NON-CONFIDENTIAL VERSION

PRELIMINARY SUBMISSION IN RESPONSE TO DATA SERVICES MARKET INQUIRY

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1 Executive summary[1]

Industry overview

1 The electronic communications sector in South Africa has changed significantly over the past two decades and the forces of technological and business change continue to reshape the industry.

2 Since the liberalisation and deregulation of the sector began in the 1990s, competition among network operators and service providers has developed, driving investment and innovation and reducing the prices of many electronic communications services.

3 The South African mobile industry has grown particularly rapidly since its launch in 1994. In early 2017, there were nearly 90 million subscribers – a penetration rate of 160%. The number of fixed lines has steadily declined since the peak in 2000, although there has been a recent increase in the number of subscribers to the new fibre-optic networks.

4 Data services have also grown quickly since Telkom launched its dial-up Internet service in 1993. This was followed by the launch of fixed broadband in 2002 over Telkom's copper network and, more recently, the growth of fibre-optic broadband networks.

5 The overall growth in data services in South Africa has been driven primarily by the growth of mobile broadband. In recent years, a substantial proportion of fixed broadband subscribers have migrated from Telkom's copper access network to broadband over fibre-optic networks or mobile broadband. It is estimated that mobile now makes up [redacted] of the country's broadband user base.

6 In this context, any assessment of the competitive landscape in the electronic communications industry should be based on the fact that this is a dynamic sector, subject to ongoing and rapid change.

Industry value-chain

7 The industry value-chain can be split into four primary layers. The layer furthest downstream involves retail data services, comprising:

- Broadband Access: the provision of connectivity that allows customers to connect to the network;
- Data services: primarily access to the Internet;

[1] This report has been prepared in the relatively limited time available and is, accordingly, preliminary in nature and it is not exhaustive on the aspects to which it refers, nor does is contain any definitive views. It should also be noted that, in the timeframe afforded, it has not been possible to address each aspect of the "Guideline questions" contained in the Competition Commission's Call for Submissions dated 20 September 2017, given the extent and complexity of the analyses required in certain instances. Instead, this report focusses on what it considers to be the key issues on which meaningful input can be provided at this stage. For these reasons, this report is submitted subject to a reservation of the right to, in due course, amend and/or supplement its contents.

- Leased lines: the provision of dedicated connectivity between customer premises, usually to business customers; and
- Managed Data Services: the provision of value-added data services, such as Virtual Private Networks, also usually to business customers.

8 The next layer upstream in the value-chain includes handsets, devices and customer-premises equipment, which are the point of technical interface between customers and the network.

9 Above this, lies the wholesale network services provided by both mobile and fixed networks. These offer connectivity, between points in the network, to other licensed operators on a wholesale basis. These services play a central role in the overall functioning of the industry.

10 Furthest upstream is a layer that includes network infrastructure services, such as mobile sites, ducts, poles and dark fibre. This layer also includes radio spectrum (an essential input into any wireless communications network) and Wholesale Internet Access.

Coverage prices and quality

11 Mobile broadband is available throughout most of South Africa with 99% of the population living within coverage of the 3G or 4G broadband networks. Fixed broadband is more limited in its coverage with currently around 1.1 million fixed broadband subscribers.

12 Speeds and other measures of quality of data service have improved over time. The average speed that customers actually experience has increased from 2-3 Mbps in 2014 to 6-7 Mbps in 2017.

13 Overall, prices for mobile broadband offered by the incumbent mobile operators have remained broadly stable over the past 3 years, while Telkom Mobile has significantly reduced the price of its mobile broadband data. Prices for fixed line data services such as Fibre-to-the-Home broadband, on the other hand, have [redacted] over the same period.

14 At the wholesale level, the incumbent mobile network operators provide services to other networks and service providers. Cell C has a national roaming arrangement with Vodacom, and Telkom Mobile has a national roaming arrangement with MTN.

15 Fixed wholesale network services are provided by most of the operators which own or control fixed networks. There is an active wholesale market for domestic and international connectivity and prices have fallen significantly in recent years. This is primarily the result of increased competition among wholesale network operators, widespread self-provision by the large mobile operators and the impact of the settlement agreement between Telkom and the Competition Commission.

16 Spectrum is an essential upstream input to the industry. The overall supply of spectrum into the industry is determined by the government which assigns it to licensees. Unequal distributions of spectrum, particularly in the sub-1Ghz frequency

band, create challenges. Lack of such frequencies raise the cost of rolling out networks to compete with the incumbent networks.

Competition in the provision of data services

17 In the mobile segment, there is some evidence to suggest that competition is not working fully effectively. The two later entrants – Cell C and Telkom Mobile – have found it difficult to build market share and achieve viable scale, despite investing considerable amounts and, in the case of Cell C, having been in the market for over 15 years. Similarly, prices for mobile broadband provided by the incumbent mobile operators have been relatively stable over the past 3 years, despite major reductions in the prices charged by challengers such as Telkom Mobile.

18 There are a number of barriers to entry and expansion in the mobile industry, which may help to explain this. There are high fixed and sunk costs associated with becoming a national mobile network operator, which create a natural barrier to entry. This is compounded by a range of other factors. For example, the historically high level of mobile call termination rates in South Africa has placed new mobile entrants at a commercial disadvantage in growing their subscriber base, which had a subsequent effect on their ability to compete in respect of mobile broadband.

19 New mobile entrants also face a shortage of suitable sites to locate network equipment. The underlying shortage of sites in premium areas is compounded by the ability of incumbent mobile operators to limit the amount and technical suitability of site space that they are willing to make available to competitors.

20 Although there are constraints on competition in respect of mobile, there are some aspects of the industry, particularly the fixed services segment, which have changed very significantly in recent years and have reduced the barriers to entry and expansion. For example, the growth of new fibre-optic networks by wholesalers and mobile operators themselves has increased the supply of upstream network capacity and eased a potential barrier to expansion.

21 The competitive landscape in the fixed data services market has changed dramatically in recent years. Consumers now enjoy a wide choice of fixed-line Internet Services Providers (“ISPs”). Many of these ISPs own and operate their own networks and provide a wide range of services. They operate a variety of businesses models, ranging from vertically integrated network operators, such as Telkom and Liquid Telecom, to smaller ISPs which purchase network services on a wholesale basis from other operators.

22 This expansion in the range of consumer choice has been helped by the growth of fixed wholesale services which has been driven by the growth of alternative fibre-optic networks. It has also benefitted positively from the settlement agreement between the Competition Commission and Telkom in 2013 and the functional separation undertaken by Telkom in 2015.

23 Finally, competition in the provision of Business Data Services has also changed significantly in recent years. The changes in the provision of wholesale fixed network services have reduced the barriers to entry and expansion in the supply of Business

Data Services. Technological developments have further enhanced this with the cost of supplying data services to business customers falling as communications technologies evolve.

2 Industry overview

2.1 INTRODUCTION

24 The electronic communications sector in South Africa has been characterised by dynamic developments over the past two decades and has evolved significantly, even over the past three or four years. The widespread use of data[2] is a relatively recent development. The high level of mobile telephone penetration in South Africa means that a large majority of individual data consumers access it by way of a mobile device.

25 In the 1990s, the government began the process of liberalising and deregulating the electronic communications sector. Mobile services were launched in 1994 when operating licences were granted to Vodacom and MTN. Telkom was a de jure monopoly provider of Public Switched Telecommunications Services (effectively fixed-services) until May 2002. It remained a de facto monopoly provider of fixed-line services until 2005, when the High Court determined that the Value Added Network Services licensees could self-provide network infrastructure. A second national fixed-line operator (Neotel, which has recently become Liquid Telecom) was introduced in 2007. During licence conversion during 2009, all of the licence holders under the Telecommunications Act 103 of 1996 (which include Public Switched Telecommunications Services, Public Land Mobile Network and Value-Added Services Network Services licences) had their existing licence/s converted into both an Individual Electronic Communications Network Services and an Individual Electronic Communications Services licence. As a result, they are now able to (and many do) provide a wide range of electronic communications services and/or electronic communications network services.

26 The South African mobile industry has grown rapidly since its launch. In 2004, there were [redacted] active mobile subscriptions in the country. By the start of 2017, this number had risen to [redacted] active subscriptions, which implies a market penetration of [redacted] Of these, [redacted] were 3G or 4G (LTE) subscriptions and therefore provided access to mobile broadband.[4] [5]

27 The fixed-line segment of the electronic communications market, by contrast, is relatively small. The number of fixed lines peaked at 5.5 million in 2000[6] following the mandatory roll-out of lines in underserviced areas and has been in steady decline ever

[2] For the purposes of this report, the term "broadband" is applied generally to data services provided to consumers and SMEs. The terms "data" and "data services" are used more broadly to apply to broadband access, internet services, leased lines, Virtual Private Networks and other managed data services.

[3] [redacted]

[4] [redacted]

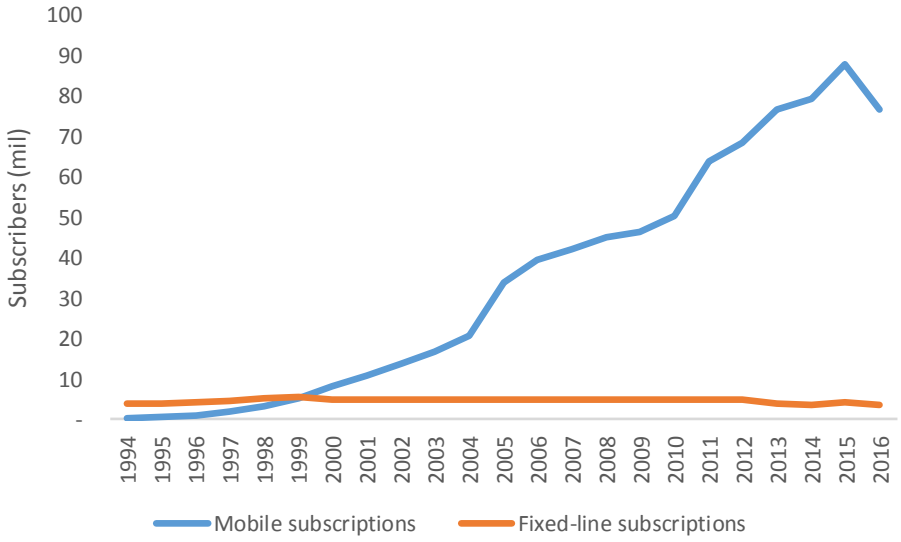
[5] 2G, 3G and 4G are used to refer to the International Telecommunications Union- / ITU-defined 2nd, 3rd and 4th generation of mobile standards. 3G and 4G networks are capable of providing mobile data services. LTE ("Long Term Evolution") is a mobile data standard which is usually considered to be consistent with the 4G standard.

