



NAB PRESENTATION TO THE ICT REVIEW PANEL

Workshop on “Emerging Technologies in the Broadcasting Sector”

Topic: Spectrum issues

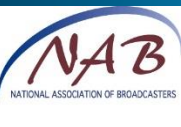
Presented By:

Andy Louis, Chairperson of NAB Technical Committee

Date: 3 October 2014



ICT Panel Policy Considerations: Spectrum Issues



Existing RF Spectrum Users

- ▶ Before any future spectrum considerations (eg: for IMT use) are to be made, all current spectrum usage earmarked for future re-assignment should be carefully assessed
- ▶ This presentation will focus on the C-band spectrum, which is on the Agenda for re-allocation to IMT
- ▶ The C-Band spectrum is extensively used by fixed-satellite services (“FSS”) and operation of IMT services in this band will potentially cause excessive levels of harmful interference and might preclude future use of this band for satellite services

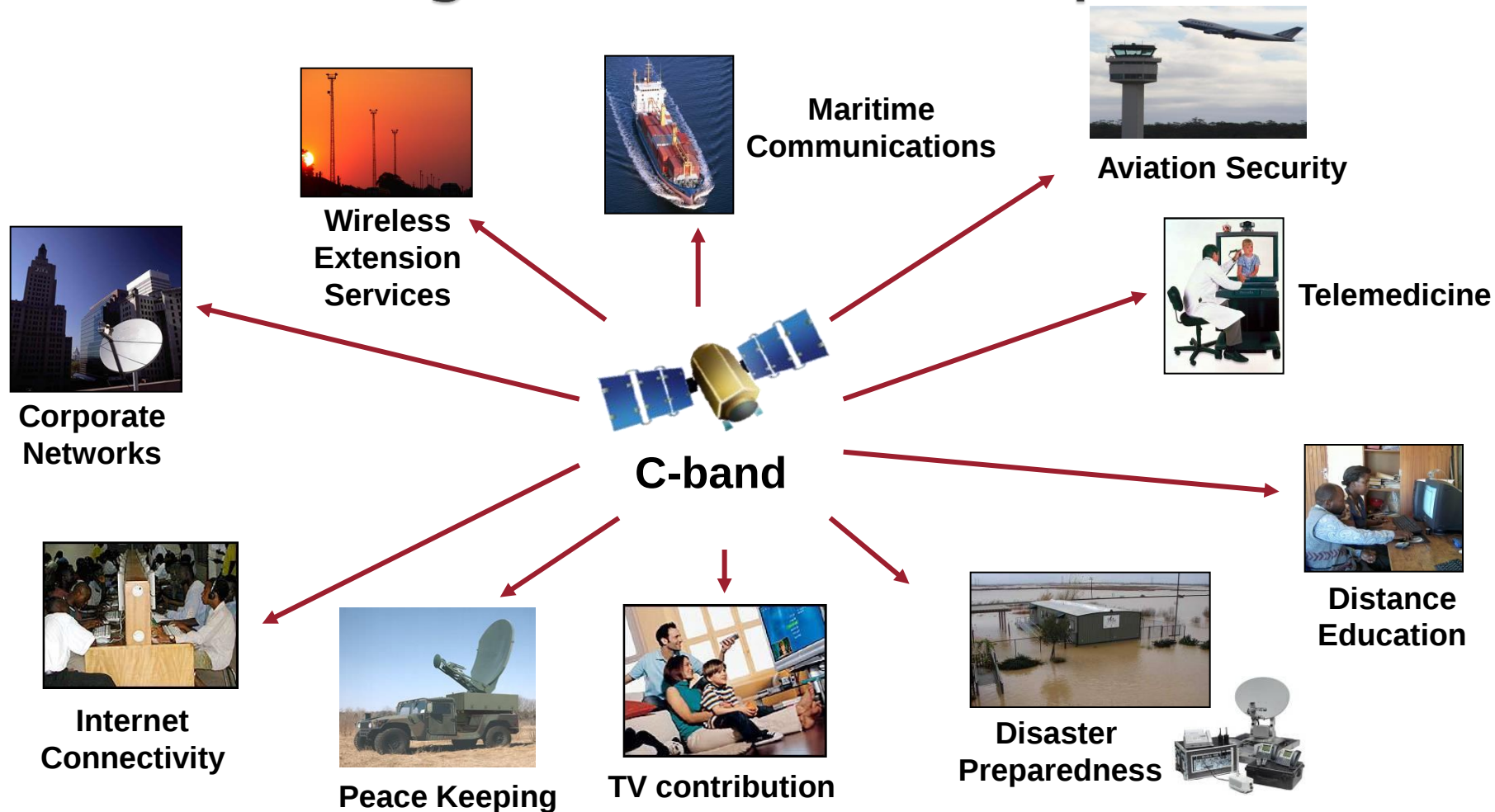
WRC-15 Agenda Item 1.1

