Highlights of the 2016
BROADBAND COMMUNITIES Summit

Broadband's benefits – and the challenges for communities, providers and property owners in realizing those benefits – were the topics of discussion at the April 2016 BROADBAND COMMUNITIES Summit, held in Austin, Texas.

A BBC Staff Report

The Internet of Things Arrives

Of all the profound changes in information and communications technology, the Internet of Things (IoT) may prove the most significant, said Florence Hudson, senior vice president and chief innovation officer for Internet2. By 2025, the economic benefit of this new technology could reach $11 trillion, or as much as 10 percent of total gross domestic product. Lifesaving applications, such as telemedicine stroke diagnosis, are already in place, but expanding the IoT to a network of many billions of sensors presents challenges.

IoT applications such as smart buildings represent the convergence of information technology and operational technology. This is a challenge because IT and OT professionals think and talk differently and operate on entirely different time frames. Buildings are built to last for 50 years; IT systems are constantly patched.

Another challenge, Hudson said, is that every device in the IoT is discoverable and hackable. She showed a video clip demonstrating a hacker easily hijacking a Jeep and remotely driving it into a ditch. (Chrysler is now working on a fix – but plenty of other devices are still vulnerable.) Internet2 is starting a smart-campus initiative with 10 universities,

and the University of Washington will lead the risk management group. Brontobytes of data will need to be secured if the IoT is to become useful.

Steven Garbrecht, director of GE Digital, commented that the more technologically advanced a system is, the more fragile it is. GE is building industrial IoT systems for power plants, airlines, streetlights and other applications. "They need to be rock solid, reliable and secure to take advantage of the opportunities [the IoT] offers," he said.

Paul Hopingardner, deputy CIO for the city of Austin, said many potential municipal IoT applications existed. For example, Austin could use sensors to connect and direct traffic and to allow ambulances to transmit patients' electrocardiograms to emergency rooms as they transported heart attack victims to hospitals. Police vehicles could record and transmit police-civilian interactions, and firefighters trapped inside burning buildings could be located and rescued. Hopingardner also stressed the need to make systems reliable and secure.

"Engineering trust into products" will be necessary for the IoT to succeed, said Patrick Sims, CTO of Lightcore Group. "It goes beyond the firewall – it's the devices themselves," Sims added.

"The Internet of Things is profoundly human," said Anne Schwieger of the city of Boston, raising a set of challenges that went far beyond the technical realm. "We need to make sure we're solving problems for people." Schwieger questioned who would own and have access to IoT infrastructure and whether the infrastructure could be monopolized in a way that would hinder innovation. "If IoT devices are working through the public right-of-way, the platform needs to be open and publicly owned, and the data produced needs to be publicly owned," she argued. "The technology will be the fun and easy part. The harder questions relate to the institutional, governmental and human side of communications."

LIFE IN A SMART BUILDING

After a power outage briefly interrupted the session, moderator Mark Johnson, chief technology officer of MCNC, asked the panelists how the experience might have been different had the building been fully automated.

Garbrecht answered that the utility could have isolated and fixed the problem more quickly. Hudson said the building would have automatically gone off-grid and used backup power until the problem was fixed. Some Internet2 participants, she said, are working on a "microgrid" (distributed energy generation) strategy and on ways for microgrids to back one another up. "It's a combination of technical and business model innovation," she said.

Hudson also thought the building would have sent out a "beacon" to notify people inside it about the event, but Schwieger pointed out that sending such a beacon would have required layers of coordination among different agencies. "Are we there yet?" she asked.

Sims argued that, had the grid itself been smart, the power would never have gone out. The utility would have automatically rerouted the power over its redundant capacity or switched over to rooftop solar panels. With the systems that will be available in five or 10 years, he said, "We won't even see the lights flicker."

The Third Wave

Mark Strama, Google Fiber: In "The Third Wave," Steve Case says the first wave of the internet (such as AOL) was characterized by technology risk: Can you make it work? That's now a settled question.

The second wave is characterized by market risk: Will consumers adopt it? That was an open question when Google announced its intention to deploy gigabit internet. It turns out the gigabit is something consumers want. They don't want to think about speed – it should just be enough.

