‘Mobile-Centric’ Fibre

Whitepaper

May 2018

mentor™

What is ‘Mobile-Centric’ Fibre?

‘Mobile-Centric’ Fibre is a new UK Fibre network designed to meet the needs of Mobile Operators who have two burning problems: increasing capacity in their 4G networks and laying the foundations for 5G. It also deals with the fibre needs of ‘Network Densification’, where operators will add thousands of small cells in the busiest areas of their networks.

The ‘Mobile-Centric’ approach is aimed at the Hyper-Dense areas of the Mobile networks - areas in the centre of our biggest cities. For now, it’s not about rural locations or quiet suburbs.

By analysing Mobile Operators’ specific traffic ‘hot spots’, their preferred small cell locations and existing street concessions, we can design a fibre network that meets the aggregated demand of all operators - and get to within a 10m dig of these new sites.

We are not advocating ‘overbuilding’ existing fibre providers. Rather, we suggest a mixed economy approach to source the network - building and buying where it makes commercial sense - but guided by our map of aggregate demand.

We are keen to use the sewer assets in cities which have played a small role in network construction, so far. Sewer routes relate well to the aggregated demand map - and show marginal overlap with existing non-BT fibre assets. They allow rapid and economical network construction and the flexibility to add huge quantities of raw fibre capacity, using a ring topology.

‘Mobile-Centric’ provides Dark Fibre services to Mobile Operators to connect their new base stations back to their core networks, often through a BT exchange. It offers natural resilience, providing clockwise and anti-clockwise diverse paths, for critical site connections.

Mobile Operators don’t just want super-resilient connections to the core - but more flexibility to mesh connections - allowing deployment of fronthaul, backhaul and x-haul solutions.

‘Mobile-Centric’ simply offers ‘Dark Fibre’. In this way it creates more value for Mobile Operator customers and their network evolution plans compared to managed ‘lit’ services.

Contents

Mobile Network Evolution

Why do we urgently need a new fibre network, specifically for Mobile?

The growth in the consumption of mobile data is relentless and well-understood; +40% per year. Perhaps, less well known is how limited the Operators’ options are.

There are only a few ways to add capacity to an existing set of base stations; once done, adding more base stations is the only option. Each new ‘Network Densification’ base station requires a fibre connection, ideally dark. But BT won't sell its fibre dark and existing Alt.Net fibre is generally in the wrong places according to our demand map.

These options are more or less the same across the world. So, the pace of densification is a good barometer for an Operator’s progress in the race to 5G, and new dark fibre is a critical enabler.

Where is the UK in the Global race to 5G?

In the CTIA’s ‘Race to 5G’ conference in April, the enthusiasm for 5G was spectacular. What is clear, is the US sees its competitors as Japan, China and Korea - not the UK, or Europe. ‘The race to lead the world in 5G is on – and America needs to win. At stake? Millions of new jobs, billions in economic growth, and transformative advances across industries.’

So, what does good look like?

In the US, Zayo plans to upgrade a US wireless Operator’s ‘fibre to the tower network’ - bringing Dark Fibre facilities to over 26 markets with over 10,000 cell sites nationwide.

Crown Castle are also transforming their portfolio of traditional cell towers and small cell concessions. It has built 50,000 small cell nodes, owns 60,000 route miles of fibre for small cell backhaul and is averaging 2.5 nodes per mile of fibre. Moreover, they have put 5,000 nodes ‘on air’ in the last year, with 30,000 more in the pipeline.

In the UK, we have seen a few trials announced - adding up to a few hundred small cells. By comparison with other markets, the UK 5G ecosystem is treading water. Numbers like those in the US, dwarf the small cells deployed in the UK so far, even accounting for the population differences. Network Densification and Dark Fibre are not an issue in the US; they are ‘business-as-usual’ today.

Overall 5G readiness scores

(Source: Analysis Mason, 2018)

We haven’t entered the 5G race yet - and the scarcity of Dark Fibre is a major reason for glacial progress.

A Basket of Solutions

More spectrum?

