Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Spectrum for Broadband	)	GN Docket Nos. 09-47, 09-51, 09-137
	)	
NBP Public Notice # 11	)	
Impact of Middle and Second Mile Access on	)	
Broadband Availability and Deployment	)	

COMMENTS OF THE SATELLITE INDUSTRY ASSOCIATION

The Satellite Industry Association ("SIA") hereby comments on the Commission's October 8, 2009 Public Notice[1] seeking information regarding the impact of middle and second mile access on broadband availability and deployment. SIA is a U.S.-based trade association providing worldwide representation of the leading satellite operators, service providers, manufacturers, launch service providers, remote sensing operators, and ground equipment suppliers.[2]

SIA is filing here to highlight a critical oversight in the Notice, which fails to acknowledge satellite networks as an important alternative in providing transport to the Internet backbone efficiently and on a distance-insensitive basis. In any policy decisions regarding

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[1] Comment Sought on Impact of Middle and Second Mile Access on Broadband Availability and Deployment, NBP Public Notice # 11, GN Docket Nos. 09-47, 09-51, 09-137, DA 09-2186 (Oct. 8, 2009) ("Notice").

[2] SIA Executive Members include: Artel Inc.; The Boeing Company; CapRock Government Solutions; The DIRECTV Group; Hughes Network Systems, LLC; DBSD North America, Inc.; Integral Systems, Inc.; Intelsat, Ltd.; Iridium Satellite, LLC; Lockheed Martin Corp.; Loral Space & Communications Inc.; Northrop Grumman Corporation; Rockwell Collins; SES World Skies, Inc.; SkyTerra Communications Inc.; and TerreStar Networks, Inc. Associate Members include: ATK Inc.; Comtech EF Data Corp.; DRS Technologies, Inc.; EchoStar Satellite, LLC; EMC, Inc.; Eutelsat Inc.; iDirect Government Technologies; Inmarsat Inc.; Marshall Communications Corp.; Panasonic Avionics Corporation; Spacecom Ltd.; Stratos Global Corp; SWE-DISH Space Corp; Telesat; ViaSat Inc.; and WildBlue Communications, Inc. Additional information about SIA can be found at http://www.sia.org.

middle and second mile access and broadband policy, the Commission must take into account the ubiquity and cost-effectiveness of satellite-provided connectivity to the Internet backbone.

I. SATELLITES CAN PROVIDE CONNECTION TO THE INTERNET BACKBONE FROM VIRTUALLY ANY LOCATION IN THE COUNTRY

The Notice discusses a number of technologies that can be used for middle mile and second mile transport, mentioning copper wire, fiber optic networks, and terrestrial wireless options, including microwave links.[3] Yet the Notice never even mentions satellite services – despite the fact that satellites today often provide middle mile connectivity to the Internet backbone. This omission is especially surprising given the concerns discussed in the Notice about availability of connectivity to the Internet backbone in rural, unserved, and underserved areas. These are exactly the types of locations that satellite service providers are ideally situated to serve and, indeed, are serving today by providing middle mile connectivity.

Specifically, the broad footprints of geostationary satellites make them particularly well-suited for establishing connectivity from user networks in areas where terrestrial infrastructure is limited. Dozens of satellites operated by SIA member companies have full 50-state coverage and many more offer full or partial coverage of the contiguous U.S. Deploying a single earth station antenna at a broadband user network's aggregation point is all that is required to initiate satellite service, allowing transport of traffic to an Internet gateway anywhere within the satellite's footprint, regardless of the intervening distance or terrain.

Furthermore, deployment of an earth station is a quick and straightforward process. A temporary fixed ground terminal can be installed and begin providing service within a few days. This allows immediate commencement of services pending licensing and installation

[3] *See, e.g.*, Notice at 3, item 1.c. (identifying transport technologies for middle mile connectivity).

of a fixed earth station antenna, which can be completed within a few months. Thus, satellite networks can provide nearly instant infrastructure to areas where terrestrial facilities are limited.