- ▶ At the upcoming 2015 ITU-R World Radio Conference (WRC'15), Agenda Item 1.1 states: “to consider additional spectrum allocations to the mobile service on a primary basis and identification of additional frequency bands for IMT”

Two of the many Frequency Bands Under Consideration:

- 3400 – 4200 MHz ← **C-Band satellite (Fixed space-to-earth)**
- 5925 – 6425 MHz ← **C-Band satellite (Fixed/Mobile earth-to-space)**

Africa's usage of the C-Band spectrum:



Source: Satellite Broadband Spectrum: Africa's Connectivity Needs & WRC Agenda Item 1.1 [David Hartshorn, Secretary General, GVF]

Importance of C-Band satellite communications:

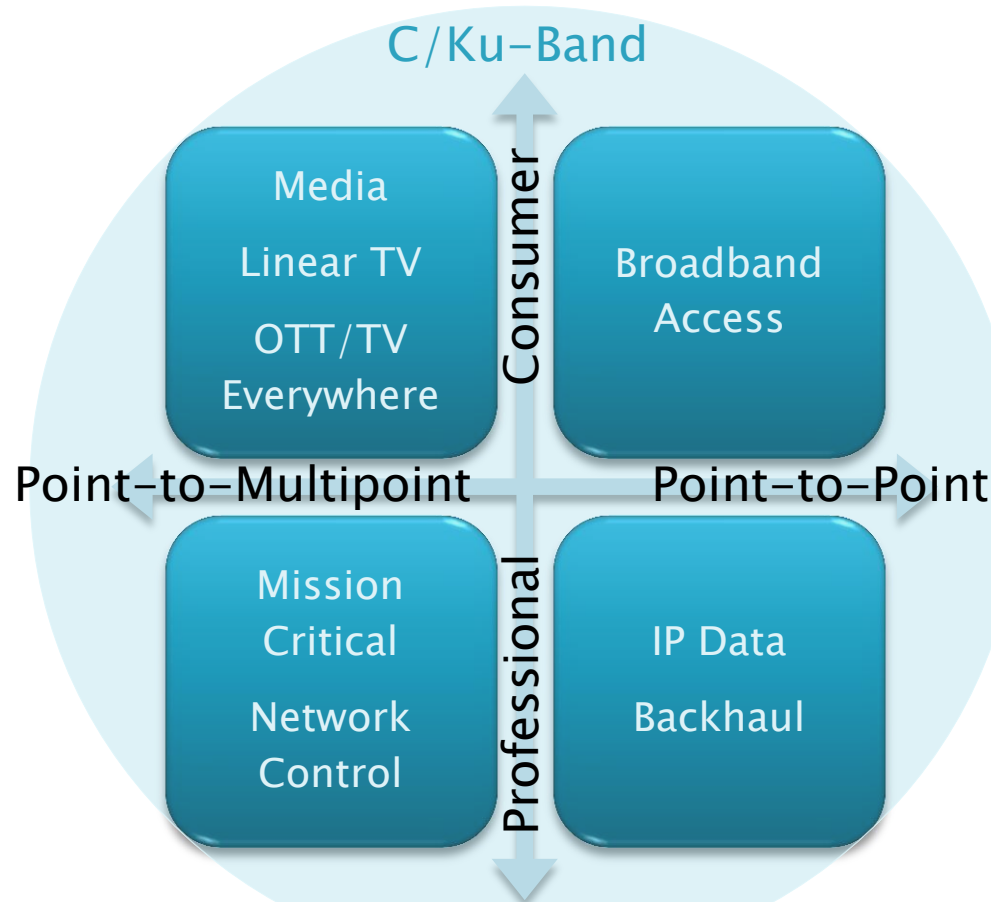
Worldwide the C-Band spectrum is seen as being extremely robust and reliable enough for many applications, such as:

- Data links (V-SAT):
 - Air Traffic Control
 - Internet access in remote areas (land and sea locations)
 - Banking point-to-point links
- Emergency services
- Television & Radio Broadcasting links

