

2018 ELECTRONIC COMMUNICATIONS AMENDMENT BILL

Economic impact assessment

November 2018



CONTENTS

Executive Summary	4
1 Introduction	10
2 Key issues with the 2018 Bill	11
2.1 The 2018 Bill contains intrusive regulatory interventions that could significantly dampen investment incentives	12
2.2 Conclusion on the key issues with the 2018 Bill	29
3 Economic impact of the 2018 Bill	31
3.1 Our previous estimate of the economic impact under the 2017 Bill proposals	31
3.2 Expected market evolution under the 2018 Bill	32
3.3 Economic impact of the 2018 Bill proposals as a package	36
3.4 Conclusion on the economic impact of the 2018 Bill proposals	48
4 The ability of the 2018 Bill to achieve its main objectives	49
Annex A Last mover advantage under open access requirements	51

EXECUTIVE SUMMARY

In August 2018, the Department of Telecommunications and Postal Services of the Government of South Africa published a Draft Bill (“2018 Bill” or “Bill”) to amend the Electronic Communications Act 36 of the 2005 (“ECA”). The 2018 Bill contains a number of modifications to the original ECA as well as to the draft Amendment Bill published in November 2017 (“2017 Bill”).

In January 2018, Frontier Economics produced two reports for Vodacom, submitted to the Government, which assessed the economic impact of the 2017 Bill proposals.¹ Frontier has now been asked by Vodacom to review the 2018 Bill proposals and provide an update of our economic impact assessment in light of the main proposed changes to the current ECA.

In doing this, we have considered the key issues with the 2018 Bill and the likely impact of the Bill proposals as a package on the mobile market and the wider economy in South Africa. Below we summarise our key findings.

The 2018 Bill proposes radical changes to the functioning of the mobile market in South Africa

The Bill includes a series of proposals which increase uncertainty and are likely to undermine trust in the regulatory framework, as compared to the current ECA.

In relation to **spectrum assignment**, the Bill proposes measures which will prevent efficient deployment and use of high demand spectrum:

- High demand spectrum is to be assigned on a non-exclusive and open access basis. This is an unprecedented measure which will dampen operators’ investment incentives by significantly limiting their ability to differentiate from each other, manage interference, ensure quality of service and provide a reliable customer experience.
- High demand spectrum licensees will be prevented from deploying and upgrading their networks using newly assigned spectrum in urban and sub-urban areas until they have met coverage obligations in rural and underserved areas.

The Bill also includes **significant market interventions**, which are not evidence-based and most likely disproportionate, as they are not the outcome of a proper market review. In particular, the Bill requires that:

- All operators provide access to their networks and facilities regardless of whether it is economically viable or efficient to do so; and
- All operators that are “deemed entities” (which, as defined under the Bill, includes all mobile operators with spectrum licences) provide cost-oriented wholesale access to their networks and facilities.

In addition to the above, the Bill envisages the establishment of a Wholesale Open Access Network (**WOAN**). The WOAN, as envisaged by the Bill, could enjoy

¹ Frontier Economics: Assessing The Draft Electronic Communications Amendment Bill, Part I (Impact Assessment) and Part II (Assessment of the Economic Basis for the Bill’s Amendments), January 2018

significant benefits vis-à-vis other MNOs. This would lead to a significant risk that network competition will be distorted at the expense of SA consumers.

Further, Vodacom's detailed legal review of the Bill² has identified a number of areas in which it erodes the independence of the Authority, in favour of the Minister.³ In particular, it makes the Minister responsible for deciding how much spectrum is to be allocated to the WOAN, requires ICASA to comply with rather than just consider the ministerial policy directions and provides the Minister with "catch-all" powers in relation to spectrum.⁴

This undermines regulatory independence and contributes to uncertainty and unpredictability around policy interventions in the market. Vodacom's submission also highlights a number of other ways in which the Bill creates uncertainty.

To our knowledge, this set of policy interventions, as a group, do not have a precedent in any competitive market in SA, or any mobile market anywhere in the world.

The Bill is likely to have a significant negative impact on mobile investment

MNOs make substantial investment in network infrastructure which they deploy, together with spectrum, to offer mobile services: over the past three years alone, over ZAR42bn⁵ has been invested in the South African Mobile sector. Further, Vodacom recently announced that it plans to invest ZAR50bn over the next five years (assuming the existing legislative and regulatory framework remains in place).⁶

MNOs typically invest with a horizon of 15+ years, and critically depend on having exclusive rights to spectrum to offer services to end users and the ability to recover their network investments. If the 2018 Bill proposals are fully implemented, we would expect this to lead to less investment and slower deployment of new mobile technologies, to the detriment of SA consumers.

- **Any assignment of spectrum on a non-exclusive basis** would make it very difficult for network operators to manage their networks (for example to address interference), and would most likely lead to a reduction in quality of service. It would also make it harder for operators to compete through product differentiation. This is an unprecedented measure, which would undermine the incentives of MNOs to undertake investments in LTE and other next generation

² Vodacom's submission providing written comments on the Electronic Communications Amendment Bill as tabled in Parliament on 20 September 2018 (Vodacom's submission hereinafter)

³ In particular, section 4 of Vodacom's submission describes the wide-ranging set of powers that chapter 5 introduces for the Minister whilst section 7.2 describes changes in a number of other areas that undermine the Authority's independence the Vodacom submission

⁴ 31E gives the minister the power to decide what constitutes high demand spectrum, setting the terms and conditions for renewal of spectrum licences and which unassigned high demand spectrum must be reserved for assignment to the WOAN;

30(2)(a) that requires the Authority to "comply with ... ministerial policies and policy directions as contemplated in section 3", whereas previously the Authority needed to consider such policies and policy directions; and

29A(h) gives the Minister "catch-all" powers in relation to spectrum by making it responsible for "any other matter relevant to radio frequency spectrum that is *necessary or expedient for the proper implementation or administration of this Act or related legislation*".

⁵ ICASA (2018), 3rd report on the state of the ICT sector in South Africa, page 19, Graph 14

⁶ <https://uk.reuters.com/article/safrica-economy-vodacom-grp/telecoms-firm-vodacom-says-to-invest-3-billion-in-south-africa-idUKS8N1LM02M>

technologies, as they would expect returns to be lower and more uncertain. This would lead to an outcome in which none of the operators is willing to make a significant investment into spectrum and related network equipment, instead preferring to wait for others to make the investment which will then be shared on non-exclusive and open access terms. This “last mover advantage” leads to inferior outcomes in terms of overall investment.

- **Requiring all MNOs to provide access to their networks at cost-oriented rates** would further undermine their ability to differentiate their services through investment at the network level. Again, this would dampen their incentives to invest in the first place, further contributing to the “last mover advantage” effect described above. This directly affects LTE network investment which is key for the achievement of SA’s universal broadband objectives. In addition, as such a measure is unprecedented, it will pose serious regulatory and implementation challenges which will add to the uncertainty - we are not aware of any regulator in the world mandating cost oriented access to *all* the facilities and network services of *all* mobile network operators present in a market.
- **The requirement for HDS licensees to cover rural areas first**, before deploying new spectrum elsewhere, would deprive users in urban and suburban areas of better/faster mobile data services in the short to medium term. In particular, it would delay the deployment of 2.6 GHz spectrum, which is available immediately and would help to address capacity constraints in urban and sub-urban areas.

The WOAN will not be able to fully mitigate the impact of a lack of investment from MNOs by investing itself and deploying new technologies. When considering the limited available international experience (Mexico, Rwanda in mobile and Australia in fixed sector) it is likely that it will take a significant period of time for the WOAN to become fully functional. As a result, investment in new mobile technologies will be reduced throughout this transitional period. Even when the WOAN becomes fully functional, overall investment can be expected to be lower than without the Bill, as the Bill’s intrusive regulatory measures will continue to dampen investment incentives in the mobile industry.

Furthermore, if the WOAN gets a disproportionate amount of spectrum (as recommended by the CSIR study⁷), and other preferential treatment, this will also increase the risk of competitive distortion and dampening of the investment incentives of the other mobile operators.

Overall, the Bill is therefore likely to lead to poorer consumer outcomes in terms of prices, quality and coverage of mobile services. We set this out in more detail below.

The lower investment under the Bill will lead to slower migration to new mobile technologies

If implemented, the 2018 Bill will lead to slower migration to more advanced technologies. As the transition to next generation technologies is the key driver of price reductions and improvements in the quality of service, a slower transition will

⁷ CSIR (2018), Spectrum requirements for Wholesale Open Access Network (WOAN) https://www.gov.za/sites/default/files/41935_gon1003.pdf

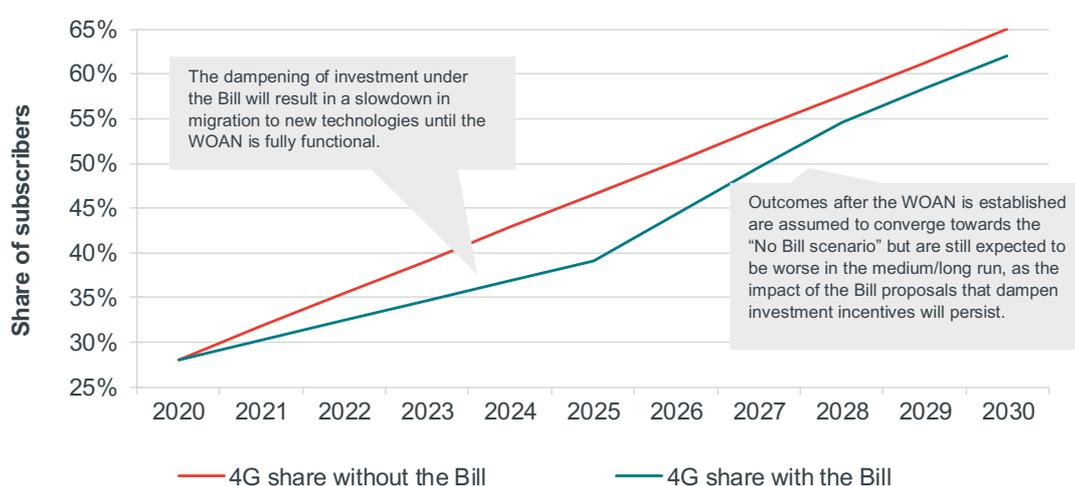
lead to consumers facing higher prices, slower speeds and lower usage than if the Bill was not introduced. This will not only lead to direct consumer losses in the mobile sector, but also in the wider economy, as slower growth in the mobile industry will have indirect effects on GDP, employment and tax income in South Africa.

We have quantified the impact of the 2018 Bill on unit costs, data prices and data usage in South Africa. Our analysis assumes that, without the Bill, the currently unassigned HD spectrum will be assigned promptly, allowing MNOs to continue to invest in rolling-out and promoting 4G broadband services⁸. Under the Bill, we project there would be a significant slowdown in the deployment of and migration to new mobile technologies.

Once the WOAN becomes fully functional, we assume that it should be able to partly address the investment deficit observed throughout the transitional period. However in the long-run, the overall level of investment in new mobile technologies is still likely to be below the levels achievable without the Bill. This is because the intrusive measures imposed on MNOs (e.g. largely unqualified cost-oriented wholesale open access requirements, non-exclusive use of and open access to spectrum and overall regulatory uncertainty) will continue to be in place and therefore continue to dampen investment by MNOs. The potential distortion of network competition due to the preferential treatment of the WOAN is also likely to further negatively impact investment.

We estimate that the number of LTE subscribers will be up to 17% lower under the Bill, leading to a lower 4G share throughout the period considered in our analysis, see Figure 1 below.

Figure 1 Lower 4G share of subscribers as a result of the 2018 Bill



Source: Frontier Economics

⁸ We have assumed that the market without Bill will develop broadly in line with the Policy Direction proposals, subject to some fine tuning. In particular, in line Vodacom's submission on the Policy Direction, we assume that the MNOs will get access to a sufficient amount of HDS, and that the WOAN will not be awarded undue, unfair or unreasonable incentives, such as excessive amounts of HDS, that will distort the market. Similarly, we assume that specific proposals in the draft Policy Direction will be adjusted and/or removed to avoid significantly hampering the investment incentives of existing MNOs.

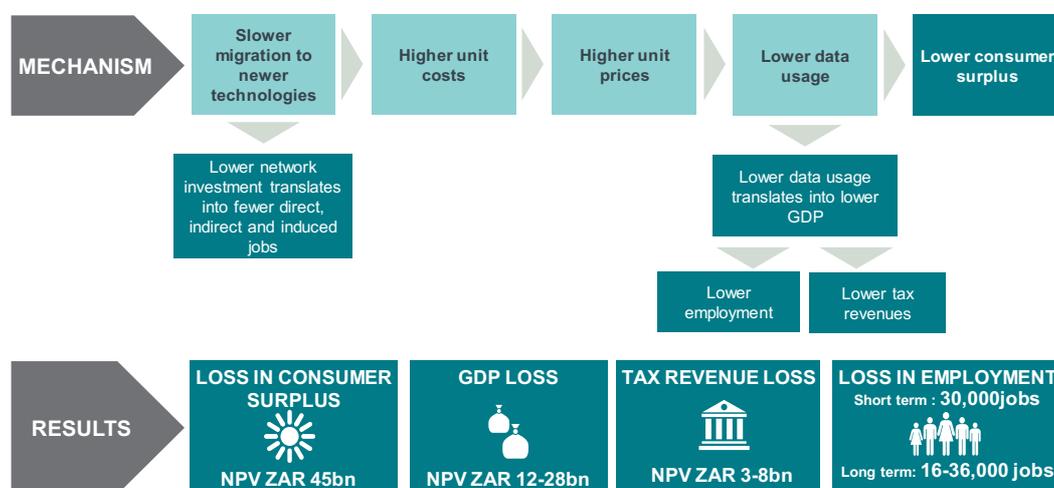
South African mobile consumers and the wider economy will be materially affected

The transition to successive and more efficient network technologies is a key driver of cost and price reductions in the mobile sector. For instance, moving from 2G to 3G leads to a more than 90% decrease in the unit cost of delivering mobile data services.⁹ Similarly, moving from 3G to 4G technology results in an approximately 80% reduction in unit costs.¹⁰ Therefore, we estimate that the slower migration to new mobile technologies (including 4G and 5G) would result in mobile data prices being up to 16% higher over the period 2025 to 2030, compared with where they would be in the absence of the Bill's proposals.

As a result of the higher prices, data usage will be lower, leading to an overall loss in consumer benefits (surplus) in the mobile sector of around **ZAR 45bn**. In addition, technical modelling¹¹ commissioned by Vodacom indicates that average data speeds would be up to 37% higher without the Bill.

In view of the pivotal contribution that broadband penetration and speeds make to wider economic growth, a slower migration to higher speed broadband technology will also have a detrimental wider economic impact. Figure 2 below summarises the estimated negative economic impact of the Bill proposals on the mobile sector and the wider economy¹².

Figure 2 Expected impact of the 2018 Bill on the mobile sector and wider economy



Based on approaches applied in earlier studies, including in SA Connect¹³, which link data usage and take-up of new technologies with GDP growth, we estimate

⁹ <https://www.gsma.com/spectrum/wp-content/uploads/2012/03/22092009182239.pdf>

¹⁰ Frontier estimates based on Ofcom's MTR model

¹¹ Northstream (2018), Bill Impact: Modelling the Impacts on Speed and Coverage

¹² For the mobile sector impact, we explicitly model the impact on the mobile market in the period up to 2030 and then assume a steady state between 2031 and 2040. All estimates are presented in Net Present Value terms. For the wider economy effects, we focus on the period up to 2025 when considering GDP, tax and short-term employment losses.

¹³ We combine the Katz et.al. (2012) study on the link between digitisation and GDP, and the Bohlin (2012) study on the link between speeds and GDP to estimate the wider impact of the Bill on GDP in South Africa, which is in line with the approach used in SA Connect.

that the Bill could result in a GDP loss of **ZAR 12-28bn**. This would directly translate into tax revenue losses of around **ZAR 3-8bn** (taking into account that historically tax revenues per year in SA were approximately 27% of annual GDP). The Bill could also negatively impact employment resulting in ca. **30,000 fewer jobs**.

1 INTRODUCTION

In August 2018, the Department of Telecommunications and Postal Services of the Government of South Africa published a Draft Bill (“2018 Bill” or “Bill”) to amend the Electronic Communications Act 36 of the 2005 (“ECA”). The 2018 Bill contains a number of modifications to the original ECA as well as to the draft Amendment Bill published in November 2017 (“2017 Bill”).

In January 2018, Frontier Economics produced two reports for Vodacom, submitted to the Government, which assessed the economic impact of the 2017 Bill proposals.¹⁴ Frontier has now been asked by Vodacom to review the 2018 Bill proposals and provide an update of our economic impact assessment in light of the main proposed changes to the current ECA.

In doing this, we have considered the key issues with the 2018 Bill and the likely impact of the Bill proposals as a package on the mobile market and the wider economy in South Africa.

This report is structured as follows:

- Section 2 sets out key issues identified in relation to the 2018 Bill proposals;
- Section 3 presents the economic impact assessment of the 2018 Bill;
- Section 4 considers the ability of the 2018 Bill to achieve its stated objectives; and
- Section 5 concludes.

¹⁴ Frontier Economics: Assessing The Draft Electronic Communications Amendment Bill, Part I (Impact Assessment) and Part II (Assessment of the Economic Basis for the Bill's Amendments), January 2018

2 KEY ISSUES WITH THE 2018 BILL

The Bill includes a series of proposals which increase uncertainty and are likely to undermine trust in the regulatory framework, as compared to the current ECA.

