service orders to active subscribers is critical.

<> Rapid approval of CPE

Whilst most RSPs will not want to touch installations, the larger ones will often want to use their own CPE, or to be able to customise operator CPE, and need a Wholesale Provider that can accommodate this wish seamlessly.

<> Difficulty Scaling Services – Manual Provisioning can't keep pace

Manual provisioning cannot keep pace with ambitious fibre rollout, high activation volumes, and frequent service changes – which can reduce operational efficiency and service velocity with increasing costs.

Automating the provisioning process is critical, from the service layer down to the fibre EMS (Element Management System) or direct OLT (Optical Line Terminal) activation.

<> Network Demarcation & Difficulty Meeting SLAs

When wholesale fibre also supports business and enterprise services, it can be hard to provide highly available B2B/B2B2C cloud services and support on-demand connectivity service changes.

Network demarcation is a real challenge for Wholesalers and RSPs. Is the problem with the in-home experience managed by the ISP or the Wholesaler who manages the connection? The first port of call is the Wholesaler, but it may not be a connectivity issue, it may be an in-home WiFi problem, which the Wholesaler can't diagnose. For the Wholesaler – the lack of visibility into the home is a problem. Connecting the ONT with speed/latency is one thing, but how do you manage the speeds/experience of the devices in the home via WiFi? This is a key question for Wholesalers and RSPs regarding network demarcation between L2 connection and homes.

What is the impact? Missed SLAs by the Wholesaler, increased troubleshooting tickets, longer Mean-Time-to-Repair (MTR), and decreased customer satisfaction. Which provider is responsible? Ultimately, the subscriber is caught in the middle.

A central platform can enable the automated provisioning and upgrading of services and address different types of fibre services, including mobile backhaul; and configure open APIs between the Wholesaler and RSP's OSS to increase proactive information sharing, notifications and resolution actions in an automated manner.

<> Delayed Order-to-Revenue/Time-to-Cash Interval from Error-Prone and Cumbersome Order, Provisioning and Commissioning Processes

The all-too-common issue of a lengthy provisioning process can cause both Wholesale Operators and RSPs to experience cash flow problems.

Error-prone and cumbersome fibre activation, order and provisioning processes are incredibly frustrating for subscribers. This can cause unnecessary truck rolls which are costly and damaging to customer satisfaction, and likely loss of business/revenue.

An integrated portal can enable the streamlining of service ordering and provisioning processes. Facilitate provisioning and service activation by offering RSPs an interface via portal or API to smooth and accelerate business critical processes, instigate a zero-touch approach to shorten the time required to get new subscribers up and running. Wholesalers should review their RSP customers' processes to identify opportunities for automation, ensuring technology advances rather than masks inefficient processes.

<> Multiple Competing Needs at Scale

With growing RSP tenancies and subscriber bases generating increased order fulfilment and activation demands, it can be challenging to focus on not only being able to rapidly onboard and tenant new RSPs, but equally, being able to segment multiple network operators and protecting subscriber data while also managing operational costs and resources.

Implementing a centralised multi-tenanted platform and Role-Based Access Control (RBAC) will help virtually separate B2B fibre network operators on a shared infrastructure.

<> Monitoring & Service Level Assurance

Combining technologies (e.g. GIS, inventory, pinpointing issues, service provisioning processes etc.) to ensure fibre installations are conducted correctly the first time is a tremendous step forward, but the job is not complete post-activation and billing. The ongoing and monitoring and assurance of services is critical. However, it is challenging to accurately and remotely pinpoint issues on the Optical Distribution Network (ODN). Additionally, operators are increasingly seeking vendor diversity in their fibre network, often driven by cost savings, so they can achieve any-to-any OLT-ONT configurations (e.g. Vendor A for OLT, Vendor B for ONT). Furthermore, in the Commercial Real Estate (CRE) industry, as builders increasingly add fibre to new real estate, the infrastructure needs to be hands-off and turnkey.

What is the impact? Hardware-based probes for network assurance are expensive, and the costs escalate quickly as you may need many probes throughout the network. Also, as fibre network vendor diversity increases, so does the complexity of the systems environment, as there are more EMS/NMS and devices in the access network, and the demarcation point becomes blurred.

