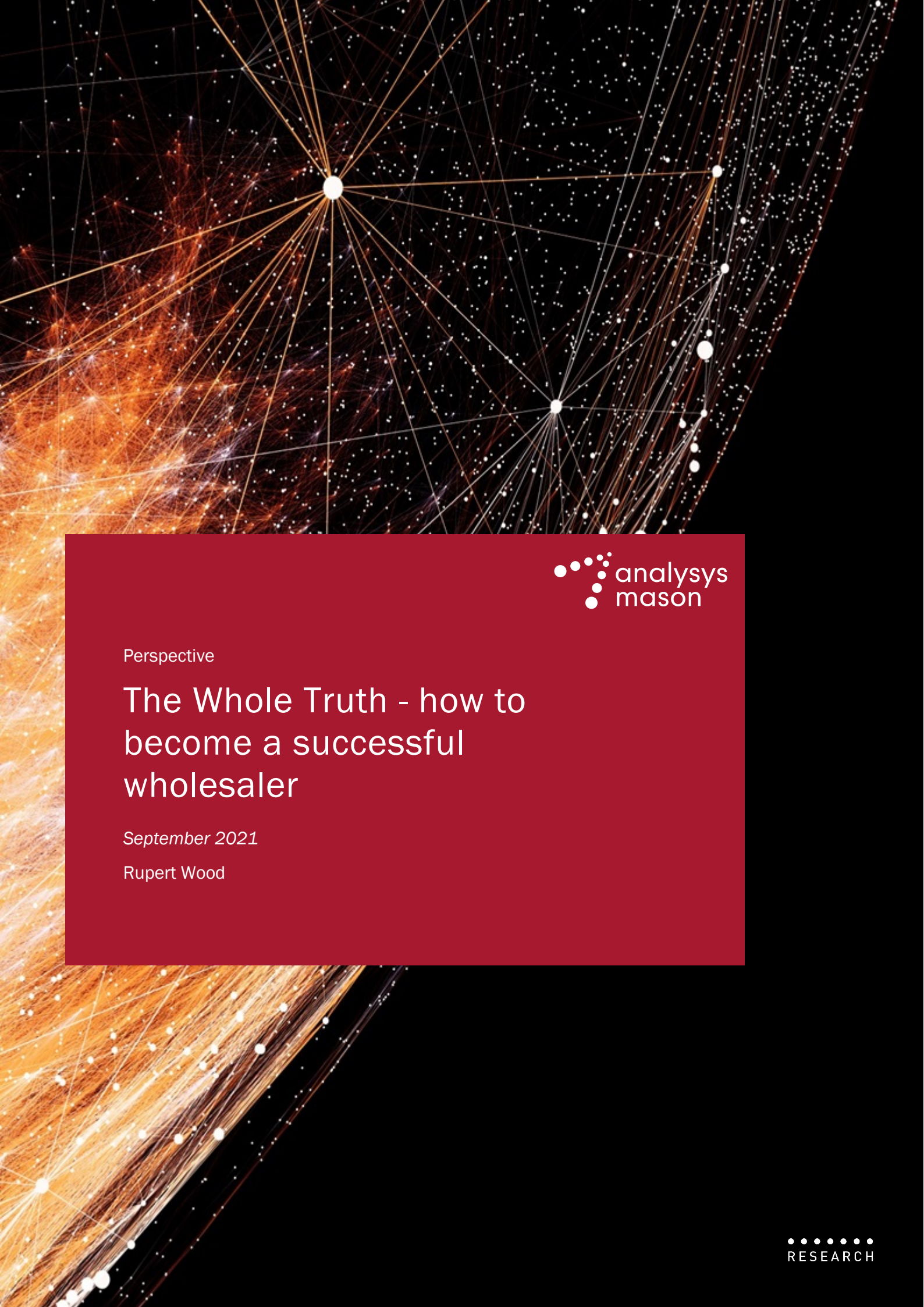

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Perspective

The Whole Truth - how to become a successful wholesaler

September 2021

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RESEARCH

1. Introduction

There are profound structural changes occurring in the fixed access market. The recent enthusiasm for private investment in FTTP and other fibre infrastructure has made the relationship between infrastructure provision and service provision looser, while at the same time fostering a larger and more commercially intense wholesale market.

Operational autonomy for retail service providers (RSPs) historically entailed 'climbing the investment ladder'; service providers had to invest in ever-more active network equipment and ever-more physical infrastructure in order to attain that operational autonomy. For the wholesaler this meant selling ever-simpler services. Virtualisation of networks onto a software platform has enabled an alternative network-as-a-service approach where autonomy and agility do not come at the expense of capex-intensity.

This paper, sponsored by Nokia, is about how to be a successful wholesaler. It assesses how new infrastructure providers can best exploit the wholesale opportunity by providing a more active set of services, and thereby help their customers overcome obstacles to timely, agile and effective use of fibre access infrastructure.

2. 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 default choice of infrastructure. In the race to build, new infrastructure providers and new investors are cornering an ever-higher part of the total build. This is especially evident in Europe.

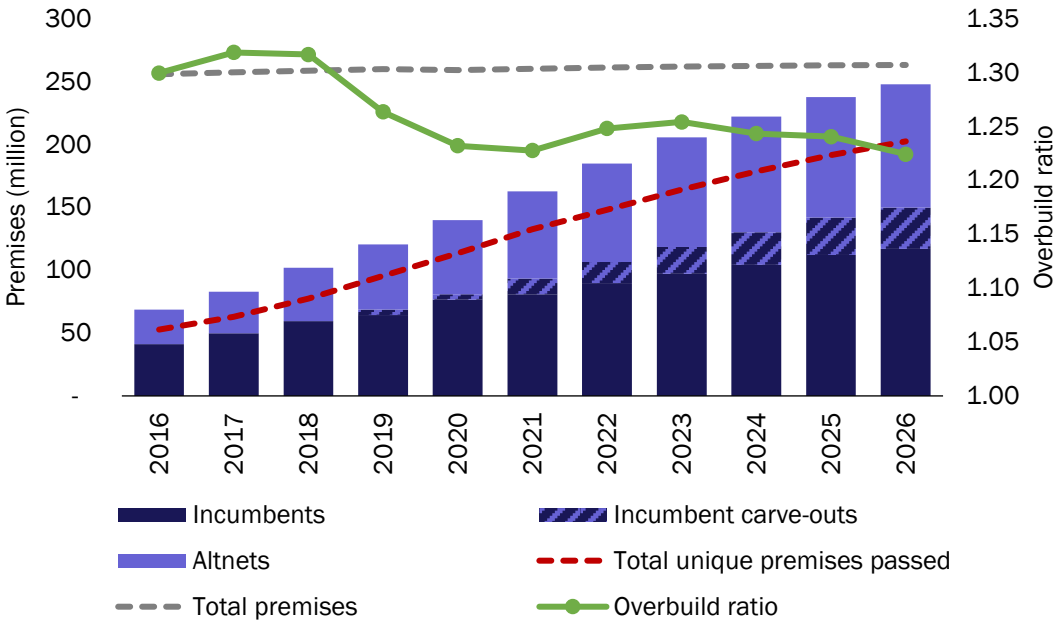
New FTTP infrastructure providers come from diverse backgrounds:

