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**REPORT
SEMINAR ON FIXED AND MOBILE SATELLITE SERVICES
APRIL 7, 2013
CALI, COLOMBIA**

(Item on the Agenda: 3.3)

(Document submitted by Coordinator of the Seminar)

Report of the Seminar on Fixed And Mobile Satellite Services

A Seminar on the Fixed and Mobile Satellite Services was held in conjunction with the XXI Meeting of Permanent Consultative Committee II: Radiocommunications including Broadcasting at ICESI University in Cali, Colombia on April 7, 2013. The Seminar was organized and presented by the Global VSAT Forum; Ciel Satellite LP; Grupo Hispasat; SES S.A.; O3b Networks Ltd.; Satélites Mexicanos S.A de C.V (Satmex); Intelsat S.A.; Telesat Brasil Capacidade de Satelites Ltda. (Telesat Brasil); TELESAT (Telesat Canada); Inmarsat plc; Star One S.A.; Hughes Network Systems LLC; EchoStar Corporation; Sindicato Nacional das Empresas de Telecomunicações por Satélite (Sindisat); and Associação Brasileira das Empresas de Telecomunicações por Satélite (Abrasat).

Summary

The participants in the Seminar made presentations concerning many aspects of the FSS and MSS including an overview of innovations in the satellite field, new generations of satellites for the Americas region, new services and applications provided by satellite, the role of satellite in National Broadband Connectivity programs, and upcoming challenges to the satellite industry on technological convergence at WRC-15. This paper provides a summary of some of the common themes and highlights of the Seminar.

Satellite is critical to meet the needs of populations and areas that are unserved and underserved by terrestrial networks, and must be incorporated into national broadband plans to ensure comprehensive delivery of telecommunications services.

There are no substitutes for C-band, which is critical and irreplaceable for certain applications. Many services use C-band specifically to access broad hemispheric beams, widely deployed and affordable terminal equipment, and the band's well-established robust resistance against rain fade. C-band satellite services are heavily relied upon by governments for a variety of applications: maritime, aeronautical services, cellular backhaul, and for social programs providing information, education and connectivity for

citizens. For example in the extended C band (3.6 to 3.7 GHz), two Brazilian companies have 9,750 stations operational (corporate, government, NGOs and broadcasters).

There are many tens of millions of C-band users globally, For example, there are an estimated 72 million C-band users of Television Receive-only (TVRO) in Brazil alone.

New satellites carry significant C-band payloads. At least 35 satellites with C-band payloads are under construction and are scheduled to be launched in 2012-2015, representing at least \$9-10 billion in new investment.

Studies and measurements have confirmed the unfeasibility of BWA/FSS sharing. Several studies performed by the ITU and Administration on sharing on the same C-band frequencies between broadband wireless access (BWA) and FSS conclude that it is not feasible, typically requiring large separation distances between the transmitting IMT (Macro) base station and the receiving FSS Earth stations (from 40 to 400+ km). In addition, studies on possible mitigation techniques showed that they all were either unfeasible or ineffective.

Severe interference cases have been reported in countries which authorized wireless access systems in some parts of the C-band, (e.g., Bolivia, Bangladesh, Indonesia). Even in adjacent frequency bands, field tests performed by Star One / Embratel demonstrated great difficulty in having fixed BWA services and FSS operate in the same geographical area.

C-band antennas and earth stations should be registered in the ITU Master International Frequency Registry (MIFR) and recognized at the international level in order to ensure future protection. Lacking a more comprehensive method of addressing this registration, two options are available:

- Individual notifications of small earth stations (~10-20) with a note indicating that hundreds of similar earth stations are in operation (action by earth station Administration);
- A note may be attached to beams indicating that hundreds of associated, similar earth stations are in operation in the beams (action by satellite Administration).

