

***Star One***  
*uma empresa Embratel*

***WRC-15 and C-Band and Extended C-  
Band Update***

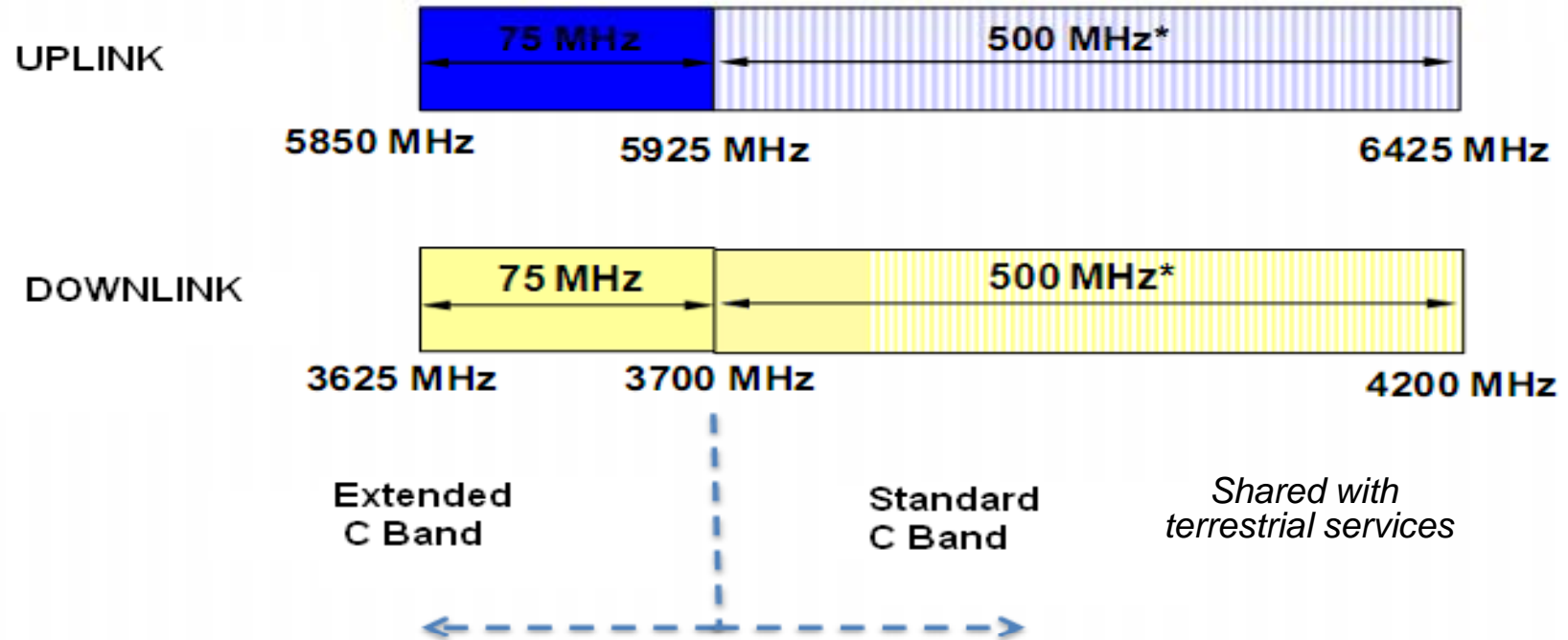
***WBU-ISOG FORUM - November 4 - 6, 2013***

