

**SUBMISSION TO**  
**THE NATIONAL TELECOMMUNICATIONS & INFORMATION ADMINISTRATION**  
**&**  
**THE RURAL UTILITIES SERVICE**

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In the Matter Of	)	
	)	
The American Recovery & Reinvestment Act of	)	
2009 Broadband Initiatives	)	Docket No. 090309298-9299-01
	)	
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**COMMENTS OF QUALCOMM INCORPORATED**

Dean R. Brenner  
Vice President, Government Affairs  
QUALCOMM Incorporated  
2001 Pennsylvania Ave., N.W.  
Suite 350  
Washington, D.C. 20006  
(202) 263-0020

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## **EXECUTIVE SUMMARY**

The central goal of the ARRA grant and loan programs should be to extend the benefits of currently available mobile broadband technology to all Americans. The FCC's recent report on the US wireless market found that 92 percent of Americans live within a census block covered by at least one mobile broadband network.<sup>1</sup> The ARRA programs should use the same metric and seek to raise the 92 percent figure to 100 percent. The 8 percent gap is in very rural areas. The laws of economics cannot be repealed—it is far more cost effective to provide mobile broadband in rural areas, as compared to fixed or wireline solutions. Areas not covered by any mobile broadband network should be defined as “unserved,” and the bulk of the funds should go to viable proposals to deliver mobile broadband using today's technologies to such areas. Areas not covered by at least three mobile broadband networks should be defined as “underserved,” and proposals either to upgrade existing networks or launch new ones in such areas should only receive funding after proposals to close the 8 percent gap have been fully funded.

Equally important as ensuring that at least one mobile broadband network covers every American is ensuring that every American can afford mobile broadband-capable devices. BTOP funding to stimulate broadband demand and adoption should include subsidies for mobile broadband-capable devices, including smartphones, netbooks, mobile broadband-embedded laptops, PC cards and USB dongles, and other devices described herein. These devices are used today by tens of millions of Americans, and they enable low cost, mobile access to the internet and broadband applications. Low income Americans must have access to these devices, both to stimulate the economy and so that every American can reap the benefits of mobile broadband.

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<sup>1</sup>Thirteenth Report, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, WT Docket No, 08-27, released Jan. 16, 2009, at Pgs. 9, 73-74.

**TABLE OF CONTENTS**

**Executive Summary . . . . . i**

**I. Background . . . . . 1**

**A. Qualcomm’s Interest. . . . . 1**

**B. The Rapid Proliferation of Mobile Broadband Based on CDMA2000 & HSPA. . . . . 3**

**C. The Constant Push to Upgrade & Enhance Mobile Broadband Technology. . . . . 6**

**D. The Deep CDMA2000 & HSPA Mobile Broadband Ecosystems. . . . . 8**

**II. The Central Goal of the ARRA Programs Should Be To Ensure That 100 Percent of Americans Are Covered by At Least One Mobile Broadband Network . . . . . 10**

**III. BTOP Funding to Stimulate Broadband Demand and Adoption Should Include Subsidies for Mobile Broadband Devices . . . . . 12**

**IV. Conclusion . . . . . 14**

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**COMMENTS OF QUALCOMM INCORPORATED**

QUALCOMM Incorporated (“Qualcomm”), by its attorneys, hereby submits these comments in response to the Joint Request for Information promulgated jointly by the National Telecommunications and Information Administration (“NTIA”) and the Rural Utilities Service (“RUS”) in the above-captioned docket and published in the Federal Register on March 12, 2009.

**I. Background**

**A. Qualcomm’s Interest**

Qualcomm is a world leader in developing innovative digital wireless communications technologies and enabling products and services based on the digital wireless communications technologies that it develops. Qualcomm is the pioneer of code division multiple access (“CDMA”) technology, which is utilized in the 3G CDMA family of wireless technologies. These technologies include CDMA2000 and HSPA/WCDMA, which are technologies used in today’s so-called third generation (“3G”) wireless networks and devices, which enable tens of millions of Americans, in rural, suburban, and urban areas alike, to enjoy advanced, high speed, and ubiquitous mobile broadband services. Qualcomm broadly licenses its technology to over

160 handset and infrastructure manufacturers around the world, who make infrastructure equipment, handsets and other consumer devices, and develop applications, all based on the CDMA2000 and/or HSPA air interfaces.