Report of the Chairman Coordinator of the Seminar

Franklin Merchán of the Ministry of Information and Communications Technologies of Colombia and the Alternate Chair of the Permanent Consultative Committee II and Clovis Baptista, Executive Secretary of CITEL welcomed delegates and opened the proceedings by thanking the coordinators of the Seminar on Fixed and Mobile Satellites and the Colombian administration for their efforts in presenting a subject so important in this region, and extended their best wishes for a successful seminar.

In the first session, entitled “Overview of Innovations in the Satellite Field,” Mr. David Hartshorn, President of the Global VSAT Forum, informed the audience that a VSAT Earth station costing \$18,000 US in 1985 today is often provided for less than \$500 and, with some program-subscription packages, are being offered on a complementary basis. He noted that there is a higher take up rate of satellite services in the Americas than in the rest of the regions, thanks to government projects as FITTEL, E-Mexico and other collaborations between government and industry, and due to government support of satellite services in the form of effective licensing, effective pricing, and effective spectrum policy. Mr. Juan Manuel Wilches of the National Spectrum Agency of Colombia noted the need for joint efforts between the satellite industry and the government, since a fiber-optic network will not meet all of Colombia’s communications needs. Mr. Wilches also informed the Seminar participants that the ANE is preparing a training scheduled for the 3Q2013 on different technologies and how they best apply to each situation, including satellites and involving various Colombian government institutions. He asked whether the Ka-

band technology would be adequate for Colombia's needs, given rain-fade issues and the high-costs of transition from Ku to Ka-band operations.

Mr. Marc Girouard of Industry Canada, noting Canada's long history in the space industry, pointed out his country's on-going comprehensive review of its regulatory regime to examine best practices, on items such as spectrum for domestic networks, conditions and obligations associated with licensing. Mr. Waldo Russo of Union Engineering, participating on behalf of the Brazilian industry associations Abrasat and Sindisat, (Brazil- Independent Consultant ABRASAT SINDISAT) emphasized the critical role of satellite for civil purposes, such as Ka-band under Brazil's national broadband plan, and for government uses, such as satellite-based and protection of the vast and unpopulated Amazon region, surveillance of Brazil's long terrestrial and ocean borders and satellite communications support for the Brazilian air space activities (22,500,000 square kilometers). Comments were made on key technologies to be expected in future satellite systems. He noted that there are projections for requirements of 1.5-1.7 terabits per second of capacity being placed on-orbit by HTS Satellites within the next 10 years, and the government and industry must work together to optimize use of space segment by ensuring greater the efficiency of bandwidth (e.g., use of Ka-band and High Throughput Satellites).

In the second session of the satellite seminar, entitled "New Generations of Satellites for the Americas Region," presentations were made by: Ms. Alejandra Ornés from Inmarsat; Mr. Edio Gomes of Hispamar, a Hispasat Group company; Mr. Paulo Bertram of Star One; Mr. Hugo Frega of Hughes/Echostar; Mr. Gonzalo de Dios of Intelsat; Ms. Joslyn Read of O3b Networks, and; Mr. Hector Fortis of Satmex.

Ms. Alejandra Ornés from Inmarsat opened the panel with a presentation on Global Xpress, a Ka-band mobile broadband system launching in 2013, with global coverage planned for 2014 and offering a variety of services (e.g. disaster relief, maritime, and aviation). It will offer the unique combination of seamless global coverage, consistent higher performance up to 50 Mbps, and the network reliability for which Inmarsat is renowned. Global Xpress will deliver higher speeds through more compact terminals, using spectrum that is far less congested. Terminals will be available in mobile, portable and fixed formats for our customers on land, at sea and in the air. For extra resilience, Global Xpress will be complemented by the standard broadband services on the Inmarsat-4s, which deliver 99.9% network availability.. Mr. Edio Gomes of Hispamar, a Hispasat Group company, explained that the just-launched Amazonas-3 at 61° W, in addition to carrying nine spot beams of Ka-band - the first spacecraft to carry this band in Latin America - also carries a large C-band payload that will be used for at least 15 years. Mr. Paulo Bertram of Star One highlighted the full regional coverage in C and Ku-band provided by the newly launched C3 satellite and the C4 satellite, to be launched in 2014. In addition to C and Ku-band coverage, its planned D1 satellite will carry a Ka-band payload that will have 20 Gbps over Brazil and switchable spot beams over Peru and Colombia.