There are fundamental principles the NAB would like to bring to the attention of the ICT Panel in relation to broadcasting:

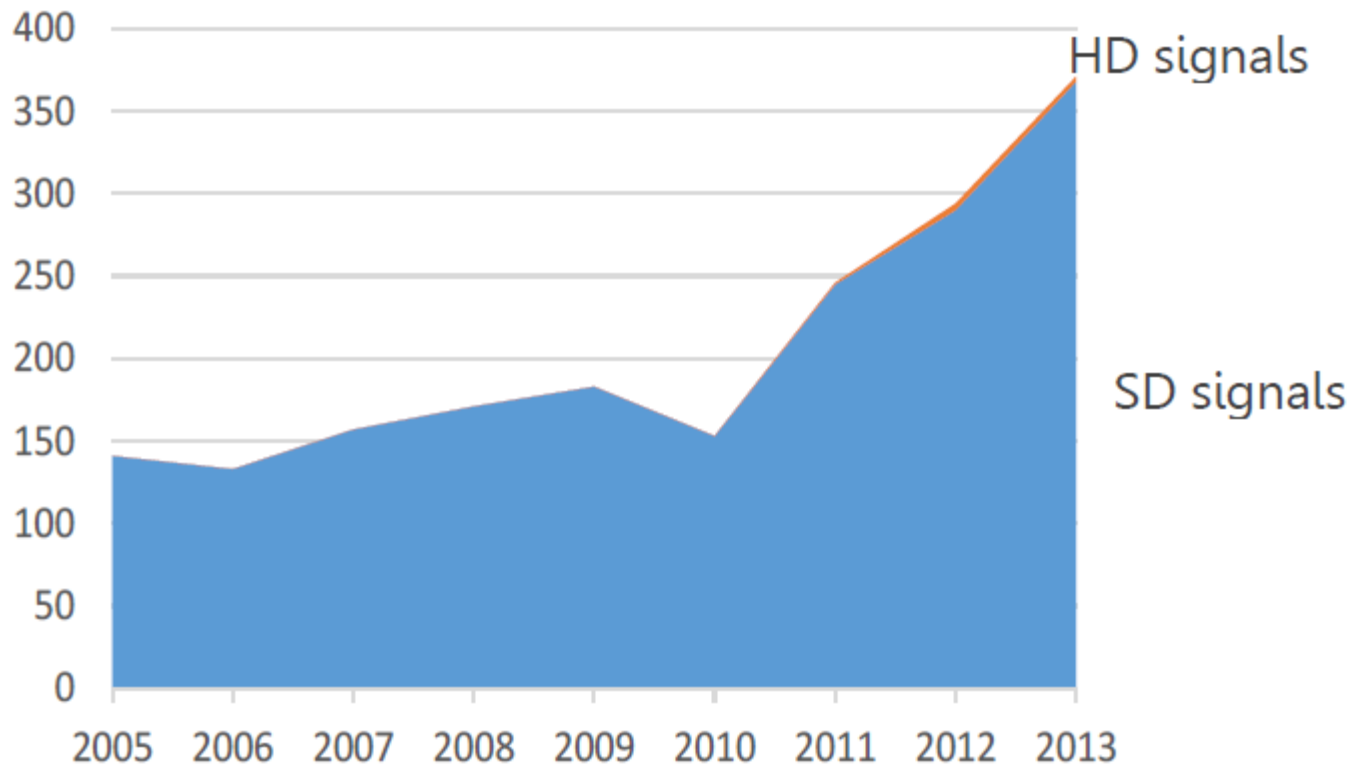
C-Band satellites are used for both Contribution links (eg: back-haul of content from other parts of the world) and Distribution links (eg: feeders to Terrestrial transmission sites)

The C-Band value proposition:



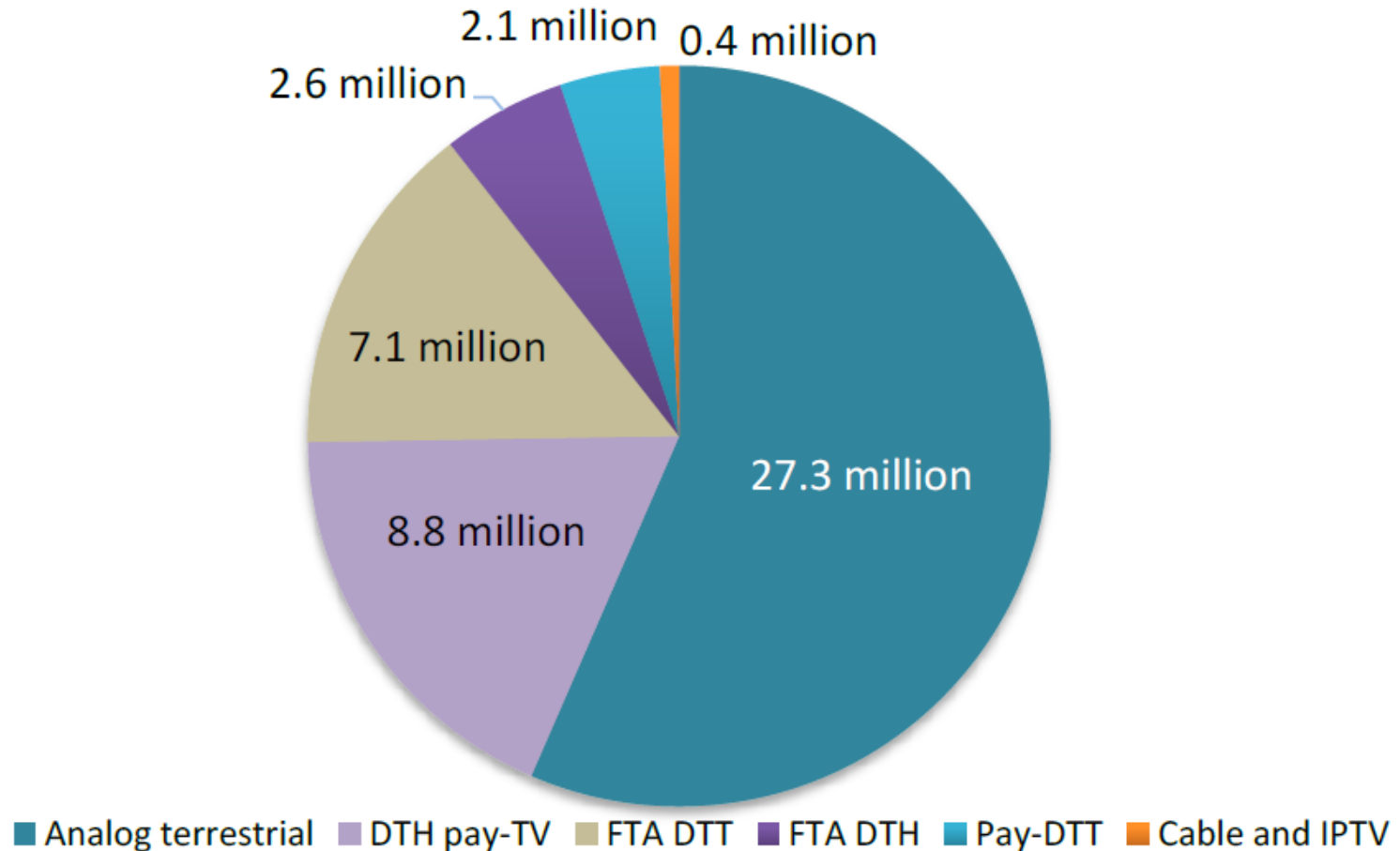
Source: Satellite Broadband Spectrum: Africa's Connectivity Needs & WRC Agenda Item 1.1 [David Hartshorn, Secretary General, GVF]

Number of TV signals distributed by C-Band satellites in Sub-Saharan Africa:



Source: Euroconsult analysis of transponder monitoring by Lyngemark Satellite [Lyngby, Denmark] www.lyngsat.com

Estimated number of African TV households by type of delivery:

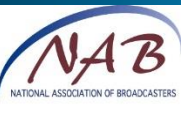


Source: Digital TV Research and Euroconsult estimates



Importance-of-C-Band-Satellite- Services.mp4

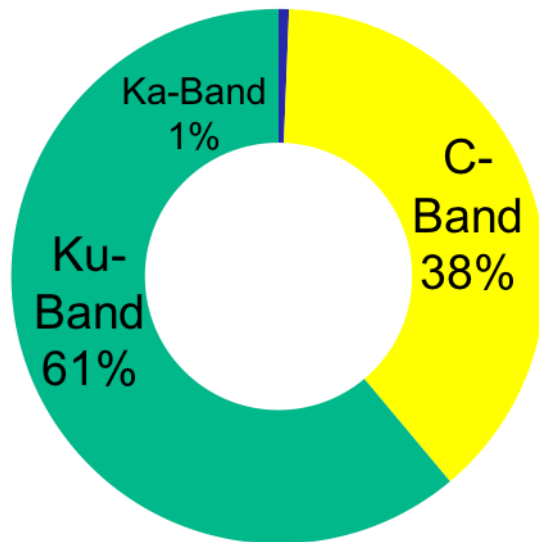
Intelsat Infographic C-band.pdf



C-Band Satellites in Service for Users

Global Distribution of 36 MHz Transponder-Equivalents

Total 5,642 TPE in Use



Source: NSR

Note: TPE count does not include multi-spot beam high throughput satellites

- ▶ Represents about **\$42–51 billion** of in-orbit investment, not including the investments in ground infrastructure.
- ▶ Substantial ongoing investment in C-band satellite capacity worldwide
- ▶ At least **52 satellites** with C-band payloads have been launched in 2007–2012, representing **\$12–15 billion** in investments.
- ▶ At least **35 satellites** with C-band payloads are under construction and are scheduled to be launched in 2012–2015, representing **\$9–10 billion** in investments.
- ▶ Satellites are long-lived assets; typical operational life is 15 years or more.
- ▶ Stable, consistent regulatory environment required throughout



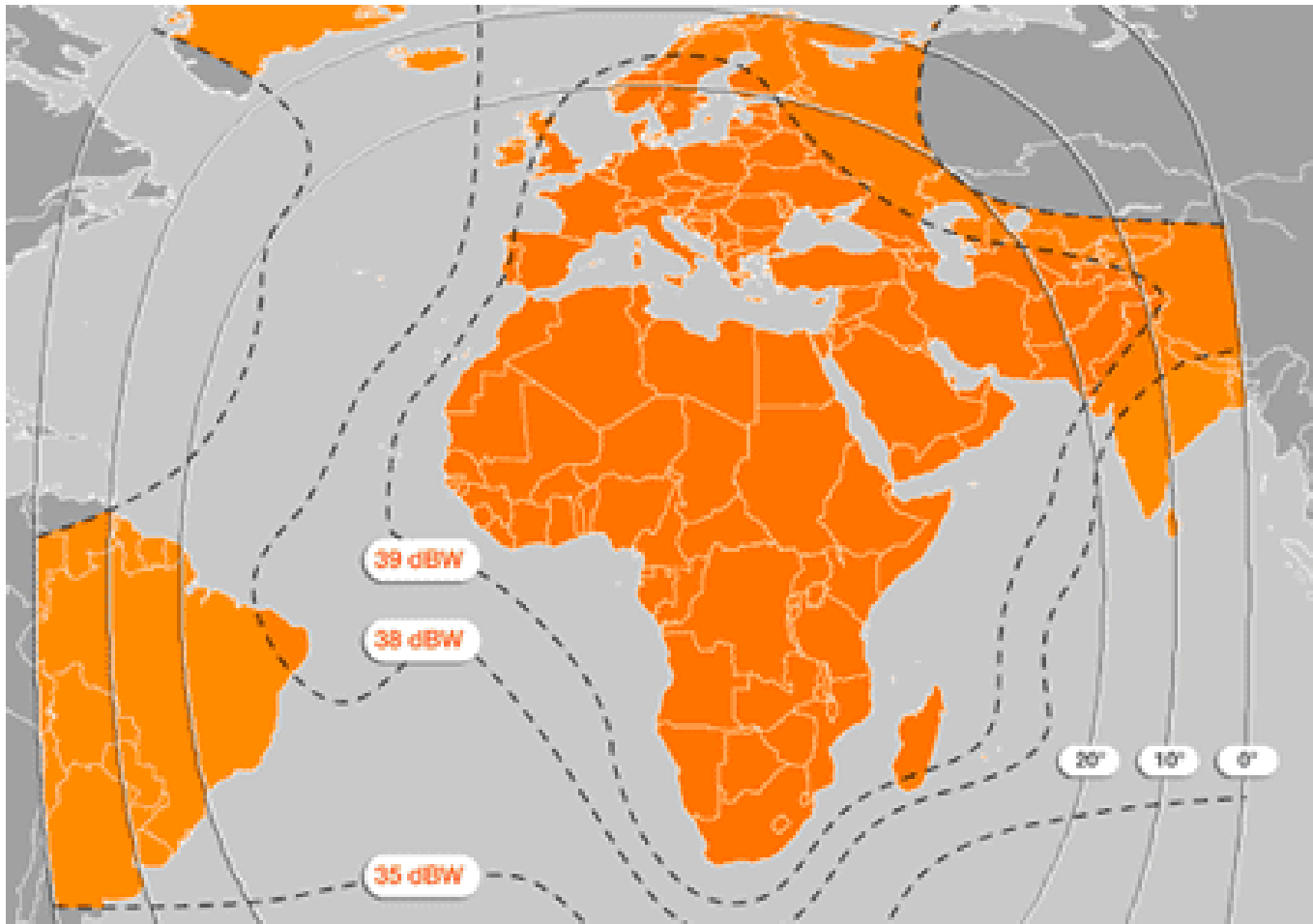
Technical Considerations:



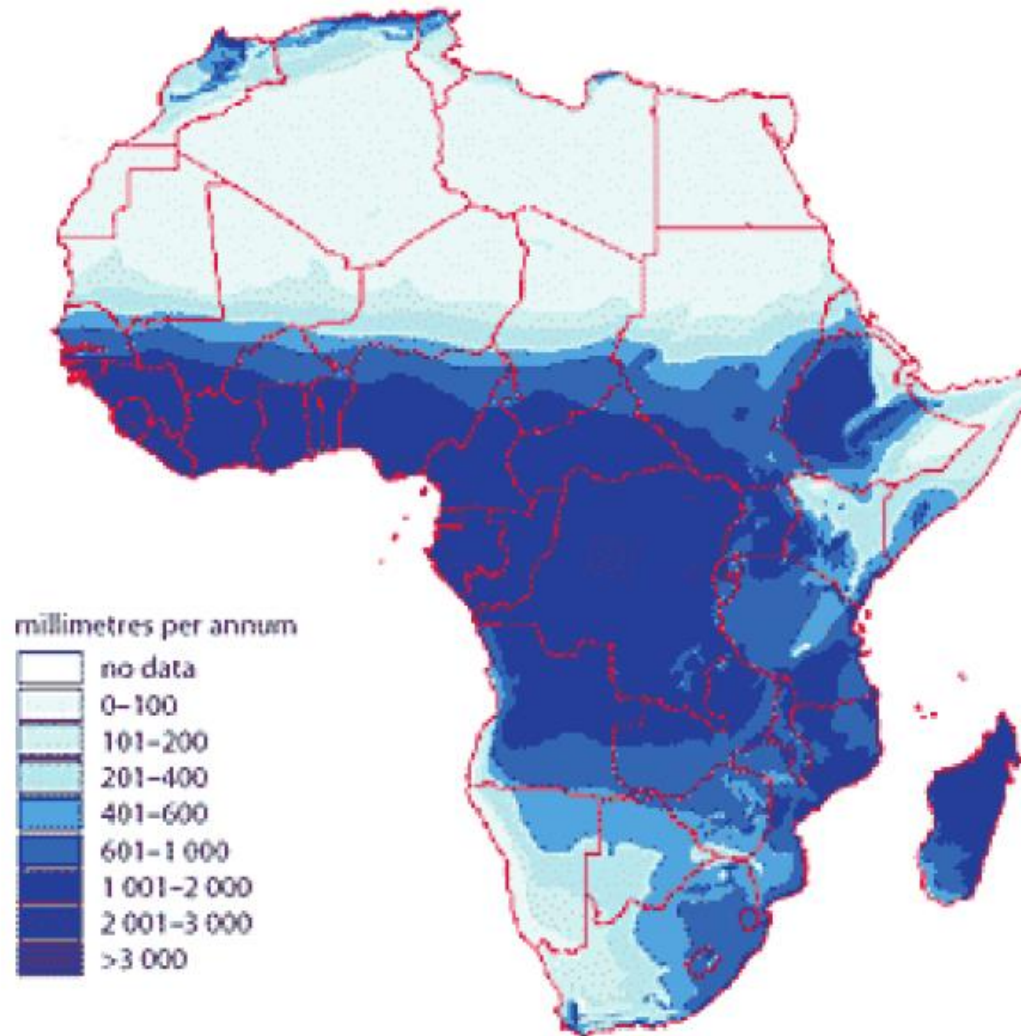
C-Band vs Ku-Band (vs Ka-band):

