

Broadband for America: The Third Way

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Summary

This paper discusses open access as one approach to deploying “big” broadband in a way that keeps government out of the business of selling telecom and broadband services while simultaneously creating substantial new business opportunities for private sector service providers. This “third way” also provides a way to solve the difficult issue of network neutrality. Properly designed open access networks are inherently network neutral: they create a level playing field for all private sector service providers without stifling innovation.

The current broadband business model is broken

The current business model for selling broadband is an anachronism that evolved in the early nineties with the introduction of dial up Internet access. At that time, there was little more than email and a few text-based Web pages available on the Internet, and selling bandwidth “by the bucket” worked fine. For something like \$20/month, subscribers got a “bucket of bandwidth” that was defined by some upper limit on that bandwidth, like 14,400 bits/second or 56,000 bits/second. The “by the bucket” business model is simple: if users empty the “bucket,” the service provider refills it--and keeps refilling it every time it empties.

As the Web evolved to include video and audio, and as new services like telephone over the Internet (Voice over IP, or VoIP) became available, more bandwidth was needed to support these uses. Broadband was and still is sold by the “bucket,” but the bucket is now larger, with the DSL bucket typically advertised as something like 1/2 - 1 megabit/second, and cable modem service typically promoted as 2 - 5 megabits/second. We are still buying bandwidth by the bucket.

This business model is fundamentally broken. There is no way to fix it. The broadband business model of selling bandwidth by the bucket is a difficult one for customers – ***a company makes the most money if their customers do not use the service at all.*** Service providers make the least amount of money if customers like the service and use a lot of it. This approach is upside down from most other businesses, and it leads to odd behavior by the service providers that causes them to punish or even disconnect customers that use too much of the service.

From an economic development perspective, this is disastrous. Local businesses should not be punished for using too much of an essential business service. An apt analogy would be if the Department of Transportation told businesses that the tractor trailers they were using were “too big” and henceforth all deliveries had to be made by pick up truck. We know intuitively that this would make the business

In the current broadband marketplace, service providers maximize profits when their customers do not use the service at all.

They make the least when customers use the service heavily. And most customers use the Internet heavily—for business applications, for personal use, and for civic uses.

Without changing the business model for delivering broadband services, access, affordability, and bandwidth needs will not be met.

uncompetitive with businesses in other regions and countries that had roads that supported tractor trailers.

When a discussion about changing the business model comes up, those in the discussion (providers, communities, government leaders) often present or are presented with just two (false) choices:

- Leave it entirely to the private sector, or
- Local government sells retail triple play services in direct competition with the private sector.

The former case—*leave it to the private sector*—is what most communities and regions have now, and especially in rural areas, the cost and lack of variety of broadband services available has hobbled economic development.

The latter case—*local governments selling retail telecom services*—has been tried in a few communities with mixed but generally positive results (i.e. prices decline and services improve). But local government does end up competing directly with the private sector, which can make this approach difficult to pursue.

But there is another option that combines the best of both policy approaches—*a third way*. In the third way, the owner/operator of the telecom infrastructure uses an open access, service-oriented business model; this approach allows many service providers, offering many different services, to share a single, high performance broadband network to deliver those services. Owner/operators of this kind of network could be an incumbent service provider, a competitive service provider, a community-owned enterprise, or a municipality. This approach is very similar to the way that roads are managed: Governments build and manage roads, but don't own or manage the businesses that use those roads to deliver goods and services. In this third way, there is true competitive pricing between competing service providers, and little or no government regulation is required.

The tremendous versatility of the Internet and the underlying technology bases now allows services that used to require their own, separate (analog) road system (voice telephony and TV services) to be delivered alongside other services like Internet access on a single, integrated digital road system.

If we managed overnight package delivery the way we manage telecom, UPS and Fedex would only deliver packages to residences and businesses where each delivery firm had built a private road for their exclusive use. We recognize immediately the limitations of such a business model—few

The third way is a true public/private partnership that limits government to basic infrastructure investments. All services for businesses and residents are sold by private sector service providers. In the third way, government does NOT compete with the private sector.

of us would have overnight package delivery to our homes because the small number of packages delivered would not justify the expense of building a private paved road.

