

Concept Paper on TV White Spaces (TVWS)

The term 'White Space' refers to portions of licensed radio spectrum that licensees do not use all of the time or in all geographical locations. TV White Spaces (TVWS) are vacant frequencies made available for unlicensed use at locations where spectrum is not being used by licensed services, such as television broadcasting. This spectrum is located in the VHF (54-216 MHz) and UHF (470-698 MHz) bands and has characteristics that make it highly desirable for wireless communications. TV White Spaces have gained popularity around the world due to the discontinuation of analogue TV signals in most countries which has led to a large free-up of the spectrum. In most countries, some of the spectrum may be/has been licensed for other uses while the rest still lays unlicensed.

TV White spaces have several important properties that make them highly desirable for wireless broadband communications. Most important of these properties include;

- Propagation
- Penetration
- Non-Line of site

Opportunities presented by TVWS in Africa

Given the current low level of Internet penetration to African rural areas and the relatively higher rural population in most African nations, TVWS presents a perfect opportunity for the deployment of white spaces radios that can be used to provide Community Network services and Internet access. This opportunity is perfect for Africa because of the relatively less number of TV broadcasters in Africa and also the observation that TV broadcasters have never had an economic incentive to serve sparsely populate areas with several concurrent TV channels as is the case with urban areas as a result, UHF TV in these regions is ready to be put to good use

Concepts of TVWS

1. Cognitive Radios

Cognitive radio has been defined by ITU as a *radio system employing technology that allows the system to obtain knowledge of its operational and geographical environment, established policies and its internal state; to dynamically and autonomously adjust its operational parameters and protocols according to its obtained knowledge in order to achieve predefined objectives; and to learn from the results obtained.*

Cognitive radio is considered as a goal towards which a *software-defined radio* platform should evolve: a fully reconfigurable wireless transceiver which automatically adapts its communication parameters to network and user demands. Cognitive radios are in two main types depending on transmission and reception parameters:

- Full Cognitive Radio (Mitola radio)
- Spectrum-sensing Cognitive Radio

2. Spectrum mobility

This is simply the process by which a cognitive radio user changes its frequency of operation. Networks that use cognitive radio techniques use the spectrum in a dynamic manner by allowing radio terminals to operate in the best available frequency band, maintaining unbroken communication requirements during transitions to better spectrum.

3. Spectrum Sharing

Cognitive Wireless Networks (CWNs) ought to avoid an overlap of operating channel. However, given the dynamism of TVWS, it is possible that overlapping CWNs share available TVWS channels.