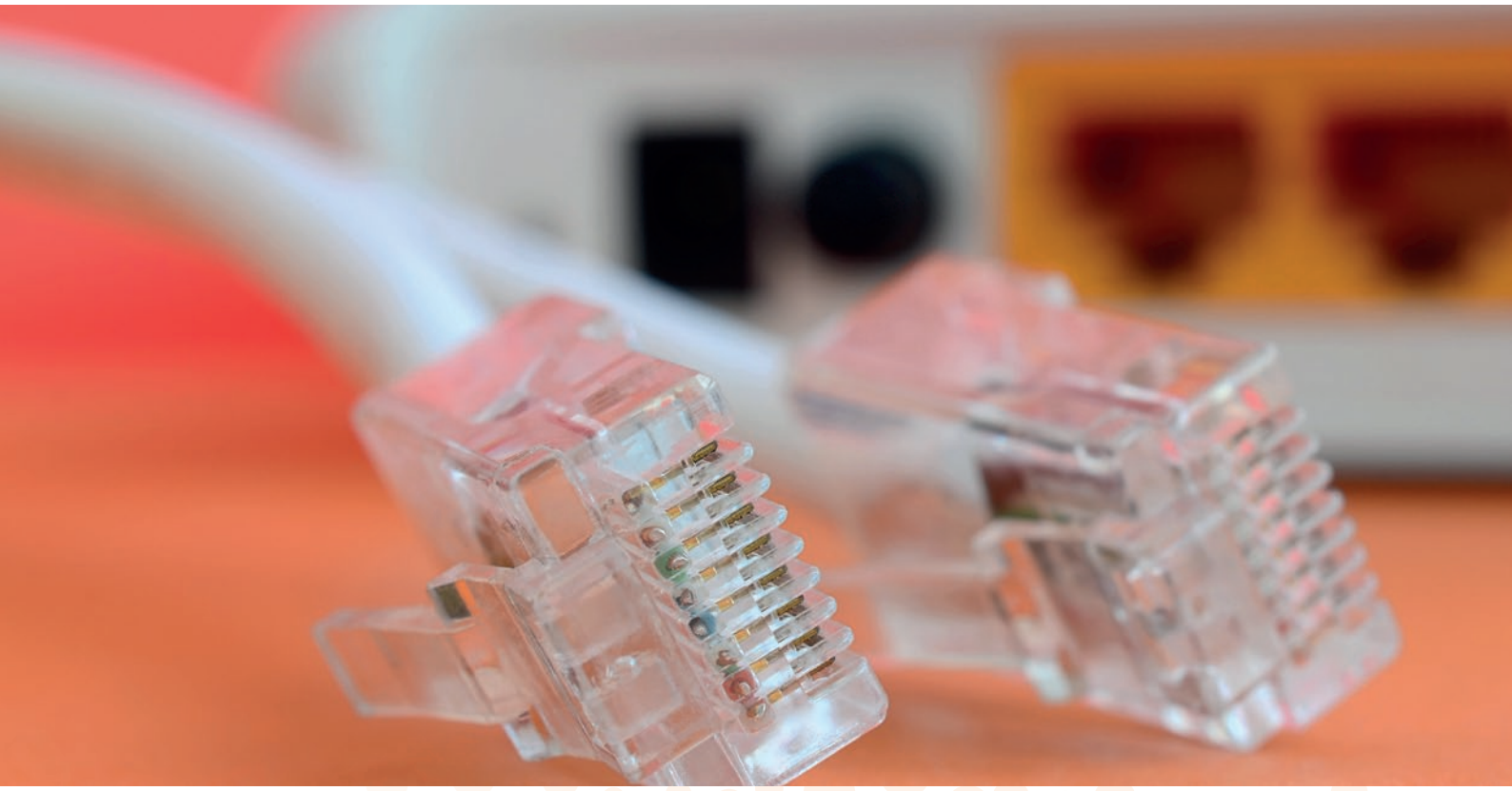

Those that fail

TO LEARN FROM HISTORY ARE DOOMED TO REPEAT IT[1]

BY JOHN FRANCIS NOLAN, FIRST MILE NETWORKS

JOHN FRANCIS NOLAN, FIRST MILE NETWORKS

John is a Chartered Engineer and Director at First Mile Networks (FMN), a leading UK technology consulting and commercialisation firm, specialising in network strategy and planning, due diligence and audit, programme and project management and operations. He has directed numerous high profile telecoms projects (most notably the Determination of Fair Value of Turk Telekom). Before FMN John held senior positions in technology and telecoms consulting, working in a number of European countries as well as the USA, Asia Pac, the Middle East and Africa. He is a member of the IET, a Senior member of the IEEE, a member of the ACM as well as a new member of the SCTE.

INTRODUCTION[2]

At the risk of understatement, the author has been "monitoring" the Internet[3] fibre access[4] market for a good few years i.e. from circa 2003 onwards with his definition of fibre access being "the replacement of the copper (and coax) infrastructure for connectivity, primarily to the home/business."

