Beyond Speed: Where Is the United States Going?

Americans know how to design and build fast networks. Now we need to identify how to use them to make our lives better.

By Andrew Cohill, Ph.D. / *WideOpen Networks, Inc.*

It may seem counterintuitive to begin discussing what comes after speed in the middle of a true bandwidth crisis in the United States. More than 15 years ago, I was trying to tell community leaders and economic developers that neighborhoods and rural roads were becoming business districts, but few paid attention at the time. Now, the COVID-19 pandemic has made homes the workplace for many people around the world. If the recurring stories in the media about corporate office downsizing are mostly true, many of us will be working from home for a long time, if not permanently.

The COVID-19 crisis brought the issue of speed and bandwidth front and center, and three different sectors of society now compete for speed in the home: home-based workers, K–12 students and, in many homes, higher-education students taking online classes instead of attending universities on campus. Suddenly there is a broader understanding of why the FCC definition of 25 Mbps/3 Mbps as "fully served" may be based more on political considerations than actual need.

But this is all good. Within five years, most U.S. homes and businesses will have dramatically improved internet service. In the next several years, millions of homes will connect to gigabit or 10G fiber service, and millions more rural homes will receive substantial bandwidth improvements through fixed-point wireless technology. Most premises also will have access to symmetric internet service (equal upload and download speeds).

If you accept this premise, I believe the question becomes, "What next?" When everyone has adequate internet access at affordable prices, what will people want and need to do with that speed?

Fiber is an enabler, but what should it enable? A short list includes improvements in business
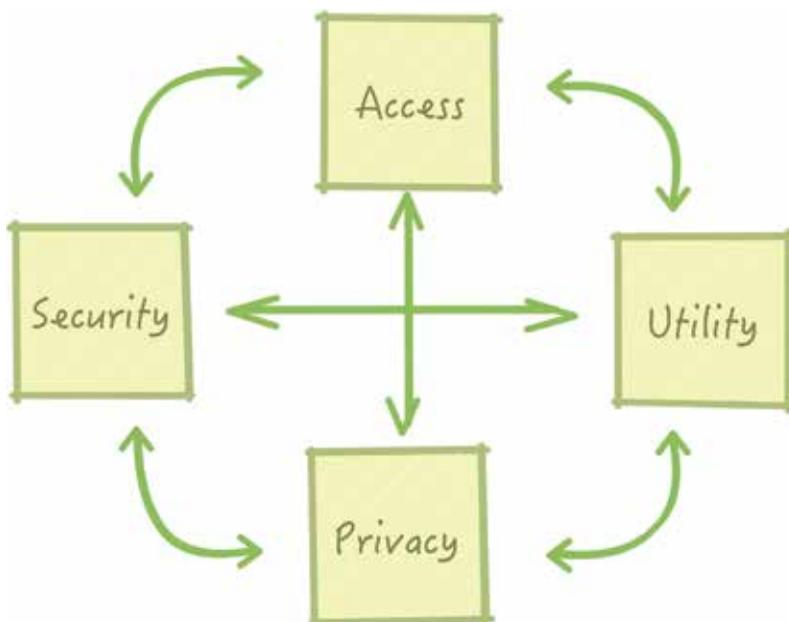
and personal quality of life, better access to educational opportunities, enhanced access to health care and improved energy management.

Four network issues need attention:

Access – Currently, access gets all the attention, as it should. Many areas of the country still need better access at better prices.

Utility – This is what people do with access to a network. Entertainment and streaming video (e.g., Netflix, Hulu, YouTube TV, etc.) have been the dominant drivers, but as noted above, the COVID-19 crisis brought other services into sharper focus (business work, education, telehealth, etc.).

Security – People want to know that networks and devices are secure, yet there are almost daily stories of network intrusions, hacking and data theft enabled by insecure network protocols. The proliferation of internet of things (IoT) devices with poor or no access control is a particularly challenging problem.

Privacy – Reliance on networks for a wide range of personal and business activities requires that data be handled appropriately and safely by a wide range of remote services. Data may range from the somewhat innocuous (e.g., what movies people watch) to sensitive business and personal health information.

ACCESS

Improved access to broadband and internet-enabled services already is creating demographic shifts likely to have long-lasting consequences. Demographer Joel Kotkin notes that job growth is shifting to smaller towns and cities, and home demand in smaller metro areas, rural markets and suburbs is improving. This is great news for rural U.S. communities that take steps to solve the internet access and affordability challenge.

The "right" access has three dimensions: bandwidth (speed), symmetry and competition. As noted above, speed and symmetric bandwidth problems will be solved for most homes and businesses, but competition will

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continue to be a challenge. The 1948 and 1996 FCC deregulation acts were supposed to create more competition. However, although most areas of the country have more providers, the industry has moved from a monolithic incumbency of the telephone and cable providers to situations in which the increase in providers offers very little competition.

Instead of telecom dominance by cable and telephone companies acting in cartel fashion, many areas of the country have what I call "the Balkanization of telecom." In rural areas, many telcos have essentially withdrawn from their own markets by not upgrading their facilities. The resulting market vacuum is filled by smaller ISPs and WISPs that have carved up those markets into smaller but still monopolistic service areas. Businesses and residents may not be buying internet from an incumbent provider offering grossly inadequate DSL, but they still have no choice of provider and no competition in packages and pricing.

