

SUBMISSION ON CONSULTATION PAPER ON LIGHT LICENSING OF THE 2.4GHz and 5GHz BAND IN ZIMBABWE

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By

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On behalf of Partners

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WRITTEN SUBMISSION BY MURAMBINDA WORKS, THE ASSOCIATION FOR PROGRESSIVE COMMUNICATIONS, THE INTERNET SOCIETY, RHIZOMATICA ON THE POLICY DIRECTIONS TO THE AUTHORITY ON THE CONSULTATION PAPER ON LIGHT LICENSING OF THE 2.4GHz and 5GHz BAND IN ZIMBABWE

1. Introduction

This is a joint submission by Murambinda Works, the Association for Progressive Communications, Internet Society and Rhizomatica. We support the objectives of this proposed regulatory change but feel the changes could go even further in order to more effectively realise those objectives. We fully support Minister Kazembe's recent statement⁵ that young people are key to closing the digital gap in Zimbabwe and that "we must now build on this and empower the next generation to become a driving force for ICT growth in the country." This statement is backed up by the National Policy for ICTs (2016-2020)⁶ which clearly identifies youth, entrepreneurship, and innovation as key pillars of ICT growth in Zimbabwe. We believe that WiFi technology is both affordable enough and powerful enough as a broadband tool that it can unlock entrepreneurship and innovation in this demographic. In order to do so however, the barriers to implementation of WiFi technology should be lowered and it should be enabled to operate at its maximum potential.

The most recent ICT Sector Report⁷ (Q3 2018) from POTRAZ reports internet subscribership at 7,690,134 representing 55.4% of the population. This represents tremendous progress but the biggest access challenge still remains of connecting more sparsely populated, lower income regions of Zimbabwe. For that, new thinking and approaches will be required.

⁵ <https://www.thezimbabwemail.com/technology-science/zimbabwe-formulating-national-broadband-plan/>

⁶ http://www.ictministry.gov.zw/sites/default/files/Zimbabwe_National_Policy_%20for_ICT_2016-2020.pdf

⁷ <https://t3n9sm.c2.acecdn.net/wp-content/uploads/2018/12/Abridged-Sector-Performance-report-Third-Quarter-2018-hmed-1.pdf>

Murambinda Works

Murambinda Works is a non-profit making organization which has been offering communication services and ICT office related service in Buhera District. In 2012 Murambinda works partnered with Ministry of Education to compliment government efforts in the introduction of e-learning services in school⁸. Murambinda Works trained all school heads and deputies the whole district on a 3 day computer literacy course.

Beside the provision of internet service through an established internet Café which has been on operation for more that 15 years now, the community of Murambinda through the local authority, the district council requested for an improved independent internet services in order to improve their communication and educational needs. The community has been in need of an affordable cost effective models that enables as many as possible to be connected.

Association for Progressive Communications

Founded in 1990, APC is an international network and non-profit organization that wants everyone to have access to a free and open internet to improve our lives and create a more just world. This goal is underpinned by shared values of community participation, cultural diversity, multidisciplinary research, and sustainable development. APC's work in Africa: Through our Africa Regional Program, APC has brought its vision and values into its ICT policy advocacy work on the continent. APC supports and collaborates with its members and partners in coordinating and contributing to the development of ICT policy, legislation and regulation in African states, as well as facilitating the development of a gender-balanced, intergenerational multisectoral and human rights-oriented pipeline of African internet governance role players through its flagship African School on Internet Governance (AfriSIG). APC has also played a central role in the development of the internet governance standards established in the African Declaration, as well as high-impact advocacy initiatives towards the Declaration's formal endorsement and instrumentalization by African human rights and governance mechanisms.

Rhizomatica

Rhizomatica is a civil society organization whose mission is to increase access to and participation in telecommunications by supporting communities to build and maintain self-governed and owned communication infrastructure. Rhizomatica's approach combines regulatory activism and reform, critical engagement with technology and the development of decentralized telecommunications infrastructure, and direct community involvement and participation.