- brand new investment often in association with one or more established retail anchor tenants
- utilities building on their own distribution infrastructure
- towercos diversifying into fibre access infrastructure
- operators extending from enterprise/transport fibre into access networks
- cable operators either replacing or supplementing legacy HFC networks

New FTTP infrastructure providers have a mix of commercial models ranging from vertically-integrated operators, which monetise their networks only through their own retail channel, to wholesale-only, and some with a mix of retail and wholesale. In addition to new players, some larger players, including incumbent operators, have carved out some or all of their access infrastructure and taken on a co-investor to accelerate build. On the basis of current arrangements, Analysys Mason estimates that by 2026 53% of build in Europe[1] (measured in premises passed) will be in the hands of alternative operators or carve-outs.

[1] EU27 plus Iceland, Norway, Switzerland and UK

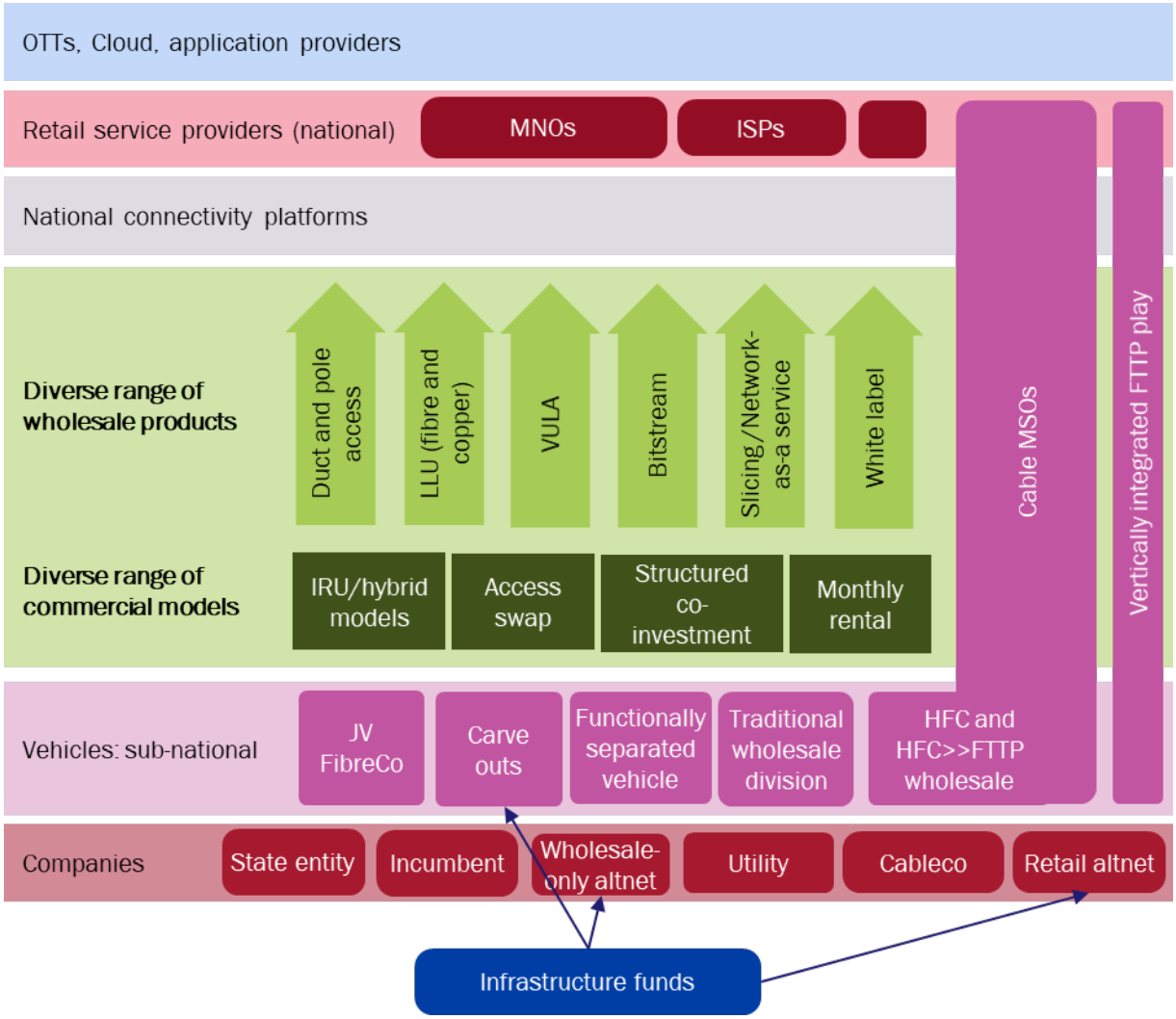
Figure 1: Forecast FTTP build by operator type and overbuild, EU27+4 [Source: Analysys Mason, 2021]



New investment in FTTP outside Europe is also 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. In Latin America, and in parts of the Middle East, there is an increasingly competitive wholesale FTTP sector.

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

Figure 2: The diversifying broadband value chain [Source: Analysys Mason, 2021]



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. It is in Analysys Mason's view likely that 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 most likely to be an open-access one, where the retail service becomes the anchor tenancy. 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 new wholesale-oriented players offer is currently diverse, ranging from duct access (sometimes at the behest of regulators) through Layer 1 fibre unbundling, the various flavours of bitstream (VULA, aggregated Layer 2, and Layer 3) to pure resale.

