

Local Loop Unbundling

A View from Opal Telecom Networks & The Carphone Warehouse

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THE Carphone Warehouse

...for a better mobile life

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Preface

This document is designed to act as a basic primer to the regulatory structure of the UK residential telecoms market, the introduction of Local Loop Unbundling (“LLU”), some technical aspects of the Opal network, and one or two issues that regularly arise in our discussions with investors and analysts. It also serves to flesh out some of the points we touch on in our slide presentations. Its target audience is primarily those who come from a predominantly retail or generalist background, so we appreciate it may add little to the knowledge of telecoms specialists.

We have tried to keep technical jargon down to a minimum, but some degree of telco-speak is unavoidable and we have included a glossary at the back that should help to explain some of the more obscure acronyms, rather than explaining every technological term where it appears in the text.

In addition we have avoided charts and diagrams because more often than not we believe that they are more confusing than helpful. This is a document to be read and annotated rather than looked at, but can be consulted in conjunction with our slide presentations.

The intention is to supplement this document over time with additional publications on key topics relating to the UK telecoms market in general or, more specifically, on Carphone Warehouse’s position within it.

Any feedback, particularly on inaccuracies or areas that you would like to see covered in more detail, would be very welcome.

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1. How Telecoms is regulated in the UK

Since the passing of the Communications Act 2003, the UK telecoms industry has been regulated by Ofcom. Ofcom succeeded Oftel and combined telecoms regulation with a broader media regulation mandate. After more than 20 years of liberalisation in the UK following the privatisation of BT, the UK still lagged most European markets in the development of competition for the provision of telecoms services. Although the corporate market had seen a number of successful new entrants, the only players to make an impact on the residential market were the cable companies. In doing so, they proved that effectively recreating BT's local access network by laying cable to every household could not generate an economic return.

Ofcom's goals

Ofcom's mandate, as set out in the Communications Act, is "to further the interests of citizens in relation to communications matters; and to further the interests of consumers in relevant markets, where appropriate by promoting competition."

Through its Strategic Review of Telecommunications in 2005, Ofcom determined to put in place a long term structure of 'light touch' regulation for the market. Its goal is to enforce regulation in key areas where alternative providers are disadvantaged, which in turn will allow it to relax regulation on the incumbent in other areas – creating a fairer but simpler regime overall.

Creating fair access

As the cable companies and other alternative network operators have found to their considerable cost over the last twenty years, the key area of disadvantage is in local access – BT's network of copper wire connecting local exchanges to households, inherited from its long history as a national monopoly. Ofcom has therefore put in place a pricing regime over various aspects of local access that is intended to open up the residential market to competition on a level playing field for the first time – not just in the provision of calls, but in line rental and broadband services as well.

Just as importantly as the pricing regime, Ofcom has reached a settlement with BT that has created a separate Access Services division within BT, now branded Openreach. The rationale behind this move is to ensure the delivery of what Ofcom terms as "equivalence" – that is, the availability of the same access products and services to alternative providers, involving the same processes, as are available to BT.

To ensure that Openreach functions as the regulator intended, Ofcom has set up the Office of the Telecoms Adjudicator, or OTA. The OTA is independent of both the regulator and industry and has been established to facilitate swift implementation of the processes necessary to enable competitors to gain access to BT's local loop on an equivalent basis to that enjoyed by BT's own businesses. An important part of this process is to develop various working groups comprising representatives from interested parties to address issues across the industry, and to seek mediated solutions between BT and other providers wherever possible.

Investment to be rewarded

The other key element of Ofcom's approach to regulation is its desire to reward service providers who are prepared to invest in infrastructure. This has been witnessed already to some extent under the previous regulatory regime, with regulated prices payable by service

providers to BT based on the number of 'legs' a particular call is carried over BT's network. Thus Opal has been able to improve its margins and its customer proposition by investing in interconnect down into BT's DLE network, with the capital and lease cost of the interconnect being rapidly paid back by the savings on the traffic that subsequently travelled over Opal's network to the DLE layer, rather than over BT's network. This is covered in more detail in the section on the Opal's network.

To this end, Ofcom has made LLU a key element of its proposals for creating a level playing field. Through a series of price cuts, and a regulated structure designed to give service providers comfort that they are being fairly treated, LLU is now a viable proposition. This is discussed in much more detail in section 3.