[6] MyBroadband, 8 June 2015, *Telkom's fixed-line numbers the lowest since 1992*, https://mybroadband.co.za/news/adsl/128464-telkoms-fixed-line-numbers-the-lowest-since-1992.html

since. The total number of fixed lines is currently 2.9 million. Of this, 1.2 million are residential subscribers[7] and the remainder are business customers.

28 Long term trends in fixed and mobile subscription numbers (including voice and data) are illustrated in the figure below (Figure 1).

Figure 1: Fixed and mobile subscriptions



Source: World Bank, 2017[8]

Note: The decrease in mobile subscriber numbers in 2016 relates to a restatement of subscriber numbers by Cell C. Cell C's website states that its subscriber numbers had grown "to over 20m by July 2015". However, Blue Label Telecom reported in a circular to shareholders that Cell C has a total active subscriber base of 12.6 million. The discrepancy relates to the length of which a customer needs to be inactive before being excluded from subscriber figures.

[7] Telkom internal data.
[8] World Bank, 2017, *World Telecommunication Development database*, https://data.worldbank.org/indicator/IT.CEL.SETS?locations=ZA; https://data.worldbank.org/indicator/IT.MLT.MAIN?locations=ZA.

29 Total numbers of data subscribers for each of the major network operators are shown below in Table 1.

30 Dial-up internet was launched in 1993 and, in 2002, Telkom launched the country's first commercial fixed broadband product using Asymmetric Digital Subscriber Line ("ADSL")[10] technology.[11] Fixed broadband connections recently reached the 1 million mark.[12] ADSL connections are now declining, largely as a result of customers switching to alternative broadband technologies such as fibre-optic networks and mobile broadband (Figure 2).

[9] FTTP includes fibre connections to individual houses which are commonly referred to as Fibre-to-the-Home ("FTTH") and to buildings with multiple dwellings (e.g., apartment buildings) which are commonly referred to as Fibre-to-the-Building ("FTTB").
[10] ADSL is part of a group of Digital Subscriber Line ("DSL") technologies which allow copper access networks to deliver data services to customers. ADSL has traditionally been the most widely deployed type of DSL in South Africa, as in other countries. This has started to change in recent years as networks are upgraded.
[11] MyBroadband, 30 November 2014, *The History of Internet access in South Africa*, https://mybroadband.co.za/news/internet/114645-the-history-of-internet-access-in-south-africa.html
[12] MyBroadband, 6 June 2016, *Telkom's impressive fibre and ADSL*, numbershttps://mybroadband.co.za/news/adsl/167433-telkoms-impressive-fibre-and-adsl-numbers.html

31 The rapid growth in data services overall has been driven primarily by the growth in mobile broadband. Increasing numbers of subscribers in South Africa now have access to the internet through their mobile devices and it is estimated that mobile makes up [redacted] of South Africa's broadband user base.[13] This has been facilitated by the growth in smartphone ownership in the country. It is estimated that there were approximately 20 million smartphones in use in March 2017 in South Africa, giving it a smartphone penetration rate of 36%[14], which is consistent with the rates in countries with a similar Gross Domestic Product per capita such as Colombia, Algeria and Peru.[15]

32 Data consumption per user is rising dramatically, supported by infrastructure improvements, widespread adoption of faster data devices and data-heavy applications such as video streaming. For example, average monthly data usage per smartphone internet user on Vodacom's network increased 386% from 84MB in 2011 to 408MB in 2015.[16] By 2017 this had further increased to 560MB per smartphone user.[17] The Independent Communications Authority of South Africa ("ICASA") reports that between 2015 and 2016 total mobile data traffic increased by 55%.[18]

[13] [redacted]

[14] Newzoo, 2017, *Global Mobile Market Report*, https://newzoo.com/insights/rankings/top-50-countries-by-smartphone-penetration-and-users/

[15] Measured on a Purchasing Power Parity ("PPP") basis.

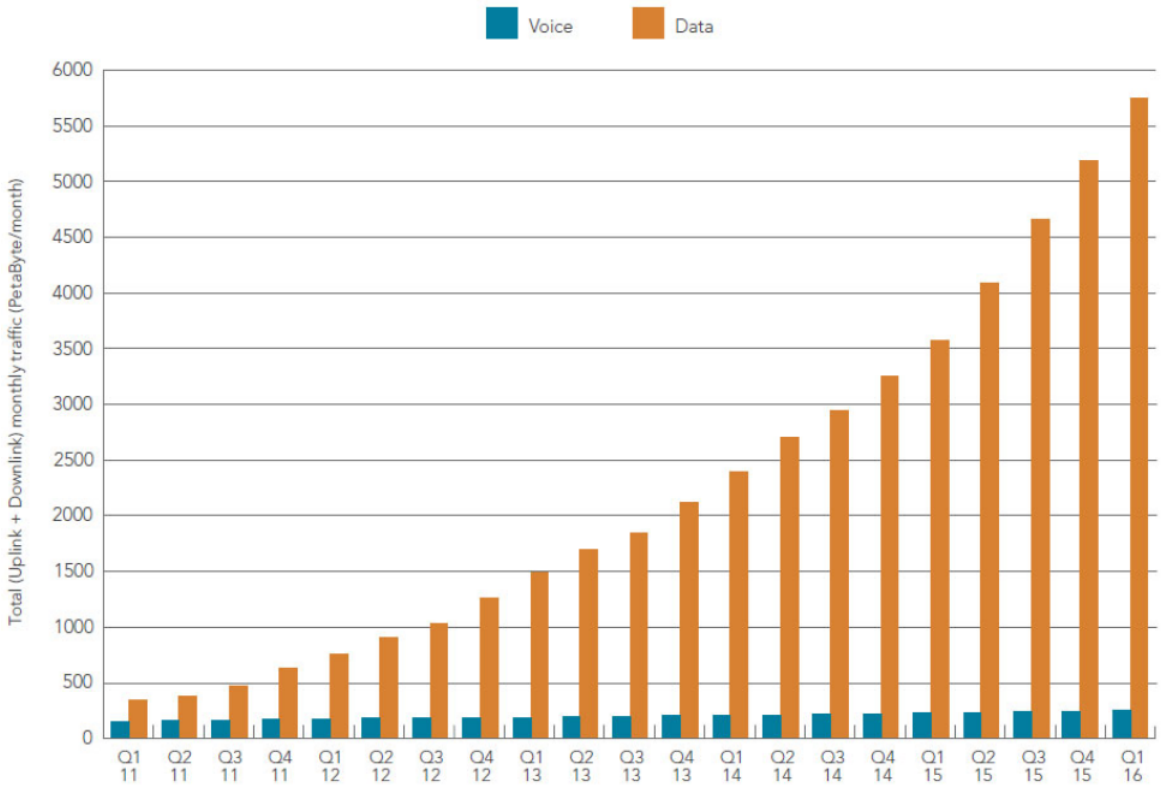
[16] MyBroadband, 5 August 2015, *The massive rise of mobile data in South Africa in 5 charts*, https://mybroadband.co.za/news/cellular/133090-the-massive-rise-of-mobile-data-in-south-africa-in-5-charts.html

[17] Vodacom, 14 May 2017, *Vodacom Annual Results Presentation for the year ended 31 March 2017*, p4

[18] ICASA, 2017, *Second report on the state of ICT sector in* SA, p 22

33 Looking ahead, between 2014 and 2019, the number of internet users in South Africa is expected to grow by nearly 100% from 15 million to 29 million,[19] while data traffic is forecast to grow six fold over the same period (Figure 3).

Figure 3: Monthly mobile data traffic, 2011-2016

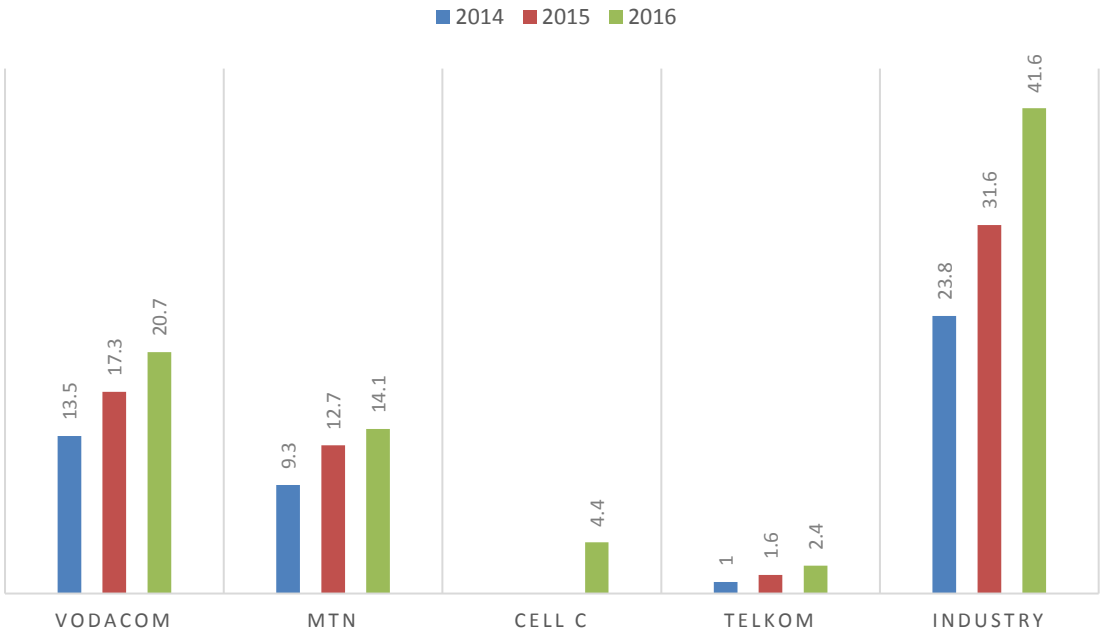


Source: Ericsson via https://mybroadband.co.za/news/cellular/170305-vodacom-and-mtns-big-battle-in-south-africa.html

[19] Cisco Visual Networking Index 2015, https://www.cisco.com/c/en_za/about/press-releases-south-africa/archive-2015/ip-traffic-growth-rate.html

34 The increase in subscriber numbers and the volume of data traffic being consumed by subscribers has resulted in significant growth in data revenues (Figure 4).