## Topics

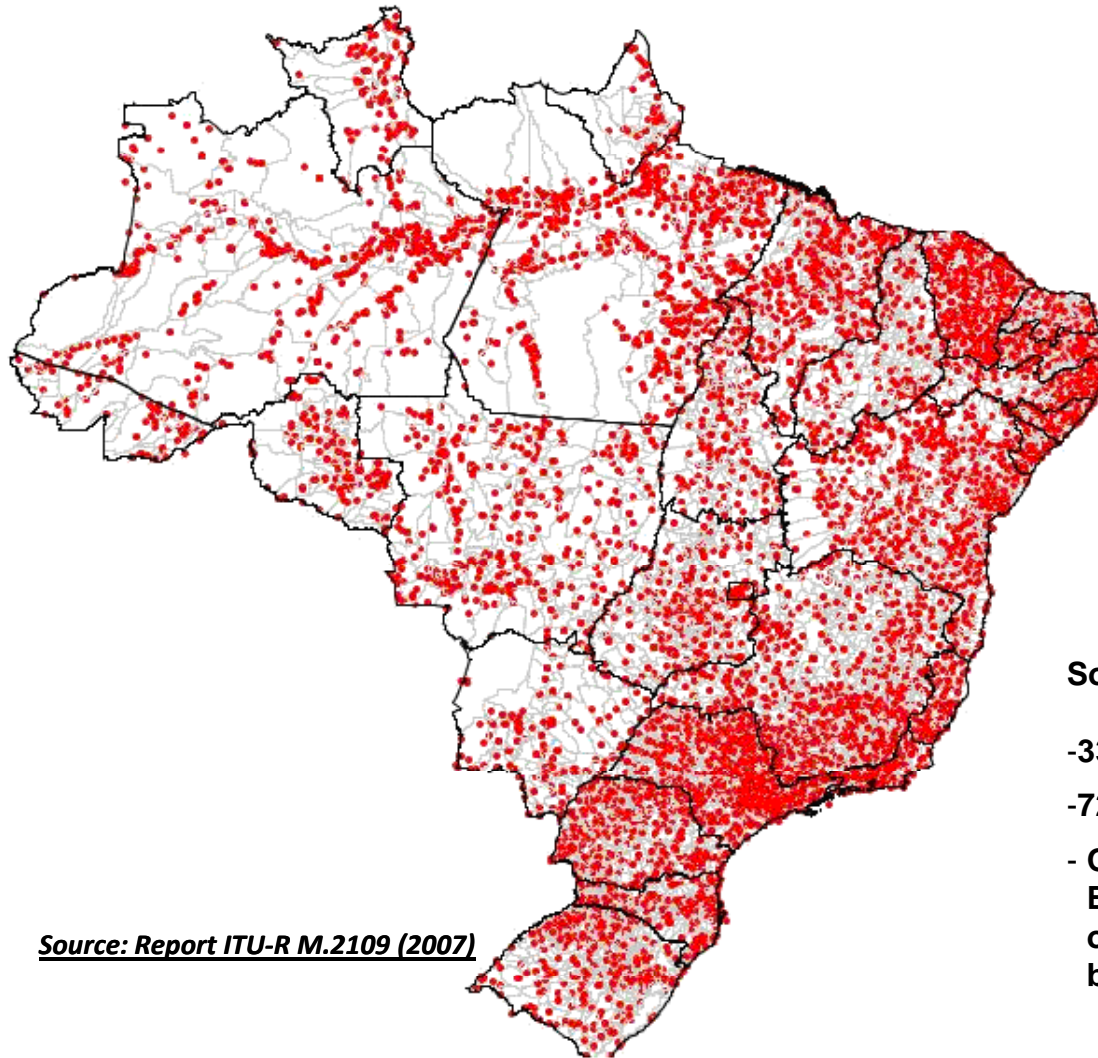
- C Band Use in Brazil
- 3.5 GHz FS Cronology
- FSS Issues and Tests
- Groups established by Anatel – Results
- WRC -2015 – Challenges
- Position of Brazilian Administration



# C Band Use in Brazil



# C band earth stations in Brazil



Source: Report ITU-R M.2109 (2007)