In relation to **spectrum assignment**, the Bill sets out that:

- High demand spectrum is to be assigned on a non-exclusive basis and subject to “open access” principles. This is an unprecedented measure which will dampen operators’ investment incentives by significantly limiting their ability to differentiate from each other, manage interference, ensure quality of service and provide a reliable customer experience.
- High demand spectrum licensees will be prevented from deploying newly assigned spectrum in urban areas before they have met coverage obligations in rural and underserved areas.

The Bill also includes **significant market interventions**, which are not evidence-based and most likely disproportionate, as they are not the outcome of a proper market review. In particular, the Bill requires that:

- All operators provide access to their networks and facilities regardless of whether it is economically viable or efficient to do so;
- All operators that are “deemed entities” (which, as defined under the Bill, includes all mobile operators with spectrum licenses) provide cost-oriented wholesale access to their networks and facilities;¹⁵ and
- All deemed entities (including all mobile operators) must undertake accounting separation.¹⁶

Further, Vodacom’s detailed legal review of the Bill has identified a number of areas in which it erodes the independence of the Authority, in favour of the Minister.¹⁷ In particular, it: makes the Minister responsible for deciding how much spectrum is to be allocated to the WOAN; requires ICASA to comply with rather than just consider the ministerial policy directions; and provides the Minister with “catch-all” powers in relation to spectrum.¹⁸

This undermines regulatory independence and contributes to uncertainty and unpredictability around policy interventions in the market, which will further chill investment. Indeed, as Martin Cave notes in his expert report:¹⁹

¹⁵ Bill, Section 43(1A)

¹⁶ Ibid

¹⁷ In particular, section 4 of the Vodacom submission describes the wide-ranging set of powers that chapter 5 introduces for the Minister whilst section 7.2 describes changes in a number of other areas that undermine the Authority’s independence

¹⁸ 31E gives the minister the power to decide what constitutes high demand spectrum, setting the terms and conditions for renewal of spectrum licences and which unassigned high demand spectrum must be reserved for assignment to the WOAN;

30(2)(a) that requires the Authority to “comply with ... ministerial policies and policy directions as contemplated in section 3”, whereas previously the Authority needed to consider such policies and policy directions; and

29A(h) gives the Minister “catch-all” powers in relation to spectrum by making it responsible for “any other matter relevant to radio frequency spectrum that is “*necessary or expedient for the proper implementation or administration of this Act or related legislation*”.

¹⁹ Appendix B to Vodacom’s submission, Section 2, page 5

“... the Bill removes discretionary authority from ICASA in a number of ways, either by prescribing what ICASA must do when previously it exercised discretion, or by transferring the exercise of discretion to the Minister. [...] This amounts to a substantial ‘hollowing out’ of ICASA’s functions. Accordingly, my conclusion from this section is that the Bill contains provisions for the redistribution of decision-making authority among the legislature, the Minister and regulator (ICASA), which depart from international practice which itself is designed to introduce certainty into the environment in which major investment decisions are made. The resulting greater uncertainty runs the risk of chilling firms’ incentives to invest.”

Vodacom’s submission also highlights a number of other ways in which the Bill creates uncertainty. In particular, the Bill: sets out that ICASA should make recommendations on the renewal of licenses and that this may be as late as 6 months before expiry; and allows ICASA to impose on licensees additional terms and conditions, regardless of whether they have significant market power.²⁰

2.1 The 2018 Bill contains intrusive regulatory interventions that could significantly dampen investment incentives

In this section we consider in detail four particularly intrusive regulatory interventions contained within the Bill, which are likely to have a significant distortive impact on market outcomes:

- Open access to spectrum and non-exclusive spectrum licenses;
- Wholesale open access to networks and facilities at regulated rates;
- Coverage obligations targeting rural and underserved areas first; and
- Unassailable advantages conferred on the WOAN.

For each of the above, we first summarise our understanding of the measures within the Bill and then set out how they go against fundamental economic principles and regulatory best practice.

²⁰ 31E(7) sets out that the Authority must make recommendations relating to the renewal of spectrum licences and the relevant terms and conditions (which previously applied for so long as the licensee had an individual licence) which may be as late as 6 months before expiry – as Vodacom notes in its submission, long term planning means that individual licensees need to understand the renewal terms well in advance of the expiry;

Under 69A, the Authority can make quality of service regulations every two years, including broadband download and upload speeds;

Under 31A, the Authority can set new obligations to provide universal access and universal service;

Under 20C(1)(b), the Authority can impose terms and conditions on licensees for the rapid deployment of networks and facilities; and

Under 8(3), the Authority may impose additional terms and conditions on any individual or class licensee, where previously this only applied to parties with significant market power.

2.1.1 Open access and non-exclusive assignment of high demand spectrum

Our understanding of the 2018 Bill proposals

Under the new section 31E(2) of the Bill:

“The assignment of high demand spectrum — (a) is subject to the principles of wholesale open access as contemplated in Chapter 8; and (b) must be done on a non-exclusive basis”

Consistency with economic principles and regulatory best practice

The requirement to assign HD spectrum on a non-exclusive basis implies that, under the Bill, licensees will no longer be guaranteed control of the spectrum they are assigned. This will significantly undermine their ability to manage interference, and hence their ability to ensure high quality of service and a reliable customer experience.

Similarly, the application of wholesale open access principles to spectrum implies that licensees will be obliged to make the spectrum they have been assigned available to access seekers. This further contributes to the risk of licensees losing control of their spectrum holdings. We also note that the Bill provides no clarity on how open access principles would apply to spectrum, which creates additional uncertainty around operators’ ability to make a return.

In the rest of this section, we explain how:

- Blanket measures requiring the non-exclusive use of spectrum will hamper MNOs’ ability to deliver high-quality services and undermine investment incentives;
- The prospect of MNOs losing control over spectrum would have an immediate negative effect on investment and is inconsistent with policies intended to facilitate sharing and trading, among other things; and
- International precedent indicates that non-exclusive use of spectrum should only apply in limited circumstances - in particular, where the risks of interference can be managed.

Non-exclusivity requirements will hamper MNOs’ ability to deliver high-quality services and undermine investment incentives

The imposition of blanket measures mandating the non-exclusive use and control of spectrum²¹ for new licences (either as a result of open access obligations or non-exclusive spectrum assignment) is unprecedented in high demand spectrum bands. It would undermine materially the incentives of MNOs to acquire spectrum licences and undertake investments in LTE and next generation technologies, for two main reasons:

- **It reduces the ability to differentiate:** one of the key drivers of investment is that it can enable operators to differentiate their services from their competitors. Control of spectrum is a vital factor in operators’ ability to differentiate – this is

²¹ We do not include in such policies any measures aimed at facilitating voluntary sharing of spectrum.

because access to spectrum, together with investment in new network infrastructure, allows operators to expand coverage, capacity (and hence speed) and deploy new technologies. Non-exclusive licensing would therefore reduce the extent to which operators are able to differentiate their services which would in turn significantly undermine the business case for investing in new network infrastructure.

This would lead to an outcome in which none of the operators is willing to make a significant investment into spectrum and related network equipment/technologies, preferring instead to wait for others to make the investment which will then be shared under non-exclusive and open access terms. This ‘last mover advantage’ leads to inferior outcomes in terms of overall investment, as we discuss in more detail in Section 2.1.2 below.

- **It makes it challenging for operators to manage harmful interference, and hence ensure high quality of service:** Mobile networks are designed to be run efficiently where one operator is using one frequency band within a particular geographic area and can therefore manage inter-site interference. Whilst regulatory bodies in several jurisdictions (including the UK) are currently exploring ways of allowing a degree of spectrum sharing, as Professor Martin Cave puts it there is a “*huge problem of technical and commercial co-ordination*”²² associated with introducing it on a large scale. Further, there are currently no global standards concerning this type of sharing and wide-scale non-exclusive spectrum usage. Requiring this type of spectrum-sharing before the significant co-ordination problems have been properly considered and addressed would create technical problems for all licensees, including the WOAN. This would in turn hamper operators’ ability to provide cost-efficient, high quality mobile services and a reliable customer service experience and their ability to comply with their spectrum-related obligations – in particular, in relation to quality of service and coverage.

Thus, by reducing the ability of operators to differentiate their services and manage interference (and hence service quality), a non-exclusive and open access spectrum regime would reduce the expected returns from investment and create significant uncertainty for operators. The overall impact is likely to be a marked decline in network investment and a reduction in the quality of service enjoyed by consumers (both due to lower investment levels and increased interference).

The technical issues associated with non-exclusive spectrum use and the likely reductions in the expected returns from investment will also reduce the value of spectrum itself. This can be seen by breaking down the value of spectrum into two components, in line with the approach used to inform auction reserve prices for 800MHz, 1800MHz and 2.6GHz spectrum in the UK.²³

- **Technical value:** this comprises the cost savings that can arise from access to spectrum for additional capacity and/or coverage purposes. The increased risk of harmful interference from non-exclusive spectrum use can be expected to reduce the technical value of spectrum - in particular due to the operational costs associated with the management of this interference.

²² Cave M. (2017), Why has spectrum sharing been so hard to accomplish?, page 1

²³ DotEcon and Aetha (2012), Spectrum value of 800MHz, 1800MHz and 2.6GHz – a Dotecon and Aetha report for Ofcom.

- **Commercial value:** this comprises the revenue gain that would arise from having exclusive use of particular spectrum. As explained above, the reduction in the ability to differentiate and ensure quality of service is likely to reduce the expected returns and hence the commercial value of spectrum.

Given the substantial risks, it is vital that the costs and benefits of any potential opportunities for sharing based on non-exclusive assignment are carefully assessed, on a case-by-case basis, and that measures are put in place to manage the risk of harmful interference. In conducting such an assessment it is important to consider whether the potential benefits from sharing could be achieved within the existing exclusive licensing framework – in particular, by facilitating voluntary sharing agreements between spectrum licensees and other network operators.

The prospect of MNOs losing control over spectrum would have an immediate negative effect on investment and is inconsistent with policies to facilitate sharing and trading

The prospect of losing exclusive control over spectrum will have an immediate chilling impact on MNOs investment incentives, as operators have to make network investments that will support the use of spectrum for years to come: RAN equipment has an economic life that extends to up to 10 years²⁴.

For example, Vodacom has announced in August 2018 its investment in relation to the deployment of 5G in Lesotho²⁵ and expects this network investment to support the provision of services for around 10 years.

Further, passive components of mobile networks (such as towers) and fixed infrastructure assets used to support mobile services – in particular, fibre backhaul links - have much longer economic lives (around 20 years for fibre optic cables and 40 years for duct).

Finally, a move away from exclusive spectrum assignment would undermine policies towards spectrum trading and sharing, as it would make unclear what it is that MNOs were trading or sharing. It would also make it much more difficult for licensees to ensure that they comply with obligations in their licences or in regulation in relation to such matters as quality of service and coverage as they would not have exclusive use of the spectrum that is required to perform those obligations.

International precedent indicates that non-exclusive use of spectrum should only apply in limited circumstances

Whilst there is some precedent for regulators allowing a degree of non-exclusive spectrum use, this has typically been in a limited number of specific cases where the risks of interference can be managed and necessary provisions put in place to ensure that concurrent usage of spectrum frequencies does not negatively impact upon communications services.

²⁴ The GSMA estimates that the useful economic lives of Radio Access Network equipment (i.e. base stations, transmission and switching assets) of around 10 years <https://www.gsma.com/publicpolicy/wp-content/uploads/2012/09/Tax-Comparison-of-fixed-and-mobile-cost-structures.pdf>. ICASA's MTR model assumes economic life of RAN equipment between 7.5 and 9 years.

²⁵ Vodacom has launched Africa's first standards-based commercial 5G network in Lesotho on 3.5GHz spectrum. <http://www.vodacom.co.ls/ls-personal/offers/voice-and-data-plans/data-plans/5g>

For example, in the UK, whilst Ofcom retains the power to grant additional licences for spectrum that has already been assigned, this does not give other users the automatic right to enter that space.²⁶ Rather, Ofcom will only consider granting additional licences where this does not degrade the incumbent's licensed access to the band and where safeguards can be put in place to appropriately manage the risk of interference.²⁷ For example:

- **Local licences:** Ofcom has issued 12 local mobile telephony licences to address areas that are poorly served by national mobile providers. The licensees are required (under the terms of the licences) to work together with mobile licensees to coordinate network deployments and thereby avoid radio interference
- **5G trials:** Ofcom has granted a number of non-operational licences to support 5G trials, which are coordinated with incumbent users to allow access to spectrum on a non-interference basis.

2.1.2 Wholesale Open Access to networks and facilities at regulated rates

Our understanding of the 2018 Bill proposals

The new section 43(1) sets out that:

“All electronic communications network service licensees ... must provide wholesale open access, upon request, to any other person licensed in terms of this Act and persons providing services pursuant to a licence exemption in accordance with the terms and conditions of a wholesale open access agreement entered into between the parties, in accordance with the general open access principles, except in the case of technically (sic) inability.”

The key change relative to the existing Section 43(1) is the requirement for network licensees to provide “wholesale open access”, where previously they were required only to “lease” electronic communications facilities.

Wholesale open access (WOA) is defined by the Bill as “... the sale, lease or otherwise making available an electronic communications network service or electronic communications facility by an electronic communications network service licensee on a wholesale basis on general open access principles, and, to the extent applicable, the additional wholesale open access principles provided in sections 19A(4)(b), 20H(2)(a)(ii), and 43(1A) and (1B)”.

The broadening of the scope of 43(1) to cover electronic communications network services as well as facilities would seem to indicate that licensees will now be required to make available to access seekers, any aspect of their networks, whereas previously this was confined to passive facilities.

In addition, we note that the requirement that facilities leasing requests be reasonable - that its, technically and economically feasible and promoting efficient

²⁶ Cave M. (2017), Why has spectrum sharing been so hard to accomplish?, page 2

²⁷ Ofcom (2017), Review of the authorisation regime for spectrum access, page 5, para. 1.18.

use of networks and services - has been deleted and replaced by a clause that allows for technical inability *only* (i.e. not economic viability or efficient use of networks, etc.) as a qualifier to section 43(1).

The Bill introduces further obligations for what it refers to as “deemed entities.” According to Section 44(3A), deemed entities include :

- Electronic communications network service licensees that have significant market power or have an electronic communications network that constitutes more than 25% of the total electronic communication infrastructure; and
- Network service licensees that control an essential facility or a scarce resource such as radio frequency spectrum.

In addition to the general WOA requirements set out under 43(1), section 43(1A) requires that deemed entities:

- Engage in active infrastructure sharing;
- Charge wholesale rates as prescribed by the Authority, which must be cost-oriented²⁸; and
- Comply with specific network and population coverage targets.

Regarding the requirement to offer wholesale access at “cost-oriented” rates, we note that this differs from the terminology used in the 2017 Bill, which set out that rates should be “cost-based.” This may indicate an intention to allow for more pricing flexibility under the WOA regime, which could at least partly mitigate the negative effects of mandating WOA to all networks (we discuss the effect on investment below). However, in view of all the changes proposed in the Bill, the implications of this change are uncertain.

Consistency with economic principles and regulatory best practice

Access obligations can be a way of trying to promote competition, by making it easier for operators that may not possess certain key infrastructure assets to offer retail services – for example, passive access remedies can make it easier to deploy backhaul, by giving operators access to duct and pole infrastructure which, due to its high sunk costs, represents a potential bottleneck in network deployment.

However, cost-oriented access obligations are a particularly intrusive form of regulation that can undermine the incentives of operators to invest. As such, they are typically regarded as a “last resort” measure for regulating markets with significant, non-transitory barriers to effective competition. Below we set out that:

- Imposing such wide ranging obligations on all operators is unprecedented and will significantly undermine investment incentives;
- Regulating prices is a highly complex task and carries significant risks;
- The imposition of wholesale access obligations is rarely observed in mobile markets;

²⁸ 43(1A) states that deemed entities must charge wholesale rates as prescribed by the Authority in terms of section 47. Section 47 sets out that “The Authority must prescribe wholesale rates applicable to deemed entities that must be cost oriented”

- Extending the scope of access obligations to cover network services as well as facilities is unjustified;
- Requiring access wherever technically possible, regardless of whether it is reasonable goes against regulatory best practice; and
- By disregarding the economic viability of access request, the Bill risks encouraging inefficient network investment and usage.

Imposing such wide ranging obligations on all operators is unprecedented and will significantly undermine investment incentives

Imposing such broadly defined access obligations on deemed entities (which includes all MNOs), which would potentially require them to open up their entire networks to regulated access at cost-oriented rates, is one of the most intrusive forms of regulation conceivable and, as far as we are aware, completely unprecedented. This will significantly undermine investment incentives due to two main effects:

- **It reduces the ability to differentiate:** Where there is mandated access to all services (including active as well as passive services) any competitive advantage that an investment might bring would also be available to access seekers, whilst the risks would be borne exclusively by the host MNO. Thus, applying access obligations to all operators in the market significantly undermines the ability of operators to differentiate, and hence the potential upside they can expect to earn from their investment.
- **It creates a “last-mover” advantage:** Imposing cost-oriented access on deemed entities creates a “last-mover” advantage with respect to investments – in particular, investments in new technologies which may carry significant risks. In other words, operators may find it preferable to wait for one of their rivals to invest and then rent access from them, rather than undertake investments themselves. This is because renting access would allow operators to enjoy the benefits of any investments made by the host network, whilst avoiding all of the risks. At the same time, as noted above, mandated access would diminish the upside from investment, by undermining the ability of the investing network to differentiate their services.

As such, imposing cost-oriented access obligations on effectively most of the mobile industry, would lead to inferior outcomes in which investment is significantly delayed or potentially never happens due to a combination of the two effects described above.

We have developed a theoretical model which analyses investment decisions under a range of scenarios using the principles of game theory. This shows that mandating cost-orientated wholesale access leads to worse investment outcomes overall – compared with a situation where access is not mandated, see the text box below. We explain this in more detail in Annex A.

