Satellite Regulation to Foster Broadband Access

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11th Global Symposium for Regulators
"Smart Regulation for a Broadband World"
Armenia, Colombia, 21 September 2011

WHY SATELLITES ?

Committed to Connecting the World

Satellites are valuable part of the broadband infrastructure strategy!

Ubiquitous connectivity

- **Suited for areas underserved / un-served by terrestrial networks**
- **Ability to augment and combine with terrestrial network**
- **Cover mass geog. area for global, regional or national coverage**

- **No `last mile issues' & reliability when natural disasters/terrorism knock out other comm.**
- **Services to remote locations & mobile sites i.e. ships, trains, planes and vehicles.**
- **Remote sites can be deployed very quickly with satellite access.**
- **Accelerate availability of high-speed Internet services in developing countries**
- **Satellite applications include-Web Browsing, Digital Media Streaming, E-mail, Multicasting, File Transfers, *VPN,* Voice over *IP* (VoIP), e-Commerce, Video Conf., Distance Learning**

Expensive ….latency … atmospheric/rain attenuation issues….. narrow beams .. waste energy over large un-served areas

– technology has advanced to mitigate these problem

What's important ?

- Elimination of national & international regulatory barriers
- Underdeveloped regulatory regimes must be updated & made consistent with international best practices

WORLD OF SATELLITES !

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Satellite services and systems for broadband delivery

Satellite services

Amongst 40 radio services (20 satellite services) defined in the ITU Radio regulations (RR), FSS, MSS and BSS are mostly used for satellite broadband delivery (Article 1 of RR)

Frequency bands
L (1 to 2 GHz)
Ku (10-15 GHz)
Ka (15 to 32 GHz)

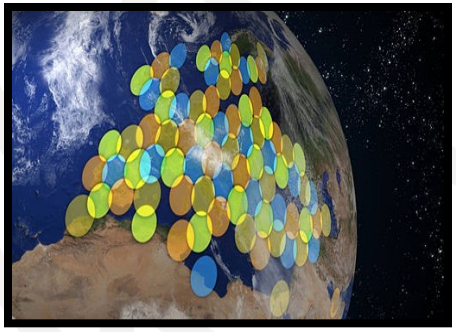
Orbits: **GEO (35786Kms) MEO (~8000Kms) LEO (~1000Kms)**

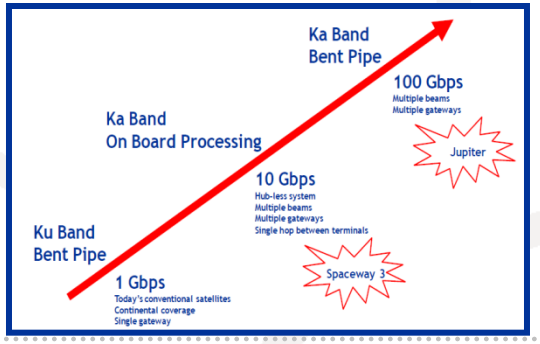
Limited success of Ka band for the satellites in 1990s (Teledesic, Iridium, etc.) attributed to - high cost of space segment and subscriber terminals and less than optimal network throughput and operational performance - Ka band has now come of age!

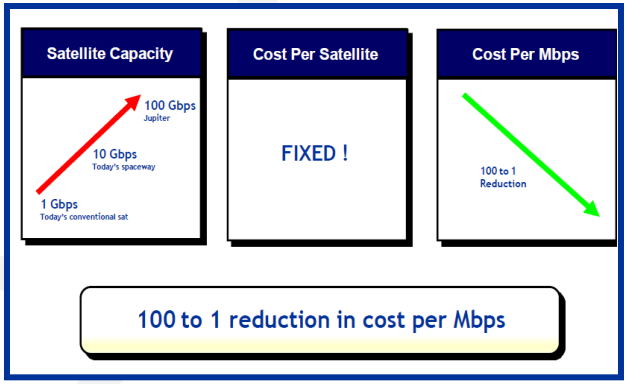
Technological upside for broadband satellites

New generation broadband systems `HTS' (High Throughput Satellite)

