The Game of Gigs

In its first three years, the Gig.U initiative achieved notable successes, learned some lessons – and helped set the stage for the gigabit race taking place across the United States today.

By Blair Levin, Ellen Satterwhite and Denise Linn / *Gig.U*

Gig.U began three years ago when three dozen research university communities came together to accelerate the deployment of next-generation broadband networks to enhance educational and economic development. We believed that eliminating bandwidth as a constraint to innovation would lead to economic and social progress for these communities and accelerate the discoveries that university communities create for the world.

We also believed market forces by themselves would not deliver such networks on a timely basis, and therefore we had to innovate in how we approached network deployments. We saw our task as creating test beds; what we were attempting to do – organize communities to stimulate private investment to upgrade or overbuild existing networks – had few precedents. This required openness to different models, some of which we hoped would succeed and some of which we thought likely to fail. Taken together, those efforts would create a map that all communities could use to create the next wireline upgrade and achieve bandwidth abundance.

We have made enormous progress. Through a combination of efforts, scores of American communities, including more than a dozen Gig.U communities, are now deeply engaged in deploying such networks. Many of these, such as our own efforts, were initiated by communities.

Now, however, in a radical change in the last 12 months, multiple service providers are initiating their own efforts. When Gig.U started, the fundamental strategy of incumbent Internet service providers was harvesting past investments in bandwidth-constrained networks. Now, numerous providers, including some incumbents, are developing strategies to deploy networks capable of providing abundant bandwidth and challenging others to enter a new, growth-oriented "Game of Gigs." The interplay between provider-initiated and community-initiated efforts provides both enormous momentum and a variety of choices – precisely what we were hoping for when Gig.U started.

It would be a mistake, however, to believe that the United States has passed the inflection point at which the accelerated progress toward a critical mass of communities with world-leading broadband networks is inevitable and irreversible. History is littered with efforts in which initial progress was reversed because of a failure to persevere.

Further, the market forces that favor allocating scarce bandwidth on legacy networks instead of deploying abundant bandwidth on new networks are still strong and, in some ways, gaining strength. We think the years 2015 and 2016 will prove decisive in achieving our goal but only if we and others spend this year with our foot on the accelerator.

The challenge from a public perspective is to make sure the Game of Gigs extends as broadly as possible. Gig.U welcomes the initiative shown by many in the private sector to accelerate the

game but welcomes even more the community leadership that understands it should not be a passive recipient of the game's benefits.

REGIONAL STRATEGY: NORTH CAROLINA

One concern raised by potential providers in the national Gig.U RFI was that a lack of scale in any individual community would make the economics of deployment difficult. We considered a national RFP, but difficulties in coordinating with so many different entities under so many different state laws made that effort impractical.

Gig.U's North Carolina members, however, appear to have found a middle ground that achieves scale and enables coordination. They created the North Carolina Next Generation Network (NCNGN) project, a collection of four universities (Duke, NC State, UNC Chapel Hill and Wake Forest/Wake Forest Baptist Medical Center) and six municipalities (Carrboro, Cary, Chapel Hill, Durham, Raleigh and Winston-Salem) that shared knowledge and resources to release a single RFP. It articulated the region's objectives and sought vendors to build and operate a gigabit fiber network. The RFP, released in February 2013, attracted eight responses.

The group quietly negotiated with the eight respondents, worked through a number of issues with AT&T and developed a model agreement for the elected officials in the individual municipalities to consider. The communities improved the economics for AT&T by accepting the uniform terms of the model agreement except for minor changes that either were required by local law or were more favorable for AT&T. The NCNGN members will continue to work with one another, AT&T and local stakeholders to expand access for community sites, public housing and small and medium businesses.

Since signing agreements with the six NCNGN communities, AT&T has announced plans to bring gigabit connections to the Charlotte and Greensboro metro areas. Google Fiber is also eyeing the Raleigh-Durham and Charlotte metro areas for gigabit infrastructure, as is Shelby-based RST Fiber. In response to the increasingly competitive landscape, Time Warner Cable recently named Raleigh and Charlotte as two of seven metro areas where TWC Maxx service will be deployed in 2015, allowing customers to receive up to six times faster Internet speeds and entertainment enhancements. Though TWC won't offer gigabit speeds, the significantly faster speeds will be a drastic improvement over its current offerings.

PUBLIC-PRIVATE PARTNERSHIP: CHAMPAIGN-URBANA, ILL.

At the end of May, UC2B – a nonprofit consortium led by the university communities of Urbana and Champaign and the University of Illinois – announced a new model for gigabit connectivity. It would pursue a public-private partnership with iTV-3, an Illinois-based ISP.

UC2B leveraged federal grant money and local matching funds to construct a high-speed fiber network, first building out in low-income, low-adoption areas. iTV-3 will now operate the existing UC2B network and extend its service to even more residents, institutions and businesses. Though the cities will not have control over the network or collect the revenue, UC2B does not have to absorb the risk of costly infrastructure investment.

Under the agreement, iTV-3 will

- invest tens of millions of dollars to build out a gigabit fiber optic network in Champaign-Urbana while operating and maintaining the existing UC2B network and providing service to existing customers.
- offer wholesale access on the network to competing companies, including making unused fiber ring capacity available to competing companies to offer service where iTV-3 has not deployed fiber to the home within five years.
- contribute to UC2B's community benefit fund, which will promote digital literacy and adoption.