Before the rise of the automobile, most roads were built largely by the private sector. After cars became important to commerce and economic development, communities began building and maintaining roads because it became an economic development imperative to have a modern transportation system in communities.

Before the rise of the Internet, digital networks were built largely by the private sector. As broadband has become critical to commerce and economic development, communities with digital roads are more competitive globally.

Access and Maintenance

- Roads: Historically, roads have been built and maintained by the community for the use of all, especially private firms that want to use them to deliver goods and services.
- Telecom: Duct, fiber, and wireless sites and towers may be built and maintained by the community and/or a neutral owner/operator for the use of all, including private firms that want to use them to deliver goods and services.
- Roads: Access to the community road system is provided by parking lots and driveways, built by property owners, developers and builders.
- Telecom: In the digital road system, access across private property to the community-wide network in the public right of way is provided by duct, fiber, and wireless systems built by property owners and/or developers and builders.
- Residential and commercial developers can begin to install telecom, and turn the duct over to the community or the owner/operator to maintain, just as sewer, water, and roads are built by developers and turned over to the community.

Services

- Roads: The local government uses roads only to deliver government services. Local government does not offer services like overnight package delivery.
- Telecom: Local government uses the digital transport system only to deliver government services. Government does not offer services like Internet access or Voice over IP.

We need digital road systems: a single, high performance network that connects every home, business, and institution to many different services providers.

This creates the largest possible market space, attracts the largest number of providers, and creates competitive pricing.

- Roads: Private sector businesses use roads so that their own cars and trucks can deliver goods and services to customers. Because businesses do not have to build and maintain roads, all businesses benefit directly by being able to reach more customers at less expense.
- Telecom: Private sector businesses use the digital transport system to deliver goods and services to customers. Because businesses do not have to build and maintain a digital road system, all service providers benefit directly by being able to reach more customers at less expense.

Fees

- Roads: There are no road connection fees, and anyone may connect to the road system for free. Governments pay for the cost of maintaining roads largely from those that use the roads. Fees are proportional to use, from taxes on tires and gasoline.
- Telecom: With the third way, there are very modest or no network connection fees; any qualified service provider may connect to the digital road system for a nominal fee and begin to offer services, without any significant capital expense. Network capital and operating costs are recovered by charging service providers a small fee that is based on a percentage of their income from services offered over the system.

The third way keeps services in the private sector, so that government does NOT compete with the private sector, but instead creates a single, shared, community-owned broadband infrastructure capable of transporting any service any business or resident wants to buy.

Broadband and broadband-delivered services

The term “broadband” is often misused as a synonym for Internet access. Broadband properly refers to a high performance network capable of delivering many kinds of services, including access to the Internet, but a properly designed broadband “digital road system” is capable of delivering not just telephone, TV, and Internet, but a wide variety of government, institutional, business, and residential services. These services can include but are not limited to:

- Internet access

The goal is to create a single, shared network—shared by every customer and every provider—just as roads are shared by many vehicles.

In a community, the local government owns the shared road, but it does not own the businesses that use the road to deliver goods and services.

- Virtual Private Network circuits (VPNs) needed to support home-base employees and to connect multiple business locations together as a single network
- IP TV (TV programming delivered via broadband)
- VoIP telephony
- HD (High Definition) business videoconferencing
- Telehealth monitoring
- Telehealth remote diagnostics
- Low latency gaming services
- Business and residential data backup services
- IP-based security monitoring
- Music download services
- Video on demand, with companies like Blockbuster and Netflix as locally attached providers
- Radio on demand
- Video editing over the network
- K-12 distance learning available to sick children
- Home school video and learning networks
- Higher education distance education
- Worker retraining services and learning resources
- Utility meter reading and electric power management for energy conservation
- Grid computing and distributed processing
- Arts and entertainment telepresence to take live performances to remote and rural locations
- Work from home jobs that require low latency, high bandwidth connections to support HD telepresence
- Home-based businesses that require symmetric bandwidth and high capacity connections to support servers, large file transfers, and e-commerce.