Figure 3: Wholesale services offered, selected alternative wholesale-oriented infrastructure providers [Source: Analysys Mason, 2021]

Infrastructure Provider	Countries of operation	Duct access	L1 unbundling	Bitstream (L2+L3)
Adamo	Spain			■
CityFibre	UK			■
Dawiyat	Saudi Arabia			■
Deutsche Glasfaser	Germany		■	■
dstelecom	Portugal	■	■	■
Gagnaveita	Iceland	■		■
Gigaclear	UK	■	■	■
Nexera	Poland	■	■	■
Onivia	Spain			■
Open Fiber	Italy		■	■
SIRO	Ireland			■
Swiss Fibre Net	Switzerland		■	
Ufinet	Latin America		■	■
UTOPIA Fiber	USA			■
Vumatel	South Africa			■
Xp Fibre	France		■	
Fastfiber	Portugal		■	
Fiberklaar	Belgium		■	
Glaspoort	Netherlands			■
TIM Fibercop	Italy	■	■	

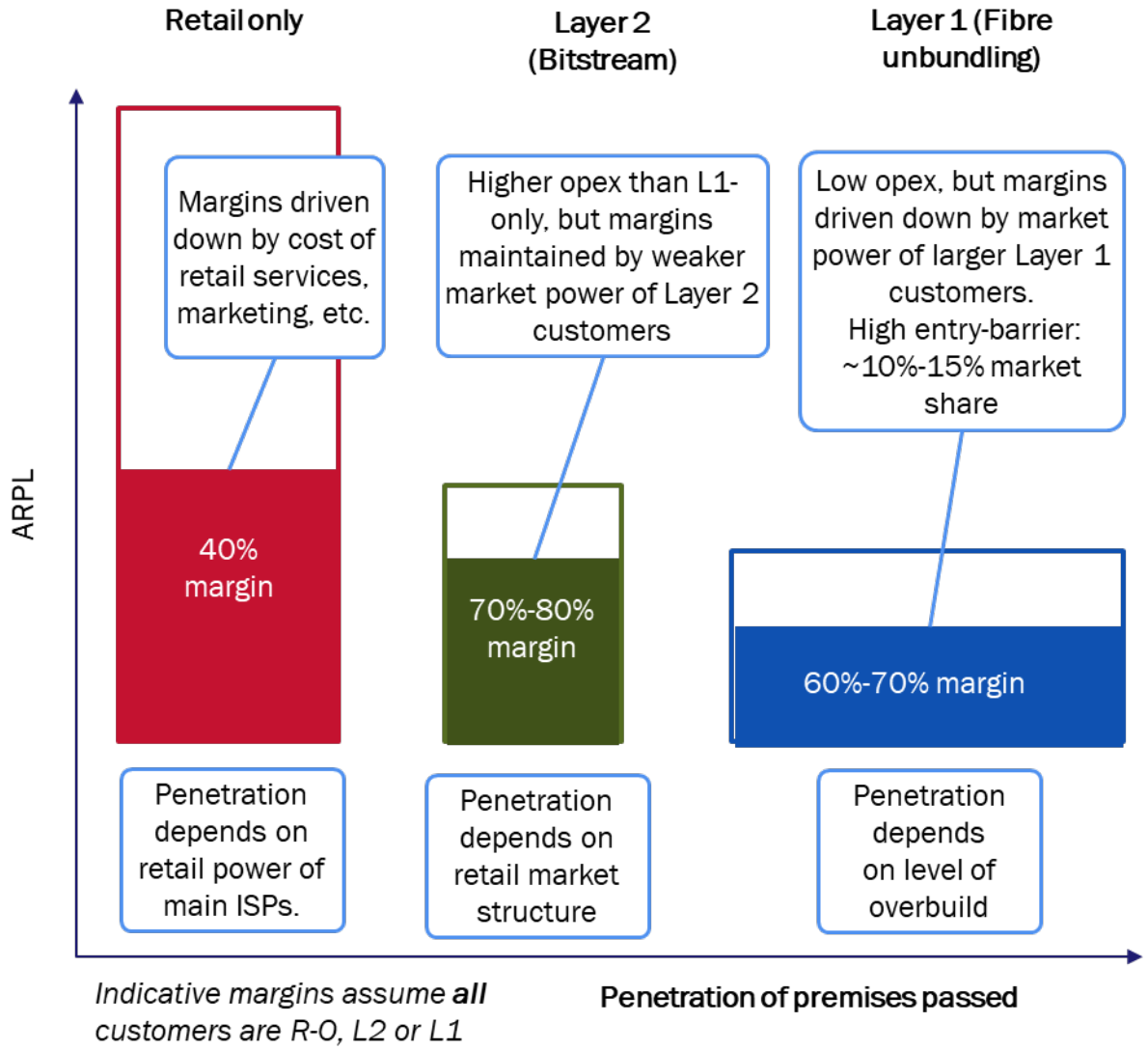
The overwhelming majority offers some form of bitstream access. A few were initially set up primarily to offer Layer1 access, and their network topology included multiple splitter banks to accommodate unbundlers. Most of these also offer bitstream access. None has voluntarily added Layer 1 unbundling capabilities to their network, as adding this capability is typically expensive for the wholesaler and clumsy for the access seeker.

3. Wholesale and profitability

FTTP is, in raw capex terms and when measured against population, the single largest investment in telecoms infrastructure since telephony itself. Maximising return on investment is critical. Success in wholesaling can seem like a double-edged sword, and new FTTP players naturally face dilemmas / uncertainties about how wholesaling affects payback.

However, likely long-term margins do not simply rise with lower costs. Active access margins will tend to be higher, despite the higher costs associated with installing and maintaining active equipment and the additional cost of a wholesale billing platform. The entry-barrier for a retail service provider to install actives on Layer 1 FTTP access is usually around 15% retail market share. Players that have this share will have sufficient market power to drive commercially negotiated wholesale prices down. Figure 5 provide Analysys Mason's view of the balance between likely long-term ARPL, utilisation of premises passed and margin.

Figure 4: Typical long-term EBITDA margins for different monetisation models [Source: Analysys Mason, 2021]



It is for this reason that wholesalers typically seek to nurture active access. The problem/opportunity for them is how to extend utilisation of the networks so as to get both higher margins and higher utilisation.

New wholesalers face an obvious danger in any FTTP overbuild areas: they absolutely have to remain competitive as wholesalers, often competing against players with years of wholesale experience.

There is, however, also a danger in non-overbuild areas: large wholesale players will want drive down on price buying a lower-spec service (Layer 1) and then use it as input to their own connectivity platform. New wholesalers will want RSPs to come straight to them rather than via this kind of intermediary.

This means, in either case, having a sufficiently attractive and flexible offer:

- to encourage larger players to become tenants
- to be able to foster a new retail market structure less exclusively framed by larger players driving down prices in exchange for volume
- to exploit new monetisation routes for the networks.