NONPROFIT MODEL: CLEVELAND, OHIO

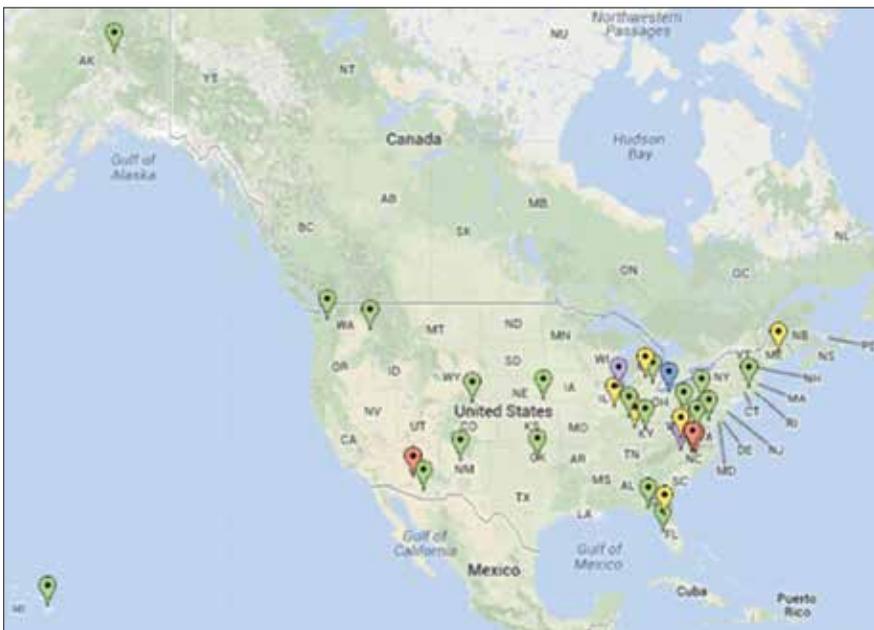The inspiration for Gig.U was the gigabit beta block created around Case

Figure 1: Gig.U member map, summer 2014. Cities in red are negotiating with two providers, cities in purple are negotiating with one provider, cities with independent projects are in yellow, cities with independent projects and negotiating with a provider are in blue and others are in green.

The Greater Lansing Gig.U Coalition created a Gigabit Ready Certified Building program. Now a local ISP is bringing 1 Gbps services to gigabit-ready buildings.

Western Reserve University. Cleveland continues to lead with experiments related to improving broadband services. One critical driver of the experiments is OneCommunity, a nonprofit fiber network started by Lev Gonick, former CIO of Case Western University. OneCommunity serves key anchor institutions in northeastern Ohio (government offices, schools, universities, hospitals and so forth) and collaborates with the community on broadband adoption projects and digital literacy training. Currently, city officials in Shaker Heights are considering a partnership with OneCommunity to extend fiber into its commercial districts and attract more economic development.

OneCommunity also formed a for-profit subsidiary, Everstream, that will provide high-speed Internet to businesses and return revenues to feed the organization's nonprofit programming. OneCommunity also just released the Big Gig Challenge, a prize of $2 million for communitywide fiber network construction projects.

UTILITY PARTNERSHIP: GAINESVILLE, FLA.

Even if a city explores a public option for gigabit service, it doesn't have to go all in right away. Gainesville Regional Utilities (GRU) has connected businesses, community anchor institutions and large apartment complexes in an innovation district around the University of Florida to 1 Gbps, 100 Mbps and 10 Mbps speeds, but it has not connected most residences yet. Its goal is ultimately to bring a gigabit to all of Gainesville. Recently, GRUCom extended its gigabit offering to all student apartments (37

complexes with roughly 6,000 Ethernet ports) to which it provides service in the Gainesville area.

As Community Broadband Networks reported, "GRUCom brings another key benefit of community networks to Gainesville – local control accommodating local needs. When the music streaming service Grooveshark, started by two UF students, took off, its need for bandwidth exploded. Director Ted Kellerman recalls having regular discussions with Grooveshark's founders during those times and making arrangements to get them the bandwidth they needed without breaking their startup budget."

GIGABIT-READY CITY: EAST LANSING, MICH.

The Greater Lansing Gig.U coalition, which comprises the Prima Civitas Foundation, the Lansing Economic Area Partnership, Connect Michigan, Michigan State University, nonprofits, commercial property managers and many regional partners, united under a "Gigabit Ready" effort with the goals of creating an attractive environment for existing ISPs to upgrade and of lowering barriers to entry. To align incentives and capitalize on its partnership with local development companies, the Gigabit Ready Coalition created a Gigabit Certified Building Program similar to the well-known LEED program.

Now, local ISP Spartan-Net and property manager DTN Management Co. have partnered to bring gigabit speeds to residences and apartment complexes in East Lansing. The efforts are focused on students and faculty, for whom broadband performance levels are a critical selling point.

PILOT INNOVATION ZONE: BLACKSBURG, VA.