ECONOMIC ANALYSIS OF LAST MOVER ADVANTAGE

The model considers two MNOs, who we assume have symmetric costs and demand and who are deciding whether to invest into new technologies. The decision to invest is determined by their expected payoffs from investment, based on a range of input assumptions.

The figure below shows the outcomes in terms of investment across the three demand scenarios: high, medium and low demand, broadly approximating urban, sub-urban and rural areas. This shows that, across the three scenarios, mandating cost-oriented wholesale access leads to equal or worse investment outcomes (but never better) compared with a situation where access is not mandated.

	High demand	Moderate demand	Low demand
	Both firms invest	Both firms invest	No investment
Outcomes without mandated access			
Outcomes with mandated access	Depending on probability of other firm investing, both firms may invest, or neither firm may invest due to 'last mover advantage'  or 	Highly likely that neither firm invests due to 'last mover advantage' 	No investment 

This can be explained by the fact that:

- Without mandated access**, if demand is expected to be sufficient to cover the cost of investment, then MNOs have an incentive to invest, given the high potential payoffs from investing. This is particularly driven by the fact that they have a chance to gain a significant competitive advantage over rivals if they are the only firm to invest. MNOs also face a risk of very low payoffs if they do not invest and hence have an inferior product to a rival who does invest. This means that even in a scenario where demand is more moderate, both MNOs will choose to invest in deploying their networks (or one MNO will invest first and agree to offer access at commercially negotiated rates).
- With mandated cost-oriented access**, both the high upside from investing, and the low downside risk of not investing are removed. This weakens the incentive to invest significantly. With mandated access, there may be an advantage from being the 'last mover' because the risks (and sunk costs) of the investment rest with the MNO that invests first and not with the MNO that prefers to acquire access from the other MNO. In practice this means that the best strategy may be to wait for a rival to invest and this may result in investment being delayed or never happening. The lower the expected demand, the higher the probability that a no investment, 'last mover advantage' outcome occurs. This is because the risks associated with investing increase.

Thus, our analysis shows that mandated cost-oriented access would lead to inferior outcomes where investment doesn't occur due to a 'last mover advantage'.

Regulating prices is a highly complex task and carries significant risks

Even where access obligations are imposed on a more targeted basis (e.g. to a specific operator or set of network facilities/services), price regulation risks significantly undermining incentives to invest. This is true even where price regulation seeks to allow for the full recovery of costs (including an allowance for investment risks).

In particular, for investment in next generation technologies (including investments in 4G and 5G) that are subject to considerable demand and cost uncertainty, setting prices at the appropriate level is very challenging as there is limited evidence of the risks faced by the operators. This issue has been faced in the context of the transition to fibre based fixed technology across EU member states. Indeed, the EC noted in its 2013 recommendation on the regulation of next generation access²⁹ that *“due to current demand uncertainty regarding the provision of very-high speed broadband services it is important in order to promote efficient investment and innovation to allow those operators investing in NGA networks a certain degree of pricing flexibility...”* It also noted that *“Reliance on cost-orientation with minimal consideration of investment risk would depress NGA wholesale prices, drive down retail prices through arbitrage-oriented entry, and thereby prevent the investing undertaking from realizing profits commensurate with the original investment case.”*³⁰

In addition, setting appropriate price controls relies on the regulator being able to make accurate forecasts of volumes and costs, which is particularly difficult in fast moving sectors, such as telecoms. The introduction of the Bill would make this exercise even more challenging, since it contains a number of measures that will have a profound impact on the evolution of the market and create significant uncertainty.

There is therefore a substantive risk of regulatory error, which could further undermine investment incentives if prices are set at a level that does not allow operators to recover efficiently incurred costs (e.g. if volumes turn out to be lower than expected).

Setting cost-oriented prices will also be a complex and time consuming exercise, given the wide range of services that will potentially be affected and the dynamic nature of the industry. Further, the new section 44(3) of the Bill, which specifies what the wholesale open access regulations will be required to address, indicates that designing and implementing the WOA regime more broadly will be a highly demanding process. Thus, the open access obligations, together with the cost-orientation requirements for deemed entities will impose a significant administrative burden on both the MNOs and ICASA.

²⁹ European Commission (2013), Recommendation on consistent non-discrimination obligations and costing methodologies to promote competition and enhance the broadband investment environment

³⁰ As such, the EC recommended that NRAs should not set price caps, provided certain safeguards were in place (in particular, to address the risk of margin squeeze) and Member State NRAs, including Ofcom, have broadly followed this approach.

The imposition of wholesale access obligations is rarely observed in mobile markets

In terms of international regulatory precedent, we note that a wide range of jurisdictions do not impose access obligations (cost-oriented or otherwise) on MNOs, on the basis that retail markets are generally found to be competitive. In particular, the European Commission removed the market for wholesale access to mobile operators' networks³¹ (covering active products such as MVNO access and national roaming) from its list of relevant markets susceptible to ex-ante regulation in 2007 because:

“The degree of competition generally observed in this market at the retail level indicates that ex ante regulatory intervention at a wholesale level may not be warranted. In addition, in most Member States the wholesale mobile access and call origination market is effectively competitive as mobile network operators conclude access agreements on commercial terms.”

The EU concluded this even though at the time of the decision, there were 14 Member States who had operators with market shares in excess of 40%.³²

Furthermore, despite the fact that the market for wholesale access to mobile networks was included in the EC's 2003 list of relevant markets, the vast majority of Member States found it to be competitive and therefore did not impose ex-ante regulations in this market.

We also note that open access obligations are rare outside the EU – the OECD recently remarked that *“in most countries with MVNOs, regulators have refrained from mandating that MNOs give MVNOs open access to their networks.”*³³

Even if there were evidence to suggest that some form of access regulation was necessary, there is no clear basis for the ‘spectrum holding’ and/or ‘25% market-share’ criteria used to define a deemed entity. Again, in order to limit the potential harm from imposing burdensome ex-ante regulation unnecessarily, it is important that any remedies are carefully targeted at relevant concerns identified by detailed market analysis.

Any broadening of the scope of access obligations should be justified by careful market analysis

Given the significant dampening impact that this form of regulation can have on investment, it is vital that regulators first conduct a detailed market analysis which takes into account the specific characteristics of the relevant markets before deciding whether it is appropriate.

This analysis should begin with a review of the relevant retail market, to identify whether there are any market failures that would justify intervention. Indeed, the EC has noted that *“... wholesale access regulation is not an end in itself, but should only be imposed only if end-user markets cannot function effectively without it (Article 65(4)).”*³⁴

³¹ Referred to by the EC as “access and call origination on mobile networks”

³² TeleGeography

³³ OECD (2013), Broadband Networks and Open Access, p.25

³⁴ European Commission (2016), Review of the Electronic Communications Regulatory Framework Executive Summary 1: Access to networks, p. 2

If competition concerns are identified at the retail level, an important next step is to identify any bottle-neck facilities - that is, parts of network infrastructure, which are difficult to replicate, either for financial, technical, regulatory or legal reasons. Regulation should be targeted at these parts of the supply chain, in order to minimise the potential distortionary effects. Indeed, the OECD has stated that *“it is typically considered that regulation should focus on ensuring access to bottlenecks in order to facilitate development of competition in downstream markets”*.³⁵

By extending the scope of access obligations to potentially cover communication providers' entire networks without first identifying the relevant bottlenecks that would justify such a wide-ranging intervention, the Bill diverges from regulatory best practice. In reality, the fact that mobile operators in markets around the world compete at all levels of the supply chain and that network access regulation is not widely observed internationally, indicates that genuine bottlenecks (that would justify such an intervention) are rare in mobile networks.

We also note that the potential benefits of wholesale network access - in particular, maximising the use of scarce resources, reducing asset duplication, increasing availability and enhancing retail competition, can be achieved through commercially negotiated leasing agreements and network sharing arrangements. In many countries around the world, including South Africa, operators have voluntarily entered into commercially negotiated agreements to share certain parts of their network infrastructure, without the need for regulatory intervention. For example:

- In the EU, there are 16 active sharing agreements currently in place as part of joint deployment programmes, all of which are commercially driven.³⁶ In addition, 5 out of the 7 national roaming agreements (excluding joint deployments) currently in place across Member States are commercially driven.³⁷
- In South Africa, Telkom and Cell C have both successfully negotiated national roaming agreements (with both Vodacom and MTN), whilst there are several MVNO operators present in the market that benefit from commercial access agreements. Alongside a recently announced national roaming deal, Vodacom and Telkom are also negotiating a “deep passive sharing” (DPS)³⁸ agreement, which would give Telkom access to 2,500 Vodacom sites. Similarly, Vodacom also offers DPS to RAIN across 5,000 sites, whilst RAIN provides Vodacom with LTE roaming on specific sites.

Further, we note that Vodacom and other MNOs provide leasing of their electronic communications facilities to other operators over thousands of sites all around the country. These sharing arrangements have typically been negotiated voluntarily, on a commercial basis, without the need to invoke Chapter 8. This indicates that

³⁵ OECD (2014), Defining the relevant market in telecommunications, Chapter 2, p.14

³⁶ BEREC (2018), Report on infrastructure sharing

³⁷ Ibid

³⁸ DPS agreements go beyond the scope of the facilities leasing regulation, under Chapter 8, and include access to masts, ground space, antennae, as well as access to various ancillary services, such as Air Conditioning (AC), backup power and feeder cables. As such, the access seeker does not need to install any passive infrastructure at the site.

the existing facilities leasing regime is already highly conducive to competitive investment.

Requiring access wherever technically possible, regardless of whether it is reasonable goes against regulatory best practice

The potential harm is exacerbated by the fact that the Bill removes the ability of operators to deny access on reasonability grounds, allowing only for cases of technical inability. This goes against regulatory best practice – our review of access regimes in other jurisdictions indicates that whilst the exact approach adopted varies, regulators are typically required to consider a range of criteria when deciding whether it is appropriate to mandate access to network infrastructure. For example:

- **In the UK**, section 87(4) of the UK Communications Act³⁹ sets out that Ofcom must take into account the **technical and economic viability** and **the initial investment** made by the access provider.
- **In Ireland**, Section 12 of the Access Regulations⁴⁰, sets out the factors which should be taken into account to ensure that access obligations are proportionate to objectives. The six specified objectives include: i) **the technical and economic viability** of using or installing competing facilities and ii) **the feasibility of providing access relative to the capacity available**.
- **In Norway**, the Communications Act⁴¹ emphasises the need to take account of both the provider's and seekers' interests and outlines a range of criteria which must be considered, including available capacity, investment risk and sustainable competition.

We also note that, even in Norway, where the regulator imposed relatively strong access conditions on the incumbent MNO, it is only **reasonable** requests for access that need to be met. It can also be noted that the access conditions imposed in Norway were imposed following an assessment of the market power of the operator concerned.

The observation that regulators in other jurisdictions are typically required to consider carefully the reasonableness of any access requirements reflects the need to balance the interests of all stakeholders in the marketplace, including network operators as well as access seekers. As such, if an operator refuses to provide access on the grounds that the request is unreasonable, the regulator should adjudicate using a range of objective criteria. International precedent suggests that criteria that should be taken into account include:

- The **technical and economic viability**, of providing access given factors such as the state of the market and the cost of installing competitive facilities;
- The feasibility of providing access;

³⁹ Communication Act 2003. This is accessible at http://www.legislation.gov.uk/ukpga/2003/21/pdfs/ukpga_20030021_en.pdf. The clause relating to access is Section 45 (5).

⁴⁰ The Irish Communications Regulation Act is accessible at <http://www.irishstatutebook.ie/eli/2002/act/20/>

⁴¹ Act No. 83 of July 4, 2003, on Electronic Communications, http://www.wipo.int/wipolex/en/text.jsp?file_id=241898

- The impact of providing access on the risk to the initial investment made by the access provider;
- The need ensure effective long term competition; and
- The impact on end users.

By disregarding the economic viability of access request, the Bill risks encouraging inefficient network investment and usage

When deciding whether to impose access obligations or adjudicating over requests for access, it is especially important that regulators take into account economic viability (in other words – the extent to which the benefits of providing access exceed its economic costs) in order to ensure efficient network investment and usage. In particular:

- There may be circumstances in which the demand for access is not sufficient to justify the costs associated with providing it. To illustrate, consider a potential scenario in which an access seeker requests access where there is currently no capacity available. In this case, the network operator would need to incur significant up-front costs in order to accommodate the request, whilst the incremental demand from the access seeker may not be sufficient to recover these costs. Under the Bill, there is a risk that the network operator would be forced to undertake the investment in these circumstances, given that it is technically possible to do so, despite the fact that it is not economically efficient.
- There may be circumstances where the form of access requested is not the most efficient way of enhancing competition. For example, the EC has recognised that the physical unbundling of fibre broadband networks may not be economically viable and that virtual unbundling virtual access products may therefore constitute a more proportionate remedy in this context.⁴² More broadly, the EC’s Access Directive requires that regulators also take into account the economic (and technical) viability of using or installing competing facilities, before imposing access obligations.
- As explained above in the context of cost-oriented access obligations for deemed entities, mandating access may render major network investments economically unviable by undermining the investing network’s ability to make a reasonable return. As such, a blanket requirement to provide access wherever it is technically possible, without due regard to economic viability, risks chilling investment incentives. Indeed, in relation to symmetric regulation⁴³ of non-replicable broadband infrastructure, we note that the EC’s proposed update to the Electronic Communications Code specifically requires that regulators refrain from imposing access obligations on recent deployments where doing so “*would compromise the economic or financial viability of their deployment*”.⁴⁴

In addition to disregarding the economic viability of access requests, the Bill appears to provide operators with very limited scope to refrain from providing access where it would be technically *infeasible* to do so – in other words, where

⁴² European Commission (2014), Frequently asked questions: Recommendation on relevant markets, page 3

⁴³ This refers to regulation which applies to all operators, regardless of whether they have SMP

⁴⁴ European Commission (2016) Proposal for a directive of the European Parliament and Council establishing the European Electronic Communications Code, Article 59, paragraph 2.

access cannot reasonably be expected to be provided given existing technical constraints. As Vodacom notes in Section 5.3, a request may be technically infeasible (e.g. due to a lack of available capacity), but still technically *capable* of being achieved (e.g. by undertaking significant investments to expand capacity) and so must be done under section 43(1) of the Bill. This further contributes to the risk that operators will be required to undertake inefficient investments, at great cost or risk, to satisfy an access request purely on the basis that it is technically possible.

Further, in cases of technical inability, the Bill (section 43(5)(d)) provides that the Authority may determine how to resolve this inability, which “*may include the apportionment of costs*”. This implies that the Authority would have the power to mandate any adjustments that the provider may need to make to its network in order to accommodate requests. In addition, conferring on the Authority the ability to determine the apportionment of costs in such circumstances magnifies the uncertainty around operators’ ability to recover the costs of providing access.

2.1.3 Coverage obligations targeting rural and underserved areas first

Our understanding of the 2018 Bill

Paragraph (c) of section 31E(4) requires that “*universal access and universal service obligations contemplated in section 31A are imposed on the radio frequency spectrum licensee, and such obligations are complied with in rural and under-served areas before the assigned spectrum may be used by the licensee in other areas*”.

In other words, licensees may only deploy HDS in urban and suburban areas *after* coverage obligations in rural areas have been fully met.

Consistency with economic principles and regulatory best practice

The requirement to roll out to rural areas first will likely lead to slower network upgrades and reduced investment in urban and suburban areas

While it is not clear how coverage obligations will be implemented in practice, there is a substantial risk that the “rural first” requirement could lead to inefficient outcomes, for multiple reasons.

First, the low frequency spectrum (700 and 800 MHz), suitable for coverage, is currently used by broadcasters and not available for mobile use. The migration of this spectrum from broadcasters will take time (we understand a realistic date for the migration to complete is 2022, but it could take longer). Throughout this period, MNOs will not have to access to suitable spectrum to meet coverage obligations in rural / underserved areas:

- **High frequency** spectrum (above 1 GHz) is generally not suitable for coverage rollout, as the cost of covering a given area is much higher than with low frequency spectrum. This reflects the fact that higher frequency spectrum has weaker propagation properties and more base stations are therefore required to achieve a given level of coverage;

- Existing **low frequency** spectrum (900 MHz) cannot be readily used to deploy 4G services in rural areas and meet the coverage obligations with speed requirements. This spectrum is currently used by MNOs to deliver 2G and 3G mobile services and would therefore need to be re-farmed, where practical and possible, before it can be used to deploy 4G.
 - This process takes time and we understand that Vodacom is currently planning to only re-farm 2x5 MHz of 900 MHz spectrum for 4G in areas that qualify, to maintain sufficient capacity in the 2G and 3G layers. The CSIR study⁴⁵ itself indicates that this would be insufficient to meet the SA Connect speed targets.⁴⁶
 - Further, we note that 900 MHz spectrum is not commonly used to deliver 4G services. For instance, according to the Global Mobile Suppliers Association (GSA), only 22% of LTE user devices can operate in 900 MHz spectrum, compared with 57.4% which can operate in 1800 MHz spectrum (the most used LTE spectrum).⁴⁷

Second, MNOs will not be able to quickly deploy additional spectrum where demand for data services is, which will particularly affect customers in urban and sub-urban areas where MNOs may face capacity constraints. The requirement to roll-out to rural areas first would delay the deployment of 2.6 GHz spectrum, which is immediately available. As a result, mobile users in urban and sub-urban areas - who would benefit the most from additional network capacity - will not get access to new services until MNOs meet their coverage obligations in rural areas and/or WOAN becomes fully functional and deploys in urban areas. This is exacerbated by the fact that, as explained above, it will be many years before MNOs have access to sufficient low-frequency spectrum to meet their coverage obligations in rural areas.