4. Retail service provider pain-points

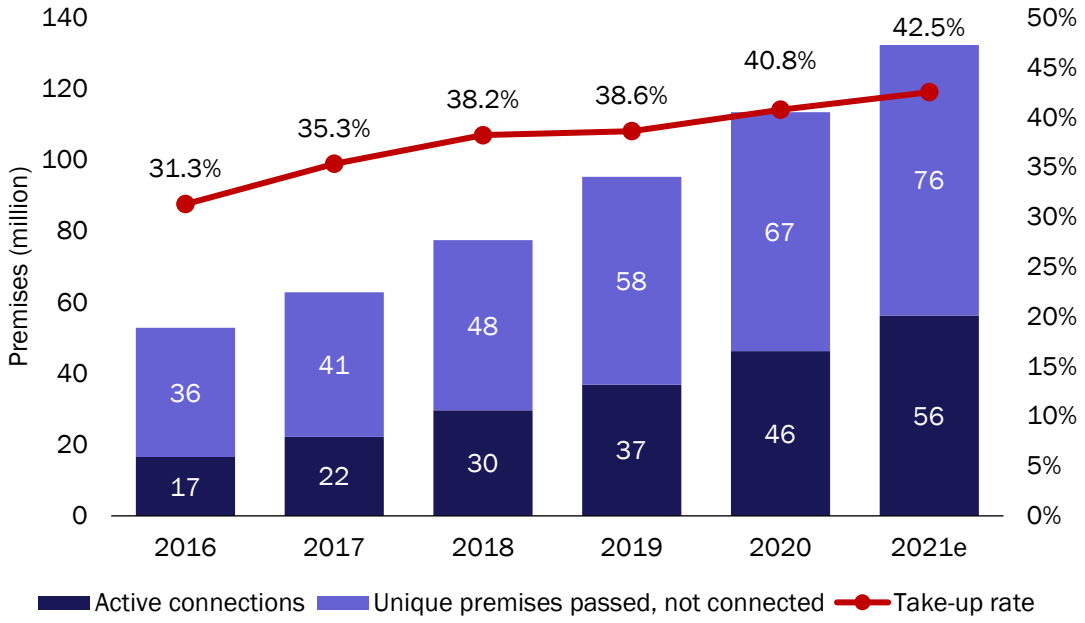
Increasing demand for FTTP creates an opportunity for any wholesaler that has first-mover advantage in any given location. However, the need to install a completely new network also creates additional pitfalls between the beginning and the end of the customer provision journey. Wholesalers have to minimise disruption, neutralise potential pain-points and meet RSPs expectations at every stage of the journey.

Service providers' pain-points represent opportunities for new wholesalers to differentiate and to win. Longer-established wholesale players may not have the same level of flexibility or commercial openness as new operators. In some cases, they will not be incentivised, until pushed hard, to open their networks to a particular set of services that cannibalises existing revenue streams. They may have less flexibility over commercial terms because of ongoing regulatory constraints.

4.1 Meeting immediate demand for FTTP

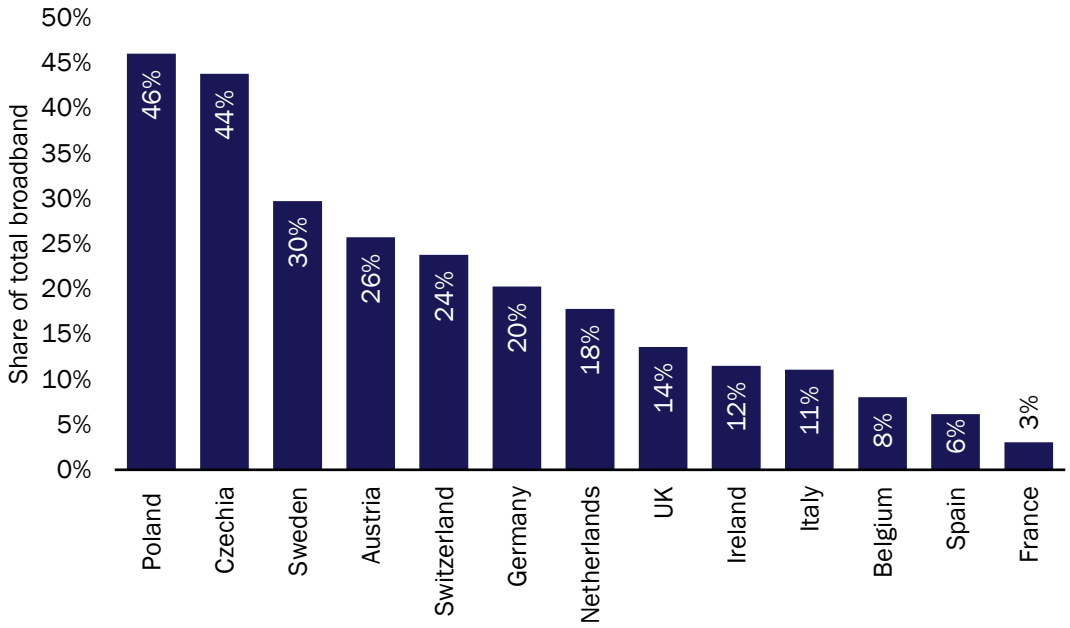
By the end of 2020, 41% of unique FTTP premises passed in Europe has an active connection. We forecast that this will rise to 58% by 2026, but it is important to note that the growth in this ratio is constrained by the rapid rate of build. Strong growth is also expected in other regions undergoing significant build-out (the Americas and emerging economies in Asia-Pacific in particular), and we see clear early signals that FTTP is beginning to disrupt cable operators.

Figure 5: Active FTTP connections as percentage of unique premises passed, Europe, 2016-2021f [Source: Analysys Mason, 2021]



As FTTP becomes the norm for consumer and small and medium business (SMB) broadband access, the balance of push and pull for an FTTP wholesaler is likely to shift in its favour. In this increasingly demand-driven environment, an immediate imperative for RSPs will be to defend retail market share. The most immediate opportunities for active FTTP wholesale lie among the smaller RSPs of the kind that have historically been dependent on incumbent copper networks. Smaller players have greatly varying share of current retail broadband markets. In addition to small service providers serving a national footprint, local wireless, LAN and cable plays will often have to engage with rather than compete against any FTTP build. Some will also engage to extend their footprint.

Figure 6: Aggregate share of retail broadband access market of service providers with under 10% market share, 2020 [Source: Analysys Mason, 2021]



Although many have disappeared through consolidation with fixed networks, mobile-only operators are another category of players among which demand might become strong. 5G FWA can be used to build a broadband base, but the huge disparities between fixed and mobile data volumes means that their cellular networks will be filled with low revenue-per-gigabyte traffic. Even such mobile-centric stalwarts as T-Mobile USA are beginning to experiment with FTTP access from third-parties, especially in urban areas where mobile networks are most heavily used.

4.2 Pain-points in the wholesale customer journey to service activation

Wholesalers have to neutralise potential pain-points and meet RSPs' 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.

- **Flexibility of commercial terms.** Depending largely on their scale, RSPs need varying financial/commercial models, pricing, contract length. This is a larger opportunity where incumbents have some constraints because of regulation.

