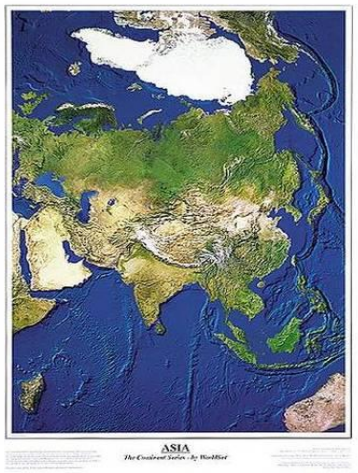


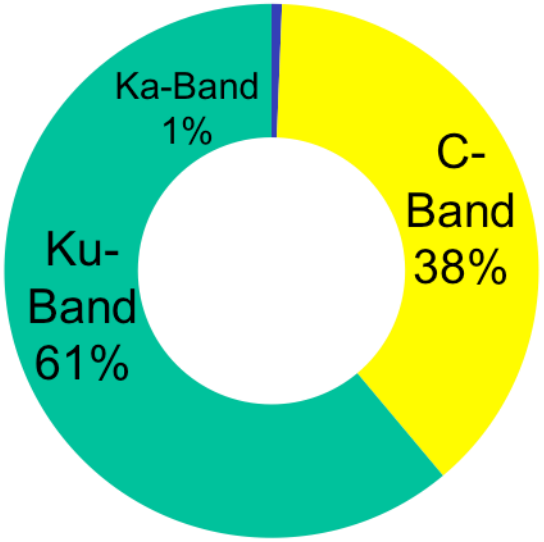
Future IMT Bands:
WRC-15 & C-band Satellite Solutions for the Caribbean