Internet Society

The Internet Society (ISOC; www.internetsociety.org) was founded in 1992 by a number of people involved with the Internet Engineering Task Force (IETF). The Internet Society is a global cause-driven organization governed by a diverse Board of Trustees. The Internet

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https://www.researchgate.net/publication/308780532_ICT_Training_in_Rural_Zimbabwe_The_Case_of_Murambinda_Works

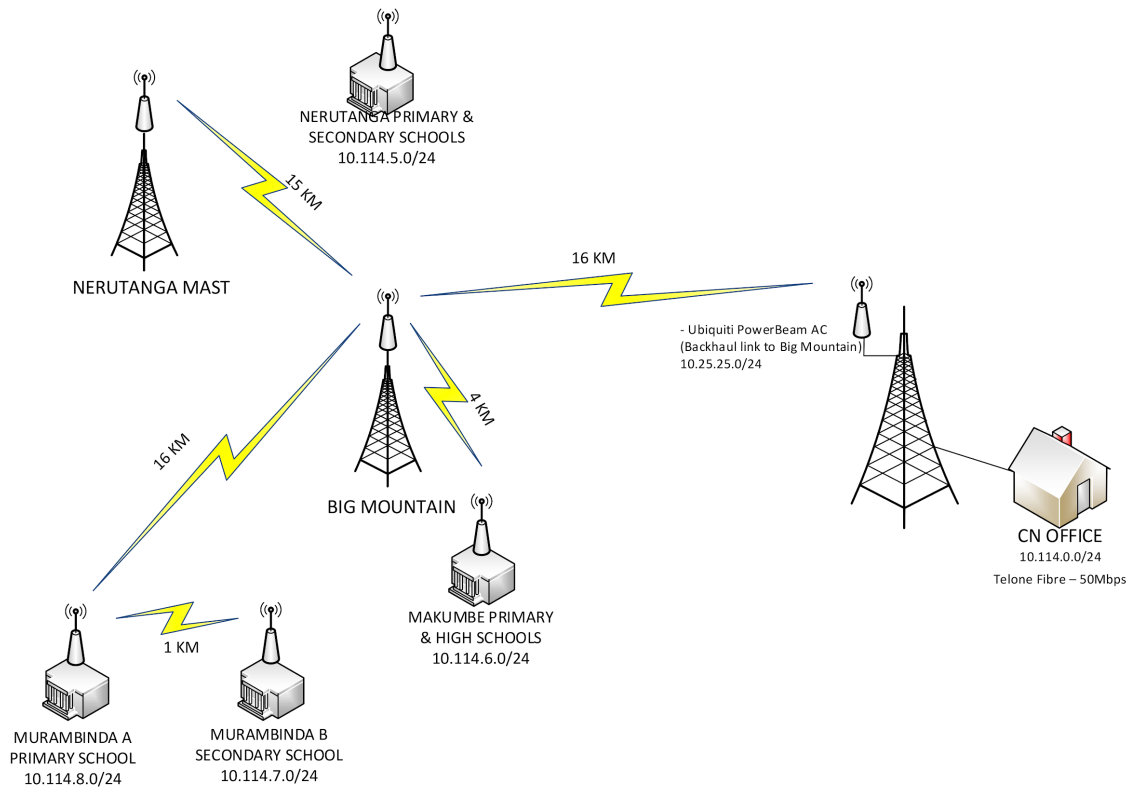
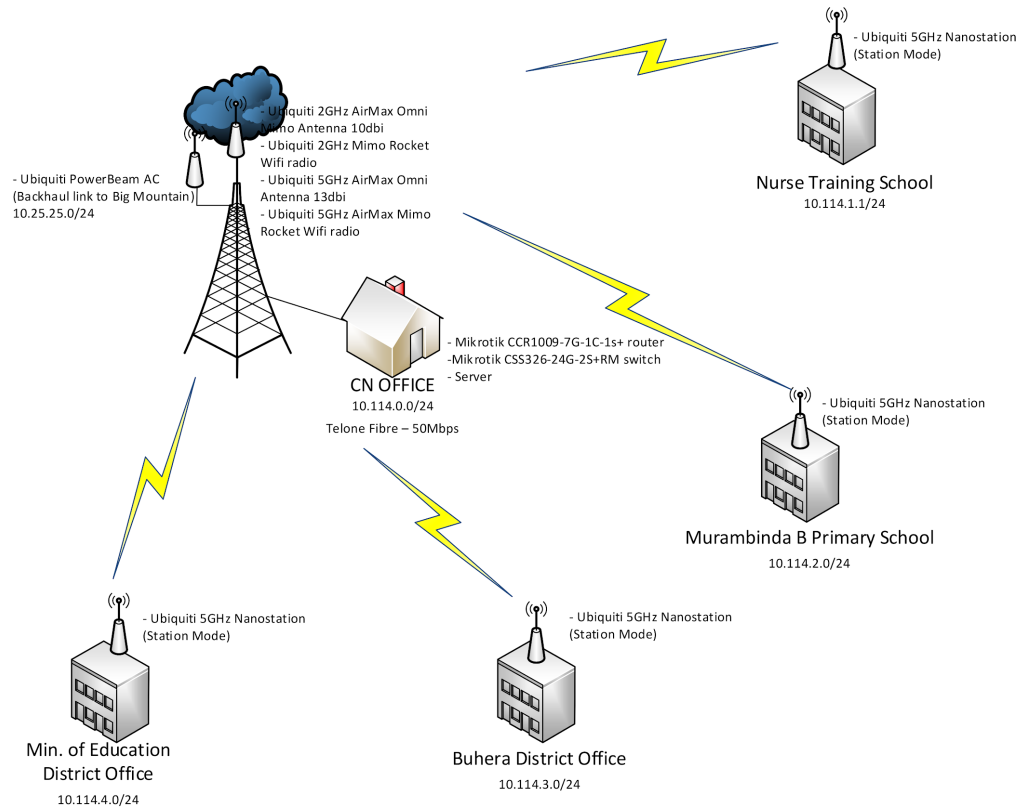
Society's work aligns with its goals for the Internet to be open, globally-connected, secure, and trustworthy. The Internet Society supports and promotes the development of the Internet as a global technical infrastructure, a resource to enrich people's lives, and a force for good in society and, as such, seeks collaboration with all who share these goals.