This paper is by way of an update on the author's current thought process and will offer opinion, etc., where appropriate. In the development of this paper, the author has drawn on his experiences within the telecoms industry and a number of references – these references are expanded upon in Section 8.

At the outset, the author wishes to draw readers attention to the early work of First Mile Networks (FMN)[5,6] with FTTH[7] in the UK, and in particular, discussions held with a number of UK "developers" namely Land Securities, Meridian Delta (MDL), and Quintain Estates.

Figure 1.1 opposite illustrates an extract from the early FMN thought process and, whilst Land Securities and MDL did not engage with our approach, we were successful with Quintain in developing a comprehensive business plan for their Wembley Park Estate.

The FMN business model was predicated on the provision of ducts and fibre at the early stage of such developments with the premise being that every potential end point on the estate would be serviced by fibre. It could be argued that the FMN model was a precursor to today's many alternative network providers and hence

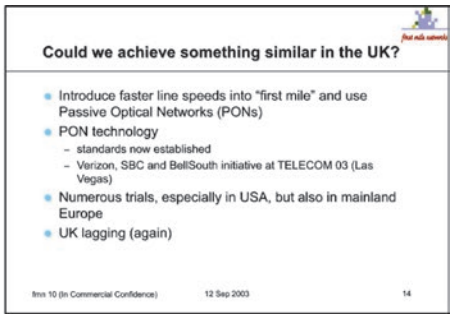

Figure 1.1: FMN – Early Work with FTTH in the UK

the author would argue that he is not some "Johnny come lately."

The paper is structured as follows:

- An introductory (and a brief) history of the UK telecoms market (and note that the author has been active in the telecoms industry since 1971, and would suggest has some standing)
- The growth of the altnets
- The need for "modelling" to assist in any financial analysis for comparative purposes - will cover both financial and organisational models
- An introduction to the Neutral Access Network (NAN)
- Brief thoughts on how the NAN concept could be progressed
- Where the market is heading and what the landscape may look like, say, in 2-10 years
- "Useful" references.

GOIN' BACK[3] - A POTTED HISTORY OF UK TELECOMS

To set the scene, Figure 2.1 below is a graphic illustrating the author's view on the evolution of the UK telecoms market from the early 70s to circa 2020 and note that this summary excludes the development of the Internet within the UK.

Figure 2.1: A "potted" history of UK telecoms – circa 1970 to 2010

Populated with valued input from Keith Gilbert (MD, Intercai Mondiale)

1 Attributed to Winston Churchill

2 Note that the term internet has many meanings, but for the purposes of this paper "Internet" refers to the global internet, whilst "internet" describes a subset of the global Internet e.g. the UK internet.

3 Goffin and King – see Nils Lofgren for a definitive version of this classic

4 See Paul Green (RIP) for a USA view on this topic at https://bit.ly/3xHkcL5

5 First Mile Networks - Dr. Chris Lilly was my business partner in this venture

6 See Chapter 8 (the Future) at https://bit.ly/3zUDePh

7 Fibre to the Home

POST 2010, THE "BITCO[8]" MODEL

The move from a circuit switched approach (primarily) for voice to delivering bits via packet switching has radically changed network architectures (see Isenberg & Nolan[9]) - see Figure 2.2 below.

"Bitco" is a term used by the author to illustrate the delivery of a digital service and note access network connectivity (and the backhaul) is delivered (primarily) via fibre.[10] It is the author's opinion that the Internet has now fully "substituted" the global PSTN[11].

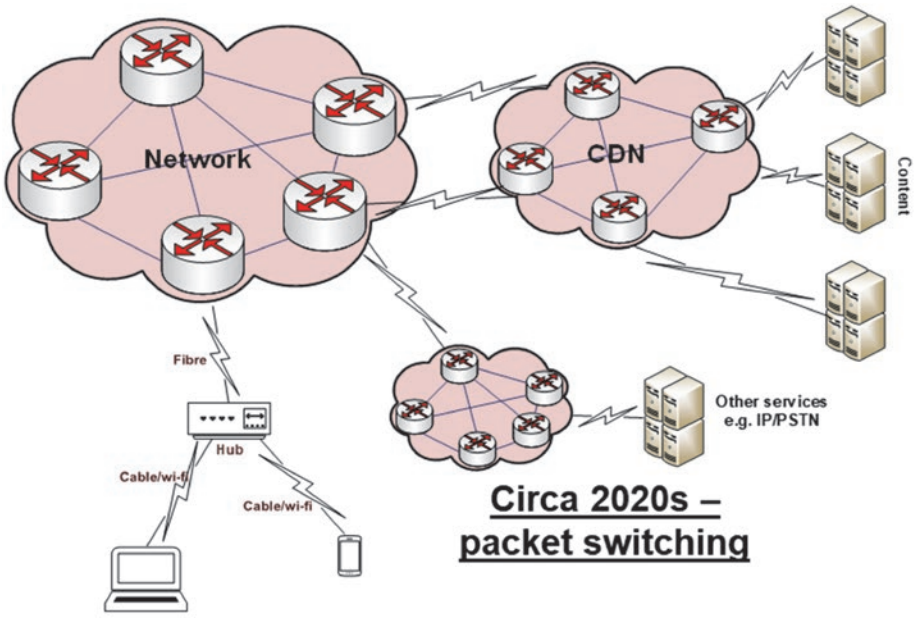

Figure 2.2: The Bitco (ISP) model

THE GROWTH OF ALTERNATIVE NETWORK PROVIDERS (ALTNETS)

