



# ATU-R REPORT

*relating to*

## SURVEY ON SPECTRUM POLICIES FOR RURAL CONNECTIVITY IN AFRICA

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**ATU-R Report 002-0**

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**August 2021**

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## EXECUTIVE SUMMARY

In furtherance of its mandate, the Task Group on the development of draft Spectrum Recommendations for Rural Connectivity surveyed ATU member-states through questionnaires to ascertain the status of rural connectivity, the policies and regulations, which member countries have adopted to promote rural ICT connectivity.

The objectives of the survey included:

- Assessment of the extent of rural connectivity in the continent;
- Identification of spectrum regulatory challenges affecting the development of telecommunication/ICT services in rural/remote areas in the continent;
- Gathering information on best regulatory practices among member-states that would promote telecommunications/ICT services in rural/remote areas.

Thirty (30) countries, representing 63% of Member States, responded to the survey. The questions were in five (5) main sections: coverage of telecommunication/ICT services in rural areas, frequency licensing regime, frequency utilisation, dynamic spectrum and license-exempt, and regulatory framework for rural connectivity.

The key findings of the survey among 30 respondent countries were:

Indicator	Finding
Network operators with coverage in rural areas	<b>17%</b> of respondent countries indicated that none of the network operators covers rural areas in their respective countries.
Dedicated rural telephony service provider	<b>3%</b> of the respondent countries have dedicated rural telephony service providers.
Availability of Universal Access Funds	<b>80%</b> of respondent countries have Universal Access Funds
Availability of Active Universal Access Funds	<b>67%</b> of respondent countries have Active Universal Access Funds
Method(s) for Assigning or Awarding Frequency Licences	<b>83%</b> of respondent countries use first-come, first-serve to assign frequency licenses; <b>23%</b> of respondent countries use auction(s) to award some frequency licenses <i>Note: some countries use both methods.</i>
Coverage Obligations In Frequency Licences	<b>70%</b> of respondent countries include coverage obligations in their frequency license conditions
Technology Neutrality	<b>47%</b> of the respondents indicated that all frequency licenses support technology neutrality; <b>30%</b> have technology neutrality for some licenses and technology-specific licenses for others; <b>23%</b> indicated that all their frequency license conditions do not support technology neutrality

Indicator	Finding
Frequency Sharing	<b>87%</b> of the respondent countries do not permit frequency sharing by license holders
Frequency Trading	<b>97%</b> of the respondent countries do not allow frequency trading
Usage of the 5GHz band	<b>80%</b> of the respondent countries allocate the 2.4GHz band for license-exempt RLAN, but there is no harmonisation in the use of the 5GHz band
Another frequency band for License exempt	<b>17%</b> of respondents are considering other frequency bands (6GHz and mm-Wave band) for license-exempt RLAN services.
TV White Space (TVWS)	<b>80%</b> have not implemented or evaluated TV White Space(TVWS) in their countries, <b>13%</b> have developed regulations and <b>7%</b> have draft regulations
Policy for Rural Connectivity	Almost all respondent countries have a national policy for rural connectivity
Interventions to Promote Rural Connectivity	<b>50%</b> of the respondents indicated that their governments had introduced targeted interventions to promote rural connectivity.

The survey results show variances in the spectrum management approaches towards promoting rural connectivity in member states. Considering that there are significant gaps in rural connectivity, ranging from low connectivity to medium connectivity, it is essential that ATU develops specific recommendations to promote rural connectivity in Africa.

## **1.0 INTRODUCTION**

### **1.1 Background of the survey**

On 1<sup>st</sup> October 2020, the African Telecommunications Union (ATU) established a task group to develop spectrum recommendations to improve Rural ICT Connectivity. This project aims to develop proposals, based on best practices in Africa and worldwide, on how spectrum policy, regulations and methods to promote rural ICT connectivity in Africa. In furtherance of its mandate, the Task Group sent questionnaires to the member countries to assess the spectrum challenges of rural connectivity in the continent. By the response deadline of 5<sup>th</sup> January 2021, thirty (30) out of forty-eight (48) member countries submitted their responses. This report presents the survey results on spectrum policies and other regulatory tools for rural connectivity in the member states.

### **1.2 Objective of the survey**

The objectives of the survey included:

- Assessment of the level of rural connectivity in the continent;
- Identification of spectrum regulatory challenges affecting the development of telecommunication/ICT services in rural/remote areas in the continent;
- Information gathering on best regulatory practices among member states that would promote provision/growth of telecommunications/ICT services in rural/remote areas.

## **2.0 SURVEY RESULTS AND FINDINGS**

This section presents the data obtained from the survey. There are five thematic blocks in this section in perspective of the objectives of the study. These include:

- Coverage of telecommunication/ICT services in rural areas,
- Frequency licensing regime,
- Frequency utilisation,
- Dynamic spectrum and license-exempt, and
- Regulatory framework for rural connectivity.

### **2.1 COVERAGE OF TELECOMMUNICATION/ICT SERVICES**

#### **2.1.1 Number of commercial network operators**

This section collected information on the number of service providers and their presence in the remote/rural areas in the respondent countries. A median of 3 Mobile Network Operators (MNOs) and 10 Internet Service Providers (ISPs) exist in each respondent country from the data. 83% of the respondents indicated that the MNOs and 70% of the ISPs provide services in remote/rural areas in their countries.

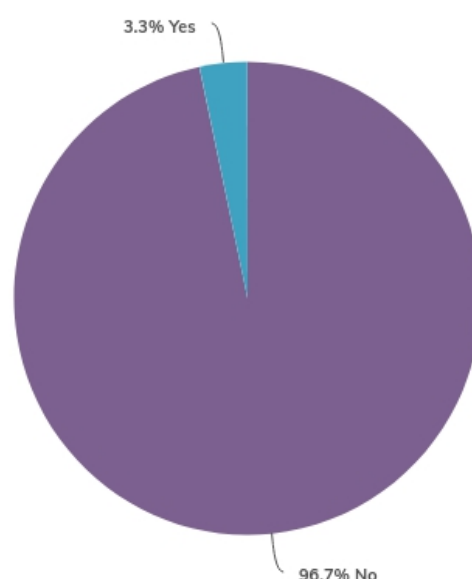
Number of MNOs (Median)	3.0
% of countries with MNOs offering service in rural areas	83%
Number of ISPs (Median)	9.5
% of countries with ISPs offering service in rural areas	70%

Figure 2.1: Number of MNOs and ISPs per country

### 2.1.2 Dedicated service provider for rural areas

Only one country indicated that it had a dedicated rural service provider.

2. Is there a dedicated Rural Telephony / communications operators or service providers?



Value	Percent	Responses
No	96.7%	29
Yes	3.3%	1
Totals: 30		

Figure 2.2: Findings in respect of dedicated rural service provider

2.1.3 Universal Access Fund Availability

The survey found that 80% of the respondents have Universal Access Funds in their respective countries.

