

**Report**

**On**

**Stakeholder Engagement I: Engagement with the Wireless Internet  
Service Providers (WISPs) in Kenya**

**Work Supported By**

**The Dynamic Spectrum Alliance (DSA)**



**Strathmore**  
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## 1. Overview

This report is a summary of the workshop conducted on 21<sup>st</sup> January 2022 at Strathmore University. The workshop's intention was to first present our findings on the preceding study of the gaps underscoring the connectivity challenges and the level of understanding on the opportunity that Dynamic Spectrum Access (DSA) introduces. Moreover, the workshop also provided a platform to determine the level of familiarity on the enacted regulations for TV White Spaces (TVWS) in Kenya as well as the framework for Community Networks by the Wireless Internet Service Providers (WISPs). Further, the latest opportunity of DSA through Wi-Fi 6 was also presented by the Dynamic Spectrum Alliance (DSAL) to the WISPs and the regulator, particularly on the experience in the Americas, Europe and the contextual economic study conducted in Kenya. Prior to the workshop, a Google form was shared with the various ISPs (Network Facility Providers - NFPs) to obtain information on the understanding of TVWS and Wi-Fi 6 and the pillars of regulations, technology, economic and market relevant to the adoption of DSA for both TVWS and Wi-Fi 6.

## 2. Responses on the Google Form

The set of questions shared on the Google Form through this [link](#) were grouped into the following:

- i. Level of license based on the Communications Authority of Kenya (CA) tier-approach i.e. if the Network Facility Provider (NFP) is a tier 1, 2 or 3.
- ii. The location(s) where the NFP operates and the access technology (ies) currently used to deliver Internet services to the end customers.
- iii. Level of familiarity on the concept of Spectrum Sharing or DSA, the enacted DSA frameworks in Kenya as well as the licensing model(s), sections on the frameworks that require clarifications or changes as well as any recommendations.
- iv. Understanding of TV White Spaces (TVWS) and Wi-Fi 6/6E (6 GHz Wi-Fi), any ongoing deployments, pilots, R&D studies, collaborations, future plans and relevant recommendations.
- v. Technical understanding, capacity and skill in regards to TVWS and Wi-Fi 6/6E together with economic and market opportunity and challenges encountered as well as anticipated in driving implementation of both TVWS and Wi-Fi 6/6E.

Although we expected to obtain lots of feedback on the Google Form due to the large number of signups (over 30 groups) to the attendance of the workshop, only five responses were given from the following stakeholders:

- Dimension Data
- Dunia Moja Network
- James Turuthi
- KETRACO
- Telkom Kenya

A detailed response from these stakeholders is available through this [link](#). In summary, there was only one NFP Tier 1 response on the Google Form – Telkom Kenya, two tier 2 NFPs and 2 tier 3 NFPs. Figure 1 shows the percentage of respondents according to tiers of operation.

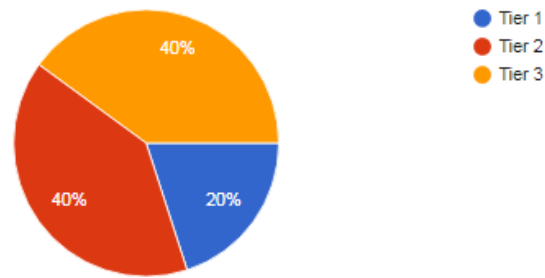


Figure 1: Respondents according to tiers of operation

Most of their services are provided through Fibre, Satellite and Microwave technologies as well as point-to-point (PtP) wireless links. 80 per cent of these respondents (4 of them) provide services in all locations – urban, semi-urban and rural areas with only one of them providing services in the rural communities. Figure 2 shows areas of operation of respondents.