- **Spot beam technology, beams illuminate smaller area (100s of kms instead of 1000s)**
- **Coverage is a honeycomb/cellular pattern**
- **Frequency reuse - drastically increases overall capacity - faster speeds to smaller dishes.**
- **Upgraded services at lower costs.**





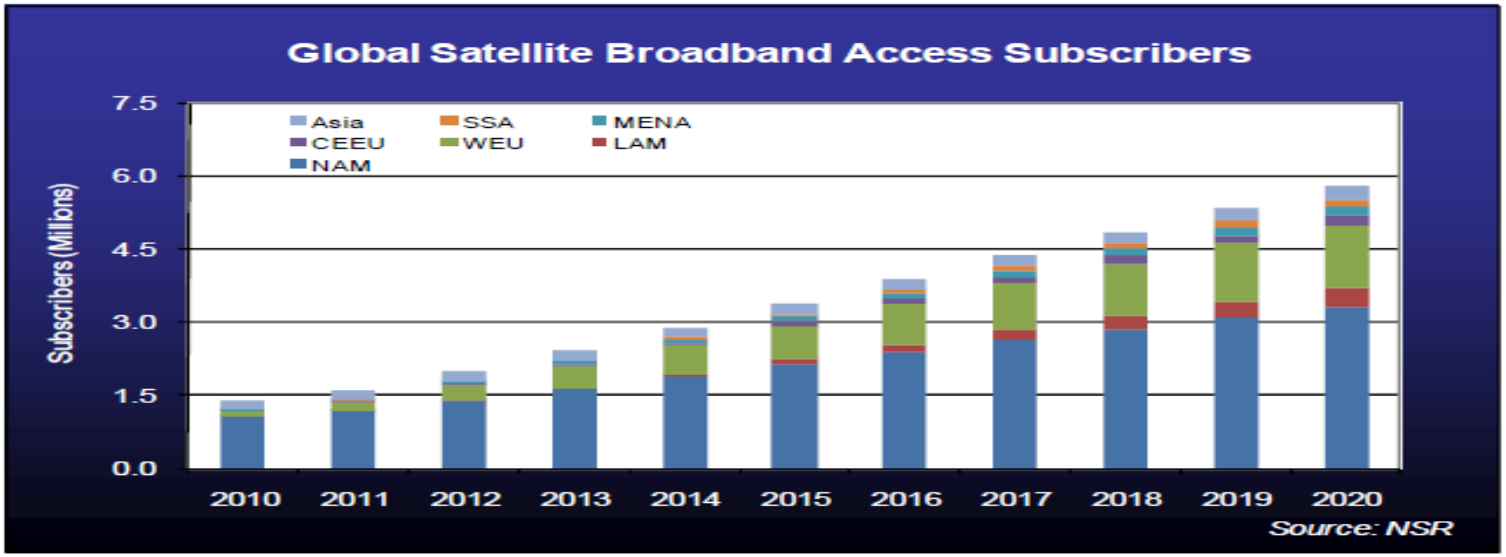


Broadband satellites:
WildBlue
HughesNet
KaSat,
ViaSat-1
Jupiter
Hylas-1
Yahsat
Express-AM4
NBN…….