For example, network analysis conducted by Vodacom in relation to the Competition Commission's Data Market Inquiry⁴⁸ showed that by September 2019, over 98% of 3G sites and over half of 4G site in urban areas would not have sufficient capacity to meet the likely speed requirements set by the SA Connect broadband targets for 2020.⁴⁹

Finally, while recognising the importance of improving data connectivity in rural and underserved areas, the requirement to roll-out in rural areas first (on a national basis) will make it more challenging, and inefficient for MNOs to plan and implement network upgrades and deploy new spectrum (which is typically done in local/regional clusters). There are therefore more efficient ways of achieving the Government's objectives in relation to digital divide and allowing rural customers

⁴⁵ CSIR (2018), Spectrum requirements for Wholesale Open Access Network (WOAN) https://www.gov.za/sites/default/files/41935_gon1003.pdf

⁴⁶ Table 8 of the CSIR study indicates that providing speeds of 5 – 10 Mbps to 20% of the population (i.e. less than Vodacom's subscriber share) would require 7 – 16 MHz of downlink spectrum.

⁴⁷ <https://gsacom.com/paper/lte-in-900-mhz-band-8-market-status-report/> and <https://gsacom.com/paper/status-lte-ecosystem-report-5614-lte-devices-announced-455-suppliers/>

⁴⁸ Vodacom's written submission in response to the Competition Commission's invitation for comments on the Data Market Inquiry and Public Hearings" from 15 October 2018, (Section 3.1.2)

⁴⁹ The SA Connect targets for 2020 require 90% of customers to have access to speeds of 5Mbps, and 50% to speeds of 50Mbps. The analysis is based on a minimum busy hour throughput of 5Mbps for 3G sites and 50Mbps for 4G sites. A site is considered to have insufficient capacity if a given throughput (or speed) cannot be guaranteed in the busy hour. More detail on this analysis is provided in section 3.1.2 of Vodacom's written submission in response to the CC's Data Market inquiry.

to benefit from increasing connectivity - for example, by setting specific timeframes within which rural coverage targets can reasonably be expected to be achieved - without depriving urban and sub-urban areas from the benefits of readily available 2.6 GHz spectrum.

Thus, the requirement for MNOs to rollout in underserved and rural areas first will likely lead to lower investment and slower and more inefficient deployment of new mobile technologies. Also, it will likely delay the deployment of high-speed networks in urban and sub-urban areas.

The requirement to roll-out to rural areas first is largely unprecedented

Attaching coverage obligations to sub-1GHz spectrum, to facilitate mobile connectivity in “challenge areas” (non-profitable areas) is in line with international regulatory best practice.

However, the requirement to cover rural areas first is largely unprecedented. The one prominent example of “outside-in” or “rural first” style coverage obligations that we have identified – from Germany – applied specifically to low frequency spectrum, which as explained above, is much better suited to coverage rollout in rural and underserved areas than the high frequency spectrum. The German regulator imposed coverage obligations specifically for 800 MHz spectrum, which required licensees to build-out their networks in listed communities (referred to as “white spots”) in four stages in areas with no or low broadband coverage, before deploying frequencies in this band in more populated areas.⁵⁰ The fact that licensees had access to 800 MHz spectrum meant that operators could rapidly deploy LTE networks in these white spots.

Further, since the coverage obligations only affected the deployment of 800 MHz spectrum, operators could quickly deploy LTE in urban / sub-urban areas, using high frequency spectrum – in the 1800 MHz, 2.1 GHz and 2.6 GHz bands – which was awarded alongside the 800 MHz band. For example, Deutsche Telekom launched services in rural areas using 800 MHz on 5th April 2011 and shortly afterwards in Cologne, on 1st July 2011, using 1800 MHz. In contrast, under the Bill, operators would be prevented from deploying newly acquired high frequency spectrum (in the 2.6GHz band) in urban and suburban areas alongside the rural deployment, until the obligations in rural areas had been met.

Finally, we note that the 800 MHz coverage obligations in Germany could be met collectively – in other words, licensees were permitted to deploy 800MHz spectrum in successive priority areas as soon as 90% of the population in previous stage had been provided with access by *at least one* licensee. In contrast, the Bill would require each operator to meet their obligations individually, in rural areas, before rolling out to urban and suburban areas. This would lead to inefficient duplication and more costly rollout in SA than it could be achieved than if MNOs were allowed to meet the coverage requirements in rural areas collectively.

⁵⁰ Aetha (2011), Case studies for the award of the 700MHz/800MHz band: Germany
<https://www.gsma.com/spectrum/wp-content/uploads/2011/11/700MHz-800MHz-band-Germany.pdf>

2.1.4 Advantages conferred on the WOAN

Our understanding of the 2018 Bill

The 2018 Bill foresees the provision of favourable treatment to the WOAN in the following key respects:

- Section 19A(7) requires the Authority to consider potential incentives to be granted to the WOAN including (but not necessarily limited to):
 - i) reduced or waived spectrum fees; and
 - ii) refraining, for a specific period, from prescribing the wholesale rates that can be charged by the wireless open access network service licensee.
- Paragraph (b) of section 31E(4) requires that each MNO that acquires new HDS commits to procuring a minimum of 30% capacity, for a period of time to be determined by the Authority. As such the WOAN will benefit from a commitment from MNOs to purchase theoretically up to 90% of its capacity if there were three HDS licensees – this should almost eliminate demand side risks faced by the WOAN, reducing significantly its cost of capital/financing costs (or expected returns).

The risks associated with preferential treatment for the WOAN, are exacerbated by the fact that the WOAN may be assigned an excessive amount of high demand spectrum under the Bill. Whilst the Bill itself does not determine how much spectrum is to be assigned to the WOAN, it confers this responsibility on the Minister. Further, as Vodacom notes in section 3.1 of its submission, the CSIR Study, which accompanies the draft Policy Direction, has recommended that a disproportionately large amount of spectrum be assigned to the WOAN. Thus, whilst the spectrum assignment is yet to be determined, if it reflects the CSIR recommendation it would further strengthen the WOAN's advantages over the existing MNOs (for example by reducing its relative cost of expanding capacity and allowing it to offer superior quality of service at substantially lower prices). This would also increase the risk of valuable spectrum resources being underutilised until the WOAN becomes fully functional. Frontier has reviewed the CSIR study recommendations in a report submitted as part of the Vodacom response to the Policy Direction, and has explained why the CSIR study recommendations are unjustified and flawed – we refer the reader to that report⁵¹.

Consistency with economic principles and regulatory best practice

The advantages that the Bill confers on the WOAN risk distorting competition

The granting of special incentives, together with the significantly reduced demand side risks arising from the substantial capacity pre-commitments, could result in the WOAN being in a position to offer LTE/ 4G capacity at an average cost that is materially lower than other MNOs. So a first risk, is that the WOAN sets unjustifiably low wholesale prices which reflect the preferential treatment it receives.

⁵¹ Frontier (2018), An Economic Assessment of the Policy Direction

Further, the WOAN may be allowed to charge unregulated rates for a period of time when there is a potentially very material capacity pre-commitment⁵². This means that it will benefit from being able to charge potentially high prices, giving it an unfair advantage vis-à-vis other MNOs in terms of higher profits. The WOAN may also be able to achieve greater pricing flexibility - in particular, when it comes to introducing and pricing new wholesale services. For example, complete pricing freedom would allow the WOAN the flexibility to price discriminate in a way that may not be available to other MNOs when offering wholesale services – this could again give the WOAN an unfair profit advantage.

If the advantages that the WOAN benefits from under the Bill provide it with a significant and unjustified cost advantage, this could reduce the returns that all MNOs could expect to make from investing at the network level. This would result in slower deployment of new technologies and less innovation, even if it does not necessarily lead to a creation of a dominant WOAN at the national level.

Any uncertainty around operators' ability to compete with the WOAN, will have an immediate negative impact on operators' incentives to invest. This chilling effect could persist beyond the transition period until the WOAN becomes established, if the preferential treatment provided to the WOAN was long lasting; or, it conferred on it an unmatched competitive advantage.

The downside risks associated with the Bill's WOAN proposals are exacerbated by the fact that it will likely take a long time to implement

Given the complexity of establishing a WOAN, it is likely to take a significant period of time for it to become fully functional. This view is reinforced by experience from similar projects in other countries - In Mexico⁵³, the deployment of a national wholesale-only mobile network is expected to reach completion 7 years after the contract was awarded. In Australia, it is expected that the establishment of a single national fixed broadband infrastructure will have taken around 10 years by the time it is completed.

2.2 Conclusion on the key issues with the 2018 Bill

In summary, the 2018 Bill contains a number of intrusive regulatory interventions, which go against fundamental economic principles and regulatory best practice and are likely to have a significant distortive impact on market outcomes. We have discussed four key issues in detail above, i.e. non-exclusive use of spectrum, Wholesale Open Access to networks, coverage obligations and advantages conferred to WOAN. We have also mentioned other measures of the Bill which will likely negatively affect regulatory independence and increase overall investment uncertainty, but without providing a detailed assessment. In the next

⁵² In other words a guarantee for the WOAN that it will be able to sell a significant share of its capacity to MNOs. Furthermore, depending on the terms under which this capacity is offered, the WOAN could potentially have guaranteed revenues irrespective of how much retail demand there is in a given area / location.

⁵³ The legislation supporting the establishment of a WOAN in Mexico came into force in June 2013, the contract for deploying WOAN was awarded to ALTAN consortium in November 2016, and the deployment of the network has started in 2017. According to the contract, the WOAN has to cover 30% of population by Q1 2018 and it has to meet the final coverage objective of 92.2% of population by 2023. In the case of Mexico the WOAN was not awarded any 800 or 2.6 GHz spectrum.

section, we discuss the economic impact of the 2018 Bill as package, looking into the likely evolution of the mobile market in SA if all Bill proposals get implemented in their current form and the expected impact this would have on consumer outcomes, including the availability, quality and prices of mobile services.

3 ECONOMIC IMPACT OF THE 2018 BILL

MNOs make substantial investments in network infrastructure, which they deploy, together with spectrum, to offer mobile services – over the past three years alone, over ZAR42bn⁵⁴ has been invested in the South African Mobile sector. Further, Vodacom recently announced that it plans to invest ZAR50bn over the next five years (assuming that the existing legislative and regulatory framework remains in place).⁵⁵

As set out in the previous section, there are a number of proposals within the Bill which are likely to significantly reduce investment in the mobile sector. This would mean slower deployment of new mobile technologies, to the detriment of SA consumers and the broader economy.

Below, we present a detailed assessment of the economic impact of the 2018 Bill on the mobile sector and the wider SA economy. We present in turn:

- a brief description of our previous assessment of the economic impact under the 2017 Bill proposals;
- the expected evolution of the SA mobile market with and without the 2018 Bill; and
- our estimates of the economic impact of the 2018 Bill proposals.

We then draw on these findings when evaluating the ability of the 2018 Bill to achieve its main objectives.

3.1 Our previous estimate of the economic impact under the 2017 Bill proposals

In December 2017, Frontier Economics was asked by Vodacom to provide an economic assessment of the economic impact of the package of 2017 Bill amendments on the mobile sector and the wider economy⁵⁶.

Our assessment took into account the methodology used in a study by Dr. Raul L. Katz to assess the impact of SA Connect⁵⁷, and was aligned with the South African Government's guidelines⁵⁸ on how to carry out Regulatory Impact Assessments (RIA).

We found that the 2017 Bill contained a number of radical proposals related to spectrum that, if imposed, would have a significant detrimental impact on market outcomes:

- First, the 2017 Bill stipulated that existing mobile network operators (MNOs) would have to return all currently used spectrum, possibly before the expiry of their related licences.

⁵⁴ ICASA (2018), 3rd report on the state of the ICT sector in South Africa, page 19, Graph 14

⁵⁵ <https://uk.reuters.com/article/safrica-economy-vodacom-grp/telecoms-firm-vodacom-says-to-invest-3-billion-in-south-africa-idUKS8N1LM02M>

⁵⁶ Frontier Economics: Assessing The Draft Electronic Communications Amendment Bill, Part I (Impact Assessment)

⁵⁷ http://www.teleadv.com/wp-content/uploads/South_Africa_presentation_final_version.pdf

⁵⁸ "The Presidency: Republic of South Africa (2012) – Guidelines for the implementation of the regulatory impact assessment (RIA) process in South Africa"

- Second, it postponed the release to MNOs of currently available but unassigned LTE spectrum (2.6 GHz).
- Third, it suggested that the majority (or even all) of this spectrum would be reserved for the WOAN.

In addition to the above, the 2017 Bill conferred on the WOAN significant and likely unmatched advantages vis-à-vis other MNOs, including having access to mobile spectrum on favourable terms and preferential access to other MNOs' networks.

As such, we considered that the 2017 Bill would have led to slower migration to more advanced technologies. This in turn would have resulted in consumers facing higher prices, slower speeds and lower usage.

In addition, we considered that the lack of competitive pressure at the network level would continue to imply higher costs, higher prices and lower quality of mobile services, compared to a scenario where network competition is maintained.

We estimated that the changes proposed by the 2017 Bill would lead to an overall loss in consumer benefits (surplus) in the mobile sector of around **ZAR 153bn**. This reduction in consumer surplus is driven both by the direct impact of higher prices, and the fact the high prices in turn suppress demand for (and therefore usage of) mobile services. In addition, technical modelling⁵⁹ commissioned by Vodacom indicated that the 2017 Bill proposals would lead to significantly lower average data speeds and lower 4G coverage.

We also found that slower growth in the mobile industry would have a significant, negative impact on the wider economy:

- a GDP loss of **ZAR 22-43bn**;
- tax revenue losses of around **ZAR 6-12bn**; and
- employment losses of between **30,000 – 60,000 jobs**.

This reflects the central role that the South African telecommunications sector plays in supporting wider economic growth.

3.2 Expected market evolution under the 2018 Bill

In line with the approach taken in our previous report, to assess the likely impact of the 2018 Bill, we first consider how the South African telecommunications market is likely to evolve without the Bill's proposed amendments to the ECA being implemented (the "No Bill" scenario). We then compare market outcomes under this state of the world with a scenario in which the 2018 Bill is fully implemented in its currently proposed form (the "2018 Bill" scenario).

The "No Bill scenario" is unlikely to be a continuation of the status quo, as there are a number of other policy and regulatory initiatives that are aiming to improve the functioning of the market and consumer outcomes. We assume that these are implemented under the "No Bill" scenario.

Below, we first describe the likely evolution of the mobile market under the "No Bill" scenario. We then discuss the expected market evolutions under the "2018 Bill" scenario.

⁵⁹ Northstream (2018), Bill Impact: Modelling the Impacts on Speed and Coverage

3.2.1 Likely evolution of the mobile market in South Africa without the 2018 Bill

Proposed policy and regulatory initiatives in the No Bill scenario

The Government has indicated that the mobile market is underperforming in certain areas.⁶⁰ A number of initiatives are underway, which aim to improve the functioning of the mobile market:

- **The Policy Direction:** the Government has recently published a draft Policy Direction which contemplates the licensing of a WOAN and the concomitant assignment of high demand spectrum to the WOAN and to MNOs, based on an ITA to be issued by ICASA under the current ECA framework. The Policy Direction could in principle contribute to achieving wider Government objectives, subject to some fine tuning of its draft proposals. In particular, as explained in Vodacom's submission on the Policy Direction, the competitive WOAN should be capable of succeeding on its own merits and should not be awarded undue, unfair or unreasonable incentives, such as excessive amounts of HDS, that will distort the market. Similarly, specific proposals in the Policy Direction need to be adjusted and/or removed to avoid significantly hampering the investment incentives of existing MNOs (e.g. 'outside-in' coverage obligations, wholesale open access to networks, and non-exclusive use of spectrum requirements).
- **ICASA's Priority Markets Inquiry:** ICASA has conducted an inquiry to assess which markets or market segments within South Africa's telecommunications sector should be subject to market reviews. ICASA has decided to conduct market reviews of i) the entire mobile value chain; ii) wholesale fixed access; and iii) national transmission and metropolitan connectivity. ICASA has identified the mobile value chain as the highest priority and has started the reviews of relevant mobile markets (both retail and wholesale) in November 2018.

The impact of these initiatives

Overall, we envisage that, if the above initiatives were implemented successfully, the likely evolution of the mobile market in South Africa would be characterised by the following impacts:

- The additional HDS suitable for 4G use will be released and assigned in a timely manner;
- Existing MNOs will get access to sufficient amounts of HDS and be able to deploy this spectrum in a cost-efficient manner in both rural and underserved areas and urban and sub-urban areas, which will lead to lower prices and higher usage of mobile data services;
- The coverage obligations attached to newly assigned HDS, including in rural and under-served areas, should support the achievement of the objective of increasing availability of broadband while allowing MNOs to roll out their networks in the most efficient way (i.e. without 'outside in' coverage requirements);

⁶⁰ See WP pages 66 – 70 for more detail

- A competitive WOAN is established to support the achievement of the Government's objectives, and with the broad support of the industry, could serve as a source of more choice and competition, as a means of encouraging new retailers into the market place, and as an enabling vehicle for supporting the Government's transformation objectives, without distorting competition; and
- The Priority Markets inquiry should identify areas of market failure where regulatory intervention may be required, and could lead to the introduction of appropriate regulatory remedies to redress any such failures.

This expected market evolution under the "No Bill" is therefore the benchmark used when evaluating the impact of the Bill on the mobile market and the wider economy of South Africa.