Satellite networks also allow significant flexibility, permitting services to be customized to the requirements of a given user and adjusted in response to user needs. Capacity is scalable and can be either shared or dedicated to a specific customer. A requirement for increased bandwidth can often be met with minimal additional investment in antenna facilities.

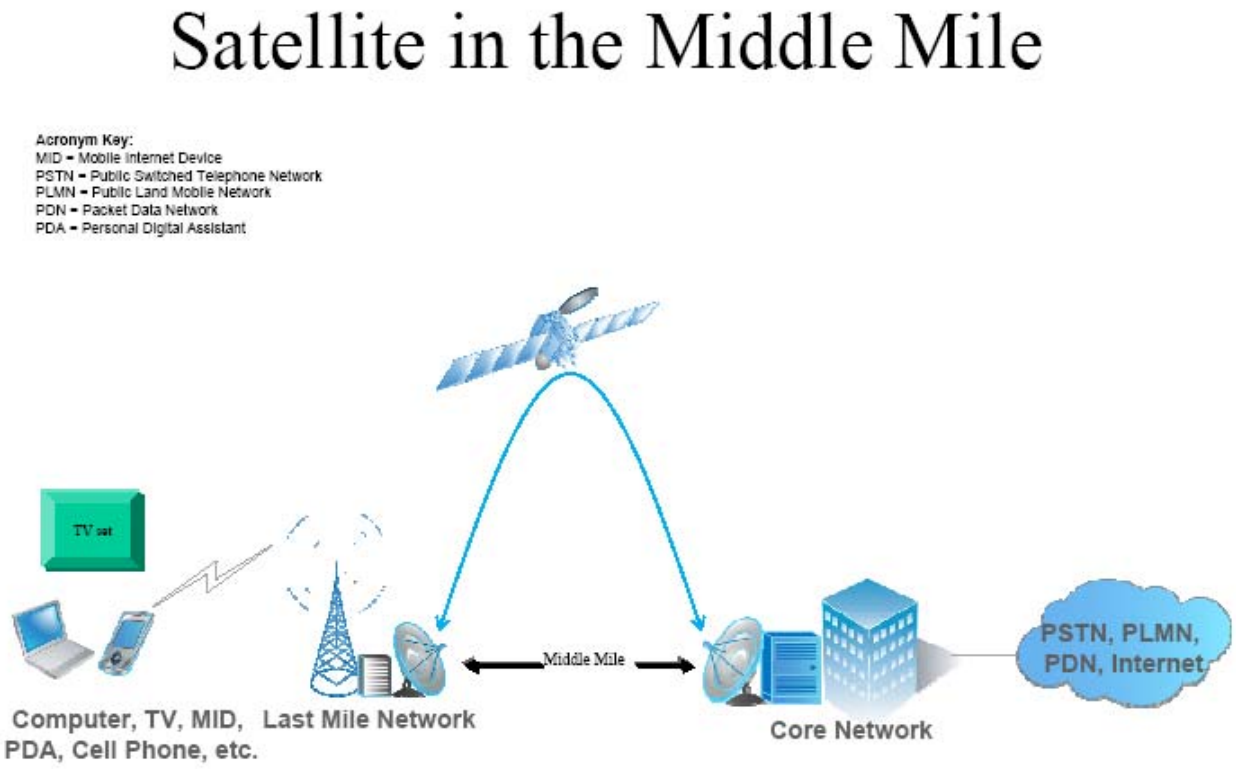
In contrast, extending a terrestrial network can involve substantial new expenditures to bury or string underground or aerial fiber or to deploy multiple new terrestrial wireless links. These construction efforts are also time-consuming, leading to delay in the initiation of new services. Finally, even when a terrestrial network is in place, it may not be possible to expand its capacity without new facility deployment.

Satellite systems, therefore, have significant advantages in providing connectivity to the Internet backbone, especially for user networks located in remote areas. Satellites provide "middle mile" transport to Internet gateways today by linking traffic aggregation points such as ISPs to the Internet backbone. Technological advancements will allow even more efficient use of satellites for such services in the future.