Automated closed-loop operations, software-based network data collection that avoids hardware probes, and AI for fault management to pinpoint issues are critical. Open standards and APIs can also help achieve fibre vendor interoperability, avoid lock-in, and implement future-proof architectures. Intent-based service modelling and provisioning also correlates, as customers order service offerings, not technology. These approaches can ensure lower IT costs and reduce OPEX spending via rapid diagnostics.



Service Pain Points

Once a service is activated, RSPs face a further set of potential pain points that indicate a need for further flexibility and automation at the interface between the Wholesale Operator and RSP.

<> Meeting rapidly evolving end-user demands

They will require more flexible wholesale service provision models and they will need to be able to plug-in new services as fast as possible, and have the flexibility to unplug if that is required.

With traditional BSS, it could take months to rollout a new product/service, “refer-a-friend” scheme or new loyalty offer. Adopting a new low-code/no-code approach enables rapid develop-test-launch for new products/offers/processes.

<> Broadband Issues

Being able to draw on AA to predict and anticipate customer concerns specifically related to broadband issues, enables rapid diagnostics tools to be deployed to quickly identify the root causes of connectivity problems and alert customers to self-serve options, allowing them to resolve problems with a few clicks and swipes.

For example: smart modems detecting intermittent home WiFi can trigger an in-app message that either directs a customer to a short self-help video or offer a scheduled call-back from a support technician, and all of this can occur before the subscriber/household has even noticed the spotty issue.

Experiences like this can make a customer feel well-cared for and increase retention, especially at critical moments such as soon after onboarding or near-contract renewals.

<> Network Faults

Small dropouts on a street, identified in network data patterns may lead an operator being able to proactively resolve the fault before subscribers and their respective RSP are affected. This minimises both engineer callouts and CX damage.

<> Poor Customer Experience due to Latency

FTTH network architectures offer excellent speed and bandwidth performance from the access network to the premise. But what happens when the number of connected devices is skyrocketing and connecting for leisure and business services is extremely sensitive to latency?

When someone is hogging the Wifi to stream content, and impacts work conference calls, this will lead to increased calls to customer care, device reboots and customer churn.

By introducing in-home experience management that uses application and traffic prioritisation, this will address latency and ensure a superior user experience for video streaming, OTT content and remote work.

<> Network Management Issues/Disconnected Processes

A common challenge for Wholesale Operators centres around network management issues, often exacerbated by a complex environment with data scattered across disconnected systems, combined with a series of labour-intensive manual processes. RSPs (e.g. ISPs) often log undiagnosed network issues because they do not have complete visibility into the real-time status of the network – often resulting in costly, unnecessary technical visits/truck rolls.

To improve operational efficiencies and enhance the experiences of both RSPs and their end-customers/subscribers, this could start with the Wholesaler creating a holistic view of network data and process efficiencies to:

- gain an improved view of network data and quickly identify issues by connecting disparate systems across the business
- remove labour-intensive manual processes by automating the end-to-end management of network issue tickets
- automate the fault-logging process to ensure the Wholesale Operator only receives tickets relating to their network, but flag if faults/tickets are raised that relate to their customers’ (RSPs’) systems
- provide RSPs with improved access to accurate, real-time network data to help diagnose issues and inform their customers/subscribers – this will make it easier to triage subscriber quality issues and determine network availability
- integrate real-time test capability into their fault management system to accurately identify the issues that can be fixed remotely or by providers to reduce site visits

<> Reduced QoE - Service Level Assurance

High subscriber demand, driven by the rapidly increased prevalence of working from home (WFH) has driven broadband services to the limit, and also created a need for SLAs not only among businesses but also for residential connections.

Supporting fibre capacity with a robust suite of tools, including device diagnostics, speed tests, remote configuration, and more, will optimise service quality for RSPs and their customers.

<> Additional network needs

Some (particularly larger players) may want to combine access to FTTP with further network needs – for example – mobile transport – and they will want a centralised system for ordering and provisioning these more complex needs.