3.2.2 Evolution of the mobile market with the 2018 Bill

In contrast with the above, if the 2018 Bill proposals are fully implemented, we would expect the mobile market in South Africa to move towards a market outcome constrained by increased uncertainty, including regulatory uncertainty, and therefore lower and delayed investment, and materially slower development of new mobile technologies. While we recognise that under the 2018 Bill the risk of the WOAN dominating the mobile market in the long run are lower (compared with 2017 Bill proposals), there is still a significant risk that network competition will be distorted through a preferential treatment of the WOAN, at the expense of competition and ultimately SA consumers.

If the 2018 Bill proposals were to be fully implemented, the most likely evolution of the mobile market would be as follows:

First, MNOs may be expected to get access to additional HD spectrum relatively quickly (e.g. through a new ITA), but will not be able to deploy this spectrum efficiently. **High frequency spectrum** (2.6 GHz) is available immediately, but the MNOs' **ability** to deploy this spectrum efficiently will likely be constrained. This is because coverage obligations would make it unlawful to deploy and/or upgrade MNOs' respective networks in urban and sub-urban areas (utilising this high frequency spectrum) until rural and under-serviced areas are fully covered. In order to cover rural and underservices areas, low frequency spectrum is likely to be critical, but currently unassigned **low frequency spectrum** (700 and 800 MHz) will not become available until 2022, as it has not yet been migrated from broadcasters.

We understand from the technical analysis by Northstream and Vodacom that MNOs would be able to meet 'rural first' coverage obligations by 2023, at the earliest, assuming 700 and 800 MHz spectrum is migrated from broadcasters by 2022. Any delay in the migration of 700 and 800 MHz spectrum will also imply a delay in the ability of MNOs to meet their coverage obligations and subsequently rollout in urban and sub-urban areas.

Furthermore, as discussed above, there are a number of issues which could significantly reduce the **incentive** of MNOs to deploy spectrum (both high and low frequency), including:

- Requirement to offer wholesale access to networks at cost oriented terms, without any regard for whether access can be offered at economically feasible terms such access would be justified i.e. reasonable.
- Non-exclusive use of and wholesale access to spectrum implies technical challenges and uncertainties around the future use of spectrum and the ability to recover spectrum-related network investments;
- Uncertainty around the terms and conditions at which the WOAN will operate and offer capacity to MNOs, and how much preferential treatment / support it will receive from the Government (e.g. how much HD spectrum it will receive and at what terms) and industry;⁶¹ and
- Uncertainty around regulatory independence and unpredictability of future policy interventions in the market more generally.

All this leads to a significant risk of a dampening of investment incentives and therefore an investment chilling effect under the “2018 Bill” scenario (vis-à-vis the “No Bill” scenario). This in turn leads to slower deployment of 4G/5G and a negative economic impact on the mobile industry and wider SA economy.

This is particularly relevant for the **‘transitional period’** until the WOAN is fully functional and able to deploy new spectrum, as SA consumers will have to rely solely on capacity constrained MNOs with reduced ability and incentive to deploy and deliver 4G mobile data services. As discussed above, the process of establishing the WOAN is complex and based on the information available it could take time for the WOAN to become fully functional.

Once the WOAN is established and able to deploy spectrum, it should be able to partly address the investment deficit observed throughout the transitional period. But the overall investment levels and the deployment of new mobile technologies in the **medium/long-run** will still likely be below the levels observed under the “No Bill” scenario. This is because the intrusive regulatory measures imposed on the MNOs (e.g. wholesale open access at cost-oriented terms) will continue to be in place and hamper MNOs incentives in relation to future network upgrades and deployment of new technologies.

Moreover, as explained above, the **preferential treatment** of the WOAN is likely to distort the competitive process in the long run, which in turn would further negatively impact investment incentives of the other mobile network operators. This effect will be closely linked to the total amount of spectrum that the WOAN gets assigned under the “2018 Bill” scenario: if the WOAN gets excessive amount of spectrum (e.g. as envisaged under the CSIR study) the risk of competitive distortion will be significantly higher, all else the same.

In summary, the expected market evolution under the “2018 Bill” scenario will most likely result in lower levels of mobile investment and worse outcomes for consumers than under the “No Bill” scenario. We estimate the economic impact of the 2018 Bill on the mobile sector and wider economy below.

⁶¹ While we recognise that these uncertainties will be gradually mitigated as the WOAN gets under way, it is reasonable to assume that MNOs will be more cautious with their investment plans until there is more clarity / certainty around the WOAN’s operations.

3.3 Economic impact of the 2018 Bill proposals as a package

In this section we consider the likely economic impact, in quantitative terms, of this difference in market evolution under the “2018 Bill” and “No Bill” scenarios. This assessment takes account of the detrimental impacts of the Bill, notably the dampening of MNO’s incentives to invest in new technologies and the potential distortion of competition due to preferential treatment of the WOAN. It also reflects the potential positive impacts of the Bill, such as the additional investment in new technologies by the WOAN, and the benefits from spectrum aggregation and improvements in retail competition.

As part of our analysis we have assessed the impact on the mobile sector, particularly the impact on mobile data prices, usage, and overall consumer benefits (surplus), both in the transitional period until the WOAN is fully functional and in the longer term. We also consider the impact on the wider economy, notably on GDP, employment, and government tax revenues. We then consider the potential impact of the Bill on data speeds. Our analysis assumes that the WOAN takes either five or seven years to become *fully functional*. This implies that by 2023-2025 the WOAN will:

- be legally established,
- have all of its HD spectrum deployed,
- will be a fully established wholesale provider, and
- will be able to offer wholesale services *nationally*,

through a combination of its own network infrastructure and relying on MNOs’ networks.⁶² We note however that this assumption does not have a material impact on our assessment of the impact of the Bill – as the impact is largely driven by the other proposed Bill changes.

Below we provide an overview of the approach we have used to estimate the impact on the mobile sector and the wider economy, and the resulting estimated impacts under our base case assumptions.⁶³ Our approach is consistent with our impact assessment of the 2017 Bill, with adjustments made to reflect the changes in the proposals under the 2018 Bill, and other relevant developments since that impact assessment was conducted. A more detailed description of our modelling approach can be found in our January 2018 report⁶⁴ setting out our impact assessment of the 2017 Bill.

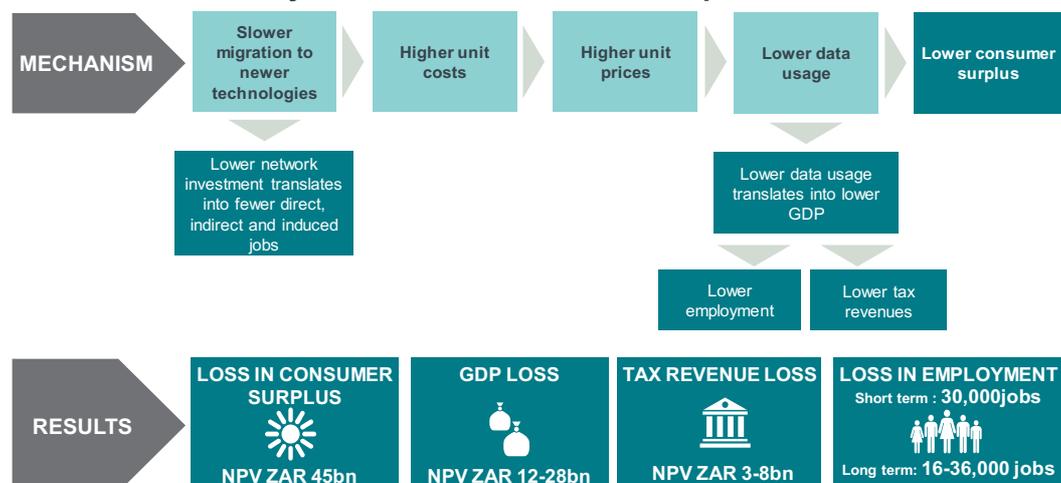
Our analysis shows that the 2018 Bill is likely to have a significant negative impact on both the mobile sector and the wider economy.

⁶² We use seven years assumption in our base case. We believe assuming the WOAN takes seven years to become established better reflects the likely complexity of setting up the WOAN, and is also consistent with the time taken to set-up similar networks in other jurisdictions such as Mexico and Australia.

⁶³ We also set out the estimated impacts on consumers when we vary our most uncertain assumptions, including the number of years taken for the WOAN to become fully functional.

⁶⁴ Frontier (2018), Assessing the Draft Electronic Communications Amendment Bill, Part I: Impact Assessment, Section 4.1

Figure 3 Expected impact of the 2018 Bill on the mobile sector and wider economy under our base case assumptions



Source: Frontier Economics

3.3.1 Impact on the mobile sector

The estimated impact on data prices, usage, and consumer benefits is driven by the fact that there will be slower deployment of (and migration to) new mobile technologies as a result of the Bill. The impact arises because new technologies can deliver high capacity broadband services at significantly lower unit costs, leading to a reduction in unit prices and an increase in data usage.

In our analysis, we therefore took the migration to new technologies both with and without the Bill as the starting point, and then estimated the resulting impacts in five steps, as illustrated in Figure 4 below. In our modelling, we explicitly modelled the period up to 2030, and then assumed that a “steady state” is reached up to 2040.⁶⁵

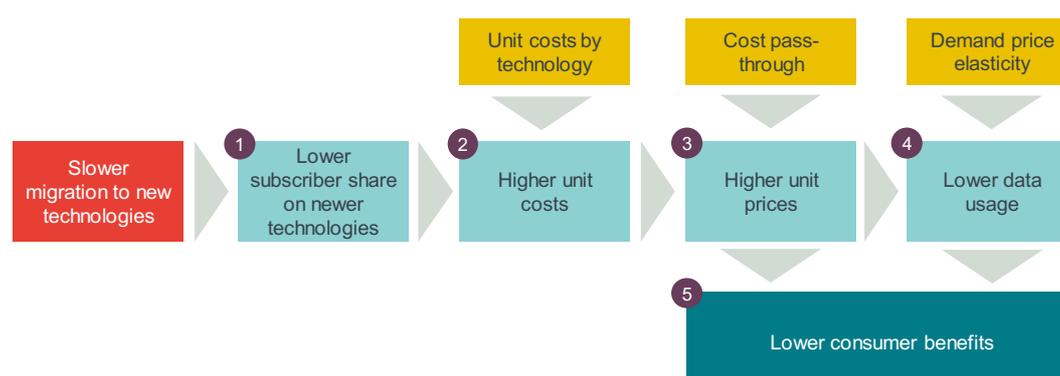
1. **Estimate the share of subscribers on different mobile technologies under the “2018 Bill” and “No Bill” scenarios.** As explained in more detail below, the migration of subscribers to newer 4G and 5G technologies is estimated to be significantly slower under the Bill, particularly before the WOAN becomes fully functional.
2. **Estimate the increase in unit costs per MB of data under the Bill.** This was done by combining the estimated technology shares under the “2018 Bill” scenario and “No Bill” scenarios with the estimated network and retail unit costs for each technology up to 2030. We have assumed that the unit costs for each technology will be the same both with and without the Bill.
3. **Estimate the increase in unit prices under the Bill.** This is estimated by assuming that the majority of the increase in unit costs will be passed onto customers through higher prices. Cost pass-through is assumed to rise from 90% in 2018 to 100% by 2025, which is consistent with the Government’s

⁶⁵ This means that we assume the difference in prices, usage, and consumer benefits between the “2018 Bill” scenario and “No Bill” scenario remains the same from 2030 until 2040.

measures under both the “2018 Bill” and “No Bill” scenarios to intensify retail competition in the mobile sector (see Section 3.2 above).⁶⁶

4. **Estimate the reduction in data usage under the Bill.** We have been conservative and assumed that data usage grows by 25% per year up to 2030 under the “No Bill scenario”.⁶⁷ The reduction in usage under the Bill was then estimated by combining the estimated increase in unit prices with a measure of “demand price elasticity” for mobile data usage i.e. how demand for data would reduce as a result of a given increase in prices. In our modelling we use a price elasticity of -1, meaning that a 1% increase in data prices between the “No Bill” scenario and “2018 Bill” scenario would lead to a 1% decrease in data usage.
5. **Estimate the reduction in consumer benefits (“consumer surplus”) under the Bill.** This is calculated by combining the estimated increase in prices and reduction in data usage under the Bill. The impacts are estimated directly to up to 2030, and then assumed to remain constant up to 2040.⁶⁸ The impact is converted to a Net Present Value (NPV) figure using a social discount rate of 8.6% per annum, which is based on a 10 year Government bond yield for South Africa.

Figure 4 Overview of approach to estimating the impact of the Bill on data prices, usage, and consumer benefits



Source: Frontier Economics

Migration to new technologies under the “2018 Bill” and “No Bill” scenarios

As highlighted above, the evolution of subscriber shares on each technology is the starting point of our assessment of the economic impact of the Bill.

⁶⁶ An increasing rate of cost pass-through implies a fall in the profitability of the industry over time, which is consistent with intensifying service based competition.

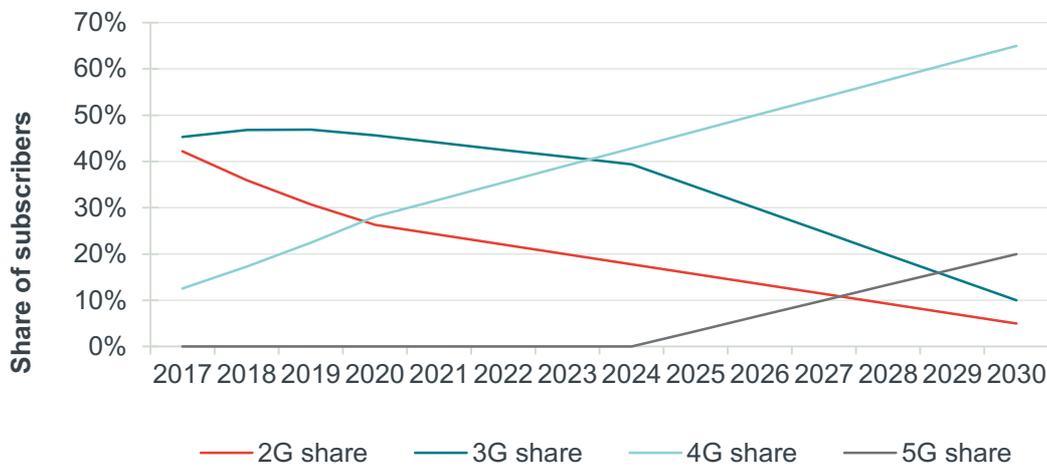
⁶⁷ This is consistent with the assumed data usage growth in our impact assessment of the 2017 Bill. Cisco estimates that data usage will increase by 50% per year up to 2021 in South Africa. Our lower growth assumption takes account of the potential for growth in demand for data to level off in the long run.

⁶⁸ The estimated impacts are “truncated” at 2040, as we would expect by that time that a future Government would take measures necessary to reverse the negative impacts of the Bill. We note however that given the relatively high discount rate, bringing forward (or pushing back) the truncation year does not have a material impact on our overall estimates.

For the “No Bill” scenario, we have taken forecasts from the GSMA (which run up to 2020) and projected these to 2030.⁶⁹ We have assumed that:

- the rate of transition to 4G continues to 2030 at a slightly slower pace than the GSMA forecasts, meaning it reaches 65% by 2030⁷⁰;
- by 2030, only 5% of subscribers remain on 2G;
- subscribers begin moving to 5G in 2025, with 20% of subscribers having transitioned to 5G by 2030; and
- the remainder of subscribers are on 3G, meaning the share of subscribers on 3G declines to 10% by 2030.

Figure 5 Share of subscribers by technology under the “No Bill scenario”



Source: GSMA and Frontier Economics

Figure 6 below then illustrates the projected evolution of subscriber shares in the “2018 Bill” scenario under our base case. These shares are calculated based on the following assumptions, consistent with the expected evolution of the mobile market under the Bill set out in Section 3.2.2.

- **Migration to new technologies is the same as under the “No Bill” scenario up to 2020.** This is a conservative assumption, as the problematic proposals within the Bill would be expected to dampen the incentives for MNOs to invest in new technologies even before 2020.
- **There would be a significant slowdown in the deployment of (and migration to) new technologies during the “transitional period” until the WOAN is fully functional.** This reflects a significant risk of MNOs incentive and ability to invest being dampened as a result of the 2018 Bill proposals (including in relation to the speed of deployment of 2.6 GHz spectrum).

⁶⁹ These assumptions are consistent with assumed migration patterns absent the Bill as part of our assessment of the 2017 Bill.

⁷⁰ We assume that the 4G subscriber share increases by 3.7 percentage points per year over 2020-2030, compared to an average of 5.2 percentage points per year up to 2020 under the GSMA forecasts.

