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DSA
DYNAMIC • SPECTRUM • ALLIANCE

Mr. Jude Mulindwa
Officer Information Services
Uganda Communications Commission
42-44, Spring Road – Bugolobi.
P.O. Box 7376,
Kampala – UGANDA

Dear Mr. Mulindwa:

The Dynamic Spectrum Alliance is a global organization advocating for laws and regulations that will lead to more efficient and effective spectrum utilization[1]. The Dynamic Spectrum Alliance's three goals are closing the digital divide globally, enabling the Internet of Things and alleviating the "spectrum crunch". The Dynamic Spectrum Alliance welcomes the *Draft TV White Space Guidelines for Uganda, June 2018*[2] on which the Uganda Communications Commission (UCC) is seeking input.

Question 1: Should the use of TVWS be permitted in Uganda?

The Dynamic Spectrum Alliance strongly urges the UCC to authorize license-exempt operations in the TV White Spaces (TVWS) on a no-interference / no protection basis across Uganda. High power fixed wireless TVWS devices can extend the Nation's growing fibre optic network and provide affordable broadband access in urban areas, and especially in less densely populated areas of the country.

Affordable Internet access is essential for Uganda's businesses to grow, its residents to enjoy an improved quality of life, and for transforming Uganda into a knowledge-based society. Broadband delivery utilizing the TVWS supports Uganda Vision 2040 and the National Development Plan. TVWS technology today can meet the 2020 goals of 4 Mbps rural and 30 Mbps urban downlink speeds.

Question 2: What is your view of the scope and proposed requirements and procedures for authorization of service providers that wish to use TVWS as highlighted in sections 3 and 4?

The proposed UCC guidelines cover the operation of TVWS in the frequency range 470- 694 MHz based on Dynamic Spectrum Allocation (DSA) technique.

The Dynamic Spectrum Alliance suggests that UCC's guideline for operation of TVWS in Uganda also include the VHF broadcast television bands. While these lower frequencies can be used for broadband communications, they are ideal for outdoor narrowband Internet of Things (IoT) applications where small

[1] Our membership spans multinationals, small-and medium-sized enterprises, and academic, research, and other organizations from around the world, all working to create innovative solutions that will increase the amount of available spectrum to the benefit of consumers and businesses alike. A full list of Dynamic Spectrum Alliance members is available on the Dynamic Spectrum Alliance's website at www.dynamicspectrumalliance.org/members.

[2] http://www.ucc.co.ug/wp-content/uploads/2017/09/TVWS-Guidelines-for-Consultation-9th-July-2018_v2.pdf.

(continued…)

amounts of data is captured over long distances and large areas such as in agriculture or environmental sensing.

Uganda is in ITU Region 1. Broadcasting service has a primary allocation 47-68 MHz (VHF), 174-230 MHz (VHF) and 470-790 MHz (UHF) frequency bands. In 223-230 MHz, fixed and mobile services have a secondary allocation. Between 470-790 MHz footnote 5.296 applies.[3]

Consequently, Dynamic Spectrum Alliance suggests that UCC may want the acronym DSA to mean Dynamic Spectrum Access rather than Dynamic Spectrum Allocation. We recognize that depending on the context, DSA can mean Dynamic Spectrum Allocation, Dynamic Spectrum Authorization, or Dynamic Spectrum Access. Each has a somewhat different meaning. Having the "a" mean "allocation" rather than "access" may lead to an unintended relationship between license-exempt TVWS devices and other occupants of the band than UCC intends.

Regarding question 4, the Dynamic Spectrum Alliance recognizes that the UCC needs to: 1) establish mechanisms that ensure license-exempt TVWS devices do not cause harmful interference to other users, 2) quickly identify substantiated complaints of harmful interference, and 3) enforce the rules. One such mechanism is a requirement for all TVWS device models to receive type approval according to UCC's Type Approval guidelines. The Dynamic Spectrum Alliance generally support this approach.