3. Is there a Universal Access Fund?

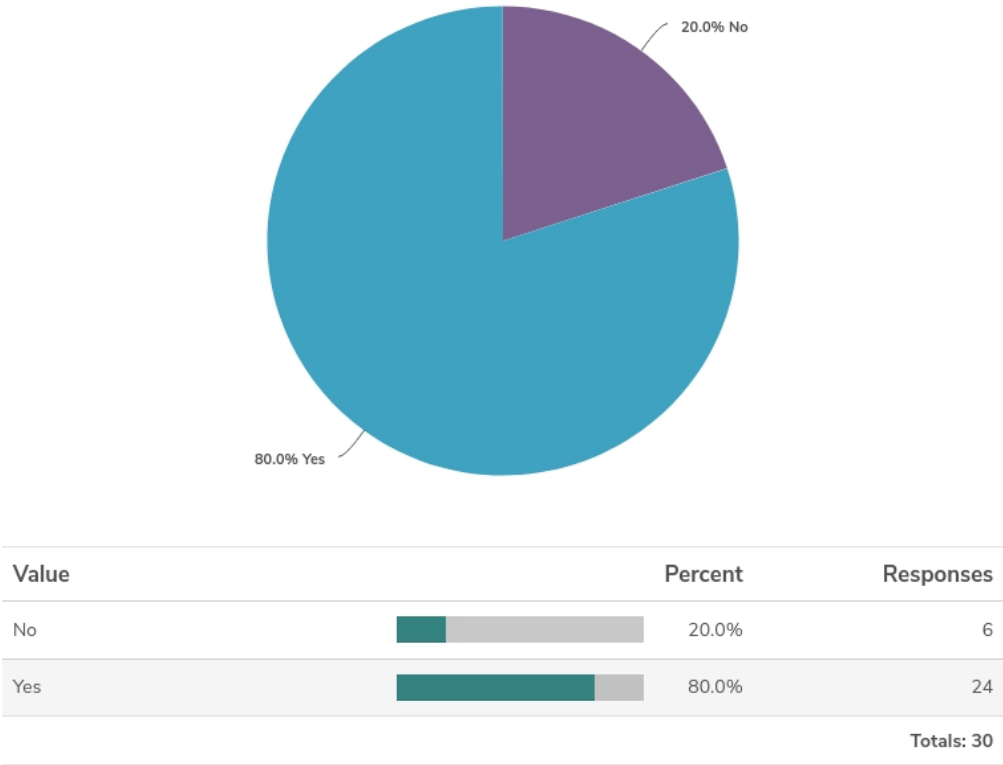


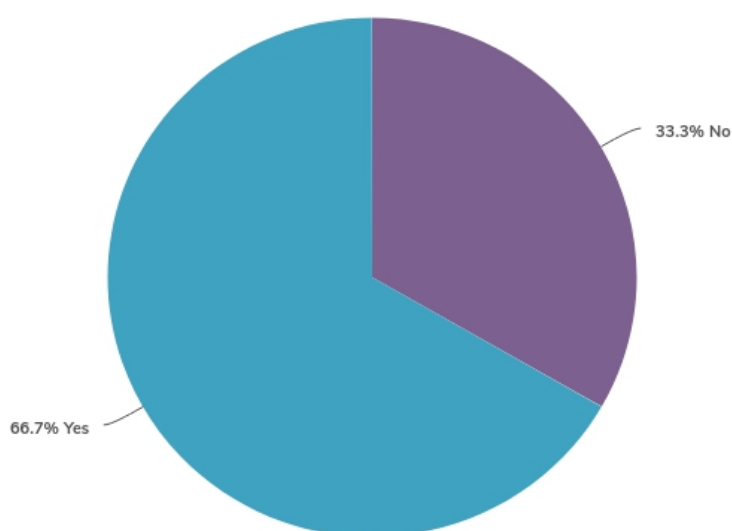
Figure 2.3: Availability of Universal Access Funds

2.1.4 Status of Universal Access Funds

The survey examined the utilisation of the Universal Access Fund (UAF) in the ATU Member States. 67% of the respondent countries indicated that they used UAF in their countries to fund universal access projects. 33% answered that the funds were dormant and not being used to advance universal access. The results show that 20% of the 33% with fixed funds responded in the previous question that they did not have universal access funds. In effect, only 13% of the respondent countries have non-active UAFs.



## 4. Is the Universal Access Fund active?



Value		Percent	Responses
No	<div><div></div></div>	33.3%	10
Yes	<div><div></div></div>	66.7%	20
Totals: 30			

Figure 2.4 Status of Universal Access Funds

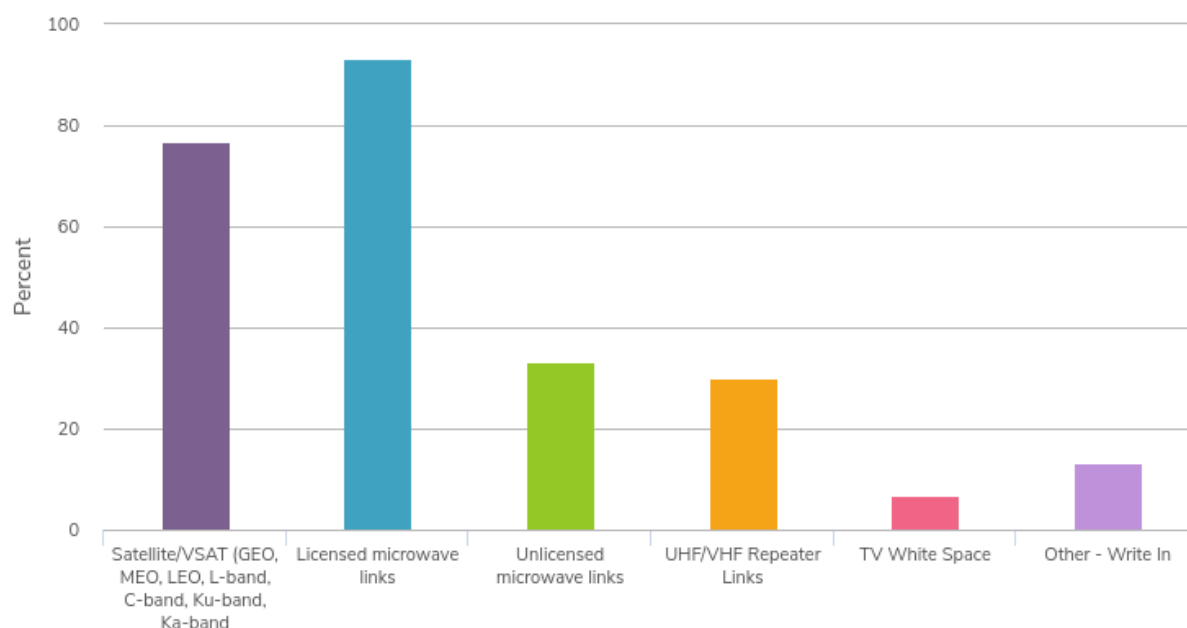
## 2.2 SPECTRUM UTILISATION

### 2.2.1 Wireless Backhaul Technologies used to connect rural areas

The survey solicited information on the wireless backhaul technologies, which the respondent countries use to provide services in rural areas. From the data, many of the respondent countries used multiple technologies. 93% of the respondents use licensed microwave links as the backhaul technology used to provide services in rural areas. 77% of the respondents confirmed using satellites for backhaul to provide services in rural areas. 33% and 30% of the respondents indicated using unlicensed microwave links and UHF/VHF repeater links, respectively. 7% of the respondents used TVWS as part of the wireless backhaul technologies for deploying networks in rural/remote areas.



5. What backhaul technologies are currently in use to connect rural and remote areas (multiple choices are possible)?



Value	Percent	Responses
Satellite/VSAT (GEO, MEO, LEO, L-band, C-band, Ku-band, Ka-band)	76.7%	23
Licensed microwave links	93.3%	28
Unlicensed microwave links	33.3%	10
UHF/VHF Repeater Links	30.0%	9
TV White Space	6.7%	2
<a href="#">Other - Write In (click to view)</a>	13.3%	4

Figure 2.5 Wireless Backhaul Technologies used to connect rural areas

### 2.2.2. Access network technologies used to connect rural areas

The survey evaluated the wireless access technologies used to connect rural and remote areas. The study established that 2G mobile (82%), 3G mobile (74%), and VSAT (71%) were the dominant wireless access technologies used to connect rural and remote areas. The result also shows a progressive deployment of LTE in rural and remote areas. About 6% of the respondent countries used TV White Space to connect rural and remote areas.

