

# Submission on proposed policy on licensing unassigned high-demand spectrum and deployment of the WOAN

8 November 2018

Dear Mr. T Ngobeni,

**WRITTEN SUBMISSION BY ZENZELENI NETWORKS<sup>1</sup>, THE ASSOCIATION FOR PROGRESSIVE COMMUNICATIONS<sup>2</sup>, THE UNIVERSITY OF THE WESTERN CAPE<sup>3</sup>, THE UNIVERSITY OF CAPE TOWN<sup>4</sup> and RHIZOMATICA<sup>5</sup> ON THE POLICY DIRECTIONS TO THE AUTHORITY ON LICENSING OF UNASSIGNED HIGH-DEMAND SPECTRUM.**

## Introduction

In Notice 1003 published in Government Gazette No. 41935 dated 27 September 2018, the Department of Telecommunications and Postal Services (DTPS) invited the public to provide written comments on proposed policy and policy directions to the authority on licensing of unassigned high-demand spectrum.

Our submission is premised on the supply-side challenges identified in the White Paper to transform “South Africa into an inclusive, people-centred and developmental digital society”. As acknowledged, “multiple networks have been rolled out across the country, with deployment skewed towards urban areas”, yet the cost of communications, especially mobile broadband, is far from being affordable to many.

In particular, our submission provides complementary strategies aligned with the White Paper’s goals of defining and treating spectrum “as a public good used to meet public interest objectives” and of managing and using it “effectively and efficiently”. The two complementary strategies proposed are:

- 2x5MHz of spectrum in the 800 MHz band should be set aside for non-profit, black-owned, small operators;
- Licensing of spectrum in the 800MHz and 2.6GHz bands should include Use It or Share It provisions allowing qualifying operators to access unused spectrum on a secondary basis.

Below we provide the rationale for this proposal, as well as the way in which it could be operationalized by the government.

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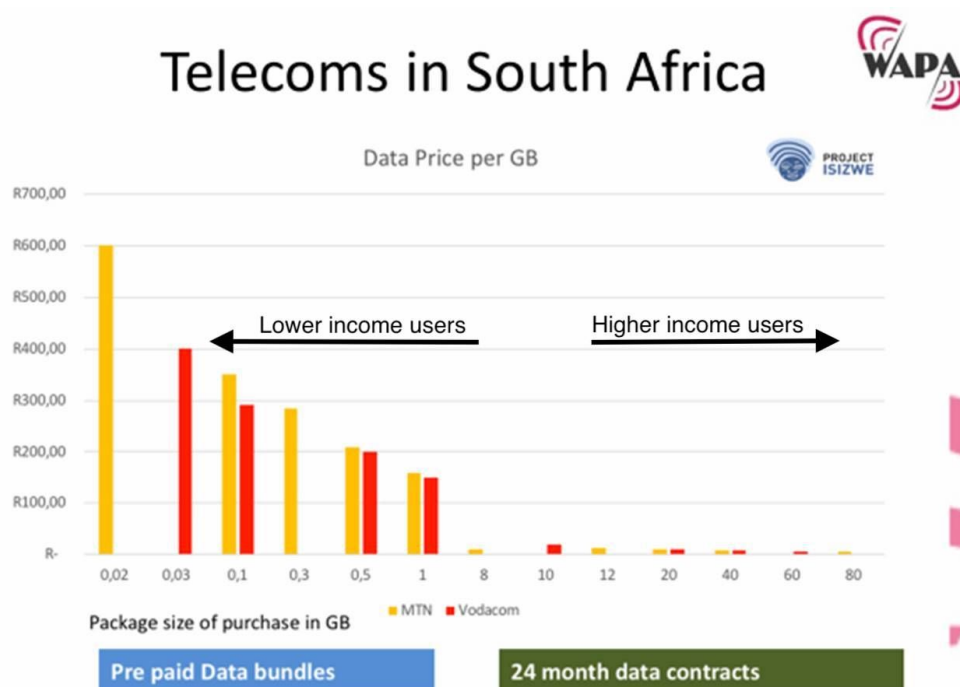
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# 1. Cost of mobile broadband for South Africa's low income population

A recent hearing at the Competition Commission highlighted the fact that the lower income sectors of South African society, not only can't afford the cost of mobile broadband, but pay proportionally more for the data they consume. This reality challenges the vision of the National Development Plan to achieve a "dynamic and connected vibrant information society and a knowledge economy that is more inclusive, equitable and prosperous".

