

Before the  
**NATIONAL TELECOMMUNICATIONS AND INFORMATION  
ADMINISTRATION, U.S. DEPARTMENT OF COMMERCE**  
and the  
**RURAL UTILITY SERVICE, U.S. DEPARTMENT OF AGRICULTURE**

In the Matter of )  
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American Recovery and Reinvestment Act of ) Docket No. 090309298-9299-01  
2009 Broadband Initiatives )  
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**Comments of Shared Spectrum Company**

**I. Introduction**

Shared Spectrum Company (SSC) respectfully submits these comments in response to the joint Request for Information (RFI) issued by the National Telecommunications and Information Administration (NTIA) and the Rural Utility Service (RUS) on the implementation of the broadband provisions of the American Recovery and Reinvestment Act of 2009 (Recovery Act). SSC commends both agencies, together with the Federal Communications Commission (FCC) for their expeditious efforts and transparency in implementing the Recovery Act’s broadband provisions, which are aimed at funding the acceleration of broadband deployment in unserved and underserved areas of the country.

In establishing and implementing NTIA’s Broadband Technology Opportunities Program (BTOP) and the RUS grant and loan programs, SSC recommends that the agencies facilitate public and private investment in technological advances that will ensure cost-effective, sustainable, viable, and scalable deployment of broadband service in rural, unserved and underserved areas. While the deployment of current off-the-shelf technologies has short-term appeal and may lead to some more broadband subscribers, the agencies should use a significant

amount of Recovery Act dollars to fund test-bed or proof of concept projects that will show future investors the way forward through innovative and effective ways of getting broadband into hard-to-reach communities.<sup>1</sup> To do this, applicants should be required to show how they plan to integrate advanced technologies into their broadband systems, as NTIA recently did in connection with the Public Safety Interoperable Communications (PSIC) grant program. For proposals to deploy wireless broadband systems, in particular, NTIA and RUS should identify the following three technology priorities: (1) adopt advanced technological solutions; (2) improve spectrum efficiency; and (3) use cost-effective measures.

SSC is a small business that has developed wireless technologies that would achieve these priorities. Specifically, SSC is the pioneer developer of innovative Dynamic Spectrum Access (DSA) technology, which enables rural broadband Internet service providers to access lower-frequency RF spectrum, reducing the cost of network deployment and operation. This will allow service providers, for the first time, to implement profitable business models and will provide consumers and businesses in rural areas with affordable and sustainable service. The company developed DSA over the past nine years on several military projects, building prototype devices and software and conducting field tests, and is now commercializing the technology. SSC's DSA technology enables fundamental improvements to wireless network performance (*e.g.*, improved link range and reliability) and reduces deployment and hardware costs.

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<sup>1</sup> This approach was wisely suggested in recent NTIA testimony. *See* Testimony of Mark G. Seifert before the Subcommittee on Communications, Technology, and the Internet Committee on Energy and Commerce, U.S. House of Representatives at p. 6 (April 2, 2009) (“We view these grants as a test-bed or proof of concept for sustainable, viable, and scalable projects. For example, we encourage partnerships between small businesses, municipalities, and others that may demonstrate nontraditional but effective ways of getting broadband into communities. These grants will not be just for large companies. When the economy recovers, these projects should show future investors the way forward.”)

## **II. Selection Criteria Should Include Consideration of Advanced Technology in Rural Wireless Broadband Systems, Including Dynamic Spectrum Access (DSA)**

As noted in the RFI, the Recovery Act established several considerations for awarding grants, but the RFI also noted that other priorities could be considered in selecting competitive grants. In addition to the Recovery Act's statutory criteria, both NTIA and RUS should encourage deployment of advanced technology in new rural wireless broadband systems. The agencies should also use this opportunity to fund test-bed or proof of concept projects that will show, with relatively nominal upfront investment of public funds, the benefits of incorporating new technologies such as DSA.

DSA enables wireless devices to continually assess the RF spectrum environment to automatically and swiftly adjust RF frequencies to changing RF and capacity conditions. The technology enables multiple networks to utilize a given spectrum band without causing harmful interference to primary, licensed and other users. DSA-enabled broadband wireless devices can use low-cost components to find the best set of frequencies and operating parameters, improving battery life and performance.

### ***A. Technology Priorities***

The agencies should give great weight to proposals, especially for wireless solutions, that meet the following three technology priorities: (1) the proposed system will use advanced technological solutions; (2) if a wireless system, it will improve spectrum efficiency; and (3) the proposed system will be cost-effective. These were important criteria developed by NTIA and the Department of Homeland Security for the PSIC program<sup>2</sup> and are equally applicable in the context of consumer-grade broadband.

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<sup>2</sup> See Public Safety Interoperable Communications (PSIC) Grant Program, "Program Guidance and Application Kit" at pp. 2-3, 42 (Table 3) (Aug. 16, 2007).

