**July 15, 2011**

**VIA E-MAIL**
politicadelere@ane.gov.co

Agencia Nacional del Espectro
Calle 93B # 16-47, Piso 6
Bogotá D.C
COLOMBIA

**Re: Regulatory Framework for Satellite Services in Colombia**

Dear Sir or Madam:

The Satellite Industry Association (SIA) welcomes the opportunity to provide comments to the Agencia Nacional del Espectro on the above-referenced consultation paper relating to defining spectrum policies for Colombia.[1] In the Consultation Paper, the ANE seeks comment on the development of policies for the use and sharing of the radiofrequency spectrum that will promote economic development and meet the needs of the Colombian population. Several questions specifically address satellite communications systems.

SIA is a U.S.-based trade association providing worldwide representation of the leading satellite operators, service providers, manufacturers, launch services providers, and ground equipment suppliers.[2] Since its creation fifteen years ago, SIA has become the unified voice of the satellite industry in the U.S. and abroad on policy, regulatory, and legislative issues affecting the satellite business. SIA members are actively engaged in providing communications services to Colombia. As a result, SIA has a strong interest in any possible policy changes

[1] *Documento de consulta pública para definer la política del Espectro Radioeléctrico*, June 2011 ("Consultation Paper").

[2] SIA Executive Members include: Artel, Inc.; The Boeing Company; CapRock Communications, Inc.; The DIRECTV Group; Hughes Network Systems, LLC; DBSD North America, Inc.; Echostar Satellite Services, LLC; Integral Systems, Inc.; Intelsat S.A.; Iridium Communications Inc.; LightSquared; Lockheed Martin Corporation; Loral Space & Communications, Inc.; Northrop Grumman Corporation; Rockwell Collins Government Systems; SES WORLD SKIES; and TerreStar Networks, Inc. SIA Associate Members include: Arqiva Satellite and Media; ATK Inc.; Cisco; Cobham SATCOM Land Systems; Comtech EF Data Corp.; DRS Technologies, Inc.; Eutelsat, Inc.; GE Satellite; Globecomm Systems, Inc.; Glowlink Communications Technology, Inc.; iDirect Government Technologies; Inmarsat, Inc.; Marshall Communications Corporation; Orbital Sciences Corporation; Panasonic Avionics Corporation; Segovia, Inc.; Spacecom, Ltd.; Spacenet Inc.; Stratos Global Corporation; TeleCommunication Systems, Inc.; Telesat Canada; Trace Systems, Inc.; and ViaSat, Inc. Additional information about SIA can be found at http://www.sia.org.

that would affect the availability of spectrum for satellite services in Colombia, especially spectrum that is already in use and in which billions of dollars have been invested. Accordingly, SIA provides general comments on the main themes of the Consultation Paper, as well as responses to questions raised in Section 3.1.8 of the paper concerning satellite services.

## General Comments

SIA urges the ANE to focus on the critical importance of the services delivered by satellites in responding to current and future requirements for communications connectivity in Colombia. As the ANE is aware, satellite frequencies such as the C-band are used extensively within Colombia and throughout the region to provide a wide range of important communications services. Billions of dollars have been invested by multiple companies and countries in satellite capacity and ground infrastructure to serve Colombia and the surrounding region. Customers who rely on satellite services include a broad range of government, commercial, and residential users.

Satellite networks are particularly well suited to meeting connectivity requirements in areas where deploying terrestrial infrastructure may not be economical due to low population density or rugged or remote terrain. This is an important factor for Colombia given its unique geography and population distribution. Satellite service providers can respond rapidly to demand to provide communications to the large, sparsely populated areas of the Colombian countryside that are difficult to reach via terrestrial systems, providing services ranging from basic connectivity to advanced broadband offerings. We urge the ANE to ensure that any changes to Colombia spectrum policy do not undercut the ability of satellite networks to provide services that are critical to public safety and economic development.

Availability of C-band spectrum for satellite services is particularly important. As the International Telecommunication Union (ITU) recognized in 2007 in Report ITU-R M.2109, the C-band downlink frequencies at 3400-4200 MHz and associated uplink frequencies at 5850-6425 MHz are widely and intensely used by the fixed satellite service (FSS) throughout the world:

> *There is extensive utilization by the FSS of the frequency band 3625-4200 MHz in all ITU Regions of the world (except certain countries in Europe and in Asia) and of the frequency band 3400-3625 MHz in ITU Region 1 (except parts of Europe) and Region 3 (except some countries of Asia). The low atmospheric absorption in these bands enables highly reliable space-to-earth communication links with wide service coverage, particularly in, but not limited to, geographical areas with severe rain fade conditions. The wide coverage enables services to be provided to*

> *developing countries, to sparsely populated areas and over large distances*.[3]

Indeed, SIA member companies have launched dozens of C-band satellites into geostationary orbit to provide service using these frequencies. These satellites represent billions of dollars of investment and are used to provide many vital services around the world today. C-band satellites are extensively used for distribution of video and audio programming. In addition, the C-band is used for video contribution. Many news organizations use C-band satellites for satellite news gathering, enabling live coverage of breaking news and sporting events from around the world. Government agencies also depend on C-band satellites because they are relatively unaffected by rain fade, providing a high level of signal reliability. The Consultation Paper recognizes this, noting that satellite services are used for important national defense, territory monitoring, and emergency response applications.[4] Furthermore, many mobile satellite services (MSS) constellations rely on the extended C-band for feeder links and tracking, telemetry and control services. These MSS satellites, in turn, perform many critical safety-of-life functions by enabling rapid restoration of communications after natural disasters around the globe.