In addition, applications now in nascent stages will make the gigabit imperative. Google really likes April Fool's Day; we get carried away with it. Last week, we announced that we were partnering to develop technology for teleportation. Well, that's a long way off, but one technology we use every day is telepresence. It's unlike what you're used to with videoconferencing on the laptop. There are no delays and no pixelization. It's truly like being in a room together. Within a few days of using it, I couldn't imagine being without it. The phone becomes completely unsatisfactory. Telepresence makes the case for symmetrical speeds. It's one of those technologies that will be a killer app.

The driving story in SXSW Interactive this year was virtual reality (VR). If SXSW has any predictive power, that's where technology is going. VR is insanely cool. Combine it with videoconferencing, and it's pretty close to teleportation. Google is using Cardboard [a low-cost VR device] in an application called Expeditions, which takes kids on field trips to the bottom of the ocean and the top of a volcano. It's a powerful way to transform and disrupt the education space. The ability to combine VR with real-time, live experience drives bandwidth consumption.

When President Obama came to Austin for SXSW, there was a 60 percent reduction in street traffic with no reduction in productivity. Videoconferencing was critical, and that requires abundant bandwidth. It's far more economical to enable people to

Mark Strama, Google Fiber

work productively from home. Inertia and legacy management practices are standing in the way, but we in Austin saw how effective it could be.

PARTNER AND POLICY RISK

The third wave is characterized by partner and policy risk. Google is the first internet company to become an internet service provider. It's going to take a while to reach all the communities you in the audience serve. The most common question we at Google Fiber hear is this: When can you get to my city (or building)?

People want competition that empowers consumers. Google Fiber recognizes this and sees partnership and policy as critical enablers. At a policy level, we recently made an announcement about a partnership with the Huntsville, Ala., electric utility. The utility is building fiber to the premises, and Google Fiber is the anchor tenant. Huntsville is enabling competition. The city's paradigm was right – it saw itself as a better builder of outside plant than a private provider would be, and it doesn't think there needs to be more than one fiber to each user. We think that's great. The opposition is the same that we've faced in entering every market. There's enough of a case for the benefits of competition that we don't see open access as being a deal killer.

We can't get to all communities right away. We are optimizing for

speed and scale, but we can't get to everyone at once. So communities need to think about a future-proof approach to construction and renovations. What investments can enable residents to benefit from competition? Cities might look at the fiber cities checklist on the Google Fiber website – it shows a list of things cities can do to attract Google Fiber or other competitive providers or to get incumbents to upgrade their infrastructure.

Think about dial-up. People have forgotten that it was awesome compared with what had come before. Before dial-up, there was the bookstore, the library and the grocery story. Dial-up offered content on demand. By today's standards, dial-up was really slow, but it made any information available whenever it was needed. Email was empowering and disruptive. Nobody thought about missing YouTube videos.

When broadband came along, the way people used the internet changed fundamentally. Kids watch more YouTube than TV. The evolution to a gigabit is a much bigger change. What uses will be found remain to be seen. If you think the evolution from dial-up to broadband was good, just wait for the gigabit.

DOES YOUR PROPERTY NEED A GIG?

Eric Boyer, AT&T

Eric Boyer, AT&T: The question is, does your property need a gig? The question is *not* whether so-and-so in Apartment 410 needs one. Do you just need a gig to the property, or do you need a gig to every unit? I think so. How about a symmetrical gig? Fiber makes a difference there.

I would argue that fiber has an advantage. It has fewer active electronics – and the fewer things that can break, the more reliable the solution is. So fiber is meaningful for property owners and for residents.

Is 4K TV meaningful for your property? Ultra-high definition with high dynamic range is materially better than high definition. There hasn't been a lot of 4K content yet, but that's about to change. The Masters Golf Tournament starting this week will offer live coverage in 4K, and more sports-oriented content is coming this summer and fall. When 100 units in your apartment complex want to watch the Super Bowl in real time, that's 100 20 Mbps streams for three hours, plus social media, plus whatever anyone else is doing at the same time.

AT&T passed more than 1 million residential units with fiber during the fourth quarter of 2015, and we're not slowing down. More than 400,000 of those units were in multifamily housing, and almost 300,000 of those are capable of getting a gig. By the end of 2016, almost all of them will be. Every new construction in a metropolitan area has fiber – and in many markets, multifamily construction is at a multiyear high. But we're continuing to add fiber in brownfield areas as well as in new construction.