2. The structure of the residential telecoms market today

When regulators find the right structure, it works

For many years post-privatisation, BT still did not face any meaningful competition in the residential market except from the capital-intensive cable companies. Alternative providers (such as Mercury) could only take calls away from BT via Indirect Access ('IDA'). This required customers either to dial a prefix number before each call to access the alternative provider's network, or to have a dialler box fitted into the wall socket to do the prefix dialling for them.

Inevitably, there was a huge amount of 'breakage' – ie people forgetting to dial the prefix, or unplugging the dialler from the wall – which meant that ARPUs were very low as a proportion of consumers' fixed line telephony spend. Given the high costs of recruiting customers, this made returns poor for IDA operators.

The next major step was the introduction of Carrier Pre-Select or CPS. Under CPS, calls made by customers of alternative providers were 'recognised' automatically at the DLE level and diverted onto the alternative carrier's network. However, the administrative process of moving customers over to CPS providers was manual and inefficient.

The advent of automated CPS in 2002 finally created a platform for genuine competition in the provision of calls to households and SMEs. Service providers now had simply to send BT details of a customer's postcode and telephone number electronically, and the customer would be switched 14 days later. As a result, the CPS market took off very rapidly, and over the next two years over 4 million customers left BT to join alternative providers.

The line rental problem

While automated CPS has created a much more competitive market for the provision of calls, until recently CPS providers have still been significantly disadvantaged in their customer proposition because of the structure of line rental pricing in the market.

Until 2005, BT's retail price for line rental was lower than the wholesale line rental ("WLR") rate, meaning that if service providers wanted to offer their customers a consolidated bill for calls and line rental, they would have to suffer a monthly loss on the line rental part. Furthermore, BT's retail product also included certain 'select' services (such as 1571 call minder) that were not part of WLR but could be re-sold separately – thus increasing the value gap. Finally, the processes for integrating with BT's systems and migrating customers were cumbersome.

Although not important as a profit generator in its own right (as a commoditised service, customers are well aware of what line rental should cost), line rental plays a crucial part in the customer relationship. It allows service providers to present customers with a unified bill, serving both to remove confusion for the customer and put all telecoms providers on an equal footing in their marketing and customer recruitment campaigns.

After an increase in BT's own retail line rental price, and a cut to the WLR rate, there is now a small positive margin between the wholesale rate and the BT retail price. As a result, take-up of WLR has grown rapidly over the last 12 months, with over 2.5m lines now wholesaled from BT.

Broadband – another commodity

After the explosion in internet take-up in the late 1990s with the advent of Freeserve and other free ISPs, the current decade has seen an accelerating migration from narrowband dial-up services to broadband. However, the problem that all ISPs face is that they essentially have the same cost base in a market where the service is commoditised – a customer has perfect visibility of the market since it is so easy to compare the monthly price payable for a certain bandwidth across multiple suppliers.

Suppliers (excluding the cable companies) all have the same fundamental cost base because until very recently, they have all been reselling a BT wholesale broadband product – called IP Stream. The monthly fixed cost of renting IP Stream is the most significant element of the overall cost base, and although some efficiencies can be achieved from having lower acquisition costs and costs to serve, IP Stream remains, at best, a nil-sum game in the prevalent pricing environment. Again, as with line rental, it does generate some value to cost-efficient voice providers by extending the average lifetime on the voice profits stream.

How LLU changes the landscape

Ofcom has recognised that BT's key wholesale products, WLR and IP Stream, do not allow service providers to deliver meaningful innovation or value to customers, nor to make a return on their investment in customer recruitment, brand development and customer management. At the same time, both Ofcom and BT have been unwilling to see a market structure in which pure resellers – who have invested nothing in telecoms infrastructure but are simply indulging in a game of regulatory arbitrage – can make an attractive living from providing these services without the incentive to invest; hence price cuts to these wholesale products have been limited.

LLU strikes the balance between encouraging alternative providers to invest in network infrastructure while acknowledging that simply recreating BT's local access network is not feasible or economically viable. This encouragement derives from the significant difference in regulated price that a provider has to pay to BT each month for an unbundled line compared to the combined WLR and IP Stream reseller model.

What is LLU?

LLU is the process by which alternative providers install their own equipment in BT's local exchanges (also called concentrators or local offices), allowing them to effectively take over the copper wire between the exchange and the customer's house and make it part of the alternative provider's own network.