David Hartshorn
Secretary General
GVF

C-Band Satellites in Service

Global Distribution of 36 MHz Transponder-Equivalents

Total 5,642 TPE in Use

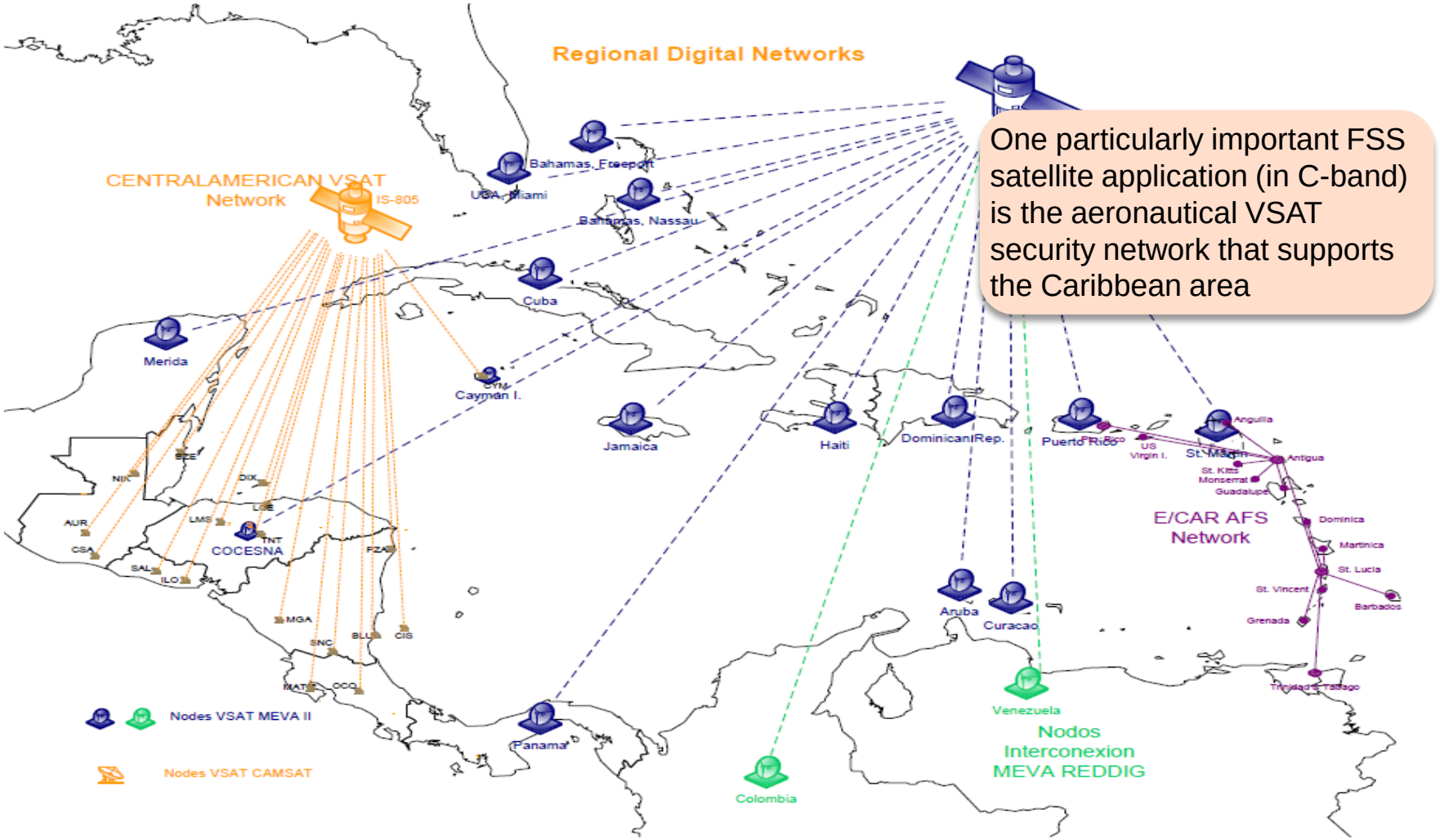


Source: NSR

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

- **At least 169 C-band satellites in geostationary orbit today**
  - 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.**
- **GEOs are long-lived assets; typical operational life is 15 years or more.**
  - Stable, consistent regulatory environment required throughout

Aviation Security in the Caribbean

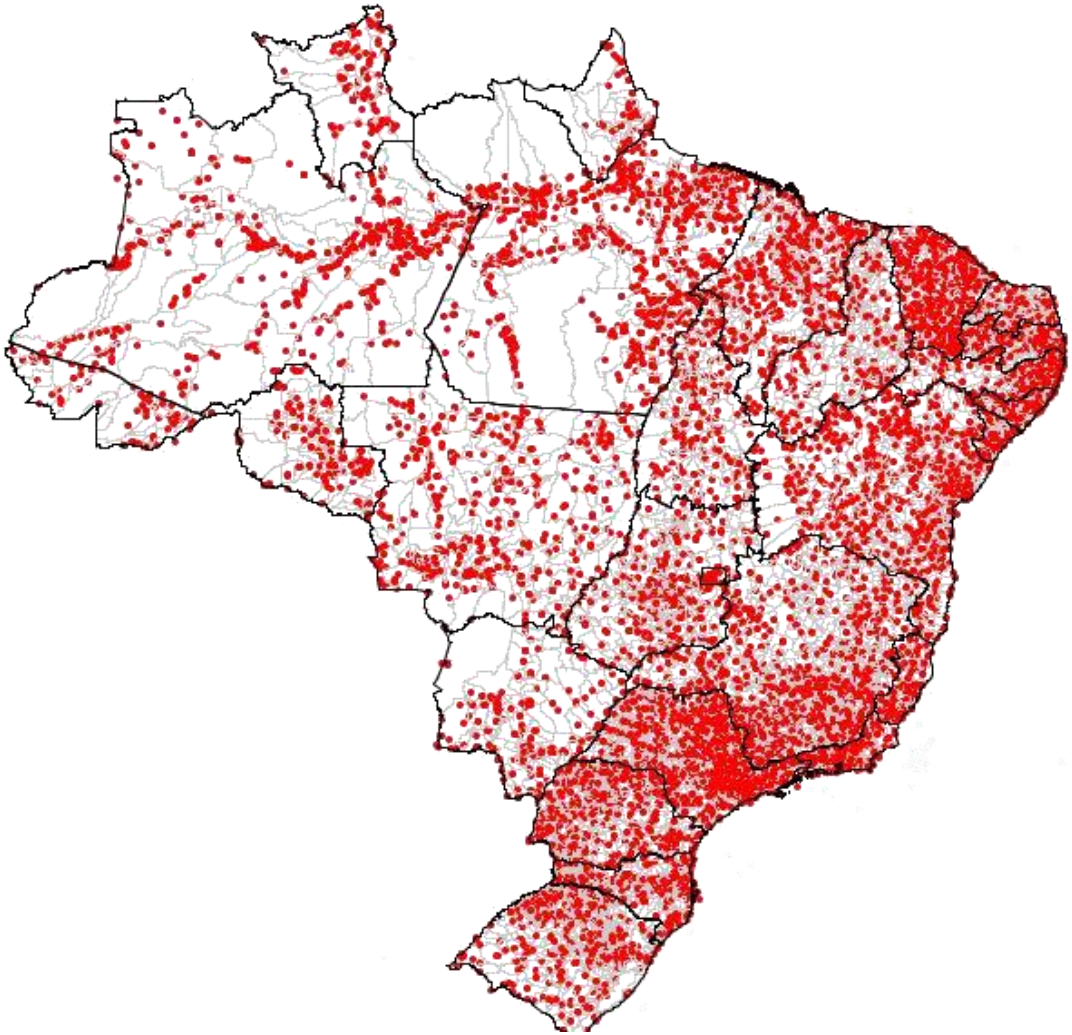


One particularly important FSS satellite application (in C-band) is the aeronautical VSAT security network that supports the Caribbean area

