Space Data®

TAKING **INGENUITY** TO NEW HEIGHTS

April 13, 2009

Dr. Bernadette McGuire-Rivera
Associate Administrator, Office of
Telecommunication and Information Applications
NTIA
U.S. Department of Commerce
1401 Constitution Avenue, N.W.
Washington DC 20230

Mr. David P. Grahn
Associate General Counsel
U.S. Department of Agriculture
Rural Development
Room 2017, Mail Stop 1423
1400 Independence Avenue, S.W.
Washington DC 20250

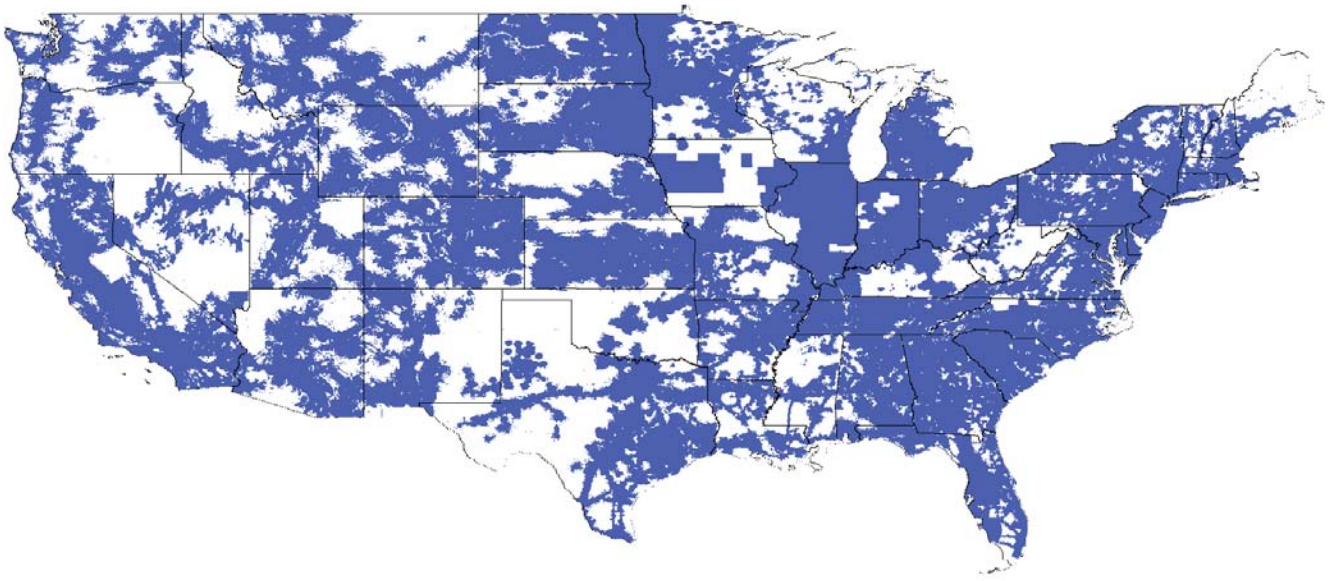
Re: Joint request for information and notice of public meetings ("RFI"), Docket 090309298-9299-01

Dear Dr. McGuire-Rivera and Mr. Grahn:

Space Data Corporation ("Space Data") responds to your "Joint request for information and notice of public meetings" ("RFI"), Docket No. 090309298-9299-01, entered into the Federal Register on March 12, 2009 regarding the establishment grants and loans under the Broadband Technology Opportunities Program ("BTOP"). Our response is organized in question and answer format based upon the questions posed in the RFI.

It has been said that American ingenuity and innovation will cure the current economic ills that create the need for the American Recovery and Reinvestment Act. Space Data is an innovator which is eager and able to be a part of the solution to bringing universal broadband internet access service with 100% coverage to areas which are unserved and underserved, quickly, reliably and economically. We can bring broadband to areas which will otherwise in all likelihood never receive such service, because they are too sparsely populated or geographically difficult to be built-out with terrestrial infrastructure. And we can do this with the same wireless spectrum and technologies in the market today. It is critical that NTIA and RUS deem systems such as this eligible for funding under BTOP.