The main piece of equipment required is an MSAN or Multi Service Access Node. This is in the form of a cabinet containing a series of racks, and is populated by line cards – one line card for each unbundled line. The access line is attached to the line card with a tie pair. Only one tie pair is required for a fully unbundled line, whereas two are required to partially unbundle a line.

What does LLU allow?

One of Ofcom's key goals is not just to ensure fair competition and keen pricing for consumers, but also innovation in the range of products and services available to the customer. LLU is a major step forward for the industry as a whole because it allows:

- i) *Pricing flexibility and product bundling.* Because of the charging structure, particularly for full unbundling, operators are able to be much more radical in the

way they price and bundle the three core services of voice, line rental and broadband. The most obvious move is towards bundled packages with unlimited calls (excluding calls to mobiles) and combining line rental and broadband at a significant discount to the current double charging structure prevalent in the UK market.


- ii) *A broader range of services.* This applies not only to the ability of broadband providers to deliver much higher speeds to customers and charge them accordingly, but also to innovation through TV over broadband and other content-based applications. It also allows for the development of value-added voice services such as call recording and voicemail.

3. Economics of LLU

The impact of LLU on the costs for alternative providers of providing a full range of residential telecoms services is significant. We have split this into two elements: the costs of providing line rental and broadband services, and the economics of delivering voice services.

Economics of line rental and broadband

The table below, from one of our investor presentations, highlights the relative costs to the service provider of offering line rental and broadband services to customers over different structures. Note that these costs do not include recruitment costs or the costs of managing customers, which are assumed to be the same across all platforms.



LLU cost savings

Monthly (£)	WLR +IPStream	MPF	MPF
Customers /exchange	N/A	250	500
Monthly rental	16.40	6.70	6.70
Other opex	2.50	4.50	3.00
Total cash costs	18.90	11.20	9.70

- **MPF is >£9 cheaper per customer month to deliver than CPS/WLR/IPStream**
- **Our strategy is to reinvest that saving in the proposition and drive volume, not margin**



In the first column, we outline the cost of providing these services via the vanilla BT wholesale products, WLR for line rental and IP Stream for broadband. Although no capital investment is required, the margin that can be generated from these services given that the going retail rate (ex VAT) is less than £25 is clearly thin, even if the costs of recruitment and management are spread across a voice relationship as well.

In the second column, we show the monthly costs in an MPF or fully unbundled environment. The monthly rental line relates to the £80 per customer year that an unbundler has to pay BT for maintenance of the line. The other opex line incorporates the costs of running and maintaining the equipment in the BT exchange, as well as the costs of transferring calls and data from the local exchange into the Opal core network (“backhaul”).

The monthly element falls by nearly £10, although the variable element within LLU operating costs leads to a higher overall opex charge per month assuming 250 customers on each exchange. Nevertheless, the overall saving is still nearly £8 a month.

In the final column we take the MPF economics but assume that there are 500 customers on the exchange. In this scenario, an unbundler saves well over £9 per customer month.

Economics of voice traffic

The other significant upside from unbundling comes from the impact on voice economics. A full unbundler benefits from all the economic rewards of owning the local loop. In other words, the charges previously paid to BT for ingress and egress fall away. In addition, the unbundler as effective owner of the copper wire is able to charge other networks to terminate calls to unbundled customers, just as Opal has to pay Vodafone or BT to terminate calls from TalkTalk customers to these other networks. Although we have yet to quantify this upside and termination rates are yet to be agreed, we believe that this is a further important element of the decision to unbundled.

What is the capital cost?

Based on our detailed costings, which we do not show here for commercial reasons, we believe that the costs of installing an MSAN (the main piece of infrastructure required to unbundle) and equipping it for 500 lines is approximately £40,000. The basic rule of thumb is that for a doubling of capacity from this level, a further £20,000 investment would be required. In other words, approximately 50% of initial capex is fixed and 50% is variable.

4. The Opal network today

Asset light model

Partly as the result of scarce financial resources during its build-out phase, and partly as a result of the glut of telecoms fibre and equipment in the UK market, Opal has always had a very rigorous approach to investment. This can be summed up as seeking to own and control those parts of the network that create tangible value, while leasing the elements where there is a surfeit of commoditised capacity or no likely economic return from investment. The result has been the construction of a network that carries well in excess of 1 billion minutes of voice traffic each month but has required capital investment of no more than £15m a year, even though that traffic has quadrupled since 2002.