SAMPLE USE OF 3625 – 4200 MHz BY THE FSS IN BRAZIL

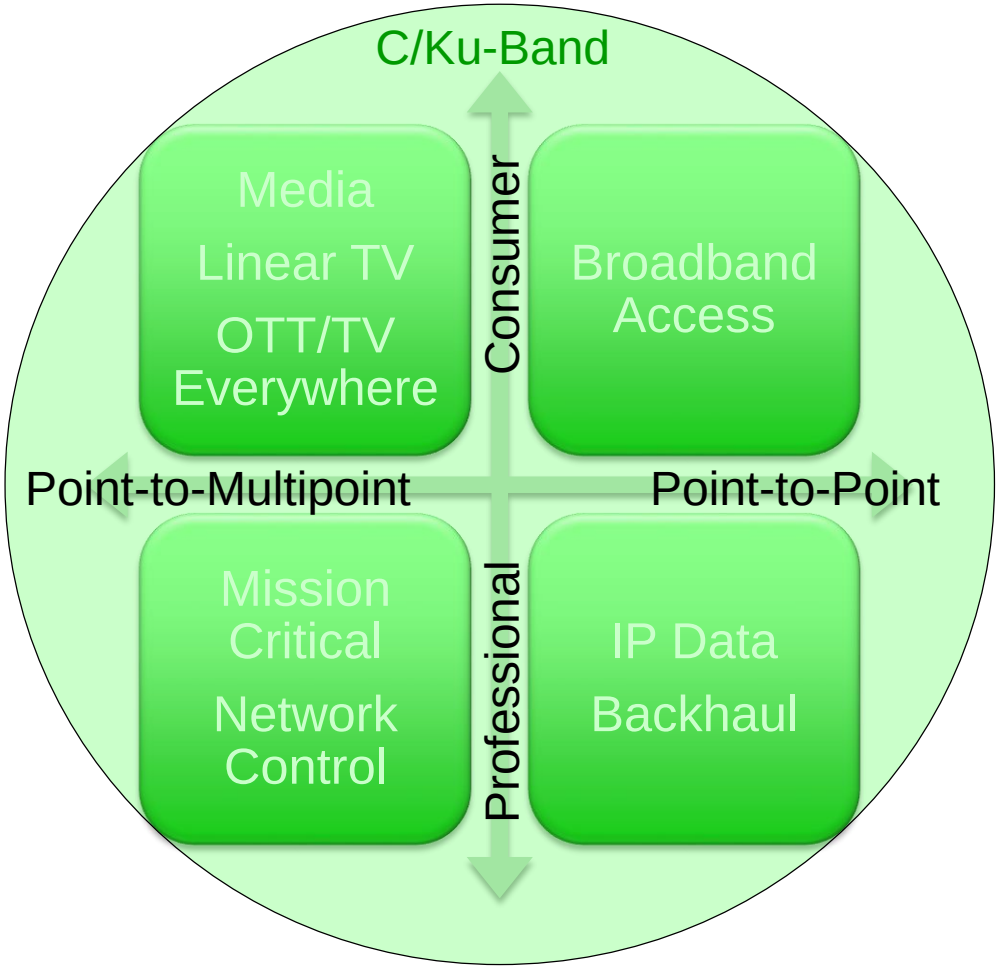
Brazilian Contribution at June CITEL Meeting (OEA/Ser.L/XVII .4.2 CCP.II-RADIO/doc. 974/06):

- **No Better Band to Address Rain Attenuation**
- **Exclusion Zones Unworkable**
- **Developing Countries Can't Afford Equipment Changeout**