Qualcomm CDMA Technologies (“QCT”), a division of Qualcomm, is the world’s largest provider of wireless chipset technology. Powering the majority of all 3G devices commercially available today, QCT has also helped lead the diversification of mobile broadband into many new types of mobile broadband-enabled devices, ranging from smartphones, mobile broadband PC cards and USB dongles, mobile broadband-embedded laptops and netbooks, and a wide variety of pocketable computing devices with mobile broadband capability. These types of mobile broadband devices are already used today by millions of Americans, and they provide low-cost, mobile access to the internet and broadband applications.

Of particular note, Qualcomm has been driving the emergence of new low-cost, low-power devices that use mobile broadband networks for wireless internet access and support e-mail, social networking, e-commerce, and distance learning applications. Late last year, Qualcomm formally announced the introduction of a new low cost PC alternative by the name of “Kayak.” See [www.qualcomm.com/news/releases/2008/081112\\_qct\\_kayak.html](http://www.qualcomm.com/news/releases/2008/081112_qct_kayak.html). Kayak consists of a reference design and recommended software specifications, which device manufacturers are using to bring to market a variety of Kayak-based devices.

These Kayak-based devices will use mobile broadband to fill the niche between desktop computers, which normally require wireline or cable for internet access, which is often unavailable in rural areas, and internet-capable mobile broadband-enabled smartphones. Kayak-based devices will include embedded mobile broadband capability, a full featured Web 2.0 browser, and access via the browser to Web 2.0 productivity and other broadband applications.

In addition, Kayak supports both television sets and computer monitors for displays and/or built-in displays. Kayak-based devices will be compatible with a standard keyboard and a mouse for input, and they will include a music player and/or 3D gaming console functionality.

The Kayak reference design uses a Qualcomm Mobile Station Modem which will enable the user to access the internet by using a standardized web browser running at desktop resolutions and mobile broadband networks which employ either 1x EV-DO Revision A or HSPA.<sup>2</sup> Thus, Kayak-based devices will use built-in cellular connectivity and an inherently low cost platform based on high-volume wireless chipsets. Kayak-based devices will enable affordable mobile broadband internet access.

**B. The Rapid Proliferation of Mobile Broadband Based on CDMA2000 and HSPA**

The CDMA2000 and HSPA mobile broadband technologies continue to proliferate rapidly all over this country and, indeed, all around the world. To date, there are 554 wireless carriers in 161 countries who have deployed one of the 3G CDMA technologies. Of those 554 carriers around the world, 107 have deployed EV-DO, 62 of whom have deployed EV-DO Revision A. Another 259 of the 554 carriers have deployed HSDPA, 71 of whom have deployed HSUPA. These broad deployments create enormous demand for EV-DO Revision A and HSDPA equipment, thereby creating economies of scale which bring down prices for carriers and ultimately consumers.

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<sup>2</sup> This pleading may reference 1X EV-DO parts whose manufacture, use, sale, offer for sale, or importation into the United States is limited or prohibited by certain injunctions against Qualcomm. The reference to such 1X EV-DO parts herein is not an offer to sell such parts and should not be misconstrued as assistance in the making, using, selling, offering to sell, or importation of such parts into the United States. Any device utilizing 1X EV-DO parts that are intended for sale to wireless carriers (other than Verizon Wireless) in United States markets must also utilize Qualcomm's hybrid mode alternative solution.

Worldwide, there are over 755 million subscribers using a 3G device. By 2012, the number of 3G subscribers is projected to reach 1.85 billion, and at that time, most 3G subscribers will be using an EV-DO or HSPA-based device. This strong demand creates an ever-expanding market for 3G-based devices, including 3G phones, smartphones, PDAs, consumer electronics devices, and laptops. These devices include more than 645 EV-DO-based devices (118 of which incorporate EV-DO Revision A) and more than 1,400 HSDPA-based devices (242 of which incorporate HSUPA). The sheer number and wide variety of these devices is increasing every day.

Here in the United States, there is fierce competition among the carriers in the provision of mobile broadband services, which has gone hand-in-hand with the rapid deployment and expansion of these mobile broadband networks into much of Rural America. Indeed, American consumers in urban, suburban, and rural areas are enjoying mobile broadband service at ever-increasing penetration rates and data speeds. Moreover, as the Commission found in its annual reports on the US wireless market, U.S. carriers have deployed competing mobile broadband technologies, which has only intensified the competition as the carriers seek to differentiate their networks by providing what each claims to be the best and most advanced high speed mobile broadband network and by offering the most robust and compelling mobile broadband services to consumers.<sup>3</sup>

Accordingly, Verizon Wireless, Sprint, US Cellular, Leap Wireless, and Cellular South, among other carriers, have deployed the CDMA2000 (EV-DO) mobile broadband technology,