**Comments on Specific Questions in Section 3.1.8**

*1. Is there unsatisfied demand for satellite services? Is it appropriate to encourage private investment in the provision of access to satellite networks and services in Colombia?*

Yes. There continues to be unmet demand for satellite services to satisfy requirements for connectivity in large areas of the country where there is not extensive terrestrial infrastructure. For example, satellite networks are an important resource for the implementation of COMPARTEL, whose goal is to allow remote areas of the country to benefit from telecommunications technologies in order to promote social welfare and economic development. Satellite technology is particularly well-suited for addressing these needs given the particular geography of the Colombian territory, which is divided by three mountain chains, and which for historic reasons has not attracted significant investment in cable, fiber, or microwave infrastructure.

The role of the public sector in attracting and guaranteeing private, national and international investment in communications is essential. For this reason, international institutions like the World Bank and international organizations

[3] Report ITU-R M.2109, "Sharing studies between IMT Advanced systems and geostationary satellite networks in the fixed-satellite service in the 3400-4200 and 4500-4800 MHz frequency bands," (2007) ("Report ITU-R M.2109") at 4.
[4] Consultation Paper at 46.

like the ITU have developed projects specifically to promote the connection of communities. Local actors like municipalities, cooperatives and small or medium commercial enterprises can propose and design various forms of partnerships between the public and private sectors to the benefit of both.

Communications connectivity has the power to unify the Colombian national territory and its citizens, in all the areas that have been historically separated. In a matter of months – not years or decades – satellite services can connect small Colombian enterprises in the agricultural zones of the south and the coastal areas of the north, as well as the three border regions (with Panama, Venezuela and Ecuador) with government, banking, and customs agencies, driving demand for related industries including manufacturing, transportation, and tourism.

Thus, it is essential that the ANE not make any changes that would impair the continued viability of satellite services or disadvantage customers who rely on satellite services in areas where terrestrial alternatives are unavailable or not economical.

*2. Which service should be primary in C-band and extended C-band – satellite links, fixed links, or both?*

As discussed above, both standard and extended C-band frequencies are used extensively around the world for important satellite services. The specific characteristics of satellite operations in the C-band, including the high signal reliability and broad coverage areas, make C-band satellite services ideally suited for addressing connectivity requirements in more remote regions and for providing capacity when terrestrial systems are unavailable. In order to ensure that these vital services are available in Colombia, satellite links should have primary status in both the standard and extended C-band.

SIA members have extensive experience with sharing between FSS and terrestrial fixed services (FS) in the standard and extended C-band frequencies. Based on that experience, SIA submits that co-primary sharing between FSS and certain types of FS networks is feasible provided that detailed coordination requirements are adopted and enforced. Specifically, co-primary sharing is possible between FSS and terrestrial fixed point-to-point networks pursuant to a coordination framework that requires a new system to protect previously deployed or licensed networks and provided that the new system is not entitled to interference protection from pre-existing facilities. Necessary procedures include the development of a publicly accessible database of all currently deployed FSS and FS facilities. When a new facility is proposed, the applicant then has the obligation to determine by consulting the database whether there is a risk of interference to existing operations, taking into the applicable separation distance and other factors including orientation of the relevant antennas.

SIA opposes co-primary status for FS operations in the standard and extended C-band unless the detailed coordination procedures outlined above are in place and unless FS operations are limited to point-to-point systems that can co-exist with FSS terminals. Absent these measures, co-primary status for FSS and FS is not feasible because satellite receive terminals can experience harmful interference from FS operations in the same band or in adjacent spectrum. Similarly, allowing terrestrial systems other than fixed point-to-point facilities would exponentially increase coordination difficulties, impairing the ability of the FSS to make meaningful use of the spectrum.

*3. In the case of massive deployment of broadband wireless networks in the 3.5 GHz band, would there be harmful interference between terrestrial and satellite systems in this band? If yes, what procedures do you think should be implemented so that both services can co-exist, or which service do you think should be primary: satellite services, or fixed services, or IMT?*

A number of studies demonstrate that mobile broadband services[5] cannot feasibly coexist with FSS operations in the same band, and so the introduction of the former would disrupt the latter. At WRC-07, under agenda item 1.4, the ITU considered the identification of new frequency bands for International Mobile Telecommunications (IMT) based on analyses conducted in between WRC-03 and WRC-07. In the period leading up to WRC-07, extensive studies were performed regarding the ability of "IMT-Advanced" stations to share with C-band downlinks in 3400-4200 MHz and 4500-4800 MHz. These studies are summarized in Report ITU-R M.2109.