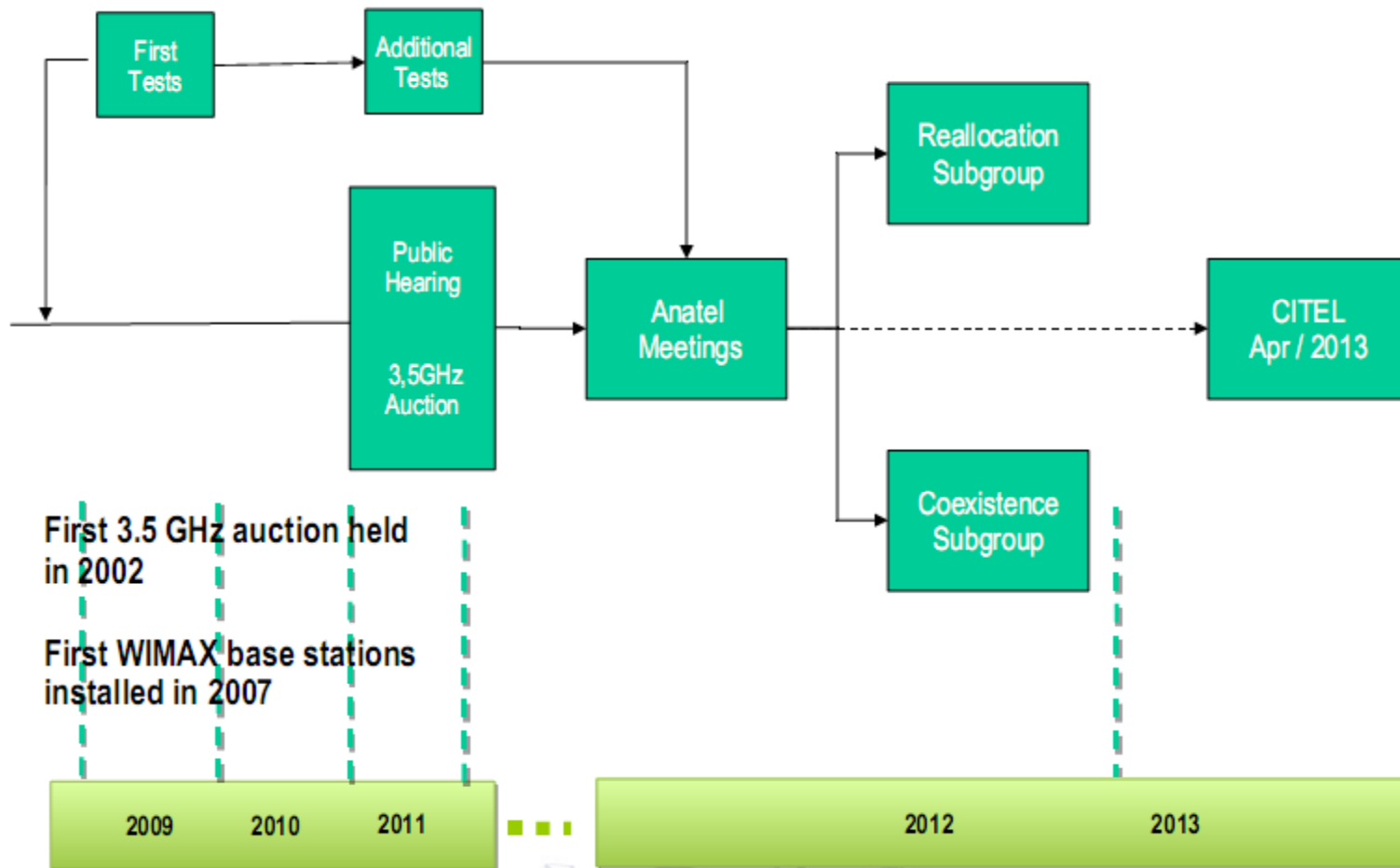
*The earth stations shown in this figure do not include unregistered earth stations such as TVRO terminals.*

## Some data:

- 33 satellite systems authorized
- 72 million users of TVRO
- On the extended C band (3.6 to 3.7 GHz), two Brazilian companies have 9,750 stations operational (corporate, government, NGO and broadcasters)

Source: ANATEL and ABERT (2012 figures)

# 3.5GHz FS Cronology



# Tests (WiMax - TVRO)



Set/2009



Orion - 2011-



INT-2011

## CONSISTENT RESULTS

- 3,5GHz WIMAX system interference into C Band satellite TV carriers (both analog and digital)
- Interference across full C band (not only extended C band is affected)
- Main causes: LO interference due to large signal into mixer and LNB input stage overload