Figure 4: Mobile data revenue, 2014-2016 (R billion)



Source: Mobile operator Annual Reports[20]

2.2 KEY INDUSTRY PARTICIPANTS

35 There are currently four established mobile network operators in South Africa. The market is dominated by the incumbents, Vodacom and MTN, both of which entered the market in 1994. Together Vodacom and MTN account for [redacted] of mobile subscribers and [redacted] of mobile data revenue.[21] Cell C entered the market in 2001 followed by Telkom Mobile in 2010, initially under the *8ta* brand. The two later entrants have been slow to build their subscriber base. Cell C's share of mobile subscribers is currently around [redacted] while Telkom Mobile has [redacted].[22] Additionally, mobile services are provided by a small number of Mobile Virtual Network Operators ("MVNO"), all of which currently use the Cell C network. It is estimated that MVNOs in aggregate have [redacted] of mobile subscribers.[23]

[20] Note, Data revenue for Cell C in 2014 and 2015 is not available.
[21] [redacted]
[22] [redacted]
[23] [redacted]

Vodacom

36 Vodacom is South Africa's biggest electronic communications provider with [redacted] subscribers, [redacted] of whom are active data users.[24] Vodacom launched its operations in 1994 alongside MTN as the country's first licensed cellular operators. Vodacom launched a 3G network in December 2004 followed by a 4G (LTE) network in 2012. The company's primary focus is still on mobile voice, SMS and broadband, but it has diversified into the Business Data Services and consumer fixed-line segments. Business service revenue (including both mobile and fixed) now accounts for almost a quarter of the Vodacom's South African service revenue.[25]

37 Vodacom owns its own extensive fibre-optic network which it uses to backhaul a significant proportion of its mobile services and to provide fibre-optic services to residential and business customers. Vodacom has also entered into a series of deals with third party fibre-optic network operators in order to extend its Fibre-to-the-Premises ("FTTP") coverage. Additionally, Vodacom offers fixed wireless products that compete directly with fixed wireline services.

38 Vodacom owns stakes on two submarine cables, namely the EASSy and WACS submarine cable systems and has partnered with MTN, Liquid Telecom (previously Neotel) and the national roads agency SANRAL in the National Long Distance fibre consortium which links South Africa's major metropolitan areas in Gauteng to those of Durban and Cape Town.

MTN

39 MTN is South Africa's second largest electronic communications provider with [redacted] subscribers,[26] [redacted] of which are data subscribers. MTN commenced operations with a 2G network in 1994. In mid-2005, it launched a 3G network followed by a 4G (LTE) network in 2012. The company provides mobile voice, SMS and broadband services and has also expanded into the business data service and consumer fixed-line segments.

40 MTN owns stakes in the WACS and EASSy submarine cable systems and has its own domestic fibre infrastructure. The company is pursuing a self-provision strategy for its mobile backhaul requirements by deploying its own fixed network infrastructure.[27] Additionally, MTN is in the process of deploying an FTTP network to offer fixed-line business and residential data services. In 2016, MTN acquired Smart Village which increased the reach of its fibre network.[28] MTN is a participant in the National Long Distance fibre consortium.

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[24] [redacted]

[25] Vodacom, 2017*, Annual Results Presentation*, http://www.vodacom.com/pdf/annual-results/2017/results-presentation-2017.pdf, p6

[26] [redacted]

[27] MTN, February 2016, *MTN acquires fibre route from Liquid Telecom*, http://pressoffice.mg.co.za/mtn/PressRelease.php?StoryID=265113

[28] MTN, 2017, *MTN/Smart Village*, http://www.smartvillage.co.za/index.php/mtn-smart-village

Cell C

41 Cell C is South Africa's third mobile operator and entered the market in 2001. Cell C launched a 3G network in 2010 followed by a 4G (LTE) network in 2015. Cell C provides mobile voice, SMS and data services and also owns fibre infrastructure which it uses to self-provide some of its backhaul requirements, as well as offer FTTP retail services.

Telkom

42 Telkom is an electronic communications network services and electronic communications services provider, providing services across many parts of the sector. Since 2015, Telkom SA SOC Limited (the Group) has undergone significant internal restructuring. The Group now includes two separate business divisions, namely:

- Openserve, which is the business division that operates Telkom's fixed network and sells network services on a wholesale basis; and
- Telkom Consumer, which is the business division that sells fixed and mobile retail services to consumers and small businesses. The fixed services are sold under the brand "Telkom", but will be referenced as Telkom Consumer in this report and the mobile services are sold under the brand "Telkom Mobile", and will be referenced as such in this report.

43 In addition, Telkom has two wholly-owned subsidiaries, namely BCX (Pty) (Ltd) and Gyro (Pty) (Ltd):

- BCX provides both traditional IT services and products as well as business data services to enterprise customers on a retail basis; and
- Gyro manages and operates the Group's property portfolio.[29]

44 Telkom Mobile is the country's fourth mobile operator and launched its services in 2010, initially under the *8ta* brand. Telkom previously owned a 50% stake in Vodacom which it sold in 2009. Initially, Telkom Mobile focused on mobile voice. It has since changed focus and repositioned itself primarily as a mobile data services provider, although it continues to offer a full set of mobile services. Telkom provides mobile broadband services under its FreeMe suite of packages. Telkom also provides fixed consumer electronic communications services, including voice and broadband. These are provided over its copper, fibre and wireless networks.

45 Telkom provides Business Data Services through supplying a wide range of connectivity and value-added services to enterprise customers. These services are now provided to business customers through Telkom's BCX subsidiary.

46 Telkom is also a provider of wholesale fixed network services through its Openserve business unit.

[29] This report refers to these business units and subsidiaries. It also refers, where applicable and the context indicates this, simply to Telkom as a whole.

Other fibre wholesale access providers

47 Since 2014, a number of new entrants have launched fibre-optic networks. Vumatel is the most prominent of these. It launched its operations in Parkhurst, Johannesburg and its network currently passes approximately 240,000 homes in major metro areas of South Africa. Vumatel is a wholesale network provider, selling network access to retail internet service providers which then provide services to end-users.

Liquid Telecom

48 Liquid Telecom is South Africa's second licensed fixed network operator. Neotel was founded in 2006 and launched its services in 2007. Liquid Telecom bought the company in 2016.

49 Liquid Telecom operates a large fibre network and offers a broad set of electronic communications services, primarily targeted at the wholesale and business sectors. Liquid Telecom owns stakes in two undersea cables, EASSy and WACS, and is a partner in the National Long Distance fibre consortium.

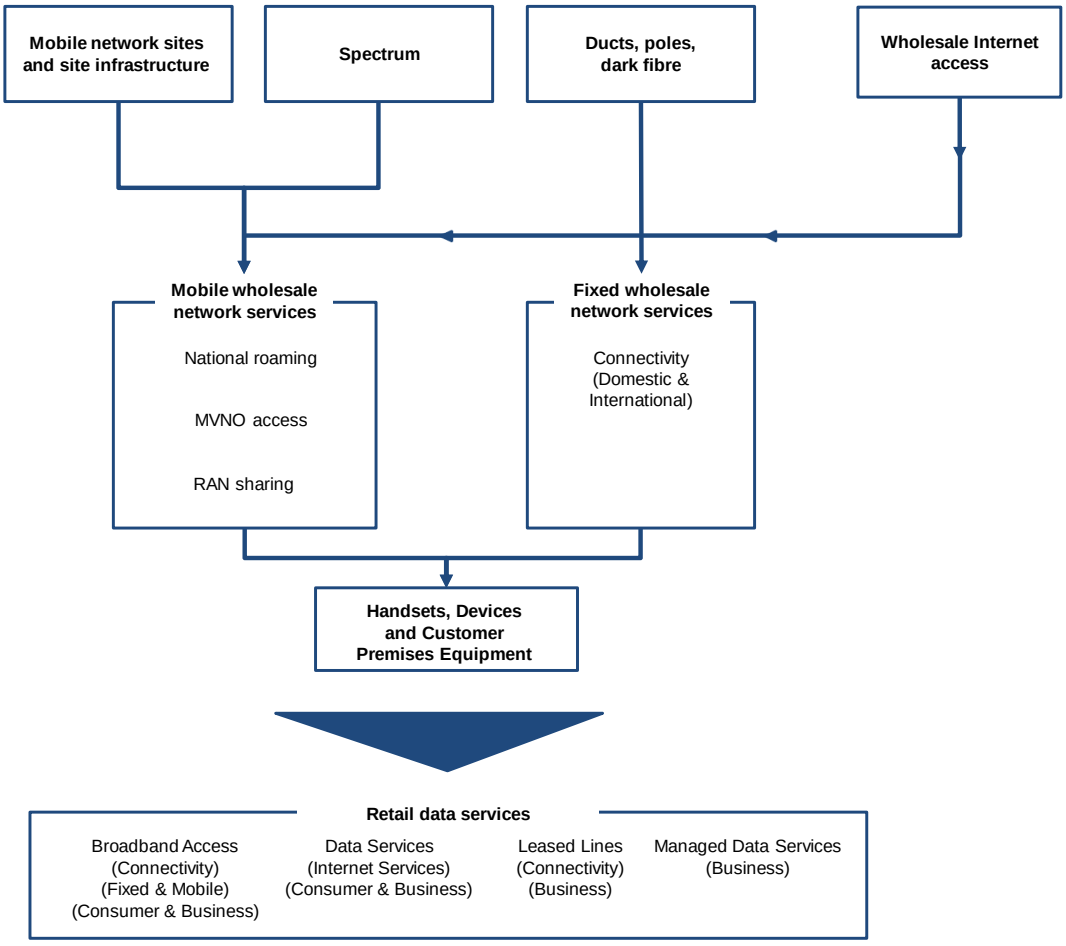
3 Industry value-chain

3.1 VALUE-CHAIN OVERVIEW

50 The value-chain for the provision of data services at wholesale and retail levels is comprised of wholesale inputs ranging from network infrastructure to active wholesale services which feed directly into the retail services provided to end users.

51 The industry value-chain is summarised below in Figure 5 and discussed in more detail in the sections that follow.

Figure 5: Data services value-chain



Source: BRG analysis

3.2 RETAIL DATA SERVICES

52 At the downstream end of the value-chain are retail data services. These include:

- Broadband Access (fixed and mobile);
- Data Services (i.e., Internet);
- Leased Line Connectivity; and

- Managed Data Services.

53 Service providers compete to supply these services to consumers and business customers on a range of metrics that includes coverage, price, quality, service innovation, customer care and brand.

Broadband Access

54 Broadband Access is a connection between the customer and the network that is capable of carrying data. Mobile broadband access is always provided using mobile technologies which rely on a wireless connection between the network and a customer device. There is a wide variety of suitable devices, including smartphones, routers and dongles (which enable a personal computer, such as a laptop, to access broadband).

55 Fixed broadband access is available to a subscriber only at a single geographical location. This is typically the residential home for consumers and the business premises for business customers. Fixed Internet can be provided using a copper or fibre-optic network connection. It can also be provided over a wireless connection.

Internet services

56 Internet services is the provision of access to the Internet and can be provided over fixed or mobile broadband access. It can be offered by the same company which provides the broadband access or it can be provided by a third party (e.g., an independent ISP).

Leased Lines

57 Leased lines provide connectivity between customer premises at fixed points in the network at defined rates. There are many different types of leased line. Some connect points that are a large distance apart (e.g., two different cities or internationally), while others connect points which are close together (e.g., within a metropolitan area).

