Digital Town Squares Drive Economic Development

Transforming a connected community into a smart community takes vision – along with a technology strategy to turn the vision into reality.

By Masha Zager / *Broadband Communities*

Without high-speed connectivity, communities can't hope to compete in the knowledge economy or provide smart-city services to their citizens. But connectivity alone doesn't guarantee success. Communities must take proactive steps to leverage that connectivity. A combination of enabling technologies, organization, and dedicated local effort is needed for cities to become truly "smart communities."

US Ignite, a nonprofit organization the White House Office of Science and Technology Policy and the National Science Foundation launched in 2012, runs several initiatives that help accelerate the smart-community movement and guide communities into the connected future. One of these, the Smart Gigabit Communities project, is a network of more than two dozen communities developing applications and services to address smart-city and IoT challenges. All these communities already have at least some access to gigabit broadband; now they are using that capacity to encourage economic innovation and better delivery of public services.

Originally funded by the National Science Foundation, the project was started to help the cities seed and prototype new applications and services, according to Scott Turnbull, US Ignite's director of technology. The first group of nine cities produced such exciting results that many other cities joined the project, most either funding their own participation or obtaining funding from private partners or universities.

The Smart Gigabit Communities now serve as test beds for high-bandwidth applications in many fields – public safety, transportation, environmental monitoring, health care, smart buildings and more. An application developed for one community can be prototyped and tested across the entire network of cities. The communities collaborate to share challenges, solutions and best practices, and they obtain technical assistance and capacity-building services from US Ignite. US Ignite also helps the communities find public and private funding for deploying the applications. Turnbull explains, "It's really about a focused effort on the ground to improve the local economy and to establish a greater citizen impact from these advanced technologies."

DIGITAL TOWN SQUARES

Most of the communities that participate in this program use a technology strategy that US Ignite calls Digital Town Squares. A Digital Town Square is an interconnect site that combines network switching capabilities – many of them in hardware provided by Juniper Networks – with edge computing capacity. Communities use these local hubs of network infrastructure to introduce new services, support advanced applications, and develop smarter communities through better broadband delivery.

Dan White, tech director at Pipeworks Studios in Eugene, Oregon, says his company requires EUGNet's connections to San Francisco and other cities.

A Digital Town Square can fill in gaps in local networking capacity that prevent communities from adopting advanced technologies. Specifically, it addresses three common problems that communities encounter when they try to develop advanced applications.

First, it provides a robust link between the local network infrastructure and the middle-mile and backbone networks that connect to the rest of the internet. Some Smart Gigabit Communities lacked adequate connections to the internet, says Mari Silbey, US Ignite's director of communications. Though their local networks supported ultra-high-speed connections internally, traffic bottlenecked when it had to go out to the public internet. "This is a way of making that tunnel larger," she explains.

Even for cities with ample internet backhaul, application developers and testers who used different carriers, and therefore different routes to the internet, might find that their traffic had to take a detour, and applications that required low latency and consistency did not perform as they should.

The second problem that a Digital Town Square addresses is that content,

applications and computing power need to be hosted close to users, rather than at remote data centers in the cloud. Edge computing – the use of distributed servers close to the network edge – is now widely used to improve response times and save bandwidth, especially for applications, such as smart-city applications, that process input from many users and/or sensors. The edge computing platform built into Digital Town Squares lets application developers keep most of their traffic local as they develop and prototype their smart-city applications. In essence, it provides them with a low-latency local area network.

Finally, delivery of smart-city applications isn't effective unless the entire community is well connected – which is true in very few places. Applications such as environmental monitoring or smart street lighting need to be ubiquitous, and incumbent providers cannot always upgrade their networks everywhere at once. In addition to providing backhaul and edge computing, the Digital Town Squares are proving useful in addressing the digital divide. "This has become massively important with

the rise of COVID," Turnbull points out. For example, Urbana-Champaign, Illinois, uses its infrastructure to upgrade the switches that provide broadband to public housing, and Chattanooga supports Wi-Fi hot spots on school buses.

The Digital Town Square infrastructure is hosted in a network operations center in each community. Various operators have stepped up to host servers in different cities – municipal networks, public-private partnerships, universities, and even commercial carriers willing to make an in-kind donation to the Smart Gigabit Communities project. Because most traffic going through a hub is local, the burden on the hosting organization is minimal.

COMMUNITY SUCCESS STORIES

In Eugene, Oregon, multiple Digital Town Squares connect to internet transport routes across Oregon and into California. These connections, along with the EUGNet fiber network in Eugene, make it possible for businesses in Eugene to work easily with counterparts in Portland and San Francisco. As a result of these

connections, 25 high-tech companies relocated to downtown Eugene over a two-year period, reducing the vacancy rates for commercial property there. At the same time, millions of dollars in venture capital poured into the city.

Using the Digital Town Square infrastructure, Eugene installed an application that monitors seismic activity for earthquake alerts, and hosted multimedia coding classes and platforms for community engagement. The city plans to build a link to the nearby city of Springfield so its residents also can use these services.

In Urbana-Champaign, the UC2B network used Digital Town Square infrastructure to significantly increase broadband capacity, improve network resilience and reduce the digital divide, as discussed on the previous page.

As a result of the increased broadband capacity, commercial providers have invested in their own

last-mile networks to support the 10 Gbps service that the Digital Town Squares make possible. The region now has redundant internet connections and the ability to distribute loads during periods of high traffic. Economic outcomes include high-tech research and jobs connected to the National Center for Supercomputing Applications at the University of Illinois, Urbana-Champaign campus.

In rural Utah, the Digital Town Square helped improve network latency, which attracts companies that require this type of service, including those in the gaming and game development industries. The Digital Town Square also hosts applications such as CloudFlare, a load-balancing service, reducing the burden on ISPs to make these investments themselves.

The Utah Digital Town Square is also being used for a specialized telehealth application. Extending

gigabit connectivity between Moab and Salt Lake City has allowed doctors to test remote application of deep brain stimulation, a technique used to treat Parkinson's disease, essential tremors and other neurological conditions. The technique could not be applied remotely without the low latency enabled by the Digital Town Square.

Many more communities could benefit from smart-city applications, according to Turnbull, and interest is growing as the project continues to produce results. Some communities are looking to join the Smart Gigabit Communities project, and others are seeking to develop regional internet exchanges. "We're in the process of creating a national movement," Turnbull says. ❖

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