In Africa, the Internet Society's Africa bureau works with chapters and stakeholders to cultivate expert communities, collaborate with regional policy makers, and build access for unserved and underserved communities. In particular, since 2016, the Internet Society has partnered with Community network operators, APC and other stakeholders to organize three annual Summits on Community Networks in Africa. At the same time, the Internet Society has provided technical, financial and logistical support to Community Networks in DRC (Mesh Bukavu & PamojaNET), Kenya (TunapandaNET), Namibia (Groot-Aub), Nigeria (Fantsuam), South Africa (Zenzeleni), Tanzania (KondoaNET), Uganda (Bosco), Zambia (Macha Works) and Zimbabwe (Murambinda Works).

2. Case Study for the proposed regulations

The following case study illustrates the power of WiFi technology to deliver affordable, sustainable rural access solutions.

Murambinda works with support from Internet Society, started in 2018 a project to set up a fully functional community network which seeks to cover a radius of 40km from Murambinda growth point up to Nerutanga along Chivu road. 6 school, the rural district council office, Ministry of Education and the Murambinda Hospital Nurses Training School will be connecting from this pilot project. The network will be powered by solar and will host some local content service. The network structure is composed of 5 GHZ and 2.4ghz ubiquiti radios. The schools to be connected will be connected with some school management software to assist teachers in improving their administrative roles, lessons planning and elearning. The diagram below shows the network architecture.



3. Answers to the questions in the public consultation

i) Would you agree with the objectives POTRAZ intends to pursue through availing the 2.4GHz and 5.8GHz bands to high-power Broadband Fixed Wireless Access Systems.