8. What wireless access technologies are used to connect rural and remote areas (multiple choices are possible)?

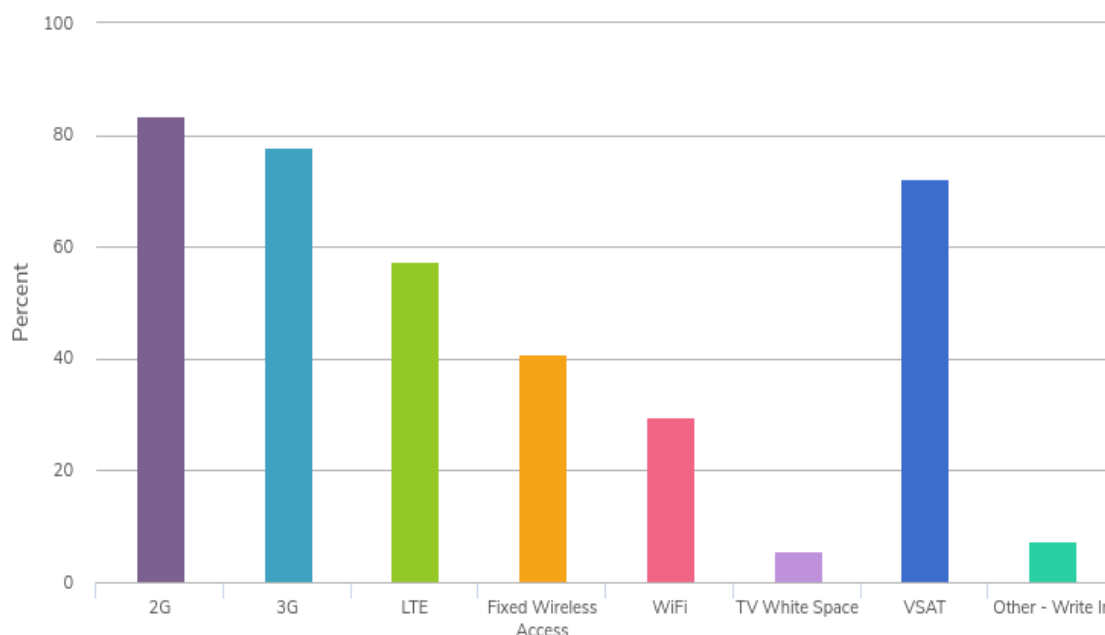


Figure 2.6 Access network technologies used to connect rural areas

### 2.2.3 Assignment of Frequency Bands identified for IMT

The survey considered frequency assignments in the IMT bands within the Africa Region. All the respondent countries have assigned 900MHz (Band 8/FDD), 1800MHz (Band 3/FDD), and 2100MHz (Band 1/FDD).

73% of the respondents indicated that they have frequency assignments in the 800MHz (Band 20/FDD). 53% of the respondent countries indicated assignments in the 2300MHz (Band 40/FDD) and 2600MHz (Band 7/FDD). Less than 30% of the respondents stated that they had assignments in the other IMT bands except for the 3500MHz (Band 42/TDD), where 47% of the countries indicated that they had assigned the frequency bands. Figure 2.7. shows details of the frequency plan.

		700 MHz / B28 / FDD	800 MHz / B20 / FDD	900 MHz / B8 / FDD	1800 MHz / B3 / FDD	2100 MHz / B1 / FDD	2300 MHz / B40 / TDD	2500 MHz / B41 / TDD	2600 MHz / B7 / FDD	2600 MHz / B7 / TDD	2600 MHz / B38 / TDD	3500 MHz / B22 / FDD	3500 MHz / B42 / TDD
Number of countries surveyed with assigned spectrum	7	22	30	30	30	16	8	16	6	6	7	14	
Percentage of countries surveyed with assigned spectrum	23%	73%	100%	100%	100%	53%	27%	53%	20%	20%	23%	47%	

Figure 2.7 Assignment of frequency bands Identified for IMT

## 2.2.4 Utilisation of assigned spectrum

80% of the respondent countries indicated that all service providers utilise all their assigned bandwidths, whilst 17% responded in the negative. 76% of the respondent countries indicated that service providers used frequency in all authorised regions/areas, and 24% indicated that not all service providers used frequency in all assigned regions/areas.

9. Do all the service providers utilise all the frequency bands assigned to them?

	Yes	No
Use all assigned bandwidth Count	24	5
Use frequency in all authorised regions/areas Count	16	5

Figure 2.8 Findings on utilisation of assigned frequencies

## 2.2.5 Capacity to monitor frequency utilisation

The survey assessed the capacity of the respondent countries to monitor spectrum utilisation. 77% confirmed their ability to monitor spectrum utilisation, while 23% indicated that they could not monitor spectrum utilisation.

10. Do you have specific mechanisms for monitoring spectrum utilisation by licensees?

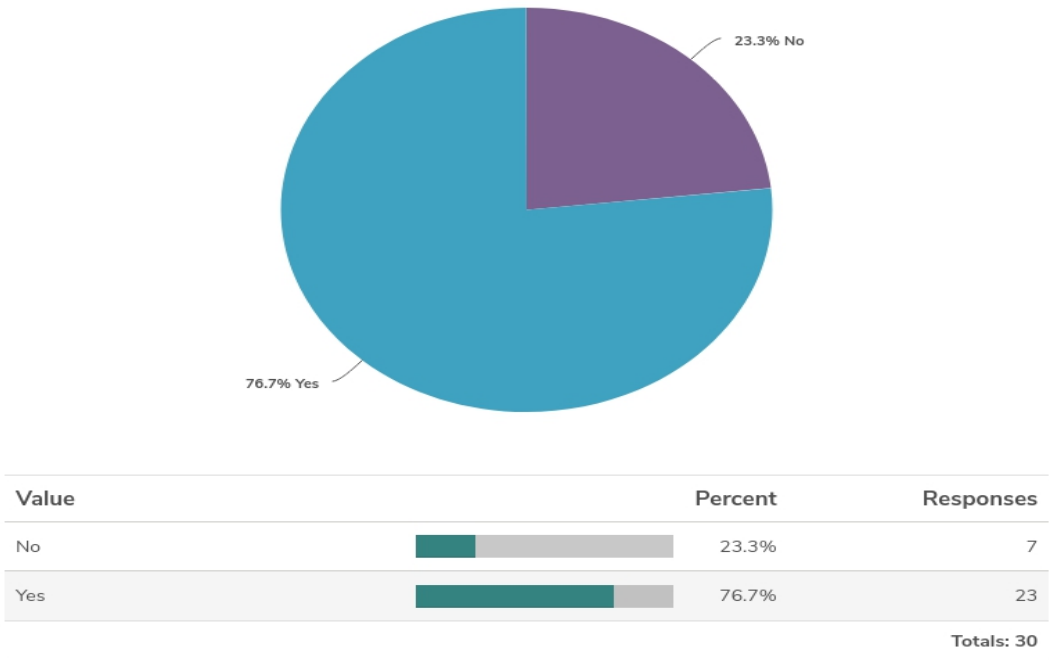


Figure 2.9 Findings on the capacity to monitor spectrum utilisation

### 2.2.6 IMT Frequency Assignment for Nationwide Coverage or Specific Geographical locations

The survey sought to ascertain if the respondent countries assigned all IMT frequencies for nationwide use or specific geographic locations. 80% of the respondent countries indicated they assigned all IMT frequencies to cover the entire country. 7% of the respondent countries reported that some IMT frequencies are assigned for specific geographic locations, and 13% responded that they had assigned IMT frequencies for nationwide use in some cases and specific geographic areas in others. The results show that the majority of the respondent countries designated all IMT frequencies to provide services for nationwide coverage.