The map on the top of the next page shows areas of the country that currently have 3G terrestrial wireless service from at least one of the two largest wireless companies, or their roaming partners, as of the end of the 1st quarter of 2009. As the purpose of the BTOP program first is to provide access to broadband service to consumers residing in unserved areas the context of our comments relate to people living in the white areas of the map below. In total about 25 percent of the landmass and about 2 percent of the population and households do not have terrestrial 3G wireless coverage today based on Census Block resolution data. The vexing problem of how to provide ubiquitous broadband access to that remaining 5 million people who live on 25 percent of the land requires innovative solutions that here to fore have not been employed.



Coverage of terrestrial 3G wireless as of March 31, 2009 leaves 5 million people unserved

Space Data is an innovative leader in providing wireless networks for broadband, communications and data services. Space Data's network utilizes an innovative balloon-borne system, a type of stratospheric high altitude platform known as a SkySite® platform, which carries access points. A constellation of SkySite platforms can provide ubiquitous wireless coverage to large regions of the United States. Space Data's proven commercial SkySite network has operated continuously (24/7/365) over the South-Central United States for more than five years, providing data communication services to customers in the oil and gas, transportation and telemedicine industries. Additionally, the Company deploys equipment with military communications protocols for government purposes. Our technology is well suited as part of a highly reliable overall network solution for ubiquitous broadband and voice coverage in geographically large rural areas. In addition, Space Data's technology can be used to assess the current status of wireless broadband access throughout the country, allowing NTIA and RUS to target BTOP funds to areas where it is most needed.

NTIA Questions and Space Data Responses:

1. *The Purposes of the Grant Program: Section 6001 of the Recovery Act establishes five purposes for the BTOP grant program. a) Should a certain percentage of grant funds be apportioned to each category?*

To bridge the Digital Divide that has developed between urban and rural citizens, the BTOP program should strive to provide ubiquitous access to broadband. Thus, we believe the most important goal to be reached by BTOP is broadband access to all persons and geographies nationwide. Because of this, funds should first be allocated to the unserved areas before funding

networks that provide greater broadband choice to citizens that already have some form of broadband access.

4. *Establishing Selection Criteria for Grant Awards: The Recovery Act establishes several considerations for awarding grants under the BTOP. In addition to these considerations, NTIA may consider other priorities in selecting competitive grants.*

We recommend that NTIA create a scoring matrix which awards points to applicants weighted for priority. Priority should be given to proposals that individually or collectively provide ubiquitous service to unserved and underserved areas in the least amount of time and most effective and economic manner possible. Factors below should be prioritized:

- Speed of deployment
- Economic provision of service to the unserved and underserved
- Use of innovative technologies that can provide service where more effectively than traditional terrestrial-based technologies

Speed of deployment

Typically, unserved areas exist because of the long timeframe to build-out areas where customer density is very low, and traditional terrestrial infrastructure is very costly.. Even with public investment, the service is likely to proceed from the served areas to underserved and unserved areas at an extremely slow rate, if ever. Unless speed of deployment is a top priority, it may be many years before these high need areas have access to the broadband services needed for education and business growth. Thus, proposals that *quickly* serve the underserved and unserved populations must receive first priority.

Service to the unserved and underserved

Ubiquitous broadband services will require different technical solutions. For example, within a defined unserved/underserved region which includes several small towns and large areas of very low population density between those towns, the best means to provide service within the towns may be the use of traditional terrestrial network. However, different network architecture may be far more practical to provide service to the areas *between* the towns.

Wired and tower-based wireless systems are necessary and appropriate for many well-populated areas. Satellites are appropriate for extremely low-density geographies but are limited in capacity, cannot be upgraded (designs often lag current technology by a decade or more), and require long lead time and large upfront capital. Between terrestrial and satellites, there are other innovative technologies such as airborne networks that can provide broad, ubiquitous, high bandwidth coverage almost immediately, without the need for expensive terrestrial infrastructure or satellites. In the end, some level of coverage to unserved places and people is infinitely better than no coverage at all or coverage that takes many years to have in place.