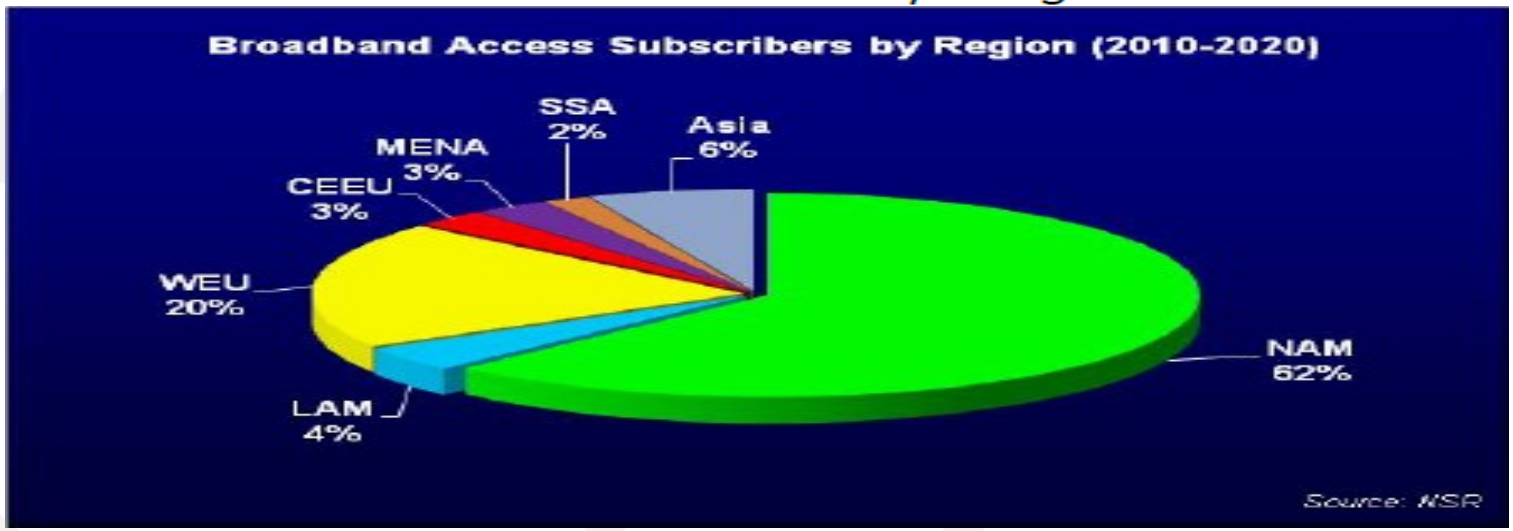
Source: http://www.sspi.com.br/portal/images/stories/pdfs/vsat2010/HUGHES_SSPI_VSAT_Day_2010.pdf

Regional trends in satellite broadband access

*Nearly **6 million** broadband access subs globally by 2020!*



North America and Western Europe largest markets



Ku band transponder demand shall dominate all through the period 2010 to 2020. However, the demand for Ka band HTS shall begin to show around 2013

Source: http://www.newtec.eu/uploads/media/1._Christopher_Baugh_-_NSR.pdf

Communication satellites – historical background

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- **Satellites began as international consortia**
  – formed by member countries for access, launch and support functions.
  (INTELSAT in 1964 for GSO FSS; INMARSAT for MSS; later, regional consortia)

- **By 1980s international structure strained & `Open Skies' policy developed**
  - commercial sat. companies at national level licensed to launch own satellite systems.

- **Satellite industry subject to international and national level regulations. Competition began in sat. sector as in terrestrial service.**

ITU's International Coordination, Satellite Filing & Examination Procedures

- Over last 48 years, from Administrative Radio Conference 1963 & up to last WRC-07, ITU conferences addressed the regulation of spectrum/orbit usage by stations of space radiocommunication services.
- WRC-12 to deal with pressing issues confronting space radiocommunication community.
- Legal regime codified through ITU Constitution and Convention exists, Radio Regulations -a binding intl. treaty
- These instruments contain principles and specific regulations governing :
  - ✓ frequency spectrum allocations to different categories of radiocommunication services;
  - ✓ rights and obligations of Member administrations in obtaining access to the spectrum/orbit resources;
- International recognition of these rights by recording frequency assignments and, as appropriate, orbital positions used or intended to be used in the Master International Frequency Register.
- Non-planned / First-come-first-served procedures & planned procedures

Tech.and Reg.Assistance to Admins.
– Cost recovery for sat filings

Satellite broadband Regulation - Nexus of the problem

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Access to National Markets - Old regulatory structures

- "Closed Skies" policies or exclusive national systems cannot keep pace with growing demands.
- Restricted access by domestic customers to foreign licensed satellites - to protect national satellite fleet from competition – and to protect the needed revenue streams.
- Artificial capping of satellite capacity & limiting transponder access, thereby forcing up prices (argument given by opponents of national satellite monopolies).
- Wide variety of licensing approaches applied has served as an impediment to the provision of satellite services.
- Some administrations also license the private VSAT services- not usually connected to the PSTN. Such redundant licensing process causes time delays and confusion.

International Regulatory Issues

- Virtual / Paper satellites hogging orbital locations and blocking off potential new satellites to serve developing countries – Cleaning up of the MIFR and issues before the WRC-12.
- Individual licensing requirements by a number of countries for mobile satellite terminals

What needs to be done ?