POTRAZ defines the objectives of the proposed regulatory change are as follows:

- i) to enhance broadband connectivity in rural Zimbabwe, particularly in schools, hospitals, police stations and rural amenity intuitions.*
- ii) to extend the reach of broadband services in both urban and rural areas of Zimbabwe.*
- iii) to enhance ICT-centric innovation in Zimbabwe.*
- iv) to connect the unconnected.*

We wholeheartedly agree that these objectives are worth pursuing. Target 9.c. of the Sustainable Development Goals clearly identifies the need to “significantly increase access to ICT and strive to provide universal and affordable access to internet in less developed countries by 2020”.

According to the International Telecommunication Union, in 2017 Africa was at the tail of ICT usage in the world, with just above 20% of the population accessing the internet, and with more than 20% who do not have even access to basic voice communications⁹. Even if they have access, many people face cultural, economic and social barriers to communicating through ICTs. In 2015, the ITU concluded that “a monthly fixed broadband package cost 1.7% of average income in developed countries, compared with 64% of average income in Africa”. Similarly, the ITU concluded that “mobile broadband cost 1-2% of monthly income in developed countries, compared with 11-25% of monthly average income in developing countries”¹⁰.

The Alliance for Affordable Internet Access (<https://www.a4ai.org>) maintains an index of internet affordability which compares the cost of 1GB of data to income levels, as expressed by the average Gross National Income (GNI) per capita. In the most recent 2017 index¹¹, the cost of 1GB of data equated to 32.97% of average monthly incomes. Among the countries studied, Zimbabwe ranked as the least affordable.

WiFi represents a low-cost alternative access technology that can help to directly address affordability issues. From a regulatory perspective, lowering fees and administrative barriers to its use will unlock the entrepreneurial potential of this technology and empower communities to address their own affordable internet challenges.

⁹ https://www.itu.int/en/ITU-D/Statistics/Documents/publications/misr2017/MISR2017_Volume1.pdf

¹⁰ <https://www.itu.int/en/ITU-D/Statistics/Documents/publications/misr2015/MISR2015-w5.pdf>

¹¹ <https://a4ai.org/mobile-broadband-pricing-data/>

ii) Would you agree with the above characterisation of the 2.4GHz and 5.8GHz bands and the proposed deployment of rural BFWA systems in rural and underserved areas of Zimbabwe?

POTRAZ intends to characterize these bands as follows:

- *2400- 2483 MHz and 5 725-5 875 MHz for the implementation of rural Broadband Fixed Wireless Access (BFWA) systems in farming and rural areas of Zimbabwe.*
- *5 725-5 875 MHz available for Short Range Devices (SRDs) and low-power BFWA systems, on a licence exempt basis in both urban and rural areas of Zimbabwe, as is the case for frequency bands 2400 – 2483 MHz, 5.15 – 5.35 GHz and 5.470 –5.725 GHz.*

As explained in detail in the answer the question iii) below we recommend removing the restriction of using BFWA in farming and rural areas only. The low level of interference from highly directional antennas allows its use in all sorts of scenarios, including urban ones. Furthermore, this entails an additional administrative burden, not only in the complex definition of farming and rural areas, but in checking that a particular link falls within those areas. Removing the administrative burden and the consequent delay reduces the barriers for entrepreneurship and innovation in this sector.

Aggregation and harmonization

Ideally all bands in 5GHz should be able to use the same power levels and thus, we discourage different power levels for different bands. Harmonizing this power levels across the entire 5GHz band would allow simultaneous aggregation of channels in one single high site. Channel aggregation is one of the main mechanisms to increase the capacity of a link, and would enable effective broadband provision to public schools, hospitals, police stations and rural amenity intuitions. An example for the harmonization of the 5GHz band was attempted by the Federation Communication Commissions (FCC), which in February 2013 issued a Notice of Inquiry (NOI) to harmonize rules on the 5 GHz which could make the aggregation of channels in 5 GHz easier¹².

New bands

The success of Wi-Fi also begs the question as to why more spectrum is not made available on a license- exempt basis, beyond the ones considered. The United States is one the frontrunners in this space. The very same Nol from February 2013 would have also made available another 75 MHz (from 5.85 to 5.925 GHz) for WiFi that is currently assigned to the automobile industry where the likelihood of it being used is low¹³.