Innovation

Providing more economical full coverage across all geographies and to remote populations is an important goal. Even if 100% of BTOP funds are allocated to traditional terrestrial technologies, vast sparsely populated regions would still have no wired or broadband wireless service. Non-traditional technologies exist, however, that could quickly and economically bring broadband services to unserved and underserved areas. Thus, BTOP should ensure that innovative technologies are given higher priority during the evaluation process.

7. *Grants for Innovative Programs to Encourage Sustainable Adoption of Broadband Service: The Recovery Act directs that not less than $250,000,000 of the BTOP shall be awarded for grants for innovative programs to encourage sustainable adoption of broadband services.*

Innovative means "new" and non-traditional with significant value either through cost reduction, or service and feature enhancement. A different approach. A new type of technology.

Widespread adoption of broadband service requires that the service provide attractive performance levels to the widest possible user base and widest possible geography. Additionally, the successful broadband service must be deployed and maintained in an efficient and cost effective manner so that it can be afforded by the public. Thus, the deployed services must be based on technologies and network architecture strategies that are appropriate for the geographic areas they are intended to serve.

Sustainable adoption requires scalability, so that capacity of serving networks can be readily and cost effectively expanded to match increasing numbers of users and increasing per-user throughput demand. Accordingly, selection criteria for BTOP grants should include the degree to which proposals can provide ubiquitous broadband service of acceptable performance (based upon current commercial standards) within designated unserved and underserved regions, the extent to which proposed technology approaches can rapidly and cost effectively meet this goal, and whether those proposed technology approaches can be practically scaled and upgraded to meet growing demand.

The practicality of a particular technology for a specific area (in terms of cost, time required to start of service, and performance provided) will depend on the population density of that area. A network that effectively and economically provides service to a city or town with a population density of 1000 people per square mile may be impractical to serve a truly rural area with a population density of only 5 people per square mile. Similarly, another technology that is effective for serving very sparsely populated areas may lack sufficient capacity to deliver service of acceptable performance and at reasonable cost to relatively high concentrations of users. The process to award BTOP grants must be sophisticated enough to promote this sort of differentiation.

Designated unserved and underserved areas will be composed mostly of vast, sparsely populated areas, briefly interrupted by clusters of more dense communities. It is therefore likely that providing practical, cost effective broadband service within most unserved/underserved regions will require the use of multiple technology solutions. Among these different approaches scalability may (and in many cases will) include transitioning from one technology to another provided such transitions are relatively seamless for the user.

For proposals that use multiple different technical approaches to provide ubiquitous service to an unserved/underserved region, NTIA should give significant consideration to whether the proposed technologies provide a practical approach for all areas of the region. Take, for example, a region in which population densities vary from 1,000 people per square mile to 2 people per square mile. A proposal which offers a technology approach practical for population densities lower than 5 people per square mile and another technology approach practical for population densities greater than 50 people per square mile, but does not offer a practical solution for population densities between 5 and 50 people per square mile, should be viewed far less favorably than a proposal that offers practical technology approaches for all population densities between 2 and 1,000 people square mile. These kind of differences will greatly impact the amount of build-out that can be achieved.

The time required to deploy and commission BTOP-funded broadband services is vitally important for several reasons. Most obviously, the sooner service is available the sooner otherwise unserved users can begin to enjoy its benefits. In addition, a relatively short time to commercial operation will allow quicker measurement of project success in terms of technical performance and user acceptance. This will be particularly beneficial if initial operations can be achieved with a relatively modest capital investment. Finally, a critical objective of the BTOP is to generate economic activity, spurring the creation and preservation of jobs. Proposals which can move rapidly toward commercial operation will be most effective in providing such economic stimulus. Furthermore, projects that will require significant early expenditures for manufactured equipment should be given particularly favorable consideration since creation and preservation of jobs in the manufacturing sector are especially important to economic recovery.