National Regulation

- Open Skies policies & International Gateway liberalization - transparent, non-discriminatory procedures for satellite system operators to obtain access to national markets.
- Ground segment sharing - through collocation and/or provision of backhaul services.
- Licensing aspects - Simplify access to satellite market for potential new entrants
- Technology neutrality - to facilitate fair competition - not to pick "winning" technologies and thus forego the possibility that a provider could implement more cost-effective technologies, either now or later.
- Regional harmonization of regulatory network

International Regulation

- Satellite filings only for realistic parameters – review & removal of unused freq. assignments from ITU Master Register – reduce coordination burden for new satellites.
- Study issues associated with additional allocations for MSS during the WRC-12 in Feb. 2012 and all other WRC–12 issues for space services & participate in deliberations (AI 1.7, 1.13, 1.18, 1.25 & 7)
- Familiarization with ITU-R satellite filing & examination procedures, software tools and ITU-R Study Group activities specially Study Group 4 dealing with satellite services.

Hybrid Broadband Networks

Integrated MSS Systems

- Use of satellite spectrum to combine terrestrial networks with satellite systems in the L band (1525-1559 & 1626.5-1660.5 MHz).
- Ground component mitigates blockage areas& allows indoor service coverage.
- CGC/ATC (Complimentary Ground Component Or Auxiliary Terrestrial Component) - integral part, of the MSS system. “CGC” of integrated MSS systems also in the L band.
- No definition for integrated MSS in ITU Radio Regulation
- MSS/other satellites used for position fixing-GPS, Galileo need protection from CGC/ATC
- Since freq. assgn. to tx. Stns. capable of causing harmful interference shall be notified to the ITU, CPM considered interim procedure for notification and recording of CGC/ATC
- In some countries – it was felt that satellite operators were simply using the “auxiliary” excuse to use satellite spectrumfor providing a basically terrestrial network (Licenses for international satellites are awarded without payment (beauty contest).

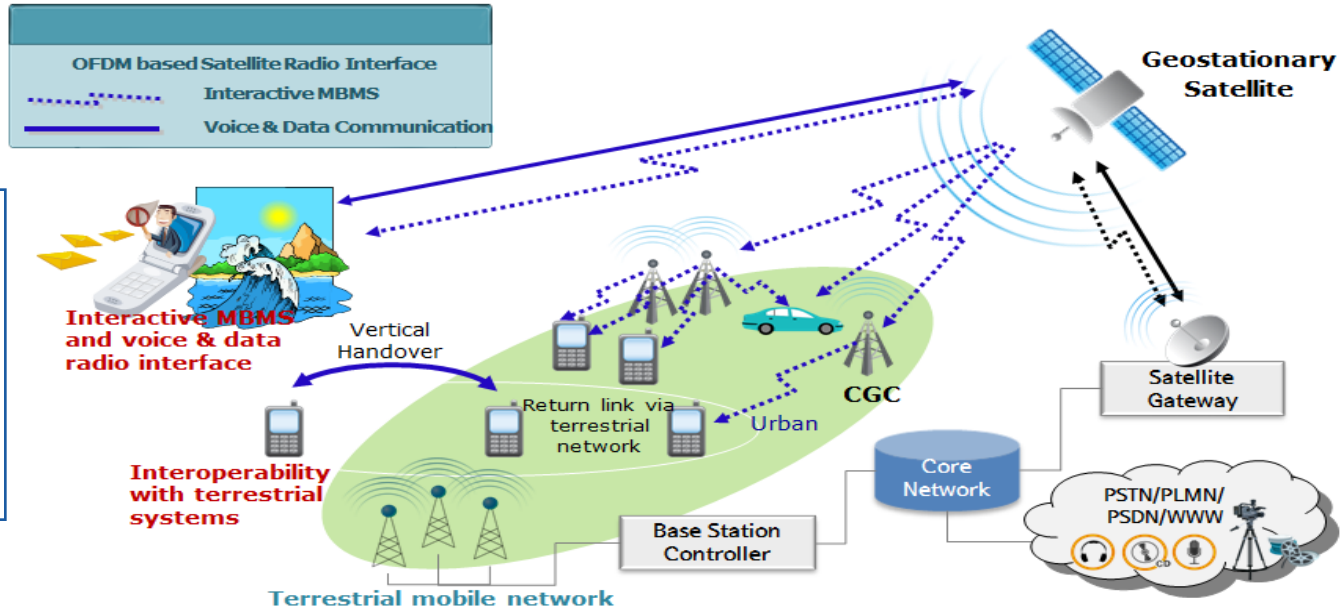
How do regulators establish rules for Integrated MSS Systems ?