Under our base case we assume that between 2021 and 2025, it takes five years in the “2018 Bill” scenario to achieve the same progress in terms of transition to new technologies as three years’ worth of progress in the “No Bill” scenario (see Figure 6 below).⁷¹ We also conservatively assume that migration to 5G begins in 2027, a delay of only two years compared to the “No Bill” scenario.⁷²

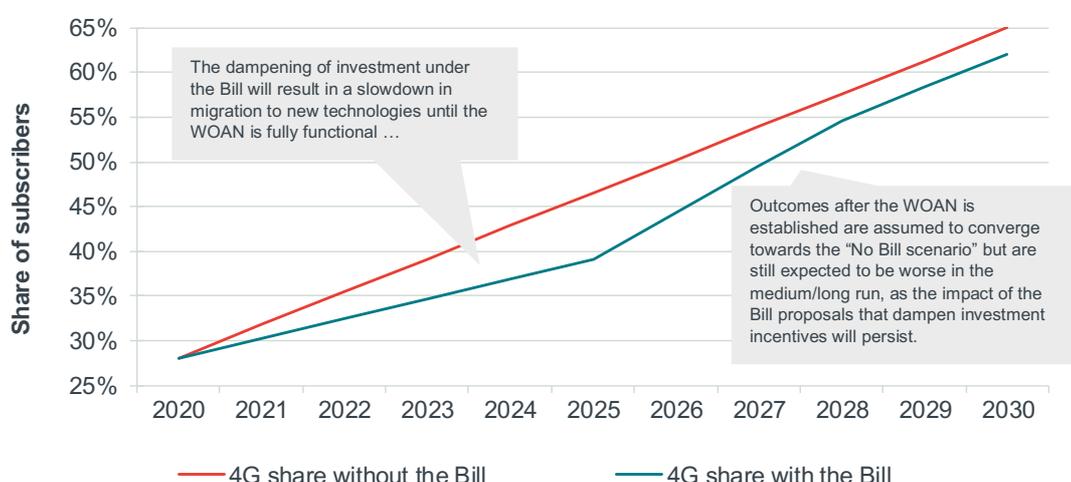
- **The share of subscribers on new technologies would “converge” towards that in the “No Bill” scenario post-2025, but will still not reach the levels obtained without the Bill in the long run.** As highlighted in Section 3.2.2, once the WOAN is established it may be able to partly address the investment deficit observed throughout the transitional period. However in the medium/long-run, the overall level of investment in new mobile technologies is still likely be below the levels observed under the “No Bill” scenario. This is because the intrusive measures imposed on MNOs (e.g. cost-oriented wholesale open access requirements, non-exclusive use of spectrum and overall regulatory uncertainty) will continue to be in place and therefore continue to dampen investment by MNOs over the medium/long term. The potential distortion of network competition due to the preferential treatment of the WOAN is also likely to have a further negative impact on MNOs’ investment incentives, if it confers on the WOAN a longer term, unjustified, competitive advantage.

To reflect the investments made by the WOAN, we assume that the rate of migration to new technologies increases after 2025, compared to the rate during the transitional period. Over 2025-2028, we assume that migration would be faster than that in the “No Bill” scenario. This is illustrated in Figure 6, which shows the share of 4G subscribers under the Bill “converging” to that in the “No Bill” scenario” over this period. We then assume that the rate of migration is the same under the “2018 Bill” and “No Bill” scenario after 2028, shown in the figure below by the 4G share in both scenarios moving “in parallel”. In practice this means that the share of subscribers on new technologies is still assumed to be smaller under the Bill after 2028, but that the difference compared to the “No Bill” scenario remains the same. We consider this to be a particularly conservative assumption, as the on-going dampening of investment under the Bill could in fact result in the rate of migration to new technologies being lower, not the same, as under the “No Bill” scenario in the long run. This would result in a widening of the gap between the 4G and 5G subscriber shares in the “2018 Bill” and “No Bill” scenarios, rather than this gap staying the same as assumed in our base case.

⁷¹ In other words, the “2018 Bill” scenario in 2025 resembles the “No Bill” scenario at the end of 2023. The assumed speed of progress is faster than that assumed in our assessment of the 2017 Bill, where we assumed that the “Bill scenario” in 2025 resembles the “No Bill scenario” in 2021. This is because MNOs will likely have access to 2.6 GHz spectrum earlier under the 2018 Bill than under the 2017 Bill proposals.

⁷² As we define the WOAN as be fully functional when it is offering services nationally, It is possible that the rate of migration to new technologies may begin to increase before 2025, as the WOAN starts offering wholesale services in certain areas. We have not reflected this explicitly in our modelling. However, we still believe that our approach is conservative given that, as stated above and below, the impact of the Bill both up to 2020 and after 2025 is likely to be larger than we have assumed within our modelling.

Figure 6 4G subscriber share under the “2018 Bill” and “No Bill” scenarios



Source: Frontier Economics

Impact on data prices, data usage and consumer benefits

Error! Reference source not found. below summarises the impact on data prices, usage and consumer benefits of the 2018 Bill based on the assumed migration patterns highlighted above.

Overall, our analysis indicates that:

- Mobile data prices would be **up to 16% higher** with the Bill. Data prices are estimated to fall less quickly under the “2018 Bill” scenario (12% per year over 2021-2030 vs 13% under the “No Bill” scenario), leading to prices that are between 6% and 16% higher over the period 2025-2030.
- Usage of mobile data would be significantly lower under the Bill, with **usage being between 6% and 16% lower** than without the Bill over 2025-2030. This translates to the average consumer in South Africa consuming **415MB less data per month** by 2030.
- These impacts could translate to a significant reduction in consumer benefits, with an estimated loss in consumer surplus of **ZAR 45bn** in NPV terms.

Impact on data speeds

In addition to the analysis of the impact on data prices, data usage, and consumer benefits, Vodacom has also instructed Northstream, a mobile technology consultancy, to estimate the impact of the 2018 Bill on average data speeds.⁷³

⁷³ Northstream (2018), Impact of the 2018 Bill: Modelling the Impacts on Speed. While Northstream calculation of the average speeds yields estimates of coverage, we do not explicitly present coverage estimates within our report. This is because Northstream modelling approach does not provide a fully accurate estimate of coverage under the 2018 Bill, given the new “outside in” coverage obligations requirements. In particular, Northstream modelling is based on the assumption that operators rollout to the most densely populated areas first, whilst in contrast, the outside in obligations under the Bill require operators to deploy in larger less densely populated rural areas before rolling out to denser urban areas. The modelling approach may therefore estimate population coverage to increase faster under the Bill than

Northstream's modelling estimates the development of average data speeds for Vodacom, MTN, Cell C and Telkom under the "2018 Bill" and "No Bill" scenarios, over the period from 2018 to 2025.^{74 75} The modelling approach is consistent with Northstream's assessment of the 2017 Bill, and is explained in detail in their report which is attached as a separate Annex.

The key differences between the "2018 Bill" and "No Bill" scenarios in Northstream's analysis are set out in the table below. Operators are assumed to re-farm spectrum later and invest less in additional 4G sites under the Bill, reflecting that MNO's have a lower incentive to invest in new technologies. Operators are also assumed to deploy 2.6 GHz spectrum later under the "Bill scenario", reflecting the requirement that MNO's meet coverage obligation in rural areas before deploying spectrum in urban and suburban areas.

would be the case, and similarly, estimate area coverage to increase more slowly than would be expected. We note that the speed estimates are effected to a much lesser extent by this modelling assumption.

⁷⁴ An average data speed across all operators is calculated based on operators' market shares, which are assumed to remain unchanged up to 2025.

⁷⁵ The modelling does not consider the provision of services by the WOAN, given that the WOAN is not assumed to be fully functional until 2025. It is again possible that the WOAN could provide services in some areas before 2025, but Northstream does not expect that considering this explicitly would have a material impact on the estimated impact on data speeds.

Figure 7 Key differences between the “2018 Bill” scenario and “No Bill” scenario in Northstream’s modelling

	“2018 Bill” scenario	“No Bill” scenario
Re-farming of 2G/3G spectrum for 4G use.	Spectrum re-farming occurs one year later than under the “No Bill” scenario ⁷⁶	Some spectrum re-farming, with the timing varying by operator
Investment in additional 4G sites	Same level of investment as the “No Bill” scenario over 2018-2020. Investment then assumed to be 50% of that in the “No Bill” scenario over 2021-2025. ⁷⁷	Investment in additional sites over 2018-2025, with rate of roll-out in line with experience in other jurisdictions.
Amount and timing of spectrum deployment	Additional spectrum as per the proposals in the CSIR study. 700 MHz/800 MHz deployed in 2022 (same as the “No Bill” scenario); 2.6GHz deployment delayed until 2023. ⁷⁸	spectrum as per the ITA. 2.6 GHz deployed in 2019; 700 MHz/800 MHz deployed in 2022 ⁷⁹
Subscriber technology mix	Consistent with Frontier approach - only three years’ worth of progress in migration to new technologies over 2021-2025.	Consistent with Frontier estimates - based on GSMA forecasts.
Subscriber growth	2.04% per year (consistent with the assumed increase in non-network costs in our analysis ⁸⁰)	

Source: Frontier Economics based on the Northstream report.

As a result of this approach, Northstream estimates that the 2018 Bill would have a significant impact on data speeds in South Africa.

In particular, the average data speed could be **up to 37% higher** without the Bill. Speeds would be between 9% and 37% higher in the “No Bill” scenario, with the impact being particularly large over 2019-2023 (speeds would be on average 30% larger over this period). This is expected, as this is the period when operators are restricted from deploying 2.6 GHz spectrum under the Bill.

⁷⁶ We note that under the 2018 Bill any re-farming will be subject to ICASA’s approval.

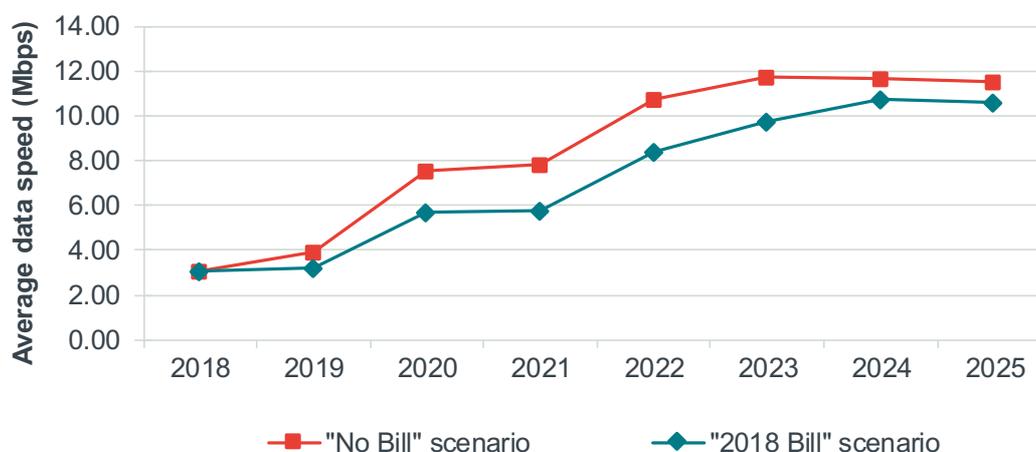
⁷⁷ This reflects Frontier’s estimate that only three years’ progress is made in terms of migration of new technologies over the five years up to 2025. The reduction in investment is assumed to be 50% (rather than 40% as implied by the progress highlighted above), as MNO’s would be able to provide some additional coverage from existing sites as a result of the additional spectrum they obtain in 2022 and 2023..

⁷⁸ This assumes that MNO’s will be able to meet coverage obligation in rural areas, and therefore start deploying in urban areas, by 2023. This is a conservative assumption, as it assumes that MNO’s would be able to meet these obligations within one year of deploying additional 700MHz/800MHz spectrum. This may not be the case, given the work needed to deploy this spectrum (such as upgrading backhaul links in rural areas).

⁷⁹ 700MHz and 800MHz is now expected to be released by 2022 at the earliest, rather than 2021 as assumed in Northstream’s analysis of the 2017 Bill. This is a conservative assumption, as there is a risk that there is a further delay in the release of this spectrum.

⁸⁰ Assumed to increase by 30% over 2018 to 2030.

Figure 8 Average data speeds under the “2018 Bill” and “No Bill” scenarios



Source: Northstream

3.3.2 Impact on the wider economy

It is widely recognised that the telecoms sector plays a significant role in the South African economy, with SA Connect (2013) itself estimating that if the broadband targets in South Africa Connect were achieved, this could create 400,000 jobs and contribute over ZAR 130bn to GDP over a 10 year period. This is because investment and spending in the telecoms sector can have a multiplier effect on other sectors, in particular through helping to improve productivity.

Given this, we have also estimated the possible wider economic impact of the Bill, in particular the likely impact on GDP, employment in the short and long term, and government revenues.

Below we provide a high-level overview of the approach we have used to estimate these impacts, and the subsequent results. Overall, we have focussed our assessment of wider economic impacts on the period 2020-2025 (i.e. the period until the WOAN is expected to become fully functional), as the majority of the impacts are likely to be realised over this period. This is again a conservative approach, because as shown above, the Bill is likely to have negative impacts even beyond this period.

Approach

Our overall approach for estimating the wider impacts of the Bill is summarised in Figure 9 below.

To estimate the impact on GDP we have selected two approaches, which draw on recent studies and our assessment of the Bill’s impact on the mobile sector:

- **The SA Connect approach.** This considers the impact of increases in digitalisation and data speeds on the size of the economy. Regarding digitalisation, we combine the estimated reduction in digitalisation under the Bill over 2020-2025 with the link between digitalisation and GDP estimated in the

Katz et.al. (2012) study.⁸¹⁸² Regarding data speeds, we combine the estimated reduction in data speeds under the Bill with the relationship between data speeds and GDP growth within the Bohlin (2012) study⁸³.

- **The Deloitte/GSMA approach.** This combines the expected reduction in data usage under the Bill with the estimated link between data usage growth and GDP in the Deloitte/GSMA (2012) study.⁸⁴

In terms of the employment effect, we have estimated both a short-term and long-term impact on employment, in line with the approach used to assess the impact of SA Connect. The short-term impact reflects the lower investment in the transitional period (2021 to 2025) under the Bill, and combines the estimated reduction in new investment under the Bill with the relationship between new investment and jobs in the Katz (2013) study.⁸⁵ The longer-term impact reflects the lower overall size of the economy under the Bill, and combines the expected impact of the Bill on GDP under the SA Connect and Deloitte/GSMA approaches highlighted above, with the ratio between GDP and employment in South Africa.

The impact on government revenues is measured by the impact on tax revenues, which is estimated by combining the expected impact on GDP under the Bill with the estimated ratio of tax revenue to GDP in South Africa.⁸⁶

⁸¹ The results of the study are presented in Katz (2013), The impact of South Africa Connect on jobs and the economy http://www.teleadvs.com/wp-content/uploads/South_Africa_presentation_final_version.pdf

⁸² We assume that increased digitalisation in the mobile sector reduces by 40% compared to the “No Bill” scenario over 2021-2025, reflecting our assumption that we assume three years’ worth of progress would be made over this five-year period compared to the “No Bill scenario”. The is a smaller reduction than that assumed in our assessment of the 2017 Bill (80%), where we assumed only one years’ worth of progress would be made over the same period.

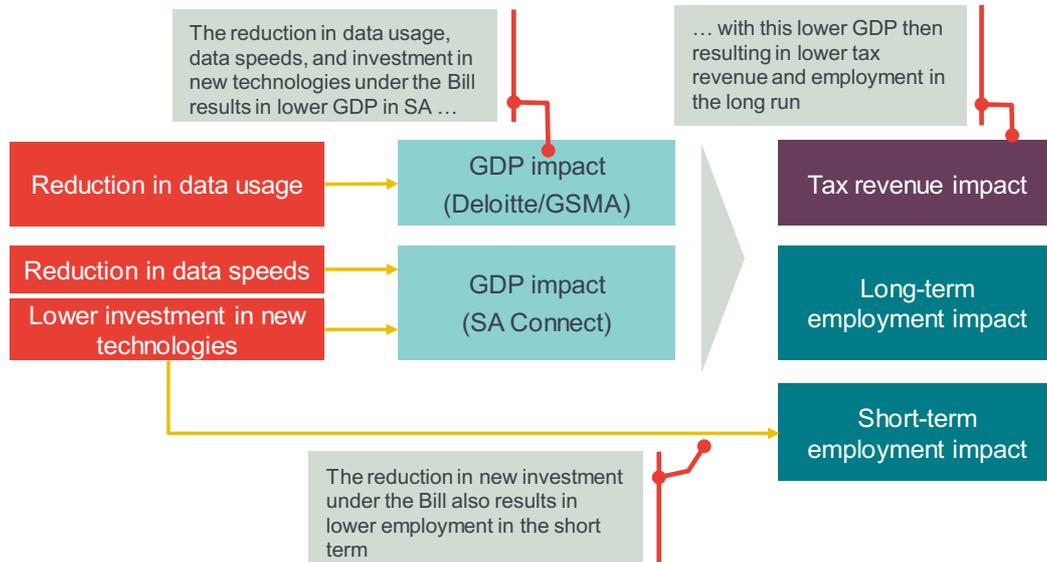
⁸³ The results of the study are presented in Katz (2013), The impact of South Africa Connect on jobs and the economy http://www.teleadvs.com/wp-content/uploads/South_Africa_presentation_final_version.pdf

⁸⁴ Deloitte/GSMA (2012), What is the impact of mobile telephony on economic growth? <https://www.gsma.com/publicpolicy/wp-content/uploads/2012/11/gsma-deloitte-impact-mobile-telephony-economic-growth.pdf>

⁸⁵ The results of the study are presented in Katz (2013), The impact of South Africa Connect on jobs and the economy http://www.teleadvs.com/wp-content/uploads/South_Africa_presentation_final_version.pdf

⁸⁶ Considering only the impact on tax revenue results in a conservative estimate of the impact of the Bill on government revenues, as it does not take into account of the potential loss in revenue from reserving spectrum for the WOAN. It is not clear from the Bill whether the WOAN will pay for the spectrum it receives. If no payment is made, then this would result in the government losing all the revenue it would have received if this was auctioned to other MNOs – this would be significant, as the Bill proposes to assign 45% of all HD spectrum to the WOAN. Even if a payment is made by the WOAN, the amount paid is likely to still result in lost revenue for the government. This is because the payment would be unlikely to reflect the true market value of the spectrum, given the price would not be determined through a competitive auction process.