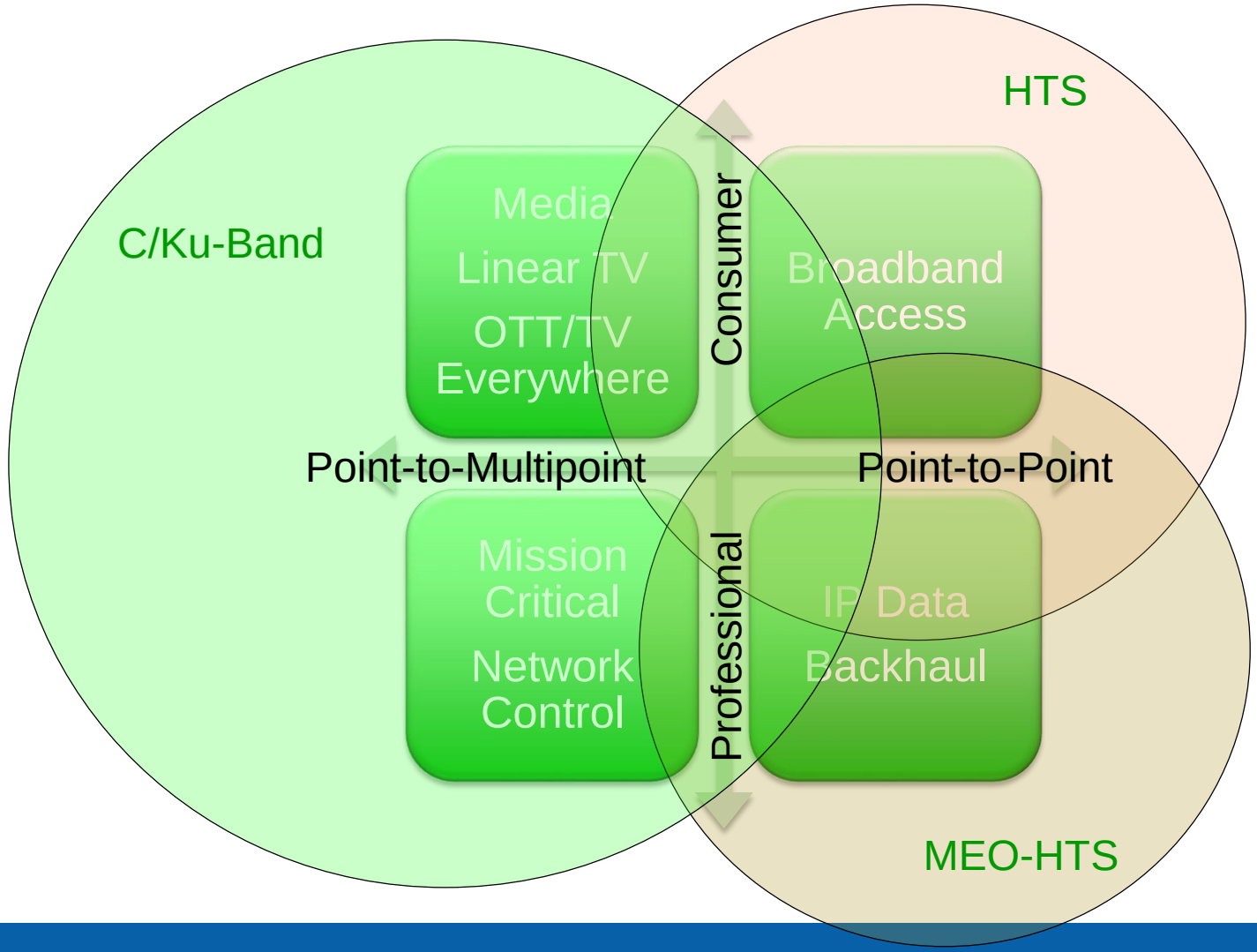


Conclusion: 3625-4200 & 4500 – 4800 MHz Should Not Be Considered for IMT

The C-band Value Proposition



The New Value Proposition



C-band Satellite Applications: Achieving Policy Goals and Business Objectives

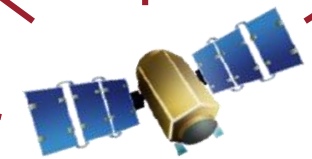
Wireless Extension Services

Maritime Communications

Aviation Security

Corporate Networks

Telemedicine



C-band

Distance Education

Internet Connectivity

Peace Keeping

TV contribution

Disaster Preparedness

C-band satellite applications increase teledensity rates, provide distance education and telemedicine, enable broadband to rural areas, and more

IMT Interests Claim They Need C-band

- Studies Show Sharing Would Create Interference
- Millions Depend on C-band for Satellite Connectivity
- Economic Contribution Is Massive
- Wireless Spectrum Demand Estimates are Wrong

Stakes & Stakeholders

The Issue

WRC-15 Agenda Item 1.1 will consider additional spectrum generally for International Mobile Telecommunications (IMT) and other mobile broadband applications … including C-band

What More Can Be Done to Save the C-band User Community?

The Problem

Such use is not compatible with the existing operations in C-band, including FSS, radar systems and fixed point-to-point links.