SIA notes that satellites are not typically used to provide a standalone "second mile" transport link as defined in the Notice, between an initial aggregation point and an intermediate point. Instead, a satellite link from the initial aggregation point would typically terminate at a gateway earth station already connected by fiber to the Internet backbone. In these cases, the "second mile" and the "middle mile" are effectively merged.

SIA member companies today provide transport linking remote ISPs and communities – including Native American tribes, Alaskan villages, and other isolated user

networks – to the Internet backbone. The figure below depicts the use of satellite service to provide middle mile connectivity



In short, by using satellites, an Internet backbone connection can be established to a user network anywhere in the U.S., regardless of the availability of terrestrial capacity. The transport service can be initiated quickly and easily, and the network characteristics can be readily adjusted to meet the changing needs of the customer.

II. BECAUSE THEIR SERVICE COSTS ARE DISTANCE INSENSITIVE, SATELLITES ARE AN ECONOMICAL WAY TO CONNECT REMOTE USER NETWORKS

Satellite networks not only have the advantage of ubiquitous nationwide coverage, they also have a cost structure that makes satellite use economical for connections to the Internet backbone from rural, remote, or underserved areas. The underlying costs of a satellite link between two points do not vary based on the distance between them, making satellites the logical choice to connect users in isolated locations to an Internet gateway. As discussed above, the only facility expense to serve a new user network is the modest investment needed to install a new earth station.

A wide range of factors that can affect the costs of extending a terrestrial wireline or wireless network to reach an Internet aggregation point are irrelevant to satellite systems. For example, the expense of laying a new underground fiber optic line depends on right of way issues, terrain factors and permitting requirements, to name just a few. Similarly, the cost of establishing a new wireless link depends on frequency availability, topographical characteristics affecting line of sight, and land use restrictions on tower location, among others. These costs will vary widely depending on where the traffic aggregation point is located and how far the terrestrial network must be extended to get there.

These factors may make it uneconomical to build out terrestrial facilities to serve users located in areas that are rural or remote or have rugged terrain. In such areas where population density is too low to justify the costs of building out new terrestrial facilities, satellite services may be the only cost-effective means today of providing transport to the Internet backbone.

Satellite service will become even more economical as technological developments in the satellite field drive down costs. High throughput Ka-band satellite systems being developed and deployed by SIA member companies will allow satellite-based transport to be offered at much lower prices than are available with traditional C- and Ku-band satellite systems.

The Commission must take into account the availability and costs of satellite services in making policy recommendations in this proceeding. For example, the Commission requests comment on whether subsidies are needed to offset the costs of constructing new middle mile or second mile facilities, presumably referring solely to terrestrial facilities.[4] As the discussion here makes clear, however, satellite services available today and in the future can in many instances be more economical for providing Internet connectivity than building out a terrestrial network. The Commission should take into account all technological options, including satellite, in proposing policies to promote broadband availability.

III. ANSWERS TO SPECIFIC QUESTIONS IN THE NOTICE

With this background, SIA provides the following responses to specific questions in the Notice about the availability and pricing of capacity for middle mile and second mile transport and Internet backbone connectivity.

[4] Notice at 6-7, item 4.g.

1.a. Required Middle Mile Capacity

In order to calculate middle mile transport capacity requirements, a typical network configuration must be defined. Because satellite-based systems are very attractive for rural and underserved areas, SIA is assuming a nominal network consisting of 50 end users on the second mile transport and 250 users on the middle mile transport (*i.e.*, five second mile networks converged onto a single middle mile transport). Based on our observations and analysis, the average "peak busy hour" load on a per end-user basis is in the range of 20 kbps. Some within the industry expect end-user consumption to grow by a factor of 3.5 over the next five years to 70 kbps per broadband user. Thus, in the nominal network described above of 250 broadband users per middle-mile transport, the throughput required today would be on average 5 Mbps (250 times 20 kbps), growing to 17.5 Mbps (250 times 70 kbps) in approximately five years.