What this means in practice

We have split our description of the Opal network into four elements for the purposes of simplicity, as follows:

- i) *Local access.* Opal is entirely reliant on BT to access customer premises. Opal pays BT for ingress and egress under a regulated pricing structure. If Opal or TalkTalk want to provide line rental or broadband to their customers, they must do so as a reseller of BT's basic wholesale services, WLR and IP Stream respectively. Before the advent of LLU, any economic ownership of the local loop has proved to be totally uneconomical, so paying BT for access has been the only viable option.
- ii) *Interconnect.* Service providers are required to pay BT based on the number of legs of the BT network that a customer's call is carried over, under a structure known as Element Based Charging ("EBC"). The further a call has to travel over the BT infrastructure, the more an alternative carrier has to pay away to BT. The only way to avoid or minimise these charges is by building out interconnect more deeply into BT's network.

Opal has historically focused a significant element of its investment on interconnect, because of the clear economic return this provides. BT has a network of DMSUs (regional exchanges) and DLEs (digital local exchanges) around the country, on which EBC is based. Having built out interconnect initially to all of BT's DMSUs, Opal has spent the last three years building out to the DLE network, so that Opal now pays BT the minimum possible rate on over 90% of all calls.

The equation for investment has been very simple. Once a sufficient amount of call traffic has built up around a local exchange, the saving on BT payments that Opal makes by installing an interconnect to that exchange outweighs the capital outlay of installing that interconnect.

- iii) *Switching.* Opal owns its switches, running 14 Nokia TDM switches out of three core sites. Owning switches not only gives Opal the ability to manage capacity on the network, but also to offer value-added services to its business customers.
- iv) *Core network.* Opal's core network comprises fibre that is entirely leased from multiple providers, typically on 3-5 year contracts. The huge excess capacity of fibre in the UK, and the rise of technologies such as DWDM that significantly increases the capacity of fibre, has led to a steep decline in prices over the last five

years. Opal perceives no direct benefit from owning fibre, as it can add new capacity as and when demand requires, and it does not have to pay business rates or employ engineers to maintain the fibre, thus keeping operating expenses down.

5. The Opal network tomorrow

Opal's own 21CN

The term 21st Century Network (“21CN”), or more generically Next Generation Network (“NGN”), refers to a telecoms network that no longer makes use of mechanical or first generation digital switching platforms to carry voice traffic.

Traditional networks carry calls between customers via discrete circuits. In other words, if customer A calls customer B using their traditional handset, a virtual path or connection is made between the two customers over which the call is carried. The connection is made through BT’s local exchange, picked up via an interconnect into the host carrier’s own network, switched via circuit switches, and then delivered via the BT exchange nearest to the receiving customer’s house.

A 21CN works on an all-IP platform. This means that voice traffic is treated the same way as data, and carried as a series of digital signals between caller and recipient. There is no continuous connection between the two parties, rather the call is divided up into “packets” of data that travel separately over the IP network and arrive at the right destination in the right order. The packets are directed or “switched” in the network via soft switches.

What does this mean for Opal?

As highlighted in the previous section, Opal’s roots lie in an asset-light approach designed to maximise the efficiency of carrying voice traffic while minimising capex, or at least focusing it on areas of value-add and commercial advantage.

The table below summarises how Opal’s network is changing from “20CN” to “21CN”. Although capital intensity is inevitably increasing, the fundamental principles of Opal’s investment philosophy remain the same.

	Opal’s existing network	Opal’s 21CN
Local access	Calls: ingress and egress to BT Line rental: WLR Broadband: IP Stream	LLU – effective ownership of local loop
Backhaul/interconnect	>700 points of interconnect to BT exchanges using TDM and SDH	Gigabit Ethernet leased from multiple providers to connect to 1,000 unbundled exchanges. 120 points of interconnect to BT’s own 21CN metro nodes
Switching	14 Nokia TDM switches from three core sites	Soft switching environment
Core network	Fibre using SDH leased from multiple providers	Leased Gigabit Ethernet connected to main internet peering centres

21CN and LLU are inextricably linked

We see LLU and 21CN as the same project, particularly as Opal is a major voice carrier which would have to evolve its network over time to integrate with BT's own 21CN project anyway. By considering LLU as an integrated part of a modern IP network we are able to design core, access & backhaul all at once, rather than unbundling today and then thinking about 21 CN tomorrow. This is why for Opal, the decision to pursue a fully unbundled platform, where we take over both the voice and broadband elements of the line, makes much more sense than partial unbundling, where we would only control the broadband element.

