Realizing the Long-Term Value of Connectivity

Open community infrastructure can provide enormous societal value by enabling services that haven't been dreamed of yet.

By Bob Frankston

When a person buys a piece of real estate, much of its value is there on day one, though the price can appreciate. Broadband and internet connectivity are very different from real estate; understanding the value of connectivity requires thinking about long-term opportunities, not just initial costs.

For example, consider the web. It started as a simple application using the limited internet of the 1980s and 1990s and became so much more valuable. Today, it enables people to do everything, from ordering food delivery at the click of a button to streaming favorite TV shows any time of day to connecting with colleagues or family over videoconferences. These innovations, many of which became essential to life during the stay-at-home orders of the pandemic, create value not just for individuals but for communities as a whole – whether they are cities or multiple-dwelling-unit (MDU) buildings. Connectivity enables new services and reduces costs.

Connectivity is about more than just broadband. Tesla can add value after its cars ship by sending updates because of its software-centric design. Similarly, Volvo recently increased the range of its vehicles with a software update. Both companies take advantage of connectivity to deliver updates seamlessly.

WHAT IS CONNECTIVITY?

Internet connectivity is very valuable. Wires initially installed for traditional cable TV were repurposed for the internet, thus enabling innovations such as the web, which in turn gives people access to the world (as well as interconnecting the devices within their homes). The ability to repurpose existing facilities and then improve them is part of a virtuous cycle that continues to this day. People used to fear the cost of long-distance phone calls. Today, the same wires allow video calls worldwide at no cost and without busy signals (for those old enough to remember busy signals).

As technology evolved, capacity and availability increased. The market met the demand by adding more facilities. More important has been the ability to use software to access the latent value in existing facilities.

People were once thrilled at the prospect of 500 channels of television and now take for granted access to millions of videos, whether they are high-cost productions on Netflix or homemade content on YouTube. This was possible by repurposing existing broadband facilities. It worked very well and allowed people to share a single connection for multiple PCs and other devices.

In the dial-up era, the purpose of connectivity was to offer a limited set of services, such as phone calls and cable content, with the infrastructure as a cost center. People paid separately for phone calls and other services. The internet is fundamentally different because it enables anyone to create services.

Awareness of the importance of ensuring everyone is connected to the internet is increasing. It doesn't matter whether the connections use fiber, radios or satellites. There is one internet, so all paths contribute to the whole.

Today, a phone call is just an app. The business model that charges each subscriber for a line is a throwback to the days of dial-up, when a separate wire was needed for each phone call and connection.

To realize the value of this new infrastructure, it's important to embrace the internet as a source of opportunity and treat it like any other shared infrastructure, such as sewers or roads. People collectively need to pay for the system as a whole because the value is in the whole.

The advent of videoconferencing is an example of the benefits of this approach. It was prohibitively expensive as a billable service, but is now free using available connectivity. It represents a shift from scarcity-based policies to what is possible once people embrace the abundance of a shared infrastructure. To get a sense of the magnitude of this shift, compare the capacity of two one-lane roads with a two-lane highway. Now multiply that by a few million.

Open connectivity means that it is free to use – paid for by the community as a whole, thus making it available for day-to-day use and for innovations. This is in contrast with today's closed connectivity available only to subscribers.

IT'S ABOUT SOFTWARE

Historically, a separate wire was dedicated for each phone – even when it wasn't in use. Thanks to software, sharing that wire among thousands of calls by converting all content to packets that can travel independently is possible. Each wire (or fiber or radio) can be shared, or all can be shared, and people are not limited by the capacity of each one. As open infrastructure, the facilities can be available for all purposes.

The internet isn't the wires themselves – it is the software that enables people to own the local facilities. People are used to a subscription model that dates back to the days when phone calls were a service. Now that a phone call is an app, users no longer need a "provider" and can, instead, think in terms of owning shared infrastructure.

APPLICATION PROGRAM INTERFACES

Using common facilities to connect or communicate is only part of the story. The web itself is just a collection of standard interfaces. When people connect to a website, they use Hypertext Transport Protocol (HTTP) as the interface and fetch pages' code using the hypertext markup language.

In the same way, interfaces access data such as train schedules. Application program interfaces (APIs) enable anyone, whether Google or a student programmer, to create programs that provide routing suggestions on smartphones. Such software is what makes a smart city smart.