The latest UK 4G/5G spectrum auction is over and critical spectrum is now in the hands of those that need it. The lopsided distribution of spectrum across UK Operators has been reduced - a little. But the auction process effectively drained £1.4Bn of cash from the UK Mobile Networks which won’t encourage network investment.

Smart Antennas?

MIMO smart antennas are now entering the mainstream. Some people hope the additional capacity, together with lighting up new, high frequency spectrum, postpones the need for densification and small cells. Not so. While these antennas are helpful – they don’t buy us much time with usage growing at c40% per year.

What’s also clear is not all towers and cell sites will be able to - or permitted to - use these larger and heavier antenna structures.

What’s wrong with traditional fibre ‘lit’ services?

In 5 to 10-years’ time, it will not be realistic to run 5G networks using standard BT EAD/LA 'lit' services - over a hub and spoke architecture. Remember, this architecture was not designed for 5G. It was designed

early in the 20th Century for analogue telephony over copper wires.

Operators cannot afford the BT EAD/LA ‘lit’ services – or live with the constraints on their evolving RAN architectures. Our target price for a small cell’s support infrastructure, including backhaul, is c£1.5k per year. With BT 1G EAD costs at c£2k per year and 10G EAD/LA c£4k per year, it’s little wonder small cell rollout is stalled. Future price declines in 10G/1G services will be offset by moving to 100G/10G. At this pace, the UK will remain in an ‘also-ran’ position and customers will be the main losers.

It’s not just about the price, either.

Using a generic ‘lit’ solution on a hub-and-spoke network, is basically an inefficient architecture where Macro-Micro interworking - so vital for aggregation, integration, and evolution must be routed through the serving exchange.

There is no resilience and few options to innovate at the optical level. It also creates timing/synchronisation challenges on applications that demand low latency and very high bandwidth.

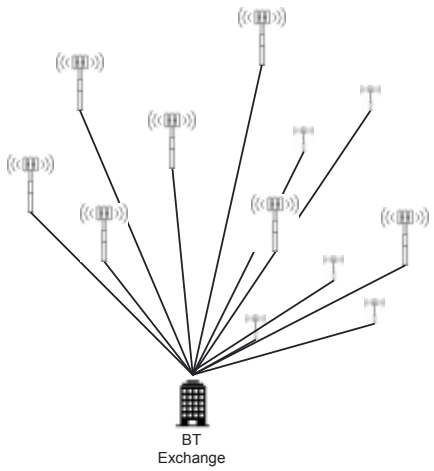
Even if the Small Cell Forum and FCC forecasts of up to 350 Small Cells per square kilometre are over optimistic, lower deployment levels, say 50 to 100 per square kilometre, will require huge densification over the next few years – completely trashing the economics of an EAD constrained architecture.

In summary, Mobile Operators need Dark Fibre now to:

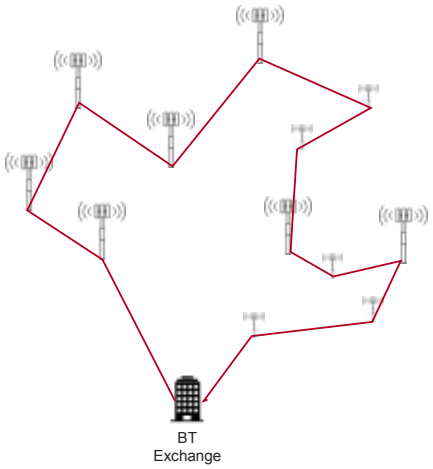
- Keep pace with the growth in data from Hyper-Dense areas;
- Exploit new 5G technical architectures;
- Avoid forfeiting their future to expensive ‘pay as you grow’ managed fibre services.

It’s needed now to take a meaningful position in the ‘Race to 5G’ and to make the most of a ‘Mobile-Centric’ fibre solution.

Hub-and-Spoke vs Ring



Hub-and-Spoke Architecture



Ring Architecture

Could we get fibre from BT?