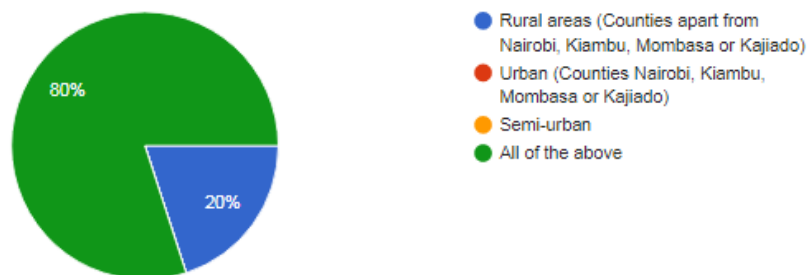


Figure 2: Areas of operation of the respondents

## 2.1. Responses on DSA in General

Figure 3 shows the familiarity of respondents with the concept of Dynamic Spectrum Access (DSA). 60 per cent of these respondents mentioned to be familiar with the concept of DSA with 20 per cent being totally unfamiliar with the concept and the last 20 per cent having a very limited understanding of the concept. This implies that a good percentage of Wireless Internet Service Providers (WISPs) in Kenya are not familiar with the concept of DSA.

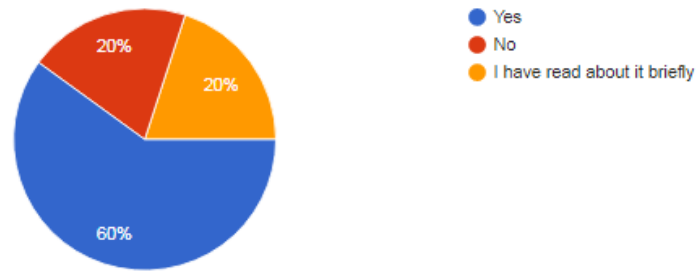


Figure 3: Familiarity with the Concept of DSA

Respondents were also asked whether they have any current dynamic spectrum access initiatives or if they have considered any future dynamic spectrum access initiatives. 60% said they currently do not have any DSA initiatives. This indicates that there is very low implementation and adoption of DSA in Kenya.

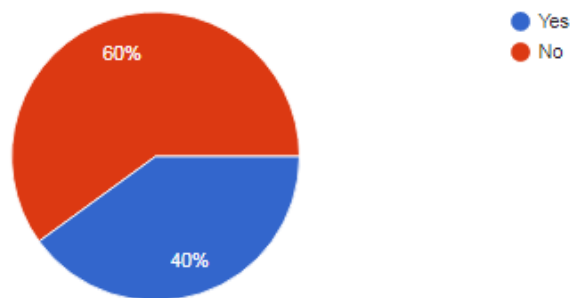


Figure 4: Respondents Feedback on DSA Initiatives

## 2.2. Responses on TV White Spaces

In terms of the architecture of the regulatory framework for TVWS shown in Figure 5, all the respondents mentioned to be fully satisfied with it.