Interoperability

The interoperability between Network Operators and Service Providers is critical. Whilst these entities will have their own distinct systems and procedures, there are key areas of interoperability open to automation and orchestration.

Traditional “boxes” are not necessary as they can be re-expressed as code. Operators will look at data through an API Query or Portal.

It is crucial to create a platform that “connects everything” and orchestrates collaboration and interoperability between all stakeholders.

Enabling new levels of business agility

Fibre providers are already selling more than high-speed broadband. Many are bundling in content services from partners and offering “refer-a-friend” bonuses. But how long should it take to develop and rollout, for example, a refer-a-friend scheme or a new loyalty offer? Using traditional BSS, these changes can take months, which does not provide the degree of agility that fibre providers will need to differentiate themselves and win in an increasingly competitive market. A new approach to BSS uses low-code/no-code which entails the use of a GUI to develop, test and launch new offers and processes. This can be done in hours and gives a new level of business agility to the fibre provider.

Fully automated and open

Ensuring end-to-end lifecycle digitisation, rather than merely automating single processes, is essential for success. From a network perspective, consider the entire network deployment journey, starting with the design of the network and continuing all the way to implementation and optimisation.

For example, using a zero-based-design approach to reimagine the entire deployment journey, weaving together disparate legacy tools, tactical process robotics, and machine learning use cases to significantly reduce the overall deployment time.

A zero-touch approach to end-customer/subscriber orders and service provisioning can dramatically shorten the time required to get new subscribers up and running.

Additionally, offering an app or web function for the end-customer/subscriber to schedule installation visits at their convenience enhances the onboarding experience and yields significant cost savings.

It is crucial to integrate compliance with industry-standard APIs into platforms from the start, as fibre providers often have a range of systems that need to be integrated.

Wholesalers should review their RSP customers’ processes to identify opportunities for automation, ensuring technology enhances rather than masks inefficient processes.

Achieving end-to-end automation is a primary goal for all fibre companies and operators, particularly for provisioning cycles and service assurance. Automation of BSS and OSS systems is driven by the need for efficiency, cost savings, and improved customer experience.

Reducing unnecessary truck rolls is critical, as these are costly. Understanding the root cause of issues, pinpointing their locations, and being able to address/resolve remotely or dispatch the right personnel to address them is essential for operational efficiency and customer satisfaction.