Openreach Dark Fibre Access (DFA) looked like it would be a good option this time last year. Even though they are the UK’s biggest owner, Openreach has managed to avoid selling Dark Fibre, despite Ofcom’s best intentions.

After several consultations, DFA 2 arrived. A new, but massively watered-down Dark Fibre product. The heart of Openreach’s legal victory was proving they did not have market power in circuits above 1Gb/s speeds. So, the DFA 2 product was limited to 1Gb/s and below. Ofcom is blocked for now. DFA 2 is dead and may be considered at the next Business Connectivity Market Review (BCMR) beginning in 2019.

Could Openreach’s competitors fix this?

Openreach’s fibre competitors supported Ofcom’s move against DFA 2 - to keep fibre prices at economic levels - and to make sure Full Fibre investment goes ahead. This means they are now the only suppliers of Dark Fibre in the UK. Mobile Operators buy Fibre from BT Wholesale, at a discount relative to BT’s price list - and the Alt.Nets also sell it at a discount relative to BT’s price list. BT’s long dark shadow over the Dark Fibre market underlines the urgent need to create a scale ‘independent’ UK Dark Fibre market, as soon as possible.

Could Full Fibre sort this out for us?

Sharon White, Ofcom’s CEO, says BT Openreach must replace their ‘Victorian-era’ copper ISP network with a modern Full Fibre broadband alternative - or risk losing hordes of customers to rivals. ‘Fibre up or Fade away’ was her pointed advice.

There have been many announcements on Full Fibre including Vodafone/CityFibre’s and BT’s own. This is good news and we fully support Full Fibre infrastructure being built for the UK as a whole.

Our concern about Full Fibre is that its initial focus is on prime residential areas - which are possibly different to the Hyper-Dense areas demarcated by the Mobile industry.

This means Full Fibre won’t help ‘Mobile-Centric’ – but, strangely enough, ‘Mobile-Centric’ could help Full Fibre.

Are BT’s Ducts and Poles part of the solution?

Part of Ofcom’s Full Fibre announcement of the new deal for Openreach is Passive Infrastructure Access or PIA. This consultation aims to radically improve access for Full Fibre ISP’s to BT’s Ducts and Poles to install their own fibre.

If this happens, it’s good news. There are some problems, however.

First, its scope is legally limited to ‘primarily Full Fibre’ network construction. Potentially, this could exclude people with a focus on ‘Mobile-Centric’. But given the DFA mess, could PIA become a **Universal Remedy** to BT’s local access dominance by offering it to all network builders - Broadband and Mobile?

Second, the current rules say that if the ducts are full, the ISP has to pay to dig around the congestion. This may rule it out for areas with the most pressing demand and the most heavily used ducts.

Finally, the proposed rules state that if the ducts are in poor condition, BT must fix them. There is an allowance in the price for some repair work, but once that’s topped, the ISP has to fund the balance of the repair cost.

It’s not yet clear whether PIA is going to be a castle-in-the-air or a bad dream.

If PIA/Duct and Pole became a **Universal Remedy** and a focus for Openreach – provided they could offer an equitable service for all users - the debates about Openreach's future could end.

The Business Case

Supercharging Full Fibre from ‘Mobile-Centric’ areas

So, what does PIA/Duct and Pole have to do with ‘Mobile-Centric’ Fibre?

Well, PIA doesn’t help fibre rings. For Mobile priority areas, we believe BT ducts are crammed with cables and we’d have to dig round half of London.

But it becomes attractive if it helps to deliver one of the economies of scope for ‘Mobile-Centric’ Fibre. Instead of the ‘last mile,’ we can use the last 1/4 mile of BT’s Duct and Pole network to deliver fibres from the rings to pass many homes and businesses in these areas.

There will be lots of spare ring fibre, so whether as a direct offering - or by partnering with leading Broadband players - this is a substantial scope economy for the core ring build. And a significant opportunity to supercharge UK Full Fibre.

What’s in it for you?