What Good Is a Gig?

Gigabit applications aren't just pipe dreams anymore. Dozens of real, useful applications are now being developed and commercialized. A panel organized by US Ignite, the public-private coalition that promotes development and use of applications for next-generation networks, showed how foresighted communities are using their advanced networks today.

Applications that require next-generation networks include those that use huge amounts of data (not just Big Data analytics but 4K video and virtual reality), those that need fast response time (IoT, virtual reality) and those that require a high degree of security and privacy. Bill Wallace, executive director of US Ignite, pointed out that latency is equally as important as speed in enabling the new generation of applications. Many of these applications use "locavore" computing – that is, local cloud storage – to improve latency.

Wallace offered the following applications as examples:

COX HOMELIFE:
HOME SECURITY & AUTOMATION
PERFECT FOR THE MULTIFAMILY COMMUNITY RESIDENT

Kristine Faulkner

Vice President / General Manager
Cox Homelife & Smart Home
Cox Communications Inc.

Kristine oversees all related operational strategies for this business unit, including marketing, sales, customer experience and advanced services development. She has been recognized in CableWorld's "Top Women in Cable Tech" and CableFAX's "Most Powerful Women in Cable" lists.

Vickie Rodgers

Executive Director
MDU Strategy & Operations
Cox Communications Inc.

Vickie is responsible for revenue growth, product development, and overall strategy for this $2 billion segment. Her team manages relationships with property owners, consultants and management companies in Cox Communications markets.

NEW SMART HOME TECHNOLOGY GOES WELL BEYOND HOME SECURITY.

Q. What is Cox Homelife℠ and why is it relevant to multifamily residents?

KF Cox Homelife is Cox's home security and automation solution that brings together professionally monitored security with smart devices to protect, monitor and control your home. The devices can be accessed easily through the free mobile app, so you can check in on your home and loved ones anytime, from anywhere. With many more people coming and going from MDUs, home security and automation gives residents more peace of mind at home and away.

VR Cox Homelife is customizable and portable, making it perfect for the MDU resident. Because devices don't have to be permanently mounted, they can be moved from one apartment to the next and expanded upon as needs change.

Q. What is the draw in having home security and automation as part of a multifamily community?

VR It's important to provide cutting-edge amenities for differentiation in the competitive landscape of the multifamily market. Residents — especially millennials — have a high expectation for technology to be included in their home's offerings. A solution like Cox Homelife is a great feature to add value for a resident and foster greater resident acquisition.

Q. What is your favorite way to use Cox Homelife?

KF I love to use Cox Homelife to check in when I'm on the road traveling for work. One of the greatest features is that I can enable automations to occur with one click. For example, I can set up personalized rules so that once the system is armed, the lights will go out and the thermostat will automatically change to a preset temperature. I also have cameras so I can check in periodically just to make sure all is good while I'm away. So many customers tell us how important their pets are to them. A recent survey told us that people check on their pets at least as many times a day as they check on their tweens or teens at home.

Q. What is the most important message you would like the multifamily market to know about Cox Homelife?

VR Wherever you live, whatever you call home, Cox Homelife is there for you. From smart thermostats that help you save energy and money to cameras that let you check in on your family and pets when you're away, Cox Homelife provides both comfort and peace of mind.

KF Nearly 60% of U.S. broadband households have interest in the safety, security and convenience benefits enabled by smart home products like Cox Homelife.* We invite you to visit your mobile app store to download the Cox Homelife app and click the "Take a Tour" button to experience all that Homelife can do.** We are constantly evolving our offering in order to meet the needs of our customers — property managers and residents alike. Every home is different and we work directly with customers to give them the security and automation that best fits their lifestyle.

VISIT COX.COM/HOMELIFE TO LEARN MORE

COX Homelife℠

Protect. Monitor. Control.

- Experiential learning: Students in Chattanooga are learning marine biology from researchers at the University of Southern California. They have access to 4K microscopic images in real time. Low-latency gigabit networks enable them to manipulate remote microscopes, view ultra-high-resolution images and videoconference with researchers at the same time.
- Virtual reality–based technical training: Entry-level wind and solar industry workers learn design, installation and maintenance skills via an immersive, cloud-based VR platform. The system enhances learning and reduces investment in equipment, lab space, personnel and field visits.
- Remote physical therapy: Interactive videoconferencing and a 3D sensing interface link a physical therapist in a clinic to a patient in a home. Quantitative movement assessments are computed and delivered to the therapist in real time so exercise routines can be updated.