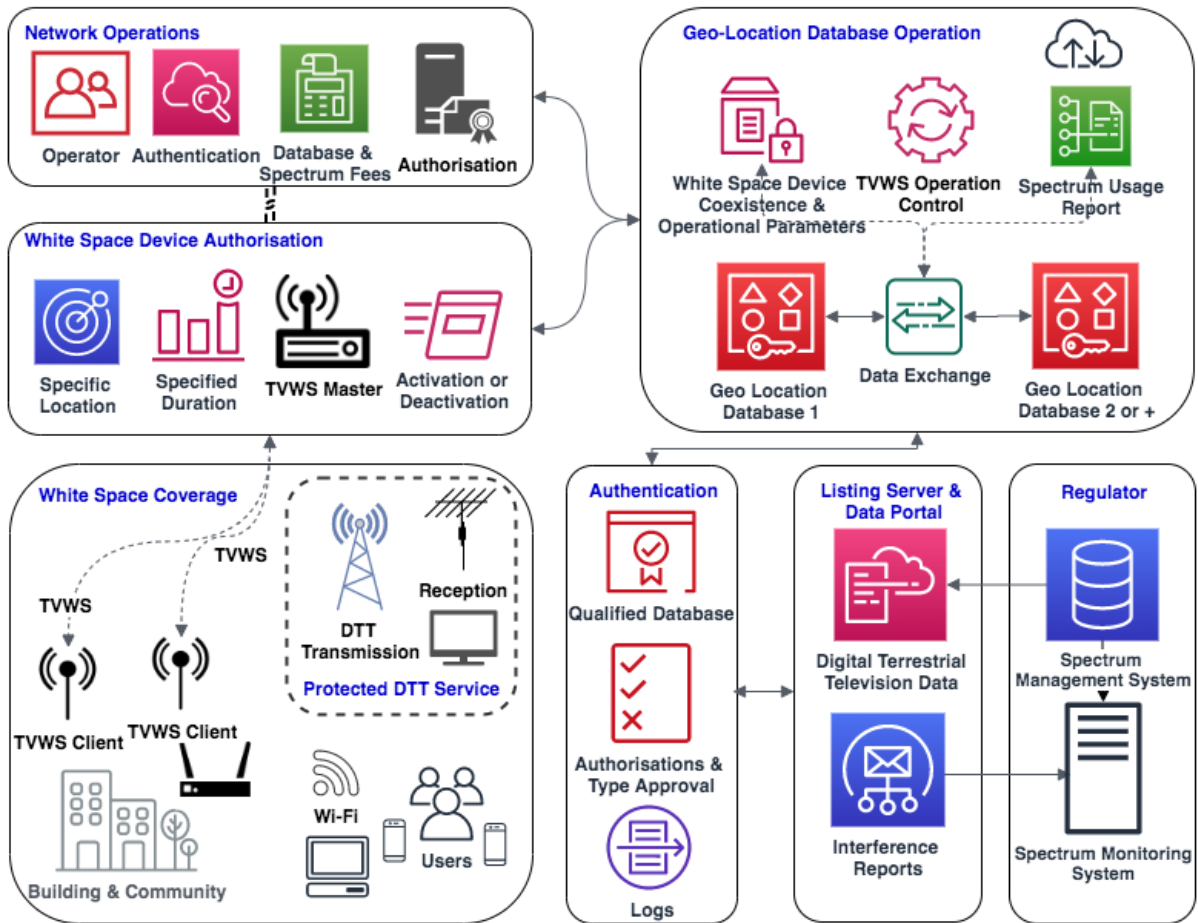


Figure 5: Architecture of the TVWS Regulatory Framework for Kenya

Interestingly, all the respondents mentioned that the TVWS framework has some barriers with 20 per cent proposing more awareness to be created and another 20 per cent saying the framework should be treated as a live document needing improvements over time. Barriers to adoption of TVWS according to the respondents are shown in Figure 6.



Figure 6: Barriers to adoption of TVWS according to the respondents

In terms of specific barriers, spectrum pricing and unhealthy competition were mentioned by one respondent. 80 per cent of the respondents, despite the barriers highlighted, mentioned that they have intentions to deploy TVWS. The following were mentioned as other challenges to future TVWS deployments:

- “Market control maybe a challenge because regulator will be required to closely monitor the usage”
- “Availability of the spectrum at the desired location and the number of years (term) for the allocated spectrum”
- Availability of well trained personnel
- Vandalism

100% of the respondents said they will consider TVWS spectrum for future bandwidth needs. Respondents also gave the responses shown in Figure 7 when asked what kind of services they intend to use TVWS in their future deployments. It can be seen that majority of the stakeholders (80%) are very keen on using TVWS for rural broadband.

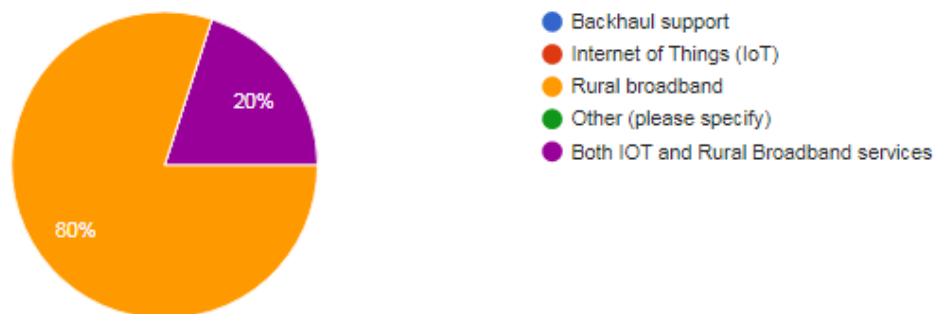


Figure 7: Potential TVWS Usage

Most stakeholders (80%) showed limited or complete lack of knowledge on deployment of TVWS. Respondents gave the following feedback when asked about how their knowledge on the technical requirements of deploying TV White Spaces measured:

- i. “No experience at the moment and details maybe available for amendments after tests”
- ii. Minimal
- iii. “I am aware of the basic technical requirements”
- iv. Good
- v. Not aware

The following were the suggestions received on how to make TVWS equipment more affordable:

- “The government needs to subsidise or better still issue the equipment to Rural based ISPs that are connecting the unconnected”
- “Equipment should be tax free, encourage local manufacturers to develop some of the required equipment”
- Zero rate white space equipment

The following were mentioned as economic or market challenges that the respondents would face if they are to make use of TV white space technology:

- Price of equipment
- Availability and cost of user devices.
- Availability of grid power in the rural areas.
- Financial status of the intended users.
- Perceived low revenue per user
- Affordability

In summary most of the WISPs show limited or complete lack of knowledge on TVWS and DSA in general. One of the major barriers mentioned by the respondents is the cost of the white space devices. On the positive side, many of the respondents indicated that they will consider TVWS for the future bandwidth needs. The most popular use case for TVWS among the respondents is rural broadband.

### 2.3. Responses on Wi-Fi 6/6E

Figure 8 shows the response on familiarity with WiFi 6/6E technology developments. 80% of the respondents said they are familiar with the technology developments on the 6 GHz Wi-Fi.

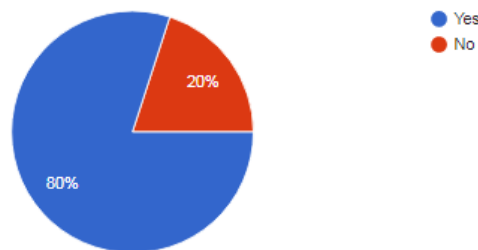


Figure 8: Familiarity with Wi-Fi 6 Technology

Respondents provided the following suggestions in regards to the adoption of Wi-Fi 6/6E:

- i. Release of equipment requirements to guide the Kenyan market and the users.
- ii. Need for Wi-Fi 6 pilots to be conducted as part of monitoring uptake and performance before any regulations are published.
- iii. Need for more stakeholder engagement.
- iv. Expansion of the band (To mean, full access to the 6 GHz band for Wi-Fi).

Some countries such as the USA, Mexico, Brazil and Canada have already authorised access to the full band while Europe has authorised access to the lower 6 GHz band (5925 - 6425 MHz). Respondents were asked their preference on whether to access part or the full 6GHz based on their knowledge, experience and strategy. Their feedback is shown in Figure 9. It can be seen from the diagram that all the respondents are in favour of access of the entire 6 GHz band.



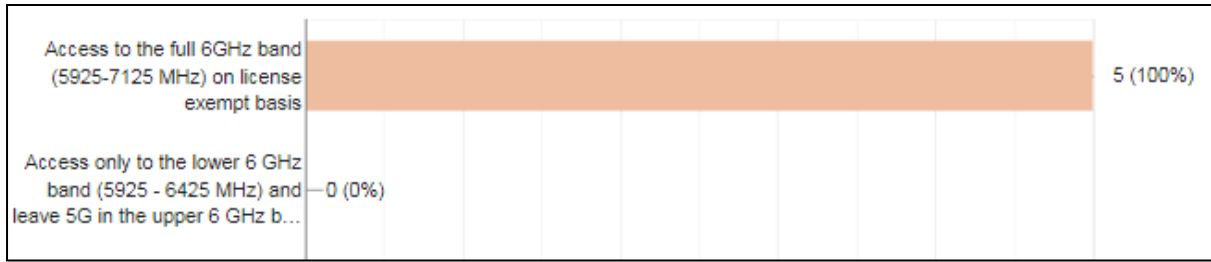


Figure 9: Response to the access of the 6 GHz band

The following responses were provided as to the preference of accessing the 6 GHz band.