The third dimension of access – competition – is best managed by encouraging the development of local transport providers (LTPs), which build and maintain a combination of fiber and wireless infrastructure and allow any qualified service provider to use its networks to sell and support services to customers. This model is still poorly understood but has been widely available in Europe. There also are many examples in the United States, including Bozeman Fiber, UTOPIA Fiber, nDanville, WideOpen Blacksburg and several other networks.

UTILITY

Networks should be useful. Entertainment has a use, but surely people can begin to look beyond

the common refrain of "Well, with more speed, Netflix does not buffer anymore." A network can make home-based work better. Improved videoconferencing devices should enable a more consistent and useful telepresence, with better cameras, better audio processing, and larger, high-resolution screens.

Personal assistants have tremendous potential to support independent living for the aging and the infirm, but these devices currently are designed to primarily support entertainment and shopping. "Alexa, play Stairway to Heaven again"; "Alexa, add paper towels to the shopping list"; and "Siri, who won the football game?" Personal assistants can remind people to take medication and could monitor in-home sensors and call 911 automatically if a medical emergency is detected. Additional research and software development are needed to make personal assistants more personal.

The COVID-19 crisis is straining U.S. education systems, but it is easy to see some opportunities emerging. With wider availability of appropriately priced symmetric bandwidth, many more education options will become mainstream, including wider use of online learning and certification. Though earning a college degree completely online may not be the right choice for all college students, a mix of classroom and online classes can reduce the amount of time needed to earn a degree and reduce the cost of that degree.

SECURITY

When internet security comes up in conversation, usually it references protecting passwords, bank accounts, email, and perhaps health records. But other dimensions of security either have

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received little attention or are poorly integrated into homes and businesses.

Video doorbells have become extremely popular, but recently, an ISP manager admitted during a conversation that video doorbells, with their ability to stream HD video into the cloud, have wreaked havoc on his network – in part because the network was designed primarily to provide good performance downstream to customers – that is, the goal is to prevent buffering and slowdowns for streaming entertainment.

A wide variety of security enablers can provide more than just security from burglary and theft. Well-designed health sensors can enhance health security; the Apple Watch already has been credited with alerting some users to impending heart attacks.

For elderly people trying to maintain independent lifestyles, homes designed with a full suite of sensors, including motion sensors (has the occupant fallen and can't get up?), fire alarms that have enough capability to evaluate a fire threat and automatically dial 911 in an emergency, water leak alarms, and carbon monoxide alarms are all examples of the potential to have homes and businesses that enhance security. Vendors such as Apple (HomeKit) provide interfaces to create support sensors and in-home services, but there are several competing and incompatible systems. And the devices are still expensive.

Energy management is another area of security. In some parts of the country, more-frequent power outages are driving demand for home-based generators, and other homeowners are installing solar panels. Both approaches enhance energy security but typically are not connected to a home's network or are connected only in a very limited fashion. The network has the potential to reduce energy use.

Much more work is needed in this area, with more focus on open and interoperable standards.

PRIVACY

A truism about popular social media platforms such as Facebook, Twitter, TikTok, Instagram and others is that "the customer is the product, not the service," meaning these "free" services are amassing extensive detail on their users and selling access to the data as the primary source of revenue. "Free" email services scan all of their user messages to identify user interests for marketing. Streaming video services sell what we watch to other companies.

We have all had the experience of browsing for some item to buy and just minutes later starting to see ads appear on every webpage we access. It is not at all clear how personal assistants such as Siri and Alexa use and market what those devices "hear" in the home. Videoconference services should not be data mining the video and audio portions of online meetings. (There were reports that Zoom was sending videoconference data to servers in China).

Networks and services should provide data privacy. More fee-based services that guarantee privacy of data are needed. Open-source personal assistants ensuring that what is "heard" in the home or business remains private are necessary. At least one open-source personal assistant (mycroft.ai) project is underway. More support of these kinds of efforts is important to getting more control over how personal data is used.

SUMMARY

As digital highways are built, the services and devices that people use are still immature. Customers need help understanding the technology and the benefits and risks of using that technology.

Network operators and ISPs can help customers make better and safer use of their network access, and these efforts need not be time-consuming or costly. Operators and providers could put pages on their websites that discuss privacy, security and utility.

A modest customer education program could have long-lasting benefits. For example, providing information on alternative search engines such as DuckDuckGo and Brave, which block trackers, site fingerprinting and cross-site cookies, is easy.

A large number of smartphone and tablet apps offer a wide variety of health and wellness services and information, and many older internet customers would benefit from knowing more about apps that could help them maintain independent lifestyles.

Providers could support well-designed open-source projects – directly by making modest financial contributions to help support development and indirectly by letting customers know more about open-source hardware and software and how to make good use of those products and services.

Perhaps the Model T era of network services and systems has evolved to the Model A era, but just going faster should be only part of the long-term goals and expectations for networks. We need to move beyond speed. We know how to design and build fast networks. Now we need to identify how to use them to make our lives better. ❖

Andrew Cohill, Ph.D. is the president and CEO of WideOpen Networks, Inc. WideOpen provides network planning and operations services to municipal networks and is building next-generation fiber and wireless networks in underserved communities across the country. More information is available at www.wideopennetworks.us.