Aaron Deacon, managing director of KC Digital Drive, spoke about several applications being developed in Kansas City.

- In-home monitoring for dementia caregivers, including video recording of difficult situations with remote playback and consultation by experts
- Health IoT application, including such basic metrics as "Was the refrigerator door opened this morning?" and advanced features such as gait analysis for Alzheimer's detection
- Software lending library: The Kansas City public library allows members to check out software and use it from their home computers. This extends the lives of old PCs (the software actually runs on the library computers) and makes software more available throughout the community.
- SightDeck: A system for real-time collaboration, including integrated display system, camera system,
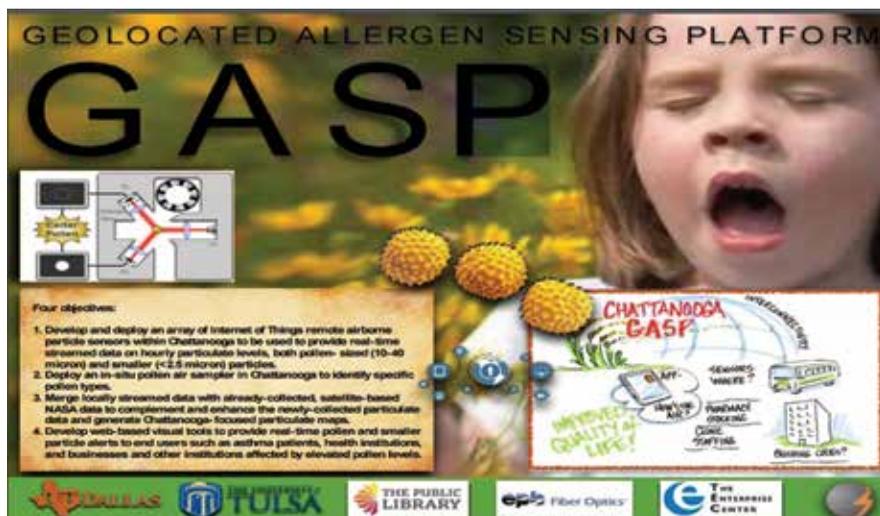
compositing system, presentation system, HD production system and broadcast studio.

Danna Bailey, vice president of corporate communications for Chattanooga EPB, said that Chattanooga's first "killer app" was the smart electric grid. The city's power distribution grid has been highly automated, resulting in improved operational efficiencies, increased options for customers and dramatic reduction of power outages.

Many other projects are in development, she added. For example, David Lary, a professor
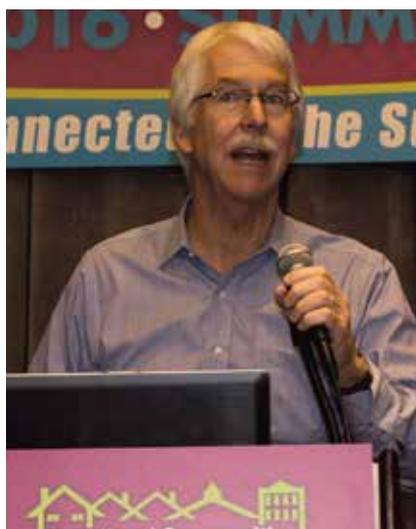
Bill Wallace, executive director, US Ignite

at the University of Texas, Dallas, spoke about his work with the city of Chattanooga on a medical and environmental informatics project related to asthma. Using historical data sets that relate environmental and weather conditions to the incidence of asthma, he can now forecast asthma outbreaks nearly four weeks in advance. The next stage, Lary said, is to deploy sensors around Chattanooga that measure environmental conditions every second and stream the data in real time. These data will be correlated with emergency room admission codes and used to advise at-risk individuals and hospitals about the potential for asthma problems.

Lev Gonick, CEO of One Community, spoke about several initiatives in Cleveland:

- Chronic disease management: A collaborative platform with uncompressed video supports interaction between patients and medical professionals. One Community is working with community anchor institutions (health care providers, universities, libraries, schools) and a holographic production provider to help manage diabetes and asthma cases. Gonick noted that the augmented reality tools used in the collaboration platform were originally developed for gaming.