On an historical note, ISPs have held an interesting position within the UK and others have covered their evolution extensively - see 3.1 opposite. In summary, the altnets can be considered as the "challengers" to the incumbent BT and more lately to Virgin Media/ O2 (VMO2). Historically, the early altnet model was based on unbundled local copper (via Openreach) using ADSL to transmit signals – later altnet models are predicated on fibre within the local distribution network.

A few of the players in the FTTH access market are identified in Figure 3.1 opposite and, with the exception of Openreach (OR) , KCOM and Virgin Media/O2, all the players consider themselves to be altnets. The self builds from the likes of B4RN, etc., are excluded, as are the bigger fibre business market players e.g. Zayo, Verizon, etc., who do not participate in this market. It should be noted this analysis is a snapshot of a moment in time and does not include all the players.

Figure 3.1 has been compiled (mostly) with data from a number of industry sources i.e.

- excellent ISP Review site (see - https://www.ispreview.co.uk/),
- Point Topic (see https://www.point-topic.com/ukplus),
- and thinkbroadband (see- https://www.thinkbroadband.com/assets/factsheet/broadband-report-july-2024.pdf.

For an up to date look all the three sites above are excellent reference sources, as is the INCA[12] organisation at https://www.inca.coop/.

British Fibre Networks	Gigaclear	IFNL	Truespeed
Cityfibre	G.Networks	Openreach	Virgin Media
Community Fibre	Grain	Sky	VX Fiber (UK)
County Broadband	Hyperoptic	Talk Talk	Wightfibre
Fibrus	KCOM	toob	zzoomm

Investor Support (a sample)

Investor	Player
Amber	Community Fibre
	toob
Aviva Investors	Truespeed
	County Broadband
M&G Investments (via Infracapital)	WightFibre
	Gigaclear
	Talk Talk (in discussions?)
	SSE Telecom (50% stake)

Observations
All players are likely to have:
1. an access component (fibre) in their offering and also the necessary backhaul to the Internet
2. a fibre installation capability
3. set up (at minimal) some form of Fulfillment, Assurance, and Billing (FAB) support systems.
4. support staff to carry out FAB activities (maybe outsourced?)
5. Have we been here before?

Figure 3.1: Sample of UK Altnets (2019)

British Fibre Networks ??	Gigaclear	IFNL/OFNL	Truespeed
Cityfibre	G.Network	Openreach	Virgin Media/O2
Community Fibre	Grain	Sky	VX Fiber (UK)
County Broadband	Hyperoptic	Talk Talk	Wightfibre
Fibrus	KCOM	toob	Zzoomm
Trooli	Upp	Glide	ITS
People's Fibre	Wessex Internet	The 4th Utility	Axione (UK)
Lit Fibre	YouFibre	Swish Fibre	Lightning Fibre
B4RK	Broadway Partners	Full Fibre	BT Broadband
Hampstead Fibre	BeFibre	B4RN	Jurassic Fibre
FibreNest (Persimmon)	Ogi	Freedom Fibre	Airband

Have we been here before? "Land Grab" and cable network consolidation (see "Decade of Pain")

Figure 3.2: Aug 21 – A Sample of altnet's in the UK

To aid later analysis within this paper, Figure 3.1 also includes some brief comments on Investor Support coupled with some initial thoughts on an organisational structure of a typical ISP[13].

For clarification purposes, Figure 3.1 does not differentiate between the author's three classifications of altnet, viz:

- Wholesale only (City Fibre and Openreach as examples)
- Vertically integrated i.e. wholesale and retail
- Retail only i.e. ISPs that use wholesale products from the likes of City Fibre and Openreach

ALTNET STATUS (SEP 2021)

Figure 3.2 opposite is one snapshot of altnet status, as of Sep 2021 and note that Openreach (for this paper) is not considered by the author to be an altnet.

Within this brief sample of altnets it could be argued as to whether history is repeating itself? The author also questions (and this can be tested via examining historical finances) as to whether any of the altnets identified in Figure 3.2 were in profit as of August 21? The author further suggests that only Openreach may meet the criterion. This will be examined further within this paper.

INFRASTRUCTURE FUNDS ARE NOW "PLAYING."

It is also interesting to note (as of Oct 21) that a number of financial institutions are "playing" i.e. they have a controlling financial position in some of the altnets, as illustrated in Figure 3.3 to the right.

SOME OBSERVATIONS

From the sample of altnets and investors identified, fibre in the access network is a sound bet. However, and at the time of authoring this paper (October 24) some of the altnets identified earlier have either been absorbed into another altnet or have ceased trading.