Next Steps

The Satellite Industry and Its User Community – Representing Billions in Economic and Social Impact -- Are Standing Together… Again

- Broadcasters
- Humanitarian Organisations
- The United Nations
- Civil Aviation
- Military

ITU Spectrum Demand Model

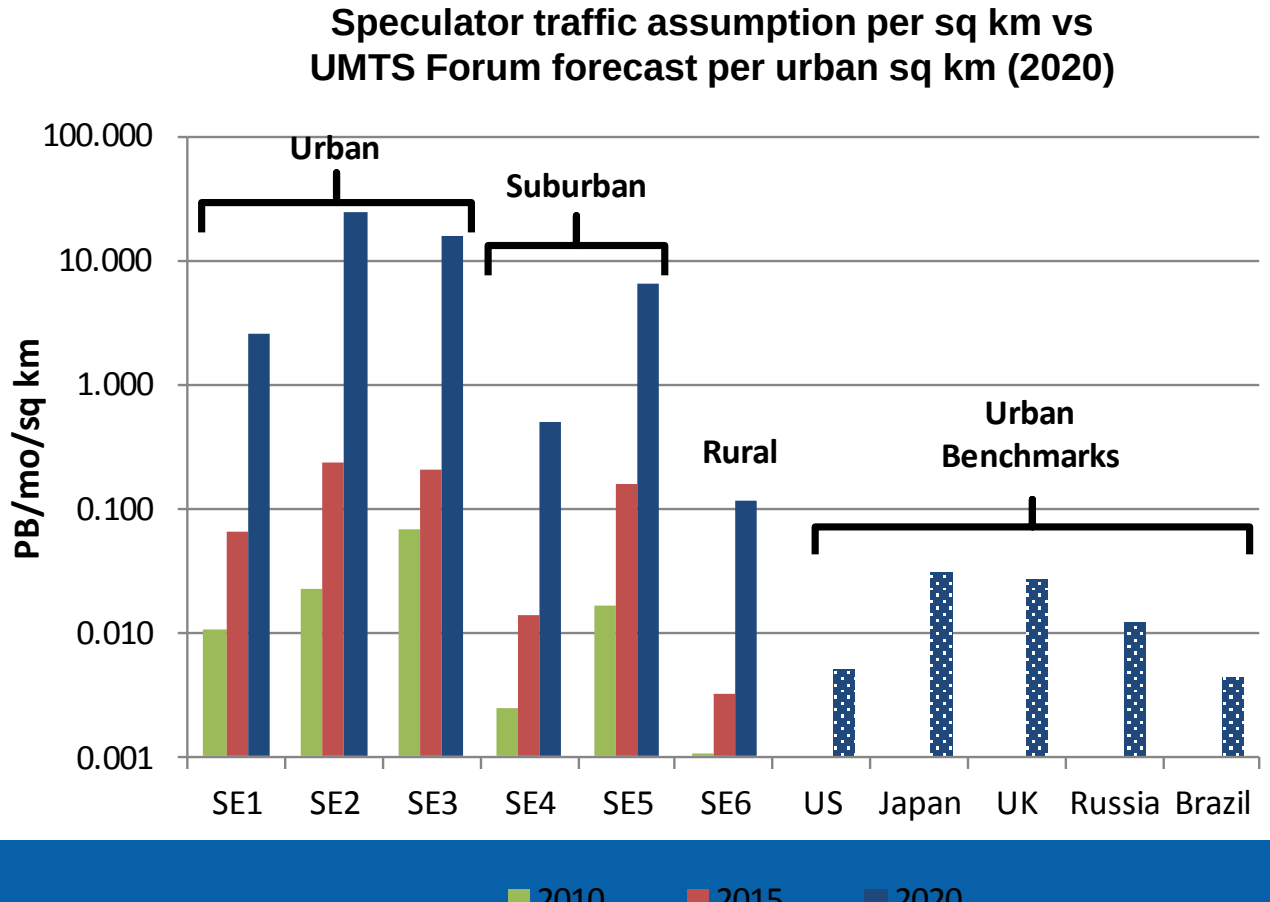
- **ITU WP-5D has developed a model,** referred to as the Speculator, to project future IMT requirements for additional spectrum

- **The model predicted that between 760 and 840 MHz of spectrum would be required for IMT by 2010**
  - No country was using more than 400MHz by 2010

- **The current version of the model,** prepared for WRC-15, predicts that between 1340 and 1960MHz of spectrum will be required for IMT services by 2020

