

# MR-455

## Hybrid Access – Addressing Demand for Higher Broadband Performance

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# 1 Executive Summary

Hybrid access is an innovative technology that shows great promise, using mobile networks to augment fixed Broadband connections. By combining wired and wireless access, customers can see;

- Faster deployment of new service
- Improved service reliability
- For those with slow Broadband, offers an immediate way of boosting broadband performance

With many countries mandating universal service obligations (minimum Broadband speed targets) and trying to rapidly bridge the digital divide, hybrid access is often viewed as a low-cost, tactical solution to address “underserved” customers.

More recently, service providers have started viewing hybrid access as an important strategic tool. With the increasing deployment of high-speed mobile networks such as Gigabit LTE-Advanced [LTE-A], capable of delivering in excess of 300Mbps peak speed, LTE-Advanced Pro [LTE-P] delivering in excess of 1Gbps speed, and evolution into 5G speeds, hybrid access can now help enhance service offerings to deliver much faster broadband bit rates while providing in-fill solutions where the business case for FTTP has not been justified.

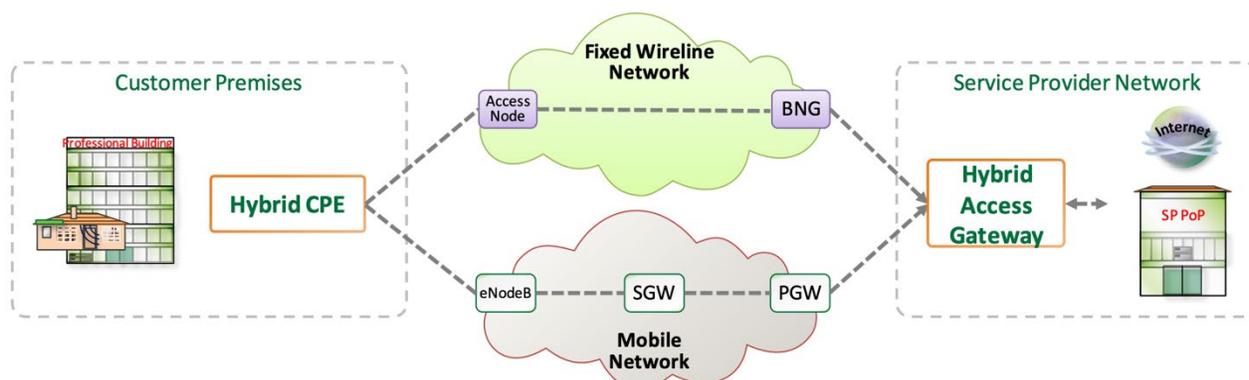
This paper discusses various use cases for hybrid access, potential market positioning, and addresses one of the main concerns that service providers have which is how much mobile capacity will be consumed.

## 2 Traditional use case

Hybrid access has, to date, largely been seen as a solution to boost the broadband speeds for “underserved” customers with rates that are insufficient for typical applications. Not so long ago 2Mbps was considered an adequate broadband bit rate [UK2]. However, with the rapid rise of applications like streaming services, on-line gaming, IPTV, social media and e-commerce, most customer expectations are now considerably higher – at least 25Mbps. Service providers are under pressure by customers to provide a solution that can meet or exceed these bit rates. Regulators in some countries are beginning to take matters into their own hands, mandating minimum broadband bit rates for every household. For example, the EU [EU] is pushing for 30Mbps universal service across the whole bloc in 2020. While speed has been the main discussion for Broadband until now, consistency and reliability are also coming sharply into focus. With Broadband reliability becoming vital for consumers and businesses, some countries are starting to introduce automatic compensation schemes for broadband outages [OFCOM], causing a direct financial impact to carriers who don’t meet requirements.

Hybrid access has been heralded as a cost-effective, quick to deploy solution that can deliver both faster bit rates and higher quality of service by leveraging existing fixed and mobile infrastructures. But adoption has been slow, with many service providers having run proof of concept trials, but few large-scale commercial deployments to date. To understand why, it’s important to appreciate how hybrid access works.

The Broadband Forum’s TR-348 [TR-348] technical report describes in detail the high-level hybrid access technical requirements and architecture. The four main components it describes are; a hybrid access-enabled CPE, a fixed network, a mobile network and a Hybrid Access Gateway (HAG) which is deployed in a service provider’s network.



**Figure 1: Typical hybrid access deployment**

While there are a variety of hybrid access solutions on the market, each with their own attributes, the general view / main concerns of service providers are;

- i) **Application support.** Many solutions only supported certain protocols such as TCP. While TCP is the most widely used transport protocol today, this prevents it being used by businesses for VPNs, but also common applications such as VoIP. UDP-based QUIC is also rapidly becoming an important transport technology

- ii) **Mobile data usage.** While many solutions have mechanisms to control the amount of traffic consumed by mobile, there is concern that it will congest their expensive-to-operate mobile network
- iii) **Expensive.** Many hybrid access solutions require the customer CPE to be swapped for a more powerful unit with integrated wireless modem. Mobile data is also as a major cost

But things are changing. Hybrid access solutions are increasingly able to support protocols beyond TCP, broadening its applicability to a wide range of applications including those listed above.