58 The term “leased lines” covers a broad range of network technologies which are used to provide connectivity. When provided at the retail level, they are typically used by corporate customers which need connectivity at guaranteed speeds[30] to connect different premises. International leased lines provide similar services, but between locations in South Africa, on the one end, and in other countries, at the other.

Managed Data Services

59 Managed Data Services cover a broad range of value-added data services typically provided to business customers. These include, for example, Virtual Private Networks (“VPN”). A VPN allows a secure encrypted connection to be established over a less secure network and is capable of supporting voice, data and video services. VPNs enable businesses to connect multiple sites over an Internet Protocol network in order to facilitate inter-branch business communications. Additionally, VPNs enable remote users to access a businesses’ resources and software applications.

[30] The term “speed”, when used in reference to data services, refers to throughput speed.

Consumer and Business Data services

60 In this report, the terms “Data Services” is applied generally to all data services. “Broadband” is used to refer to data services provided to consumers. “Business Data Services” is used to refer to the services provided to business customers. This includes Broadband Access, Internet Services, Leased Lines and Managed Data Services.

3.3 HANDSETS, DEVICES AND CUSTOMER-PREMISES EQUIPMENT

61 Most, if not all, of these products are de-regulated and hence largely unlicensed (equipment type approvals being the only main form of regulation) and, for that reason, this aspect will not be explored in depth in this report.

3.4 MOBILE WHOLESALE NETWORK SERVICES

62 Wholesale network services dealt with in this regard include national roaming and MVNO access. It is also possible to provide wholesale access to an operator’s entire Radio Access Network (“RAN”)[31] through RAN sharing. Each arrangement is suitable for different types of purchasing operators.

63 National roaming agreements are concluded by mobile network operators that have limited geographical coverage with their own network. Through roaming agreements, such an operator is able to provide services to customers across a larger area.

64 MVNO access is suitable for a mobile service provider which does not have any of its own RAN infrastructure and instead purchases an entire mobile service from a mobile network operator on a wholesale basis. There are different types of MVNO ranging from a full MVNO which operates its own core network and purchases a limited set of wholesale mobile services to a light MVNO which purchases a broad set of mobile network services, including access to the core.

65 RAN sharing[32] occurs when operators share active and / or passive elements of the RAN, such as antennas, feeder cables and radio cabinets. The different network signals carried over the shared network elements are then split to ensure each operator’s traffic is directed to its own core network.

3.5 FIXED WHOLESALE NETWORK SERVICES

66 Fixed wholesale network services comprise a range of connectivity services provided to other licensed operators on a wholesale basis. This allows them to provide services to customers without having to construct an entire network of their own.

67 There is a range of transmission technologies used to provide connectivity. It can be delivered over different types of physical connection, including copper, fibre-optic or wireless connections.

[31] Radio Access Network refers to the part of the mobile network that establishes connections between individual mobile devices and the core network.
[32] Also referred to as “active mobile network sharing”.

68 International connectivity is used for connecting points in South Africa with points overseas. It can be purchased by other electronic communications service providers for the purpose of connecting with ISPs in an overseas location.

69 International connectivity in South Africa is provided primarily via one of the submarine cables that land in the country. Prior to 2009, South Africa was served by a single submarine cable system ("SAT-3/SAFE"). Since then, three additional submarine cables have been connected to South Africa, namely, Seacom (2009), EASSy (2010) and WACS (2012). This has resulted in significant increases in the total amount of international capacity connected to South Africa and reductions in the price of international connectivity.

3.6 WHOLESALE INTERNET ACCESS

70 The Internet is a global system of inter-linked computer networks. In order for the users of one network to access content from or communicate with users of another network, these networks need to interconnect. This is done by large ISPs, often referred to as Tier 1 ISPs. The Tier 1 ISPs establish local and international internet networks which are registered with an international body. Tier 1 ISPs then connect with other Tier 1 ISPs, thereby effectively making up what is known as the "Internet".

71 These ISPs offer wholesale Internet access in two ways:

- Internet transit is a service provided by Tier 1 ISPs that enables small ISPs to access the global internet by transiting over their internet networks. Transit is typically a metered service.
- Internet peering is done between ISPs which exchange traffic. Peering is most commonly done on a settlement-free basis, but can also be on a paid-for basis.

72 Wholesale Internet Access can be provided by Tier 1 ISPs either within South Africa or at an overseas destination. In the former case, the interconnecting ISP would need to have domestic connectivity to the point of interconnection. In the latter case, the ISP would need to have access to international connectivity that enables it to access the overseas point of interconnection.

3.7 SPECTRUM

73 Access to spectrum is essential for the operation of a mobile or other wireless network. It is also used in fixed networks in situations where it is economically or technically preferable to the construction of wireline (copper or fibre) infrastructure.

74 Internationally, frequency bands are allocated for use for various communications services (e.g. mobile, fixed, satellite, etc.). Within a country, specific frequencies within a band are then assigned to individual parties on either an exclusive or shared basis. In the case of mobile, this is almost always on an exclusive basis.

75 Specific mobile technologies (i.e., 2G, 3G and 4G) were initially assigned to operate on separate frequency bands. However, over time, network and handset technology has evolved to allow them to be provided over a range of different frequency bands.

76 Frequency bands vary in their propagation characteristics and this has significant economic implications for network operators. Broadly, lower frequency bands propagate further than high frequency bands. It therefore costs less to provide coverage over large areas using lower frequency bands than using higher frequency bands. Lower frequency bands also penetrate buildings more effectively, which improves indoor coverage.

77 There is currently an asymmetry in the assignment of low frequency spectrum (i.e., spectrum below 1 GHz) between the various mobile network operators in South Africa. The only International Mobile Telecommunications ("IMT") band currently available below 1 GHz (i.e., the 900 MHz band) has been fully assigned to Vodacom, MTN and Cell C. The lack of sub-1 Ghz frequency spectrum is disadvantageous for Telkom Mobile from a cost perspective. This is discussed in more detail below.

3.8 MOBILE SITES AND SITE INFRASTRUCTURE

78 A RAN is constructed on sites which can consist of a purpose-built mast or an existing raised structure (e.g., a building). The site can be owned by the mobile network operator or leased from land or building owners. The site and/or infrastructure at the site can be used by a single operator or can be shared with other operators or parties.

79 Site infrastructure is made available to mobile network operators on a wholesale basis. This can be in several different forms including access to land, power or air-conditioning services, space on a mobile tower and other ancillary services.

3.9 DUCTS, POLES AND DARK FIBRE

80 Ducts and poles are two types of network infrastructure which are used to support fixed networks. Ducts are pipes which are laid underground into which network cabling is installed. The majority of ducts are installed specifically for the purpose of supporting the communications network infrastructure. However, ducts can also be part of transport infrastructure or utility networks and then accessed for the purposes of installing electronic communications networks. The majority of poles used for electronic communications networks are installed specifically for that purpose, but it is also possible to install copper or fibre-optic cabling along electricity network poles or even street lighting.

81 Dark fibre is the term applied to fibre-optic cables that have been installed, but without electronic communications equipment attached. It can be provided to other network operators on a wholesale basis so that they can incorporate it into their networks by terminating the fibre-optic cables on their own network equipment. It is therefore often considered an upstream input into the electronic communications value-chain.

4 Coverage, prices and quality

4.1 RETAIL DATA SERVICES OVERVIEW

Data services coverage

82 By 2016, 3G and 4G population coverage in South Africa was 99% and 75%, respectively.[33] The coverage of fixed broadband services is more limited. By 2016, there were 1.1 million fixed broadband subscriptions, which equates to 6.5% of households.[34] Recently, a number of operators have announced significant fibre-optic network roll-out plans, which has led some analysts to predict that, by 2020, 3 million homes will be connected directly by fibre.[35] Vumatel is an example of an operator rolling out fibre networks. Its network already passes approximately 240,000 homes and it has announced that it is considering connecting 2.5 million homes within the next two years.[36] Further details on new entrants are provided in Section 5.2.

Data services speeds

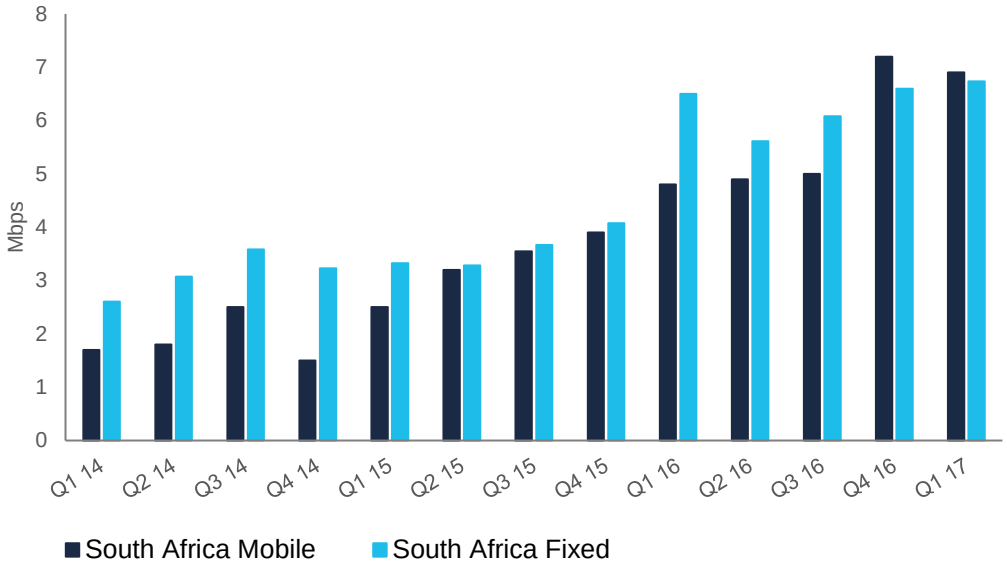
83 The speed at which data can be accessed on a device is a key characteristic of a data service. This is generally measured in Megabits per second ("Mbps").

84 The speeds that service providers advertise to customers have increased very significantly over the past few years. For example, Vodacom and MTN advertised speeds of up to 3.6 Mbps in 2008.[37] Vodacom currently advertises speeds of up to 60 Mbps.[38] Telkom's DSL-based fixed broadband proposition currently advertises speeds ranging from 2 Mbps to 40 Mbps.[39]

85 The speed that data subscribers actually experience is usually lower than the advertised speed. Average actual download speeds in South Africa on fixed and mobile have increased, reaching an average of 6.9 Mbps and 6.7 Mbps respectively at the beginning of 2017 (Figure 6). This means that, unlike in many countries where fixed speeds are significantly higher than mobile speeds, fixed and mobile networks in South Africa are closer substitutes for one another on, at least, the key metric of speed.