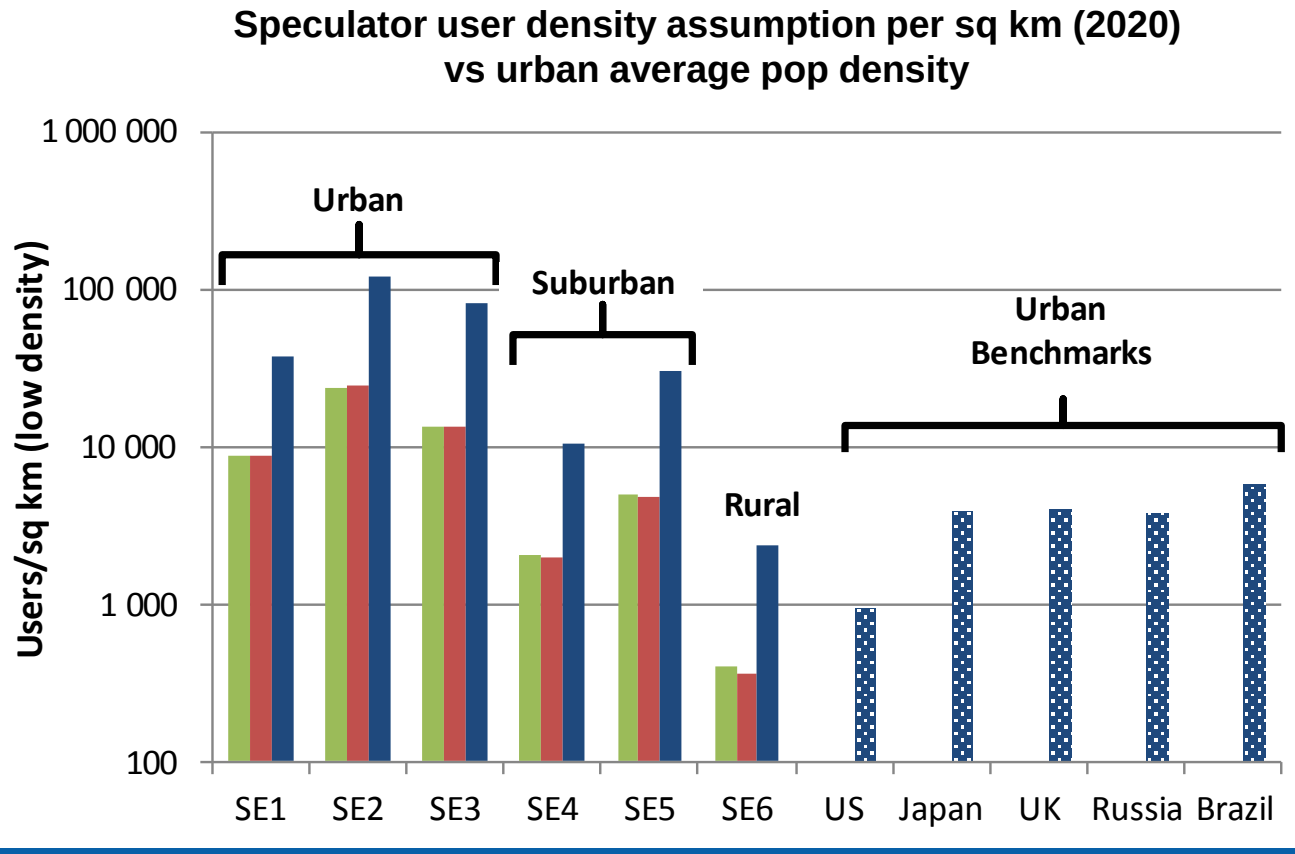
Traffic Density Comparison

- **Speculator assumptions exceed the UMTS Forum projections of urban traffic per sq km by two or three orders of magnitude**