Solutions are able to be retrofitted to existing CPE (because of reduced CPU, flash and RAM footprint), use low-cost mobile USB dongles, smartphones and other mobile Wi-Fi hotspots. Adopting various bonding technologies and virtualising the back-end servers to run on commodity hardware [TR-416], rather than dedicated appliances, reduces cost. This dramatic reduction in hybrid access solution costs means it is becoming economically viable for many, even against the revenue back-drop.

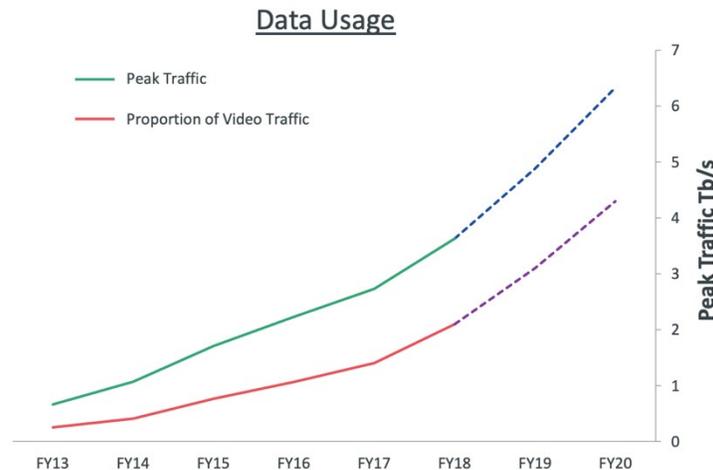
Also, many service providers will have areas where deploying FTTP makes sense, but there will inevitably be other areas where the business case is marginal or unclear. Hybrid access can help strengthen the business case for FTTP deployment in an area by demonstrating demand for higher bit rate services.

### 3 Mobile network usage and the evolving need

The competition for providing broadband services is intensifying, and the business case is being challenged by the promise of faster bit rates and better reliability for less money. While customers might not know what to do with an ultra-fast connection, they know that faster is better, particularly if it costs the same or less than a slower connection.

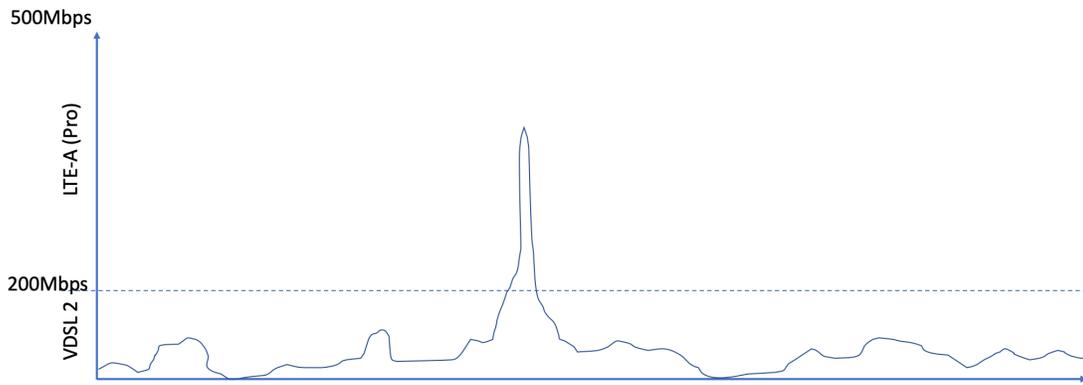
While FTTP is being deployed, partial or wholly copper based solutions such as ADSL2+ and VDSL2 will continue to provide connectivity for a large percentage of the population for many years to come. In parallel, cable companies are aggressively rolling out DOCSIS 3.1 which can often deliver high peak bit rates. Satellite and fixed wireless solutions continue to proliferate and deliver improved services. This competitive reality results in the potential for significant customer churn for copper-based service providers.

With many service providers deploying LTE Advanced / Pro wireless networks, capable of delivering peak 300Mbps to 1Gbps, the appeal of hybrid access is growing, allowing already fast fixed lines to be further speed-boosted to reach near-FTTH like bit rates. Full FTTH will of course provide a superior solution, but a fast hybrid access solution can provide a similar customer experience that they would not otherwise be able to receive.