[33] ICASA, 2017, *2nd Report on the state of the ICT sector in South Africa*, para 4.9
[34] Telkom, 30 September 2017, *Group Interim Results*, p32 and Statistics South Africa, 30 June 2016, *Media Release: Community Survey Results 2016*, http://www.statssa.gov.za/?p=7957
[35] Vox Telecom, EE Publishers, 5 April 2016, *Fibre rollout expected to reach 3-million homes by 2020*, http://www.ee.co.za/article/fibre-rollout-expected-reach-3-million-homes-2020.html
[36] Mybroadband, 31 October 2017, *How many homes can get Vumatel fibre in South Africa*, https://mybroadband.co.za/news/fibre/234946-how-many-homes-can-get-vumatel-fibre-in-south-africa.html
[37] Mybroadband, 24 January 2008, *MTN 3.6 Mbps HSDPA here*, https://mybroadband.co.za/news/cellular/2647-mtn-3-6-mbps-hsdpa-here.html
[38] http://www.vodacom.co.za/vodacom/services/internet/lte
[39] Telkom, 2017, *ADSL Shop*, https://secure.telkom.co.za/today/shop/plan/adsl-line/

Figure 6: Comparison of fixed and mobile download speeds



Source: Akamai, State of the Internet Connectivity Report Q1 2017, https://content.akamai.com/uk-en-pg9141-q1-soti-connectivity.html

86 As a broad benchmark, the speed recommended by Netflix to stream a High Definition quality film is 5 Mbps,[40] while a high-quality music stream requires 0.32 Mbps.[41]

Retail channels

87 Sales and marketing of consumer data services are done through direct and indirect channels. The three direct channels are physical shops, contact via telephone and contact via the operator's website.

88 Indirect channels play a significant role. Third-party retailers are paid commissions for selling subscriptions and services (e.g., pre-paid voice and data bundles) to customers. There are a number of different categories of indirect channels, including on-sellers, dealers, and independent dealers: On-sellers take responsibility for processing, billing and customer care. Dealers have partnerships with operators and typically have distribution sales targets agreed. Independent dealers are sales professionals that tend to facilitate sales for specific small business and high value residential customers.

Data service prices

89 The effective price faced by data consumers in South Africa varies significantly. Table 2 below summarises the price per MB for small data bundles offered by the four mobile network operators.

[40] Netflix, *Internet Connection Speed Recommendations*, https://help.netflix.com/en/node/306
[41] Spotify, *Audio settings*, https://support.spotify.com/uk/using_spotify/system_settings/high-quality-streaming/

Table 2: Mobile data prices (small bundles), price per MB (R)

Bundle size	Vodacom	MTN	Cell C	Telkom Mobile[42]
10 MB	1.50			0.29
30 MB	0.40		0.40	0.29
50 MB		0.50		0.29
100 MB	0.29	0.35	0.29	0.29

Source: Operator websites

90 As shown in Table 2, the price per MB of data tends to decrease as bundle size increases. For even larger bundles than those shown in the table, the effective price per MB is significantly lower. For example, a 5GB bundle (valid for 30 days) on Vodacom currently costs R399, or 8c per MB.[43] Telkom Mobile's price per MB is the same for small bundles in the 10MB to 100MB range. However, for larger bundles, the price per MB is significantly lower. Its 5GB FreeMe product, for example, costs R299, or 6c per MB.

91 For many of the large mobile network operators, however, mobile data prices have been relatively static, over the past four years.44 However, there are some exceptions. MTN increased some of its data prices in 2017. Telkom Mobile, on the other hand, has significantly reduced its data prices since 2014.

92 Table 3 below summarises the evolution of an illustrative 1GB pre-paid data bundle over the past four years.

Table 3: Average 1GB mobile pre-paid data bundle prices, 2014–2017 (R)

	Q2 2014	Q2 2015	Q2 2016	Q2 2017
Vodacom	149	149	149	149
MTN	149	149	149	160
Cell C	149	149	149	149
Telkom	180		99	99

Source: Business Tech, July 2017, South Africa has the highest data prices among Africa's biggest economies, https://businesstech.co.za/news/mobile/185941/south-africa-has-the-some-of-the-highest-data-prices-in-africa/ and ResearchICTAfrica.net's RAMP Index Q2 2017

93 Prices for fixed-line broadband, by contrast, have declined significantly in recent years (Table 4).

[42] Telkom Mobile charges a standard rate of R0.29 per MB for small bundles and out-of-bundle usage.
[43] http://www.vodacom.co.za/vodacom/shopping/data/prepaid-data.
[44] Several operators have recently reduced their out-of-bundle rates. For example, Vodacom cut its out-of-bundle rate from R1.99 to R0.99.

94 These price reductions are illustrated even more clearly by reference to an example. Price trends for MWEB, an ISP, for consumer data services provided over Telkom Openserve's network, have declined sharply over the last two years (Figure 7).

95 Price reductions have also been seen in ADSL products. For example, Telkom's 10 Mbps uncapped product was priced at R999 in 2015.[46] In August 2017, this price was reduced to R799, a 20% reduction.[47]

45

4.2 TELKOM'S RETAIL SERVICES

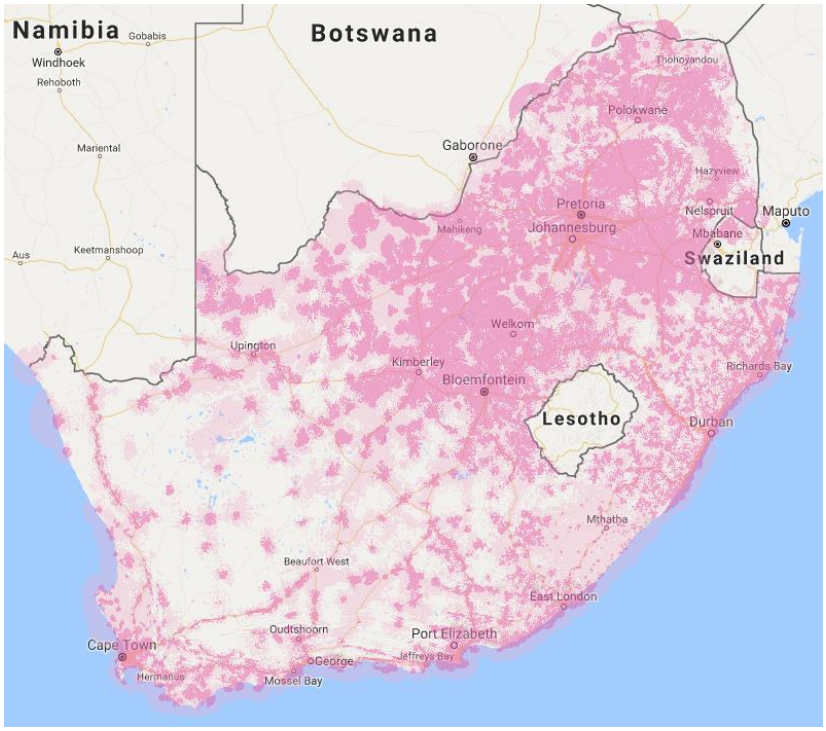
History of Telkom's retail data services

96 Telkom's initial presence in mobile services in South Africa was through its 50% stake in Vodacom, which it sold in 2009. Telkom re-entered the mobile segment of the market with the launch of its own mobile business – Telkom Mobile – in 2010.

97 Telkom Mobile has offered mobile services across the country since launch. This has been achieved through a strategy of both building its own sites at certain locations and roaming on MTN's network in other areas of the country.

98 Telkom Mobile's services now cover approximately 99% of the population through a combination of its own sites and its roaming arrangement with MTN. Telkom Mobile's overall service coverage, including both voice and data, is illustrated in Figure 8.

Figure 8: Telkom Mobile services coverage, including roaming arrangement with MTN



Source: Telkom, 2017, https://secure.telkom.co.za/today/ucm/

99 The subscriber focus of Telkom Mobile was initially on the pre-paid segment, but this has evolved over recent years to include a focus on the post-paid segment (i.e., where customers pay for services used on a monthly basis in arrears). Telkom Mobile has

[46] MyBroadband, August 2015, *Cheapest uncapped ADSL packages in South Africa, https://mybroadband.co.za/news/adsl/136302-cheapest-uncapped-adsl-packages-in-south-africa.html*
[47] MyBroadband, July 2017, *Telkom's killer uncapped ADSL prices*, https://mybroadband.co.za/news/adsl/222307-telkoms-killer-uncapped-adsl-prices.html

also evolved from being primarily focused on voice services to both voice and data, but with a strong emphasis on its data proposition.

100 Telkom Mobile's voice and data services have been available over its own 2G and 3G networks where they have been deployed and have adequate capacity. In other areas, services have been provided via its roaming arrangement with MTN. Telkom Mobile launched 4G data services via LTE technology in 2013. These are provided over its own network, because the MTN roaming agreement does not include 4G services.

101 In 2013, Telkom launched a new fixed wireless broadband service using 4G technology operating in the 2300MHz frequency band.

102 Telkom has offered fixed broadband to businesses and residential customers via its copper network since the launch of its ADSL service in 2002. The coverage of this service increased as Telkom progressively upgraded its exchanges. By 2010, 100% of Telkom's 4,000 exchanges were ADSL-enabled.[48]

103 This programme of broadband provision over the copper network has been supplemented by the rollout of its fibre-optic network. It launched Fibre-to-the-Cabinet ("FTTC") services in 2013 and FTTP services in 2014. As of March 2017, Telkom had passed 220,000 premises with FTTP and 1,991,000 premises with FTTC.[49]

Telkom's current retail data services

104 Telkom offers a broad range of mobile broadband packages, primarily as part of the FreeMe product suite. FreeMe was launched in July 2016 and provides a choice of packages that currently include 500MB, 1GB, 2GB, 5GB, 10GB, 20GB or unlimited. The packages include free texts and free calls to Telkom fixed and mobile numbers. In August 2017, Telkom launched LIT, which offers FreeMe contract subscribers inclusive music and video streaming from selected providers. FreeMe is available bundled with a handset or on a SIM-only basis, and is available as pre-paid and post-paid bundles and as a family shared plan. FreeMe is marketed to both consumers and business customers. In addition to its FreeMe packages, Telkom offers a range of other wireless services to business customers.

105 Also available are Telkom Mobile's SmartInternet and Internet Starter Pack plans which are data-only packages and are available on a SIM-only basis or bundled with a Mi-Fi[50] device.

106 Telkom markets a set of wireless broadband products to a fixed location in a home or a business. These are primarily branded as SmartBroadband Wireless packages and

[48] MyBroadband, 3 August 2010, *Telkom reaches 100% ADSL 'coverage'* , https://mybroadband.co.za/news/adsl/14236-Telkom-reaches-100-ADSL-coverage.html
[49] Telkom, 2017, *Annual Results 2017,* http://www.telkom.co.za/ir/apps_static/ir/pdf/financial/pdf/Telkom_Annual_Results_Booklet_WP_2017_Final.pdf, p26
[50] Mi-Fi is a brand name used to describe a wireless router that acts as mobile Wi-Fi hotspot.

provide the capability to download at up to 90 Mbps with a capped data allowance using a wireless 4G router supplied by Telkom.