Another mechanism UCC proposes is to authorize TVWS use. More specifically, Internet service providers intending to provide services over TVWS spectrum will apply to the UCC and "the process of authorization will be in accordance with the existing application procedures for radio spectrum". Taken in conjunction with Section 8 of the proposed rules, we see UCC's approach as reasonable.

We offer two caveats. First, our experience is that some so-called TVWS networks consist exclusively of point-to-multipoint TVWS links, while other so-called TVWS networks are in fact heterogenous network that incorporate one or more TVWS links. The Dynamic Spectrum Alliance requests that the UCC in its application procedures differentiate whether the service providers' network consists exclusively of TVWS links or if the service providers' network only incorporate a limited number of TVWS links within a heterogenous network. Second, we urge that if the UCC chooses to charge fees for authorization of service providers utilizing TVWS spectrum, the fees are based on cost recovery rather than to raise revenues for the Treasury.

Question 3: Do you have any concerns about the proposed technical requirements and standards specified for the use of TVWS in Uganda as highlighted in section 5? If yes, please explain.

The Dynamic Spectrum Alliance suggests UCC consider Section 7 of our 'Model Rules and Regulations for the Use of Television White Spaces v2.0, December 2017' (Model Rule v2).

"*Technical Requirements for WSDs Operating in 8MHz Television Broadcast Bands*

(a) Geolocation and Database method

[3] *Additional Allocation*: in …. Uganda… the frequency band 470-694 MHz is also allocated on a secondary basis to the land mobile service, intended for applications ancillary to broadcasting programme-making. Stations of the land mobile service in the countries listed in this footnote shall not cause harmful interference to existing or planned stations operating in accordance with the Table in countries other than those listed in this footnote. (WRC-15)

(1) WSDs relying on the geolocation and database method of determining available frequencies may transmit using the maximum transmit powers provided by the database pursuant to Section 4 (of the Model Rules v2)
(2) Devices must comply with the emission limits specified in ETSI EN 301 598 v2.1.1 (2018-01).
(3) A device shall report its out-of-band emission behaviour as one of ETSI's Device Emission Classes 1-5.
(4) Maximum transmit powers provided by the database shall specify the maximum equivalent isotropically radiated power (EIRP) in 8MHz bands, which shall not exceed 40dBm/8MHz in any 8MHz band.
(5) The maximum EIRP in each 100kHz band within an 8MHz band shall be 19 dB below the maximum EIRP in that 8MHz band
(6) The conducted power delivered to the antenna system of a device in an 8MHz band must not exceed the maximum EIRP minus the amount in dB equivalent to the total directional gain of the antenna(s) in dBi.
(7) Maximum transmit powers shall be applied in a similar manner by Fixed, Personal/Portable, Master, and Client devices.

In addition, the Dynamic Spectrum Alliance believes that antenna gain can be increased above 6 dBi as long as the conducted power of the TVWS radio is reduced accordingly so that the maximum radiated power remains constant at 36 dBm as proposed by UCC (or 40 dBm as we propose).

There needs to be a location accuracy requirement for TVWS devices that feeds into the TVWS database's calculation engine that determine the exclusion zone necessary to protect each licensee. If GPS is being considered as the means of determining location accuracy, UCC needs to keep in mind that the accuracy of commercial grade GPS is +/- 15 meters.

Finally, the Dynamic Spectrum Alliance suggests that UCC allow TVWS base stations and customer premise equipment in rural and remote regions to operate at heights up to 100 meters above ground level. Increasing TVWS device height above ground level from 30 meters to 100 meters is something under consideration in the United States. At some locations and geometries, the increased TVWS base station height will be a useful tool for network designers. For one thing, it can reduce capital expenditures as more area can be covered by fewer TVWS base stations. The TVWS database in combination with transmit power control on the device will ensure that licensees will be protected equally as well regardless of whether the TVWS base station is situated at 30 meters above ground level or 100 meters above ground level.