Why Open Access Works

The table below outlines some of the key differences between the legacy business model currently used by most incumbent and competitive telecom providers. Open access works primarily because a different business model--many services and many providers using a shared (not private) infrastructure--completely changes the underlying costs, revenue

potential, and income potential for the network. There is no slight of hand or “magic” assumptions associated with open access. Instead, a different business model is applied to solving the delivery of twenty-first century telecom and broadband services--a business model that does not try to continue to use business models based on outmoded twentieth century analog, copper-based infrastructure.

If we managed roads the way we manage telecom, we would not get package delivery at our homes and businesses until Fedex or UPS decided to build a private paved road for their trucks to our house.

Most of us would never get package delivery with that model because we would not send or receive enough packages to justify the expense of building a Fedex-only road to our home.

But that is exactly how we manage telecom.

We can get a package delivered to our door for a few dollars because all shipping companies share a single common road system.

And UPS and Fedex are doing very well financially because the shared model makes the marketplace for shipping bigger, not smaller.

Why The Third Way Works		
Features	Legacy Approach	The Third Way
Basic Concept	Three separate services (voice, video, data) with little or no sharing of network infrastructure.	Very high efficiency achieved by end to end automated service provisioning. All providers share capacity on a single high performance network.
Owner/Operator Involvement	Network owner/operator decides where and when to offer services. Some areas get little or no service.	Owner/operator provides universal access to all locations and transport to any service provider at published rates. Owner/operator provides high performance digital road system that benefits all public and private users. Buyers have a rich set of choices.
Governance	Owned by a private company. Community must accept whatever services are offered.	May be owned by local government, by a community enterprise like a broadband authority or coop, or by a private sector firm. Wide variety of services sold by many private sector companies on the network.
Competition	Little or none in most areas. Cartel-like pricing keeps prices high.	Level playing field creates robust competition. Service providers compete, driving down costs and providing great service to get customers.
Service Options	Limited. Providers typically offer only triple play.	Unlimited. Low cost of market entry and high level of service automation attracts service providers and encourages innovation.

Revenue	Limited by low returns on just a few services.	Unlimited. Revenue directly linked to demand. Increased revenue provides income to maintain the network and increase capacity as demand rises.
Service Area Expansion	Limited to high density population areas. Rural areas at a structural disadvantage.	Unlimited. Expansion completely supported by revenue sharing. Open services networks can become financially sustainable relatively quickly.

Universal access is not just a good idea in concept, it is actually the least financially risky approach to building networks.

When every business and every residence is included in the pool of telecom service buyers, you have created the largest possible market space and have maximized the potential profits of service providers.

Open access works for three very simple reasons:

The business model is different

Incumbents continually indicate that they cannot make a business case to build fiber everywhere, and that they find it especially difficult to make a business case to provide fiber in rural areas. Open access third way networks use a completely different business model that does not have the limitations of existing incumbent business models.

Shared, not private

The business model is fundamentally different because a single network is shared among many providers, rather than having multiple networks, each with only one provider. Multiple networks built to each customer only increases costs. A single shared network reduces costs for all providers and for all users.

Many services

The business model is different because the network is designed to support delivery of dozens or hundreds of services, each paying its fair share of use, rather than just two or three services (i.e. triple play) using a no-growth flat rate fee structure.

Design Principles for an Open Access Network

In the twenty plus years since the first open access broadband networks were begun, we have had the opportunity to observe a wide variety of public and private efforts to expand broadband services in communities. The characteristics in this section reflect the best practices and lessons learned that have been collected from many projects across the United States. Ten principles have emerged that can be used to guide the development of “third way” open access broadband networks.