Fern Trading is an interesting example in that (and as the author understands) operational support has been "consolidated" across their three brands – a good example of cost reduction and market facing.

Initial/Current Fund	Operator	Model (W, R)
Albion Capital	Grain	R
Amber (via The National Digital Infrastructure Fund NDIF)	Toob Nextgenaccess (Dark Fibre)	R W
Antin Infrastructure Partners/West Street Infrastructure Partners	Cityfibre	W
Aviva Investors	ITS Technology Group Truespeed County Broadband	W R R
Basalt Infrastructure Partners	Full Fibre	W
BT Group Plc (and maybe others????)	Openreach	W
Cube Infrastructure	G.Network Trooli	R R
Downing LLP	Broadway Partners	R
Fern Trading see https://www.ispreview.co.uk/index.php/2023/02/fern-consolidates-uk-isps-jurassic-fibre-swish-fibre-giganet-and-alipoints-fibre.html	Giganet Jurassic Swish	R R W
ING Bank	Zzooom	R
KKR	Hyperoptic	R
Liberty Global	VM/O2	R
Macquarie Capital	KCOM	R
M&G investments (via Infracapital)	Wightfibre Gigaclear Neos Fibrus Spectrum	R R N/A R R
Toscafund	Talk Talk (and Freedom Fibre?)	R
Warburg Pincus	Community Fibre	R

Figure 3.3 — Sample of UK Investors participating within UK FTTH market (Oct 21)

It could be argued that some of the essentials of business planning i.e. identifying market share and the associated addressable market, and more importantly the competitive status, may have been missed.

Developing the author's argument further in that "was a business plan and modelling exercise carried out by all altnets before buildout, etc," and more importantly, whether investors tested the many altnet business plans by financial modelling?

Finally, and the ultimate test of altnet success (or otherwise) is whether they "track" the business plan in measuring profitability? This can, of course, be tested.

THE MODELLING[14] OF AN ISP/ ALTNET

A brief note to introduce the "thorny" subject of modelling and, in this paper, as a necessary input to any business plan. As a general comment, an investor will insist on a business plan before any discussions on funding are initiated. If a business plan is approved, it should then be used as the basis of a performance monitoring tool during the life of the company.

THE BUSINESS PLAN

Effective business planning requires a structured quantitative approach. A central part of such an approach is a financial model used to explore the potentials and sensitivities of any business case. In many cases considerable effort is expended building the financial model from scratch and often insufficient testing results in errors that may go undetected.

In today's rapidly changing environment companies often need to review their market position and even reassess their strategic objectives. This need may be triggered by, for example, loss of market share to a competitor, a requirement for refinancing or the planned introduction of a new product or service.

Poorly prepared business plans, created in an ad hoc fashion, can fail to reflect the complex situation facing the business. They may prove difficult to implement, requiring frequent adjustment, and can, in some circumstances, cause significant losses to be incurred.

8 Sometimes referred to as an "Internet Service Provider" or ISP

9 Just Deliver the Bits: David Isenberg and John Nolan, 2010, Journal of the ITP, Vol 4 Part 1. – see https://bit.ly/36SkoMp

10 Note that for the purposes of this discussion, the signal transmission technology is GPON (or later variant). It should also be noted that wireless alternatives to fibre in both the access and backhaul networks are available, but this paper's focus is fibre.

11 Public Switched Telephone Network

12 Independent Networks Co-operative Association – an excellent initiative and see https://www.inca.coop/news/altnet-report-2024

13 Introduced here and expanded upon in Section Five.

14 Note that this paper and the analysis is constrained to FTTH service providers

One of the activities of the business plan is, invariably, a financial and operational model.

FINANCIAL MODELLING[15]

Effective business planning requires a structured quantitative approach. A central part of such an approach is the financial model used to explore the potentials and sensitivities of the business case. In many cases considerable effort is expended building the financial model from scratch and often insufficient testing results in errors that may go undetected.

OPERATIONAL MODELLING

Whilst the financial model should help with "sensitivity analysis" of a business plan, an integral part of the model is the operational component i.e. what are the costs associated with launching the business and subsequently supporting during launch and ongoing costs?

The sample business plan identified above can be used to build a timeline covering launch and ongoing support costs, but it is likely that a more detailed model to illustrate operational requirements (and costs) is needed and hence an integral input component into any business plan.

One such model, the FAB model is that promoted by the TM Forum[17] and is illustrated in Figure 4.2. opposite.

Note that the model is not the latest version of the TM Forum FAB model, but it is the version used by the author.

As Figure 4.2 illustrates, the model is easily understood and ignoring the Operations Support and Readiness functionality (for a later discussion, maybe) is the Fulfillment, Assurance, and Billing functions. It is likely (and from the author's experience of working with service providers across the globe) that the altnets have a support function that maps very closely to the FAB model. Figure 4.2 is introduced as an aid to illustrate opinion later within this paper.