There are both cost and technology aspects to this, which are inter-related. In partial unbundling or SMPF you need twice as many wires. The splitter (filter) needed to separate the high frequencies used for broadband are located on the unbundler's racks, not BT's, requiring a return pair back to BT for the voice element. In full MPF only one pair is needed reducing wiring costs and terminal space. This may seem a bit trivial but space in BT's exchanges is expensive.

A limiting factor on density of equipment fitted is terminal space on the BT-provided racks. Full MPF allows you to double your equipment density hence saving on operating costs. Tie cables are also expensive at £4.77 a pair so having twice as many, which SMPF requires, is costly.

Having evaluated the exchange equipment we concluded that MSANs and not DSLAMs were the best choice. It is then a natural step to consider the MSAN the point at which voice and data merge, the voice being converted to IP and merged with the IP from the broadband.

This is an absolutely key point and the crux of the linkage between LLU, 21CN and VoIP. As we explain later in this paper, in a fully unbundled world there is no cost advantage to the service provider from delivering voice calls over broadband from the customer site to the exchange – there is no marginal cost via either route. Using an MSAN platform, we will be converting the circuit switched call from the customer's standard equipment into IP, so that it can travel over the same backhaul and core network infrastructure as the broadband IP traffic. To our minds, this is true VoIP, with VoIP between the customer premises and the exchange being irrelevant.

Partial unbundlers face a dilemma

Compare this set-up to a partial unbundler. A partial unbundler has two choices for providing voice services to customers: either via a VoIP package or via CPS. Under a VoIP package, the customer is still paying standard line rental but does not have the convenience of using standard equipment to take advantage of cheap calls, but the provider can have an efficient backhaul structure based entirely on IP. Under a broadband and CPS package, the customer has all the convenience of an existing voice service, but the network provider will require conventional SDH backhaul for the voice and IP over SDH for the data backhaul, which is very inefficient and expensive.

In short, partial unbundling gives LLUOs the choice of either an inferior customer service or a more expensive backhaul set up – a quandary not encountered by full unbundlers.

What will happen to Opal's "legacy" network assets?

Our existing network not only cost relatively little to set up but is also highly efficient to run. In the short term, Opal will continue to switch a significant volume of traditional voice traffic,

with the increase from the migration of Onetel traffic and underlying growth likely to offset the decrease from customers moving to an unbundled platform for the time being. Circuit switching over TDM are not redundant technologies but as BT migrates from a platform of 700 or so DLEs down to 120 metro nodes over the next four years as part of its own 21CN project, we will mirror this evolution. So although overall we will incur some double-running costs, the efficiency of both our current and future networks is such that this will not be a costly exercise, reflecting the benefits of not owning significant amounts of legacy assets.

6. VoIP in the residential market

There has been a huge amount of coverage relating to Voice over Internet Protocol (“VoIP”) over recent months, with providers such as Vonage and Skype attracting significant publicity, and any number of other consumer brands such as Tesco and Dixons looking to provide VoIP services to their customers. While VoIP, in isolation, does appear to offer good value to customers on certain types of call, we do not believe that it will make a significant impact on the UK residential market because the customer still needs to pay for a separate phone line and rates for standard telephony in the UK are already very good value.

What is VoIP?

VoIP is the technology that enables people to make telephone calls over their broadband connection rather than their standard telephone line. This can be done in a number of ways, but usually via a headset directly connected to a PC, or via a special IP handset or adaptor. Unlike traditional telephone calls, which are circuit-switched (ie they take place over a discrete and continuous connection between caller and recipient), VoIP calls are packet-switched – the conversation is converted into “packets” of data that are transmitted over the internet and re-assembled on reaching the recipient.

What are the perceived benefits of VoIP?

VoIP calls are perceived to be cheaper than standard circuit-switched calls. In addition, there are a number of “smarter” benefits, such as the ability to receive voicemail as email, record and store calls as data files, and have a universal number on which people can contact you or from which you can make local rate calls anywhere in the world.

How can VoIP providers undercut standard telephony providers?

VoIP providers are able to avoid ingress charges because VoIP calls are carried via the broadband connection, not the standard phone line. Calls to other VoIP users will also avoid egress charges, since they will reach the recipient over his or her broadband line. In the UK, ingress and egress are currently each charged at approximately 0.28p/minute.