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<sup>3</sup> See Thirteenth Report, DA 09-54, released January 16, 2009 at Pg. 66.

and their deployments are expanding every day. Overall, according to the Commission's latest report, EV-DO is available in over 1.5 million square miles across the country.<sup>4</sup>

On the other hand, AT&T has deployed the alternative WCDMA/HSDPA technology, and it is expanding the footprint of its WCDMA/HSDPA network at a very rapid rate. AT&T provides mobile broadband across much of the United States. Initially, AT&T deployed the HSDPA technology, and subsequently, AT&T completed deploying HSUPA, thereby supporting higher speed uploads and downloads. For its part, T-Mobile has also launched HSDPA on its AWS-1 spectrum and now provides this mobile broadband service to an ever-increasing footprint. Thus, the mobile broadband networks based on HSPA/WCDMA technology are also expanding rapidly.

Mobile broadband networks based on these technologies are also operated by smaller carriers. For example, Stelera Wireless provides mobile broadband service via HSPA to rural areas in Texas. Prior to Stelera's launch, these areas either had no broadband service of any kind or very limited service. Likewise, just a few weeks ago, Cellular South announced a major expansion of its mobile broadband service, provided via EV-DO, in Mississippi to cover the Mississippi Delta region as well as counties in Southwest and Eastern Mississippi. Mississippi has the lowest broadband penetration among the 50 states—mobile broadband is critical for that state and the others.

All told, in January 2009, the Commission found in the Thirteenth Report that approximately 263 million Americans live within a census block in which one carrier provides mobile broadband service, as defined by the FCC to include EV-DO or WCDMA/HSPA; 207 million Americans live in a census block in which two or more carriers provide such mobile

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<sup>4</sup> Id. at Pg. 73.

broadband; and, 145 million Americans live within a block in which three or more carriers offer mobile broadband. Thirteenth Report at para. 145. These numbers are literally increasing every day as the carriers constantly expand and enhance their mobile broadband networks.

In addition, the number and variety of devices, including handsets, PDAs, smartphones, and other consumer electronic devices, which incorporate EV-DO or HSPA is also growing by leaps and bounds every single day. These technologies are now embedded in numerous laptop models sold by the major laptop vendors offering consumers another way to access mobile broadband services. Mobile broadband via EV-DO or HSPA is or will soon be available in a whole variety of new consumer electronic devices—personal navigation devices, pocketable computers, mobile computing devices, and the like, all of which could be of tremendous use to residents of rural areas just as much as suburban and urban residents.

**C. The Constant Push to Upgrade and Enhance Mobile Broadband Technology**

As operators began deploying EV-DO and HSPA in its initial forms—EV-DO Release 0 and HSDPA—the ecosystem of vendors who develop and support these technologies were simultaneously working on upgrades to these mobile broadband technologies, and there is a constant and never-ending drive to enhance these technologies which continues to the present and shows no sign of slowing down into the future. The networks rapidly migrated to the first upgrade—EV-DO Revision A and HSUPA.

Today, as noted supra and as the FCC found in its recent report, Verizon Wireless, Sprint, and others provide mobile broadband service to areas in which over 92% of Americans live via EV-DO Revision A, which supports peak data speeds of 3.1 megabits per second (“Mbps”) on the downlink and 1.8 Mbps on the uplink. There should be no question that this technology,

which is fully available today, qualifies as “broadband” for purposes of the ARRA grant and loan programs.

Likewise, AT&T is concluding its network upgrade to HSUPA, which will support peak data speeds of up to 1.8 Mbps to 5.6 Mbps on the uplink. AT&T has also announced that it will upgrade its downlink in the near future to support peak data rates of 7.2 Mbps to 20 Mbps on the downlink. Stelera Wireless already delivers peak download speeds of 7.2 Mbps and peak uploads of 2 Mbps. There should be no question that this technology also qualifies as “broadband” under the ARRA grant and loan programs.

All of the mobile broadband technologies described above are available today. These technologies, and the equipment and devices to deliver it to consumers, are “shovel ready” in every sense of that term. It would truly accomplish the purposes of the ARRA broadband programs to provide funding to ensure that the 8 percent of Americans who do not have access to a network using this technology where they reside will be covered very soon.