### Main Objective:

- Analyse conditions for future auctioning of 3.5 GHz spectrum that will protect FSS users from harmful interference
  - Model BWA networks, signal propagation and TVRO stations for interference studies and simulations
  - Set operational power limits
  - Establish required guard bands
  - Propose minimum equipment performance specifications
- Extensive collaboration and participation from members of ABERT, ABRASAT and SINDISAT



# Main Results



- Developed model allows
  - Changing of critical and important input values
  - Simulation of current conditions and scenarios (signal levels, distances etc)
  - Simulation of future equipment performance improvements
- Coexistence of terrestrial systems operating in the 3.5 GHz band with C band satellite systems:
  - Preliminary results indicate that, even at low power levels, higher quality receiving equipment are not yet available (for VSATs and TVROs)





# Current "Solutions"



- Cause of problem
  - Huge signal level difference between systems
  - Receive chain overload at earth stations
- Solution
  - Attenuate input signal
    - Shielding or physical obstacles (trees, buildings)
    - Filtering at input
  - Equipment with higher saturation levels (can handle the power of interfering signal)
  - Combination of previous solutions



# Challenges at WRC-15



WRC-15 addresses the issue of additional spectrum allocations to the mobile service on a primary basis, identifying additional frequency bands for International Mobile Telecommunications (IMT)



Considering

**m) the need to protect existing services when considering frequency bands for possible additional allocations to any service;**

*LESSONS FROM THE REPORT ITU – S.2109 (from year 2010):*

When a BWA system is deployed, this creates an exclusion zone within which future deployments of FSS earth stations would not be possible. **This limitation would adversely affect the future development in these zones of the infrastructure telecommunications/ICT of those countries which rely on the FSS ...**

When the BWA stations and/or FSS earth stations are deployed in a ubiquitous manner and/or the locations of the stations are not known, no minimum separation distance can be guaranteed. **In this case, compatibility of BWA networks operating within any part of the 3400-4200 MHz range and FSS networks operating in this same range is not likely feasible within the same geographical area.**

### Agenda Item 1.1: Preliminary Proposal for WRC - 15 3600 - 4200 MHz

- WRC-15 agenda item 1.1 asks for consideration of additional spectrum allocations to the mobile service and identification of additional frequency bands for IMT. JTG 4-5-6-7, the responsible group for conducting studies under agenda item 1.1, is considering a range of frequency bands, varying from 410 MHz to 6 GHz.
- The Brazilian Administration has been conducting studies to satisfy agenda item 1.1 in various bands and has been able to conclude its consideration for the band 3600 - 4200 MHz.
- Considering the extensive use of the C Band in Brazil, the Brazilian Administrations considers the need to protect the Fixed Satellite Service in the frequency band 3600 - 4200 MHz.
- The Brazilian Administration would like to present a proposal of **NOC** in the Radio Regulations to the frequency band of 3600 - 4200 MHz in response to agenda item 1.1



### Agenda Item 1.1: Preliminary Proposal for WRC - 15 3400 - 3600 MHz

- WRC-15 agenda item 1.1 asks for consideration of additional spectrum allocations to the mobile service and identification of additional frequency bands for IMT. JTG 4-5-6-7, the responsible group for conducting studies under agenda item 1.1, is considering a range of frequency bands, varying from 410 MHz to 6 GHz.
- The Brazilian Administration has been conducting studies to satisfy agenda item 1.1 in various bands and has been able to conclude its consideration of the band 3.4-3.6 GHz.
- WRC-07 has approved the identification of the band 3.4-3.6 GHz to IMT via footnote in several countries in Regions 1 and 3. In Region 2, the band 3.4-3.5 GHz was allocated to the mobile service on a primary basis in several countries, while the band 3.5-3.6 GHz was already allocated to the mobile service on a primary basis in Region 2.
- Following the decisions of WRC-07 and considering the fixed satellite service is allocated in Brazil on a secondary basis in the band 3.4-3.6 GHz, the Brazilian Administration has approved, nationally, the identification of this band to IMT. **It is necessary, however, to establish technical conditions to guarantee sharing of IMT operating in the band 3400-3600 MHz with FSS operating in adjacent band 3600-4200 MHz**



Thank you  
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