11. Are all IMT frequencies assigned for nationwide use or are some for specific geographic locations?

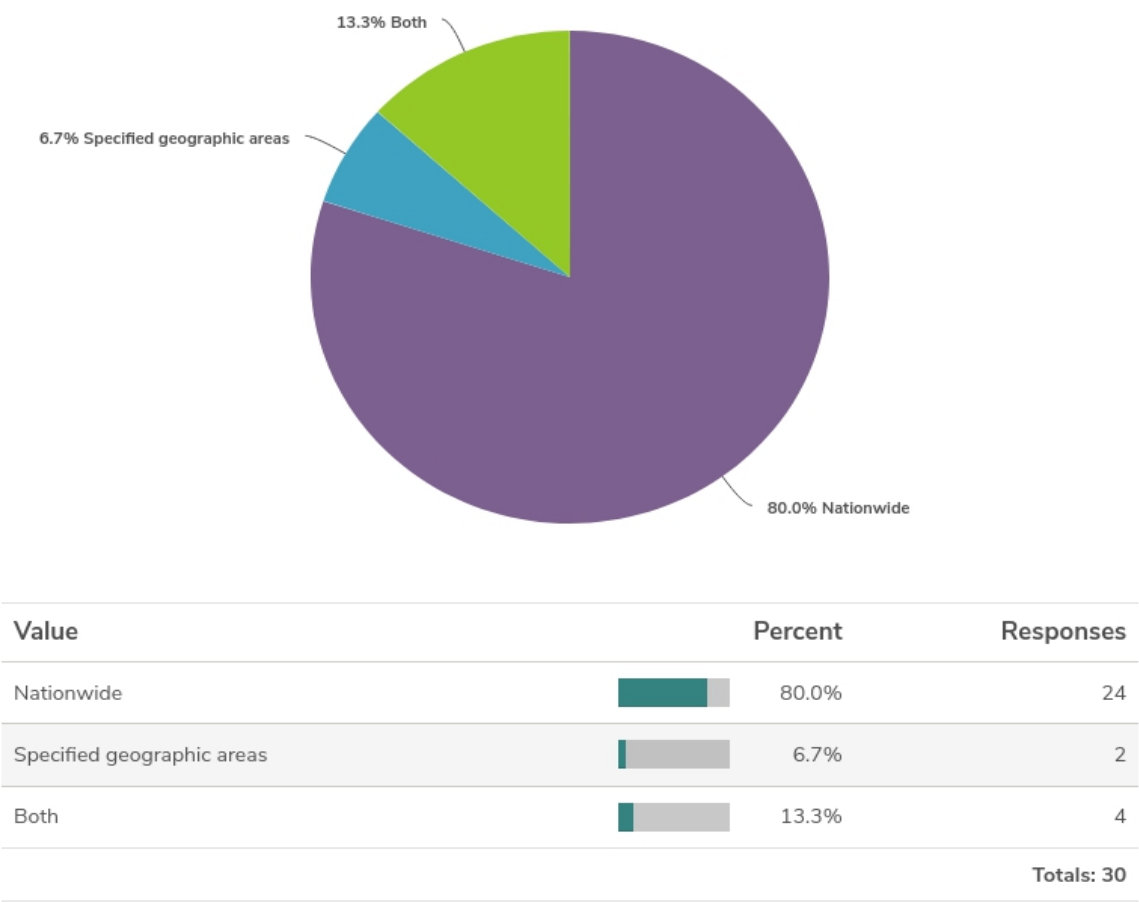


Figure 2.10. IMT frequency assignment for national and specific locations

## 2.3 FREQUENCY LICENSING

### 2.3.1 Methods of Frequency Assignment

The survey responses revealed that the ***first-come, first-served*** approach was the standard method used for frequency assignment, with 83% of the respondents employing this method. 43% use tenders also termed as beauty-contests and 23% use auctions in addition to the ***first-come, first-served*** approach. One respondent indicated that they used other ways also.