But, the EV-DO and HSPA technologies are not standing still. Both EV-DO and HSPA technology are being enhanced substantially, and these enhancements will all be backwards compatible—operators who use EV-DO and HSPA do not require new spectrum to upgrade their networks to the next version of these technologies. The next upgrades to EV-DO and HSPA will result in dramatically faster data rates. EV-DO Revision B enables the aggregation of three EV-DO carriers in one 5 MHz channel. In its Phase I, EV-DO Rev. B will support downloads at a peak rate of 9.3 Mbps and eventually, in Phase II, at 14.7 Mbps, while supporting uploads at up to 5.4 Mbps. This technology will undergo an additional upgrade, now known as EV-DO Advanced, which, if implemented with four carriers, will support downloads of up to 34.4 Mbps and uploads of 12.4 Mbps. These upgrades are all backwards compatible, meaning that they will

not require any new infrastructure. The net result of these upgrades to CDMA2000 will be wireless broadband service with data rates that are ten times faster than even today's fastest EV-DO-based networks achieve.

Likewise, there are substantial upgrades for HSPA technology on its roadmap. The initial version of the technology known as HSPA + (also called HSPA Evolved—HSPA Release 7) will support peak downloads of 28 Mbps and uploads of 11 Mbps. Future releases of HSPA, Releases 8 and 9, will increase the peak downlink speeds, first to 42 Mbps and then to 84 Mbps.

Moreover, Qualcomm and many other vendors around the world are working on LTE, a so-called fourth generation OFDM-based technology. This technology is not yet available, but is under active development. It does require new spectrum, but by auctioning the 700 MHz spectrum last year, the Commission has filled that need.

Thus, there is a constant push to develop and deploy both short term and longer term enhancements to mobile broadband technology. These efforts continue to accelerate in the United States and around the world, and there is no end in sight. For purposes of developing criteria to implement the ARRA (American Recovery and Reinvestment Act of 2009) grant and loan programs, these conclusions are very important: high speed mobile broadband technology is being used today in much of urban, suburban, and rural America; this mobile broadband technology will continue to advance and proliferate; and, providing funding to ensure that at least one network employing this technology covers the area in which every American lives would both stimulate the economy and ensure that all Americans have access to high quality broadband service throughout the entire nation.

#### **D. The Deep CDMA2000 & HSPA Ecosystems**

As noted supra, Qualcomm licenses its technology to over 160 companies, who

manufacture infrastructure and subscriber devices (including phones, smartphones, consumer electronic devices, and the like). These companies span the entire wireless industry. In particular, the number of companies manufacturing devices based on mobile broadband technologies, such as CDMA2000 and HSPA, continues to increase, along with the different types of devices themselves. At last count, 111 companies have manufactured at least one CDMA2000 device, and more than 169 companies have manufactured at least one WCDMA or HSPA device. These devices span all price points—from low end 3G phones to very high end smartphones and other consumer electronics devices.

In particular, eighteen laptop manufacturers now offer at least one laptop model with a form of mobile broadband technology embedded inside, and more than 100 such laptop models have been brought to market. It is becoming increasingly common for Americans, in urban, suburban, or rural areas, to access the internet and a plethora of mobile broadband services through these mobile broadband-embedded laptops or by using a PC card or USB device with 3G connectivity.

Also, as noted supra, whole new categories of devices employing mobile broadband are now available. One example is the Amazon Kindle, an e-book reader which uses mobile broadband to enable wireless downloads of books. Other examples are many different kinds of pocketable computing devices, mobile broadband-embedded netbooks, and the like. Finally, as described supra, Kayak-based devices, which also use this mobile broadband technology, will provide a low-cost, low-power PC alternative, which is especially important for low-income Americans, whether they live in rural, urban, or suburban areas.

Once again, for purposes of the ARRA grant and loan programs, the conclusions from these facts are as follows: the types of devices employing mobile broadband continues to expand exponentially, and it is crucial that all Americans have access to these devices.

**IV. The Central Goal of the ARRA Programs Should Be To Ensure That 100 Percent of Americans Are Covered by At Least One Mobile Broadband Network**

As stated supra, the FCC issues an annual report on the US commercial wireless industry, and those reports establish a benchmark which should be used for purposes of designing the criteria for the ARRA grant and loan programs. In the most recent report, which was issued just three months ago, the Commission found that 92% of all Americans live in a census block served by at least one mobile broadband network, as the FCC defines “mobile broadband network.”<sup>5</sup> To calculate this metric, the FCC defines mobile broadband networks as including those that are based on technologies such as CDMA EV-DO or WCDMA/HSDPA, which meet the FCC’s definition of broadband (peak speeds of 768 Kbps) and which the FCC found typically enable downloads on fully loaded commercial network of 400 to 800 Kpbs.<sup>6</sup> The FCC has used this same metric in its prior two annual reports. Two years ago, the FCC found that 63% of all Americans lived in a census block covered by at least one mobile broadband network, and last year, the figure in the FCC’s annual report was 82%.<sup>7</sup>

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<sup>5</sup>Thirteenth Report, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, WT Docket No, 08-27, released Jan. 16, 2009, at Pgs. 9, 73-74.