Blacksburg is home to a free gigabit Wi-Fi network that covers about 40 percent of the downtown area. Initial funding to install the fiber at two locations was modest – about $90,000 – and was collected through a crowdfunding campaign started by TechPad, a local coworking and hacking community. Though the future of the network is unclear, the first few years of the project were meant to gauge local demand for faster speeds and nail down a sustainable funding model.
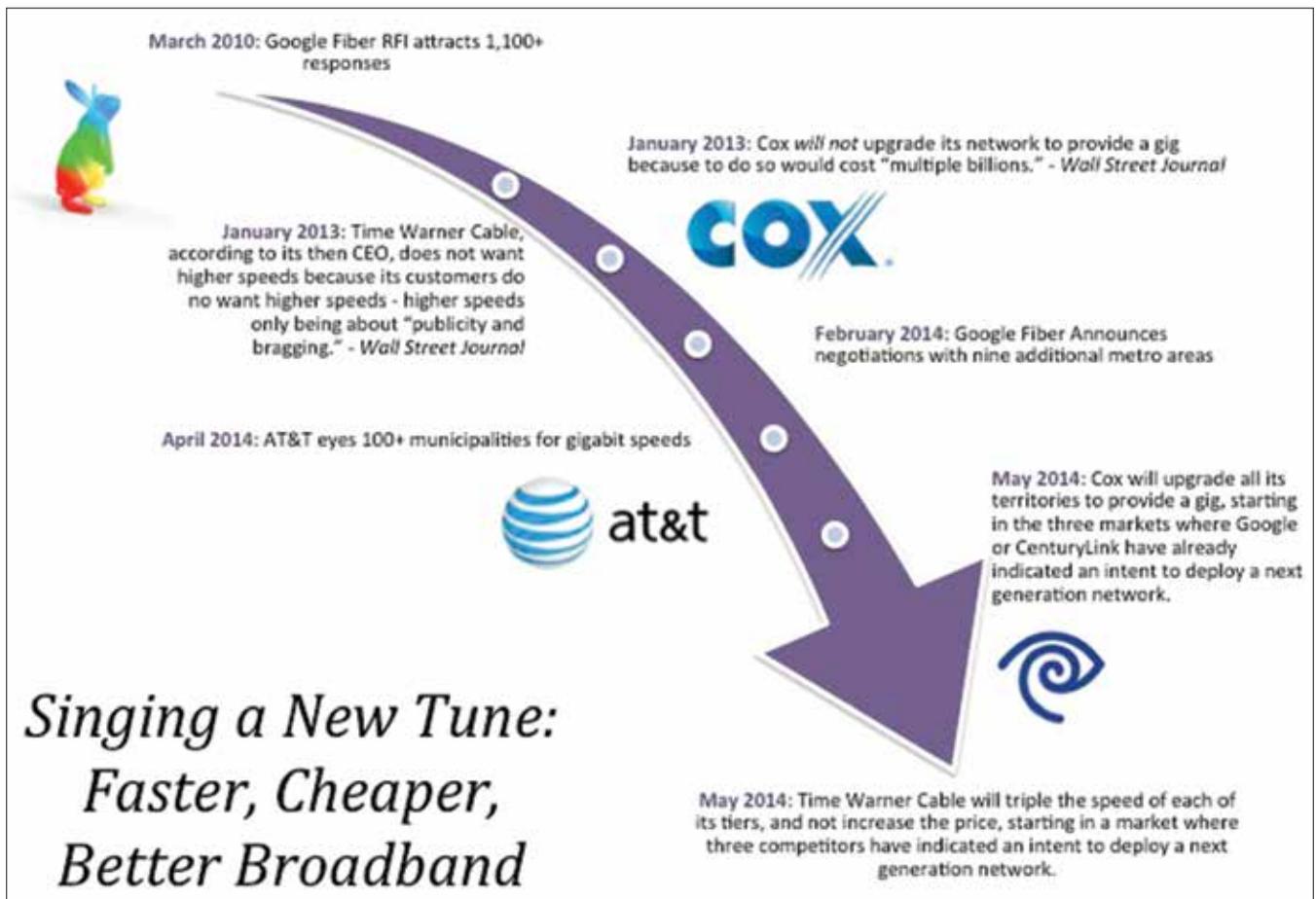
REDUCED DEPLOYMENT COSTS: LOUISVILLE, KY.

Louisville, home to the University of Louisville as well as such information-based enterprises as Humana and UPS WorldPort, used an RFI and RFP to gain the attention of potential service providers and gain insight into the options for improved bandwidth. The city stated its goals as follows:

- Create a world-leading, gigabit-capable network across the city or in targeted commercial corridors, as well as in residential areas with demonstrated demand, to foster innovation, drive job creation and stimulate economic growth.
- Provide free or heavily discounted 100 Mbps (minimum) Internet service over a wired or wireless network to underserved and disadvantaged residents across Louisville.
- Deliver gigabit Internet service at prices comparable to those in other U.S. gigabit fiber communities.

Citizens put up a fiber map that allows residents to indicate their interest in fiber, which the city hopes will encourage ISPs to build out fiber-based networks.