- **Sharing marketing and demand aggregation overheads.** While consumer and SMB demand for FTTP is increasing, RSPs will want to share some of the overhead cost and effort of marketing FTTP such that end-users understand they both want and need it. Sharing the cost of demand aggregation at a 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. Using advanced digital provisioning and service assurance tools is an effective way of reducing the number of end-user touchpoints and the number of truck-rolls.

- **Dealing with property-owners**. Getting permissions from landlords to enter properties and install lines is a 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**. While most RSPs will not want to touch installation, 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 without major delays.

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

4.3 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 wholesale infrastructure provider and retail service provider.

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

- **Service level assurance and troubleshooting**. The rapidly increased prevalence of working from home has created a need for SLAs not only among SMBs but also for residential connections.

- **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.

Requiring the wholesaler always to be in the loop of such actions is an additional layer of complexity for an RSP, which translates into both a time burden and a financial overhead.

5. Differentiating on bitstream

While bitstream may appear to be a fairly commoditised service, for the new player in an increasingly competitive wholesale space, there remain several distinct ways to differentiate on the basic bitstream service.

5.1 Choice of technology

XGS-PON has established itself as the technology of choice for new fibre networks, and the next generation of xPON technologies is emerging. 25GS-PON looks ready to be fully commercialised in 2022, and higher-speed. evolutions up to 50Gbit/s and even 100Gbit/s are already under development.

While use-cases for third generation access technology outside of mobile x-haul are embryonic, wholesalers should not underestimate the marketing advantage of speed. A halo-effect applies in retail to a certain extent, but it is more substantially true in wholesale. When competing against cable networks, newer optical access technologies create substantial advantage. DOCSIS4.0 will reach in theory 10Gbit/s shared downlink and perhaps 4Gbit/s-6Gbit/s uplink, and at considerable additional expense and effort. It is highly unlikely that cable networks would extend into wholesale in areas where 10G or even higher speed fibre networks have overbuilt them.

5.2 Aggregation, contention and QoS

Wholesalers can offer total flexibility around point of handover (PoH). Incumbent wholesalers often offer only a subset of options in their network hierarchy.

For new wholesalers there is, in many markets, an opportunity to service B2B needs that lie somewhere between dedicated Ethernet connections and mass-market broadband. Established players are often not incentivised to address this gap: QoS options may be artificially limited, and the option of fully uncontended access at equivalent speeds to the end-user path is rare.

SLAs/SLGs provided by established players for FTTP broadband may be limited to simple measures such as provision and fault repair times; they do not often extend to other QoS measures such as packet loss, jitter or latency.

5.3 Bitstream tariffication

With a few exceptions, alternative wholesalers generally have free rein to charge on purely commercial terms. Most incumbent wholesalers are subject to some *ex-ante* price regulation, and most are also unable to geographically de-average tariffs. These limitations offer new wholesalers obvious advantages.

Active wholesalers should also be alive to the spectrum of options between long-term commitments and monthly rental. Likewise, most incumbent offers have charges for one or more of three key elements: the end-user path, backhaul transport and port capacity at the PoH. There will be room to challenge on each of these elements.

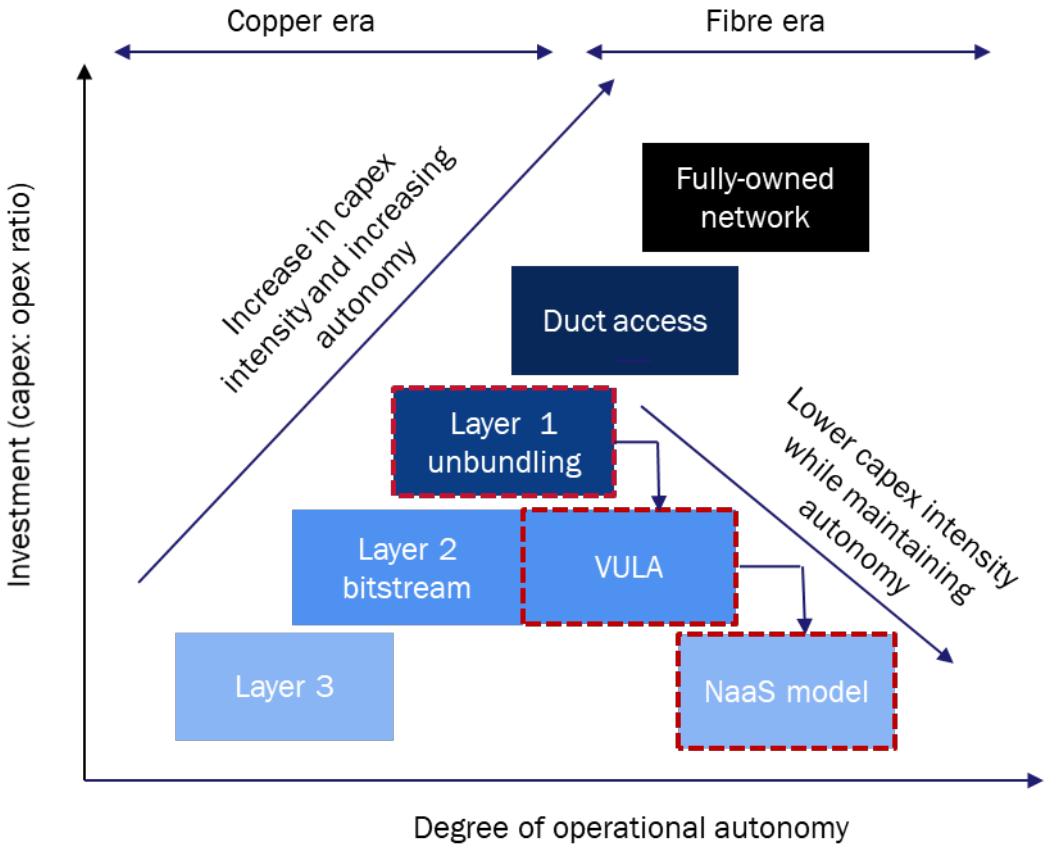
There is also clear room for disruption in some cases around the one-off tariffs for FTTP installations and the tariffs for service activations. Some incumbent plays, realising that first-time installation costs are an obstacle to take-up, have reduced these charges but have also shifted to charging more heavily for each service activation, so, for example, subscribers pay a large activation fee each time they move house.

6. VULA as stepping-stone to NaaS

Historically, in Europe and other regulated markets, gaining operational autonomy meant ‘climbing the investment ladder’. The access-seeker, having gained a retail foothold with ‘OTT’-type Layer3 services, would, so the theory went, invest in ever-more network elements (transport, actives) and thereby buy ever-simpler services from the wholesaler. It would, in theory, benefit from owner-economics and reduce its TCO.