Question 4: What is your view on the proposed arrangement for management of the TVWS database by a third party authorized and under the oversight of UCC as highlighted in section 6?

The Dynamic Spectrum Alliance supports UCC's proposal to have the TVWS database managed by a third party authorized and under the oversight of the agency.

Question 5: Do you have concern(s) with any of the roles assigned to the different stakeholders in the TVWS ecosystem in Uganda as highlighted in section 8?

The only concern the Dynamic Spectrum Alliance has regarding the roles assigned to the different stakeholders in the TVWS ecosystem is that assigned to End user of a service or terminal that is operating using TVWS. We believe that only fixed devices used for broadband access should be registered. These devices operate at radiated power greater than 20 dBm. For these higher-power fixed devices, the End User should register both the base station and the customer premise equipment with the service provider.

End Users of personal / portable TVWS devices operating at a maximum power of no greater than 20 dBm, should not have to register their devices with the service provider. Personal / portable client TVWS devices are likely to consist of a dongle plugged into an external USB port or integrated into a multi-band Wi-Fi radio in a laptop, tablet, of phone. A possible unintended consequence of the proposed rule requiring End Users of TVWS devices having to register their devices with services providers is that some Ugandans in the future may have to register certain widely owned consumer devices that they have never had to register before.

Similarly, requiring End Users to register narrowband IoT sensors that will operate over the TVWS with the service provider may be impractical as well as a barrier to adoption – particularly for something like agriculture on small farms.

Question 6: Do you have any additional roles that should be included for any of the stakeholders to ensure successful implementation of these guidelines or effective use of TVWS technology in Uganda?

- The Dynamic Spectrum Alliance supports the roles assigned to providers of services using TVWS. in addition, we believe that these service providers should also be responsible for registering fixed TVWS base stations and customer premise equipment intended for broadband access (e.g. an EIRP of 20 dBm or greater) in the TVWS database when it installs the equipment.

- The Dynamic Spectrum Alliance suggests that the end user of the service using TVWS needs to re-register its device with the provider of services using TVWS if the end user moves a TVWS base station or customer premise equipment operating at an EIRP of 20 dBm or greater, more than 100 meters from the location where the TVWS equipment was last registered. [The service provider, in turn, must update the device registration in the TVWS database]. In addition, the Dynamic Spectrum Alliance suggested that UCC replace 'technical requirements' in the last sentence with 'rules'.

- The Dynamic Spectrum Alliance supports the role assigned to the manager of the TVWS database. We also suggest UCC consider some of the text included in Section 5 of our Model Rule v2 with respect to the role and responsibilities of the manager of the TVWS database.

Question 7: Do you have any general comments or remarks with respect to these guidelines?

Last year, the Dynamic Spectrum Alliance released an updated version of its 'Model Rules and Regulations for the Use of Television White Spaces v2.0, December 2017'. We welcome UCC to review our updated Model Rules. Dynamic Spectrum Alliance staff and representatives from several of our member companies stand ready to assist UCC in answering any questions it may have.

If the Dynamic Spectrum Alliance must choose one thing above all else in its Model Rules v2 that UCC should consider adding to its proposed rules, it is the adoption of the five TVWS device emission classes under the ETSI EN 301 598 standard. Device Emission Class 1 and Class 2 are intended for urban settings where there are services in addition broadcast television services in operation, such as licensed PSMEs, that need to be protected from harmful interference. The out-of-band emissions limit UCC proposes is equivalent to the out-of-band emission for these most stringent device emission classes in the first adjacent channel. In rural and remote areas, there is less of a need for as stringent an emissions mask. Distance can be used for attenuating adjacent channel signal leakage. In these rural and remote areas, TVWS devices of device emission class 4 or class 5 will suffice to protect the few broadcast TV stations

operating in these areas, while being considerably cheaper to manufacturer, and thus more affordable to End Users.

Respectfully submitted,

Kalpak Gude
President
Dynamic Spectrum Alliance