COMMENTS

The modelling of an altnet has been introduced with three main objectives, viz:

1. To introduce the capability for "testing" the financial rigour of a business plan
2. As an aid within any discussion on the concept the concept of shared infrastructure across multiple altnets (and BT/VMO2)

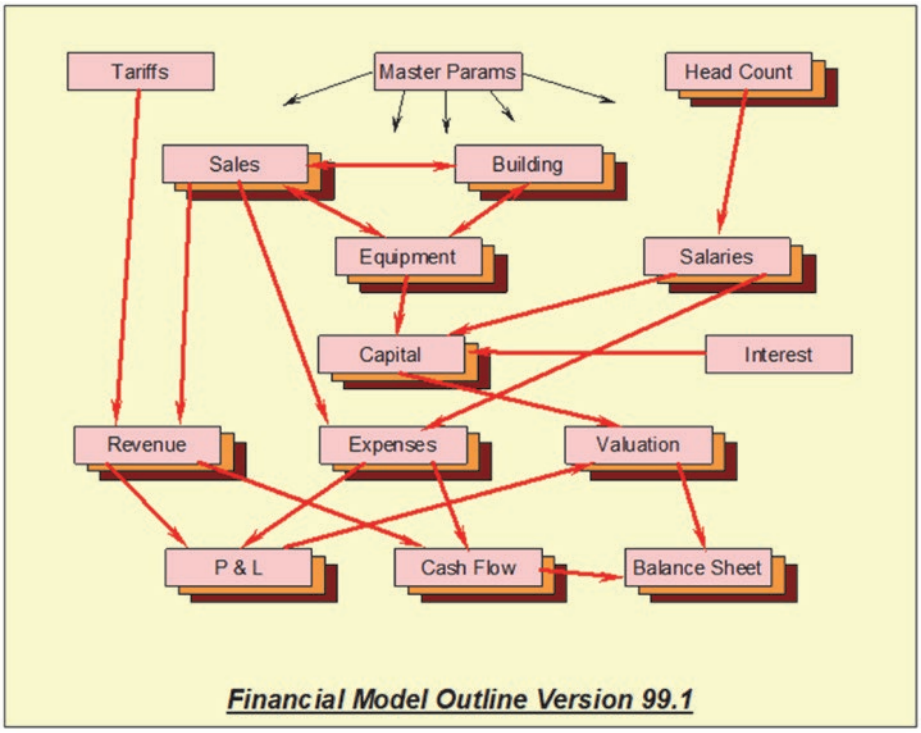

Figure 4.1: An Example of a Financial Model

3. Earlier comments identifying competitive pressures suggest the "bit pipe" into the customer premises is a challenge for multiple service providers.

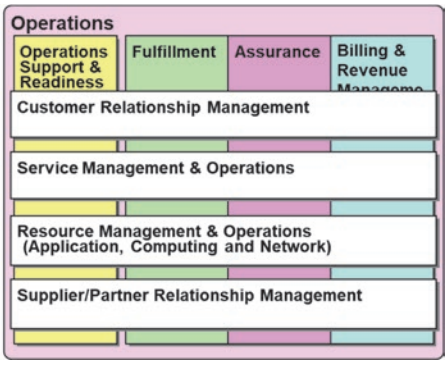

Figure 4.2: TM Forum FAB Model

THE NEUTRAL ACCESS NETWORK – "IT DIDN'T COME FROM NOWHERE[18]"

If, and as the author aludes to, there is some value in sharing infrastructure into customer premises (the bit pipe) then what would this approach consist of?

Back in (2010), my company First Mile Networks (FMN won a UK Technology


Technology Strategy Board Competition:
Feasibility Studies for Digital Britain
Reference: BV072P
Lightpaths on demand – an innovative approach to wavelength open access
March 2010

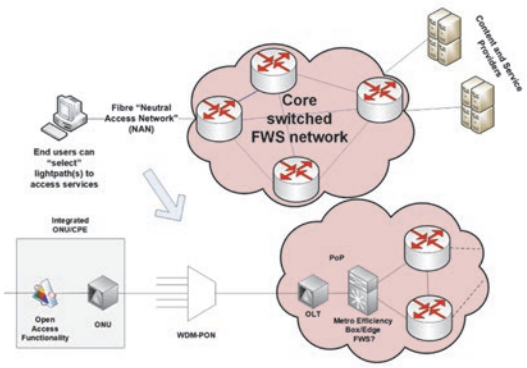

Figure 5.1: Lightpaths on Demand

Strategy Board competition to develop some thoughts on wavelength switching[19] and whilst the full report is fairly extensive, it did highlight some of the challenges within the UK fibre to the home market.

The author contends that any introduction of switching wavelengths into the access network will be fibre based (the concept is examined in more depth within the study).

One of the outcomes of the study was the need for a single fibre "bit pipe" to avoid the need for multiple fibre access networks into the customer premises[20].

The study introduces two models, as follows:

OUR FIRST MODEL

FMN constructed a graphical model of the service delivery chain of a generic altnet and applied it to a representative sample of SPs in the UK.

Note the FAB and Business Plan "objects" shown within the SP models are to illustrate systems and operational costs, etc., and are likely to be within the backhaul component of the model but are omitted for clarity.