12. Which methods do you use to award spectrum licenses to telecom network operators (multiple choices are possible)?

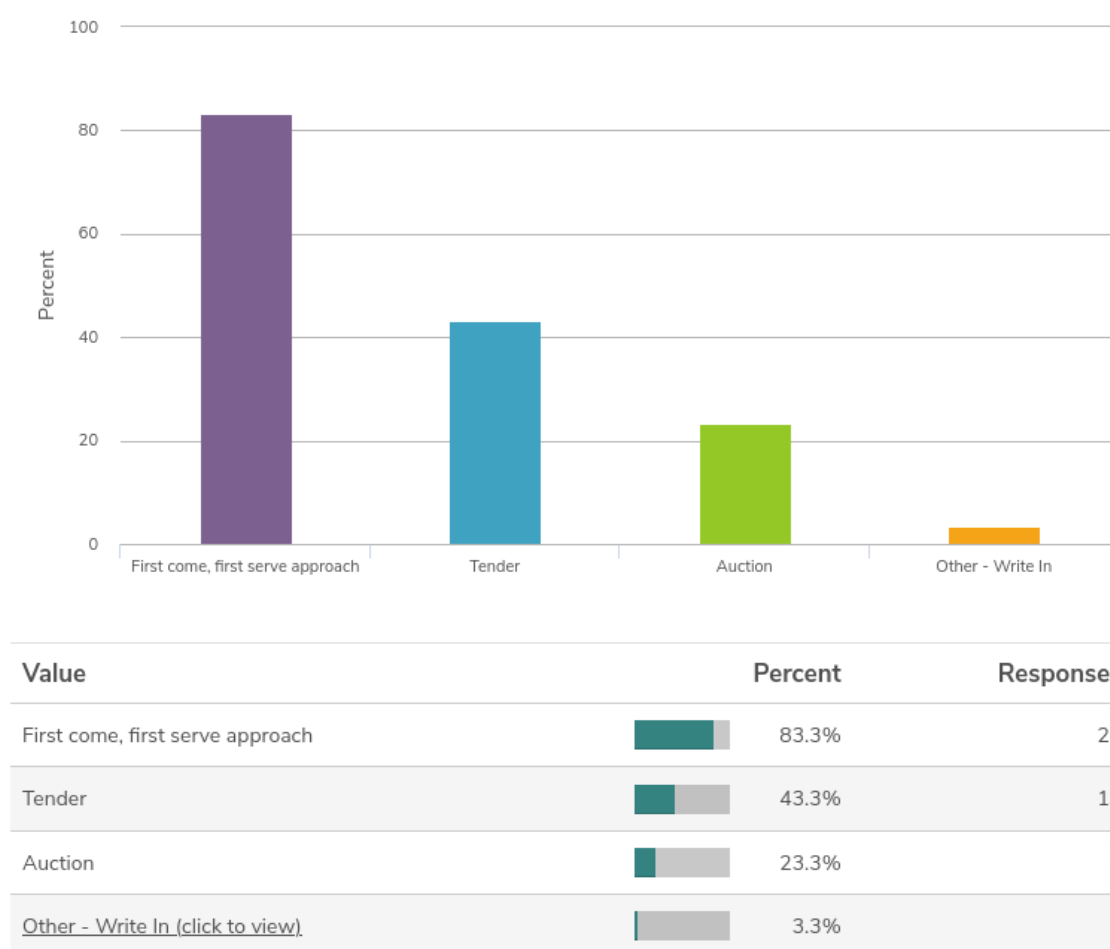


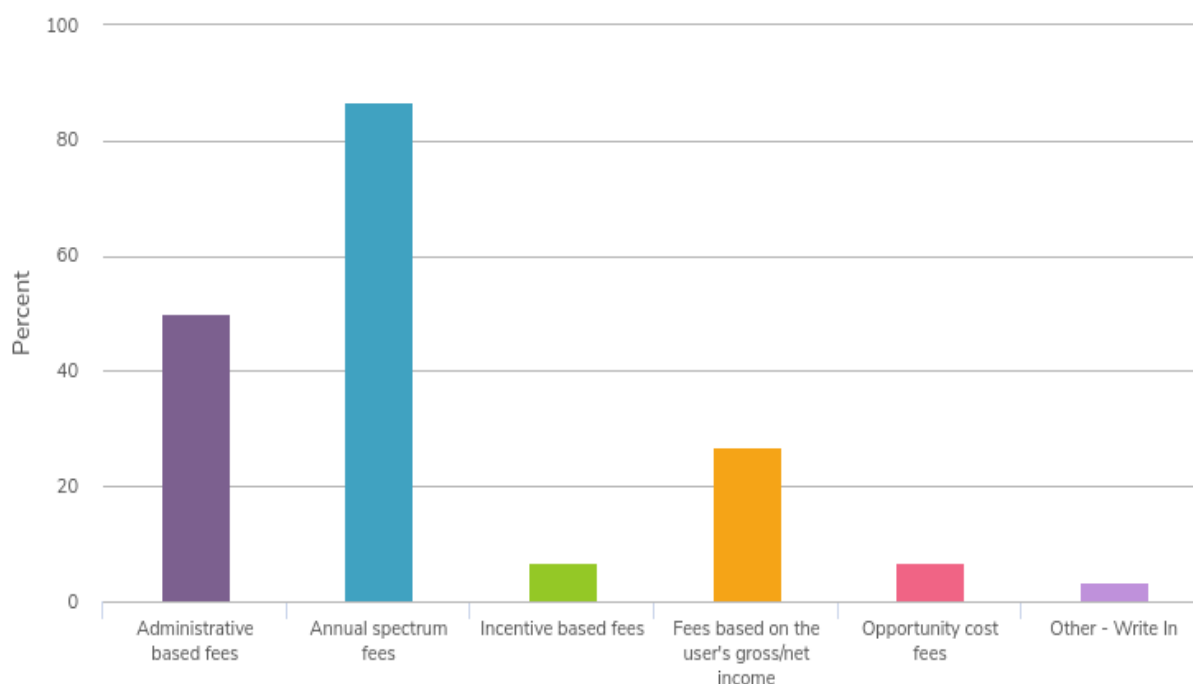
Figure 2.11 Findings on the Methods for Frequency Assignment

### 2.3.2 Spectrum Fees

Under this section, the survey assessed the nature of fees charged for the licensing of the radio frequency spectrum. The responses revealed that 80% charged annual spectrum fees

and 50% charged administrative fees. 27% charged fees based on gross yearly income.

### 13. How do you charge spectrum fees?



Value		Percent	Responses
Administrative based fees	<div><div></div></div>	50.0%	15
Annual spectrum fees	<div><div></div></div>	86.7%	26
Incentive based fees	<div><div></div></div>	6.7%	2
Fees based on the user's gross/net income	<div><div></div></div>	26.7%	8
Opportunity cost fees	<div><div></div></div>	6.7%	2
<a href="#">Other - Write In (click to view)</a>	<div><div></div></div>	3.3%	1

**Figure 2.12 Findings on the nature of fees charged for spectrum**

### 2.3.3 Coverage Obligation in Frequency License Conditions

Seventy per cent (70%) of the survey respondents indicated that their frequency licenses included coverage obligations, while the remaining 30% indicated that none of their frequency licenses has coverage obligations.



14. Do any of your frequency licenses include coverage obligations?

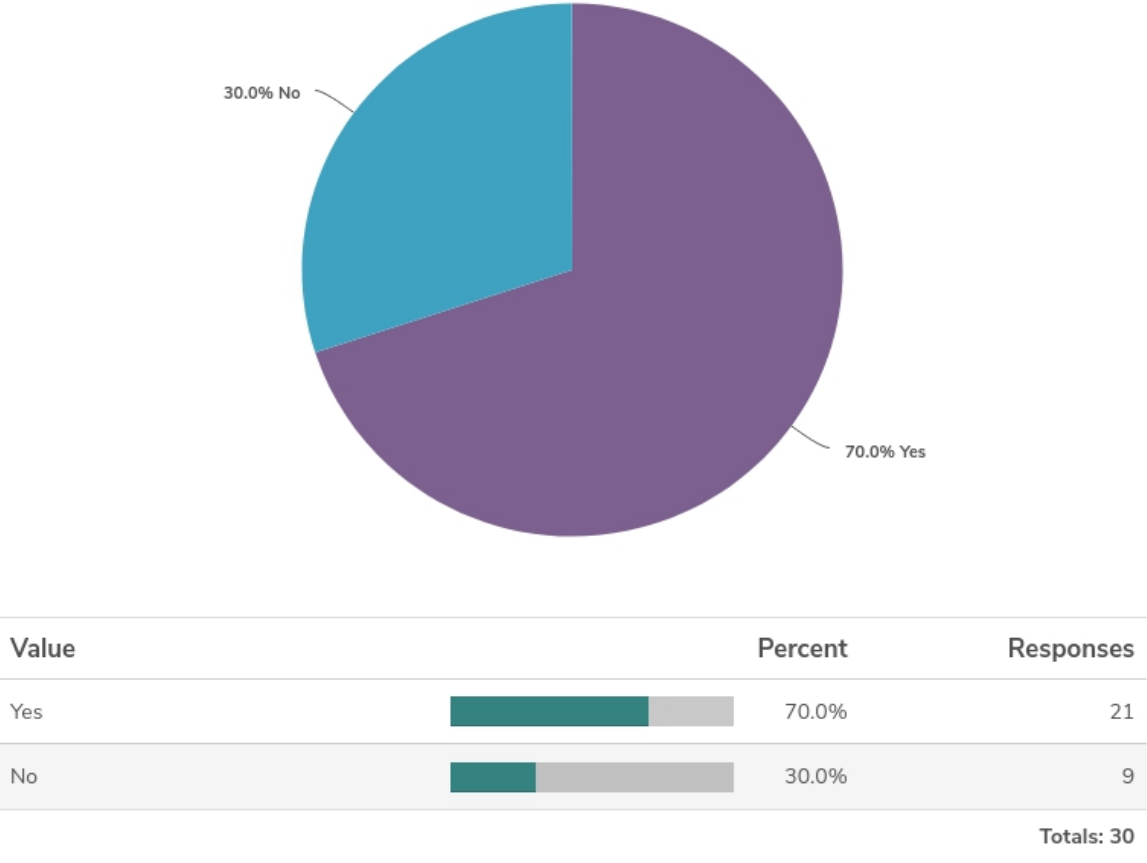


Figure 2.13 Findings on the inclusion of coverage obligations in spectrum licenses

2.3.4 Technology Neutrality in Frequency License Conditions

The survey assessed the adoption of technology neutrality in frequency licensing. The results show that 47% of the respondents applied technology neutrality to all their frequency licenses. 30% indicated they had technology-neutral licenses in addition to technology-specific assignments. 23% indicated their frequency license conditions do not support technology neutrality.