- ▶ The large geographic coverage area of C-band satellite beams allows for whole regions or continents to be connected – resulting in a very cost-effective communications network. For example:
 - Sentech uses a C-Band satellite to deliver all of the SABC TV and Radio stations to all of the Terrestrial transmitter sites spread across South Africa
- ▶ C-band is essentially resistant to rain fade. While services in higher frequencies (eg: Ku-Band) sometimes experience degradation of their signal, services provided in C-band offer extremely high reliability, even during heavy rain
- ▶ Due to its longstanding good experience with and dependence on C-band, many signal distributors have made a considerable investment into developing an overall network (ground infrastructure, satellite connectivity, and remote equipment) that is heavily reliant upon, and communicates with, C-band satellites.

Typical C-Band coverage area:



Typical rain pattern for Africa:



How about sharing?

- ▶ **Interference is a Problem**
- ▶ Satellite receivers are extremely sensitive devices because they are designed to receive extremely low-power signals from satellites located in space 36,000 kilometers above the equator.
- ▶ Many of the newer applications which are seeking to utilize C-band spectrum, such as mobile or nomadic terrestrial wireless systems, emit signals from many locations and in all directions simultaneously. This transmission mode, coupled with the levels of power requested for such operations, can easily interfere with satellite receivers.
- ▶ In some countries where regulators have allowed terrestrial wireless services to use C-band, there have been massive interruptions of satellite broadcasting services, affecting hundreds of millions of viewers.
- ▶ Examples where Satellite broadcasting operations have been negatively affected: Bahrain, Bolivia, Tanzania, Hong Kong, the U.S. and many other countries and regions
- ▶ The interference caused by terrestrial wireless systems is not limited to same band operations. Out-of-band interference received from terrestrial wireless services in adjacent bands is also a problem; high power signals from wireless systems in an adjacent band are sufficient to make it impossible for sensitive satellite receivers to operate in an adjacent band. Thus, terrestrial mobile deployment in just a part of the C-band would negatively impact satellite services.

Sharing Studies:

- ▶ Various ITU technical studies have confirmed that separation distances in the tens and hundreds of kilometers are required to protect satellite receivers from terrestrial mobile services if the latter were allowed to operate in C-band. Such large exclusion zones around every satellite earth station would render any terrestrial mobile service in this band economically unfeasible for wireless system operators

Does IMT really need so much?

- ▶ Questionable Need for Additional Spectrum for IMT
- ▶ While no one disputes that mobile data traffic is increasing, mobile operators should be encouraged to first **improve the network density** and efficiency within their existing spectrum before asking for additional spectrum which is already extensively used by other services
- ▶ Example: large scale switchover by wireless operators to small cell system architecture would dramatically increase network capacity in wireless systems' existing frequency bands
- ▶ Technological advancements such as MIMO (multiple-in-multiple-out) can increase network capacity without any increase in spectrum
- ▶ Additionally, one of the large drivers behind the increase in terrestrial mobile data traffic is **video**. However, much of the video on mobile devices and tablets is consumed in Wi-Fi-connected areas (the home, the office, the public library or airport), *and it is not clear that cellular networks need increased bandwidth for this purpose.*
- ▶ The above factors, when taken together, would seem to obviate the need for the identification of additional spectrum for wireless systems – contrary to what wireless operators and their supporters claim

Conclusions:

- ▶ Spectrum requirements for Emerging Technologies in the Broadcasting Sector should not adversely affect existing spectrum allocations
- ▶ Satellite spectrum (especially the C-Band range) is an extremely scarce resource, subject to the planning, design and implementation of a few international Satellite Manufacturers, many years in advance, and costing Billions of dollars
- ▶ Satellite network owners such as Intelsat, Eutelsat, SES World Skies, and many others are appealing to Governments worldwide, to preserve the C-Band spectrum for satellite communications
- ▶ Satellite network users such as Sentech, Multichoice, Orbicom, Telemedia, Globecast and many others are appealing to the ICT Review Panel, and in turn the DTPS to be extremely cautious when recommending increased spectrum to fulfil a Government mandate for broadband penetration through wireless mobile communication

Resources:

- ▶ <http://www.ses.com/blog-cband>
- ▶ <http://www.intelsat.com/tools-resources/c-band/>
- ▶ <http://gvf.org/index.php/component/content/article/21-news/231-cband-satcom-info.html>