It is important to note that these networks are inherently network neutral: all providers pay the same rates, using a public rate chart, and because the

network is managed by a neutral third party that sells no services to businesses or residents, the business model achieves network neutrality without the need or cost of regulation.

Universal Access

Every home and business should have the same level and quality of service. This is an economic development imperative as more and more people work and learn from home. Children, young adults, and workers in retraining programs, regardless of where they live, need equal access to learning resources, including high bandwidth video-enriched learning environments and live and streamed video lectures. New telemedicine and telehealth services offer the promise of improving access to health care while lowering costs.

Geographic Equality

Every area of a served region should have the same level and quality of service. Residents and businesses of cities, towns, and rural areas of a served region should be able to access and use the same learning resources and job opportunities as any other part of the region.

Level playing field

Every service provider, small and large, should be able to play by the same rules. The 1984 and 1996 efforts to reform telecom have not entirely succeeded in creating equality of competition. True competition creates more and better kinds of services and lowers the cost of services for all users, including governments and schools. We need as little regulation as possible so that innovation is not stifled and so that small and large firms can compete fairly for customers.

Public/private partnerships

Telecom, because it relies on the use of publicly owned right of way, is inherently a public/private partnership. Local government should partner with existing private sector telecom providers to create a regional digital road system, managed much the same the way that roads roads are managed, which is a mature and time-tested public/private partnership. An owner/operator builds and maintain the digital road system, but private sector businesses are free to use those roads to sell goods and services directly to their customers. Regulation is minimal, and government does not compete with the private sector. Instead, modest public investments create enormous private sector business opportunities.

Fiber and Wireless

Neither fiber nor wireless alone is a complete solution for business, personal, government, and telecommunications needs. Wireless is

It is a myth that it is too expensive to build fiber networks in rural areas.

The small incremental cost of rural fiber can easily be offset by having the right service-oriented business model.

And take rates for services tends to be higher in rural areas.

essential for mobile access to network services like voice and the Internet, but it is not a business class solution and will not support economic growth in a meaningful way. Fiber has the capacity to support any high bandwidth business, government, telemedicine, or entertainment service a community will need for decades, but does not provide mobile access to the network. Communities need both and should pursue obtaining both. The good news is that with the right business model, any community, even in a rural area, can afford a world class, fully integrated fiber and wireless network that will support business attraction and retention.

Community Participation via Partnerships

A community must have some measure of control over its economic future. Achieving this goal requires investments in telecom infrastructure at the local and regional level. Public participation in the development of shared digital roads, managed just as traditional roads are managed, lowers costs for private sector service providers and creates new opportunities for start up companies and incumbent providers that have said they cannot afford to build fiber networks in rural areas.

Local and regional investments in broadband do not automatically mean government is competing with the private sector.

Throughout the United States, local governments and regional government collaborative projects are creating true public/private partnerships that are expanding business opportunities for both existing telecom service providers and helping to create new businesses and jobs. This approach includes helping incumbents telephone, TV, and Internet providers expand their customer base and increase availability of their services to a wider market area.

Multi-service networks

Multi-service open networks create true competition and lower prices. This approach is fundamentally different from the way telecom networks have been built and managed in the past. In a multi-service network, each category of service (e.g. telephone, TV, Internet access, telemedicine, video on demand, and more) has multiple service providers offering many different service packages and bundles at a variety of price points. The community digital road system makes this model easy to implement and to manage, encourages innovation in service offerings, and lowers the price of telecom services because all providers share a single high performance digital road system.

Symmetric Bandwidth and QoS

Upstream and downstream data capacity should be equal, and the network should be capable of providing business class QoS (Quality of Service) bandwidth management. Most current broadband systems restrict upstream data capacity to a fraction of the downstream capacity. These limits on customers chokes off economic development, entrepreneurial activities, and work from home opportunities. Without the ability to provide QoS, business class services cannot be offered reliably to customers. This becomes especially important with respect to support for home-based businesses and work from jobs.