107 Unified services which include mobile and fixed technologies are marketed as Always On For Business and UNLIMITEDbusiness for businesses and UNLIMITEDhome for consumers. The UNLIMITEDbusiness and UNLIMITEDhome products are available at speeds of 4Mbps, 8Mbps, 10Mbps, 20Mbps, 40Mbps and 100Mbps. 100Mbps is only available over FTTP. 40Mbps is available over FTTC or FTTP while other speeds are generally available over either FTTP, FTTC or ADSL. The products all offer uncapped data and range in price from R599 to R1,699 a month. A variant of these products is also available called Softcap, which offers a discount in return for the amount of data usage per month being capped.

108 For consumers, additional packages currently available include Telkom Fast/Faster/Faster Plus/Elite/Elite Plus xDSL which offer broadband solely (i.e. without voice). *do Plans* are a further variant of Telkom's capped data plans. They include extras such as email accounts with cloud storage and free data from 12am-7am.

109 For businesses, a wide range of additional packages are available, including Multisite Internet, which offers accounts for multiple branches to be consolidated under one account, Premium Fibre Uncapped, which offers additional Value Added Services and up to 100Mbps speeds. A wide range of IT services are also available from Telkom, such as domain name services, hosted managed backup services, storage services and security services.

Pricing of Telkom's data services

110 Telkom has significantly reduced the price of its mobile data since 2015. Telkom has one of the lowest data prices across a range of bundle sizes compared to the other major operators (Table 3 and Table 5).

Table 5: Monthly pre-paid mobile data bundle pricing, April 2017 (R)

	1GB	2GB	5GB	10GB	20GB
Telkom	99	149	299	399	599
Cell C	149	249	399	599	999
MTN	160	260	430	650	1250
Vodacom	149	249	399	599	999

Source: Mybroadband.co.za,[51] excludes MVNOs

111 Price comparisons available for consumer retail fixed broadband indicate that Telkom offerings are generally among the most competitive available across a range of speeds (Table 6). The prices shown in the table are part of Telkom's UNLIMITEDhome

[51] MyBroadband, 21 April 2017, *The cheapest big month-to-month mobile data bundles in South Africa*, https://mybroadband.co.za/news/cellular/207674-the-cheapest-big-month-to-month-mobile-data-bundles-in-south-africa.html

packages which were launched in 2017. The packages include free calls to numbers on Telkom's fixed-line and mobile networks.

Table 6: Monthly fixed broadband pricing, July 2017 (R)

ISP	4Mbps Uncapped ADSL	10Mbps Uncapped ADSL	20Mbps Uncapped FTTC	40Mbps Uncapped FTTC
Telkom	599	799	999	1,299
MWEB	644	958	1,134	1,644
Webafrica	684	983	1,174	1,724
Axxess Premium	698	998	1,498	1,928
Cybersmart	788	978	1,357	1,762
Afrihost Premium	796	1,096	1,496	1,946
Crystal Web Premium	827	1,273	1,597	1,997

Source: Mybroadband.co.za[52]

4.3 MOBILE WHOLESALE NETWORK SERVICES

Coverage

112 Mobile wholesale network services include national roaming, MVNO access and RAN sharing. A new mobile network operator would be likely to conclude an agreement relating to RAN sharing or national roaming in order to be able to offer services on a nationwide basis. An MVNO entering these sectors would want to purchase MVNO access and/or associated services.

113 Wholesale mobile network services in South Africa can, in principle, be supplied by any mobile operator over its own network. However, in practice, national roaming is provided primarily by Vodacom and MTN as the two largest operators and the only ones with networks that cover the entire country. They are also two of the largest site operators.

114 These services are not subject to direct regulatory controls and the operators provide them on a commercial basis. Cell C has a national roaming arrangement with Vodacom and Telkom has a national roaming agreement with MTN for 2G and 3G voice and data roaming.

115 In 2017, it was announced that Vodacom and WBS[53] had entered into a RAN sharing agreement. The full details of this agreement are not in the public domain. However,

[52] MyBroadband, 31 July 2017, *Telkom's killer uncapped ADSL prices*, https://mybroadband.co.za/news/adsl/222307-telkoms-killer-uncapped-adsl-prices.html
[53] WBS operates under the brand name "Rain".

it appears that it is a hybrid site-sharing and RAN-sharing deal in which WBS obtains access to Vodacom sites and Vodacom is able to utilise WBS's RAN.

Pricing

116 Mobile wholesale contracts are concluded on a bespoke basis and there is little public information about the prices paid for these services. In general, a common structure for a roaming contract would be a minimum guaranteed spend for a specified initial volume of traffic. Additional charges would apply if volumes exceed the agreed initial amount. Contracts can also include tiered pricing so that the additional price charged for traffic varies as the total volume changes.

4.4 FIXED WHOLESALE NETWORK SERVICES

Coverage

117 Fixed wholesale network services are sold by many of the entities which own fixed network infrastructure. These can consist of local access, national (local or long distance) or international connectivity services.

118 Openserve, for example, provides wholesale fixed access connectivity services via both its copper and fibre-optic networks. It also offers a range of national (local and long distance) and international connectivity services.

119 Local access services are also provided by a growing number of alternative fibre-optic network operators. In 2014 Vumatel deployed its first residential fibre-optic network in Parkhurst, Johannesburg and MTN laid cables in the Monaghan Farm area of Fourways. Since then, several additional network operators have begun deploying their own fibre-optic networks and coverage now extends to large parts of the major metropolitan areas. These new entrants typically concentrate on rolling out FTTP networks and then sell access to other service providers on a wholesale basis.

120 Local access networks can also use wireless technology. These are provided by Wireless Internet Service Providers which install antennas at a customer's premises and then provide connectivity over their own local wireless networks. Telkom also provides wireless connections to customers either as standalone links or as backup to wireline connections.

121 All of the major network operators have infrastructure which is used for backhaul and core networks. Some entities (e.g., Openserve and Liquid Telecom) use these networks to sell fixed network services on a wholesale basis. Others (e.g., Vodacom and MTN) use their networks primarily for providing their own retail services.

122 International connectivity is currently offered by multiple operators including Telkom, Seacom, Vodacom, MTN and others. Telkom owns landing stations at Melkbosstrand and Yzerfontein near Cape Town and Mtunzini on the Kwa-Zulu Natal coast. Liquid

Telecom is the landing party in South Africa for the Seacom cable which lands at Mtunzini.

Prices

123 There has been a significant decrease in wholesale prices offered by Openserve. In July 2017, Openserve announced that it was reducing its wholesale prices by an average of 9% and provided upgrades to network speeds free of charge.[54] Price reductions in some key wholesale products were even greater. For example, the price of IP Connect - a wholesale leased line product used by ISPs - was reduced by 25%.[55]

124 Liquid Telecom also reduced its wholesale prices in July by up to 58%.[56] In the following month, Vumatel announced that it was also reducing its wholesale prices by an average of 9%.[57]

125 The effect of these changes can also be seen in the retail market. In a recent market commentary, it was noted that [redacted].[58]

The impact of the Competition Commission Settlement Agreement on the price of wholesale fixed services

126 Telkom reached a settlement with the Competition Commission in 2013, which contained a set of commitments that Telkom undertook to implement. These introduced significant changes to the way in which the business operates.

127 The key components included price reductions for certain wholesale leased line products used by other operators and ISPs, enhanced non-discrimination obligations and a transparent audit process to ensure compliance. The agreement stipulated that Telkom would significantly reduce wholesale prices, and to a lesser extent retail prices, in its 2014, 2015 and 2016 financial years. Telkom reduced prices on its products in each year stipulated. In the 2016 financial year, for example, Openserve reduced its price for wholesale fibre-optic broadband access by up to 10% and

[54] MyBroadband, July 2017, *ADSL and fibre wholesale price cuts for South Africa,* https://mybroadband.co.za/news/adsl/220426-adsl-and-fibre-wholesale-price-cuts-for-south-africa.html
[55] MyBroadband, 19 July 2017, *ADSL and fibre wholesale price cuts for South Africa*, https://mybroadband.co.za/news/adsl/220426-adsl-and-fibre-wholesale-price-cuts-for-south-africa.html
[56] MyBroadband, July 2017, *Massive NeoBroadband uncapped fibre price cuts*, https://mybroadband.co.za/news/adsl/220426-adsl-and-fibre-wholesale-price-cuts-for-south-africa.html
[57] Econex, September 2017, *Competing for a byte of the fibre market?,* https://econex.co.za/competing-for-a-byte-of-the-fibre-market/
[58] [redacted]

reduced rates for Metro Ethernet by 35% to 40%.[59] Openserve reduced wholesale prices further in 2017.

4.5 WHOLESALE INTERNET ACCESS

128 ISPs typically agree to peer at common points called internet exchange points. There are a number of bespoke hosting centres around the country which have been become the most convenient place of choice for these purposes.

4.6 SPECTRUM

129 As discussed above in Section 3, spectrum is essential for the delivery of wireless communications services, including all mobile services. The assignment of spectrum is a key factor that affects a mobile operator's costs, coverage, quality and, ultimately, competitiveness. The assignment of spectrum among the major operators in South Africa is summarised in Table 7.

Table 7: Spectrum assignment

Band	Vodacom	MTN	Cell C	Telkom	Liquid Telecom	WBS
850 MHz	-	-	-	-	2 x 4.92 MHz	-
900 MHz	2 x 11 MHz	2 x 11 MHz	2 x 11MHz	-	-	-
1800 MHz	2 x 12 MHz	2 x 12 MHz	2 x 12 MHz	2 x 12 MHz	2 x 12 MHz	2 x 12 MHz 1 x 10 MHz
2100 MHz	2 x 15 MHz 1 x 5 MHz	2 x 15 MHz 1 x 10 MHz	2 x 15 MHz	2 x 15 MHz 1 x 20 MHz	-	-
2300 MHz	-	-	-	1 x 60 MHz	-	-
3500 MHz	-	-	-	2 x 14MHz	2 x 28 MHz	-

Source: Econex[60]

Notes: Excludes spectrum above 3500 MHz which is used for point-to-point backhaul links

130 The distribution of the IMT bands with frequencies below 1GHz is a significant feature of the industry in South Africa. Spectrum in frequency bands below 1GHz propagates further than higher frequency spectrum. Fewer sites are therefore required to cover a given geographical area when using sub-1GHz frequency than when using spectrum in higher frequency bands. Lack of sub-1GHz frequency spectrum is particularly challenging for an operator wishing to provide network coverage in rural areas. Sub-1GHz frequency spectrum is also better at penetrating through walls. It is therefore

[59] BusinessTech, April 2015, *Telkom axes wholesale prices*, https://businesstech.co.za/news/broadband/85840/telkom-axes-wholesale-prices/

[60] Econex, August 2016, *ICASA Invitation to Apply for spectrum – impact on competition in telecoms markets in South Africa - Report for Submission, p8*

easier to provide in-building network coverage using this than higher frequency spectrum.