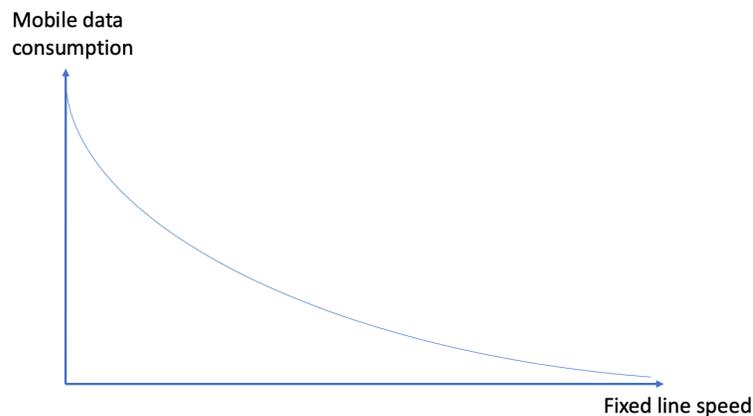
**Figure 2: Network data usage**

Many understand the notion of over-subscription and that, on average, customers aren't fully utilizing their connections 24/7. Figure 2 shows a leading European service provider's back-bone network traffic for 4.3M customers, and that at peak time generates approximately 4Tbps [TT] – that's less than 1Mbps per customer and underscores this point.



**Figure 3: Using mobile to top up xDSL**

Figure 3 shows how hybrid access can use high-speed mobile access to seamlessly provide a speed boost to a VDSL2 connection, only when required to do so. The bursting into mobile can be controlled to intelligently manage traffic during times of peak mobile network contention, which many hybrid solutions can validate.



**Figure 4: Mobile data consumption versus fixed line speed**

Many service providers will appreciate the fact that as a fixed line’s speed increases, the frequency of a customer saturating the connection decreases. Figure 4 shows that as fixed line speed, the amount of mobile data consumed to ‘top up’ is reduced. A private study conducted by a single operator in 2018 showed that the average data consumed for hybrid access customers was;

- 4Mbps fixed line used on average 86Gbytes / month
- 100Mbps fixed line used on average 5.5Gbytes / month

The example above highlights how hybrid access for faster speeds no longer consumes significant amounts of mobile capacity, which mitigates the high-cost perception.

## 4 Summary

Service providers are increasingly recognizing the appeal of hybrid access solutions in order to;

- Improve the basic service of customers with slow broadband bit rates
- Provide rapid service activation
- Improve connection reliability
- Deliver higher bit rates as a key differentiator
- Help build the case for FTTP deployments by highlighting areas of demand.

To address the main concerns mentioned;

- i) Application support. Most modern-day hybrid solutions now support any application, not just TCP-based
- ii) Mobile usage. As has been demonstrated higher fixed line speeds do not require large amounts of mobile data. Also, cheapest pipe first / speed boosting methods ensure mobile is only used when absolutely required
- iii) Expense. By use of existing customer CPE / mobile devices versus purpose-built devices, much of the associated costs have reduced significantly or eliminated. Coupled with the reduction in mobile usage the overall cost of hybrid access solutions is significantly less than in the past

Hybrid access is a technology whose time has come, having evolved from a technology with limited applicability and appeal, to one that now cost-effectively provides operators with the opportunity to offer higher performance broadband services.

## 5 References

The following references are of relevance to this Marketing Report. At the time of publication, the editions indicated were valid. All references are subject to revision; users of this Marketing Report are therefore encouraged to investigate the possibility of applying the most recent edition of the references listed below.

A list of currently valid Broadband Forum Technical Reports is published at [www.broadband-forum.org](http://www.broadband-forum.org).

Document	Title	Source	Year
TT	Talk Talk full year results presentation	<a href="#">Talk Talk Group</a>	2018
LTE-A	Gigabit LTE Advanced	<a href="#">3GPP</a>	2018
TR-348	TR-348	<a href="#">Broadband Forum TR-348 report</a>	2016
TR-416	TR-416	<a href="#">Broadband Forum TR-416 report</a>	2018
OFCOM	Ofcom automatic compensation	<a href="#">Ofcom</a>	2019
LTE-P	LTE Pro explained	<a href="#">Carritech</a>	2019
EU	EU universal Broadband	<a href="#">European Union</a>	2016
UK2	Article on UK 2Mbps minimum broadband scheme extended	<a href="#">Choose.co.uk</a>	2018

### 5.1 Abbreviations

This Marketing Report uses the following abbreviations:

<b>MD</b>	Marketing Draft
<b>MR</b>	Marketing Report
<b>WA</b>	Work Area
<b>FTTP</b>	Fiber To The Premises
<b>VDSL</b>	Very High-Speed Digital Subscriber Line
<b>LTE</b>	Long-Term Evolution cellular
<b>LTE-A</b>	LTE Advanced
<b>LTE-A Pro</b>	LTE Advanced Pro
<b>xDSL</b>	Family of Digital Subscriber Line technology

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