15. Do your frequency license conditions support technology neutrality?

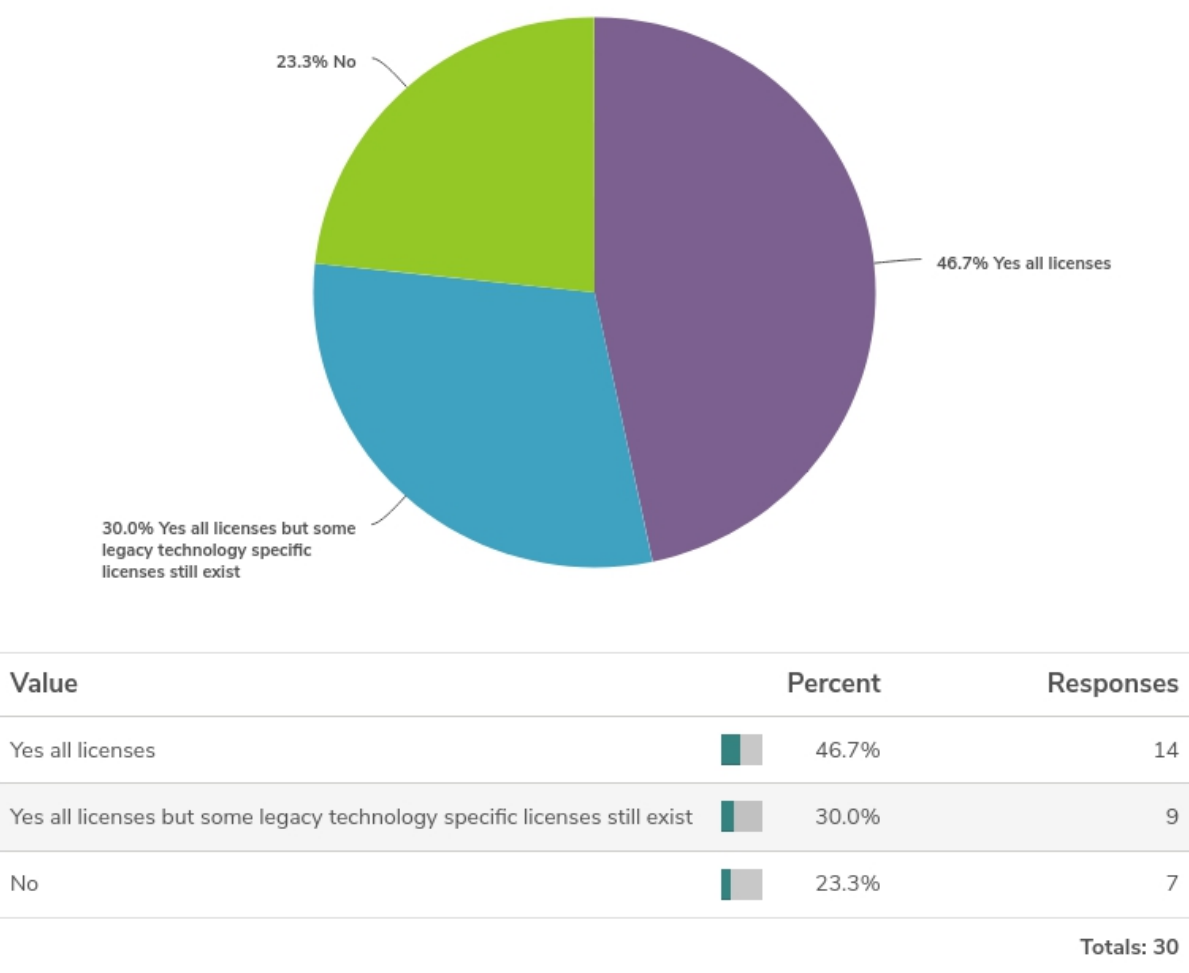


Figure 2.14: Findings on the application of technology neutrality to spectrum licenses

2.3.5 Frequency Sharing

87% of the respondent countries do not permit sharing of licensed frequency among operators. 13% of the respondents indicate that their frequency license conditions permit frequency sharing. Exclusive frequency licensing appears to be the dominant practice among the respondent countries.

16. Do your frequency license conditions permit frequency sharing?

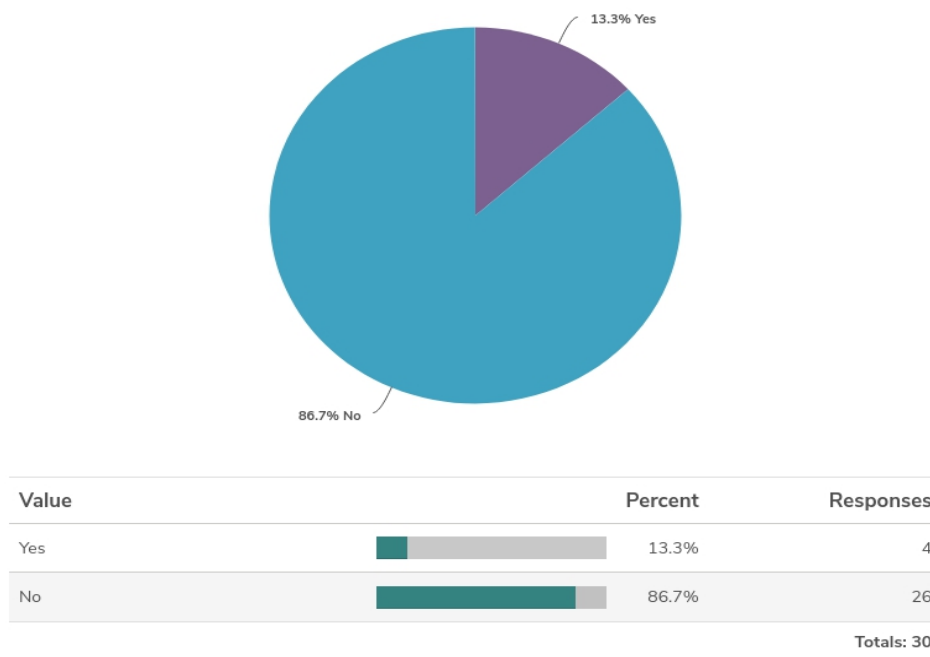


Figure 2.15 Findings on frequency sharing

### 2.3.6 Frequency Trading

97% of the respondents indicated that their frequency license conditions do not permit frequency trading, i.e. holders of spectrum licenses trading their spectrum holdings by themselves. Only 3% of the respondent countries permit frequency trading.

