White Paper:

Fundamentals of ARRA & the Role of Satellite Internet Providers

Introduction: ARRA & Skycasters

The 2009 US law entitled the American Recovery and Reinvestment Act (ARRA) seeks through its broadband initiatives to provide underserved or unserved citizens with access to the Internet in their businesses, communities, schools and support organizations.

Skycasters, an Akron, Ohio, provider of broadband satellite Internet solutions for businesses, communities, schools and support organizations that need more than traditional terrestrial landlines, is an interested party in assisting the United States in achieving its goals of spreading the availability to broadband internet access.

Several competitive advantages make Skycasters the best choice for underserved or unserved businesses, communities, schools and support organizations to gain broadband access to the internet:

1. Everything in Skycasters' infrastructure—from our teleports and hubs to the network operating center—is company-owned, which allows us complete control over the quality of the services we provide.
2. The equipment at our headquarters and at the customer site is business-grade.
3. Unique in the industry, all Skycasters' product offerings include CIR (confirmed information rate) bandwidth, which permits the customer access to information at peak times. The rest of the industry promises access, but often fails to deliver when the customer most needs it.

This white paper briefs ARRA's funding for broadband Internet access dissemination and support, the degree of federal involvement, how funding distribution occurs, and what opportunities Skycasters may pursue, specifically in the realms of community development, education, and medical delivery.

What is ARRA?

From the VPOTUS. On May 13, 2009, Vice President Joe Biden's first quarterly report of the progress of the February 17, 2009 American Recovery and Reinvestment Act stated that the act had five major purposes:

- "To Preserve and Create Jobs
- "To Assist Those Most Impacted by the Recession
- "To Provide Investments Needed to Increase Economic Efficiency by Spurring Technological Advances in Science and Health Care
- "To Invest in Transportation, Environmental Protection, and Other Infrastructure that Will Provide Long-Term Economic Benefits
- "To Stabilize State and Local Government Budgets in Order to Minimize and Avoid Reductions in Essential Services and Counterproductive State and Local Tax Increases"

Nearly $800 billion is being made available to the following areas:

- $288 B – Tax relief
- $144 B – State and local fiscal relief
- $111 B – Infrastructure and science
- $81 B – Protecting the vulnerable
- $59 B – Health care
- $53 B – Education and Training
- $43 B – Energy
- $8 B – Other

$7.2 B has been allocated specifically for helping achieve national broadband access.

ARRA describes the minimal acceptable broadband access as 5 Mbps. Compare speeds of various applications below:

56 kbps	dial-up
64 kbps	ISDN;
128 kbps	ADSL up;
200 kbps	ARRA 1st NOFA suggested minimum upload speed
384 kbps	ADSL down; Skycasters entry-level plan upload speed
784 kbps	ARRA 1st NOFA suggested minimum download speed
1 Mbps	Wi-Fi
1.5 Mbps	Skycasters entry-level plan download speed
4 Mbps	Token ring
5 Mbps	ARRA benchmark bandwidth for all users
5.5 Mbps	Skycasters max speed for single site
10 Mbps	Cat 3 cable; cable modem
11 Mbps	802.11b Wi-Fi
13 Mbps	Skycasters PTMP community distribution speed
20 Mbps	Cat 4 cable
100 Mbps	Cat 5 cable
108 Mbps	802.11g Wi-Fi
1 Gbps+	Ultrafast Ethernet; fiber

Google, in their 6/8/2009 “Comments of Google, Inc. In the Matter of A National Broadband Plan For Our Future,” recommends a benchmark speed of 5Mbps, but cautions on pages 18 and 19:

> “broadband facts may show that the FCC’s prior “predictive judgments” were overly optimistic. They may show that reasonable wholesale access on competitive terms is not available. The factual examination may even conclude that a lack of vigorous competition – along with considerable barriers to entry and consumer switching costs – enables and even invites discriminatory conduct and/or broadband service provisioning decisions such as broadband capacity caps that would not occur in a competitive arena.”

And that therefore:

"…the FCC should underscore its flexibility to adopt tailored safeguards as a viable proxy for the intense broadband platform competition that has thus far proven elusive."

Google's comments suggest that national distribution of high bandwidth fiber and copper is unrealistic, and that widespread use of satellite to bridge the digital divide will be warranted.

How ARRA Works

While ARRA's first Notice of Funds Available, published July 7, 2009, at BroadbandUSA.gov, defines the workings of ARRA more clearly, we include several prepublication descriptions and responses.