Unlimited bandwidth

Every home and business should have the capacity to use or provide any service from any location. A well-designed network should be capable of delivering any amount of bandwidth to any site in the community. Bandwidth should be defined in terms of the lower acceptable capacity, not the upper limit on capacity. Limits on network capacity and use simply tells some businesses “Don’t put your business in our community.”

Decentralized Design

The robustness of the Internet is derived in large part from the principle that the Internet is not one network, but instead it is a network of networks. Building new, high performance networks that are locally owned and managed and that are firmly vested in communities mirrors the robustness of the Internet itself—a time-tested model without peer. The principle of “biological diversity” applies to the Internet and to this third way approach, as it becomes more difficult for system failures, natural disasters, or cyber-attacks to succeed if there are many independent networks.

Roles and Participants

ILECs and CLECs

Incumbent providers have indicated for some years that their current business model does not support universal access to high performance fiber and wireless networks. In the third way approach, an incumbent provider that opens their network to support many providers and many services can actually enjoy higher revenue and income than is possible with the old, closed, triple play business model. A second option for ILECs and CLECs is to collaborate to build a community or regionally owned high performance network to every residence and business, thereby relieving the providers of the very high capital expenses that they have indicated they cannot afford. This allows them to offer both their existing

Triple play and even quadruple play service models are rooted in the limitations of our antiquated cable and telephone networks.

A modern fiber network can support hundreds of service providers offering hundreds of different and specialized services.

Revenue from each service helps offset the overall cost of building and maintaining the network.

services (e.g. telephone, TV, Internet access) on the new shared network at extremely low cost, along with the ability to reach new customers that they have stated they cannot afford to reach using their existing business models. If local governments are the network owners, those governments sell no services to businesses or residents, so there is no unfair competition from government.

Application and Content Providers

Specialized application, service, and content providers can connect their servers and services directly to local high performance networks and dramatically reduce or eliminate the cost of backhaul. This allows them to offer high quality services and content (e.g. hosted business applications, data backup, IP-based security, movies on demand) at much lower prices.

State Governments

State governments can help encourage and support the development of the inter-community networks that provide regional network resiliency and redundancy. States can also provide a revolving broadband loan fund to support the development of local and regional open access, service-oriented networks. By taking a small, negotiated equity stake in these networks in return for start up financial capital, over time, states will enjoy a new stream of revenue that can be used to expand build out and/or provide contributions to the state general fund.

Federal Government

The Federal government can help support the development of very high performance inter-state fiber routes that provide next generation connectivity. The Federal government can also accelerate local build outs by providing financial support for early phase planning and some limited access to start up funds. Little or no regulation is required because network neutrality is built into the third way open access, service-oriented business model.

Local and Regional Governments

Local government and regional consortiums (e.g. authorities, joint municipal agreements, coops, etc.) play a key role by taking on the leadership role in getting these new networks built. Ownership options are plentiful, and local leaders do not have to take on direct management responsibility. Time tested, reliable ownership and governance models like authorities and coops provide the right level of local control without unduly burdening local officials and without requiring the use of tax dollars to build these networks.

Why should communities invest in telecom infrastructure?

Prices go down for Internet access, for telephone service, for TV, and for other services on the network.

Communities that have built service-oriented open access networks are seeing price drops of 40% to 70%.

Lower costs for telecom services attracts new businesses, helps retain existing businesses, helps create jobs, and enables local governments and school systems to cut costs.

Businesses

Businesses will see dramatic reductions in the cost of telecommunications; open access, service-oriented third way networks already in operation in the United States (e.g. nDanville, The Wired Road, Utopia) are achieving rate reductions of up to 70%. Entrepreneurs and start up businesses will have more capital to invest in the core business and in job creation, rather than in business overhead.