Figure 18:
Interoperability

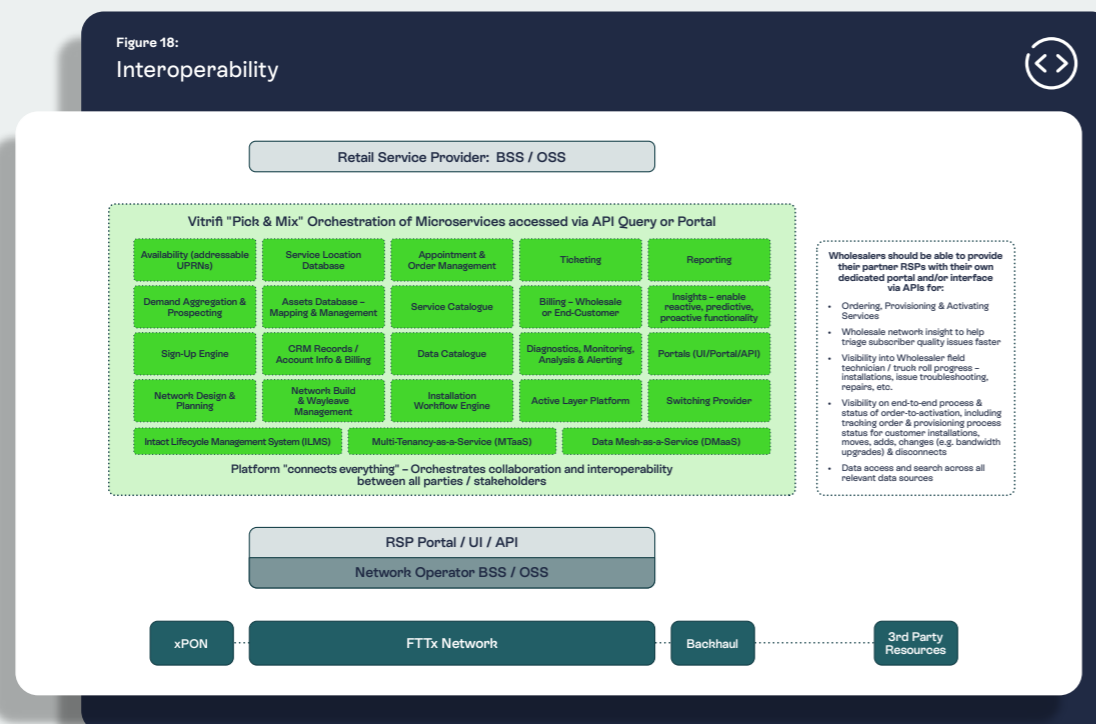
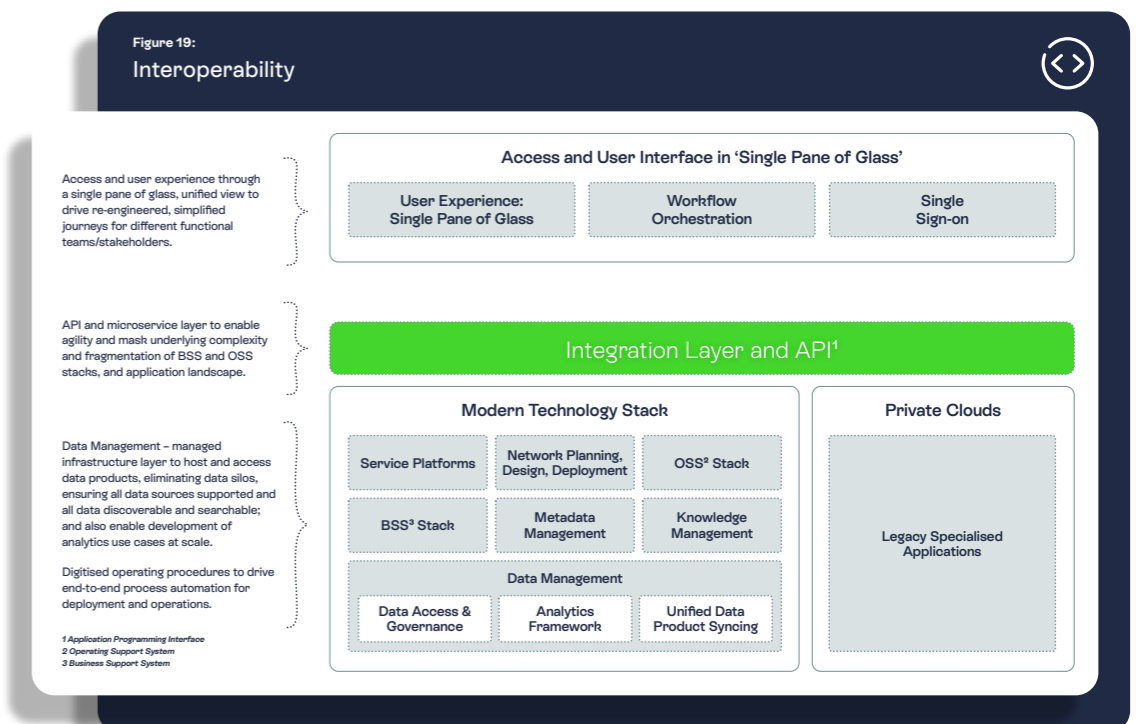
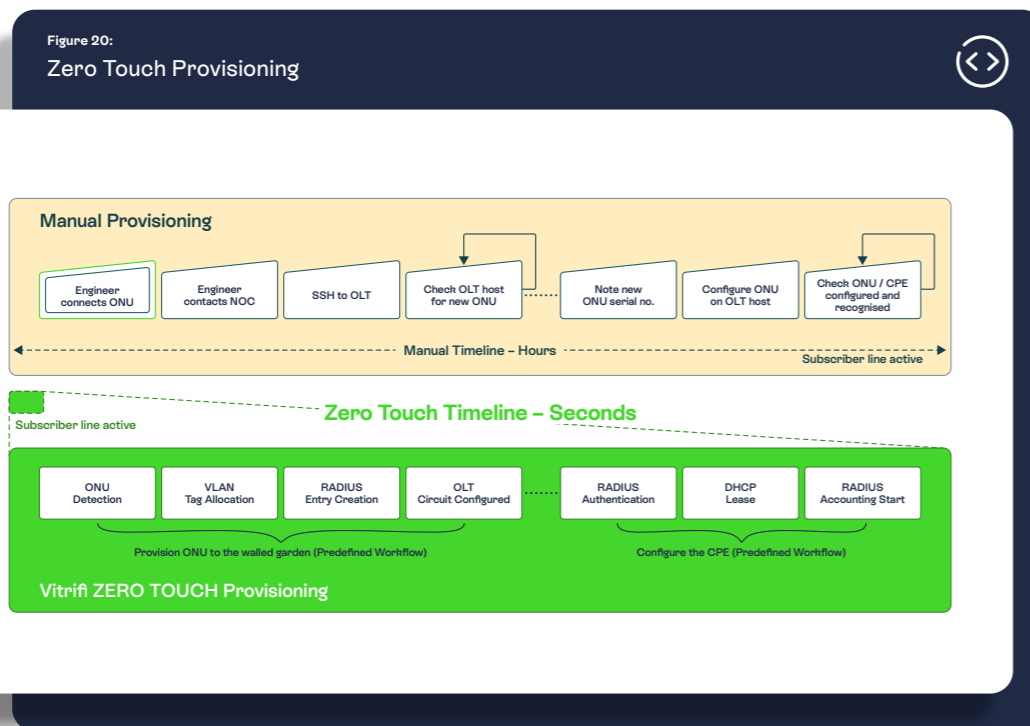