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N E T W O R K S

- The Cleveland Health-Tech Corridor: A series of IoT and Big Data demonstration projects along the corridor will explore the value of combining universities, health care, transportation, retail, and public spaces and recreation.
- Network-enabled STEM classes: To address the shortage of good STEM teachers, this proposed project will offer real-time, interactive, daily progamming in as many as 15 cities.

Apparently, gigabit networks unleash enormous creativity. For example, new applications underway in Cleveland include a surgical theater – a high-definition platform that brain surgeons use to practice their skills – and an entirely new art form, pioneered by a dance professor at Case Western Reserve University who stages holographic dances with dancers in multiple locations.

In answer to a question about communities getting started as application test beds, Bailey said, "You'd be surprised how many smart people you've got in your community. In Chattanooga, an ad hoc group of community volunteers just started connecting the dots."

Big Providers, Big Plans

Six large cable providers and telcos shared their plans for serving the multiple-dwelling-unit (MDU) market over the coming year. All are investing in higher broadband speeds and innovative services. Five of the six are currently installing fiber to the unit in many (though far from all) MDU communities; the sixth is installing fiber to the building with plans to upgrade to all-fiber networks at a later date. The cable providers are upgrading to DOCSIS 3.1 in the MDU communities where they will not install fiber. Other persistent themes included support for mobile devices, ease of installation and improved customer experience.

CENTURYLINK

CenturyLink is investing in gigabit fiber, said Chris Denzin, the company's vice president for national field sales and development. It has 500,000 route miles of fiber today and doubles its capacity every 18 months; it also has major data centers around the United States and the world. Two years ago, CenturyLink committed to build fiber to the home on its existing network, and now it has significant FTTH investments in 17 states. It uses GPON to provide symmetrical gigabit service and plans to upgrade to next-generation PON, which will support higher speeds. Inside buildings, fibers are run through microducts. All new properties are fiber-fed.

In deciding where to deploy FTTH, CenturyLink looks at a number of factors, including the following:

- Is there demand for fiber bandwidth?
- Is the fiber underground or buried?
- Are utility poles available?
- Is the city friendly to broadband investment, and is there community involvement?

In buildings where it does not deploy fiber, CenturyLink intends to use G.fast, an advanced DSL technology that Denzin said was "inexpensive but not quite as good as fiber to the unit."

CenturyLink is developing a software-defined network/network functions virtualization (SDN/NFV) ecosystem, which will include virtualized customer-premises equipment.

Denzin introduced a new type of customer experience: CenturyLink ON, which provides instant symmetrical gigabit in the home, provisioned within 30 seconds. Customers can sign up, activate and manage their accounts online and receive online bills. There are no contracts, installation fees, equipment fees, truck rolls or delays.

AT&T

Todd Flack, assistant vice president for AT&T Connected Communities, said AT&T's gigabit FTTH product, GigaPower, was expanding across the United States and was now available to 1.5 million households in more than 50 metropolitan areas. AT&T is developing a real-time, online map of fiber properties that owners can use for marketing. The map will display the property name when a user hovers over a point.

Michael Slovin, vice president
XFINITY Communities

With the acquisition of DIRECTV, Flack said, AT&T now has the largest video subscriber base in the United States. AT&T is continuing to enhance U-verse video through 2016 but will ultimately replace it with an IP-based version of DIRECTV video delivered over fiber. Video service options will include mobile video, skinny bundles, a subscription-based streaming application and the Front Porch Audience Network, which will feature original programming targeted to teens and millennials.

For wired service, AT&T GigaPower uses GPON technology with fiber running through microducts to small indoor optical network terminals. To deliver great wireless

experiences inside buildings, AT&T uses a combination of small cells, metro cells and managed Wi-Fi. The company operates more than 5,000 stores, which sell wearable devices and home automation devices in addition to AT&T core products.

Applications that AT&T expects to become increasingly popular and important include connected cars (onboard diagnostics, passenger entertainment) and tracking for package deliveries.

VERIZON

The huge buying power of the millennial generation drives a lot of Verizon's decision making, said Mike Weston, executive director of Verizon Enhanced Communities. The millennials are the first generation to grow up using technology, and they consider service quality more important than price – in fact, they will pay premium prices for better service. This generation's use of social media, mobile devices, over-the-top video, augmented reality and 4KTV is driving demand for bandwidth. As a result, Verizon's entry-level fiber-to-the-home broadband tier is now 100 Mbps.