¹² https://transition.fcc.gov/Daily_Releases/Daily_Business/2013/db0220/FCC-13-22A1.pdf

¹³ https://transition.fcc.gov/Daily_Releases/Daily_Business/2013/db0220/FCC-13-22A1.pdf

Currently there is another ongoing process in the United States that could expand the license-exempt band. In July 2017 the FCC issued an NOI entitled "Exploring Flexible Use in Mid-Band Spectrum Between 3.7 GHz and 24 GHz"¹⁴. On the particulars of the 5.925-6.425 GHz band the FCC sought comments on, among other things, the compatibility with adjacent band as "this would allow the devices to operate with wider channel bandwidths and higher data rates as well as increased flexibility for all types of unlicensed operations." Additionally, it made the question extensible to the 6.425-7.125 GHz band.

This process resulted in a Notice of Proposed Rulemaking in October 2018 where the FCC proposes¹⁵ the following:

- "In the 5.925-6.425 GHz and 6.525-6.875 GHz sub-bands, unlicensed devices would only be allowed to transmit under the control of an automated frequency control (AFC) system."
- "In the 6.425-6.525 GHz and 6.875-7.125 GHz sub-bands, unlicensed devices would be restricted to indoor use and would operate at lower power, without an AFC system."

The proposal needs to be subject to public comment, but experts expect the new rules to be finalized in 2019.

We recommend that POTRAZ initiate similar processes to harmonize the band to allow more aggregation of channels as well as to explore new spectrum to add to the current bands where BFWA services could be provided.

iii) Would you agree with the proposed light-licensing framework in respect of the implementation of Broadband Fixed Wireless Access systems in rural and underserved areas of Zimbabwe?

"POTRAZ proposes the following conditions for deployment of rural BFWA systems:

i. Licensing: All rural BFWA systems shall operate under respective licences issued by POTRAZ.

ii. Interference Protection: All rural BFWA systems shall be operated on a non-protection and non-interference basis

iii. Application: Applicants shall submit a completed form providing key information on the deployment type; transmitter location; Antenna Height, Transmit Frequency; channel bandwidth; transmit power and user contact details.

iv. Applicable Fees: A fee prescribed by the Authority from time to time shall apply. Currently, POTRAZ is proposing a fee of \$50.00 per link.

¹⁴ https://transition.fcc.gov/Daily_Releases/Daily_Business/2017/db0713/DOC-345789A1.pdf

¹⁵ FCC Notice of Proposed Rulemaking In the Matter of Unlicensed Use of the 6 GHz Band. 2 October 2018. <https://docs.fcc.gov/public/attachments/DOC-354364A1.pdf>

v. EMC & EMF standards: All base stations and CPEs shall comply with emission standards, as stipulated by the Authority.

vi. Publication: POTRAZ shall publish the details of all licensees in a publicly accessible database

vii. Authorised installers: Only licensed radio dealers accredited by POTRAZ and/or Public Network Operators shall be authorised to do rigging and installations for rural BFWA systems. “

Whereas we agree with points ii) and v) above, we recommend provisions i), iv) and vii) to be removed. Most countries in the world allow the provision of BFWA services on a license exempt basis provided points ii) and v) are met. The reasoning for this is that a light-licensing scheme no matter how light, introduces an administrative overhead on both the applicant and the regulator. In turn, as justified in the answer to question v) below, we recommend self-regulation and conflict resolution by industry associations. Similarly, the answer to question v) below, justifies the removal of the 50 USD fee proposed in point iv). Finally, the requirement in point vii) creates an unnecessary barrier for entrepreneurship and innovation which does not exist in most other countries, as BFWA systems in 5GHz do not require a particular expertise to be deployed. In summary we consider that provisions i), iv) and vii) are counterproductive to the objectives pursued by these regulations and should be removed.

iv) Would you agree with the proposed implementation of low-power SRDs and BFWA systems in the 5.8GHz bands under technical and regulatory conditions specified in Annex 1?

