

Connecticut Gigabit Conference

**Table Stakes for the Future
(In Something Other than Basketball)**

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First things first. Congrats on the Double Championship. Wow.

Second thing. I hate to break it to you because I know many in this room want to savor those great March Madness moments, but speaking on behalf of the rest of the country, its time to move on.

So let's talk baseball. In honor of the start of another season, I'll begin by challenging its great sage, Yogi Berra, who said, 'predictions are hard, particularly about the future.'

He's wrong.

We know the future.

In the future, economic value creation, which for several millenniums was primarily based on the manipulation and subsequent distribution of physical objects, increasingly will be based on manipulating and transporting bits of information.

The fastest growing companies will be those that lead in improving, and taking advantage, of that information exchange.

Every service provided by enterprise will be transformed by that information exchange.

The importance of that high-performance knowledge exchange will not just be economic; everything we do in our civic life, and in most, but not all, of our personal lives, will be enhanced by information that will travel over, and be transformed by, what we think of as the broadband platform.

So that's the future.

Let me give you a glimpse of how that future will look in education.

Every K-12 classroom will be linked to a high capacity physical conduit with the last connection provided by robust Wi-Fi, with kids on tablets interacting with teachers, fellow students and digital content.

If you were to visit that classroom, you'd see students working on tablets. A teacher might point to a student and say to you, "that student is about to ask me a question about negative numbers." You, being from the past, might say "huh?" The teacher would point to her tablet, which reflects the progress of each of the students. When any student got a problem wrong three times, a red mark would appear, as there would for this student on the problem set involving negative numbers.

Sure enough, seconds later that student raises his hand and asks the predicted question. And critically, the teacher assists that student with the precise aid that student needed to move forward.

I know that's the future because it's already happening. The exact story was relayed to me by someone who visited an Innova School in Peru, which uses Khan Academy material as their curriculum.

By it could not happen in classrooms with approximately 72% of the K-12 students in the United States; those classrooms lack the necessary bandwidth.

Let's look at the future in health care. Genetic sequencing will play a huge role in diagnosing and treating medical conditions. One doctor described our current practice of treating without the sequence as "sending generals into battle without a map of the battlefield. What we are doing now (with genetic sequencing) is building the map."

Fortunately, the price of doing the sequencing has dropped dramatically.

But, again, lack of bandwidth is a barrier. The largest genetics-sequencing lab in the world, based in China, finds its results so data-intensive, it takes weeks to transmit via the Internet. Instead it sends computer disks containing the data, via FedEx.

There's a similar story in almost every sector; indeed, the New York Times just reported, entrepreneurs are moving to those few towns with better bandwidth because they need the bandwidth.

We know the future. We also know the opportunities it opens will not arrive until we have access to faster, better, cheaper broadband networks.

So that's the question at the core of this conference: what is Connecticut going to remove its bandwidth barrier to the future? What is Connecticut going to do to create bandwidth abundance?

One answer: do nothing. Just assume markets are perfect and will deliver everything Connecticut needs at precisely the right price point and at precisely the right time.

It's not an unreasonable view, but if the government had taken that view, all manner of things, from the Internet itself to the University of Connecticut would not exist, which would be bad not just because of the championships you would not have enjoyed. The University—a manifestation of what Lincoln said about government doing for people what people cannot do for themselves--makes many contributions throughout the state in a variety of sectors, such as providing economic engines like the UConn Health Center and its Jackson Laboratory for genomic research.

Another answer, also not unreasonable: take the position that broadband infrastructure is public in nature, and like roads, sewers, and the defense department, the government ought to be the monopoly provider. In most of the country, however, that is not how we have funded communications networks.

Those choices lay out the boundaries of the challenge in answering that core question.

That is, as we know the table stakes for economic growth and leadership in the future includes higher capacity, future proof broadband networks, what do you do today, in that very large space between doing nothing and doing everything?

I suppose I should note one other option---talk a lot about how important it is to have future proof networks and then do nothing about it.

To be honest, that's often the way we roll in Washington DC; we say something is hugely important, pat ourselves on the back for being visionary, and then we wait for that spin cycle to turn and go on and say something else is hugely important.

In a pundit economy, talking is a lot easier than action, particularly when the actions are not obvious. Indeed, in 2009, as we were looking at the data for the National Broadband Plan, and we saw the need for communities with world leading bandwidth.