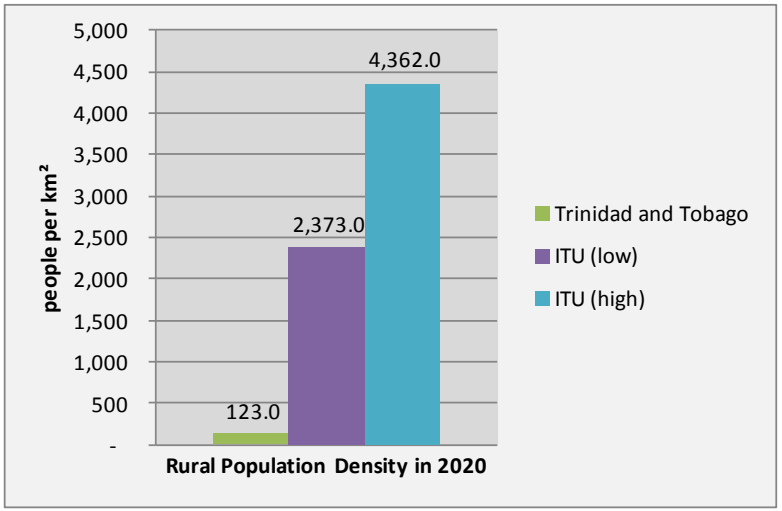


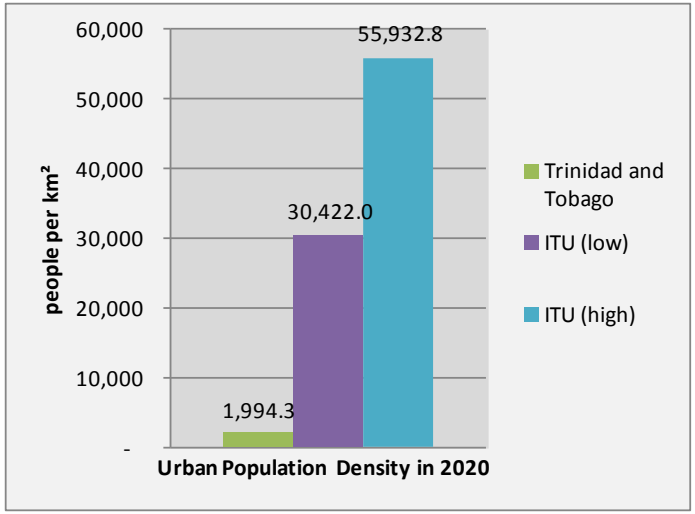
User Density Comparison

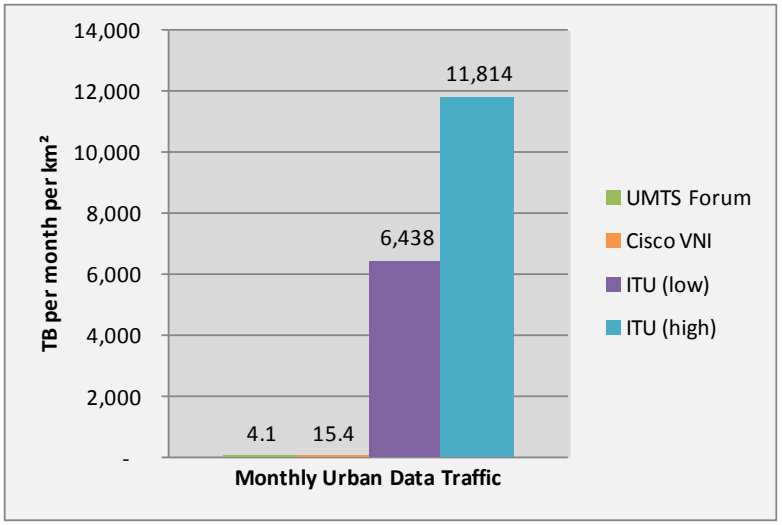
- **User density is much higher than urban average even in suburban environments**

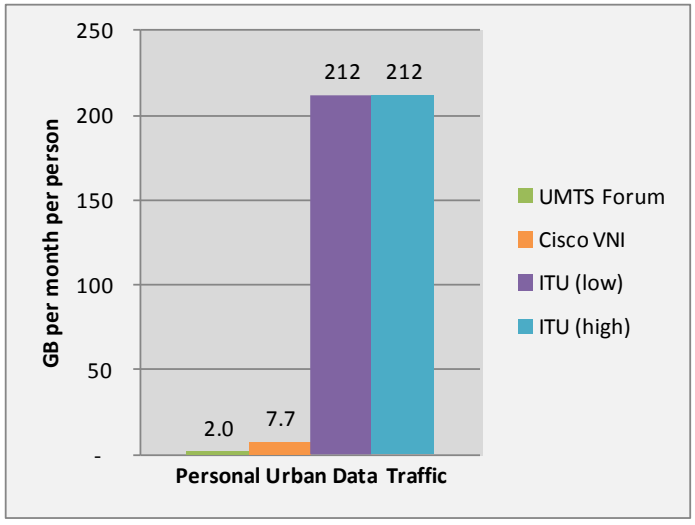


Comparison – Trinidad & Tobago









Conclusion

- **The Caribbean Depends on C-band Satellite**
- **Wireless Spectrum-Demand Estimates…**
  - Appear Grossly Over Stated
  - Need to be Examined Prior to WRC-15
- **“No Change” to 3.4-4.2 GHz for WRC AI 1.1**

Key Services Supported by C-band Satellites

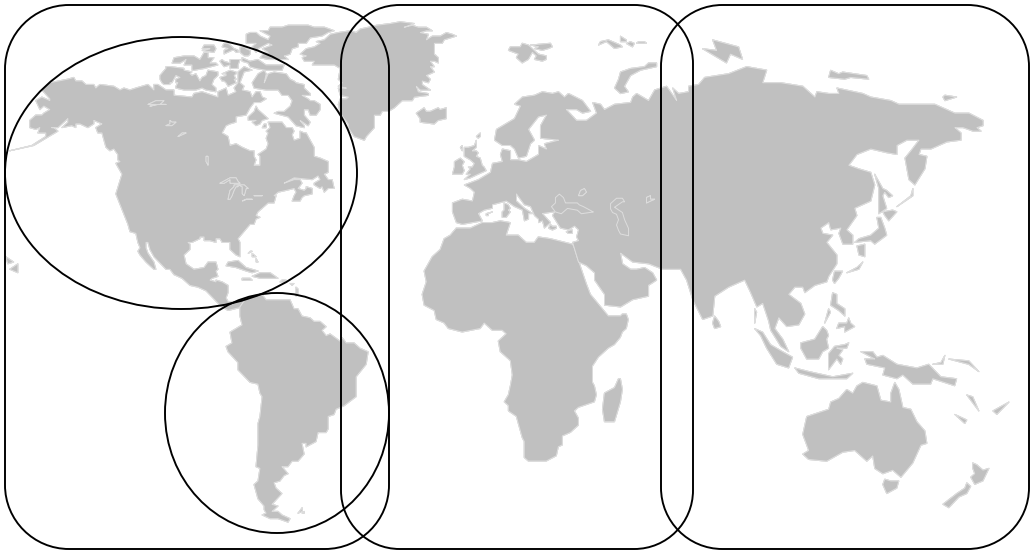
- Media Distribution
  - C-band is used to distribute media content around the world, including, e.g.
    - Cable distribution to 7038 cable head-ends around the United States, serving 60 million U.S. households
    - Cable distribution to 4711 cable head-ends in Latin America and the Caribbean, serving more than 29 million cable homes (2012)
    - 20 million receive-only C-band television dishes in Brazil alone
- Media Contribution
  - Special events coverage (e.g. Olympics)
  - Satellite news gathering
- Feeder Links for mobile-satellite services (MSS)
  - Supporting public safety and emergency relief missions around the world.