Ms. Joslyn Read noted that the O3b Networks' MEO satellite system's global service is expected by Q4 2013 via eight satellites to be launched in 2013 (four more are under construction). O3b Network's satellite broadband system is designed to bring very high speed, low latency Internet services to rural and remote communities around the world. Ms. Read also mentioned the global regulatory challenges to Ka-band satellite systems include: satellite inclusion in national broadband plans, Ka-band satellite spectrum access, new licensing regimes in Ka-band, the need to streamline ground equipment approvals, and the need to relax spectrum fees. Mr. Hugo Frega of Hughes/Echostar explained the advantages of Ka-band and the services that Hughes provides using High Throughput Satellites (HTS) in North America, including Jupiter, a 60 spot-beam satellite covering highly populated areas in North America and offering more than 100 gigabits per second of throughput at affordable prices. Hugo also mentioned a study that showed that for every 10% increase in broadband penetration, a 1.2% growth in GDP is observed.

Mr. Gonzalo de Dios of Intelsat observed that HTS are based in the C- and Ku-bands as well, noting that EPIC, a global coverage platform that is being developed by Intelsat, will be based on HTS with multiple spot beams in the C- and Ku-bands. He pointed out the reliance on satellite as THE technology to serve rural and underserved areas, by providing either last mile or backhaul solutions to user in areas that are not, and probably will never be, served by other technologies. In addition, Mr. de Dios noted the use of platforms such as EPIC to provide flexible and cost-effective solutions for existing and new applications, including mobility. The final panelist, Mr. Hector Fortis of Satmex, discussed the recent launch of Satmex 8, which carries 19 more Ku-band transponders than Satmex 5, and also mentioned Satmex 7, to be launched in 2015 with 24 transponders in C-band and 40.5 transponder equivalents in Ku-band. He highlighted the 25% reduction in costs made possible by the use of next-generation electric satellites like Satmex 7. Mr. Fortis closed by mentioning that the Mexican government has a proposal to change many aspects of the telecommunications regulation in México. Cofetel also launched a public consultation on satellite regulation, on which comment is solicited by April 30.

The third session, entitled “Satellite Service Providers and New Satellite Applications,” featured an overview of new applications available and what the market is demanding. Mr. Andrés Abril Vargas, Manager of the Central Region for Ecomil SA, explained how his company integrates satellite services for clients in the petroleum, mining, banking and commercial sectors, as well as for intergovernmental organizations and national defense. Mr. Alvaro Sandoval, of BANSAT, explained how broadband Ka-band transmissions, like those now available on Amazonas-3, can overcome the problem of rain-fade using power levels eight times higher than other currently-deployed traditional Ku-band satellites. He emphasized that the price of this service is very competitive, with complete user equipment of no more than \$300 dollars US for a 75 centimeter antenna transmitting at speeds up to 18 megabits per second per user.

Mr. Michael Lemke of the Defense Information Systems Agency reviewed uses by various government agencies, including air traffic control, maritime applications, the National Oceanic and Atmospheric Administration. He noted that C-band is still a critical resource for the government, and that its C-band terminals have experienced harmful interference from terrestrial sources. Mr. Greg Oliveau of Gogo, a provider of on-board aircraft connectivity serving 1 million users (60,000 passengers per day), noted that today 2700 aircraft are equipped with Gogo WiFi services using L, Ku, Ka capacity. Prices for the service are expected to decrease as Ka-band capacity is added, under an agreement with Inmarsat.

In the fourth session, entitled “Satellites and National Broadband Connectivity Programs,” Mr. Cidar Ramirez described Bolivia’s Tupak Katari satellite and planned services, which are set to begin early in 2014 following a late 2013 launch. Planned services include tele-medicine, direct-to-home television, tele-education, Internet access, and mobile service expansion. Ms. Diana Tomimura of the Brazil Ministry of Communications noted that Brazil is currently served by 4 Brazilian satellite operators employing 15 geostationary satellites, and 18 foreign satellite operators using 36 geostationary satellites. As part of its comprehensive national broadband plan, Brazil is reviewing means for lowering taxes on VSAT equipment to reduce equipment costs.