17. Do your frequency license conditions permit frequency trading?

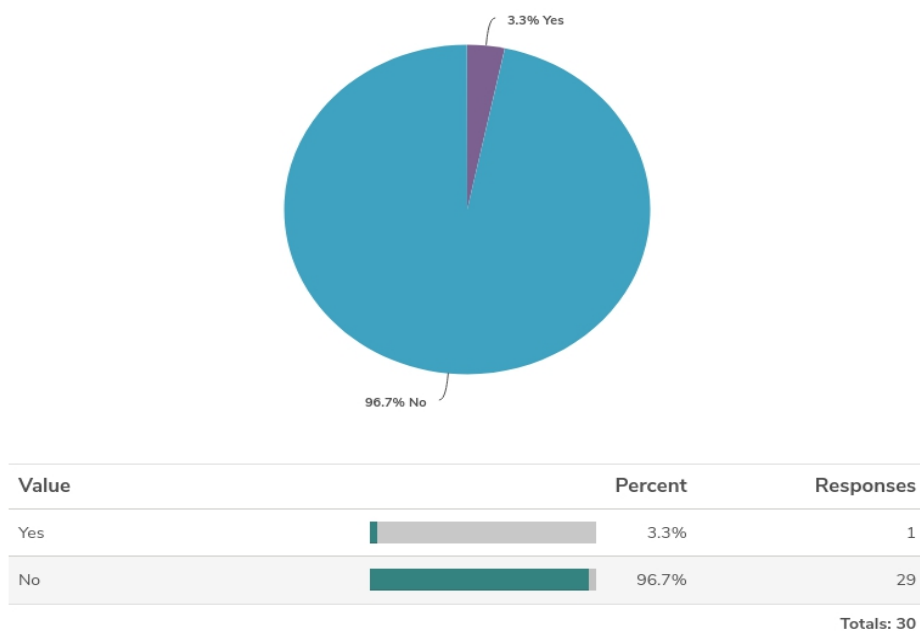


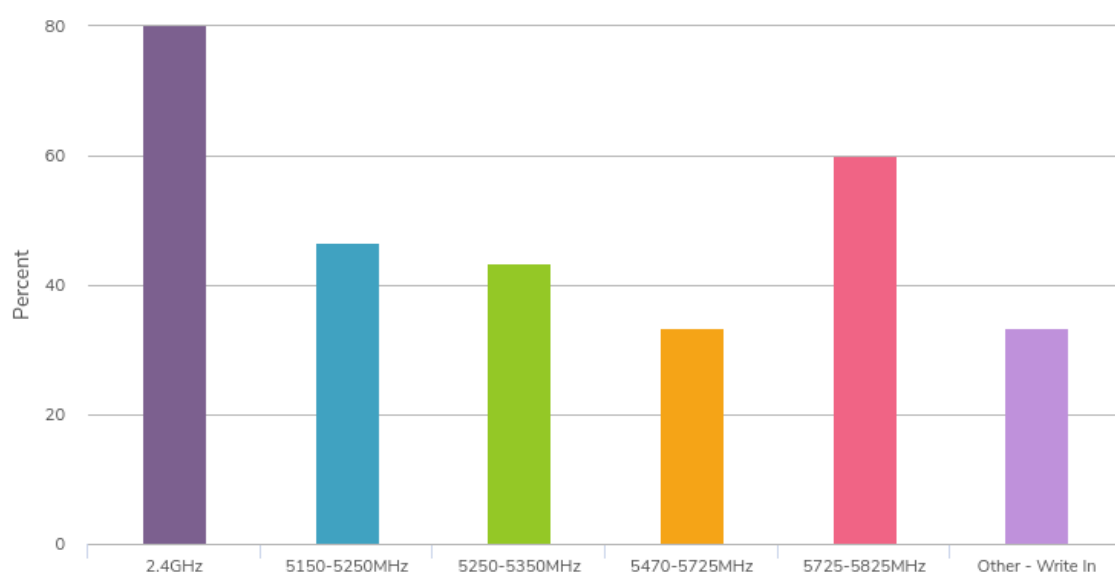
Figure 2.16 Findings on the permission of frequency trading among spectrum licensees

## 2.4 LICENSE EXEMPT AND DYNAMIC SPECTRUM

### 2.4.1 ISM Frequencies Used for Access, P2P or P2MP

The data shows that 80% of the respondent countries used the 2.4GHz band as license-exempt spectrum for Point-to-Point, Point-to-MultiPoint or as Access service. 47% used the 5.2GHz band (5150-5250MHz), 43% used the 5.3GHz band (5250-5350MHz), 33% used the 5.6GHz band (5470-5725MHz), 60% used the 5.8GHz band (5725-5825MHz), and the remaining 33% used other frequencies.

18. Which ISM frequencies are available for license exempt use for Point to Point, Point to MultiPoint, or Access services?



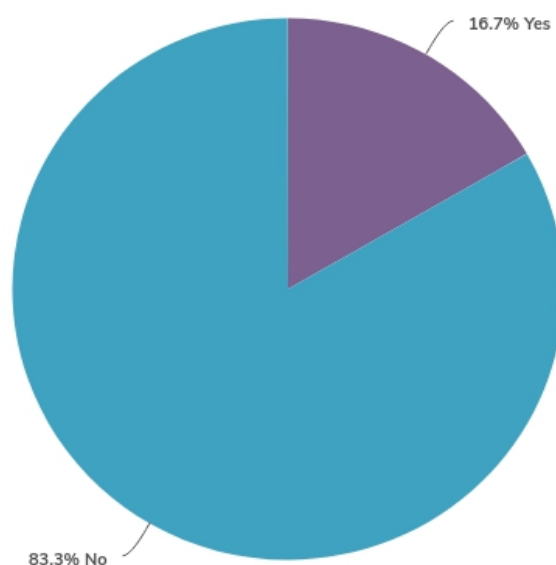
Value	Percent	Responses
2.4GHz	80.0%	24
5150-5250MHz	46.7%	14
5250-5350MHz	43.3%	13
5470-5725MHz	33.3%	10
5725-5825MHz	60.0%	18
<a href="#">Other - Write In (click to view)</a>	33.3%	10

Figure 2.17 Findings on Licence-exempt Frequencies

### 2.4.2 Other Frequencies Considered for License Exempt

83% do not consider other frequencies for license-exempt use, and 17% have considered different frequencies currently under evaluation for license-exempt use.

19. Are there any other frequencies (e.g. 6GHz, mmWave) currently under evaluation for license exempt use?



Value		Percent	Responses
Yes	<div><div></div></div>	16.7%	5
No	<div><div></div></div>	83.3%	25
Totals: 30			

Figure 2.18 Findings on other frequencies treated as Licence-exempt

### 2.4.3 Dynamic Spectrum

The survey assessed the implementation of regulations for dynamic spectrum such as TV White Space (TVWS). 80% indicated that they had no rules for dynamic-spectrum use, 13% stated that they had regulations in place, and 7% answered that they had draft regulations under evaluation. The findings show that many countries have not adopted dynamic spectrum technologies, including TV White Space.

20. Have dynamic spectrum regulations such as TV White Space (TVWS) been evaluated or implemented?

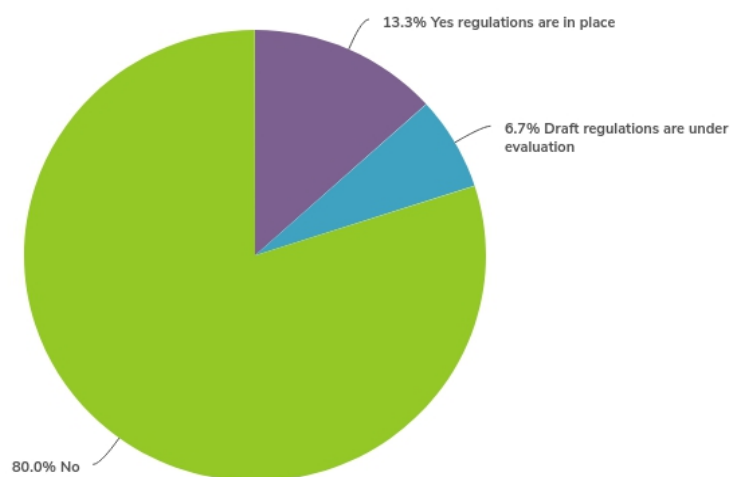


Figure 2.19 Findings on the adoption of dynamic spectrum technologies

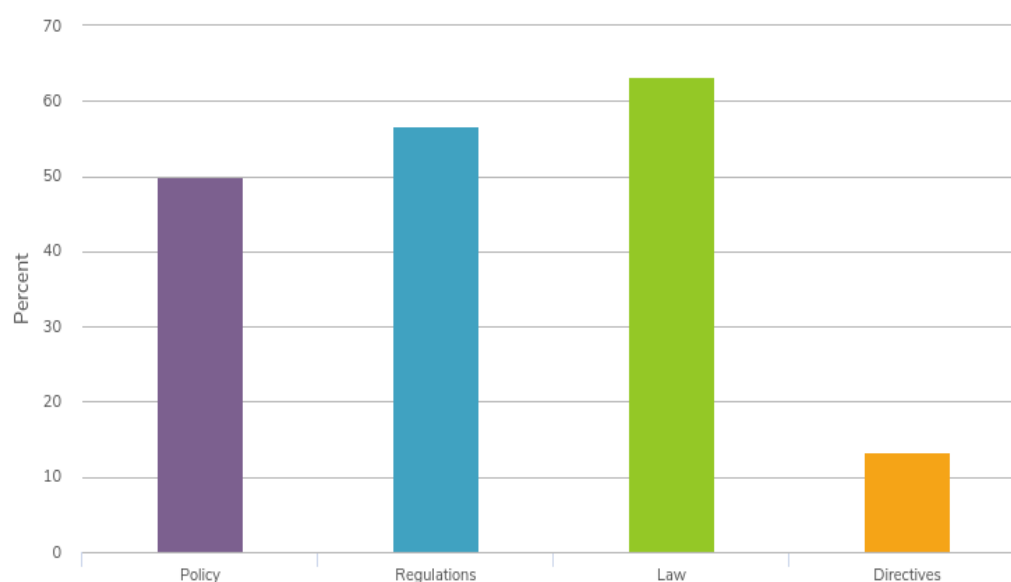
## 2.5 REGULATORY FRAMEWORK FOR RURAL CONNECTIVITY