These priorities will also lead to sustainable adoption of affordable broadband service because systems meeting such criteria are not likely to fall victim to obsolescence or future spectrum shortages. Moreover, while these three criteria are inherently technologically neutral, they can be applied in the context of wireless solutions to avoid funding projects that merely dump soon-to-be obsolete equipment on the shoulders of rural consumers at taxpayers' expense. Especially in rural and other high-cost areas, NTIA and RUS should be proactively promoting and showcasing different technologies that can, in the long run, provide the most "bang for the buck" and can deliver the service characteristics that best meet the particular circumstances. One such technology is Dynamic Spectrum Access (DSA).

### ***B. Dynamic Spectrum Access Wireless Broadband Solutions***

In implementing the Recovery Act, NTIA and RUS must take into account the fundamental problem that current wireless and wireline technologies will not provide long-term, cost-effective solutions for many rural and high-cost areas. If it was profitable to reach rural households and businesses with current network technologies it would have been done already. The business economics of existing technologies simply do not and will not work. The agencies and potential grantees should therefore be aware of an emerging technology called Dynamic Spectrum Access (DSA) to address this problem, allowing for affordable and sustainable broadband service.

While wireless technologies are generally far more cost effective for serving remote and rural areas, the core challenges are (a) the scarcity and cost of spectrum licenses, and (b) base station infrastructure deployment and operational expenses. Most of the licensed spectrum has already been divided up among a vast array of licensees, many of whom dramatically underutilize their bandwidth. With only a handful of spectrum licenses remaining for

unscheduled future FCC auctions, acquiring spectrum licenses (even in rural areas) is difficult and expensive. Most of the spectrum that has been auctioned is in frequency bands above 1 GHz (where propagation over long distances and through trees is more difficult) and was sold to large, nationwide service providers whose prime interest is serving metropolitan areas. Moreover, building multiple new base stations from the ground up can be cost prohibitive since significant expenses include, among other things: network planning, siting, land acquisition and zoning; new infrastructure equipment (*e.g.*, tower, shelter, cables); and radio equipment. Backhaul also adds substantial costs to network deployments and rise in proportion to the number of base stations.

The solution to these challenges is enabled by a combination of positive developments in the regulatory environment, emerging technology, and the use of existing infrastructure. On the regulatory side, the FCC has taken action to open up spectrum to shared access, starting with its 2003 Secondary Markets initiative<sup>3</sup> and most recently with its decision to permit operation in the TV white spaces.<sup>4</sup> In parallel with this, DSA technology has been developed to enable network operators to efficiently share spectrum with primary users and safely access the white spaces. The combination of these changes allows broadband service providers to access preferred spectrum far more cheaply and efficiently than in the past (in some cases at no cost), which translates directly to the bottom line of wireless broadband access business models.

One of the many benefits of DSA is that it enables cost-effective access to preferred (*i.e.*, lower) frequencies. For example, DSA-enabled unlicensed devices can access the TV white

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<sup>3</sup> See FCC Report and Order 03-113, available online at [http://wireless.fcc.gov/licensing/index.htm?job=secondary\\_markets](http://wireless.fcc.gov/licensing/index.htm?job=secondary_markets).

<sup>4</sup> See FCC Report and Order 08-260, available online at <http://www.fcc.gov/oet/headlines/2008.html>. The current device output power restrictions will need to be relaxed in order for TV white spaces to be effectively utilized in rural settings, but the FCC said that it plans to commence a proceeding on that issue in the near future.

spaces (54 MHz-to-608 MHz) for free. Service providers could also strike deals with 700 MHz licensees to use their spectrum on a cost-effective, leased basis rather than securing spectrum via auction or outright purchase. Access to these lower frequencies allows a service provider to dramatically decrease site deployment costs because RF signals propagate over greater distances at these frequencies, which enables a given area to be covered with fewer base stations and less infrastructure.

Thus, an economical, long-term solution for implementing sustainable rural broadband Internet access networks is to deploy DSA technology, which is the only technology that can use both free and leased spectrum below 1 GHz and, to the greatest extent possible, existing radio towers and infrastructure. Many rural areas have challenging hilly and forested terrain, but also have a base of existing infrastructure (*i.e.*, over 95% of the area is within 15-20 km of an existing antenna structures). This distance range would be inadequate to cover such areas using existing wireless technologies operating above 1 GHz, requiring new infrastructure to be sited, approved and constructed. Coverage would be assured with DSA by using the best frequencies available for customers furthest from their serving tower, and higher frequencies for customers closer to the tower. Achievable link range will allow coverage up to 20 km using frequencies in the lower portion of the TV band, so long as adequate powers are permitted. Furthermore, by utilizing existing towers, service providers can significantly lower deployment costs. DSA serves as an economical backhaul solution as well.

### **III. Conclusion**

Shared Spectrum Company encourages the rapid implementation of the Recovery Act's broadband funding provisions. SSC urges NTIA and RUS to use a significant amount of Recovery Act dollars to fund test-bed or proof of concept projects that will showcase new and innovative technologies. Dynamic Spectrum Access (DSA) is one such technology that can, in the long run, provide the most "bang for the buck," leading to affordable and sustainable wireless broadband service in rural, unserved and underserved areas.

Respectfully submitted,

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