Institutional Users

Institutional network users are a key part of the success of the third way. Demand aggregation, by creating a single large unified market space (i.e. universal access), provides the financial incentive for service provider competition. It is critically important that K12 schools, colleges and universities, state agencies, public safety agencies, and health care facilities NOT create separate private networks restricted to a small set of specialized users and locations. Private institutional networks, ironically, raise prices for other users in the community, especially the business sector, by removing major “anchor” tenant and large bulk buyers from the market space for telecom services. Instead, institutional users play a critical early role in the development of these networks by committing to buy services like Internet and voice “on network,” as well as using the network to build private virtual networks (VPNs) to meet their own institutional needs.

Long Haul and Middle Mile Providers

Many areas of the country lack good fiber routes in and out of their respective regions, in large part because of the lack of market aggregation—it is too expensive for these middle mile and long haul providers to reach a critical mass of inbound and outbound traffic. But local open access networks, by aggregating demand and creating a single large pool of buyers, creates the financial incentive for dramatically increased private sector investment that will in part or in whole solve backhaul and middle mile access issues—and this can dramatically reduce the financial burden on state governments and the Federal government to assist with this need.

Citizens

Broadband services of all kinds are transforming work and family life, and one of the biggest changes brought by the Internet is the ability to work from home, either part time or full time. In fact, it is now common to run businesses from home. To get the most benefit from this change, it becomes extremely important to be able to deliver business class services with symmetric bandwidth and guaranteed QoS to any location, residential or otherwise, on a third way network. Increasingly, workers and business

people are making relocation decisions based on quality of life and affordable broadband availability, and rural communities with great quality of life can breathe new life into their downtowns and neighborhoods if business class broadband services are available everywhere.

Summary

Communities can't wait any longer. Virtually all businesses, large and small, now use the Internet. Affordable access to telecom services is now a business essential, and many kinds of new job opportunities require broadband. Open access service-oriented networks, using a new and different business model and a new and different network architecture, offers existing incumbents and network operators an opportunity to overcome the inherent financial shortcomings and network inefficiencies in their existing networks. For communities that choose to invest in telecom as basic infrastructure, open access networks provide a robust and financially sustainable business model that uses a time-tested model for government infrastructure investments--an approach that not only does not compete with existing private sector providers but also creates new private sector business opportunities and helps to create new jobs locally.

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Cohill writes regularly on his blog about broadband planning and policy issues.

www.designnine.com/news

An electronic copy of this paper is available at:
<http://www.designnine.com/broadband-the-third-way.html>

Open Access Networks

The Wired Road
www.thewiredroad.net

nDanville
www.ndanville.net

Palm Coast FiberNET
<http://www.ci.palm-coast.fl.us/PalmCoastFiberNET/>

Utopia
www.utopianet.org

About Andrew Cohill

Dr. Andrew Michael Cohill is the President and CEO of Design Nine. He is a broadband architect with an extensive background in broadband network design and broadband planning. Cohill has an international reputation for his work advising communities on broadband and telecommunications issues. In the United States, he has worked with clients across the country, with recent work in Minnesota, South Carolina, New Hampshire, Virginia, New Mexico, Pennsylvania, and Texas.

He was the Director of the world renowned Blacksburg Electronic Village (BEV) at Virginia Tech from 1993 to 2002. In the nineties, Blacksburg became widely known as the "most wired community in the world," with more than 87% of the town's residents using the Internet by 1999.

He is a widely published writer, and author and co-editor of the popular book about Blacksburg (*Community Networks: Lessons learned from Blacksburg, Virginia*). His numerous papers and reports are widely circulated, and his technology news blog (www.designnine.com/news) has thousands of readers per month. He is a popular speaker on community broadband issues, economic development, and technology because of his clear explanations, shrewd insights, and engaging manner.

Design Nine has become one of the best known broadband planning and broadband project implementation firms in the U.S. The company specializes in municipal and community broadband planning and build outs; Danville, Virginia (www.ndanville.net), Palm Coast FiberNET (<http://www.ci.palm-coast.fl.us/PalmCoastFiberNET/>) and The Wired Road (www.thewiredroad.net) are three of the firm's recent community broadband projects. Design Nine works nationwide on broadband planning and broadband network implementation for public and private sector clients.