The ITU-R Report demonstrates that it is impractical for the existing FSS to share these bands with IMT. The studies showed that minimum separation distances ranging from tens of kilometers to greater than 100 kilometers would be required between transmitting IMT stations and receiving earth stations in order to avoid interference into the earth station from in-band, co-channel IMT signals.[6] An IMT transmitter operating in an adjacent band would need to be separated from an earth station by up to tens of kilometers to avoid causing interference. At smaller distances (from as close as hundreds of meters to a kilometer or more) an IMT transmitter in an adjacent band would be more disruptive still, capable of causing overdrive of the FSS receiver.[7] Based on these studies, proposals to identify C-band frequencies for IMT on a global or even regional basis were defeated at WRC-07. Instead, footnotes were adopted that identified 3400-3600

[5] While these studies address mobile broadband services, similar results would be expected for base station of fixed wireless access systems operating at similar power levels (e.g., fixed point-to-area systems).
[6] *See* Report ITU-R M.2109 at 41-42.
[7] C-band earth station receivers designed to receive very low-power signals from satellites located in the geostationary arc can be overloaded if the earth station is located near high-power transmitters.

MHz for IMT in certain countries only.[8] WRC-07 also adopted a power limit that mobile service stations must meet at the border of other countries in order to protect existing or future earth stations in those areas. As a follow-up after WRC-07, additional studies were conducted regarding broadband wireless access (BWA) systems. These studies led to similar conclusions, and are contained in Report ITU-R S.2199 released in 2010.[9]

This more recent ITU-R report confirms the prior analysis. Specifically, ITU-R S.2199 of Working Party 5A, "Studies on compatibility of broadband wireless access (BWA) systems and fixed-satellite (FSS) networks in the 3400-4200 MHz band," considers three possible types of interference into FSS earth stations where BWA systems are introduced: 1) co-frequency emissions from BWA causing in-band interference to FSS systems, 2) unwanted emissions from the BWA transmitters (out-of-band due to spectrum roll-off and spurious emissions), and 3) signals from nearby BWA transmitters causing overload to FSS earth station receivers operating in adjacent bands.

It has been verified that when a BWA system operates in a band immediately next to the band in which the FSS earth station operates, the effectiveness of the pass band filter is very limited. Operation of BWA in a channel immediately adjacent to the band used by an FSS earth station may cause interference to receive earth stations through two different mechanisms:
(i) Low Noise Block converter (LNB) saturation; and (ii) unwanted emissions from BWA transmitters that fall within the band in which the FSS earth station operates.

These studies demonstrate that co-frequency operation of BWA systems (fixed and mobile) and FSS receive earth stations in the same geographic area is not feasible. In order to provide protection to FSS earth station receivers, significant separation distances between the stations of the BWA network and the FSS earth station receivers are required.

Given the importance of C-band satellite services to promoting connectivity for all parts of Colombia, it is essential that satellite networks be able to operate without interference. In order to avoid such interference, the standard and extended C-band cannot be made available for terrestrial mobile wireless broadband services on a co-primary basis.

SIA urges the ANE to keep in mind that any upgrade in the status of mobile services in the C-band would create harmful interference for FSS networks, and

---

[8] *See* Nos. 5.430A, 5.432A, 5.432B and 5.433A of the ITU Radio Regulations, Edition 2008.

[9] *See* Report ITU-R S.2199, "Studies on compatibility of broadband wireless access systems and fixed-satellite service networks in the 3400-4200 MHz band" (2010).

that it need not implement all possible allocations in the international frequency allocation table if it is not technically feasible to do so within Colombia.

*4. Do you think that registration of earth stations in Colombia could solve the problem of interference between satellite and fixed service links? If yes, and you use earth stations, what period of time for registration of such stations would be prudent, taking into account that geographic coordinates must be included?*

As discussed above, SIA member companies have extensive experience with methods for managing interference and promoting compatibility of FSS and FS systems in C-band spectrum. For example, in the U.S., licensing or registration of individual earth stations is required to establish rights of protection from interference. A similar approach could be applied in Colombia; however, registration alone would not be sufficient to resolve interference issues. As discussed above, interference in a shared band could be avoided only where operators adhere to coordination requirements and where fixed service operators observe certain operational parameters and limits.

SIA suggests that a period of 30 days would be sufficient to register existing earth station facilities.

In conclusion, SIA appreciates the opportunity to provide input to the ANE on the issues raised in the Consultation Paper and looks forward to continuing to contribute the perspectives and expertise of our membership in the ANE's spectrum management proceedings.

Please address any questions regarding this filing to my attention at pcooper@sia.org or Tel: +1 202-503-1560.

Respectfully submitted,

Patricia Cooper
President
Satellite Industry Association