Figure 19:
Interoperability





Support multiple brands on a single platform

As we've seen in the mobile market, cable TV and fixed-line telecoms markets in the past, there will be future consolidation in the fibre market. Therefore, it is important that any systems that fibre providers invest in today, need to be able to support multiple brands on a single platform. Also, we may see fibre providers roll out new brands e.g. a business-focused brand that is separate from their consumer brand. Being able to support multiple brands on a single platform will save time, money and effort.

As we've seen in the MVNO market, there used to be a small number of operators/ key players, and those were the brands – you had for example, a Cellnet phone, or a Vodafone phone. There are now hundreds of MVNOs, targeting different demographics and verticals.

The forced multiplier of wholesale is simply that we have more Marketing departments, more Brand teams, more demographic separation and targeting, and as a result this drives more capacity into the network.

Configuration, flexibility and cost

Fibre operators need a business model that allows them to increase (and perhaps even reduce) their spending in line with the size of their business. Uncertainty over the outlook for fibre operators and the likelihood of consolidation in many countries create an even stronger case for a scalable, flexible approach that is aligned with industry standards.

The future network vision is based on automation and agility, which is forcing greater simplification and alignment of IT and networks to create a coherent techCo stack.

Importance of “Good” Data

Collecting and analysing data has become integral to business operations. As companies increasingly adopt data-driven systems, the importance of maintaining data quality has never been higher. Advances in technology have made data analysis accessible for companies of all sizes and sectors, from telecoms to finance, insurance, health, media, and hospitality – companies are using data strategically to better understand their users, customers, partners and wider ecosystem.

Fast-growing technologies such as AI, ML and IoT continually add massive volumes of data to enterprise systems. IDC forecasts that the amount of data “created, captured, copied and consumed in the world” will continue to climb at breakneck pace. The market research firm estimates that the amount of data created over the next three years will exceed the data created in the past 30 years. The world will generate over three times more data in the next five years than in the previous five.

Telecom operators in particular, possess vast amounts of data that remain underutilised due to organisational silos. These silos limit the discovery, access, and leverage of data assets which could otherwise provide actionable insights, enable new revenue sources through AI/ML-enabled products, and facilitate data brokerage with other organisations.