- “Full access is required so that there should no limitation on usage and equipment selection”
- “In most cases, new technologies come with a higher price tag, this limits its adoption. When there are additional restrictions e.g. licensing, then the adoption of that technology would end up being a premise for the well-off and not for everyone.”
- “This is to increase access and affordability”
- “License exempt accessibility will help solve indoor internet access problems”

Respondents were also asked whether the currently existing 40 MHz Wi-Fi channels in the 5 GHz band are sufficient. Fig 10 shows the responses. 50% of the respondents said it is not sufficient and 25% said they find it as the only present alternative. This implies that most of the WISPs require more bandwidth for WiFi.

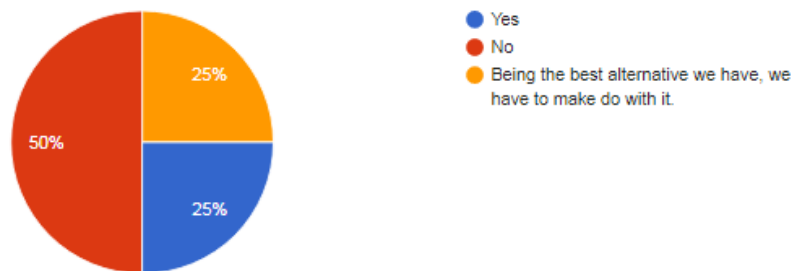


Figure 10: Sufficiency of 40 MHz Channels in the 5 GHz Wi-Fi Spectrum

Regarding the economic opportunities envisioned for the 6 GHz Wi-Fi, respondents agreed that there exists quite a number of them while providing the following specific responses:

- Wi-Fi 6 can help reach more people in the rural areas.
- It provides faster and more reliable connectivity
- It can facilitate opening up affordable Internet access and increase trade.
- Through traffic offload, it will help save the cost of infrastructure, particularly for NFP tier 1s.

In order to find out any potential challenges, respondents were asked to mention any market or economic challenges that they foresee in the adoption of Wi-Fi 6/6E technology. Their main concern is the price of devices. Their specific responses were as follows:

- “If the pricing matches the existing devices then there should be no problem.”
- Lengthy period for return on investment
- “Interference (This is however a technical challenge)”
- Availability and cost of devices

In summary most of the respondents are in agreement that Wi-Fi requires more bandwidth due to the congestion challenges and restricted channel availability in the preceding Wi-Fi generations in the 2.4 and 5 GHz. Hence, they see an opportunity to expand their Wi-Fi services in the 6 GHz band. However the challenges mentioned need to be addressed.

### 3. The Workshop

The hybrid (both physical and virtual) workshop conducted on the 21<sup>st</sup> featured the following presentations:

1. Findings on Gap Analysis studies carried by Strathmore University Research Team prior to the workshop.
2. A talk on the roadmap for Dynamic Spectrum Access (DSA) in Kenya by the Communications Authority (CA).
3. Presentation from the Dynamic Spectrum Alliance (DSAL) on TV White Spaces across the world.
4. Presentation from the Strathmore Research Team on TV White Spaces in Kenya.
5. Presentation from HPE on Wi-Fi 6E.
6. Presentation from DSAL on Wi-Fi 6 Developments.
7. Presentation on the “Economic Impact of Designating 6 GHz for Unlicensed Use in Kenya” from Telecom Advisory Services LLC.

All these presentations have been shared in a public Google Drive folder accessible through this [link](#). The workshop also featured a section on Q&A where stakeholders sought clarifications and understanding on both TVWS and Wi-Fi 6. The workshop had very few stakeholders attending physically with a good number attending online. Specifically, only two companies attended physically, both of which are Community Networks – Tunapanda and Aheri.