### 2.5.1 Legal and Policy Environment for Rural Connectivity

The survey assessed the legal, regulatory and policy environment for rural connectivity and made the following findings:

- 50% of the respondent countries have policies for universal access and rural connectivity,
- 57% have regulations or legislative instruments that support universal access and rural connectivity,
- 63% have laws or Acts of Parliament that support universal access and rural connectivity and
- 13% have directives for universal access and rural connectivity.

21. Are there provisions in the national communications policy in support of universal access and/or rural connectivity?



Value		Percent	Responses
Policy	<div><div></div></div>	50.0%	15
Regulations	<div><div></div></div>	56.7%	17
Law	<div><div></div></div>	63.3%	19
Directives	<div><div></div></div>	13.3%	4

Figure 2.20 Findings on the Legal, Regulatory and Policy Environment for Rural Connectivity

### 2.5.2 Specific Spectrum Policies or Regulatory Intervention to Promote Rural Connectivity

The survey found that 50% of the respondent countries had specific spectrum policies or regulatory interventions to develop telecommunications \ ICT in rural and remote areas and the other half did not.



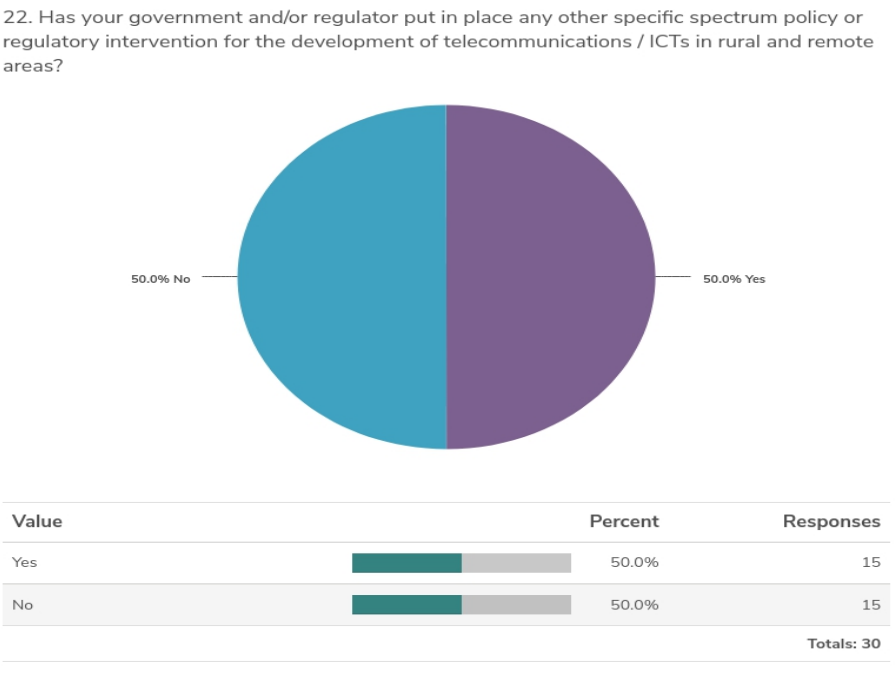


Figure 2.21 Findings on specific spectrum policies for rural connectivity

2.5.3 Policy Evaluation Mechanisms

The survey indicated that 64% of the respondents have mechanisms to monitor and evaluate the success of policies, while the remaining 36 % do not.

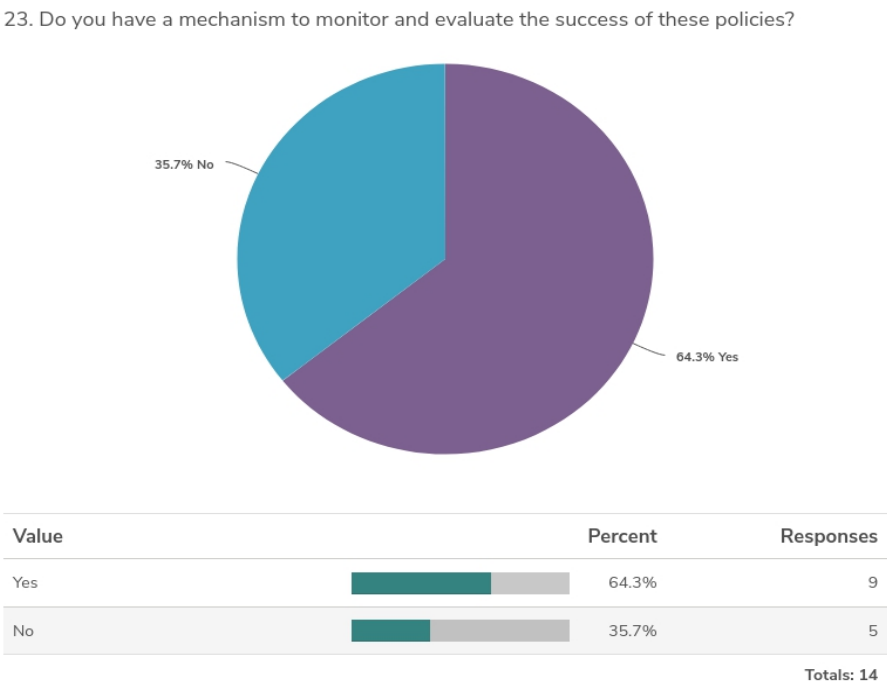


Figure 2.22 Findings on the Mechanisms for Policy Monitoring and Evaluation

### 3.0 OBSERVATIONS

The following was observed from the survey results:

- Some respondent countries have not yet assigned the 700MHz and 800MHz bands. These bands may be essential for providing coverage to rural areas and dispersed settlements.
- A vast majority of respondent countries do not permit frequency trading.
- The vast majority of respondents do not permit frequency sharing - most licences are exclusive, and there are not many standardised frameworks to enable sharing of frequencies among operators.
- About 80% of the respondents indicated that there were Universal Access Funds in their countries, out of which 67% were actively being used to promote universal access objectives.
- Only one (1) country indicated that it had a dedicated rural service provider;
- The adoption of dynamic spectrum techniques such as TV White Space has not been widely adopted among respondent countries.
- A little less than half of the respondents applied the principle of technology neutrality to spectrum licenses.
- The 5GHz ISM sub-bands have not been harmonised among respondent countries as the use of the different sub-bands varied among respondents.
- Half of the respondents indicated that their governments had introduced special interventions to promote rural connectivity.

### 4.0 CONCLUSION

The survey identified significant gaps in the spectrum policies and regulatory approaches towards promoting rural connectivity in member states. Therefore, targeted recommendations are desirable to address the gaps and accelerate rural connectivity in Africa.

### ABOUT THIS REPORT

**Development:** This report was developed by an ATU Task Group on the development of a draft Spectrum Recommendations for Rural Connectivity. This group was led by the following:

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