What the US Says. The government's recovery site, Recovery.gov, describes the mechanics of the program:

"…The different agencies -- such as the Departments of Education; Health and Human Services; and Energy -- will decide who will receive award grants and contracts. Sometimes the money will go to a state government; other times, the funds will go directly to a school, hospital, contractor, or other organization. Agencies will then deliver that information to the Recovery.gov team. We will subsequently make the information available on Recovery.gov, and you will be able to track where the money is going. You'll be able to search by state or even by Congressional district; you'll be able to look up names of Federal contractors or other recipients of Federal dollars; and you'll be able to send in comments, thoughts, ideas, questions, and any responses you have to what you find."

Public Response. The federal agency, National Telecommunications and Information Administration (NTIA), invited anyone to submit answers to a set of questions, in hopes that the resulting dialog would help define the parameters of providing broadband to the entire nation. Responses are posted on a public NTIA web site.

On 13 April 2009, Ernst and Young responded publicly to NTIA questions 5-7 regarding ARRA mechanics:

"While final determinations must be made by NTIA / RUS, we note the following considerations that NTIA / RUS should bear in mind:

- In determining grant, loan, loan guarantee or other mechanisms to be employed, the funding agencies should consider the degree of economic advantage conferred by the funds. For example, RUS' traditional low-interest loans may be assumed to confer less economic advantage than an outright grant. NTIA / RUS may wish to consider certain EU guidance, specifically:
  - A competitive tender process is presumed to lessen the risk of unfair economic advantage; while a tender process does not appear to be contemplated here, maximum transparency can afford similar outcomes.
  - The degree of intervention is less (and indeed is not considered state aid) if a "market economy investor principle" or "private investor principle" is applied.[i] While we would not anticipate the contemplated

funding would meet such a market test, we believe it is appropriate to favor mechanisms that most closely resemble the conditions under which a market participant would provide funds.
    - As a corollary, it seems reasonable that mechanisms such as grants (with no repayment obligation) would carry greater constraints than loans (which require repayment and bear interest).
- In determining criteria for expanding computer center capacity and encouraging adoption of broadband services, we believe the key success factor is to explicitly enumerate the qualification criteria and metrics that will be used to measure success. The qualification criteria and success metrics should be tied to each other – that is, a qualifying entity should be one that proposes to meet the targeted metrics, and success should be measured by progress against those same criteria.

Tools that Improve Understanding. Of all the various databases and websites estatblished by all the various governmental and NGO organizations, maps are a very popular way to portray the transparency of funding awards.

Online maps at Recovery.gov (http://www.recovery.gov/?q=content/investments-state) and USDA (http://www.usda.gov/recovery/map/) show total funding by state. The USDA map also provides a database – albeit, not downloadable.

Agencies Involved

Most federal agencies are involved in some aspect of utilizing or distributing funding. Recovery.gov lists update sites for 29 federal agencies at http://www.recovery.gov. From each of those sites, many other agency Recovery update sites are available. For example, of the nine or so departments, services, and offices within the Department of the Interior, six have Recovery sites.

For administration of "broadband initiatives funded by the Recovery Act," the FCC is tasked with coordinating with the USDA and the NTIA of the Dept of Commerce. Broadband initiatives funding includes:

- $4.7 B – for the NTIA's Broadband Technology Opportunities Program
    - Of these funds, $250 million will be available for innovative programs that encourage sustainable adoption of broadband services;
    - At least $200 million will be available to upgrade technology and capacity at public computing centers, including community colleges and public libraries;
    - Up to $350 million of the BTOP funding is designated for the development and maintenance of statewide broadband inventory maps.
- $2.5 B – for the USDA's RUS Distance Learning, Telemedicine, & Broadband Grant & Loan Programs
- $700MM – The Farm Service Agency, "to supplement disaster recovery programs"

Broadband Initiatives Funding Distribution Mechanisms

NTIA Funding Schedule:

o Issuance of Notice of Funds Availability --Mapping	Early Summer 2009
o Issuance of Notice of Funds Availability --General	Early Summer 2009
o Outreach and Grant Guidance Workshops	Summer 2009
o Submission of Grant Applications	July 2009 – September 2009
o Initial Grant Awards	Fourth Quarter 2009
o Second and Third Notices of Funds Availability --General	2010
o Completion of Grant Awards	*September 30, 2010*
o Broadband Map Posted to Website	*February 17, 2011*
o Substantial Completion of all Grant Projects	*September 30, 2012*

Status Report. The NTIA's first quarterly status report of their Broadband Technology Opportunities Program (BTOP), released May 18, 2009, states that in addition to inviting public comments:

> "…consultation with RUS, the FCC, and the States, as well as territories, possessions and other agencies of government, will guide NTIA's implementation of substantially all aspects of the Act from start to finish. The Act specifically allows NTIA to transfer funds to the FCC to support its obligation to produce a national broadband plan.
>
> "NTIA is also seeking close coordination with other Federal agencies responsible for implementing related Recovery Act initiatives, such as the Department of Housing and Urban Development, the Department of Health and Human Services, the Department of Transportation, the Department of Energy and the Small Business Administration. Through constructive coordination, funds and expertise can be leveraged where appropriate—and duplication and redundancy will be avoided to maximize the utility of taxpayer dollars.
>
> "Critical to the successful administration of BTOP will be an efficient yet thorough process for reviewing grant applications. While the substantive review of grant applications will remain within NTIA, the outsourcing of some administrative aspects of the grant process will expedite the award of BTOP grants while maximizing efficiency. NTIA currently is preparing an appropriate Request for Proposal for those services."

Ex Parte Meetings. In addition to public meetings, the NTIA's BTOP Ex Parte Meetings reveal issues with specific requirements of the ARRA legislation. For example, in the May 20th Ex Parte meeting between representatives of ADTRAN, Inc. and staff from NTIA's domestic policy office, ADTRAN comments:

> "in establishing any minimum data rates to define "broadband," NTIA should base the definition on actual, sustainable data rates experienced by the subscriber, not on "peak" or "theoretical maximum" data rates. The paper models these different characteristics for different broadband architectures and establishes a means to

make an “apples-to-apples” comparison of data rates for different broadband access technologies. ADTRAN did not advocate a specific minimum data rate, but suggested that NTIA should look to the ability to support common user applications, which are likely to evolve over time. In addition, because the user experience is important, ADTRAN suggested that NTIA should also include latency as a factor in defining broadband for purposes of this grant/loan program.”

Skycasters couldn’t agree more. The ISP industry as a whole, both terrestrial and satellite, commonly state “up-to” speeds, accompanied by a fine print disclaimer. We feel that use of these “theoretical” speeds in describing the services is misleading to the purchasing public. Skycasters offers all clients CIR, or confirmed information rate, which is a guarantee of bandwidth, regardless of the time of day. That means both VoIP and data transfer can occur consistently and reliably, whenever the customer chooses.

Without CIR, any minimum bandwidth the government requires is rendered irrelevant. The government can mandate speeds “up-to” 5 Mbps, but without also mandating CIR, the user’s broadband experience may be slower than dial-up, while still meeting “the letter of the law.”

USDA’s Role. USDA’s Rural Development will administer ARRA funding through several programs:

- Business and Industry (B&I) Guaranteed Loan Program
- Business Enterprise Grant Program
- Rural Utilities Service Broadband Investment Program $2.5 billion for Loans and Grants
- Community Facilities Direct Loan and Grant Programs
- Section 502 Direct Loan Program
- Section 502 Guaranteed Loan Program
- Water and Environmental Programs

Because the broadband initiatives are considered similar to the Rural Electrification Act of 1936, the Rural Utilities Service may fund programs most directly related to Skycasters’ objectives. The RUS vision is stated as:

“RUS will support the expansion of broadband service in rural areas through financing and grants to projects that provide access to high speed service and facilitate economic development in locations without sufficient access to such service.”

RUS stipulates:

“The ARRA includes the following requirements for broadband projects funded under the bill:

1. 75 percent of the areas to be served by a project receiving funds from such grants or loans shall be in a rural area without sufficient access to high speed broadband service to facilitate rural economic development;

2. Priority shall be given to:

- Projects that will deliver end users a choice of more than one service provider;
- Projects that provide service to the highest proportion of rural residents that do not have access to broadband service;
- Projects that can commence immediately upon approval.

3. There should not be duplication of projects funded under the RUS Broadband Investment Program with the Broadband Technology Opportunities Program at the Department of Commerce.

Timeline
Within 60 days of April 13, 2009, the last day of the public comment period, the USDA intends to publish a series of Notice of Funding Availability (NOFA) in the Federal Register seeking applications for USDA assistance. We anticipate approximately three NOFAs.

Timing on the subsequent NOFAs will be dependent upon results from previous NOFAs and our coordination with NTIA and FCC as we deploy funds."

Skycasters' Opportunities

Point to Multi-Point Internet Access (PTMP). You're in a coffee shop, and you need internet access. Depending on the shop or the location, the service may be offered for a fee, be fee-free, or free for an initial short period. Your fee may be settled directly with your credit card, or via PayPal at the provider's website.

