Putting the Gigs to Work

Highlights of the 2018 Broadband Communities Summit held in May in Austin, Texas

A BBC Staff Report

Why Do Homeowners Want Fiber?

Each community has unique reasons to demand better broadband. The Great Communities session at the Summit presented two very different California communities, built a half-century ago about 100 miles apart. One is a small, urban condo apartment building, and the other is a luxurious private oceanfront community with award-winning architecture and a world-class golf course.

Until recently, both communities had inadequate broadband, and in both cases, the resident owners eventually succeeded in securing FTTH networks. Both have increased their property values as a result.

Of the 38 units at 407 Orange St. in Oakland, a majority were occupied by people who worked from home at least some of the time. Residents were frustrated that the DSL network in the building provided only 6 Mbps at the best of times. As time went on, their bandwidth needs increased, and the network became increasingly inadequate. They researched the possibility of installing an FTTH network in the building and even requested bids for constructing such a network. However, with bids in the $60,000 to $80,000 range, they eventually decided the cost was too steep.

Finally, in 2016, Associa, the management company retained by the condo association, learned that AT&T had begun to install gigabit fiber in Oakland and suggested that AT&T Fiber might be a good fit for the condo. AT&T proposed a solution that met the condo's aesthetic and connectivity needs and proposed to cover the entire cost of the deployment. The new network went live in May 2017, and by March 2018, 60 percent of the residents subscribed to fiber services.

A hundred miles north of Oakland, residents of The Sea Ranch – a primarily vacation-home community that includes both owner-occupied and rented units – suffered from even worse connectivity. Obsolete cable plant kept broadband speeds below 3 Mbps, and internet access was often nonexistent. Cellular service was also spotty. Deployment challenges included the oceanfront location, large lots and California's strict environmental reviews, which required permits from 23 state and local entities.

The Sea Ranch was unsuccessful in attracting a provider to invest in a fiber network. However, its homeowners had deep financial resources and ultimately decided to pay for their own network through a special assessment.

Heather Burnett Gold, FBA

Heather Burnett Gold, Fiber Broadband Association: I served on the FCC's Broadband Deployment Advisory Committee, and no one knows the purpose of it or how the model codes will be used. I'm proud of some things, such as the creation of asset inventories that communities need to have in place to inform the investment case. … And there was good language on the one-touch make-ready process. But what are these codes for?

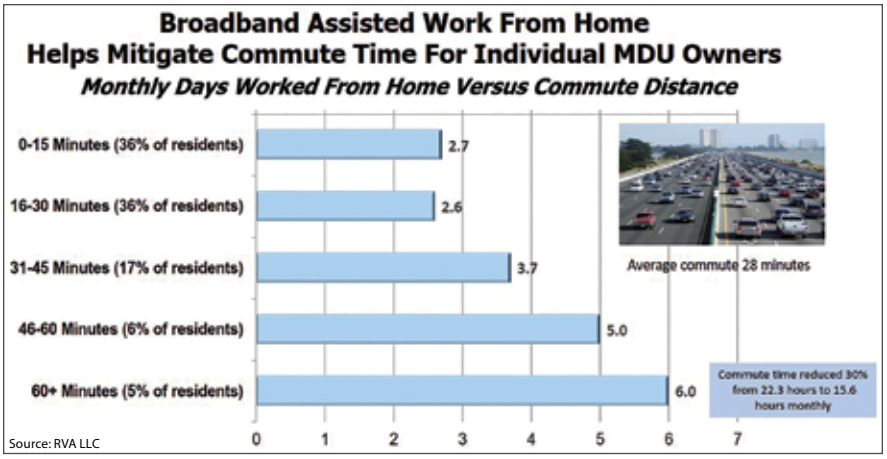
(To finance the network up front, the homeowners association borrowed from its membership and from a commercial source.) This gave the community the ability to build the most future-proof network possible – a point-to-point Ethernet architecture that supports unlimited bandwidth demand for existing homes and a backbone with spare capacity that will support the growth of the community and even the expansion of the network to neighboring communities.

The Sea Ranch engaged GigabitNow, a Seattle-area company, to design, build, maintain and operate the network. The network was activated for the first 500 homes in December 2016 and was available to all 1,900 premises by August 2017. Exceeding the homeowners association's expectations, 84 percent of homeowners opted for internet access, and 40 percent signed up for phone service.