A study of "Pay as you go" and contract mobile packages offered by MTN and Vodacom demonstrate the disproportionate nature of the cost of access for lower income and higher income users as shown in the Figure below.



The value of electronic communications is steadily rising. With smartphones delivering powerful generic services like group and personal messaging and more specific apps aimed at critical sectors such as education, agriculture, and others, communication networks are approaching the status of essential infrastructure for a modern economy. It is also a question of rights. Freedom of expression and the ability to communicate are key to the development, dignity and fulfillment of every person; ensuring that people can gain an understanding of their surroundings and the wider world by exchanging ideas and information freely with others. For people to exercise their right to express themselves and to communicate, they need to have access to reliable and affordable electronic communications

## 1.1 Using the spectrum in the policy direction to reduce the cost of mobile broadband

A part of the high-demand spectrum under discussion, not used by the WOAN, will be auctioned to mobile networks operators<sup>6</sup>. Existing incumbent operators claim that the allocation of more spectrum for mobile broadband will allow them to reduce the consumer cost of data communication<sup>7</sup>. This should not prove challenging given that costs to consumers have remained consistently high over the past 3-4 years, and are among the highest in the continent<sup>8</sup>. Still, it is doubtful that any reduction will be significant enough to provide affordable data communications to the lower income sectors of the population. Using the affordability definition from the UN Broadband Commission (1GB should not cost more than 2% of monthly disposable income), rural South Africans who currently use 1GB, and are able to pay the full cost of 1GB bundle, would have to dedicate 60% of their disposable income for it<sup>9</sup>. Worse still, poor people can often only afford smaller bundles, with an even higher cost per MB as shown above, resulting in an even higher percentage of their disposable income being spent for those smaller bundles.

The part of the spectrum allocated for the WOAN is designed to reduce the cost of communication and increase competition by encouraging small and medium size operators or community networks to purchase wholesale capacity from the WOAN at a regional level. Part of the reason for the WOAN's ability to provide wholesale capacity at a low cost is due to spectrum being available on a reduced or no-fee basis for the first five years.

However, as the case of spectrum for mobile telephony has proven, further assignment of spectrum and licensing more operators contributes to covering higher percentages of the population, but not necessarily to affordable communications. In 2016, a study showed that rural South Africans were dedicating 22% of their disposable income to make a few short calls and send some SMSes<sup>10</sup>.

The two strategies above (auctioning spectrum for MNOs, and creation of the WOAN to encourage further competition) should be complemented with strategies that enable low-income communities to provide themselves with affordable mobile broadband and telephony services. In particular this submission proposes two additional strategies:

- A set-aside of 2x5MHz in the 800 MHz band for non-profit, black-owned small operators; and
- The implementation of Use It or Share It provisions for the spectrum allocated nationally but not used in certain areas.