The process attracted proposals, and the Louisville Metro Council approved 20-year franchise agreements with Louisville-based BGN Networks, London-based SiFi and New York–based FiberTech (which has a residential partnership with Greenlight Networks). Each company has a

March 2010: Google Fiber RFI attracts 1,100+ responses

January 2013: Time Warner Cable, according to its then CEO, does not want higher speeds because its customers do no want higher speeds - higher speeds only being about "publicity and bragging." - *Wall Street Journal*

January 2013: Cox *will not* upgrade its network to provide a gig because to do so would cost "multiple billions." - *Wall Street Journal*

February 2014: Google Fiber Announces negotiations with nine additional metro areas

April 2014: AT&T eyes 100+ municipalities for gigabit speeds

May 2014: Cox will upgrade all its territories to provide a gig, starting in the three markets where Google or CenturyLink have already indicated an intent to deploy a next generation network.

Singing a New Tune: Faster, Cheaper, Better Broadband

May 2014: Time Warner Cable will triple the speed of each of its tiers, and not increase the price, starting in a market where three competitors have indicated an intent to deploy a next generation network.

Key moves in the Game of Gigs

different plan with different geographic targets. The city will not offer tax incentives or contribute financially to these fiber networks, but it continues to provide technical assistance to all firms pursuing the deployment of service in Metro Louisville.

RECENT GIG.U INITIATIVES

On September 15, three cities in Connecticut announced an RFP for gigabit services, inviting other Connecticut cities to join. Later in September, the towns of Bryan and College Station, Texas, announced that their RFP process had resulted in the incumbent cable company's agreeing to a dramatic upgrade of its network to be able to offer a gig. The cities are still in discussions with other respondents to the RFP.

Gig.U communities Lexington, Ky. (home to the University of Kentucky),

and Albuquerque, N.M. (home to the University of New Mexico), are both beginning the process of issuing requests for proposals.

GOOGLE FIBER

Though the Gig.U efforts were largely community-initiated, a world-leading broadband network takes at least two partners – a willing community and an interested provider. Fortunately, the interest of service providers has taken a quantum leap since Gig.U started, dramatically accelerating the opportunities for communities that wish to have gigabit-capable networks.

There is no doubt that the prime force driving the Game of Gigs has been the Google Fiber effort, which has announced deployments in Kansas City, Austin and Provo. Google further announced that it would enter into discussions with 34 communities in
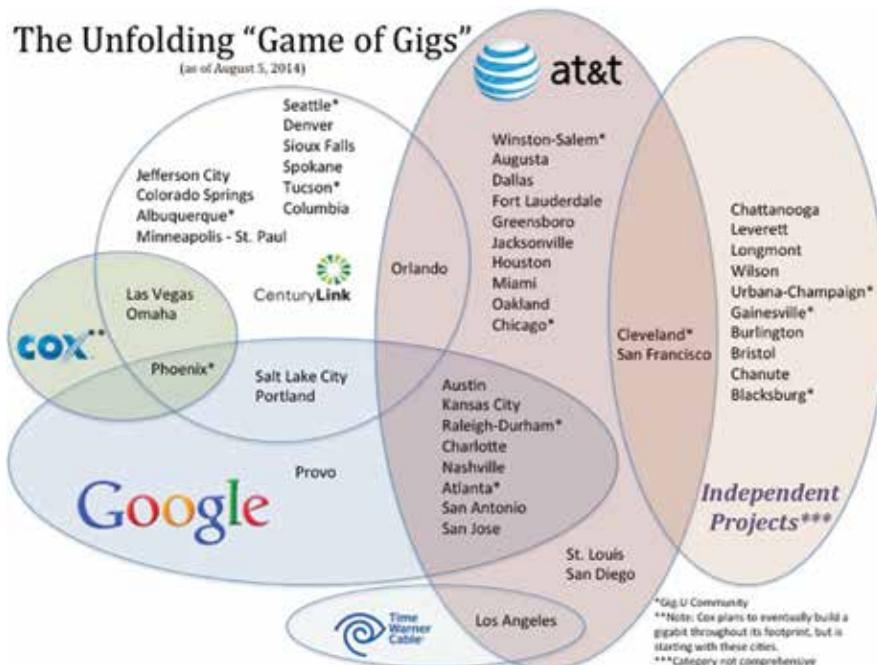
nine regions, three of which have been involved with the Gig.U effort, with the hope – though not the guarantee – that Google will deploy fiber networks in those communities.

AT&T

Shortly after the Google expansion announcement and the AT&T-NCNGN agreement, AT&T announced that it was considering expanding its footprint of gigabit-capable fiber networks to 100 cities and municipalities in the United States. Though Google's efforts were no doubt important, the reactions of local governments have been equally important. As Randall Stephenson, CEO of AT&T, noted, "Cities and municipalities are beginning to hold up their hands and say we would like you come in and invest. And they're actually beginning to accommodate

The Unfolding "Game of Gigs"
(as of August 5, 2014)

Seattle*
Denver
Sioux Falls
Spokane
Tucson*
Columbia

Jefferson City
Colorado Springs
Albuquerque*
Minneapolis - St. Paul

at&t

Winston-Salem*
Augusta
Dallas
Fort Lauderdale
Greensboro
Jacksonville
Houston
Miami
Oakland
Chicago*

Chattanooga
Leverett
Longmont
Wilson
Urbana-Champaign*
Gainesville*
Burlington
Bristol
Chanute
Blacksburg*

Las Vegas
Omaha

CenturyLink

Orlando

COX**

Phoenix*

Salt Lake City
Portland

Cleveland*
San Francisco

Austin
Kansas City
Raleigh-Durham*
Charlotte
Nashville
Atlanta*
San Antonio
San Jose

Google

Provo

**Independent
Projects*****

St. Louis
San Diego

Time Warner Cable

Los Angeles

*Gig.U Community
**Note: Cox plans to eventually build a gigabit throughout its footprint, but is starting with these cities.
***Category not comprehensive

Provider-initiated projects and community-initiated projects overlap and spur each other on.

and tailor terms and conditions that make it feasible and attractive for us to invest. That being the case, you will see us do more and more cities around the country."