Some brief observations in that fibre access networks in the UK may be delivered via:

- An OR product
- Another SP access network e.g. VF and City Fibre
- An integrated delivery chain e.g. Virgin Media, KCOM, and others

The concept and model are illustrated in graphical format in Figure 5.2 below:

As Figure 5.2 illustrates, the UK currently has a plethora of delivery mechanisms, of which (and hopefully intuitively) cannot be sustained financially. This led to our second model.

OUR SECOND MODEL

Initial observations with the "Islands" model are threefold, viz:

- There are likely to be similarities in costs across all ISPs. This may be tested financially, but as any CFO will comment in that containing and reducing costs is paramount
- The author further suggests that competing access infrastructures leads to land grab and whilst initially it offers an ISP the opportunity to deliver faster internet speeds, the end user is restricted in choice as to how they switch – see electricity supply as a model. The introduction of the OTS[21] is considered by the author as an intermediate solution to this issue
- Within our research[10] FMN investigated the concept of using WDM-PONs as a future mechanism for the delivery of services on a wavelength basis. This could be implemented with current access network structures, but once again there are potentially duplications of costs and systems.

This led FMN in the consideration of a "Neutral Access Network (NAN)[22]" as a second model and is illustrated below. Network sharing is not new, and the best example of network sharing is the construction of, and the maintenance of, subsea cables.

Indeed, such luminaries as CMS (a leading law firm) have published recent thought pieces on the subject and see[23] as an example.

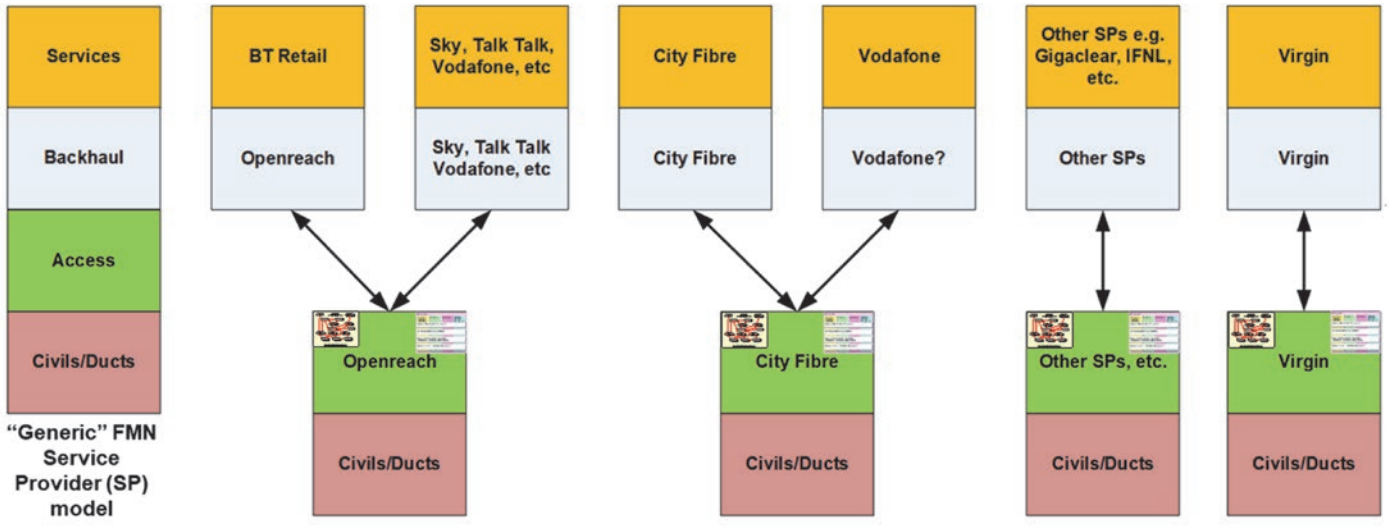

Figure 5.2: Islands of Access Networks Model

15 The author is indebted to Intercai Mondiale (IML) in the development of the structure of the financial models illustrated in this paper - see www.intercai.co.uk