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<https://www.fin24.com/Companies/ICT/south-africa-to-start-4g-spectrum-auction-by-april-2019-says-cwele-20181011>

<sup>7</sup> <https://techcentral.co.za/our-prices-will-tumble-when-we-get-more-spectrum-mtn/84526/>

<sup>8</sup> [https://researchictafrica.net/ramp\\_indices\\_portal/](https://researchictafrica.net/ramp_indices_portal/)

<sup>9</sup> Using R149 for 1GB bundle from main providers in rural areas (MTN and Vodacom) and income levels and household size for Nyandeni local municipality: <https://wazimap.co.za/profiles/municipality-EC155-nyandeni/>

<sup>10</sup> C. Rey-Moreno, R. Blignaut, W. Tucker, and J. May, "An in-depth study of the ICT ecosystem in a South African rural community: unveiling expenditure and communication patterns," *Journal of Information Technology for Development*, 2016. Available at:

<https://www.tandfonline.com/doi/full/10.1080/02681102.2016.1155145>

## 1.2 Background to the proposed complementary strategies to spectrum assignments

The proposed complementary strategies are aligned with International Telecommunications Union (ITU) Development Bureau (BDT) recommendations which state that it is “important that administrations, in their radio- spectrum planning and licensing activities, consider mechanisms to facilitate the deployment of broadband services in rural and remote areas by small and non-profit community operators”<sup>11</sup>.

Communities in South Africa are proving that they can provide themselves with considerably more affordable communication than traditional models through the use of WiFi<sup>12</sup>. Around the world, rural communities are proving they can set-up and operate their own GSM<sup>13</sup> and LTE networks<sup>14</sup>. The only barrier to providing themselves with affordable mobile broadband, is access to wireless spectrum.

Low-cost alternative GSM technologies have existed for some time and there are a variety of new manufacturers in this space including Range Networks<sup>15</sup>, NuRAN<sup>16</sup>, Fairwaves<sup>17</sup>, Facebook’s Open Cellular initiative<sup>18</sup> and others. The result is that it is possible to put up a GSM or LTE base station for a few thousand dollars.

What constrains small operators and community networks from taking advantage of these innovations is the fact that the popular IMT spectrum bands have largely been assigned to existing Mobile Network Operators (MNOs). However, regulatory innovations in some countries are beginning to change that reality.

## 1.3 Set-aside spectrum for rural communities in Mexico

Mexico is the only country in the world where a fraction of the spectrum dedicated to mobile network services has been set aside specifically for the use of small operators and community networks in underserved regions. After a successful pilot by Rhizomatica in the state of Oaxaca<sup>19</sup>, the Mexican communication regulator (IFETEL) analysed the assignments in the 850 MHz band and concluded that there was a small amount of spectrum that remained unassigned. The modest amount of spectrum available meant that it was of little value to commercial operators. As a result, in IFETEL’s Annual Program for the Use and Exploitation of Frequency Bands 2015<sup>20</sup>, it assigned<sup>21</sup> 2x5 MHz of 850 MHz spectrum for social-purpose implementation.

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<sup>11</sup> Recommendation ITU-D 19. WTDC 2017 report. [https://www.itu.int/en/ITU-D/Conferences/WTDC/WTDC17/Documents/WTDC17\\_final\\_report\\_en.pdf](https://www.itu.int/en/ITU-D/Conferences/WTDC/WTDC17/Documents/WTDC17_final_report_en.pdf)

<sup>12</sup> Refer to Annex A for more information.

<sup>13</sup> <https://www.rhizomatica.org/what-we-do/>

<sup>14</sup> <https://www.internetsociety.org/blog/2018/09/building-a-community-lte-network-in-bokondini-indonesia/>

<sup>15</sup> <https://rangenetworks.com/>

<sup>16</sup> [nuranwireless.com/](http://nuranwireless.com/)

<sup>17</sup> <https://fairwaves.co/>

<sup>18</sup> <https://oc.telecominfraproject.com/>

<sup>19</sup> [http://www.dof.gob.mx/nota\\_detalle.php?codigo=5387867&fecha=06/04/2015](http://www.dof.gob.mx/nota_detalle.php?codigo=5387867&fecha=06/04/2015)

<sup>20</sup>

<http://www.ift.org.mx/industria/espectro-radioelectrico/programa-anual-de-uso-y-aprovechamiento/programa-2015>

<sup>21</sup> Social use gives rights to use and exploit frequency bands in the radio spectrum to provide

Telecomunicaciones Indígenas Comunitarias (TIC), a non-profit organisation based in Oaxaca, Mexico, holds a concession as a social telecommunications operator, and currently serves 3,350 active daily users spread across 63 villages and communities in the state of Oaxaca with 2G voice and data services. These users are served by 14 community-owned and operated cellular sites.