131 There is currently no sub-1GHz frequency spectrum assigned to Telkom. The financial implications of this are likely to be significant. It is estimated that [redacted] would be required to provide coverage to a 2,000 km^2 urban area with 900 MHz spectrum, while [redacted] would be required to provide coverage using 1800 MHz spectrum.[61] The [redacted] required to provide coverage using the higher frequency spectrum would increase the costs of network rollout. Telkom's estimated capex required to establish a mobile site is [redacted] with an additional annual opex cost of [redacted]. It would therefore require [redacted] in capex to provide coverage in the 2,000 km^2 urban area using 1800 MHz spectrum rather than sub-1GHz frequency spectrum. Similar estimates have been made for the UK market by Ofcom, the UK telecoms regulator.[62]

132 The assignment of spectrum also has implications for the amount of time that it takes to build a network. Networks using higher frequency spectrum require more sites to cover a given area which lengthens the time required to complete network rollout.

133 In February 2017, ICASA announced that the proposed assignment of spectrum in bands 700MHz, 800MHz, and 2600MHz would be deferred until further notice. 700MHz and 800MHz bands will become fully available only after TV broadcasting has been migrated out of them. The deadline for this migration is currently set for December 2018 but it has already faced a number of delays and is unlikely to be completed by this date.[63]

4.7 MOBILE SITES AND SITE INFRASTRUCTURE

134 There are extensive site-sharing agreements amongst mobile operators and between mobile operators and other site owners. Telkom Mobile shares sites with all the mobile operators.

135 Concluding agreements for these site-sharing arrangements can be a challenge for small operators. The larger mobile operators can deny requests for tower sharing on a number of grounds including lack of spare space. Where site-sharing has been

[61] Econex, August 2016, *ICASA Invitation to Apply for spectrum – impact on competition in telecoms markets in South Africa - Report for Submission,* p15-16

[62] Ofcom, 2012, *Second consultation on assessment of future mobile competition and proposals for the award of 800 MHz and 2.6 GHz spectrum and related issues*, Annex 6: Revised Competition Assessment, https://www.ofcom.org.uk/__data/assets/pdf_file/0021/58314/2nd_condoc_annex_6.pdf, para. 3.27

[63] Tech Central, August 2017*, Minister reaffirms new digital TV deadline,* https://techcentral.co.za/minister-sets-new-digital-tv-deadline/76187/

agreed, it has sometimes been made available only in inferior site locations or at unfavourable heights on towers (i.e., at points lower than other antennas).

136 As volumes of traffic continue to increase in the future, site occupancy rates will increase, and it is expected that it will become more difficult for access seekers to reach site-sharing agreements on commercially viable terms.

137 Currently, the regulation of infrastructure sharing is through the Facilities Leasing Regulations of 2010, and is limited. There is a general obligation on all Electronic Communications Network Service ("ECNS") licensees to lease facilities. However, there is no regulation of the price. This can leave access seekers at a disadvantage if the wholesale market is not working effectively.

4.8 DUCTS, POLES AND DARK FIBRE

138 Openserve and other operators own ducts and poles throughout South Africa. Electronic communication networks can also be rolled out using alternative network infrastructure such as street lighting poles, sewers, storm water drains and overhead lines along railways.

139 In 2015, for example, Vodacom entered into a 15-year deal with the Passenger Rail Agency of South Africa to lease and then resell its dark fibre network which extends for over 900km. Link Africa is the local patent holder for technology that enables it to deploy fibre-optic networks using existing underground sewer and storm water infrastructure.

140 Fibre-optic infrastructure has also been deployed using the transmission network owned by ESKOM, the national power utility. ESKOM's fibre-optic network is operated by Broadband InfraCo, a state-owned enterprise. In 2016, Broadband InfraCo's network had approximately 14,661km of fibre and 156 Points of Presence across all nine provinces.[64]

[64] Broadband InfraCo, October 2016, *2015/2016 APP Presentation to Portfolio Committee,* http://pmg-assets.s3-website-eu-west-1.amazonaws.com/161013broadband.pdf

5 Competition in the provision of data services

5.1 COMPETITION IN CONSUMER DATA SERVICES - MOBILE

141 There is some evidence that competition in the provision of mobile broadband services is not fully effective. In particular, it has proved difficult for new mobile operators to enter the market and successfully challenge MTN and Vodacom.

142 For example, Cell C has been active for over 15 years, but still has only a [redacted] share of mobile subscribers – significantly less than either MTN or Vodacom. Telkom Mobile has been active for over 6 years, but still has only [redacted][65] of the country's overall mobile subscribers and only 5%[66] of the mobile broadband subscriber base (Figure 9). MVNOs have a very small share of the total number of subscribers.

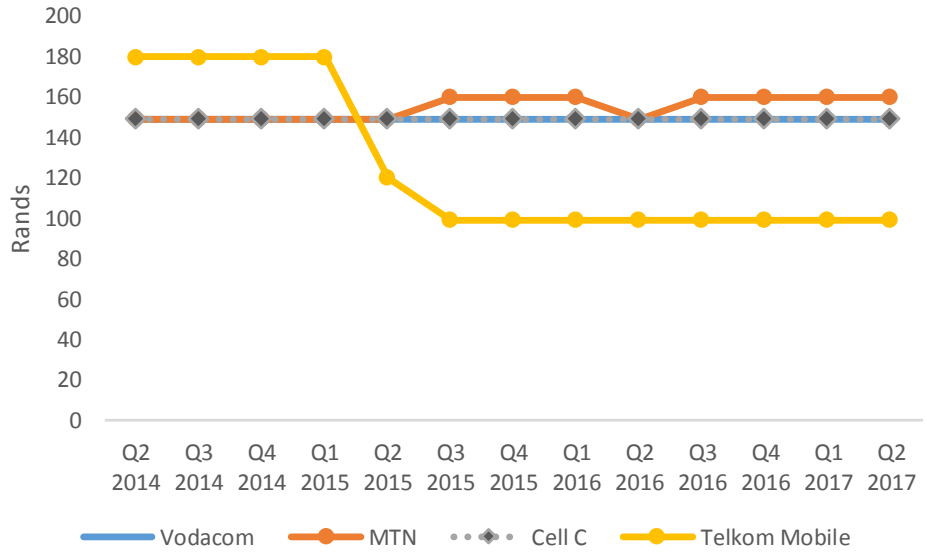
143 Although some mobile operators have set prices below those of the established mobile players, these larger operators have not reduced their prices in response. In Q1 2015, for example, Telkom Mobile reduced its prices, dropping the price of 1GB of

[65] [redacted]

[66] Telkom reported having 2.6m mobile broadband subscribers in March 2017. Telkom, 2017, Annual Results 2017, http://www.telkom.co.za/ir/apps_static/ir/pdf/financial/pdf/Telkom_Annual_Results_Booklet_WP_2017_Final.pdf. ICASA reported that there were 50.3m mobile data subscriptions as of December 2016. ICASA, Second report on the state of ICT sector in SA, https://www.ellipsis.co.za/wp-content/uploads/2017/05/ICASA-Report-on-State-of-SA-ICT-Sector-2017.pdf, page 18. 2.6m/50.3m = 5%

pre-paid mobile data by over a third. The competitors did not respond to this price reduction and maintained pre-paid data prices at broadly the same level (Figure 10).

Figure 10: Prices of 1GB pre-paid data, 2014–2017 (R)



Source: ResearchICT Africa.net's RAMP Index Q2 2017[67]

Barriers to entry and expansion

144 New mobile entrants face significant barriers to entry and expansion which constrain their ability to compete with the incumbent operators.

145 The high fixed cost of building and operating a network means that new entrants which have not yet achieved sufficient scale have a higher average cost of service than large established operators. This can be mitigated to an extent by domestic roaming arrangements which allow entrants to offer their services on a national basis before they have built sites throughout the country. However, the terms of these roaming agreements can be unfavourable to entrants or smaller operators with limited bargaining power and could mean that their incremental costs are higher than those of the large mobile network operators, putting them at a commercial disadvantage.

146 Unlike new entrants, large operators with well-established positions may benefit from reliable profit streams from their existing customer base. This makes it easier for them

[67] ReseachICTafrica.net, 2017, *Policy Brief No.3*, http://www.researchictafrica.net/polbrf/Research_ICT_Africa_Policy_Briefs/2017_Policy%20Brief%203_South%20Africa.pdf, p6

to engage in customer retention activities such as device[68] subsidies and financing assistance. This makes it harder for entrants to build market share.

147 Many subscribers purchase both mobile voice and data services. Factors that create barriers to entry in mobile voice can therefore have implications for competition in mobile broadband. Termination charges are an example of this.

148 Termination charges are the payments that one operator makes to another when a call crosses between networks. New entrants typically exhibit unbalanced voice traffic with their subscribers making more calls to subscribers on other networks than to subscribers on the same network. There is therefore typically a net payment from the new entrants to the incumbent mobile operators. This payment increases when an entrant reduces its retail prices in an attempt to attract subscribers because it results in an increase in the outflow of voice traffic. The situation is further exacerbated by high termination rates.[69]

149 Mobile termination rates in South Africa have historically been high. This has made it hard for new mobile operators to compete in voice and this has, in turn, had a negative indirect impact on their competitiveness in mobile broadband.

150 Some groups of subscribers also exhibit "stickiness" which makes it difficult for an entrant to attract them to their network. This can be caused by brand loyalty or simple customer inertia. It can also be the result of customer contracts that have the effect of "locking in" customers for an extended period through, for example, exit fees or other deterrents to switching networks. Vodacom's post-paid retail offers typically have a standard minimum duration of 24 months with a financial penalty for early termination.[70] This is one of the factors that contributes to Vodacom's low rate of consumer contract churn which was 4.2% in 2017.[71]

151 Number portability is another factor that affects competition in the mobile market. It is designed to facilitate customer switching and therefore promote competition. However, if implemented incorrectly, it may fail to fully address the barrier to expansion that is created by subscribers' unwillingness to change their number when they switch networks.

152 New entrants are also likely to face a shortage of suitable sites on which to install network equipment. Alternatively, where sites are available, they may be prohibitively expensive or they may have technical characteristics (e.g., the position on the tower

[68] This includes handsets, routers and dongles.
[69] The price per minute charged by the receiving operator for terminating voice calls.
[70] Vodacom, 2017, *Voice and Data deals*, http://www.vodacom.co.za/vodacom/shopping/plans/plans
[71] Vodacom, 2017, *Annual Report 2017*, http://www.vodacom.com/pdf/annual-results/2017/announcement-15052017.pdf

for antennae equipment) which put the entrant at a disadvantage to the incumbent operators.