17 TM Forum -see https://www.tmforum.org/

18 Robbie Robertson (RIP) speaking at the Last Waltz on the evolution of rock and roll.

19 https://bit.ly/2V0XakI

20 Why would there be a need for multiple fibres if wavelengths are being "switched?"

21 https://totsco.org.uk/

22 See Reference 2 – worth a read and Bogliolo is to be applauded for developing the concept

23 https://cms.law/en/int/publication/cms-network-sharing-5

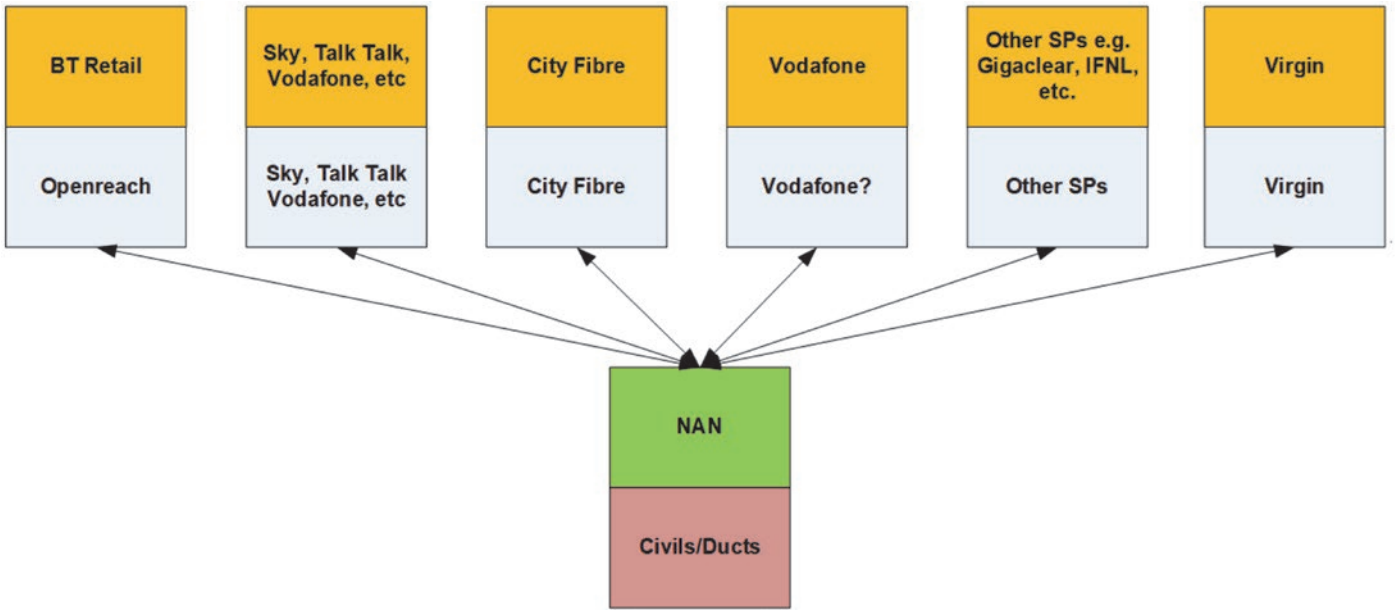

Figure 5.3: The Neutral Access Network (NAN)

FMN suggest that the NAN concept could be developed within the UK, but an initial proof-of-concept consultation is essential to develop the concept further.

The author has some initial thoughts as to where the ownership of any such consultation should reside - this is outlined (briefly) within the next section.

Of relevance to any consultation is a recent initiative by the INCA UK Infrastructure Sharing Group[24] (ISG) which, as the name suggests is an effort to share infrastructure and is exploring the following:

- Opportunities for sharing between altnets and third parties;
- The possibilities of standardising commercial, technical and operational approaches to sharing;
- The suitability of the existing Access to Infrastructure Regulations framework;
- And the need for improved communication between all parties including local communities.

INCA are to be applauded for moving this forward and the initiative maybe a precursor to any future NAN consultation.

IF YOU BUILD IT, HE WILL COME[25]

This paper is but a summary of the author's observations on the evolution of the UK fibre access market over the last twenty years and identifies structural issues within.