8. Broadband Mapping: The Recovery Act directs NTIA to establish a comprehensive nationwide inventory map of existing broadband service capability and availability in the United States that depicts the geographic extent to which broadband service capability is deployed and available from a commercial provider or public provider throughout each State.

Space Data views broadband mapping as an integral factor in awarding BTOP funds to ensure the deployment of ubiquitous, high quality broadband service, nationwide. To this extent, the broadband map must perform the following critical functions:

1. Provide a means of assessing the current state of broadband access throughout the nation. The effective distribution of resources for the broadband initiative is difficult, if not impossible, without knowing the location of the areas of greatest need. Therefore, it is imperative that nationwide mapping be done (even if at a lower resolution) as quickly as possible to allow decision makers to allocate funding in a timely manner. To this end, lower resolution (tower level) maps of wireless broadband usage can be furnished by airborne platforms within several months of receiving funding. This type of mapping would quickly provide the needed information to accurately proceed with the broadband initiative. This would provide one of the earliest layers of mapping data.

2. Provide a source of feedback as to the broadband initiative progress for both government organizations and the public. The map would provide a single overview of the progress of the broadband initiative. Various “layers,” listed below, could be updated, and turned on and off to show the current broadband coverage, the current progression of service, and the planned progression of service. The map also must include economic data so decision maters can appropriately target areas where funds are most needed.

The layers should include:

- Wired coverage (different layers for different technologies – cable, DSL, fiber, etc.)
- Wireless coverage
- Frequency bands down to the channel level
    - Allocated spectrum
    - Current spectrum use
    - Spectrum allocated but not in use
- Underserved and unserved areas
- Population density
- Economically disadvantaged areas
- Room for additional layers as needed (i.e. disaster area overlays for FEMA, utilities, municipal planning, etc.)

As the mapped data will be used to monitor build-out progress, each data point (tower, landline, fiber link, etc.) should, as appropriate, include:

- Type of service such as cable, DSL, fiber, wireless, etc.
- Frequency and bandwidth
- Timestamp (date/time of the wireless survey, date the tower started operating, etc.)
- Location in latitude and longitude (and circular error probability CEP if the source is wireless) Approximate Receive Signal Strength Indication RSSI if wireless
- Spatial resolution of the wireless scan
- Length of time of the wireless scan
- The service provider, operator, or public safety group
- Open data fields for expansion

Census blocks would provide clear data as to which areas are covered without specifically showing private individual or specific business use. This is especially important when proprietary information to the broadband carrier may be involved. Census block groups should be considered for an initial wireless survey for reasons of timeliness as discussed earlier.

Decision makers must have immediate access to at least a preliminary nationwide map of wireless broadband in order to allocate funding in an appropriate and timely manner. Existing airborne platforms, including stratospheric system, can provide a nationwide, medium resolution map of the desired spectrum use within a few months of receiving funding. This type of mapping would quickly provide the needed information to accurately proceed with the broadband initiative and would provide one of the earliest layers of mapping data. This nationwide scan of frequency use and location can be repeated regularly to assess current wireless services as well as the progress of build-out.

10. Timely Completion of Proposals: The Recovery Act states that NTIA shall establish the BTOP as expeditiously as practicable, ensure that all awards are made before the end of fiscal year 2010, and seek assurances from grantees that projects supported by the programs will be substantially

completed within two (2) years following an award. The Recovery Act also requires that grant recipients report quarterly on the recipient's use of grant funds and the grant recipient's progress in fulfilling the objectives of the grant proposal. The Recovery Act permits NTIA to de-obligate awards to grant recipients that demonstrate an insufficient level of performance, or wasteful or fraudulent spending (as defined by NTIA in advance), and award these funds to new or existing applicants.

Space Data strongly supports the efforts of NTIA and RUS to establish three BTOP funding windows. NTIA and RUS must adhere to these windows if they are to ensure that the awards are made by the end of FY 2010. Further, it is critical for BTOP recipients to regularly report on their progress to ensure BTOP monies are properly directed and used to satisfy the goals of the Recovery Act. Initial applications as well as on-going progress reports should include detailed coverage maps. In addition to timelines, milestones, coverage maps accompanying the proposal must provide details on how the project meets BTOP goals.