AT&T completed deals to provide its GigaPower service to all six communities that were part of the NCNGN project. AT&T has also moved forward with agreements in Nashville, Dallas and other cities.

CENTURYLINK
In 2013, CenturyLink announced trials of gigabit networks in Omaha and Las Vegas. In February of this year, CenturyLink announced it would offer a gigabit service to multitenant-unit office buildings in the Salt Lake City area. In April, CenturyLink began an effort to seek out apartment buildings in Portland, Ore., that would be interested in obtaining a gig. Both Salt Lake and Portland are cities in which Google Fiber has expressed an interest.

Then, in another wave of upgrade announcements at the end of the summer, CenturyLink revealed that it would provide gigabit speed availability in 13 additional cities. Sioux Falls, Spokane, Colorado Springs,

Albuquerque, Tucson, and Phoenix will receive business service only. Seattle, Portland, Denver, Jefferson City, Columbia, Minneapolis-St. Paul and Orlando will receive both residential and business service.

OTHER PRIVATE INITIATIVES
C Spire, a company offering mobile and wireline services in Mississippi, ran a contest similar to Google's, offering to provide gigabit networks to a selected group of communities in the state. As a result, C Spire says, it will deploy gigabit networks in nine communities.

Cox Communications announced it would offer gigabit services throughout its territories. Cox said it would start in Phoenix, Las Vegas and Omaha, areas already targeted by Google and CenturyLink. This is another demonstration of the importance of competition in accelerating network upgrades.

Time Warner Cable told Los Angeles in mid-July 2014 that the company planned to deliver gigabit speeds by 2016. This news comes months after the city released its own RFI and AT&T expressed interest in negotiating for GigaPower service.

Details on exact pricing or how Time Warner's plan will match the city's original RFI wish list remain unclear. In response to the RFI, at least one other company, Dutch startup Angie Communications, expressed interest in building out in Los Angeles.

The larger providers aren't the oenly ones looking at offering gigabit services. Bright House Networks, which provides cable and broadband services to 2.4 million subscribers in five states, became the first cable company to announce it would offer a gigabit product to its residential customers, with a project serving a new community of 6,000 homes in Florida.

Suddenlink, which provides cable services to 1.4 million subscribers in eight states, announced Project GigaSpeed, in which it will upgrade its faster tiers in all areas to a gig by 2017. In making the announcement, the company noted that Google and AT&T are establishing gigabit-level speeds and that this effort will help Suddenlink stay competitive.

Even equipment makers are getting into the game. For example, ADTRAN announced its own Gig Communities initiative, designed to get a gig to 50 communities this year and to 200 by the end of next year.

These ISP efforts overlap, and, together with the community-initiated efforts, have propelled the Game of Gigs forward.

COMMUNITY-INITIATED AND ISP-INITIATED EFFORTS FLOW TOGETHER
A year ago, ISPs such as Cox and Time Warner Cable were antagonistic toward gigabit upgrades. They responded to gigabit initiatives with comments suggesting that upgrades were too expensive and, further, that they knew best what their customers wanted, and customers did not want higher speeds. Now they are singing a different tune.

This is not meant as criticism. Rather, ISPs deserve credit for recognizing how the landscape has changed. Though the model for Google Fiber and a number of the Gig.U

communities are different, these efforts have successfully demonstrated the feasibility of next-generation network deployment *and* the popular demand for faster speeds.

Community-led efforts – whether focused on the creation of an innovation district, the implementation of a fiber-readiness plan or the release of an RFP – place pressure on service providers to address that community's desire for an upgrade. Above all, the dynamic of competition drives incumbents to think anew about the adequacy of their service offerings.

It's not an accident that there is a tremendous overlap between the cities in which Google is looking at entry and incumbents are looking at upgrades. It's not an accident that Comcast, Verizon and Time Warner have recently announced speed increases, with a focus on communities in which gigabit efforts by others are proceeding.

It is a happy bit of luck that because of the non-identical footprints of the incumbents – Google's putting pressure on AT&T puts pressure on Cox, which puts pressure on CenturyLink, which puts pressure on Time Warner Cable, and so forth – the game can expand more rapidly than it would if only two companies with identical footprints were playing. The combined efforts of Google Fiber, experimental local ISPs and community organizing creates the Game of Gigs – a game that creates pressure on incumbent market participants to rethink their strategies and focus on delivering bandwidth abundance. This is a game all communities should think about playing. As they do, they should consider the lessons Gig.U communities have learned in their own efforts.