Verizon is experimenting with blending new, interesting combinations of services for the millennial audience. Go90 is a wireless-only, advertising-based mobile service that blends social media and short-form video, allowing users to share content seamlessly. Other offerings include AOL Live, Custom TV (a skinny bundle) and the Fios mobile app.

Despite the fact that Verizon is now focused on East Coast markets, it is still committed to Fios FTTP. "Expect to see some new announcements," Weston said. The planned upgrade from GPON to NG-PON will dramatically increase the capacity of the Fios network. Verizon also intends to deploy 5G wireless in unique ways. "It's complementary to some other things," Weston said, "and not a replacement for 4G wireless."

Verizon also has software platforms for the IoT and for connected cars, and thousands of developers are already

> The huge buying power of the millennial generation drives decision making by Verizon and other providers.

working on applications for those platforms. Verizon is investing in some new applications that it believes will be useful, such as ride-sharing for parents and early earthquake detection – and it even provides incubator workspace for some developers.

COMCAST

"People are buying cars on eBay from their mobile phones!" said Michael Slovin, vice president of XFINITY Communities, describing customers' growing reliance on the mobile internet, both at home and on the go. He added, "Fans at the Super Bowl generated eight months' worth of streaming HD video."

To address skyrocketing bandwidth demand, XFINITY Communities created what it calls the Advanced

Communities Network. Over the next few years, all 1.2 million XFINITY Communities residents will gain access to gigabit speeds – some, mostly new builds, via fiber-to-the-home networks and others via traditional coax cable. Comcast has already launched DOCSIS 3.1 in a limited market. "We didn't want to build 'fiber to the rich,'" Slovin said. "Our philosophy is to get gigabit speeds to everyone, then let the customer choose whether it should be symmetrical or not."

Depending on building construction, microduct or siamese cable may be used inside buildings. "The products are resonating with residents," Slovin said.

Comcast customers, like those of other providers, watch less live TV

MUNICIPAL FIBER NETWORK SPURS BUSINESS GROWTH

Mayor Karen Sheek, Cortez, Colo.

Mayor Karen Sheek, Cortez, Colo.: Earlier this year, Osprey Packs told us they wanted to stay in Cortez, but only if they could be a bigger presence in the community with a location in the heart of Cortez, not in an industrial park – and they had to have fast, reliable internet service. They wanted us to dedicate six strands of fiber for them and be able to buy more strands in the future. Well, we could do that! We negotiated a win-win deal on land acquisition, and they are scheduled to break ground in the fall. That's a real success story. They promised that by moving their international headquarters to Cortez, they would guarantee 45 new high-paying jobs. I'm optimistic we'll be able to bring in more economic development. Lots of people are getting tired of air pollution and noise pollution, and Cortez is a wonderful alternative where they can still be fully connected to the world.

> "We didn't want to build 'fiber to the rich,'" Slovin said, explaining that Comcast's philosophy is to deliver gigabit speeds to everyone.

than they used to – but they watch more video overall because they have access to various on-demand services. The fastest growing platform is a multimedia device connected to a TV screen, and Comcast's TV App works with some of these. Other services include X1 Share (video sharing from smartphone to a TV), and X1 Stream.

Slovin said that Comcast was working to improve its customer service, which has generated many complaints, "but we know we have a ways to go." New service features include X1 Co-Pilot, which enables a chat agent to take over a customer's equipment to solve a problem; Tech ETA, which shows a technician's expected arrival time; and community account representatives for MDU communities.

CHARTER

Charter has just become the second-largest U.S. cable provider, and it's upping its game. "We knew we were behind," said Adam Ray, vice president of Spectrum Community Solutions, "so we made a commitment to build fiber to every new-build property of 100 units or more. We're dedicating a node or nodes to each property and investing for an EPON future." Until EPON is needed, Charter will use RFoG nodes and leverage existing in-building coax. Brownfield communities will have DOCSIS 3.1 networks.