But there were no obvious options. There was no roadmap. Further, the data clearly pointed to the incumbent providers following a perfectly rational harvesting strategy in terms of their wire line networks; that is, allocate capital to optimize a return on past investment rather than invest to deploy world-leading networks. Market forces were not driving an upgrade to those levels anywhere.

Fortunately, a number of state and local leaders did not accept that fate. Thanks to their leadership and their actions, a roadmap for communities that wish to lead in the bandwidth delivered economy is emerging.

Communities are charting one path by working in partnership with Google Fiber. This has already resulted in Gigabit service in 3 communities with discussions going on in 34 others. Just as critical, these efforts are revealing steps any community can take to improve the economics of fiber deployment.

Local ISPs are getting in the game. In Lansing, Michigan, a local ISP has deployed around the Michigan State campus. In Mississippi, a local ISP named CSpire ran a challenge, similar to Google Fiber, in which it has announced plans for several gigabit communities in the state.

Electric Utilities are exploring the territory. Chattanooga has gotten the most attention but others, such as in Florida where the University and Gainesville utility, have done similar, albeit smaller, projects and now others are looking to do the same.

All this has caused incumbents to look anew at ways to deploy future proof networks. AT&T is responding to Google fiber efforts in Austin and San Antonio with their own fiber efforts; CenturyLink has decided to pre-empt potential competition with trials in Omaha and Las Vegas. A cable company in Florida, BrightHouse, just announced a gigabit trial.

I could go on. Indeed, almost 20 Gig.U communities, including two I just mentioned, are exploring ways to accelerate the deployment of next-generation networks to advance education and economic development. Yesterday, you may have read about how a collaboration between 4 universities and their surrounding communities in North Carolina is leading AT&T to provide world leading networks in those areas.

Several things are worth noting about the North Carolina news.

First, it was the first to result in a commitment by an incumbent provider. I don't think we've hit a tipping point but we know a lot more about what any provider, including incumbents, need and incumbents have moved a long way in their thinking from when we started.

Second, while the multi-community collaboration entailed upfront costs and a feeling of slogging that often accompanies multi-stakeholder coordination, it brought scale to the project. This is an important consideration for a number of providers and such regional approaches may be the only way some communities obtain an upgrade.

Third, the process the North Carolina group used is a model that can be utilized by other communities throughout the country. It used an RFP, which generated 8 responses, followed by plenty of meetings and discussions between the communities. There were candid discussions of trade-offs and alternatives. All sides learned and that learning will benefit all communities and service providers.

But for it to work, local governments need flexibility. Those who seek to constrain local government options in negotiating for better bandwidth for their residents should understand that taking options off the table takes away the creativity and leverage local governments need to obtain new investments.

No one should pop the Champagne. There's a lot of work still to come. Nonetheless, we can be cautiously optimistic that over the next several years we can turn what was, in the U.S., a gigabit desert, into a gigabit garden.

Not all these efforts will succeed; indeed there have already been setbacks. Networks are a tough, capital-intensive business and we cannot expect that new start ups will rush to embrace the opportunity; indeed, the most likely path to success involves adjacent market entry by well capitalized existing companies and responses by existing providers. And even then, not such efforts will succeed at first. But just like in this state, whose first settlement, located near here, did not last long, if there is a determination to succeed, the early setbacks are a speed bump, not a wall.

So what are the actions you can take to make sure your state has the future proof networks it needs to lead in the 21st Century information economy?

That is what you will be talking about all day but let me provide a framework, and then you will fill in the specifics.

Let's start by understanding why the incumbents, who are rational economic actors, are not building future proof networks.

The reason can be expressed in this formula.

$$C + O > (1-r)R + SB + (-CL)$$

That is, under the current math, no incumbent or new entrant is likely to upgrade or build a network because the new or incremental Capital and Operating Expenditures are greater than the risk adjusted revenues plus System Benefits (benefits to an investor overall network by investing in a part of the network) plus the threat of competitive losses.