## 1.4 Use It or Share It provisions in other spectrum bands

A good example of Use It or Share It is TV White Space regulation. Wireless spectrum in specific geographic locations not being used by television broadcasters can be used by TV White Spaces devices as long as these transmissions are guaranteed not to interfere with television receivers. The method currently employed to ensure that broadcasters are protected from interference is a geo-location spectrum database (GLSD). A device wanting to access spectrum sends its coordinates to the GLSD and the GLSD is able to calculate the spectral impact of that device using radio prediction modelling. It then returns a set of channels and corresponding maximum power levels that can be used by the TV White Space device. Rules for the operation of TV White Space devices have been published in South Africa in early 2018 and full commercial operation of TV White Space networks is expected early 2019, once a secondary TVWS database has been selected.

Interestingly, the set-aside spectrum being requested in this submission operates in a band that is currently being used by television broadcasters and is commonly referred to as Digital Dividend 1 (DD1). This is likely to be cleared over the next two years. But in the meantime, there is the possibility of using this band on a Use It or Share It basis.

Exclusive, national allocation of GSM spectrum in the 900 and 1800 MHz bands in South Africa supports the case for a Use It or Share It provision to reduce the cost of communications for low income populations. It has been shown that most of this spectrum is not used in rural South Africa<sup>22</sup>. Enabling communities to use it on a secondary basis using the technologies described in Section 1.3, would significantly reduce the communication costs in rural communities.

## 1.5 Opportunity for complementary strategies in the South African ecosystem

The cellular market can roughly be divided into three groups in South Africa as shown in the Figure below:

- **Heated market:** 50% of the population live in 1% of the land - by area. These densely populated areas have multiple competing operators where return of investment is easily achieved. Yet, many township communities are still dealing with unaffordable access in these areas and set-aside spectrum can be used to provide alternative lower-cost LTE access to these communities
- **High opportunity market:** 40% of the population live in 9% of the land. In this region there are many opportunities to provide improved coverage and affordable access with set-aside and “use it or share it” spectrum.
- **New solutions market:** 10% of the population live in the remaining 90% of the land. This is a sparsely populated region where new solutions are required to provide coverage