Another key technology is managed Wi-Fi, which Spectrum Community Solutions launched in 2015. "Unmanaged Wi-Fi is a pain," Ray said. "Property management sees

it's a poor customer experience." With managed Wi-Fi, Spectrum installs a media distribution hub in each unit and manages the in-building wireless network. Property management can distribute and manage network credentials without having to call tech support.

Like other providers, Charter sees the mobile video future. Its mobile video app allows customers to watch video on mobile devices either inside or outside their homes. Customer support, too, has been automated; MDU residents can now order services online and receive texts to let them know when technicians are on their way.

COX

Cox Communications wants its networks to be future proof and to deliver on the IoT, said Guillermo Alvarez-Rivas, director of multifamily sales for Cox Communications. Its strategy to achieve these goals is to provide gigabit internet service via GPON in new communities and via DOCSIS 3.1 (beginning later in 2016) in brownfields. "Owners don't want to tear up old buildings," Alvarez-Rivas said. Cox is also installing managed Wi-Fi access points throughout the buildings. Siamese cable and microduct are used within buildings.

The company has already introduced gigabit service in 15 of its 20 markets. "We did not know how we were going to do it when it was first announced," Alvarez-Rivas admitted. These gigabit networks will support security cameras inside units, smart thermostats, community Wi-Fi with 50 Mbps speeds, cloud services, streaming IP video and more. "Everything has to work on a mobile platform," Alvarez-Rivas said. Video must be available where and when residents want, on the device of choice. Cox has entered into telehealth partnerships with the Cleveland Clinic and other health care providers that will allow residents to have virtual doctor visits, order prescriptions online and have medications delivered the same day by drones.

E-RATE IS AN ENORMOUS STRATEGIC OPPORTUNITY

Joanne Hovis,
CTC Technology & Energy

Joanne Hovis, CTC Technology & Energy: Schools served by municipal fiber are paying less per Mbps and are able to get better service at lower prices – if they pay at all. There's an alignment of interest and missions between local governments and schools. They see each other as partners. Schools are the biggest buyers of telecom services in the United States. They're important stakeholders with enormous needs. The FCC introduced competition for E-Rate subsidies in 2009, so the services don't have to be provided by a phone company. The provider can be a nonprofit, a locality or a research and education network. In 2014, the FCC added new funding to make sure there could be direct fiber optics to every school and library and Wi-Fi inside the buildings. We're not anywhere near that goal yet, but there are new competitive dynamics. If you put all the pieces together, it's an enormous strategic opportunity, and it would be a shame not to take advantage of it.

Economic Development: Successful Local Projects

A community fiber network succeeds by understanding and meeting the needs of its particular community.

Mitsuko Herrera, UltraMontgomery: Our business roundtable found that pricing was not the biggest pressure point for either large or small businesses in Montgomery County; rather, what they needed most was reliable, high-speed connectivity at all speeds and the availability of diverse routes.

The county is leveraging its existing fiber and deploying new fiber in a way that is complementary to other providers to make broadband as widely available as possible. We hope to make our fiber available as an on-ramp to spur cooperation and collaboration. For example, the county shared the cost of bringing fiber across the river to Ashburn, Va. [site of a major internet point of presence] with two other providers.

We're not trying to maximize the number of our customers; we're trying to maximize the number of jobs in the county. Companies have different needs. One company wanted a 200 Mbps link; smaller companies needed less but still had to update their websites in real time. For biotech companies, the biggest concern is power, but they need huge databases.

To make Montgomery County a smart community, the county is installing a smart transit system and putting Wi-Fi in parking lots and buses. We're also finding ways to provide broadband to the lowest-income residents and senior centers – this could make us eligible for Lifeline funding. As part of a federal grant, we connected public-housing properties.

Terry Huval, Lafayette Utilities System: LUS originally put in fiber for its own electric plant, and then the Chamber of Commerce asked if the fiber could be used to support oil and gas companies trying to find a way to stay in town. We decided to serve those companies that the Chamber of Commerce pushed us to. Once we

Mitsuko Herrera, UltraMontgomery

began to expand citywide, there was already a lot of grassroots support, and opposition made us even more popular.

Because of concern about the digital divide, we offered low prices, placed infrastructure in all parts of town and tried to get low-income people involved in the project. We couldn't get grants, so we had to borrow or earn all the money to build the network.

Fiber became a differentiating factor, and it brought new businesses to town with high-paying jobs.