153 There are several different reasons for the constrained supply of suitable sites on which entrants can locate their network equipment:

- The process of obtaining permits to construct sites can take time and raise the cost of network rollout. In some cases, it is not possible to obtain such permits for prime locations forcing entrants to use less advantageous sites which puts them at a disadvantage to incumbents.
- Existing operators may limit the number of sites which they are willing to make available to competitors or only offer positions on towers which are less technically suitable (i.e., at lower heights on the towers). Alternatively, they might make their tower infrastructure available to entrants, but charge a high price thereby reducing the commercial viability of using it.

154 The assignment of spectrum in South Africa is also a factor that contributes to the difficulties that new entrants have in effectively competing with the large incumbent mobile operators. This is discussed in more detail in Section 4.6.

155 Indirect retail channels are an essential part of the sales and marketing function of a retail service provider. Access to a network of retailers which are incentivised to sell services on behalf of a service provider is therefore a key part of an entry and market growth strategy. If such access is not available to an entrant because, for example, the owners of primary retail channels have signed exclusive contracts with other service providers, this will be a significant barrier to expansion.

Barriers to entry and expansion that no longer exist

156 There are some aspects of the industry which affect its overall competitiveness that have changed significantly in recent years. The supply of wholesale fixed network services is one example. The growth of fibre-optic networks, particularly in metro areas, has created additional competition in the supply of these services which are a key input in the provision of mobile broadband services. Vertically integrated operators such as Liquid Telecom are important players in this segment. Other players such as Dark Fibre Africa provide upstream inputs which are then used by companies wanting to supply leased line services to mobile network operators.

157 There is also extensive self-supply of fixed network services by mobile operators. Network infrastructure players such as Dark Fibre Africa have leased dark fibre to mobile operators which have used this to build their own backhaul and core services. Vodacom, for example, has reported that backhaul from 92% of its mobile sites is self-provided.[72]

158 Similarly, there has been a significant increase in the number of submarine cables connecting South Africa to the world and the number of wholesale providers of capacity on them has expanded the supply of international connectivity.

[72] Vodacom, 2017 Annual Report, p.34

5.2 COMPETITION IN CONSUMER DATA SERVICES - FIXED

159 The competitive landscape in respect of the provision of fixed consumer data services has changed dramatically in recent years. New players have entered introducing additional competition at both retail and wholesale levels. Ongoing technological convergence has also meant that previously separate market segments have begun to merge, further enhancing competition.

160 Consumers now enjoy a wide choice of fixed-line ISPs. There are vertically integrated ISPs such as Telkom, Liquid Telecom, Vodacom and MTN which own and operate their own networks (fibre-optic and wireless) and use them to provide data services to end-users.

161 In addition, there are several fixed network operators which sell access at a wholesale level to ISPs which then provide data services to consumers. For example, [redacted] ISPs have signed agreements to use Openserve's fibre-optic broadband service (known as "OFB"), [redacted] which are currently active. Similarly, [redacted] ISP have signed resell DSL agreements with Openserve.[73] As a further example, the Vumatel website lists 32 ISPs which sell services over its fibre-optic network.[74]

162 This growth of wholesale fixed network services and the knock-on effect on the retail sector has been driven by three key factors:

- The settlement agreement entered into between the Competition Commission and Telkom contributed to a reduction in the prices of some of Telkom's key wholesale products used by service providers both in respect of Consumer Data Services and Business Data Services. Telkom committed to price reductions [redacted] of which was allocated to wholesale customers. In practice, Telkom exceeded these commitments and provided price reductions worth approximately [redacted], of which approximately [redacted] was in wholesale products.[75] The settlement agreement also ensured that Telkom did not discriminate in the way in which it treated external wholesale customers compared with its own downstream business. These conditions where extended as a result of the conditions imposed on Telkom during the BCX acquisition.
- The functional separation undertaken by Telkom in 2015 and the creation of a separate Openserve business unit further enhanced the ability of downstream service providers to compete against Telkom.
- In addition, the rapid growth of competing fibre-optic networks over the past 5 years has given downstream retail service providers a wider choice of supply. This competitive pressure has been further enhanced by the entry of wireless operators such as WBS. WBS's services provide comparable data connectivity to that provided over ADSL or fibre and operates on a wholesale-only basis.

[73] Telkom internal data
[74] Vumatel, 2017, *Package Browser*, https://shop.vumatel.co.za/packages/all
[75] Telkom, 2016, *Submission on price reductions submitted to the Competition Commission as part of their regulatory impact assessment study*

163 The extensive growth in fibre-optic networks since 2012 is illustrated in Figure 11.

164 Figure 12 below illustrates the growth of fibre-optic access networks for the period April 2014 to September 2017. While Openserve's fibre-optic network currently has the highest number of homes passed, Vumatel's network is growing rapidly.

165 It is also worth noting that a higher share of homes passed by Vumatel's network are connected than is the case for Openserve's network. This means that, although Vumatel's network [redacted] of the total number of homes passed by fibre-optic networks, it [redacted] of the homes connected. Openserve, on the other hand, has [redacted] the total number of homes [redacted] of the total number of homes connected (Figure 13).

166 The impact of competition between fixed networks is evident in the migration of customers from copper – which is primarily owned by Telkom – to other technologies, which are owned by a range of operators, over the last three years (Figure 14).

76 [redacted]

167 A further competitive constraint is placed on fixed broadband by mobile broadband. This is for several reasons:

- As shown in Figure 6, the technical performance of broadband services provided to consumers over fixed and mobile networks in South Africa is very similar. This is unlike many other countries where fixed networks have consistently offered faster data speeds than the mobile networks.
- The upgrades of the copper networks to provide faster broadband began relatively late in the evolution of the industry in South Africa. As a result, many consumers have dropped their fixed line subscription and rely exclusively on mobile networks for their data services. There has therefore been a significant shift from fixed to mobile as the primary form of data connectivity in South Africa in a way that has not been seen in many other countries.

168 As a result of this competition between fixed and mobile, fixed broadband services providers are tightly constrained by the mobile broadband propositions available. There is direct evidence of this in the way that Telkom is able to market its 4G LTE and LTE-A over 2300 MHz mobile product as a substitute for fixed broadband. The WBS network proposition is also a mobile technology which is targeting fixed consumer broadband subscribers.

5.3 COMPETITION IN BUSINESS DATA SERVICES

169 Competition in the supply of Business Data Services has also changed significantly in the last 5 years. This has been driven by a combination of disruptive new entry, technological convergence and increasing customer demand for unified communications solutions. The entry of new service providers has been facilitated by

the deployment of extensive national and metropolitan fibre-optic networks by competing operators able to supply downstream wholesale customers which compete in provision of Business Data Services. Operators such as Vodacom, MTN, Liquid Telecom and Dark Fibre Africa, for example, own or lease extensive national and metropolitan fibre-optic networks which enable them to provide the wholesale network services that were once provided exclusively by Telkom.

170 A major development in the Business Data Services segment was the acquisition in February 2017 of Neotel by Liquid Telecom. The acquisition has potentially given the business access to more funding and improved its prospects.

171 Another trend worth noting is the emergence of consortia of smaller players that, by combining their resources, are able to offer complete ICT solutions and compete with larger operators.

172 Finally, technological developments mean that the distinction between broadband and enterprise level data services is disappearing. For example, new SD-WAN technology means that VPN services can now be provided at lower cost over broadband access lines. Previously VPN services were provided via relatively expensive high-cost dedicated lines.

173 There are many shared upstream inputs in the provision of Consumer Data Services and Business Data Services. In addition to the factors that have affected prices in the provision of Consumer Data Services there are other factors that have placed additional downward pressure on the prices of Business Data Services.

- For example, the geographical concentration of business customers in metro areas in South Africa means that many of them are within access of the fibre-optic networks, even though the coverage of those networks is still relatively limited on a national basis.
- [redacted].

5.4 IMPACT OF REGULATION ON COMPETITION

174 The regulation of the sector has had significant implications for the overall development of competition.

Licensing

175 One key component of this is the overall licensing regime which governs some of the basic rights and obligations that apply to operators in the sector. All licences are issued by ICASA – the industry regulator. At the wholesale level, there are firms which build networks and provide connectivity over such networks to other licensees. At the retail level, there are firms which provide services to end-users on a retail basis.

176 Typically, companies wanting to build networks require an ECNS licence to construct, maintain and operate electronic communications networks and to provide electronic

77 [redacted]

communications network services over these networks. Electronic communications network services are provided at the wholesale level (e.g. licensee to licensee). This includes the provision of fibre-optic access services on a wholesale basis.

177 In order to operate at the retail level and provide electronic communications services to end-users on a retail basis, an Electronic Communications Service ("ECS") licence is required. Retail services include the provision of broadband access and / or internet services to end-users.

Spectrum

178 The assignment of spectrum to licensees and the monitoring of the way in which it is used is a major regulatory function and has a significant impact on the way in which competition has evolved over time.

179 Shortages of spectrum raises costs to mobile network operators of providing network coverage and results in lower speeds and lower quality of service. This is discussed in more detail in the sections above.

Mobile number portability and call termination

180 Number portability and call termination are regulations that are not specific to mobile broadband services, but affect competition in the overall mobile retail sector. They therefore have implications for competition in respect of data services. They are discussed in more detail in the sections above.

6 Conclusions

181 The electronic communications sector is complex, with many different players offering a wide range of services. It is also changing rapidly as technology evolves and new players enter the market.

182 Data services are a key component of the industry and are becoming more important as the number of data subscribers increases. The rapidly growing demand for data will require sustained investment into network infrastructure in order to continually increase the coverage of networks and improve the quality of service.

183 In common with many countries around the world, South Africa's electronic communications industry has a complex structure. There is a broad range of business models and extensive wholesale relationships between participants at all levels.

184 The structure of the South African industry has been significantly impacted by the recent entry of new participants. This has taken place upstream through, for example, the construction of new fibre-optic networks and the establishment by WBS of a wholesale 4G (LTE) network. It has also occurred downstream with the entry of new data service providers, including those which purchase most of their network services from other network operators.

185 This investment and market entry has had, and will continue to have, a significant impact on the services that customers receive. In addition to improvements in coverage and quality, the prices of many data services have fallen significantly in recent years.

186 Prices for fixed broadband, for example, have fallen considerably over the past 3 years. Prices for mobile broadband products, on the other hand, have stayed relatively stable over the past 3 years although there are exceptions to this. Telkom Mobile, for example, has dropped its mobile data prices significantly.

187 This is potentially an indication that competition in mobile is not fully effective. The sustained market position of Vodacom and MTN and the difficulty that Cell C and Telkom Mobile have had in building market share could be an indication that there are significant barriers to expansion in respect of mobile. These range from the distribution of spectrum to constraints on customer switching.

188 The regulation of mobile call termination rates – which, in the past, have been high in South Africa – has made it difficult for new mobile entrants to grow market share.