The arrival of FTTx networks (FTTC and FTTP) halted this direction of travel as it was generally uneconomic to unbundle shorter copper sub-loops (and with vectoring increasingly technically difficult too), and technically difficult to unbundle FTTP PONs. Virtual unbundled local access (VULA) on FTTx networks was a work-around to this problem. VULA offers essentially sought to replicate, at an active layer, the kind of operational autonomy that copper local loop unbundlers has hitherto enjoyed.

Figure 7: The ladder of investment and the opex-oriented alternative [Source: Analysys Mason, 2021]



Although local exchange (LEX) -located handover is one important feature of VULA, it is in fact one of four.

- Local access
- A high degree or full control over connection to end users (own CPE)
- Service-independence (i.e. not restrictions over what the access technology can deliver)
- Uncontended access

In fact, the local access option has not always in practice mattered. Some incumbent wholesale operators shifted their PoHs to different locations in the network hierarchy. Telekom Deutschland, for example, offered PoHs on its FTTC/VDSL network either at cabinets or at a small sub-set of LEXs. TDC also offered PoHs behind DSLAMs and at a sub-set of exchanges. In both cases, significantly, it has been the more centralised options that gained in usage, while PoHs deeper in the networks remained relatively unused. In other markets, for example the Netherlands and the UK, incumbent VULA PoHs have been concentrated at a subset of LEXs.

It is by no means certain that wholesale FTTP access seekers in every market will follow the same path that many took for copper (that is, towards physical unbundling and a more capex-intensive/owner-economics

approach). In fact, in many regulated markets, layer 1 wholesale on copper has never been a large part of the overall (wholesale) market. While the French model was set up to facilitate the physical unbundling of FTTP, it is by no means certain that many other markets will follow the same approach, *or that the retail service provider market actually demands it.*

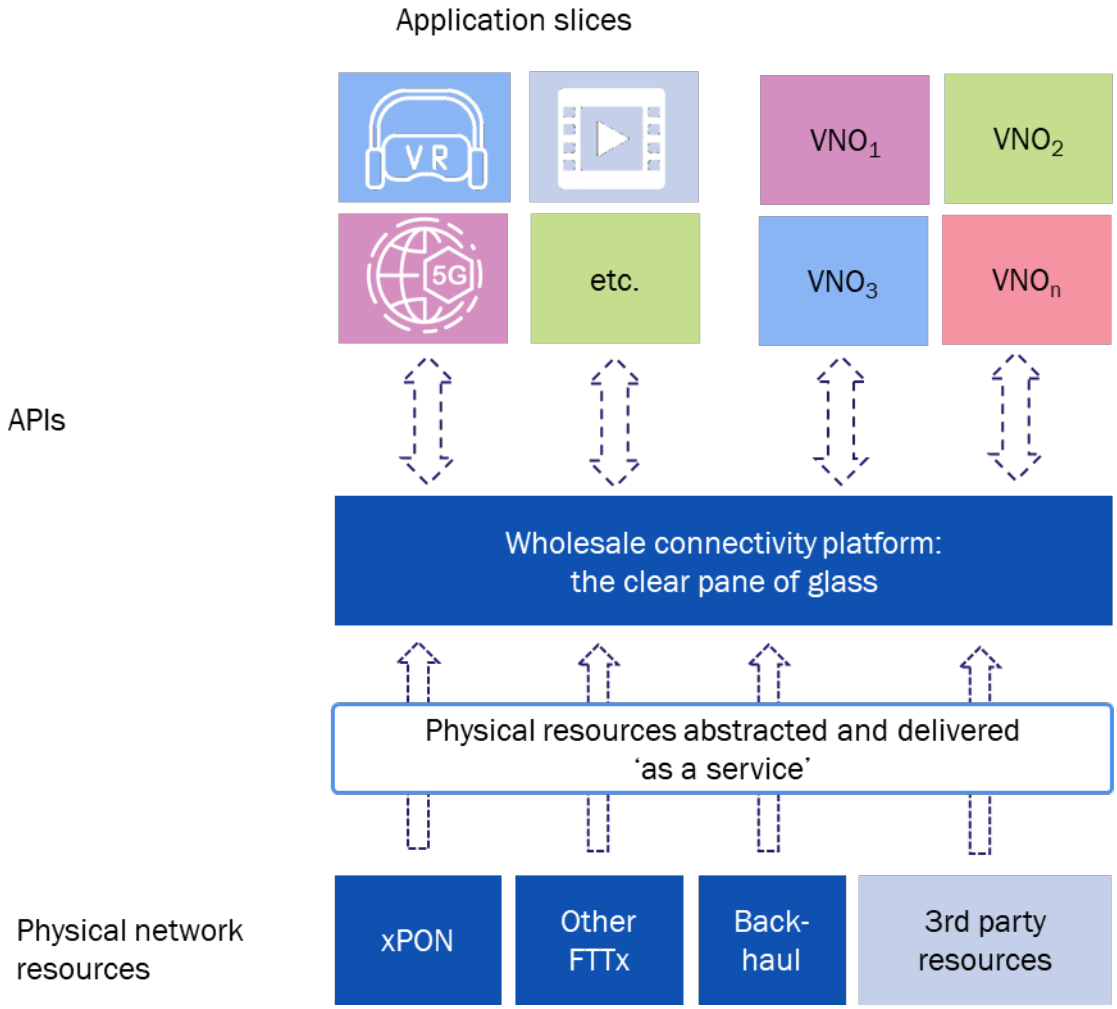
Network-as-a-service open-access models enable an even high degree of operational autonomy than unbundled access and regulated VULA typically offer, but this time with lower entry-barriers and lower capex-intensity.

7. Network as a service (NaaS)

Software defined access networks (SDAN) transforms the access network into a platform by abstracting network functions and serving them up as software functions in a potentially cloud-native environment. It enables the partition of network resources, including the aggregation / backhaul parts of the network, into discrete slices. For a single operator, these might be tailored for distinct applications with specific requirements: for example, a partitioned channel with guaranteed low-latency for its gamer retail customers, or a separate slice for mobile transport to small cells.

The same principle can be applied to wholesale slices for third parties, so that network slicing is commercialised as network-as-a-service (NaaS). NaaS has the potential to transform ‘access-seeker’ RSPs into full virtual network operators (VNOs), each with a high degree of operational autonomy over its own set of virtual resources. The result is that the process of provisioning wholesale services is given what is essentially a digital experience makeover.

Figure 8: Network as a service [Source: Analysys Mason, 2021]



This offers many clear advantages in terms of time to market for connectivity services and in terms of the ability to tune these to customer's evolving needs rapidly. The model also allows VNOs to integrate easily with partners on the service side, and to provide application slices tailored for those specific purposes, so as to speed up service innovation. This could serve to avoid multiple negotiations for access to content and applications. Because entry-barriers are much lower, NaaS on FTTP could also foster a different kind of retail dynamic, less dependent on a simple price-for-volume dynamic that fuels a race to the bottom on price for speed, and more dependent on service differentiation.

