

THE EFFECTS OF FIXED WIRELESS ACCESS USING C-BAND SPECTRUM

Practicalities

A shortage of traditional terrestrial infrastructure has led to Fixed Wireless Access (FWA) becoming an important communications technology in Africa. FWA is well-suited to providing a number of services in the region. At the same time, FWA services must not harm existing communications infrastructure, and spectrum allocated to FWA should be coordinated and allocated appropriately with spectrum given to other vital services. The 3.4 - 4.2 GHz (C-band) spectrum range is allocated to Fixed Satellite Services (FSS). Any allocation of this spectrum to FWA services would result in significant interference to satellite services and severely impact communications infrastructure that is central to telecommunications in Africa.

Current Uses of C-band

C-band spectrum is used extensively in the Africa region to provide fixed communications and broadcast services. The band also provides a number of important strategic services including maritime communications, avionics and robust and reliable Virtual Private Networks (VPNs) for government and large corporations. It also provides vital connectivity services such as backhaul and rural telephony to remote areas.

C-band is also the focus of next-generation satellite services in Africa. Rugged IP networks for banks and other businesses are being developed using C-band spectrum throughout the continent.



VSAT installation, University of Dar es Salaam

Africa relies heavily on the use of C-band satellite capacity. Other frequencies such as Ku-band (11/14 GHz) are readily available in other parts of the world and some regions rely heavily on terrestrial fibre for backhaul services. However, the lack of Ku-band satellite coverage and terrestrial fibre in Africa means that there is no other option than C-band for offering many essential services. Many users of receive-only satellite antennas have no need for licences and are not registered with the regulator. This means that the total usage of C-band satellite services in the area is impossible to measure.

Dangers of FWA Interfering with C-band Satellite

Satellite services operating at C-band will be damaged when forced to co-exist with FWA services. Problems will occur, including signal delays, synchronization loss, black-out periods and total loss of transmission. In order to co-habit the same frequency bands, the two technologies require an exclusion zone of 100-150km, making co-habitation difficult in most cases. Importantly, there are also military users of satellite C-band services whose locations are often not made available. In many countries, this makes co-habitation impossible.

Moving to other Satellite Frequencies

Moving customers in the region to other satellite frequencies is not a viable option. Both Ku-band and Ka-band systems suffer from rain attenuation problems not suffered by the more sturdy C-band systems. Areas of Africa which experience heavy rainfall have no option other than C-band.



Robust, remote satellite communications use C-band throughout Africa

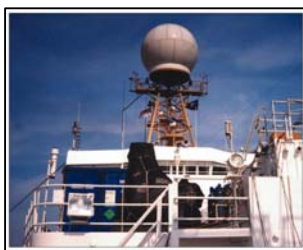
Ku-band satellite capacity over Africa is in short supply and expensive. Ka-band capacity is very limited. The scarcity of alternative satellite capacity at Ka-band and Ku-band also leads to much higher costs.

Portability Worsens Problems

The concept of FWA as a substitute for a mobile service confuses both services and ignores some fundamental technical differences. FWA can provide connectivity where traditional (wired) infrastructure does not exist, and can do so with minimal spectrum. Mobile networks offer premium connectivity with the benefits of mobility. By their nature, mobile systems rarely share spectrum with any other services due to the extreme difficulty in preventing interference between them. Fixed networks can co-exist to a limited extent with other systems, provided that careful planning is used to predict and limit harmful interference. However, widespread deployment of FWA is best made in bands that are *not* shared with other services, as this removes the constraint for pre-planning and allows a more spectrally-efficient network.

Solution: Working Together with FWA

Satellite and FWA networks can co-exist to offer a variety of important communications services, provided that their discreet frequencies are properly co-ordinated. Satellite provides important backhaul services for FWA systems in many cases and must be allowed to continue to do so. This can only be achieved through the proper coordination of spectrum and not allowing FWA to inhabit bands already allocated to FSS.



C-band is vital for maritime communication and other services

Thus while C-band satellite services must use the 3.4 - 4.2 GHz band, a number of lower frequency ranges can be used to provide FWA services. The use of lower frequencies is also of benefit to FWA service providers due to the need for less dense networks. FWA networks have been successfully implemented at 800/900 MHz, at 1800 MHz and at 2500 MHz in parts of the world, and these frequencies offer much better propagation characteristics.