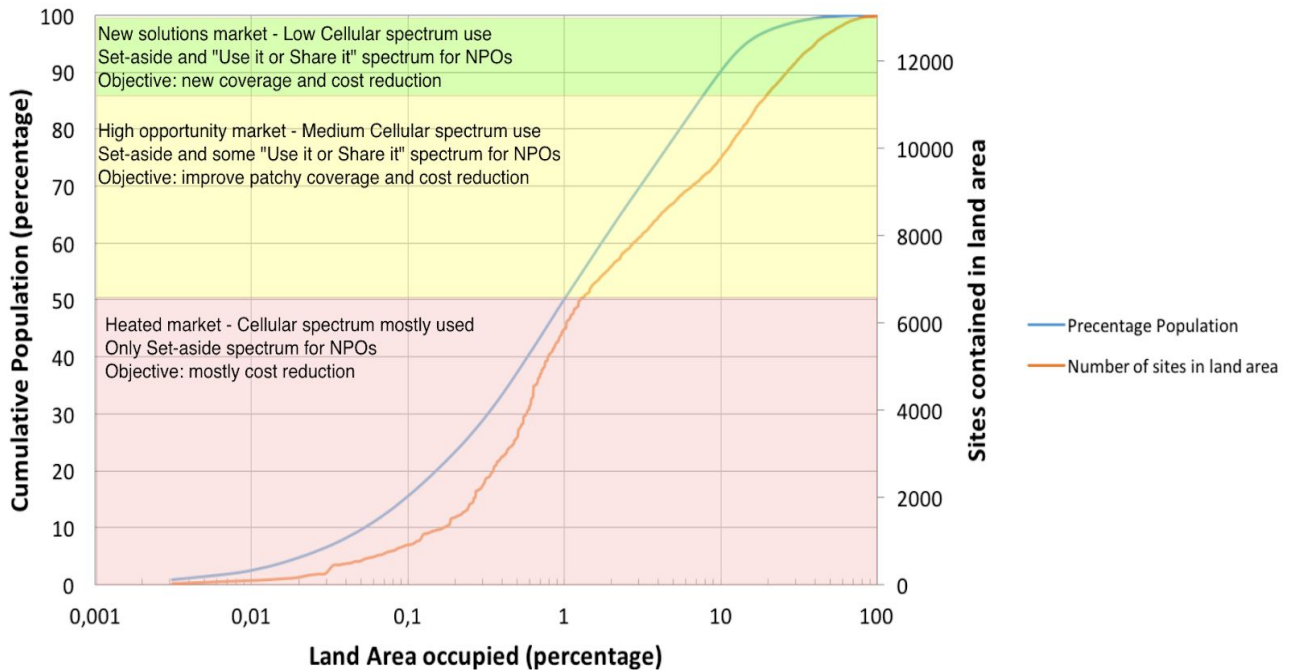
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telecommunication services for cultural, scientific, educational community services on a non-for-profit basis.

<sup>22</sup> [https://www.apc.org/sites/default/files/Zenzeleni\\_APC\\_UWC\\_-\\_ECA\\_A\\_Workshop\\_1.pdf](https://www.apc.org/sites/default/files/Zenzeleni_APC_UWC_-_ECA_A_Workshop_1.pdf)

affordably. Solutions like satellite are generally not affordable for most people living in these areas. This is an ideal area to aggregate set-aside and it spectrum in the 800MHz band and use technology like TV White Space equipment for middle mile wireless backhaul between sites and/or towers.

The focus of this proposal is to propose innovative spectrum regulation that can provide affordable solutions in the “new solutions” and “high opportunity” markets. However, opportunities also exist in the “heated market” space to lower costs in high density urban township areas.



## 2. Proposal for a spectrum set-aside to address the unserved

In order to directly address the challenge of providing sustainable, affordable access in sparsely populated, economically disadvantaged regions, we propose that 2x5MHz of spectrum in 800MHz (Band 20) be set aside nationally for use by non-profit organisations committed to closing access and affordability gaps in South Africa. This would allow for the immediate deployment of low-cost LTE services in underserved regions. We propose 2x5MHz of spectrum as it is the minimum amount of spectrum for the operation of commercial low-cost LTE equipment. The 800MHz band allows for large cell sizes which further reduce the cost of network deployment.

LTE makes use of advanced interference management techniques that allow cells to operate adjacent to each other. This effectively allows an organisation to reuse the spectrum at every cell even when they are adjacent to each other. In the case of cells owned by different organisations that may be adjacent to each other, the same set of spectrum can be used if they agree to share the control system.

### 2.1 Management of the set-aside

Management of this set-aside spectrum should be designated to an independent, non-profit, organisation that would be responsible for sub-assignment to community organisations and for

arbitration in the event of disputes. Management of the spectrum should be organised according to Nobel-prize laureate, Elinor Ostrom's eight principles for the management of a common pool resource<sup>23</sup>. There are examples of this kind of organisation in South Africa, see Annex A. The organisation managing this spectrum must be sanctioned in terms of its ECS and ECNS license or exemption.

## 2.2 Qualifying Organisations

Organisations wishing to access the set-aside spectrum should comply with the following criteria:

- they must be incorporated as a not-for-profit organisation or cooperative;
- they must hold a national or class ECN and ECNS license or exemption; and,
- they must meet at least BB-BEE Status of Level Two Contributor.