## 4. Highlights of the Workshop

### 4.1. On TV White Spaces (TVWS)

While TVWS has had a lot of trials and demonstrations in Kenya, stakeholders attending the workshop cited that TVWS has not yet matured for commercial deployment due to the following challenges:

1. Cost of TVWS equipment / devices.
2. Limited skill in implementing and deploying TVWS. This also ties to the gap of local manufacturing of the equipment.
3. An understanding of the technology term “TV White Spaces” and the entire umbrella of the concept of TVWS in addition to the TVWS framework.
4. Economic sustainability of the TVWS technology.

### 4.2. On Wi-Fi 6/6E

In the physical workshop, the stakeholders viewed Wi-Fi 6/6E as an opportunity to enhance connectivity although they felt that more awareness needs to be created for better understanding and practical demonstrations to be shown. Concerns raised were mostly on the cost of the devices and the backward compatibility of the technology. On backward compatibility, the Dynamic Spectrum Alliance provided a comprehensive response on the devices that are to operate in the 6 GHz band. While Wi-Fi 6 refers to the devices based on the IEEE 802.11ax standard, which includes devices compatible with both 2.4 GHz and 5 GHz bands as well, newer devices that are to operate exclusively on the 6 GHz band, still under the IEEE 802.11ax standard are what the Wi-Fi Alliance has denominated as Wi-Fi 6E devices. Hence, Wi-Fi 6E devices are envisaged to be the ones that will take full advantage of the 6 GHz band.

On the economic opportunity of Wi-Fi in the 6 GHz band, stakeholders were in agreement that there is a huge opportunity through provision of Internet access and the implementation of the Internet of Things (IoT) technology that Wi-Fi 6 can provide. The presentation by Telecom Advisory Services illuminated extensively on the elements that stakeholders can potentially look out for in the adoption of Wi-Fi in the 6 GHz band for economic benefit.

## 5. Recommendations Based on the Stakeholder Engagement

The engagement with the stakeholders, both physically, online and through the Google Form, in general, showed that there exists a need to continually organise Dynamic Spectrum Access-based workshops to educate the stakeholders on the existing developments and upcoming opportunities as the level of awareness is quite low at the moment. The specific recommendations based on DSA, TVWS and Wi-Fi 6E are provided here.

### 5.1. On DSA in general

There is a huge need to create more awareness on the concept of spectrum sharing in general. Specifically, the architecture of Dynamic Spectrum Access (DSA), implementations of DSA in various bands across the globe, existing frameworks for DSA and a keen focus on the technology, regulations as well as the commercial deployments. While this needs to be done, it is also important to get stakeholders participating in the workshops, conferences as well as sessions demonstrating DSA. To effectively enable this, the Communications Authority of Kenya (CA) can take the lead in organising such awareness activities in order to have as many stakeholders as possible attend such sessions. For example, stakeholders from the Community Networks seemed unaware that they are allowed to access unlicensed and lightly licensed spectrum at no spectrum fee. Such information can be provided through the awareness sessions.

### 5.2. On TV White Spaces

Most of the respondents raised concerns on the cost of white space devices (WSDs). To encourage adoption, tax exemption and subsidies can be considered for these devices. This was also suggested by the WISPs who participated in the engagement activity. Further, there is also a gap in skill in terms of technical deployment of the TVWS by the WISPs. Therefore, training activities can be conducted to equip the technical teams of the WISPs to deploy TVWS networks.

### 5.3. On 6 GHz Wi-Fi

The stakeholder engagement clearly showed that, while the stakeholders are aware of the development of Wi-Fi in the 6 GHz band and see a great opportunity, they were not familiar on how the deployment for the Wi-Fi 6/6E can actually work in practice. Therefore, it would be great for Wi-Fi 6 pilots to be conducted in the country and provide exemplars that can provide a benchmark for implementation and adoption. It would also help the regulator develop a strategic roadmap from a point of practical experience in enacting the necessary and fitting regulations for Kenya. Similar to TVWS, the cost of equipment was also highlighted here. Hence, the approach of tax exemptions and subsidies might also serve well in driving down the cost of Wi-Fi 6E devices to encourage adoption.