Recent advancements in AI have drastically lowered the barrier to entry for automating workflows. Foundation models offer an off-the-shelf AI experience, bypassing the need for extensive resources and capital to develop these models in-house. Fine-tuning allows businesses to customise these models for specific use cases at a fraction of the cost of full-scale training.

However, having “good” data has become even more critical. Organisations often struggle with data spread across multiple heterogeneous systems (CMS, CRM, Inventories, ERP etc.), leading to data silos.



Even when data is consolidated in a data warehouse, its validity, completeness, and recency are not guaranteed. This problem is pronounced in the telecom industry due to the non-uniformity of data across different domains – e.g. graph data for networks, geospatial data for GIS, and relational data from CRMs managing subscribers. These varied formats hinder unification under common architectures like data lakes and warehouses, preventing telecom operators from fully exploiting their data.

Today's enterprise data infrastructures are complex and evolving, driven by new business requirements, new data sources, and changing data shapes. They involve multi-layered systems, including on-premises and cloud repositories like data lakes, data warehouses, data marts, lakehouses, and delta lakes. These systems ingest data from real-time and batch streams, leveraging middleware such as Kafka, and feed data into various applications like reporting dashboards, real-time data applications, and ML feature stores. Enterprises now manage petabytes or even exabytes of data, making DataOps extremely complex and dynamic.

Optimising DataOps for cost, performance, and reliability is achievable, but without best practices and tools, it becomes exceedingly challenging.

A robust DataOps strategy is essential to avoid daily firefights, ensure data performance and reliability, maintain business agility, and control costs.

The High Cost of Low-Quality Data

With data volumes steadily rising, maintaining the quality of the underlying data that drives decisions is a growing challenge.

Business leaders are starting to notice the impact of bad data on their bottom lines. According to a survey by Gartner “organisations believe poor quality data to be responsible for an average of US\$15 million per year in losses.” Gartner also found that nearly 60% of those surveyed didn't know how much bad data costs their businesses because they don't measure it in the first place.

Forrester Research has found that the persistence of low-quality data throughout enterprise systems robs business leaders of productivity, as they must continually vet data to ensure it remains accurate. Forrester also found that “less than 0.5% of all data is ever analysed and used” and estimates that if the typical Fortune 1000 business were able to increase data accessibility by just 10%, it would generate more than US\$65 million in additional net income.

How to ensure Data Quality

1) Pay attention to larger patterns:

When bad data hurts your organisation, it is important not to assume that this is just an isolated, one-time event. Instead, business leaders should scrutinise the larger patterns in play.

Does your organisation have the tools in place to monitor and measure data quality?

2) Move on from legacy tools that can't keep pace with modern problems:

For each bad data-driven outcome, the impacted companies most likely had standard IT and Application Performance Management (APM) tools in place, but the bad data slipped passed them. No monitoring tools even detected any sort of degradation in infrastructure or applications.

To proactively mitigate the bad data problem, businesses require modern data management tools that provide visibility into the entire data lifecycle, from creation all the way to presentation on end-user devices, and back.

3) Treat your data stack as critical infrastructure

As businesses become ever-more data-driven, quality data has become a mission-critical asset. Treat it as such.

That may mean adopting modern data architectures, such as ELT-based ones, or it could mean adopting technologies like data pipelines. It especially means finding data management tools that are capable of monitoring data across all of your assets, while ideally using AI and/or ML, to find problems automatically, without human intervention.

The bad data problem isn't going away any time soon, but if organisations follow these steps, they will be better able to spot bad data and remediate it before it grows into system outages, lost revenue, or bad publicity.

4) Harness the data trends on the horizon

As the volume of data in the world continues to grow exponentially, companies that put solutions and processes in place to master their data will rule the day. This explosion in data across the world presents a real challenge – but also an incredible opportunity to build leaner, more scalable data infrastructures now to enable exponential success later.

A unified, multi-dimensional next generation managed data platform using ML is needed to manage diverse, changing, and fast-growing data architectures effectively – to ultimately: eliminate data silos; support any data source; and make all data discoverable and searchable.

The telco of the future...