Still, haste makes waste. No one wants waste to be a historical tag line on BTOP. That's why the successful distribution of BTOP funds is ensuring that decision makers should have access to at least a high level nationwide broadband inventory map with the characteristics listed above.

Additionally, standards and metrics used to measure proposals should vary (and be proportional) with the size of awards. Proposals should include milestones against which progress can be evaluated. Proposals should include self-defined methods to measure their progress and success. Acceptance of those metrics occurs automatically with award. Proposals, with insufficient, improper milestones and metrics should be denied.

13. *Definitions: The Conference Report on the Recovery Act states that NTIA should consult with the FCC on defining the terms "unserved area," "underserved area," and "broadband." The Recovery Act also requires that NTIA shall, in coordination with the FCC, publish nondiscrimination and network interconnection obligations that shall be contractual conditions of grant awards, including, at a minimum, adherence to the principles contained in the FCC's broadband policy statement (FCC 05-15, adopted August 5, 2005).*

The following general definitions for the terms "unserved area," "underserved area," and "broadband service" are recommended:

Unserved area: A general region where wired or wireless broadband service (as defined below) is not available. This recognizes that satellite-based internet services are available but have significant capacity limitations and impose severe constraints on daily or monthly use by individual subscribers. Ubiquitous service to unserved areas is the top goal for BTOP.

Provision of ubiquitous service depends on putting an economically efficient number of users beneath the footprint of each access point. We believe this is the main reason that terrestrial build-out has been limited in sparsely populated areas. To cover sparsely populated areas requires larger footprints in order that an economic quantity of potential users is available to cover the costs of an access point. This typically means

building higher towers. A mountain top site may be needed to cover sparsely populated areas as it has a larger footprint. However, it may also cover populated areas within its large footprint. With a non-traditional approach, airborne systems can be employed that have very large coverage footprints and thus can cover the population necessary to be efficient even in the sparsest areas. However, it is critical that BTOP allow this type of technological solution just as it would allow a mountain top site that covers a densely populated area within its footprint. It is also critical that BTOP allows solutions such as this, with wide footprints to be eligible even though they cover some areas of dense population that may be covered by other service. The non-traditional service will be self selected by the marketplace to serve the sparsely populated regions.

Underserved area: (a) A region in which broadband service is not generally available, or (b) A region in which the available broadband service(s) regularly suffer from degraded performance (due to excessive loading or other factors) to the point where service quality no longer fits the definition of "broadband service." Number of providers, cost per month, bandwidth, and consumer take rates are other important measures.

Broadband service: Data communications service (using TCP-IP) which provides a minimum peak data speed to the user as well as a minimum average per-user throughput rate. There should be some flexibility to accommodate some performance degradation due to heightened per-user demand under unusual circumstances; however, the minimum peak and average data speed criteria should be met under typical maximum loading conditions without imposing highly restrictive use limits for individual subscribers. "Broadband service" must, at a minimum, include access to the public Internet. It also is important to differentiate between standards for wired vs. wireless service.

From the user's perspective the most important performance criteria for broadband data services are peak and short term average throughput rates that can be reliably provided. Roughly speaking, peak data rates define the apparent speed with which small data transmissions, for example a typical email message, can be sent or received. Short term average speeds determine what sorts of applications, such as streaming media, can be practically supported, and how long it takes to upload or download large files. It should be noted that these thresholds may be different for different types of users (e.g., in a wireless system "acceptable" peak and average throughput rates may be higher for fixed users than for mobile users).

It is generally accepted that for commercial Internet access for typical users "broadband" speeds are much higher for the downlink than for the uplink. Furthermore, for most (but by no means all) non-commercial users perception of performance is more heavily influenced by downlink speed.

In defining minimum data speed requirements for "broadband service" the BTOP should recognize that in technologies employing shared channel resources (primarily wireless) the total channel throughput must be shared by all simultaneous users. This is a different service than is provided by dedicated channel technologies (e.g., DSL) where available throughput is not shared. The primary difference is that in shared channel services maximum practical average per-user data speeds will be much lower than peak speeds, while in dedicated channel services there will typically be little difference between peak and average speeds.