Figure 9 Approach used to estimating the impact of the 2018 Bill on the wider economy



Source: Frontier Economics

Expected impact on the wider economy

The table below summarises the estimated impacts of the Bill on GDP, tax revenue, and employment. Overall, our analysis indicates that:

- The Bill could have **an impact on GDP in the region of ZAR12bn to ZAR28bn** in NPV terms over 2021-2025, depending on which approach is used.
- This impact on GDP could then result in **a reduction in tax revenue under the Bill of ZAR3bn to ZAR8bn** in NPV terms over this period.
- The Bill could result in **30,000 fewer jobs across the telecoms sector and wider economy during the transitional period**, due to lower investment in the mobile sector.
- It could also result in **16,000-36,000 fewer jobs in the longer term** as a result of the lower overall size of the SA economy under the Bill.

Figure 10 Expected impact of the Bill on the wider economy

	SA Connect approach	Deloitte/GSMA approach
GDP impact	ZAR12bn in NPV terms over 2021-2025 <i>ZAR10bn impact due to reduction in digitalisation; ZAR2bn through reduction in data speeds.</i>	ZAR28bn in NPV terms over 2021-2025
Tax revenue impact	ZAR3bn in NPV terms over 2021-2025	ZAR8bn in NPV terms over 2021-2025
Employment effect Short-term (via lower investment)	30,000 fewer jobs during the transitional period (2021 to 2025)	
Employment effect Longer-term (via lower GDP) – based on 2025	16,000	36,000

Source: Frontier Economics

3.3.3 Sensitivity analysis

As highlighted above, there is uncertainty around the number of years it will take for the WOAN to become fully functional. We have therefore considered a sensitivity in our analysis where it takes five years for the WOAN to become fully functional (i.e. by 2023), rather than seven years as assumed in our base case. We have assumed that the Bill would still result in a two-year delay in migration to new technologies during the transitional period, consistent with the base case.⁸⁷ As shown in the figure below, the NPV loss in consumer benefits under this sensitivity would be **ZAR45.0bn**, only slightly smaller than the ZAR45.5m impact under the base case. This is expected, as the slowdown in migration to next generation technologies is the key driver of the impact on consumer benefits.

There is also uncertainty around the impact that the Bill will have on rate of migration to new technologies, both before and after the WOAN becomes fully functional. We have therefore considered two further sensitivity tests:

- Larger slowdown of migration to new technologies in the transitional period.** We consider a sensitivity where it takes five years in the “Bill scenario” to achieve the same progress as two years’ worth of progress in the “No Bill scenario”, rather than three years in our base case. This represents a three year slowdown in migration, relative to two years under the base case. Under this approach, the NPV loss in consumer benefits would be **ZAR68bn**.
- No “convergence” in the subscriber share on new technologies after the WOAN is fully functional.** This assumes that the rate of migration is the same under the “2018 Bill” and “No Bill” scenario after 2025, rather than after 2028

⁸⁷ This means that the share of subscribers on new technologies in “2018 Bill” scenario in 2023 resembles the “No Bill” scenario at the end of 2021. This is a reasonable assumption, as the proposals driving the dampening of investment during the transitional period, such as restrictive coverage obligations, would still have the same impact on investment incentives even if the WOAN became fully functional earlier.

as assumed in our base case.⁸⁸ Under this approach, the negative impact of the Bill on the NPV of consumer benefits would further increase to **ZAR78bn**.

Figure 11 Sensitivity analysis[Error! Not a valid link.](#) *Source: Frontier Economics*

3.4 Conclusion on the economic impact of the 2018 Bill proposals

In summary, our detailed analysis shows that the 2018 Bill is likely to have a significant negative impact on both the mobile sector and the wider economy, even when making conservative assumptions around the determinantal impacts of the Bill. Moreover, the Bill is estimated to have a significant negative impact even when varying the most uncertain assumptions in the analysis, such as the number of years taken for the WOAN to become fully functional.

In light of these findings, we conclude below by discussing briefly the ability of the 2018 Bill to achieve its main policy objectives.

⁸⁸ As highlighted above, this is still a conservative assumption, as the on-going dampening of investment under the Bill could in fact result in the rate of migration to new technologies being lower, not the same, as under the "No Bill" scenario in the medium to long term.

4 THE ABILITY OF THE 2018 BILL TO ACHIEVE ITS MAIN OBJECTIVES

The main objective of the 2018 Bill⁸⁹ is to support the Government's long-term policy objectives for the ICT sector in South Africa. The key objectives that relate to the development of the mobile market in South Africa are shown in **Figure 12** below, which also summarises the impact of the Bill against these objectives.

Based on our assessment of the key issues with the 2018 Bill and the estimated economic impact of the Bill proposals as a package, we find that the Bill is unlikely to support these objectives and hence achieve its stated purpose.

Figure 12 Assessment of the 2018 Bill against Government objectives

Objective	Impact of the Bill
<p>Increase broadband coverage in rural and underserved areas</p>	<p>Lower coverage due to:</p> <ul style="list-style-type: none"> ▪ Lower incentives for existing operators to invest due to number of measures that impact on expected returns, including imposition of cost-oriented access obligations and non-exclusive use spectrum. ▪ WOAN will take time to become fully functional and will likely focus its rollout on urban areas first.
<p>Reduce the costs of communications services to end-users, including the promotion of infrastructure sharing and access</p>	<p>Higher prices due to:</p> <ul style="list-style-type: none"> ▪ Slower migration to new technologies due to the dampening effect of the Bill measures on non-exclusive use of spectrum and WOA on operators' incentives to invest in next generation mobile technologies; inability of existing operators to roll out efficiently in urban and sub-urban areas (due to restrictive 'outside-in' coverage obligations); delay in deploying additional spectrum in the expected time it will take to establish the WOAN; potential distortion of competition at the network level due to preferential treatment of the WOAN.
<p>Promoting investment and innovation in the sector</p>	<p>Less investment and innovation due to:</p> <ul style="list-style-type: none"> ▪ Lower ability and incentives for existing operators to invest due to number of measures that increase regulatory uncertainty and distort competition.

⁸⁹ The 2018 Bill, p. 2

<p>Enhancing service-based competition, to increase consumer choice</p>	<p>Likely limited impact relative to “No Bill” scenario:</p> <ul style="list-style-type: none"> ■ retail competition will be promoted via the competitive WOAN which would compete alongside existing operators under the “No Bill” scenario (so the WOAN proposed under the “2018 Bill” will have only limited incremental contribution in this area); ■ minimum capacity commitments required under the 2018 Bill leave only limited scope for new retail entrants to rely on the WOAN, as existing MNOs will likely have to purchase 90% of the WOAN capacity; and ■ benefits of any potential increase in service-based competition are likely to be modest compared to the negative impacts on investment, since service-based competitors do not own their own RAN, and hence have limited ability to innovate.
--	---

<p>Redressing market dominance and control</p>	<p>There is a reduced but not negligible risk of establishment of a dominant WOAN which would increase in market concentration at the wholesale level.</p>
---	--

Overall, the 2018 Bill will likely lead to consumer outcomes that are inconsistent with the Government’s long-term policy objectives for the mobile sector. In particular, we would expect the Bill to lead to higher prices, slower transition to next generation mobile technologies (with higher mobile broadband speeds), and less innovation, compared to what would be achievable in its absence.

ANNEX A LAST MOVER ADVANTAGE UNDER OPEN ACCESS REQUIREMENTS

A.1 Summary

To help consider the impact of mandated cost-oriented access on investment incentives, we have developed a theoretical model which analyses investment decisions under a range of scenarios using the principles of game theory.

The model considers two MNOs, who we assume have symmetric costs and demand and who are deciding whether to invest into new technologies. The decision to invest is determined by their expected payoffs from investment, based on a range of input assumptions.

Our analysis of the model finds that the outcomes can be grouped in three categories, under which the investment decisions and impact of mandating wholesale access are consistent:

1. **High demand** - Where the expected payoffs from investment are high, as investment into new technologies is expected to lead to significant demand growth and/or marginal cost savings. This scenario will be most relevant for urban areas with high population density and demand.
2. **Moderate demand** - Where the expected payoffs from investment are positive but less certain i.e. where there is potentially sufficient demand growth (or marginal cost savings) to recover the fixed costs but this may not be the case if both firms invest. This type of scenario may be reflective of less populated semi-urban areas and/where there is less demand certainty.
3. **Low demand** - Where the payoffs are expected to be low, or even negative i.e. where there is unlikely to be sufficient demand to recover the fixed costs. This type of scenario might occur in underserved rural areas where demand may not be sufficient to recover the high fixed costs of new investment.

The figure below shows the outcomes in terms of investment across the three demand scenarios: high, medium and low demand, broadly approximating urban, sub-urban and rural areas. This shows that, across the three scenarios, mandating cost-oriented wholesale access leads to equal or worse investment outcomes (but never better) compared with a situation where access is not mandated.

Figure 13 Outcomes of game theory analysis

	High demand	Moderate demand	Low demand
	Both firms invest	Both firms invest	No investment
Outcomes without mandated access			
Outcomes with mandated access	Depending on probability of other firm investing, both firms may invest, or neither firm may invest due to 'last mover advantage'  or 	Highly likely that neither firm invests due to 'last mover advantage' 	No investment 

Source: Frontier

This can be explained by the fact that:

- **Without mandated access**, if demand is expected to be sufficient to cover the cost of investment, then MNOs have an incentive to invest, given the high potential payoffs from investing. This is particularly driven by the fact that they have a chance to gain a significant competitive advantage over rivals if they are the only firm to invest. MNOs also face a risk of very low payoffs if they do not invest and hence have an inferior product to a rival who does invest. This means that even in a scenario where demand is more moderate, both MNOs will choose to invest in deploying their networks (or commercially agree to invest with a joint venture or access arrangement).
- **With mandated cost-oriented access**, both the high upside from investing, and the low downside risk of not investing are removed. This weakens the incentive to invest significantly. With mandated access, there may be an advantage from being the 'last mover' because the risks (and sunk costs) of the investment rest with the MNO that invests first and not with the MNO that prefers to acquire access from the other MNO. In practice this means that the best strategy may be to wait for a rival to invest and this may result in investment being delayed or never happening. The lower the expected demand, the higher the probability that a no investment, 'last mover advantage' outcome occurs. This is because the risks associated with investing increase.

Thus, our analysis shows that mandated cost-oriented access would lead to inferior outcomes where investment doesn't occur due to a 'last mover advantage'.⁹⁰

A.2 Detailed analysis

As explained in Section 2, imposing cost-oriented WOA requirements on all future network investments will directly reduce MNOs' expected returns from these investments, particularly those based on next generation technologies that carry considerable risks. This is driven by the fact that:

- Access obligations undermine that ability of operators to differentiate their services and hence reduces the upside from investment; and
- Where there is mandated access, MNOs may prefer to rent access than take on the risks of investment themselves – we refer to this as “last mover advantage” and explore this in more detail below.

We consider the question of investment incentives with and without mandated cost-oriented access by analysing the decision of two symmetric MNOs on whether to invest in new networks/technologies or not, based on the expected payoffs in each outcome.

We have looked at a range of scenarios in which we vary in terms of the fixed costs of investment, the total level of market demand (with and without investment), marginal costs (with and without investment) and prices. From this analysis we find that the range of scenarios can be grouped into three broad categories, under which the investment decisions are consistent:

1. **High demand** - Where the expected payoffs from investment are high, as investment into new technologies is expected to lead to significant demand growth and/or marginal cost savings;
2. **Moderate demand** - Where there payoffs from investment are expected to be positive but less certain i.e. where there is potentially sufficient demand growth to recover the fixed costs but this may not be the case if both firms invest; and
3. **Low demand** - Where the payoffs are expected to be low, or not positive i.e. where there is unlikely to be sufficient demand to recover the fixed costs.

It is likely that the high and moderate demand scenarios are more relevant in the context of investments in urban areas (e.g. to expand capacity), whilst the low demand scenario may be more relevant in situations where fixed costs are high relative to demand (e.g. expanding coverage in rural areas) or when undertaking investments in new technologies with very high up-front costs.

In these scenarios we can consider the outcomes in terms of investment strategies for both MNOs with and without mandated cost access.

For a given operator (MNO 1), the payoff from investing will differ depending on whether:

- Whether the other MNO (MNO 2) decides to invest; and
- Where MNO 2 decides not to invest, whether MNO 1 offers wholesale access.

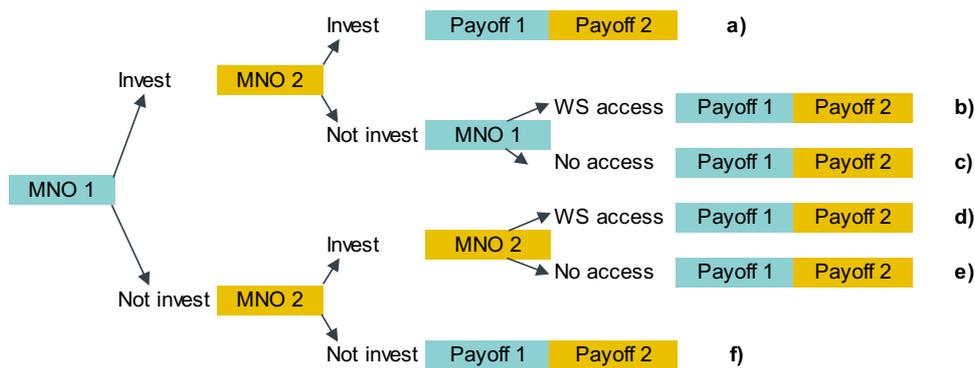
⁹⁰ Our analysis also suggests that any cost savings that can be achieved with mandated cost-orientated access could also be achieved with commercial agreements.

Similarly, the payoff from not investing will differ depending on:

- Whether MNO 2 decides to invest; and
- Where MNO 2 does decide to invest, whether it offers wholesale access.

In line with the principles of game theory, MNOs will choose a strategy (to invest or not invest and to offer access or not), based on their own payoffs, under different outcomes, and based on what they know about the other MNOs. This can be illustrated in a payoff decision tree as shown below.

Figure 14 investment decision tree



Source: Frontier

Without mandated access, in a market with two players, if MNO 1 has chosen to invest and their rival, MNO 2, has not invested, they then have a choice between outcomes - offering access (option b) or not offering access (option c). They will only choose **b)** i.e. to offer access, if this gives them a higher payoff than **c)** - not offering access.

However, MNO 2 will only accept access if it also gives them a higher payoff than no access. This is a secondary stage of choice, and it is unlikely to be pivotal to the initial investment choice. This is because any access agreement will lead to some sharing of the benefits and costs of the investment between the MNOs. In the extreme scenario⁹¹ an MNO will be able to capture the whole market demand if they offer no access, so no sharing arrangement could offer them a better payoff.

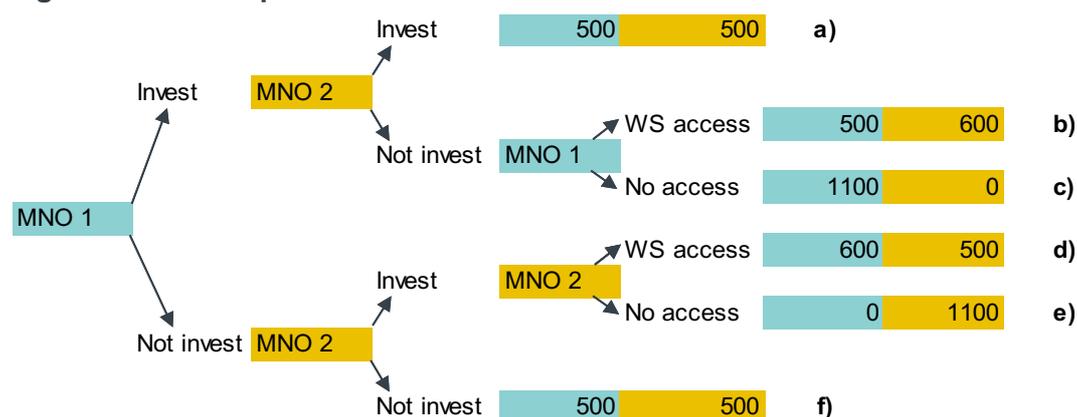
This is illustrated by the following example:

- If MNO 1 has invested, MNO 2 will get payoff:
 - a) 500, if it also invests;
 - b) Up to 600 (depending on the cost of access), if it does not invest but gains access to MNO 1's network (because there is some saving, the fixed cost of investment = 100, from only one MNO investing); or
 - c) 0, if it does not invest and is not allowed access to MNO 1's network.

⁹¹ i.e. if we consider a Cournot model of competition where competitors either share the market, or (without capacity constraints) one takes the whole market demand.

- The higher potential payoff under **b)** means that MNO 2 has an incentive to try to negotiate an access deal with MNO 1, to share the (up to) 100 it could gain with access, over and above the payoff from **a)** of 500.
- Ex-ante, the minimum payoff that MNO 2 would be willing to accept in this scenario is 500, since this is what it would receive under **a)**. However, this would leave MNO 1 with a payoff of 600 whereas their payoff would be 1100 if they did not give access. Thus MNO 2 cannot sufficiently compensate MNO 1 to offer access.⁹²

Figure 15 Example 1



Symmetric players?	Yes
Total market demand (no investment)	200
Total market demand (investment)	240
Fixed costs of investment	100
marginal cost (no investment)	5
marginal cost (investment)	5
Price	10
WS Price	5

Source: Frontier

Whilst access agreements can on some occasions be commercially negotiated in order to benefit from some cost savings by avoiding duplication, when it is voluntary, it does not have an impact on whether any investment takes place (although it may affect whether more than one MNO invests or not). Therefore to simplify the analysis we can assume that options **b)** and **d)** will not occur in a scenario without mandated access unless there is some form of co-operation, such as a co-investment agreement. Therefore rather than considering access as part of the decision tree, we can first establish the strategies in the absence of coordination and then establish whether MNOs have a viable coordination strategy.