1.b. Required Second Mile Capacity

As SIA has explained, satellite systems are not typically used for standalone second mile transport. Instead, traffic being delivered by satellite from an initial aggregation point would be transported directly to a gateway earth station already connected by fiber to the Internet backbone. In the network described above, with 50 users being served from the initial aggregation point, the throughput required for such a service today would be 1 Mbps (50 times 20 kbps), growing to 3.5 Mbps (50 times 70 kbps) in approximately five years.

1.c. Technology Options for Middle Mile Transport

The Notice's discussion of technology options for middle mile transport fails to mention satellite services, which are a cost-effective means of providing middle mile transport in parts of the U.S. today and will be available at even lower prices in the future. Typical pricing

for middle mile transport today using a C- or Ku-band satellite system would be $4,000/Mbps per month for symmetrical service. SIA anticipates that with the deployment of high throughput Ka-band systems, this price could drop to as low as $200/Mbps per month in two to three years. Therefore, in the nominal network described above with 250 users, the approximate service cost for satellite-based middle mile transport today is $20,000 per month ($4,000/Mbps/month times 5 Mbps). Within five years, the middle mile transport cost would be a fraction of that amount – approximately $3500 per month ($200/Mbps/month times 17.5 Mbps). The dramatic reduction in costs per user due to advancements in technology far outpaces the increase in expected end-user consumption.

1.d. Technology Options for Second Mile Transport

Satellite service is also an economical choice for transport from an initial aggregation point to the Internet backbone (combining second mile and middle mile transport), both today and in the future. Using the same methodology as in 1.c., transport from the initial aggregation point of the nominal network described above with 50 users would cost approximately $4,000 per month today ($4,000/Mbps/month times 1 Mbps). Within five years, the cost would drop to approximately $700 per month ($200/Mbps/month times 3.5 Mbps). Again, the savings from improved satellite technology are significant even with higher assumed end-user consumption.

2.a. Factors Affecting Pricing of Middle Mile Transport
and
2.b. Factors Affecting Pricing of Second Mile Transport

As discussed above, pricing for satellite connectivity does not vary based on the distance between the aggregation point and the Internet backbone, and population density is also irrelevant. This makes satellite services very attractive for serving remote, rural, or underserved

locations. Satellite service pricing is not regulated but is constrained by vibrant competition among satellite service providers as well as competition with terrestrial service offerings.

3.b. Factors Affecting Pricing of Connection to Internet Backbone

Users of satellite-based transport also benefit in the prices paid for connection to the Internet backbone. The major satellite service providers' dedicated Internet access ("DIA") ports are located in urban areas. Thus, networks in remote, rural, and underserved areas using satellite transport can enjoy the same, low cost connection to the Internet backbone as is available in highly competitive urban areas. Many satellite service providers are themselves Tier 2 ISPs. As a result, they can offer low cost access to the Internet because of the peering relationships in place between Tier 1/2 network service providers ("NSPs") and ISPs.

4.c. Expenses for Constructing Middle or Second Mile Transport

As discussed above, the only requirement to establish a new connection for satellite-based middle or second mile transport is installation of an earth station at the relevant aggregation point. Once that is in place, transport via satellite to the Internet backbone access point, however distant, is enabled and available at flat per capacity pricing. None of the many factors that affect the costs of terrestrial network build out – and can cause those costs to vary so widely – is relevant to satellite transport.

4.g. Need to Subsidize Construction of Middle or Second Mile Transport Facilities

The Commission should not consider any subsidization to support build-out of terrestrial transport facilities without a full understanding of transport availability and costs that includes satellite networks. As SIA has demonstrated, satellite-based transport is available nationwide, requiring only addition of an earth station to establish a new connection. Pricing for

satellite transport is expected to drop significantly in the next three to five years. In making its policy recommendations, the Commission must consider all transport technologies, including satellites.

IV. CONCLUSION

SIA demonstrates herein that satellite service is a viable and cost-effective means of providing middle mile and second mile transport to user networks in remote and underserved areas both today and in the future. SIA urges the Commission to take this information into account in its policy decisions in this proceeding.

Respectfully submitted,

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Dated: November 4, 2009