SOFTWARE ENABLES OPEN CONNECTIVITY

The concept of software-defined open connectivity is exciting because it means new services can be created

without the capital costs of new infrastructure, and people can save money by sharing common facilities for multiple purposes. It is similar to the multilane highway example on the previous page. This pooling creates effective capacity.

People are used to zero-sum analogies in which someone using a facility is taking away from others. But the internet offers a very different experience – the more people participate, the more capacity is available. This is no surprise – functioning markets create more capacity to meet demand.

When the idea takes hold, there can be a rapid transition. COVID-19 accelerated this process by introducing people to video calls and making streaming a norm. As people discover new ways to use open connectivity, adoption will be rapid and the new normal.

REALIZING THE FULL VALUE

In a new community with fiber to each home, there is immediate value in the ability to connect to the internet. At the very least, families can save perhaps $1,000 a year on the internet portion of their monthly bill. Without the limitations of a subscription model, people can get full, high-speed connectivity for all their devices as they travel throughout a community, whether it's a single MDU building or an entire city. Anyone can add capacity and fill in dead spots with Wi-Fi gear.

If a community wants to deploy a traffic or an air-quality monitor, it can place it wherever needed with no additional investment in infrastructure. Schools won't have to worry about whether students can afford an internet connection – they can assume it and provide inexpensive laptops to those who need them.

Taking advantage of the new opportunities will take time. Today, a connected watch may cost $200, but it requires a $20-per-month cellular account. Another device to monitor health, another monthly fee, and the innovator must negotiate with multiple providers. Even then, connectivity fails if an accounting error occurs or the user is contracted with the wrong provider. Children can have wrist devices that easily call home for help. As an aside, many people would choose to avoid invasive tracking while still allowing kids to call home.

Today, millions of dollars are invested in new services and smart cities. That's a way to get more of the same, but genuine innovations, such as the web and electronic spreadsheets, didn't involve large upfront investments. Instead, personal computing enabled people to establish the value without having to convince investors, thus allowing discovery. When Dan Bricklin and I created the first electronic spreadsheet, we had no idea how it would transform the world. We didn't have to – we could implement something useful with modest expectations.

Perhaps the next exciting innovations will come from high-school students sharing their experiments without convincing a venture capitalist of the value of their ideas.

Eventually, cities will be able to use connectivity for even the most mundane applications, such as determining which trash cans have been emptied and which sewers are clogged. Cities will also realize savings by not paying for separate schools and public works infrastructure. Public safety agencies may take longer to take advantage of the common facilities but will use them side-by-side with their existing facilities until they become comfortable.

City services will also be increasingly available as APIs, enabling applications that can use the information. Today's lawn sprinklers check the weather and save water by not operating on rainy days.

A critical result of these innovations will be the willingness to invest in more capacity and more software development as people see the value they get from their investment.

Now let's take an even longer view. What will the value of connectivity be in 30 years? The web was created within 10 years of the availability of the internet as an open infrastructure among universities. That was 30 years ago, and there continue to be new possibilities.

Twenty-five years ago, while at Microsoft, I championed the effort to ensure open connectivity within homes. Today, IP-connected devices ranging from printers to light bulbs to cameras are increasingly part of homes. There is no separate internet of things. Devices all use the same protocols, but innovation stops when people leave home and lose the ability to assume open connectivity.

COMMUNITYWIDE OPEN CONNECTIVITY

Thirty years ago, the web didn't exist, and people could watch shows only in specific time slots (or program a VCR). Picturephone was an expensive novelty. But 30 years from now, the idea of a cell phone bill won't make any more sense than the idea of a computer tying up a phone line when dialed into AOL did.

Today, on the cusp of a new era, writing and sharing connected apps and providing new services is becoming easier. In 2022, the ability to assume connected health care may be the most critical transformation.

BEYOND BROADBAND

Awareness of the importance of ensuring everyone is connected to the internet is increasing. It doesn't matter whether the connections use fiber, radios or satellites. There is one internet, so all paths contribute to the whole.

The future value of this connectivity goes far beyond internet access. Only through open community infrastructure can society realize the enormous value and possibilities of future, undreamed-of services. ❖

Bob Frankston has been online from home since 1966 and is best known for creating the electronic spreadsheet.