Below are POTRAZ’s proposed power limits for the 5.8 GHz Band

Topology Parameter	P-MP (Point-to-Multipoint)	P-P (Point-to-Point)	Mesh	AP-MP (Any point-to-Multipoi
Frequency band	5725 MHz to 5850 MHz			
Radio service Fixed	Fixed			
Application	Fixed Wireless Access			
Maximum mean e.i.r.p.	36 dBm* (4W)	36 dBm * (4W)	33 dBm (2W)	33 dBm (2W)
Maximum mean	23 dBm/MHz	23 dBm/MHz	20 dBm/MHz	20 dBm/MHz

e.i.r.p. density				
TPC range for each station	12dB	12dB	12dB	12dB
Dynamic Frequency Selection	mandatory	mandatory	mandatory	mandatory
Duplex Type	TDD	TDD	TDD	TDD
*for rural BFWA systems, higher e.i.r.p. levels can be authorised, on a case-by-case basis, provided the increase is achieved through higher antenna gain.				

Below are POTRAZ's suggested changes to ISM regulation

Frequency Band	Proposed New Permission
2400 – 2483.5 MHz	36dBm with option for higher e.i.r.p through higher antenna gain, for rural BFWA systems.
5150 – 5350 MHz	No Change (200mW max EIRP 50m radius P – MP Indoor use only DFS and TPC Mandatory No Pt – Pt.)
5470 – 5725 MHz	No Change (1000mW max EIRP 300m radius P – MP Both Indoor and Outdoor DFS and TPC Mandatory No Pt – Pt.)
5725 – 5850 MHz	*36dBm for urban Both Indoor and Outdoor DFS and TPC Mandatory

	<p>36dBm with option for higher e.i.r.p through higher antenna gain, for rural BFWA systems.</p>
<p>*for rural BFWA systems, higher e.i.r.p. levels can be authorised, on a case-by-case basis, provided the increase is achieved through higher antenna gain.</p>	

The table below contains the regulated output power, and E.I.R.P. in the bands used by Wi-Fi technologies in seven countries: Mexico, South Africa, Brazil, Argentina, U.S.A., India and Canada. Values allows some comparison with POTRAZ recommendations.

Other Countries do not make a distinction between urban and rural.

- Most countries control interference for BFWA systems by reducing the transmitted output power from the radios, rather than the E.I.R.P, which is also limited but to way higher levels than the ones recommended by POTRAZ. In the particular case of Canada there is no limit in the antenna gain for Point to Point links, in both 2400 – 2483.5 MHz and 5725 – 5850 MHz provided the TxPower remains equal or below 1 Watt.
- Countries do not authorized higher levels in a case by case basis, as this would require an unnecessary bureaucratic burden for both the applicant and the regulator, together with introducing unnecessary delays. With the current recommended provisions, all links in the network that Murambinda Works is building would require to be approved in a case by case basis¹⁶. This defeats the purpose of this regulation which should encourage and reduce the barriers for entrepreneurship and innovation to be used to *“enhance broadband connectivity in rural Zimbabwe, particularly in schools, hospitals, police stations and rural amenity intuitions”*.
- In the band 5150 – 5350 MHz, some countries allow higher E.I.R.P, than POTRAZ, as well as the use of BFWA systems, such as the case of the United States in the lower band (5150 – 5270 MHz) in this frequency range, with an E.I.R.P. up to 53 dBm.
- POTRAZ could go even further and harmonize the power levels across all bands in 5GHz to enable higher levels of channel aggregation.

¹⁶ A Link Budget analysis using the 36 dBm E.I.R.P. initially allowed for the 5.8 GHz band results in less than 2km, considering using standard fade margin thresholds.