Companies don't undertake new capital expenditures because they want to; they do so because they can justify the expense in light of a new opportunity or to defend an existing revenue stream. In 2009, when the National Broadband Plan was gathering information about planned investments, no incumbent providers had publicly announced plans for world-leading networks in the United States. That

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some have done so now represents a positive change in their perception of both the opportunity and the threat.

CHANGING THE MATH
The formula for making the math of next-generation deployment work creates challenges for both current providers and new entrants. The key is for communities to reduce three factors – capital expenditures, operating expenditures and risk – and increase three factors – potential revenues, system benefits and the threat of competition.

The Google Fiber and Gig.U experiences demonstrate that there are three basic strategies for doing so: using existing assets more effectively, increasing regulatory flexibility and efficiency, and aggregating demand.

Use assets more effectively. Every city has assets that, if better utilized or improved, could lower the cost of deploying next-generation networks. The process begins with an inventory of those assets that can affect deployment. The most obvious are rights-of-way, including pole access and fees, conduit access and building access. Gig.U created an asset inventory for this purpose.

Next comes making available information regarding conduit, ducts, and other rights-of-way, as well as government-controlled facilities to which providers providers can attach equipment. Cities can establish policies that make rights-of-way and poles available to providers on a clearly defined, reasonable basis through a rapid approval process.

Make-ready work on poles is also a critical factor. Cities should ensure that make-ready work is done expeditiously, coordinate with new providers to save costs and allow them to perform the

work themselves through approved contractors.

Even without a specific provider in mind, cities can act – with minimal cost – to upgrade assets to ultimately reduce the cost of new networks. For example, cities can install ubiquitous fiber conduit or even dark fiber that can be leased to approved entities. With a "dig once" philosophy that requires such installation anywhere there is road construction, cities can reduce deployment costs along roadways by 90 percent while adding less than 1 percent to the cost of construction and minimizing disruption to neighborhoods. Cities can use pole maintenance policies to provide space for new attachers.

Cities can also use building codes and community development plans to drive fiber investment. For example, cities can adopt rules that require new construction and major renovations to include structured wiring that facilitates fiber deployment. Again, if done as part of a larger construction project, the incremental cost of structured wiring is minimal. If done on its own, the incremental cost is huge.

Be flexible. Perhaps the most important innovation that enables gigabit projects is letting consumers determine where buildouts should take place instead of requiring communitywide buildouts without any indication of demand.

In Kansas City, city officials did not dictate the map for Google's buildout. Instead, neighborhoods made that decision. Google built in neighborhoods that had sufficient demand to justify the investment. It worked out to nearly the same level of coverage. About 95 percent of neighborhoods in Kansas City qualified.

> University communities have proven attractive magnets for gigabit network deployment because they attract high-bandwidth users.

This model dramatically reduced cost. First, it lowered the risk. Second, it facilitated a buildout neighborhood by neighborhood instead of house by house, which results in significant savings in capital expenditures.

Many cities that have attracted next-generation networks have been flexible in terms of expediting permitting and inspections. In construction, time is not just money. It's a lot of money. Speeding up these processes can be critical to lowering costs.

Aggregate demand. The precommitment tactic noted above enables demand aggregation. So does creating a website that both pushes and pulls information. Another Gig.U tool provides a frame for such a website.

Communities can and should have different points of view as to which demand aggregation tactics are most appropriate to serve their needs. For example, some involve the utilization of anchor institutions, but providers have different points of view about the roles of schools, libraries, and health care facilities in a new deployment. Another variable is the presence of a university, which is a kind of an über anchor institution. Universities tend to attract a lot of high-bandwidth users to the communities that surround their campuses, one reason university communities have proven attractive magnets for gigabit deployments.

LESSONS FOR ALL COMMUNITIES

Any community – regardless of size, density, or demographics – that wishes to improve bandwidth should heed the following lessons:

Organizing community resources and stakeholders is essential. Communities that have moved forward are similar only in that they have decided to make improving the broadband available to the community a high priority. A community with a vibrant tech or startup community should leverage that energy to produce project support. These stakeholders are first adopters and already understand the "why" of gigabit speeds.

Understand how rules and assets affect deployment costs. The organizing effort starts with a detailed understanding of how communities' policies and assets affect the economics of network deployments. Gig.U, the Fiber to the Home Council and others have developed tools for this exercise, and the public documents from the Google Fiber project also provide a road map for cities.

The right time to start thinking about how to improve the economics is today. Every time a street is dug up, every time an area is developed or redeveloped, there is an opportunity to lower the cost of a future deployment.

Incumbents respond only to a potential change in the status quo. In every community Gig.U has worked with, action by the city resulted in an effort by incumbent providers to respond in an incremental fashion. The old saying "The squeaky wheel gets the grease" turns out to be true. For example, without its RFP, it is doubtful that Los Angeles would have received an offer from Time Warner Cable to offer a gig throughout the city.

Cities must choose between quick, short-term wins and slower, longer-term wins. When cities become squeaky wheels, they often have opportunities to obtain quick concessions from incumbents in exchange for stopping a process that opens the door to new providers. Some cities may best be served by taking what is on offer, but others have the potential for far greater gains.