In the absence of mandated access, MNO 1 must decide whether to:

- invest knowing that they will get either **a)** or **c)** depending on the behaviour of the other MNO; or

⁹² If, as is likely in actual markets, MNO2 can credibly threaten to invest, then scenario c) is no longer a viable outcome for MNO 1, so they may consider an access arrangement.

- not invest and get either **e)** or **f)** depending on the behaviour of the other MNO. And MNO 2 must make the equivalent decision.

If **cost-oriented access is mandated** for all players, options **c)** and **e)** will not occur.

Therefore MNO 1 must decide whether to :

- invest knowing that they will get either **a)** or **b)** depending on the behaviour of the other MNO; or
- not invest and get either **d)** or **f)** depending on the behaviour of the other MNO. And MNO 2 must make the equivalent decision.

If an MNO's choice of strategy (i.e. to invest or not invest) is the same regardless of how the other player reacts, they have a "dominant pure strategy". If a dominant pure strategy is not available we can consider mixed strategies, in which each MNO decides to invest or not invest with a certain probability and we can calculate whether the expected payoff from investing is higher than not investing based on the probability of different outcomes.

Below we consider the MNOs' optimal strategies under three main scenarios (high demand, moderate demand and low demand) with and without cost-oriented access. We also consider whether any viable coordination strategies are available. We use illustrative numbers to demonstrate the outcomes.

A.2.1 High demand scenario

First we consider the range of possible scenarios where the expected payoffs from investment are high – in other words, where investment gives rise to an increase in demand and/or marginal cost savings that are expected to outweigh the fixed costs of investment. We demonstrate this with a specific example, where investment would lead to an upgrade in quality which stimulates demand, however our analysis suggests that these results hold in all "high demand" scenarios with symmetric players.

Without cost-oriented access

If the payoffs from investment are higher than (or equal to) not investing, regardless of whether the other player invests or not, then without mandated access both MNOs have a pure strategy to invest.

This can be shown either as a scenario where total demand in the market increases, or as a scenario where marginal costs after investment reduce.⁹³

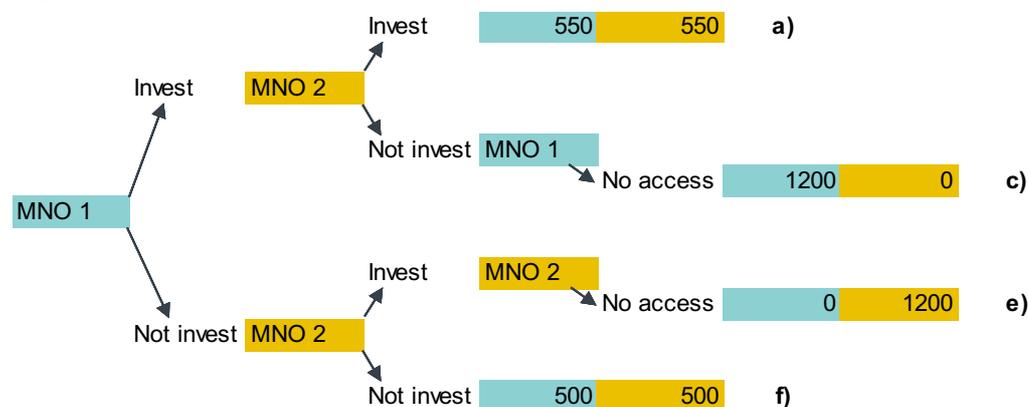
An example is shown below:

- If MNO 2 invests, then MNO 1 will be better off investing as its payoff from **a)** 550 is higher than **e)** 0
- in MNO 2 doesn't invest, then MNO 1 will be better of investing as the payoff from **c)** 1200 is higher than **f)** 500.

⁹³ We have modelled both and found the outcomes to be the same (with equivalent assumptions). For simplicity we focus on the notion of "high demand".

Therefore MNO 1 has a pure strategy to invest, and since this example is symmetric, MNO 2 has the equivalent evaluation of payoffs and will also invest. Therefore we end up in scenario **a)** and both MNOs invest and earn the expected payoff 550.

Figure 16 Scenario 1: Market demand is high (no access)



Symmetric players?	Yes
Total market demand (no investment)	200
Total market demand (investment)	260
Fixed costs of investment	100
marginal cost (no investment)	5
marginal cost (investment)	5
Price	10

Source: Frontier

If MNOs know that they both have a dominant pure strategy to invest⁹⁴ the MNOs could co-operate (i.e. through a joint venture (JV)) to save the costs from duplication of fixed investment (in this example 100) and both benefit from higher payoffs of 600 each.

With cost-oriented access

We consider the same example as above (with all the same inputs), with cost-oriented access, where an access seeker pays a wholesale price equal to the marginal cost.

An example is shown below:

- If MNO 2 invests, then MNO 1 will be better off not investing as its payoff from **d)** 650 is higher than **a)** 550.
- if MNO 2 doesn't invest, then MNO 1 will be better off investing as the payoff from **b)** 550 is higher than **f)** 500.

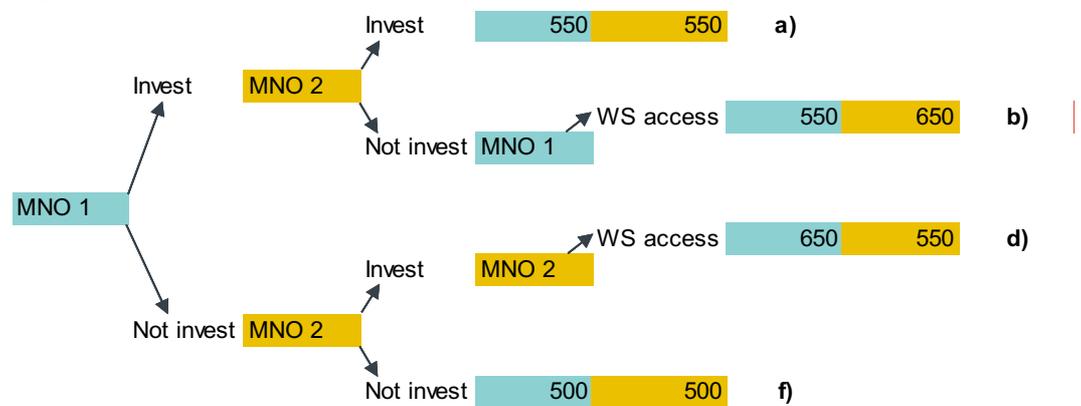
Therefore there is no pure strategy equilibrium in this game, as they both want to do the opposite of their rival. Unlike the scenario without mandated access, the high potential payoff from investing (i.e. the ability to offer a superior product) has been removed as they have to offer rival access to their network. This weakens

⁹⁴ This depends on how much their forecasts of demand are driven by private or publicly available information for example.

the incentive to invest. In addition, because there is no risk of losing share if the rival invests and they do not (since they would both have access to the new network assets), the downsides of not investing have also been removed. The incentives are further skewed towards not investing because the MNO that invests still faces some risk on the fixed cost recovery.

We can instead consider mixed strategies based on probabilities of the different outcomes. In this scenario, for each MNO, investing will give a payoff of 550. Whilst not investing will give a payoff of either 500 or 650. Therefore they will invest if they attach a weight (or probability) above 45% to the scenario where the other MNO does not invest – as this would also make the expected payoff of not investing equal to 550. If they are risk averse, they would attach a high probability to the scenario that their rival would not invest and they would choose to invest.

Figure 17 Scenario 1: Market demand is high (access)



Source: Frontier

If the access price is set to recover marginal costs, then there is no downside to being the MNO who invests but each MNO will still wish to avoid a scenario where they both invest, so there is no pure strategy equilibrium.

As a result, the outcomes in this scenario depend on the probabilities they place on the other MNO investing. However, there is no outcome which is superior, in terms of consumer outcomes, to that under the scenario where there is not mandated access, as consumers will be better off if investment takes place and MNOs both provide these services to customers, either over a single network or two networks⁹⁵.

A.2.2 Moderate demand scenario

Next we consider the range of possible scenarios where the payoffs from investment are expected to be positive (i.e. the benefits to consumers outweigh

⁹⁵ Note consumers will benefit if a JV results in cost savings some of which are passed on to consumers. On the other hand, there will be greater infrastructure competition in the scenario in which both networks invest, which could in turn drive consumer benefits e.g. greater competitive pressure at the network level could give rise to improvements in efficiency which may be passed on to consumers.

the costs) but less certain or lower – in other words, where the increase in demand is such that it is commercially viable for one but not two operators to invest.

Without cost-oriented access

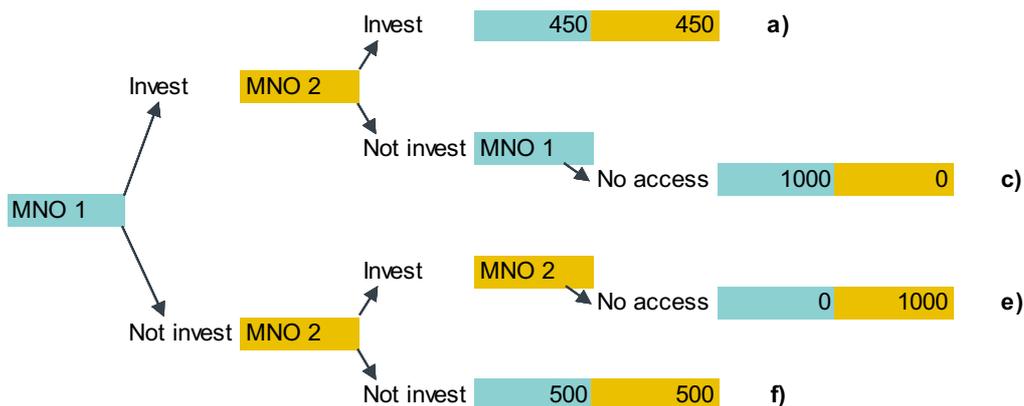
In this example, total market demand increases as a result of the investment but to a lesser extent than in the high demand scenario. Here the MNOs are worse off if they both invest, than if neither of them invests.

An example is shown below:

- If MNO 2 invests, then MNO 1 will be better off investing as its payoff from **a)** 450, is higher than **e)** 0.
- in MNO 2 doesn't invest, then MNO 1 will be better of investing as the payoff from **c)** 1000 is higher than **f)** 500.

Therefore MNO 1 has a dominant pure strategy to invest, and since this example is symmetric, MNO 2 has the equivalent evaluation of payoffs and will also invest. Therefore we end up in scenario **a)** and both MNOs invest and earn the expected payoff 450.

Figure 18 Scenario 2: Market demand is moderate (no access)



Symmetric players?	Yes
Total market demand (no investment)	200
Total market demand (investment)	220
Fixed costs of investment	100
marginal cost (no investment)	5
marginal cost (investment)	5
Price	10

Source: Frontier

This is a 'prisoners dilemma' outcome⁹⁶, as both MNOs would be better off if they both did not invest. If MNOs know that this is the case, the MNOs could coordinate and agree to not invest. However this would not be a stable outcome, as both MNOs would have an incentive to 'deviate' from the agreement and earn the payoff 1000. Therefore the only coordination strategy possible would be a joint venture

⁹⁶ Ref generic explanation of this?

to save the costs from duplication of fixed investment (in this example 100) and both benefit from the 500 payoff each.

As in the high demand scenario, although investment is now more risky/has lower payoffs, there is still a significant potential payoff from investing (i.e. the potential market power they could achieve from having a superior product) which can be achieved if they are the only MNO to invest. There also still exists a significant risk of losing share if the rival invests and they do not (as they would have an inferior product). As a result both firms still choose to invest.

With cost-oriented access

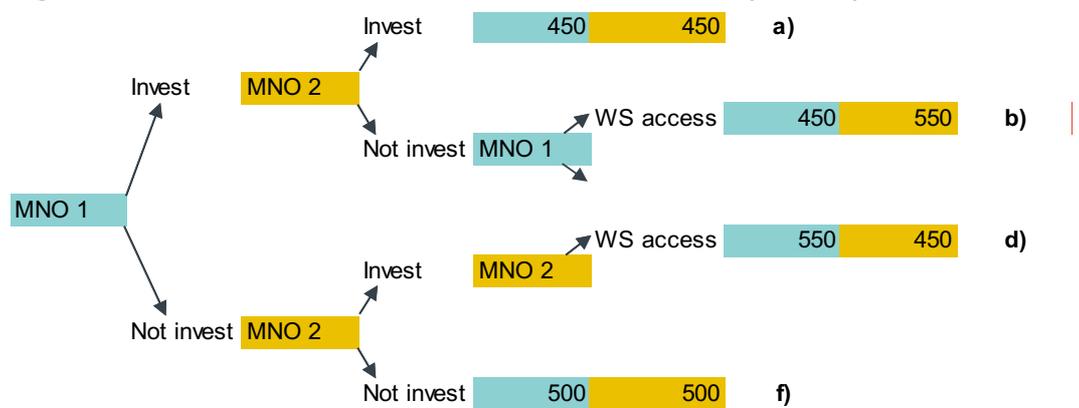
We consider the same example as above (with all the same inputs), with cost-oriented access, where an access seeker pays a wholesale price equal to the marginal cost.

An example is shown below:

- If MNO 2 invests, then MNO 1 will be better off not investing as its payoff from **d) 550** is higher than **a) 450**.
- if MNO 2 doesn't invest, then MNO 1 will be better off not investing as the payoff from **f) 500** is higher than **b) 450**.

Therefore the dominant pure strategy in this game, is to not invest. This is because, although higher payoffs are available to both if one MNO invests, the MNOs each want to be the access seeker because they are charged a price at marginal cost, and therefore do not have to bear the fixed costs. Therefore there is an advantage from being the "last mover". The risks of not investing have been removed due to cost-oriented access, and the potential high payoffs have also been removed. As a result, there are no risks and, some potential benefits from waiting for your rival to invest.

Figure 19 Scenario 2: Market demand is moderate (access)



Source: Frontier

As a result, the outcomes in this scenario are worse for consumers than if no cost-oriented access was mandated, as the operators will want to be the last mover rather than the first mover.

If access was mandated such that it recovered the full costs (both fixed and marginal) then outcomes under b) and d) would each give payoffs of 500. In this example

- If MNO 2 invests, then MNO 1 will be better off not investing as its payoff from **d)** 500 is higher than **a)** 450.
- if MNO 2 doesn't invest, then MNO 1 will be indifferent between investing and not as the payoff from **f)** 500 is the same as **b)** 500.

Therefore although the strategy is not as strong given some indifference, the MNOs still have a dominant pure strategy to not invest.⁹⁷

A.2.3 Low demand scenario

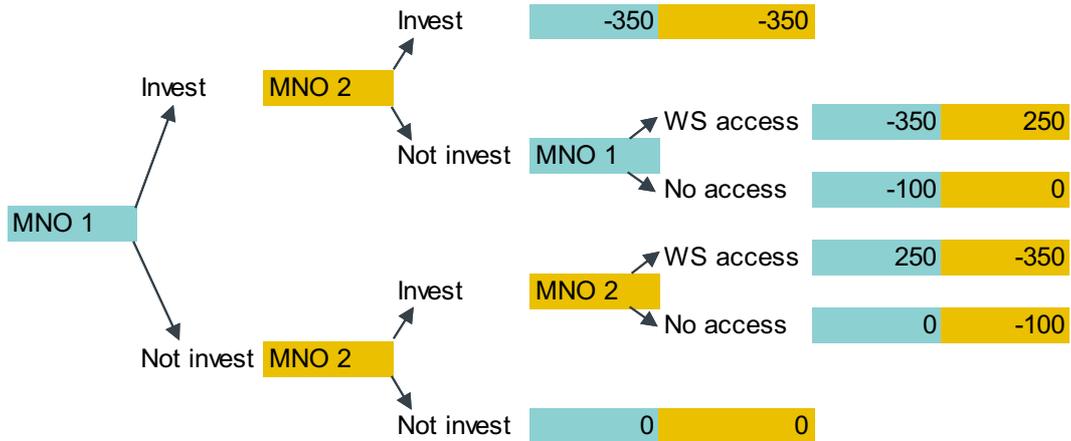
Finally we consider a scenario where the investment would not be sufficient to recover the costs of investment i.e. because demand is insufficient and the fixed costs are high. This could be the case when considering investment to expand coverage into rural areas, where the high costs of deployment mean that it is not commercially viable.⁹⁸

In this example, there is some demand for the investment, but this is not sufficient to recover the high up-front costs.

⁹⁷ In some scenarios, access mandated such that it recovers full costs could lead to a mixed strategy outcome as in the high demand scenario, where dependant on probabilities there may be investment or the 'last mover advantage' may persist.

⁹⁸ However the results still hold in a scenario where there is an 'upgrade' as per the other scenarios but the fixed costs of investment are still high.

Figure 20 Scenario 2: Market demand is low



Symmetric players?	Yes
Total market demand (no investment)	0
Total market demand (investment)	100
Fixed costs of investment	600
marginal cost (no investment)	5
marginal cost (investment)	5
Price	10
WS Price	5

Source: Frontier

Therefore the MNOs have a dominant pure strategy to not invest, whether access is mandated or not as there are no positive payoffs from investing and the payoff from not investing = 0, will always be better than negative profits.

Therefore cost-oriented access will have no impact on investment decisions where there is insufficient demand to recover the costs.

A.2.4 Modifications to our scenarios

We have also considered the impact of changing the assumptions in the simplified examples we have used. Relaxing the assumption of symmetry typically means that one firm has a stronger incentive to invest or be the first mover, however without mandated access, each MNO will still face a high potential upside from investing and a significant potential downside from not investing, and therefore the results still hold. Asymmetry may have an impact on ability or incentive to co-operate, but in our examples, we found no scenarios where this meant cost-oriented access led to improved outcomes.

Further with three players, there are more options for co-operation, and the payoffs differ, however again we found this did not alter our conclusions.