9.1 Regulated output power in bands used by Wi-Fi technology in the countries under study

	2400 – 2483.5 MHz		5150 – 5250 MHz		5250 – 5350 MHz		5470 – 5600 MHz		5600 – 5650 MHz		5650 – 5725 MHz		5725 – 5850 MHz	
	EIRP	Tx Power	EIRP	Tx Power	EIRP	Tx Power	EIRP	Tx Power	EIRP	Tx Power	EIRP	Tx Power	EIRP	Tx Power
Mexico	33 dBm in PtP 30 dBm in	27 dBm in PtP 24 dBm	23 dBm	17 dBm	30 dBm	24 dBm	30 dBm	24 dBm			30 dBm	24 dBm	36 dBm	30 dBm
South Africa	20 dBm		23 dBm		20 dBm		30 dBm				30 dBm		36 dBm (PtP 53 dBm)	30 dBm
Brazil	36 dBm	30 dBm	23 dBm		23 dBm		30 dBm	24 dBm			30 dBm	24 dBm	36 dBm	30 dBm
Argentina	36 dBm	30 dBm	23 dBm	17 dBm	36 dBm	30 dBm	36 dBm	30 dBm			36 dBm	30 dBm	36 dBm (53 dBm for PtP links)	30 dBm
United States	36 dBm in PtMP. In PtP 1 dBm less in TxPower per 3 dBi	30 dBm	36 dBm in PtMP & 53 in PtP	30 dBm	30 dBm	24 dBm	30 dBm	24 dBm	30 dBm	24 dBm	30 dBm	24 dBm	36 dBm in PtMP and no limit in the Antenna Gain in PtP	30 dBm
India	36dBm	30 dBm	20 dBm		20dBm								20 dBm & 36 dBm (5.825)	30 dBm
Canada	36 dBm in PtMP and no limit in the Gain in PtP	30dBm	23 dBm indoor only		30 dBm	24 dBm	30 dBm	24 dBm			30 dBm	24 dBm	36 dBm in PtMP and no limit in the Gain in PtP	30 dBm

v) Would you agree with the fee of \$50.00 per link proposed by POTRAZ?

We believe that WiFi BFWA links should not be subject to any additional license fees or obligations beyond that of any single organisational license requirement for internet service provision. Adding an additional fee and application process per BFWA link would have the impact of stifling entrepreneurship and innovation, particularly among young people who may have the expertise but limited resources to invest. WiFi access points which can cost less than USD100 are within reach of young entrepreneurs but they may be excluded if each link accrues both fees and administrative overhead. We believe that the social and economic benefits from the deployment of this infrastructure in underserved areas far outweighs any benefit that might be accrued from those fees. If we are to truly unlock the potential of Zimbabwean youth to address the digital divide then we must put affordable, accessible tools in their hands.

In order to address concerns regarding potential interference among service providers, we suggest that the creation of an industry association for wireless service providers be considered. The Wireless Access Providers Association (<https://wapa.org.za/>) in South Africa or the Wireless Internet Service Providers Association (<http://www.wispa.org/>) in the United States are two examples of industry associations as an effective approach to self-regulation in the use of license-exempt spectrum. These associations provide a forum for wireless standards education and capacity-building as well as dispute resolution among service providers. Wireless service providers associations are a proven successful mechanism for ensuring the safe growth of the WiFi service provider industry. Taking this approach will also have the additional benefit of reducing administrative overhead for POTRAZ.

4. Final recommendations and conclusion

In order to address the challenge of affordable access to internet in Zimbabwe and to maximise the potential of WiFi technologies to deliver access to underserved regions, we recommend that administrative and financial barriers to the implementation of WiFi broadband solutions be reduced as far as possible. We further recommend the establishment of an industry association which can assist in technical capacity-building, awareness raising, conflict resolution, and standards conformance. This would be in line with other countries cited where wireless service providers using license-exempt spectrum are thriving and delivering affordable access in rural areas.

Toward that end, we propose the following:

- Don't restrict the proposed changes to farming and rural areas.
- Remove the light licensing scheme proposed and instead opt for industry self-regulation. This would include a removal of
 - WiFi-specific license requirements except equipment homologation
 - any associated fees; and,
 - the requirement to use only certified installers.
- Permit higher E.I.R.P. levels and control interference via TxPower in all bands considered. The proposed E.I.R.P. levels do not allow broadband provision using BFWA for more than a few kilometres.

Further we would like to propose that the following be considered:

- Harmonization of the band as suggested above.
- Expansion of license-exempt regulation into new frequencies, as per FCC