Robert Wack, Westminster, Md.: Just building Westminster's municipal network created a dozen new jobs. One business relocated its headquarters and data center in town partly because of the fiber project. An existing company plans to move its call center into Westminster. Many businesses say the availability of municipal fiber will make a significant impact on their operating expenses and their efficiency. We hope to quantify that going forward.

An indirect benefit is that the incumbent provider has become much more willing to do deals with customers to retain their business. That's a benefit to the community – people are saving money. One requirement we had in our agreement with Ting [the operator and service provider on Westminster's

network] was that it provide disruptive quality of service and pricing. We didn't include specific numbers, because we wanted "disruptive" to be a moving target.

James Benham, JBKnowledge and College Station, Texas: As an entrepreneur, I've tried to add the amenities of a large city to the little town of College Station. We love football and have a big stadium. There's population growth due to the university and a lot of people with a big need for bandwidth. The city owns the electric utility, there's healthy growth in retail sales and property values, there's tourism due to the Southeastern Conference, there's a biotech corridor, there's national recognition. The only problem was bandwidth and pricing. Key areas were unserved, and bandwidth prices were very high. Companies were leaving for Austin because of that. The talent and labor pool were leaving because they couldn't get bandwidth, either.

We formed a coalition and, together with the city of Bryan, sent out an RFP that offered the city's dark fiber and conduit for lease at affordable rates. We made GIS information readily available and promoted dig-once policies. The RFP changed the dynamic with the incumbent carrier for the better. Here's some of what we learned:

- Not everyone who claims to be on your team actually is. Some of them are just spying.
- Putting long-term economic development ahead of short-term profit is crucial, even if that means leasing assets at cost.
- The first responses to an RFP aren't necessarily the best ones. Waiting longer and digging deeper brought in better proposals.
- Promoting the project is very important. Make sure everyone hears the complaints about the current system.

Sightings From the Summit Exhibit Floor: Fiber Enclosures and Tracer Wire

Boxes for handling fiber in tight places come in almost any shape and size imaginable. Shown (left to right) are enclosures from Opterna, iPhotonix, Primex, Zhone (top), Clearfield (bottom) and Preformed Line Products.
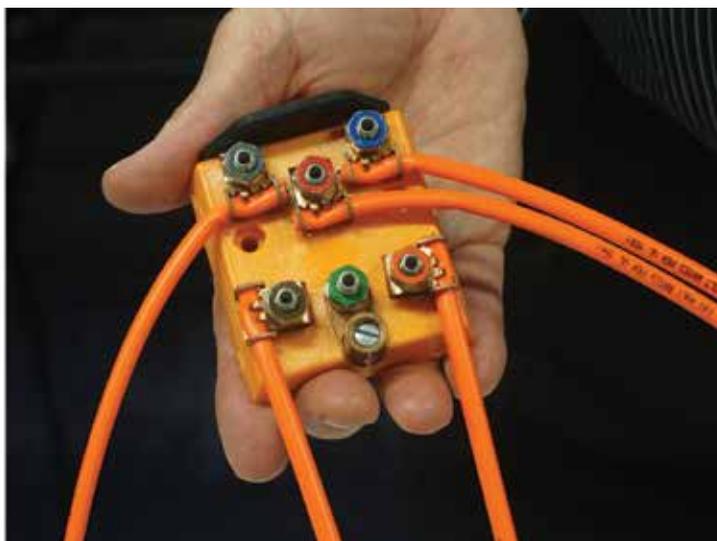
Rough and ready Trace-Safe wire from Neptco helps deployers find buried cable. Field technicians have a wide variety of building blocks, such as this endpoint; multiple-wire couplers are easy to waterproof (left). Power-connector blocks (right) can also be easily fabricated in the field to meet specific needs.

Three Companies Unveil Research Findings at the Summit

Three organizations presented new research at the 2016 BROADBAND COMMUNITIES Summit: Magellan Advisors made public a benchmarking analysis of seven different approaches for communities to improve broadband access; Strategic Networks Group discussed its survey of state broadband policies and outcomes, which was undertaken in conjunction with the Rural Telecommunications Congress and with support from the NTIA; and Calix presented a report from its consulting arm about best practices for installing managed Wi-Fi in a dense multifamily environment.

The three articles following this one present summaries of these research reports. The full reports can be obtained directly from the authors.