There is perhaps a false perception that NaaS is suitable only for small players or niche use-cases. Rapid and flexible access to fibre access (and of course to fibre x-haul) makes sense for larger mobile-focused players that need to offload FWA traffic or that simply need a compelling fixed + mobile offer in a retail market increasingly dominated by converged offers.

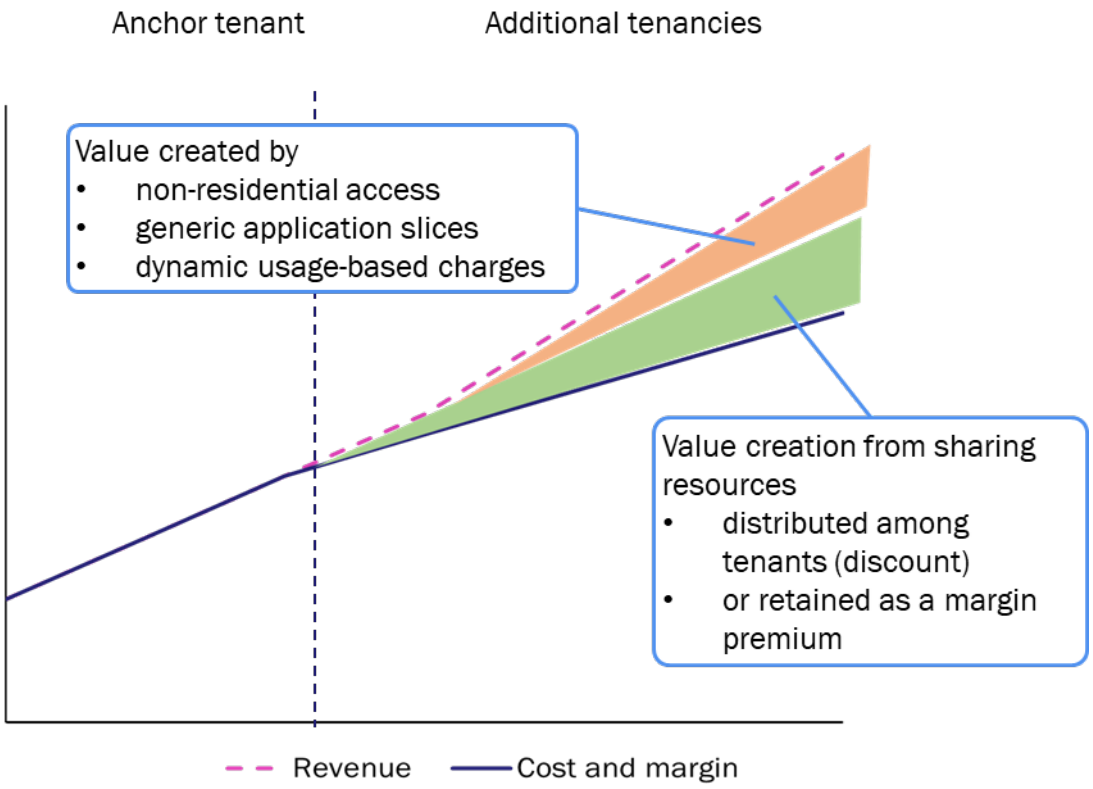
7.1 Tariffication of NaaS

The design of tariffing on an NaaS platform is vital to its success because NaaS implies a shift towards a more opex-centric model with lower entry barriers. For all the advantages of time to market and service agility, TCO will never be far from front-of-mind.

NaaS tariffication needs to handle dynamism and must also accommodate operators' demands for changing network configurations. That means a mix of payment types, including some that are already familiar (such as charging for Layer 2 VULA-type access), but also including payment on a usage basis for all or some of resources. Despite, or perhaps because of, this agility, NaaS wholesalers will need to keep to a meaningfully concise and clear catalogue of services.

Appropriate tariffication of network-as-a-service should serve to create additional value through sharing resources *and* by enabling new revenue streams.

Figure 9: Value creation from sharing active networks [Source: Analysys Mason, 2021]



8. Beyond fibre access

Servicing the wholesale market for broadband FTTP – including transport – will be the core business for most new wholesale fibre businesses. Put simply, it is worth more in revenue terms than other uses, and many players from the older fibre metro/backhaul/transport areas may move into broadband. However, there are important adjacencies with good growth potential in the coming decade.

8.1 Servicing mobile needs and creating mobile opportunities

One of the most important potential new sources of revenue is from servicing new and existing transport needs of mobile networks. While existing macro-cell sites are mostly fibred up, 5G and virtual RAN create some new requirements.

3.5GHz 5G networks largely sit on the existing grid of sites, but they will eventually require more. While individual operators may require more than 20% additional sites, the multi-tenant nature of towercos means that probably no more than 20% more physical sites are likely to be required. Rural and road/rail coverage needs may add to this.

More interesting, and of greater potential, are indoor enterprise small cells, whether installed by MNOs or third parties (neutral hosts, private enterprise networks). XGS-PON and 25G PON technologies substantially lower a major barrier to large-scale deployments. Wi-Fi currently services most of the needs for indoor enterprise wireless connectivity, so it is best to understand enterprise cellular small cells as enabling an opportunity rather than as meeting an existing need.

Virtualised RAN networks, where processing is more centralised, or even in the Cloud, require transport that demands vastly higher bandwidth, and with much more stringent requirements for latency, than the aggregate data traffic itself. There are capex cost-savings to be made in deploying this architecture, and densification becomes less expensive, but only if sufficient high-quality and low-cost fibre is available. Next-generation PON technologies have the potential to deliver just that.

5G FWA is an important part of many operators' broadband plans, covering principally those areas where FTTP is uneconomic. Given the asymmetry between the average traffic generated by a broadband connection and by a mobile device (about 40x difference in most markets), mobile networks supporting FWA will require vastly more capable backhaul.

8.2 Edge

Cloud computing is becoming ever more distributed to Edge locations, typically co-located on telecoms infrastructure. Edge computing will be served by both mobile and fixed access networks. 5G standalone mobile requires a distributed Edge, and the main public Cloud businesses are increasingly pushing deeper into networks for their own purposes, in some cases as far as enterprise premises. This will require ever-more fibre links and burgeoning amounts of bandwidth between the various locations.

8.3 Smart cities

Smart city initiatives have started to proliferate in the past decade, especially, but by no means confined to, countries with a more top-down approach to economic and social development. It is beyond the scope of this paper to enumerate the various and overlapping motivations behind smart city projects, but chief among them will be:

- Municipal and utility efficiency (in particular, transport and energy)
- Economic development (improving the attractiveness of cities to investors)
- Quality of life (improving public safety, reducing carbon emissions, environmental monitoring, optimising public and private transport).