For purposes of advertising and promotion, commercial broadband services often claim speeds of "up to" a (usually impressive) value. However, for purposes of measuring performance in terms of user

experience these "up to" speeds are generally meaningless. Far more important are throughput speeds which can reliably be delivered to each user, particularly at times of typical peak loading.

It is reasonable to anticipate that proposals will call for the use of wireless technologies to serve areas of low population density since provision of wired service to each user in such areas is likely to be prohibitively expensive. Furthermore, in order to achieve economies of scale the wireless services used for sparsely populated areas will likely need to accommodate long radio links which will limit throughput speeds. Therefore, to make service practical and affordable in areas of low population density the BTOP should recognize that of necessity minimum tolerable data rates associated with "broadband service" in those areas may be somewhat modest – say, peak speeds of 500 kbps downlink and 100 kbps uplink, with average speeds of perhaps 200 kbps/50 kbps. In areas of greater population densities broadband service may practically be provided by wired networks or by wireless networks with modest length radio links. Accordingly, minimum downlink/uplink data speeds for "broadband service" in higher density areas should be more like 1 Mbps/200 kbps peak and 500 kbps/100 kbps average. In all cases, however, it should be recognized that over time "broadband service" speed requirements will likely increase to keep pace with increasing norms for societal reliance on the Internet for commerce and education.

RUS Questions and Space Data Responses:

The provisions regarding the RUS Recovery Act broadband grant and loan activities are found in Division A, title I under the heading Rural Utilities Service, Distance Learning, Telemedicine and Broadband Program of the Recovery Act.

1. What are the most effective ways RUS could offer broadband funds to ensure that rural residents that lack access to broadband will receive it?

We recommend that NTIA create a scoring matrix which awards points to applicants weighted for priority. Priority should be given to proposals that individually or collectively provide ubiquitous service to unserved and underserved areas in the least amount of time and most effective and economic manner possible. Factors below should be prioritized:

- Speed of deployment
- Economic provision of service to the unserved and underserved
- Use of innovative technologies that can provide service where more effectively than traditional terrestrial-based technologies

<u>Speed of deployment</u>

Typically, unserved areas exist because of the long timeframe to build-out areas where customer density is very low, and traditional terrestrial infrastructure is very costly.. Even with public investment, the service is likely to proceed from the served areas to underserved and unserved areas at an extremely slow rate, if ever. Unless speed of deployment is a top priority, it may be many years before

these high need areas have access to the broadband services needed for education and business growth. Thus, proposals that *quickly* serve the underserved and unserved populations must receive first priority.

Service to the unserved and underserved

Ubiquitous broadband services will require different technical solutions. For example, within a defined unserved/underserved region which includes several small towns and large areas of very low population density between those towns, the best means to provide service within the towns may be the use of traditional terrestrial network. However, different network architecture may be far more practical to provide service to the areas *between* the towns.

Wired and tower-based wireless systems are necessary and appropriate for many well-populated areas. Satellites are appropriate for extremely low-density geographies but are limited in capacity, cannot be upgraded (designs often lag current technology by a decade or more), and require long lead time and large upfront capital. Between terrestrial and satellites, there are other innovative technologies such as airborne networks that can provide broad, ubiquitous, high bandwidth coverage almost immediately, without the need for expensive terrestrial infrastructure or satellites. In the end, some level of coverage to unserved places and people is infinitely better than no coverage at all or coverage that takes many years to have in place.

Innovation

Providing more economical full coverage across all geographies and to remote populations is an important goal. Even if 100% of BTOP funds are allocated to traditional terrestrial technologies, vast sparsely populated regions would still have no wired or broadband wireless service. Non-traditional technologies exist, however, that could quickly and economically bring broadband services to unserved and underserved areas. Thus, BTOP should ensure that innovative technologies are given higher priority during the evaluation process.