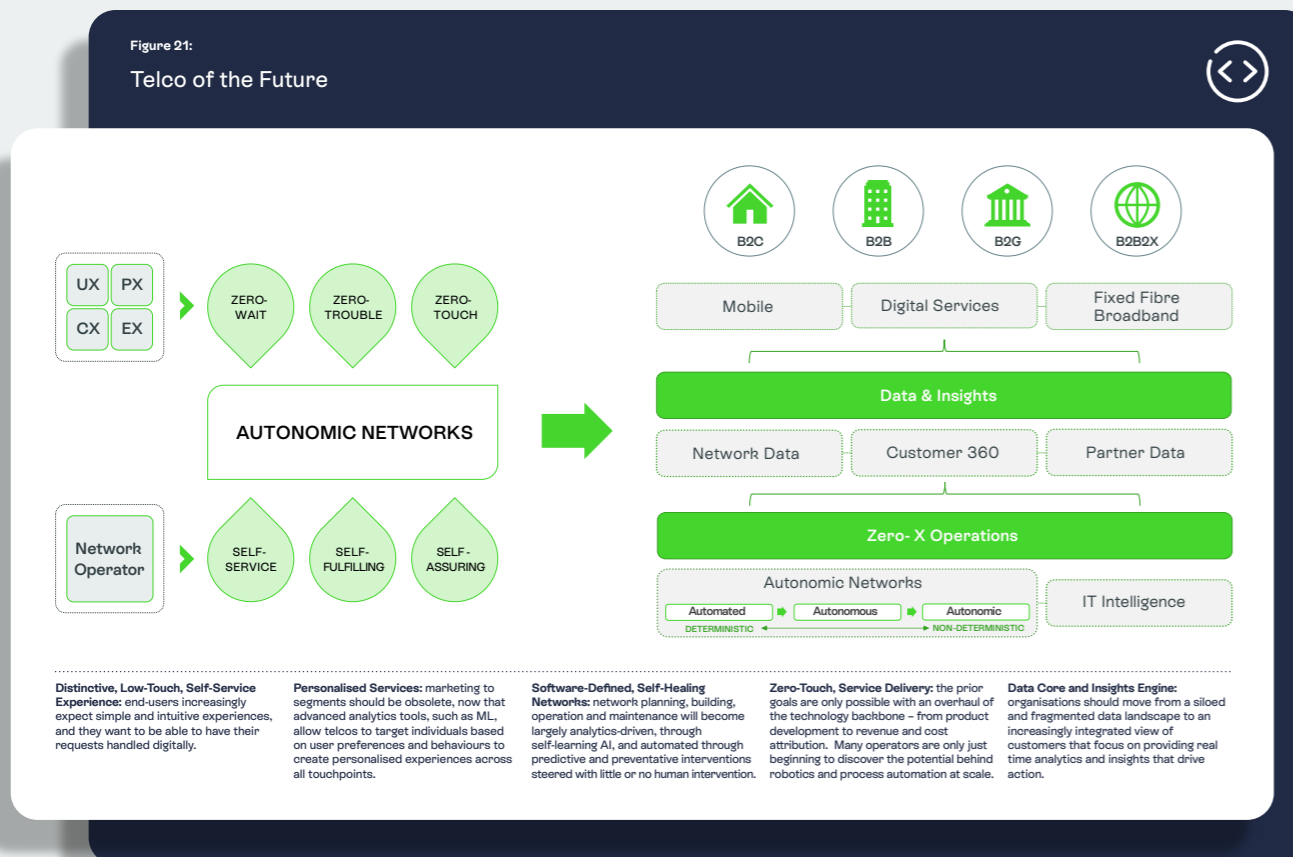
...will have characteristics that represent a fundamental shift from a laggard organisation made up of siloed business units to an agile entity in which digital- and-analytics DNA infuses everything the company does.



Look out for deep dive Blogs and InfoBriefs in the coming weeks and months. These will cover topics such as Vitrifi's Closed-Loop Model, Wholesale Fibre Broadband Standardisation, and productised services delivering, for example – Multi-Tenancy-as-a-Service (MTaaS), Intact Lifecycle Management System (ILMS), Data-Mesh-as-a-Service (DMaaS) – among others.

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