PTMP, coupled with a Wi-Fi antenna, commonly provides the broadband wireless signal to patrons in urban settings. PTMP, when coupled with satellite-backhauled WiMAX, can deliver this type of solution to sparsely populated or rural areas.

Skycasters' satellite technology backhauls PTMP applications that include:

- **Telemedicine:** Wi-Fi for your clinic, or WiMAX for an entire medical campus.
- **Disaster Response**: Swiftly restore comm links for an entire disaster area.
- **Oil, Gas & Mining**: Link hundreds of wireless SCADAs or RTUs to one dish.
- **Business Continuity**: Backup your current terrestrial-linked PTMP solution.
- **Remote Business**: A WiMAX tower services 75 to 100 square miles, perfect for a distant city or resort, or an industrial or military complex.

PTMP solutions built initially with a satellite backhaul can be easily converted to another technology (eg, fiber) when it becomes available, while preserving the infrastructure investment. The satellite solution will remain on-site as a backup for other technologies as they are introduced.

Satellite/WiMAX-based PTMP solutions can be deployed in many situations in fewer than 90 days, and for roughly $300,000 per tower, and $150-$300 per end user.

Partnering. Several aspects of the ARRA legislation encourage implementation via partnerships, including matching funds requirements, and eligibility requirements. While Skycasters' legacy service offering consists of discrete site broadband satellite Internet service to businesses, local or national governments, or remote control of industrial device networks, flexibility to quickly devise and implement innovation and partnership is our hallmark. Remote locations have been the first customers served, but increasingly urban business, governments and other entities are selecting broadband satellite Internet to supplement land-based infrastructure for primary communications or redundancy. A best way to identify these opportunities is working directly with recipients of federal funding or to partner with other infrastructure providers.

Partnering with other infrastructure partners permits Skycasters to consider alternative ways to service the market. The high cost of servicing remote locations with fiber is an incentive to consider immediately servicing those points with satellite, either with the long-term objective of running fiber to that point, or relying wholly on satellite service for the foreseeable future.

Providing communities with wireless service has been an objective since Wi-Fi was invented. However, Wi-Fi's limited range requires multiple points of transmission. The recent introduction of WiMAX, which broadcasts two-way communication capabilities over a 75 to 100 square mile region, indicates that remote communities could be serviced with satellite without requiring the community to hardwire service points.

Partnerships are available at all levels. Fiber, WiMAX, cell-phone, disaster response, educational, and health support organizations all contend with vast distances and redundancy issues related to the fragility of land based solutions. Many such concerns are wrestling with the high cost of communications infrastructure. Broadband satellite internet provides a sensible alternative that can serve both short term and long term objectives.

Partnering with philanthropic organizations or NGOs with communications objectives is another avenue to take. Skycasters is forming relationships with several such organizations to identify synergistic capabilities that can be drawn upon to fulfill Federal objectives. Other types of partnerships that Skycasters is pursuing:

- Local communications consultants
- National VoIP providers
- Fiber installation contractors
- Fiber network management firms
- Wireless or WiMAX providers
- SCADA Manufacturers, installers or network owners

Skycasters Exceeds Matching Funds Requirement. The USDA RUS' Community Connect Broadband Grant Program requires projects include matching funds that must equal at least 15% of the award:

> "The applicant's minimum matching contribution must be for **eligible purposes** and should be equal to 15% of the grant amount requested. All matching funds must be eligible for funding under the grant program. Matching funds are subject to

dollar amount limitations as provided for the Community Center and Operating Expenses. The aggregate total of grant funds and matching contributions can not exceed limitations set forth in regulation. For example, the total amount available to be used for grant and matching funds for the community center is $100,000. The total amount available to be used for grant and matching funds for operating expenses is $250,000.

Matching funds shall be in the form of:

1. Cash for eligible grant purposes, and may include:
    - Bandwidth expenses used to provide Basic Broadband Transmission Services to the Community Center for the first 2 years of operation.
    - Salary expenses incurred in operating the Community Center for the first 2 years of operation.
2. In-kind contributions of eligible grant purposes;
    - Must be new or non-depreciated assets with established monetary values.

Skycasters will provide an equipment subsidy to grant applicant that meets or exceeds this requirement.

Telemedicine. Originally referring to clinical medicine that relied heavily on telephone communications, telemedicine is increasingly broadband-Internet based, including consultations, remote medical procedures, and examinations.

While still frequently consisting of two health professionals reviewing case materials over the telephone, it just as frequently includes terrestrial and satellite broadband connections carrying complex patient data and video-conferencing for real-time consultations across town, or around the world.