RUS must effectively combat the economics of the traditional build-out of broadband service by subsidizing and incentivizing build-out in sparsely populated areas. It cannot do this with traditional technologies and must look to innovative solutions that exist.

Provision of ubiquitous service depends on putting an economically efficient number of users beneath the footprint of each access point. We believe this is the main reason that terrestrial build-out has been limited in sparsely populated areas. To cover sparsely populated areas requires larger footprints in order that an economic quantity of potential users is available to cover the costs of an access point. This typically means building higher towers. A mountain top site may be needed to cover sparsely populated areas as it has a larger footprint. However, it may also cover populated areas within its large footprint. With a non-traditional approach, airborne systems can be employed that have very large coverage footprints and thus can cover the population necessary to be efficient even in the sparsest areas. However, it is critical that BTOP allow this type of technological solution just as it would allow a mountain top site that covers a densely populated area within its footprint. It is also critical that BTOP allows solutions such as this, with wide footprints to be eligible even though they cover some areas of dense population that may be covered by other service. The non-traditional service will be self selected by the marketplace to serve the sparsely populated regions*2*.

In what ways can RUS and NTIA best align their Recovery Act broadband activities to make the most efficient and effective use of the Recovery Act broadband funds?

RUS and NTIA should align their Recovery Act broadband activities with a common aim of providing ubiquitous access to broadband services. That is, toward the goal of every family and enterprise (within reason) having access to a minimum level of Internet access at affordable cost regardless of their location. To this end, the project foci of RUS (areas that are at least 75% rural and currently lacking adequate broadband service) and NTIA (areas which are currently "unserved" or "underserved") are in fact quite compatible.

In order to reconcile the RUS and NTIA approaches, differentiation should be made between city/town areas within general rural regions and the low population density areas between those cities/towns. For example, in a particular region 90% of the geographic area may be sparsely populated and totally without service, while 70% of the region's population resides in cities/towns where adequate broadband service is already available. From the standpoint of RUS, the region in this case would be considered rural and without sufficient access for economic development. NTIA should classify the region as "underserved," even though most of its population has adequate access to broadband service, because the vast majority of the geographic area, and a not insignificant fraction of its population, has no service. For both RUS and NTIA, the goal of ubiquitous service would be furthered in this case by consideration of proposals that focused exclusively on providing broadband service to the currently unserved areas even if deploying an additional competitive service in the more densely populated towns might be a more commercially attractive investment.

3. *How should RUS evaluate whether a particular level of broadband access and service is needed to facilitate economic development?*

RUS can evaluate the historical build-out of broadband service and model the effect of different access and service parameters against their economic impact. Some service is infinitely better than no service. On the other hand, user demands for speed and service levels are partly dependent on best available levels, or at least conventional levels elsewhere in the nation and around the world. There is likely to continue to be a cost/benefit trade-off between speed and cost, which. This is appropriate and should be taken into account. Additionally, choice and options are important, but secondarily so compared to having any access at all.

A minimum level of broadband access might represent at least a ten-fold improvement over dialup for rural residents, and T1-equivalent rates for rural business as a program baseline. For areas less than 75% rural, an overlay approach to provide basic access for the unserved rural islands should be a priority toward the goal of true geographic ubiquity of access.

In less dense rural areas requirements may be relatively moderate – say, peak speeds of 500 kbps downlink and 100 kbps uplink, with average speeds perhaps 200 kbps/50 kbps. However, it should be recognized that over time the requirements will likely increase to keep pace with increasing norms for societal reliance on the Internet for commerce and education.

4. *In further evaluating projects, RUS must consider the priorities listed below. What value should be assigned to those factors in selecting applications? What additional priorities should be considered by RUS?*

Factors such as consumer choice, funding projects from past successful applicants or projects that are ready to start immediately are laudable criteria and can be considered as secondary criteria. However, traditional solutions will yield predictable and insufficient results. Innovative technologies exist that break this mold. Those should be evaluated seriously to become part of the BTOP funded solutions to extending broadband internet service.

Very truly yours,

/s/ Gerald Knoblach

Gerald Knoblach
Chief Executive Officer
Space Data Corporation