Hybrid Broadband Networks (cont.)

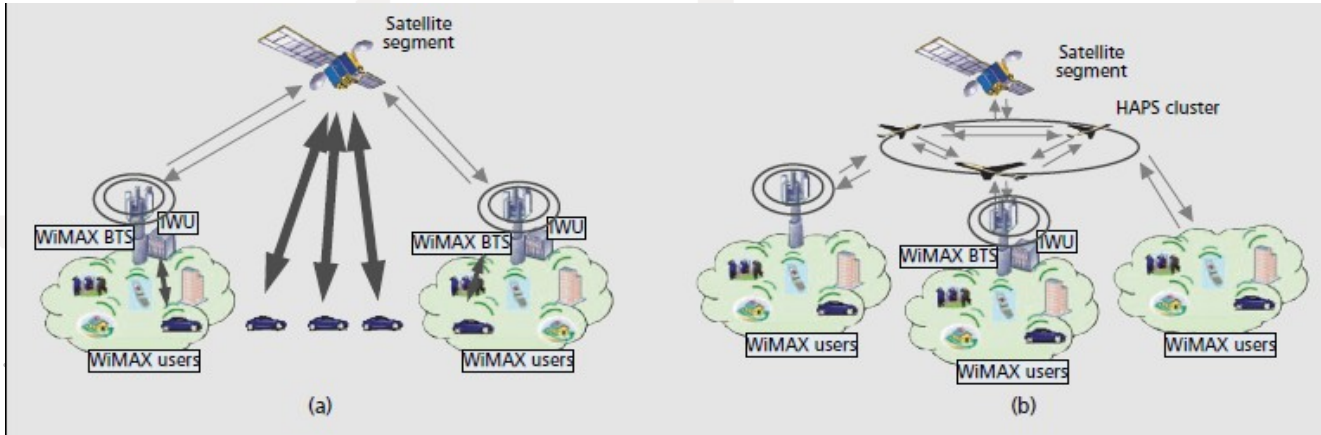
Satellite component of the IMT advanced

Band (MHz) for IMT: 450-470; 698-960;1710-2 025;2110-2200;2300-2400;2500-2690;3400-3600
development of radio interface for the satellite component of IMT specifications

An example of IMT- advanced system architecture using Orthogonal. Freq. Division Multiplexing (OFDM) techniques



Use of HAPS for Interoperability between WiMAX & broadband mobile space networks



What is at stake? – Opportunities & applications !

- **Relief Operations during Natural Disaster / Emergency Situations**
  - FSS & MSS ground terminals - easily deployed for relief operations
  - MSS for backhaul of terrestrial services
  - VSATs, vehicle mounted earth stations and transportable earth stations access FSS & operate in disaster area with a `hub' earth station that uses large antenna size. Can operate in 14/12 GHz, 30/20 GHz with antenna sizes ranging from 1.2 to 3m
  - MSS systems include: Inmarsat, Thuraya, HIBLEO-2/Iridium, HIBLEO-4/Globalstar, SkyTerra, TerreStar and AceS

- **Agreements between ITU and a number of agencies and organizations on the use of systems, including FSS systems, for disaster-related telecommunications.**

The Tampere convention- Came into force on 8 January 2005 - ratified by 43 administrations

- **Waiving of Regulatory barriers that impede use of telecom. resources during disasters.These include licensing requirements to use allocated frequencies, restrictions on the import of telecommunication equipment, as well as limitations on the movement of humanitarian teams.**

Concluding remarks

- **Work towards empowerment of national governments to `open skies' !**
- **File realistic technical parameters for satellite system while notifying them to the ITU for international coordination - respect ITU Radio Regulations – a binding international treaty.**
- **Familiarisation with ITU's filing & examination procedures for space systems.**

Thank you

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