However, VoIP providers have no cost advantage on terminating calls to anyone other than a VoIP user. If a VoIP customer calls a mobile phone, or an international number, or even just another residential user in the UK, the VoIP provider still has to pay for termination. So for the vast majority of calls made by a typical telephone user, the cost saving of a VoIP provider is only 0.28p per minute. Thus VoIP providers typically offer VoIP-to-VoIP calls for free (because there is no marginal cost of providing such calls), and seek to make their margin on other types of call.

What does the customer have to pay?

The UK market is structured in such a way that customers will continue to pay separately for broadband access and their exchange line. VoIP really comes into its own in markets where there is a “naked DSL” product – ie where customers can have broadband access without having to pay for a traditional phone line on top, and therefore make all their calls via VoIP. Given that more and more packages contain some element of free calls within the standard line rental charge, customers who use a VoIP service are effectively paying twice.

Are there other disadvantages of VoIP?

The quality of VoIP calls is considered to be inferior to standard calls, although it is improving. In addition, VoIP calls need a separate power supply and a new handset or adaptor, whereas the standard telephone line has its own power supply. Finally, there is no requirement currently for VoIP operators to provide a guaranteed emergency call service, so customers will continue to want the security of a standard phone service.

How LLU operators replicate VoIP cost economics

If an operator pursues a fully-unbundled strategy (MPF), it takes over the economic rights to both the broadband element and exchange line element of the local loop. As a result, in addition to enjoying much lower monthly rental costs to BT in return for the capital investment made, the LLU also avoids having to pay BT the 0.28p ingress fee to transmit a standard PSTN call to the local exchange. Thus through the process of unbundling, an LLU effectively replicates the cost economics of a VoIP provider. However, the benefits are even greater for the customer, who has no need to spend money on new equipment to enjoy VoIP-type economics.

7. Other revenue and cost opportunities from LLU

This paper has focused almost exclusively on the opportunity that LLU provides in the residential market, and specifically on the reduction in monthly rental fees payable to BT on an unbundled platform compared to a wholesale platform. Over the coming months we will highlight further potential opportunities that for the time being remain unquantified. A brief description of these areas follows.

Ingress, egress and termination

Through unbundling, an operator effectively takes ownership of the local loop. Aside from the reduced monthly charge to BT, there are two other important commercial benefits that this ownership confers.

Firstly, an LLUO no longer has to pay BT to carry an outgoing call from the customer to the exchange (“ingress”) or to deliver a call from the local exchange to the customer (“egress”). For an efficient network like Opal, with a very low marginal cost per minute in its core network, this saving can represent a significant element of its variable cost of sales.

Secondly, an LLUO has the right to charge other networks (whether mobile or fixed line) for delivering calls over an unbundled line from the local exchange to its customers (“termination”). The level of this charge is yet to be determined but Opal is not restricted simply to mimicking BT’s rate card – the over-riding principle is that networks should be entitled to generate a fair return from their investment.

Business customers

Opal’s business-to-business telecoms operations are heavily orientated towards voice and line rental services. Local loop unbundling means that Opal could save significant costs on ingress and egress of its 600m monthly minutes of business traffic, while generating additional revenues from charging termination. Opal’s business customer base has a very close geographical overlap with the TalkTalk residential base, so a material proportion of its customers will be within the footprint of unbundled exchanges.

Perhaps more importantly, LLU will give Opal a potentially valuable opportunity to provide broadband and data services to its SME base and new customers. The acquisition of the business ISP Rednet as part of the Onetel deal has brought new skills into our corporate telecoms business, which we intend to leverage across Opal’s strong sales and distribution platform.

While many of the smallest business customers may be interested in packages similar to our residential offering (a strategy we have pursued with some success on the voice side with TalkTalk Business), the larger customers will be looking for a wider and more value-added range of services, such as security. Finally, VoIP does have a role to play in the SME market. To take a very simple example, a small law firm or estate agency could run several telephone lines off a single line rental bill using VoIP.