Key Services Supported by C-band Satellites

- **Rural and remote communications**
  - Internet and basic connectivity
  - Cellular backhaul applications
- **Mobility**
  - 3510 C-band Earth Stations on Vessels (ESVs) in 2012, providing video distribution, Internet and mobile backhaul
- **Other C-band services, including**
  - Disaster recovery and preparedness
  - Tracking, Telemetry & Command (TT&C) for many satellite systems in other frequency bands, for example, for launches

Unique Attributes of C-Band Satellite Services

- C-band satellite services cannot easily be replicated at other satellite bands or via terrestrial means
  - ***Geographic reach***. C-band easily covers entire continents and oceans and offers an economically viable way of providing intercontinental and global communications
    - Smaller or hard-to-reach markets and low density regions are covered as easily as metropolitan areas
    - Particularly ideal for point-to-multipoint applications (broadcast, widely-dispersed networks), and remote/rural deployment
  - ***Resistance to rain-fade***
    - C-band is less susceptible to signal interruptions from heavy rains than higher bands (Ku, Ka), making it better suited for tropical or high-rain areas at high availabilities



WRC-15 and IMT

- **Under Agenda Item 1.1, ITU is tasked with identifying additional frequency bands for IMT**

- **Working Party 5D (WP 5D) is to identify suitable IMT frequency ranges**
  - Consider only the technical feasibility of operating IMT in the specified frequency range. Will NOT consider impact to/from other incumbent services
  - Update IMT bandwidth requirements
  - Provide/Update IMT parameters

- **Joint Task Group 4-5-6-7 (JTG 4-5-6-7)**
  - Perform sharing studies
  - Generate Conference Preparatory Meeting (CPM) Report
  - Identify candidate frequency bands for IMT from the frequency ranges provided by WP 5D
    - Administrations can propose IMT frequency bands – separate from the frequency ranges proposed by WP 5D

Sharing between FSS & BWA/IMT is not feasible

- **ITU studies –** Studies have concluded that protection distances of between 51 – 430 km are necessary to allow co-frequency sharing between BWA/IMT systems and FSS earth stations, i.e. co-coverage sharing is not feasible
  - Adjacent band protection distances to avoid LNB overload of FSS receivers are between 10 – 31 km
  - Considering that a typical city has a radius of 15 to 30 km, sharing between BWA/IMT systems and FSS receive earth stations is not realistic
  - See Reports ITU-R M.2109 & S.2199
- **Government, strategic, and commercial FSS services in the C-band will suffer**
  - Resulting interference can cause signal delays, synchronization loss, blackout periods, blackout areas, and total loss of transmission
  - Many countries – Bolivia, Hong Kong, Indonesia, Fiji, to name a few – have experienced interference when deploying BWA systems in C-band
    - WiMAX testing led to 30% of TV households in Bolivia missing some of World Cup 2006
    - Similar testing in Hong Kong led to 300,000 households across Asia to lose their TV service

Sharing between FSS & BWA/IMT is not feasible

- Sharing is exacerbated by a large number of receive only earth stations already deployed – many of which are unregistered
  - Shielding, for example, requires knowing the location of every earth station
  - Further, site shielding is expensive and infeasible on a regional or worldwide basis

Satellite Industry Concerns

- **Renewed efforts to identify the 3.4 – 4.2 GHz band for IMT**
  - WRC-07 studies demonstrated incompatibility of satellite services with IMT
    - Interference from IMT transmissions into FSS receive stations
    - Requires large distance separations between IMT stations and FSS earth stations
  - No technology developments that change the compatibility analysis since 2007 to warrant different outcome at WRC-15