## 2.3 Fees for set-aside spectrum

Organisations using set-aside spectrum should be exempt from spectrum fees if they meet the criteria for Exempt Micro Enterprises (EMEs) as defined in amended Broad-Based Black Economic Empowerment (BB-BEE) ICT Sector Code. Organisations that meet Qualifying Small Enterprise (QSE) criteria of the Code should receive reduced spectrum fee considerations. Larger organisations should meet regular fee requirements for spectrum use.

## 3. Use It or Share It provisions

Recognising that newly assigned spectrum for the WOAN is likely to take some time to be deployed in sparsely populated, economically-poor areas that continue to be unserved or underserved by existing operator services, we propose that Use It or Share It provisions be added to spectrum assignments in the 800MHz and 2.6GHz bands. Use It or Share It provisions would shift the nature of the spectrum license from a "right to exclusivity" to a "right to protection from interference" for the primary license holder. This would open up possibilities for more grassroots approaches to the delivery of services to underserved communities. Use It or Share It provisions would complement the spectrum set-aside in increasing the potential for the delivery of higher capacity broadband and more comprehensive coverage.

### 3.1 Management of Use It or Share It provisions

The management of the Use It or Share It provisions could be handled in a similar manner to the "lite licensing" of spectrum in 11GHz by the FCC, whereby the process of spectrum assignment is highly simplified. Having validated that the organisation applying meets the criteria for spectrum use, a simple confirmation is made that the spectrum is unutilised and available in the region requested.

This simplified assignment process could be managed by ICASA or the responsibility for this could be outsourced to a designated organisation, which would be accountable to ICASA.

### 3.2 Qualifying Organisations

This spectrum should be available to any organisation, commercial or non-profit:

- holding a national or class ECN and ECNS license or exemption; and,
- which meets the requirements of at least BB-BEE Status of Level Two Contributor.

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<sup>23</sup> <http://www.onthecommons.org/magazine/elinor-ostroms-8-principles-managing-commmons#sthash.wkcwUTYD.dpbs>

### **3.3 Fees for Use It or Share It spectrum use**

Organisations using spectrum on a secondary Use It or Share It basis should be exempt from spectrum fees if they meet the criteria for Exempt Micro Enterprises (EMEs). Organisations that meet Qualifying Small Enterprise (QSE) criteria should be charged a reduced spectrum fee. Larger organisations should meet regular fee requirements for spectrum use.

### **3.3 Future Considerations**

In the event that the WOAN network grows sufficiently large to meet operators using spectrum under the Use It or Share It provisions, a plan for a Common Pool Resource strategy should be implemented which would allow the Use It or Share It operator to access capacity on the WOAN network and vice versa on terms which compensate each partner according to their usage and contribution, based on Common Pool Resource principles.

LTE supports aggregation across Band 7 (2600MHz) and Band 20 (800MHz). This would allow organisations that require larger amounts of capacity to aggregate spectrum from Use It or Share It and set-aside spectrum.

## **4. Summary**

Past spectrum assignments for mobile communications have failed to provide affordable access to low-income sectors of the population. The proposed scenario to auction a block of spectrum to MNOs and use the rest for the WOAN holds the promise of bringing the cost of mobile broadband down, but past experience has shown that this might not be sufficient to make access truly affordable to the poor. We make the following two recommendations:

- 2x5MHz of spectrum in the 800 MHz band should be set aside for non-profit, black-owned, small operators;
- Licensing of spectrum in the 800MHz and 2.6GHz bands should include Use It or Share It provisions allowing qualifying operators to access unused spectrum on a secondary basis.