Mr. Hector Carril, adviser to the Secretariat of Communications of Argentina, delivered the ARSAT presentation, as the delegates from ARSAT were not able to travel due to the floods in Buenos Aires. Mr. Carril shared with the delegates the progress of ARSAT satellites under construction, include photographs of the assembly of the payload and the service modules. Hector Valdez of the Secretariat of Communications of Mexico joined the session on behalf of Alonso Picazo, who could not travel to the Seminar. Recent and planned launches of satellites in the government’s MEXSAT program are dedicated to the modernization of the platform of national security, the need for secure government communications, and the need for a means for rapid response to natural disasters. Mexico’s anticipated reform of the telecommunications sector is expected to be great boost to the satellite industry.

The final session of the satellite seminar, entitled “WRC-15: Challenges to the Satellite Industry on Technological Convergence,” addressed several agenda items of concern to the Fixed Satellite Service at WRC-15, including A.I. 1.1, 1.6.2, 1.8, and 7. Regarding A.I.1.1, Mr. Paulo Bertram, representing Abrasat and Sindisat of Brazil, noted the extensive use and therefore importance of the FSS band 3400-4200 MHz for fixed satellite services. Millions of receive terminals globally access satellite services in this band; this extensive use is due to its excellent propagation capabilities. The presentation indicated that it would be very difficult if not impossible to use effective mitigation techniques with IMT type of technologies, even when services using these technologies are in an adjacent band.

Ms. Kim Baum of SES, noting that Agenda Item 1.6.2 seeks address the imbalance in uplink FSS allocations (800 MHz) versus the downlink (1000 MHz) spectrum at Ku band in Region 2, urged CITEL countries to participate in studies that would lead to the allocation of an additional 250 MHz in the 13-17 GHz band. Mr. Gonzalo de Dios of Intelsat, addressing Agenda Item 1.8 concerning improvement in the regulations related to Earth Stations on board Vessels (ESVs), noted how the use of current technology for ESVs, operating at lower power than presently specified in the Radio Regulations, is leading to the reduction of coordination distances. The presentation also indicated that significant growth is expected in the use of Earth Stations on board Vessels. Mr. de Dios noted that facilitating the introduction and use of maritime services via satellite is essential but must be done in a light touch manner to reduce the burden on government bodies as well as on service providers and vessel operators. He pointed to a recently completed an industry consensus-based White Paper on Maritime Satellite Regulation. The paper, which is accessible at <http://www.gvf.org/regulatory/regulatory-guidelines.html>, describes how that can be achieved in a way that supports both the service requirements and policy goals described in this document, and ensures proper management of radio spectrum by users at sea.

Finally, Mr. Yvon Henri of the ITU-R BR indicated that the extensive use of C-band for FSS operations (VSAT, TVRO,...) was not properly taken into account in the ITU process, and made several suggestions on possible ways to provide enhanced international recognition of such C-band receive terminals. One suggestion was for Administrations to notify individual small FSS C-band Earth Stations located on their territory with a note indicating that hundreds of similar Earth stations with the same characteristics were in operation in the same area. In a similar way, a note by the notifying administrations of the satellite network could be associated with the relevant Earth Stations in a service area associated to the downlink beam frequency assignments. Such approaches, as well as any one that could provide a better international recognition of the extensive use of C-band for certain FSS operations, could be considered under WRC-15 Agenda Item 7.0 concerned with Resolution 86.

Mr. Claudio Palomares of the Ministry of Transport and Communications of Peru and Chair of the CITEL/PCC II Working Group Relative to Satellite Systems to Provide Fixed and Mobile Services thanked the presenters and coordinators for a successful seminar and closed the proceedings.