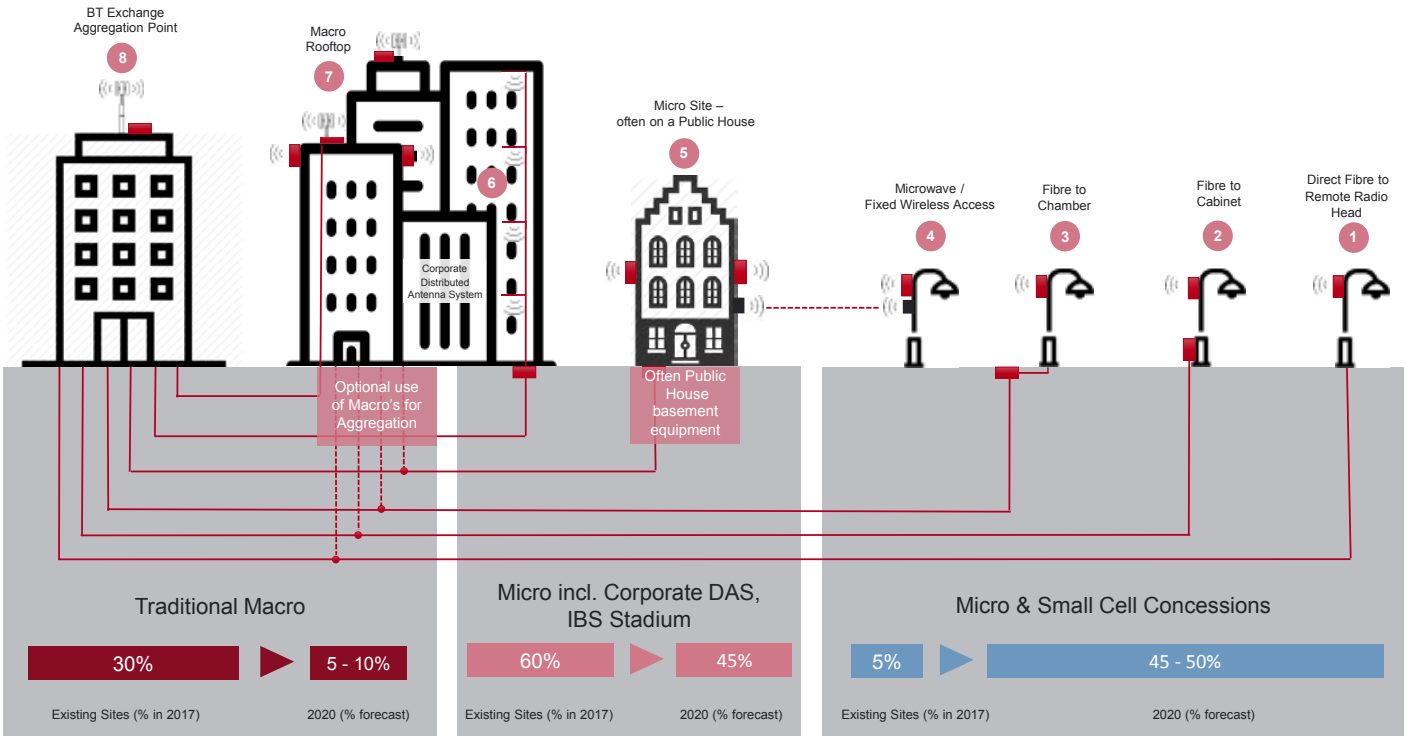
A design without a business case is an exercise in make-belief. The business case we’ve built shows ‘Mobile-Centric’ is a solid proposition, practically and commercially – with a ‘shovel ready’ engineering programme ready to roll.

The shift away from EAD/LA will be driven by aggregated Mobile Operator demand, densification and economies of scope. In Dense Urban areas, the business case for a single Operator building its own fibre network to its existing macro sites is marginal. There are no savings on a 20-year BT EAD/LA Total Cost of Ownership (TCO).

In Dense Urban areas, with two Operators aggregating demand and driving modest densification, say x2, the TCO for the self-build approach is 50% of the EAD TCO - with small cells.