We believe that creating the legislation for the strategies above will:

- lower the cost of access for underserved urban and rural areas of South Africa;
- allow more competition to enter the cellular market, especially from micro and small-scale telecommunication enterprises and;
- increase coverage in areas where there is patchy or no mobile broadband coverage



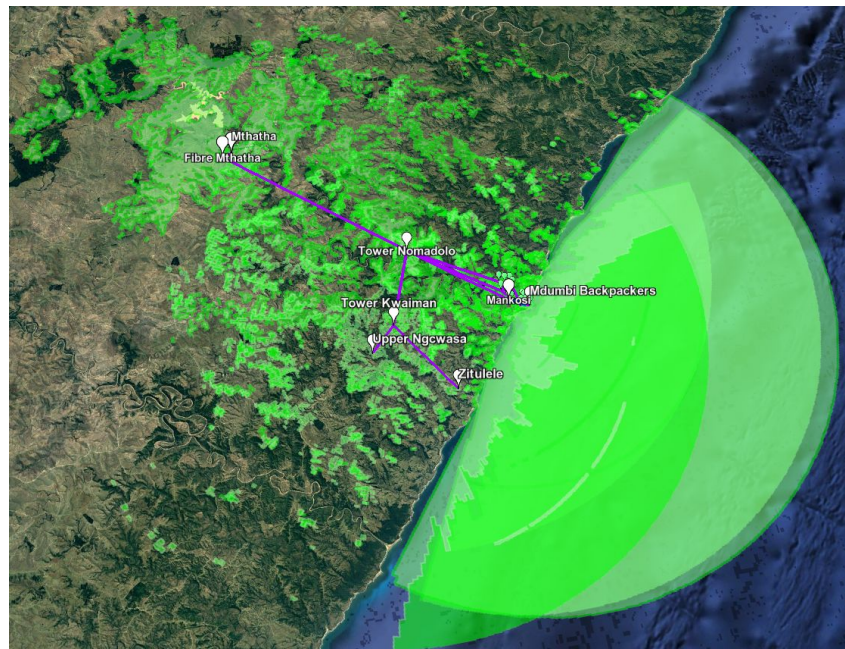
## Annex A - Example: Zenzeleni Network

Zenzeleni Networks is a non-profit organisation that builds the capacity of rural communities to design and operate telecommunication businesses that they own themselves, allowing them to maximise the benefits and value thereof. Its roots are founded in post-graduate doctoral research at the University of the Western Cape (UWC). Subsequently, it became a UWC spin-off in partnership with the Mankosi community, in one of the most disadvantaged areas of the Eastern Cape (more information on this below).

Zenzeleni Networks ensures that the needs of the community are fulfilled. This includes:

- The deployment and use of affordable technologies that community members can install, maintain and operate.
- The co-creation of a local business whose income is re-invested back into the community.
- Knowledge transfer, uptake and transferring of skills.
- Ensuring access to a reliable backhaul network, that is scalable and managed in a way that increasingly reduces user costs, thereby ensuring a higher retention of local income within the community.
- Ongoing engagement with the broader telecommunication ecosystem to ensure compliance, access opportunities and efficiencies.

The first Internet Service Provider in this ecosystem, Zenzeleni Networks Mankosi Co-op Ltd, is a demonstrated proof of its potential, as it has connected 13,000 people and 10 institutions using WiFi technology, offering prices many times lower than those offered by existing operators. Below you can see its current footprint and backhaul, to its data center in Mthatha.



Zenzeleni Networks Mankosi is a 100% Black Owned, 40% women, telecommunications co-operative that has been legally sanctioned by ICASA and holds ECS and ECNS exemptions. One other Co-Ops is the same region and two more in Cape Town are currently being supported to follow Mankosi's steps.

Zenzeleni's has received both national and international recognition with an award for South Africa's Best Innovation with Social Impact in the last edition of the Technology Innovation

Agency's Innovation Bridge 2017<sup>24</sup>, and was Finalist Award in the Equal Rating Innovation Challenge by the Mozilla Foundation<sup>25</sup>. Additionally, other donors such as the European Commission, the Internet Society and the Association for Progressive Communication have provided funding for the CAPEX and initial OPEX of the operations. Currently, the OPEX is covered by the users of the services provided.