In every case, the implementation of smart-city systems requires joined-up thinking. Assuming xPON for mass-market broadband is a sunk cost, xPON architectures enable much less expensive fixed connectivity to dense, multiple end-points (monitors, sensors, even just public Wi-Fi6 and 7) than would previously have been possible with a dedicated municipal network approach. Electric vehicle charging represents a timely opportunity, and, particularly in new build areas, substantial savings can be made by sharing the cost of power infrastructure and the fibre infrastructure.

Many smart city plans turn heavily on cellular or other wireless connectivity. Setting aside the point that all of these will require, at some demarcation point, fibre backhaul, direct fibre access to stationary devices such as video monitors has several key advantages over wireless.

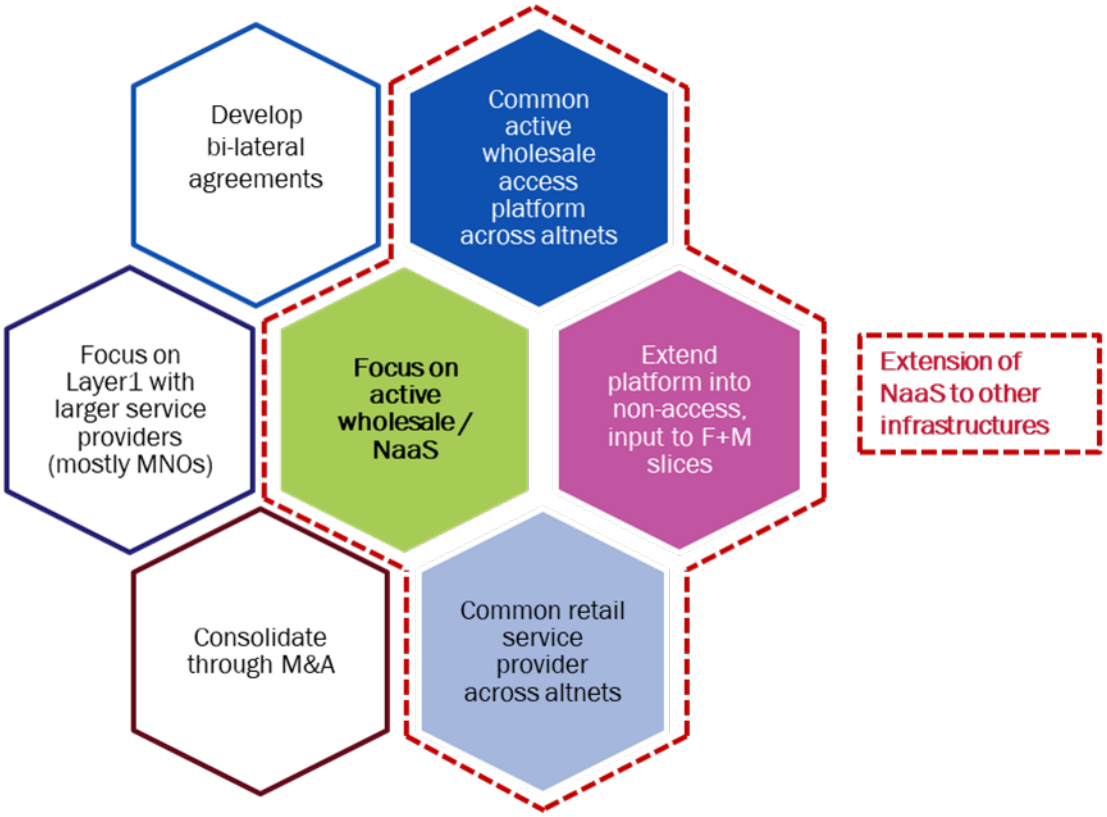
- Buried or ducted fibre has a remarkably long asset life.
- Fibre will always have, when and as required, a bandwidth advantage.
- xPON systems require far fewer active elements; once deployed, they are less visually intrusive, and they have far longer and more reliable reach than their wireless counterparts.

Smart cities can be seen as a further tenancy opportunity for active wholesalers, one that sits outside the box of traditional wholesale to service providers, but which depends on the same slicing concept as NaaS. Furthermore, it is a template for other more purely commercial densified deployments not only to, but within, enterprises.

9. Third-party infrastructure as input to the NaaS platform

One important further extension of the NaaS platform approach is that it can be used to integrate third-party physical network resources onto a common software platform. This could be important in markets (for example the UK) where alternative operator FTTP networks are numerous and fragmented. The creation of a common virtualised connectivity platform across multiple infrastructures would bring benefits of scale; VNOs would have to negotiate contracts with a single party and would thereby alleviate the pain-point of multiple contracts. The establishment of such a platform would likely be less costly and less time-consuming than consolidation through M&A.

Figure 10: Longer-term options for fibre wholesale [Source: Analysys Mason, 2021]



A different approach, already well-established in Norway, is the establishment of common residential retail service provision across multiple discretely-owned fibre infrastructures. Having a common and large-scale retail service end may help in boosting consumer recognition and take-up. While this is a shift away from wholesale in the residential segment of the market, it relies on the same abstraction as the wholesale platform and leaves room for wholesaling in other market segments.

10. Conclusions and recommendations

New fibre infrastructure providers need quickly to capture the take-off in demand for full-fibre access. A vertically-integrated approach is unlikely to fit well with the existing retail market structures. The question then is what sort of wholesale service set is optimal. Offering passive wholesale access only will not maximise margin, so the trick is to find a way of offering active wholesale services in a way that appeals commercially to all retail market segments.

Active access, and in particular the full network-as-a-service approach, offers the wholesaler:

- A service set that allows service-providers to make a break from the costly and time-consuming ‘ladder of investment’ model, and to move to a more opex-oriented approach while retaining a level of autonomy as VNOs.

- An opportunity to maximise return on investment by sharing infrastructure at an active layer, reducing the risk of being reduced to a provider of unlit fibre.
- An opportunity to foster new retail market structures, gain new types of customers with varying requirements, including multiple infrastructure requirements across fixed, mobile and enterprise.

The alternative fibre infrastructure landscape will in many countries become fragmented between different investor-owners. Whether or not these networks are overbuilt, there will be a need for some sort of unified approach between currently discrete networks. The network-as-a-service approach can be extended to encompass multiple infrastructures and can be developed as a common service platform. This is ultimately a simpler and neater approach than financial consolidation.

11. About the author

Rupert Wood (Research Director) is lead analyst for Analysys Mason's telecoms infrastructure research.

This perspective was commissioned by Nokia. Analysys Mason does not endorse any of the vendor's products or services.