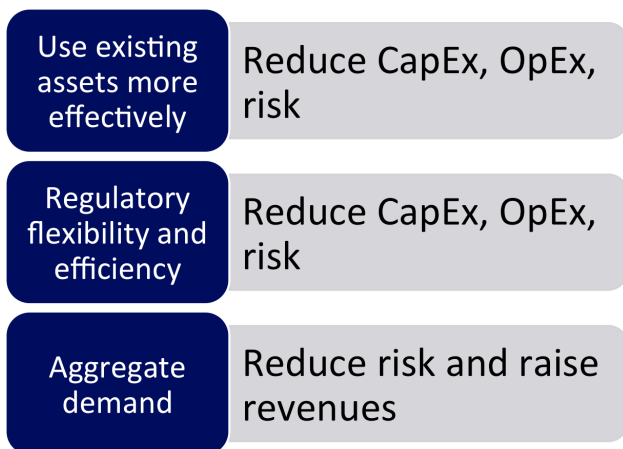
Communities that wish to have a gigabit have to change the equation to incent investment in faster broadband; they need the right side to be greater than left side.

To do so, communities must take steps that reduce the first three factors—cap ex, op ex and risk—and increase the next three factors—potential revenues, system benefits and threat of competition.

The Google Fiber and Gig.U experiences over the last three years have demonstrated there are three basic strategies for doing so:

- Using existing assets more effectively;
- Regulatory flexibility and efficiency; and
- Aggregating demand

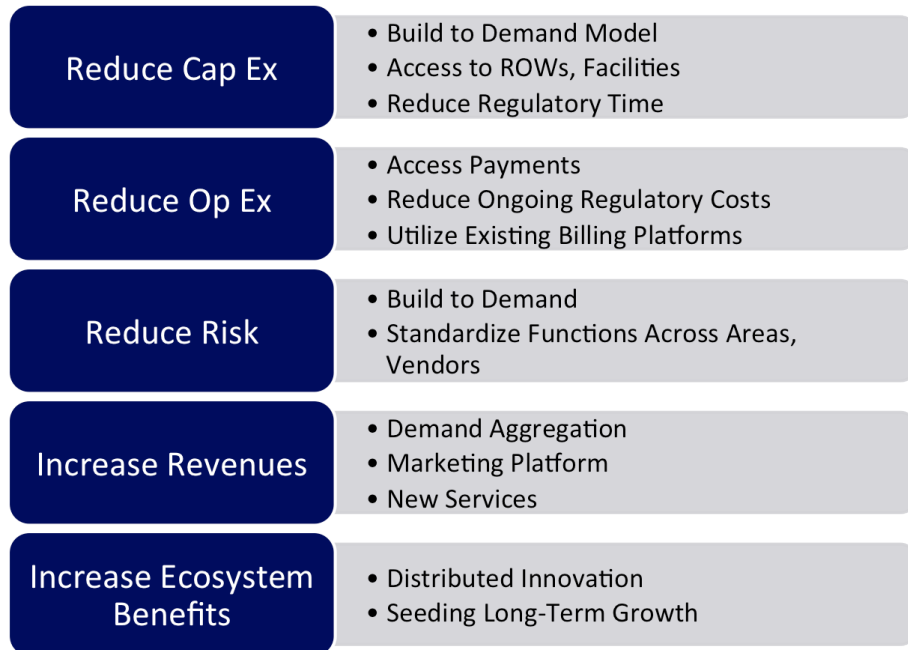
Figure 1: Key strategies to improve communities' fiber readiness



Drilling down deeper, there are a number of tactics that are within the existing power of most communities to successfully carry out these strategies.

Through these strategies and tactics, we can see how local communities and ultimately the country can accelerate an economically viable next generation upgrade.