Success depends on quick decision making. One reason Google chose Kansas City, Kan., as its initial project was that the unified government structure gave Google the confidence it would get quick decisions. Other projects have not gone as quickly as hoped because there were multiple decision makers. It is often difficult to find a high-level government executive to own the project and ensure its completion. Empowering such a person, and making sure the project is not an orphan, has been critical to the success of projects to date.

All efforts improve the situation relative to the status quo. Each solution has advantages and disadvantages, but in all cases, the cost to the community is negligible and the benefits are significant. There is no cost to asking questions; indeed, simply asking the right questions causes incumbent providers to become more interested in how a city is thinking and more responsive to future needs. Competition – even the threat of competition – tends to improve the performance and the offerings of incumbents.

Experiments don't always work the first time. That's why they are called experiments. Pioneers don't have the advantage of a clear map. In each effort to date, people made mistakes. They key is not to let the mistake determine the fate of the project but to correct the error and move forward. A good example of the right way to approach the long-term objective is the work of the Seattle Citizens Telecommunications and Technology Advisory Board. The city's disappointment in the inability of Gigabit Squared to deliver on its promises does not

diminish the centrality of world-class broadband to the economic future of the city.

Scale matters. The larger the ultimate addressable market, the more a provider is willing to risk incurring startup costs. It is unlikely that the eight respondents to the NCNGN project would have responded to six RFPs. However, larger efforts must make sure the desire for scale does not result in complicated, lengthy decision making.

Local leadership is the single most important ingredient for success. In every community in which an effort has moved forward, strong local leadership has made next-generation broadband a priority for local political, business and civic leadership. In most city governments, however, no one's *job* is worrying about next-generation speeds. Chief innovation officers are not required to focus on broadband networks specifically, and even cable, information or telecommunications offices often carry out more traditional functions.

LESSONS FROM EXPERIMENTATION

Experimentation involves a risk of failure. The broadband bonanza consumers enjoy today owes a great debt to such visionary efforts as Time Warner's Qube, Apple's Newton and @Home. All failed as business matters, but each demonstrates that a failed project can still advance the mission.

In that light, it is not surprising that some projects Gig.U helped stimulate have stalled. Most notably, two early projects involving the vendor Gigabit Squared have been put on hold as Gigabit Squared was not able to meet early benchmarks in moving forward with the projects.

All the providers in current Gig.U-affiliated projects are either upgrading existing networks or moving into an adjacent geographic or product market. Gigabit Squared, by contrast, was a true new entrant. Such an entity carries operational and financing risks much greater than those of established players. Further, the cost to an established company of not meeting its obligations, and thereby creating problems for its existing business lines, is greater, and the incentives to finish the job, whatever it takes, are also greater.

The greater risks associated with a true new entrant are neither new nor surprising. Indeed, both communities that entered into agreements with Gigabit Squared did due diligence and included contract provisions to minimize the risk. As a result, the financial losses to the communities were circumscribed, with the biggest loss, in some sense, being a loss of

> New entrants, despite their high failure rate, may be the change agents that cause the greatest improvements.

time. Despite that setback, we have a high level of confidence that those communities will find ways to realize their original visions.

We could have taken the view that no new entrants should be allowed to participate in Gig.U projects. We believed, however, that there was value in opening the door as broadly as possible – particularly, as was the case in 2011, when so few wanted to enter. New entrants in any business have a high failure rate, yet when one looks at the history of innovation, new entrants are often the change agents that cause the greatest improvement in the performance of a sector.

Preemptively closing the door to those who might bring the freshest perspective was not wise, in our view. As noted by a key participant in the process that created the University of Illinois/Champaign-Urbana/iTV-3 partnership, the Gigabit Squared process helped stimulate those communities to organize their thoughts and assets in a way that led to a successful negotiation with an existing business that sought to expand both its geographic reach and its product offerings.

Nonetheless, what matters is how the ideas are turned into action, and for that to happen, the math has to work. And the math, as we knew but learned again, is tougher when a new entrant without existing business lines plays an essential role.

NO POPPING CHAMPAGNE – YET

We are more optimistic than ever that the movement toward upgrading wireline broadband networks will lead to a critical mass of communities obtaining world-leading networks at affordable prices, but we don't believe the momentum for such deployments is irreversible or inevitable. Several

potential turns in the road could lead to the Game of Gigs ending before its benefits are fully delivered.

The Google Fiber business line is not core to Google's current revenue model, and the company has the option to simply not proceed with further deployments. Google's entry into the next-generation broadband market is the single greatest input driving competitive responses that improve the environment for achieving Gig.U's mission. If Google were to withdraw or even indicate that it was not proceeding further, incumbents and others would likely slow down their own efforts, and progress would likely stall.

The proposed mergers involving broadband providers could make the economics of deploying next-generation networks either easier or harder, both for the merging entities and for others. The government's review of those mergers could have either a positive impact or a negative impact on the barriers to entry and upgrades. If negative, the mergers and their review processes could also lead to progress stalling.

Economic changes might distract city leaders from devoting political capital to initiatives that often take longer than their terms of office. If city priorities change, the current momentum could fade.

Arguments about next-generation networks' potentially increasing the digital divide might gain traction, which could change the political calculus in some cities, increase the cost of upgrades and reduce the momentum for next-generation networks.