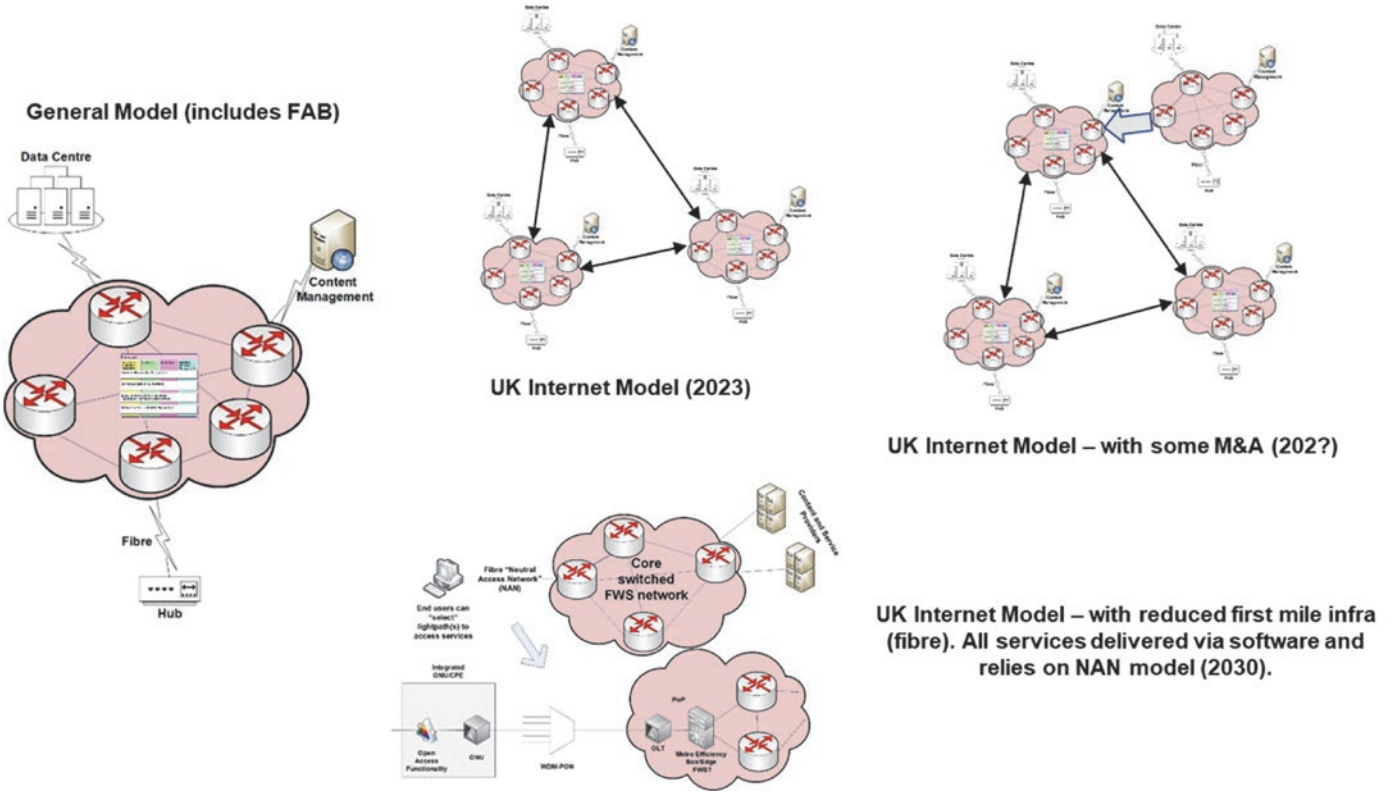

Figure 7.1: A future UK model?

Some of pressing issues identified are:

1. It is the author's view that ISP market cannot sustain multiple altnets/ISPs – the attrition of altnets and associated redundancies have been painful (and will continue)
2. Duplication of effort (read costs)

Could the NAN model be a possible logical solution to the problem? The author suggests that any consultation, and more importantly, the development of the initial financial model should reside initially within INCA[26]. This ownership, it is suggested, is a precursor to eventual Ofcom stewardship.

The model outputs would then drive (or destroy) any future consultation exercise.

ANNEX ONE - A FUTURE UK MODEL??

Some thoughts as to where the UK Bitco market is heading, but fundamentally, the number of altnets and ISPs (BT/VMO2 excluded) will reduce over time. This will/ should be driven by profitably!

Longer term, this may consist of a small number of wholesale Service Providers (SPs) delivering all fibre to customers with "virtual" retail ISPs providing internet services.

The more observant reader may identify that the model in Figure 7.1 has similarities to the creation of VM from the bones of NTL (see earlier "Decade of Pain").

www.firstmilenetworks.co.uk

REFERENCES

1. Beyond Babel[27], New directions in communications, Brenda Maddox, Andre Deutsch, 1972
2. Monopoly and Competition in British Telecommunications The Past, the Present and the Future: John Harper, 1997, Pinter.
3. Introducing Neutral Access Networks: Alessandro Bogliolo, 2009, IEEE Next Generation Internet Networks Conf.
4. Switching and service delivery in futuristic networks: John Buckley, 1983, BT Technology Journal Vol 11 No. 4. – see https://bit.ly/37zIMTo
5. Just Deliver the Bits: David Isenberg and John Nolan, 2010, Journal of the ITP, Vol 4 Part 1. – see https://bit.ly/36SkoMp
6. Fiber to the Home White Paper: Paul Green 2003 – see https://bit.ly/3xHkcL5
7. Internet Economics: McKnight and Bailey, 1997, MIT Press.
8. Regulatory Creep and Regulatory Withdrawal: Cubbin and Currie, 2002 - https://bit.ly/3CGlt7E
9. Meeting the Traffic Requirements of Residential Users in the Next Decade with Current FTTH Standards: Hernandez, et al. IEEE Communications Magazine, June 2019.
10. A 10 Point Plan for a better Openreach: Sky, et al, 2016 – see https://bit.ly/3iBKz0t
11. The potential for wavelength switching to provide virtual structured cabling across the UK: First Mile Networks, 2010 – see https://bit.ly/2V0XakI
12. Optical Fibre Systems (Chapter 8): Dr. Chris J. Lilly, British Telecom Jan 1981 – see https://bit.ly/3zUDePh

24 See - https://www.ispreview.co.uk/index.php/2024/02/broadband-altnets-setup-new-uk-infrastructure-sharing-group.html

25 From "Shoeless Joe" – a novel by W. P. Kinsella

26 The author has yet to approach INCA with this proposition

27 When it was first published, I recall this book causing quite a kerfuffle in what was then Post Office Telecommunications. For info, and circa late 1972, I was attending an A4 Internal course (Strowger).