Figure 2: Tactics within existing powers of communities

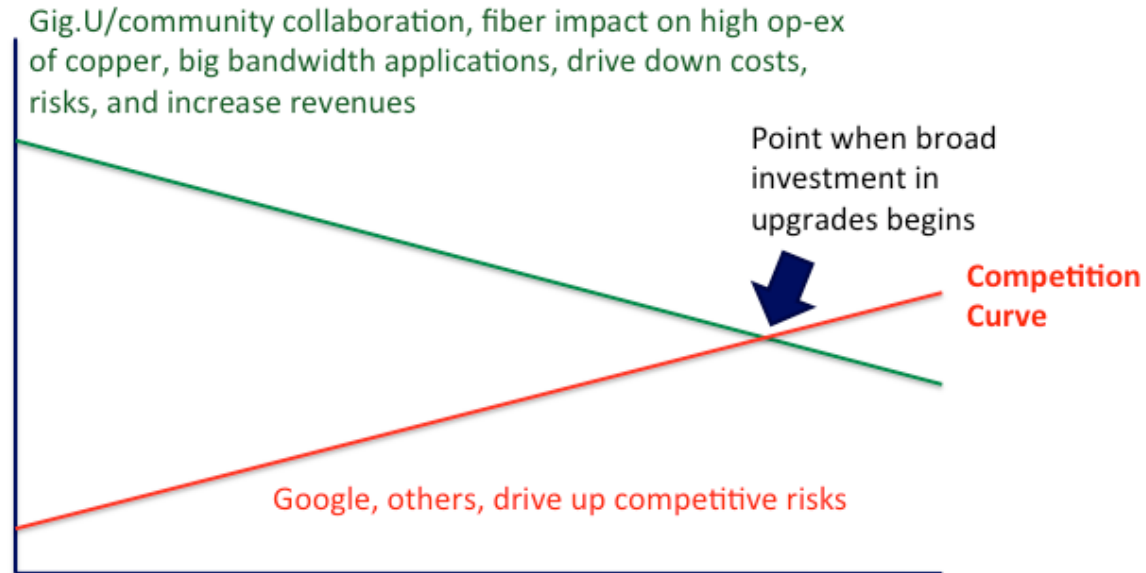


A lot of these tactics involve the utilization of anchor institutions, which is one reason why university communities—which are a kind of uber anchor institution—have proven to be such an attractive magnet for [gigabit deployments](#).

I know from personal experience that Connecticut has some world-class university communities, and again, not just in basketball.

When communities act to lower the cost and risk of an upgrade—while also creating an opportunity for more revenues—it drives down the cost curve, illustrated by the green line, going down and to the right.

Figure 3: Gigabit build out when cost curve drops enough to meet rising competition curve



In addition, when communities invite new competition, it raises the level of competition, as illustrated by the red line going up and to the right.

The Gig.U thesis is that when the two lines meet—when incumbents and new entrants have both a viable financial model and the financial motive—then we will begin to see the broad deployment of such networks.

We know the strategy works on an individual community basis.

Within hours of Google announcing it was building a gigabit network in Austin, AT&T announced it was at least considering doing the same.

Shortly thereafter, Time Warner Cable announced a citywide Wi-Fi project, saying, “Google’s recent announcement encouraged us to deploy our network more aggressively now.”

Google’s announcement about its discussions with 34 other communities has prompted similar reactions.

It is too early to know the precise parameters of how any deployments that result from these announcements, but they represent a welcome change in the public reaction to communities expressing an interest in world leading networks.

What we see in communities where Google or Gig.U have announced projects is what we saw when MCI started to compete with AT&T, when DBS started to compete with cable, when wireless grew from two national providers to seven, and when cable started to compete with telcos in the Internet Service Provider market. The incumbents become better companies, consumers benefit, innovation explodes and our economy grows.

So the policy directions are clear: drive costs down and competition up.

Indeed, every community that starts the process of seeking an upgrade sees nothing but upside. When communities start to take steps to drive down the cost curve and drive up the competition curve, there is no downside. Yes, there are many challenges but the question is only about how best to capture the most upside.

Moreover, where we see a move for an upgrade, we see a virtuous cycle: community efforts to obtain better networks leads to broader uses of broadband that leads to higher adoption which assists in creating a greater competitive dynamic which itself leads to greater innovation, with each factor positively re-enforcing all the others.

In short, what we have seen over the last several years is that communities have the power to take their bandwidth destiny into their own hands, and through a broad-based community effort, improve both their economic and social prospects in the decades ahead.

Let me close with this. If local and state officials 100 years ago had perfect foresight, they would have made certain plans—land for an airport, designs for roads that could handle combustion vehicles, long-term access to water and inputs for electricity—that would have positioned them for growth and leadership in the 20th Century economy.

Our foresight cannot be perfect, but despite what Yogi Berra said, we can be certain today, that as state and local officials make plans for their communities to thrive in the information age economy, they need to make plans that make sure every community has the bandwidth it needs.

For the bottom line is this: many things every state and city does today will affect what kind of broadband networks it will have in ten years; in ten years, whether it has faster, cheaper, better broadband networks will affect everything that state and city does.

Which is why everyone who lives in Connecticut a decade from now will owe everyone in this room a debt of gratitude for acting now to make sure Connecticut has abundant bandwidth, the table stakes for leading in the 21st Century for everything other than basketball.

Again, congratulations for what your teams did earlier in the week and what you are doing today.

Thank you.