We agree that cities should ensure that their broadband policies, in aggregate, result in all their residents' having opportunities to use broadband networks that offer full access to participation in economic, social and civic life. However, some concerns

about the digital divide appear designed to stop or slow new competition rather than solve any digital divide issues. For example, some critics say the Google Fiber project ignores low-income communities in Kansas City when in fact it will connect 95 percent of the neighborhoods there. There are even options for communities that wish to ensure that 100 percent of residences have access to an upgraded network – for example, the method that Macquarie is proposing to finance its buildout to communities in Utah.

THE METROPOLITAN BROADBAND REVOLUTION

Nearly a half century ago, Sen. Daniel Patrick Moynihan said, "If you want to build a world-class city, build a great university and wait 200 years." More recently, Bruce Katz of the Brookings Institute described a rapidly evolving Metropolitan Revolution, for which a core element is the presence of an innovation district. Among the key ingredients for such a district are universities and great broadband.

The relationship between universities, cities and economic growth is compelling. With value creation becoming ever more dependent on the collection, storage, analysis and dissemination of information, the relationship should become even more compelling.

Progress, however, is not self-executing. Good ideas may be born from multiple discussions, but they are *refined* only with experimentation. Gig.U members have undertaken both these tasks, yielding benefits to their communities and others.

University communities were well positioned to pioneer these upgrades. With major research institutions housing fiber assets or adding to the demand for faster Internet speeds, there were natural leaders ready to take their communities to the next step of bandwidth abundance. Because of their need to retain and attract talented students, researchers and professors, these communities were early to see the value of better, cheaper, faster broadband as an economic and social engine.

The effort is not limited to university communities. In the last decade, city governments have emerged as admirable hubs of innovative thinking and policy experimentation. Mayors, city councils, CTOs and CIOs have gotten creative about efficient government services and economic development. With broadband impacting the success of education, public safety, health care delivery and the entrepreneurial environment, leaders are looking at network infrastructure as a worthy community concern.

The federal government is unlikely to drive this agenda. But rather than cursing the darkness, Gig.U has chosen to light a candle. We believe that candle can, and will, be used to light many more. What is at stake is not "bragging rights" but the quality of the platform by which the United States, as an economy and a society, collectively provides itself and future generations

the opportunity to continually improve every aspect of citizens' lives. Cities are grasping that need and that opportunity.

We know the economy will increasingly be delivered over bandwidth. Economic value creation, once based on the manipulation and distribution of physical objects, increasingly will be based on manipulating and transporting bits of information. As mayors make plans for their communities to thrive in the information-age economy, they need to make sure the communities have the bandwidth they will need well into the future.

Winston Churchill, after the Allied victory at the second battle of El Alamein in 1942, famously said, "This is not the end. It is not even the beginning of the end. But it is, perhaps, the end of the beginning." So it is with our effort.
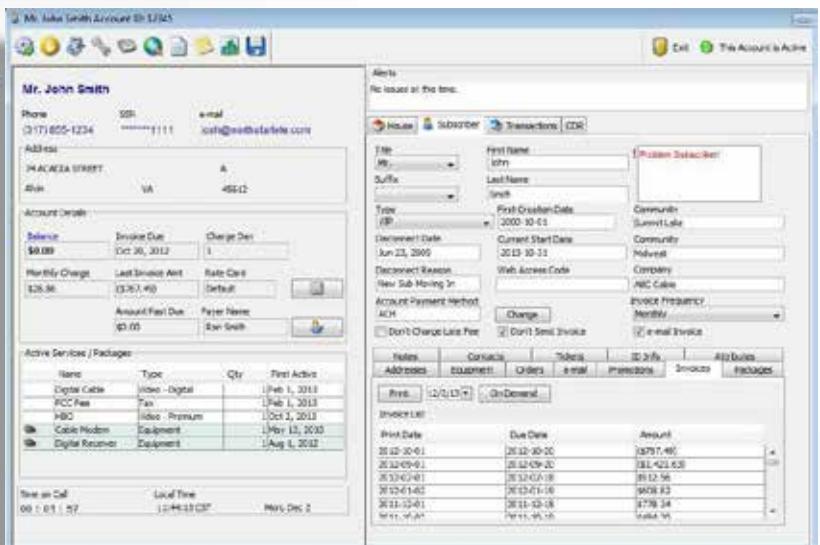
When Gig.U came together three years ago, we were not certain of achieving sufficient success to drive

the next great American broadband upgrade. Though success is still not certain, we believe there is a good chance that this is the end of the beginning and that in the next several years, numerous cities and the entire country will benefit from the map created by the Gig.U communities. ❖

Blair Levin is the executive director of Gig.U, a coalition of universities and community leaders that works to advance the deployment of next-generation networks. Ellen Satterwhite, a director of the Glen Echo Group, participates in the Gig.U project. Denise Linn, a student at the John F. Kennedy School of Government at Harvard University, worked with Gig.U as a Harvard Ash Center Summer Fellow. Contact Blair at blair.levin@gmail.com. Read the full Game of Gigs report at www.gig-u.org/cms/assets/uploads/2012/12/81714-Gig.U-Final-Report-Draft-1.pdf.