This reaches our target of c£1.5k per year Opex range, including all the infrastructure needed - fibre plus cabinet and the concession rental. With three or four operators the TCO is even better. In our reference design, adding a third and fourth operator reduces the per-site TCO by a further 20%.

Hyper-Dense - Portfolio Illustration



Our ‘Mobile-Centric’ design also delivers lots of spare capacity – allowing fibre wholesaling to Residential and Enterprise-focused ISPs - and supercharging both business cases.

And the punch line?

Using this approach, we can cut several hundred pounds from the cost of each Full Fibre home passed – which is radically cheaper than traditional dig or BT/EAD based solutions.

Outside Dense Urban areas, the cost-per-metre of deployment drops - but so does site density and the pace and urgency of densification. Economies of scope are very important here to make a truly compelling business case.

Conclusion

This whitepaper describes a ‘Mobile-Centric’ approach - but there is a 5G race going on – and the UK is not really in it yet. Not because:

- UK Research isn’t focused on 5G - because it is!
- UK Mobile customers aren’t big users - we are!
- Operators aren’t innovative - they are!
- UK Spectrum is locked away and idle - it isn’t!

‘Mobile-Centric’ isn’t hard to understand.

We know where the Operators need priority fibre to drive their network densification plans - down to the individual site grid reference.

We know how to build fibre quickly - and how to demolish the restrictions posed by BT EAD – and bring a healthy bunch of architectural benefits as well.

We can demonstrate real savings and make positive returns on the investments - if we aggregate demand and focus rollout.

We even know how to supercharge Full Fibre in the same neighbourhoods - by using the last 1/4 mile of BT’s Ducts.

Let’s get some momentum behind ‘Mobile-Centric’ and get the UK into a much stronger position in the 5G race!

How Mentor can help you

Mentor has 3 solid decades of experience in running complicated programmes in the UK Telecoms market. We broke new ground creating some of the first wave of Alt.Net deployments, led a number of 2G, 3G and 4G implementations and have also lent a guiding hand to most of the UK’s infrastructure players.

Today, Mentor is helping Mobile Operators, Fibre providers and Infrastructure players to figure out how to respond to the huge opportunities presented by 4G densification and the move to 5G.

For Mobile Operators, who have habitually bought managed ‘lit’ services from BT, Mentor is crafting design and deployment schemes for fibre networks and Optical Solutions across their Core and Access networks.

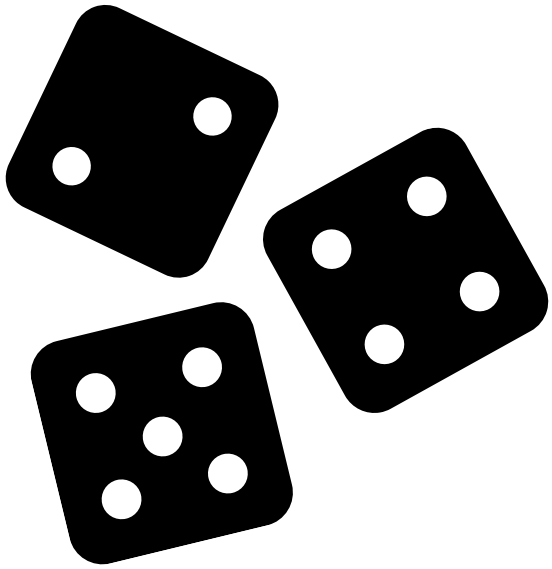
We are also helping Fibre providers to design solutions that meet the unique architecture, operational and business case requirements of the Mobile Operators. And we are supporting Infrastructure players, and their investors, as they look to monetise the opportunities presented by the move to 5G.

We are single-mindedly drumming up support for a functioning UK Dark Fibre market so 4G and 5G can realise their potential.

With our strong industry relationships and independence - combined with our deep design, operational and commercial experience - **we are the natural partner to help you** develop compelling multi-party business cases for ‘Mobile-Centric’ Fibre; support your internal teams; and, to help get the job done faster than you might think.

Why roll the dice?

Get in touch with us now.



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