8. Glossary

Access layer	The part of a telecoms network connecting a customer to the nearest network node – ie the copper loop to the local exchange.
ADSL2+	Asynchronous Digital Subscriber Line advanced second generation equipment, allowing speeds of up to 8 Mbps over DSL.
ATM	Asynchronous Transfer Mode, an intermediate technology providing backbone network for first generation soft switches.
Backhaul	The link between the local exchange and the core network, allowing the transfer of voice and data to and from the access layer.
BES	Type of backhaul product available from BT.
Broadband	Generic term for high speed internet access.
Circuit switching	Traditional process by which voice is transmitted over a telephone network via a single dedicated open circuit between caller and receiver.
Core network	The fibre ring at the centre of a network that delivers voice and data around the country.
CPS	Carrier Pre Selection, the platform on which TalkTalk has grown to date, whereby calls are switched from BT onto an alternate service provider's network at the local exchange level.
Dial-up	Narrowband internet services over the traditional telephone line.
DLE	Digital Local Exchange, of which there are approximately 700 around the UK.
DMSU	Digital Main Switching Unit. Old name for BT trunk exchanges now called NGS. These are the regional exchanges which form a link in the BT network for the purposes of EBC.
DSL	Digital Subscriber Line: Technology for higher bandwidths down copper wires.
DSLAM	DSL Access Multiplexor. First generation unbundling infrastructure, handing off voice and data over DSL between the customer and the unbundler's backhaul and core network, installed into BT exchanges.
DWDM	Dense Wave Division Multiplexing: a technology that divides the light spectrum in fibre cables, significantly increasing the data capacity of fibre networks.
EBC	Element Based Charging: BT charging method for ingress & egress of calls based on the number of "legs" of the BT network over which a call is carried.
Egress	The process of (and the charge for) delivering a call out of one's own network back on to another provider's network to reach a customer.
FULL	Fully Unbundled Local Loop, in which an unbundler takes over a customer's traditional voice line as well as their DSL service.
GIGE	Gigabit Ethernet: Ethernet network technology using IP at Gigabit speeds. Highly efficient pathway for transferring broadband and IP voice traffic.
IDA	Indirect Access: Use of access codes to route traffic across BT's network.
Ingress	The process of (and charge for) delivering a customer's outgoing call from another provider's network onto one's own.
IP	Internet Protocol: packet switched technology used on the internet. The

	method by which both voice and data will be switched over NGNs.
IP Stream	BT's wholesale broadband product, currently the staple product used by mass market ISPs.
ISP	Internet Service Provider: company selling internet access.
LLU	Local Loop Unbundling: process that allows other operators access to BT's local loop.
LLUO	LLU Operator: a carrier providing services over unbundled local loops.
Local loop	The copper wire that connects houses to the BT local exchange network.
MPF	Metallic Path Facility: BT's name for the copper wire in the local loop. The technical term for FULL.
MPLS	Multi Protocol Label Switching: a technology to support quality of service over an IP network by routing all related packets the same way over a network.
MSAN	Multi Service Access Node. Second generation exchange equipment used to connect copper loop. Differs from a DSLAM in that it converts normal circuit-switched voice calls into IP for transmission, whereas a DSLAM can only handle IP voice.
Narrowband	See Dial-up.
NGN	Next Generation Network: industry term for future telecoms networks that will transmit both voice and data traffic on an all-IP platform. See also 21CN.
NGS	Next Generation Switch: BT's latest trunk exchanges replaced DMSUs.
OFCOM	The regulator of the UK telecoms market.
OFTTA	Office of the Telecoms Adjudicator. The body responsible for overseeing the successful implementation of LLU.
Openreach	The access services division of BT, responsible for delivering equivalence of service on a range of access products. The result of the regulatory settlement between BT and OFCOM.
Packet switching	Process by which information (both voice and data) is transmitted over an IP network.
POTS	Plain Old Telephone Service: Basic phone handset with push buttons.
PSTN	Public Switched Telephone Network. Historic name for the UK phone network.
SAC	Subscriber Acquisition Cost: cost of gaining a customer.
SDH	Synchronous Digital Hierarchy: Current digital transmission technology.
SMPF	Shared Metallic Path Facility: shared use of unbundled copper loop. Technical term for PULL.
Soft switch	IP switching platform.
TDM	Time Division Multiplexing: digital switching technology being replaced by IP.
Termination	The process of (and charge for) delivering a call from any network or customer over one's own line. LLUOs become terminating operators through the process of unbundling, as they have the right to charge other networks for delivering calls from their customers.
Tie pair	The wires connecting the copper loop into an MSAN or DSLAM.

VoIP	Voice Over Internet protocol: Sending voice over a network using IP technology
VPN	Virtual Private Network: virtual path/bandwidth through a managed network.
WLR	Wholesale Line Rental: BT's standard wholesale product offered to resellers.
21CN	21 st Century Network. See NGN.