Patient self-service and pharmaceutical ordering via the web are forms of in absentia care, or care at a distance, that we are all familiar with. Other forms include live streaming of remote patient monitoring, telesurgery (telepresence that lets a doctor, using robotics and video, perform surgery while physically distant from the patient), critical care applications, VoIP, and non-video patient monitoring.

Sustainability of remote healthcare depends increasingly on providing patient data security. Skycasters' broadband satellite Internet technology supports all the common forms of web security, with the ability to add 3DES and full HIPAA compliant security as required.

The Fed Funds Telemedicine. The following table from the National Rural Healthcare Association, shows that rural healthcare has a much greater degree to improve than does urban healthcare.

A National Rural Health Snapshot	Rural	Urban
Percentage of USA Population**	nearly 25%	75% +
Percentage of USA Physicians**	10%	90%
Num. of Specialists per 100,000 population**	40.1	134.1
Population aged 65 and older	18%	15%
Population below the poverty level	14%	11%
Average per capita income	$19K	$26K
Population who are non-Hispanic Whites	83%	69%
Adults who describe health status as	28%	21%
Adolescents (Aged 12-17) who smoke	19%	11%
Male death rate per 100,000 (Ages 1-24)	80	60
Female death rate per 100,000 (Ages 1-24)	40	30
Population covered by private insurance	64%	69%
Population who are Medicare beneficiaries	23%	20%
Medicare beneficiaries without drug	45%	31%
Medicare spends per capita compared to	85%	106%
Medicare hospital payment-to-cost ratio	90%	100%
Percentage of poor covered by Medicaid	45%	49%

In response to the needs of rural healthcare, on 16 April 2009, the FCC announced:

> "…the approval of funding under its Rural Health Care Pilot Program (RHCPP) for the build-out of five broadband telehealth networks that will link hundreds of hospitals regionally in Iowa, Minnesota, Montana, Nebraska, North Dakota, South Carolina, South Dakota, Wisconsin, and Wyoming. In addition, funding has been approved for the design of a telehealth project in Alaska. Collectively, these projects are eligible to receive $46 million in reimbursement for the engineering and construction of their regional telehealth networks. Funding commitments for these projects were issued by the Universal Service Administrative Company, or USAC, which administers the RHCPP for the FCC."

This is but one indication that far greater broadband satellite Internet opportunities may exist within telemedicine funding than in the broadband initiatives.

Communities. The expense of satellite means it is not the technology of choice where terrestrial solutions are available. But the vastly greater cost of extending land-based wire, glass fiber and point-to-point microwave to remote communities makes satellite communications for backhauling last-mile solutions such as Wi-Fi or WiMAX for critical infrastructure including education and health care far more possible.

"Committed to the Future of Rural Communities," a USDA's publication, addresses the two highest priority aspects of serving rural communities, education and health care information. It says:

> "The USDA Distance Learning and Telemedicine Program makes loans and grants to develop the Information Superhighway in rural America by providing broadband facilities to rural schools, hospitals and medical clinics. This assistance jump-starts the development and deployment of advanced telecommunications services throughout rural America, bringing the latest information and care to rural education and health service providers."

The cost of not having access to education and the Internet market place far outweighs the bandwidth costs of satellite communications. Suddenly, with satellite, communities that have been off the grid, now have access to distance learning, including video and training software, teleconferencing, and social networking.

Education over the Internet is also called, "distance learning." The United States Distance Learning Association (USDLA) describes distance learning:

- "Provides K-12 primarily with courses and electronic field trips
- Supports rural and inner city classes with student enrichment, student courses, staff development and in-service training for teachers and administrators.
- Permits degree students accessibility to material they would otherwise have to travel great distances to obtain.
- Saves companies costs related to effective and efficient employee training."

In Summary: Universal Availability and Speed of Deployment

President Obama said in a 29 May 2009 speech, "America's digital infrastructure … is the backbone that underpins a prosperous economy."

As a nation, we need to make broadband universally available as soon as possible. These two goals, universally available and ASAP, are mutally exclusive if we must wait for fiber. If we want ASAP, we cannot rely on terrestrial solutions alone.

Satellite broadband Internet solutions can do ASAP. Skycasters can get equipment and service to almost any location in the nation in 10 days, and deploy PTMP in 60 to 90 days. Communities can benefit from broadband Internet for businesses, schools and hospitals now, while preparing the infrastructure for the arrival of fiber down the road.

Broad deployment of satellite-backhauled PTMP solutions are the first step towards bridging the digital divide, and delivering on the promises of ARRA.