This national and international recognition triggered the interest of and subsequently support from the Department of Telecommunications and Postal Services (DTPS) and the Department of Science and Technology (DST). DTPS's Deputy Minister, Stella Ndabeni-Abrahams, made this support public in her address to the parliament in the Budget Vote 2018<sup>26</sup> and as part of its SMME strategy, DTPS is committed "to extend the current network in Mankosi, by initiating community-based ISP co-operatives, who will own and manage their own network.". DST, via the Social Innovation unit at TIA Agency, is currently supporting the documentation of the Zenzeleni model for further scale.

Although currently provides data services, Zenzeleni's initial goal was to reduce high levels of expenditure of voice communications for the rural poor. Despite limited income levels (~R400/month), mainly coming from social grants, people expend 22% of disposable income for a limited a basket of communications services<sup>27</sup>. These high costs are a result of the combination of 94% of the users being customers of the most expensive voice provider in the area, plus the mark-up of up to 20% that rural dwellers need to pay for their airtime<sup>28</sup>.

Despite Zenzeleni's initial efforts to reduce these costs, by providing VoIP services in both analogue and WiFi-enabled phones, findings one year later in the same community, and in 2016 using nation wide data, showed that reductions in Mobile Termination Rates (MTRs) has had no impact on percentage of income spent on communications in these areas. So, in parallel to the hands-on approach, Zenzeleni has advocated for access to unoccupied GSM spectrum in rural areas. As such, it submitted<sup>29</sup> and presented<sup>30</sup> that approach at the *Portfolio Committee on the Cost to Communicate* in September 2016, made a submission to the public consultation on the the Electronic Communications Amendment Act<sup>31</sup>, which was presented<sup>32</sup> in the workshop in February 2018.

Zenzeleni Networks have been featured in written and broadcast press around the world, including Radio France International, Balancing Act, The Conversation, Quartz Africa, Tech Central, Global Voices, Cape Times, Business Day, Daily Dispatch, My Broadband, DW<sup>33</sup>.

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<sup>24</sup> <https://www.innovationbridge.info/ibportal/?q=content/landline-cellphone-internet-plan-empowers-communities-their-terms>

<sup>25</sup> <https://equalrating.com/innovative-solutions/>

<sup>26</sup> <https://africanewswire.za.com/deputy-minister-stella-ndabeni-abrahams-telecommunications-and-postal-services-dept-budget-vote-2018-19/>

<sup>27</sup> Including 7 SMS, 77 minutes of calling time, and 25-30 MB

<sup>28</sup> <https://www.tandfonline.com/doi/full/10.1080/02681102.2016.1155145>

<sup>29</sup> [https://www.apc.org/sites/default/files/Policy%20brief%20Cost%20to%20Communicate\\_13092016\\_FOR%20SUBMISSION.pdf](https://www.apc.org/sites/default/files/Policy%20brief%20Cost%20to%20Communicate_13092016_FOR%20SUBMISSION.pdf)

<sup>30</sup> <https://pmg.org.za/committee-meeting/23322/>

<sup>31</sup> [https://www.apc.org/sites/default/files/Zenzeleni\\_APC\\_UWC\\_Submission\\_ECAA\\_2017.pdf](https://www.apc.org/sites/default/files/Zenzeleni_APC_UWC_Submission_ECAA_2017.pdf)

<sup>32</sup> [https://www.apc.org/sites/default/files/Zenzeleni\\_APC\\_UWC\\_-\\_ECA\\_A\\_Workshop\\_1.pdf](https://www.apc.org/sites/default/files/Zenzeleni_APC_UWC_-_ECA_A_Workshop_1.pdf)

<sup>33</sup> <https://www.dw.com/en/world-in-progress-stories-that-matter-from-around-the-world/a-19385803>