<sup>6</sup>Id.

<sup>7</sup> Eleventh Report, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, WT Docket No, 06-17, released Sept. 29, 2006, at Pg. 54; Twelfth Report, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, WT Docket No, 07-71, released Feb. 4, 2008, at Pgs. 8, 68-69.

Qualcomm believes that the ARRA grant and loan programs should be based on this important metric and should be designed to achieve a central national goal: 100% of all Americans should have access to mobile broadband. This is an achievable goal, and it is a goal which all affected stakeholders, and the public at large, could rally around. As shown herein, mobile broadband technology, both in terms of network equipment and devices, is readily available. And, as also shown herein and in the FCC's annual reports, the metric to determine the nation's progress against this goal is also already in place. There is truly no need for a long debate about the definition of "broadband," or the appropriate metric to measure the nation's progress. It is time to devote funds from the ARRA to close the 8 percent gap so that every American has access to mobile broadband.

As a result, the term "unserved" for purposes of the ARRA programs should be defined to mean any area not covered by at least one mobile broadband network, and the term "mobile broadband network" should be defined with the same definition that the FCC uses. The bulk of the ARRA grant and loan funds should be devoted to funding viable proposals which seek to cover the 8 percent of the US population not now covered by any mobile broadband network using the currently available mobile broadband technology.

There is no question that ARRA funding would be vital to close the 8 percent gap. By definition, the 8 percent of Americans who do not live in a census block covered by at least one mobile broadband network live in very remote, rural areas, and while mobile broadband is by far the most cost-effective solution to bring broadband to these areas, the costs even to extend mobile broadband into these areas, especially for back haul, are substantial. Public funding, targeted to cover the costs to extend mobile broadband into these unserved areas, would bring

incalculable benefits for the nation, both by providing short term stimulus for the economy and by ensuring that no American is left without access to broadband.

In addition, the term “underserved” should be defined to mean any area not now covered by at least three mobile broadband networks, again as the FCC defines that term. In the FCC’s most recent annual report, they found that only 51% of the US population lives in a census block covered by at least three mobile broadband networks.<sup>8</sup> Proposals to upgrade networks in underserved areas or launch new networks in such areas should only receive funding after proposals to serve unserved areas have been fully funded. The primary goal of the ARRA programs should be to bring mobile broadband service to the 8 percent of the US which does not have access to any mobile broadband network at all. Only as a secondary goal, to the extent that funds are left over after the primary goal has been achieved, should the ARRA grant and loan programs be used to raise the 51% figure so that more Americans have access to upgraded and/or mobile broadband networks.

**V. BTOP Funding to Stimulate Broadband Demand and Adoption Should Include Subsidies for Mobile Broadband Devices**

As noted in the Joint Request for Information, the purposes of the BTOP (Broadband Technology Opportunity Program) established in the ARRA include not just providing access to broadband service for consumers residing in unserved and underserved areas, but also stimulating “the demand for broadband, economic growth, and job creation.” Joint Request at Page 2, quoting Section 6001 (b) of the ARRA. Low income Americans will not have true access to broadband, and will not demand it, if they cannot afford mobile broadband devices. It is not enough to ensure that one or more mobile broadband networks cover every American. All Americans need access to mobile broadband devices to utilize such network or networks.

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<sup>8</sup> Thirteenth Report at para. 147.

A report recently issued by the Aspen Institute, ICT: The 21<sup>st</sup> Century Transitional Initiative, based on the Institute's 23<sup>rd</sup> Annual Conference on Communications Policy, considered how information and communications technologies could be leveraged to help stimulate the economy and establish long-term economic growth. The Report calls for subsidizing devices, including wireless devices, used to go on line as a way to increase broadband adoption. Report at Page 16. The Report states that there is a consensus among experts that "the lack of a device is a gating factor to broadband access and one that could be addressed effectively."

It is undoubtedly true that for many lower income Americans, the lack of a mobile broadband-capable device is a gating factor to mobile broadband access, and funding from BTOP, as well as the \$250 million set aside in the ARRA to encourage broadband adoption, should be devoted to subsidizing the cost of the full panoply of mobile broadband-capable devices for lower income Americans. Doing so would both stimulate the economy and drive demand for broadband, twin goals of the ARRA.