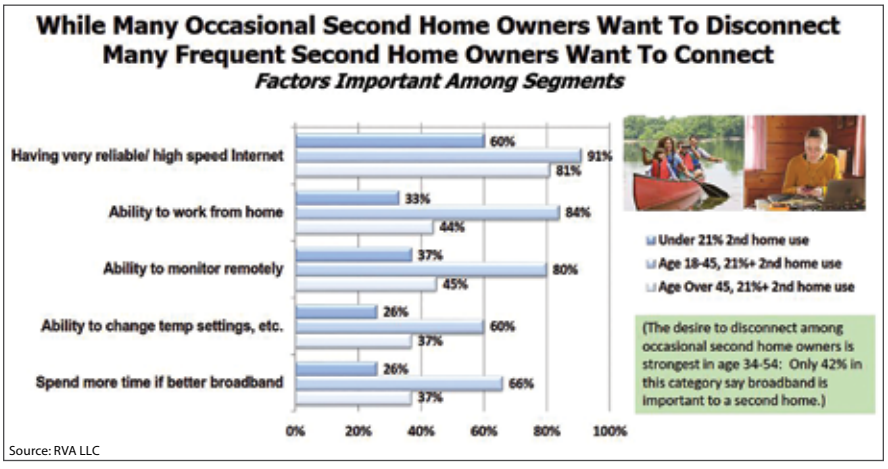
MDU AND SECOND-HOME OWNERS WORK AT HOME

In preparation for the Great Communities session, **Broadband Communities** commissioned Michael Render, CEO of the market research firm RVA LLC, to survey owners of units in multiple-dwelling-unit (MDU) communities and vacation homes about their need for broadband. This is the largest, most detailed survey of its kind to date.

At the session, Render reported that very high speed, reliable broadband was the highest-rated amenity for MDU unit owners, with 86 percent of respondents considering it important or very important. FTTH subscribers



The longer a condo owner's commute, the more important telecommuting is.



Connectivity is important for owners who want to spend more time at their vacation homes.

Barry Walton, Corning

Barry Walton, Corning: Deploying fiber to the unit in a multifamily building can be very challenging, and following a set process can maximize the chances of success. We learned at Bell Aliant that mirroring the original copper installation wasn't necessary; in a fiber deployment, it's best to gather as much information as possible (including blueprints and photos), review the owner's requirements and explore all the design options before deciding on a design approach. Each building has unique characteristics, and these will impact the design selected. Not only the cost of the deployment but also the time it will take and the risks of possible damage are important. Getting the owner to sign off on the plan is crucial, and so is making sure the owner and residents understand what to expect in terms of timeline, products used and quality of the result. It's becoming more cost-effective to bring fiber to every unit and then store the slack if the resident isn't going to subscribe – this reduces technicians' installation time if the resident takes services at a later date. In some buildings, it may even make sense to "fish" the wire inside the walls of all the living units.

Blair Levin, Brookings Institution

Blair Levin, Brookings Institution: The BDAC model codes will not boost deployment or close the digital divide. They have an asymmetry of rights and responsibilities – all the obligations are on the cities. The object of the process was to create a narrative in which the cities are the obstacle to 5G deployment, but even Wall Street doesn't agree with this. It's not even relevant to most cities, because 5G isn't being deployed in most cities. A better approach would be something like the Google Fiber process, in which each city made its own deal for deployment. And if a city doesn't want 5G to be deployed, well, that's its business.

among the respondents were much more satisfied with their broadband service than cable or DSL subscribers.

The residents of 407 Orange St. were not unusual in their need to telecommute; the survey showed that more than half of MDU unit owners under age 55 sometimes worked from home, and more than 15 percent had home-based businesses. In general, the farther MDU owners lived from their offices, the more often they wanted to telecommute. Those who lived an hour or more from their workplaces used broadband to reduce their commuting time by 30 percent. A substantial number used advanced broadband tools such as videoconferencing and virtual private networks.

The survey of second-home owners had more ambiguous results. Owners who used their second homes only occasionally wanted to disconnect from the internet; owners who used their second homes frequently considered connectivity very important. Younger (under-45) owners who spent more time in their second homes were especially interested in working from the vacation homes when they were there and monitoring the homes remotely when they weren't there. Two-thirds said they would spend more time in their vacation homes if the broadband access were better.

PROPERTY VALUES RISE WITH FIBER

At 407 Orange St., where condo unit owners can now work from home at broadband speeds up to a gigabit, the condo association is marketing the new network on Zillow and other real estate websites. Two recent sales of comparable units in the building, one just before and the other just after fiber services went live, show a price increase of $90,000, or 21 percent. This price difference, which may reflect factors in addition to the FTTH deployment, is considerably higher than the national average of about 3 percent that FTTH typically adds to condo unit value, according to Render's surveys.

At The Sea Ranch, home sales had been slow before the network was built, and sellers felt the prices did not reflect the properties' true values. Since the network was built, houses have become easier to sell and command higher prices. Significantly, more young families are buying homes, confirming Render's finding that younger demographics place a higher value on connectivity for vacation homes.

The Major Providers Reveal Their Plans

At the Summit, senior officials from AT&T, Verizon, CenturyLink, Comcast and Cox Communications discussed their plans for serving multifamily communities – and, not surprisingly, all five companies have similar visions of the future.

All the majors are increasing their deployment of gigabit or near-gigabit speeds, using several technologies. They recognize the importance of frictionless sign-up and instantly available service. And they are all excited about the potential of smart-home and smart-building applications.

Chris Curtin of **Verizon** said the Fios FTTH network now passed 13 million homes (after the sale of networks in several states) and had a 40 percent penetration rate. "There are more requests for Fios than we can address today," he said, and as a result, property owners are starting to invest in FTTH networks themselves, following Verizon's specifications, so they can receive Fios services sooner.

Alan Fitzpatrick, Open Broadband

Alan Fitzpatrick, Open Broadband: Everyone understands that faster internet is good. But when it comes to gigabit service, you have to show people what they can do with it. For example, with gigabit speed in a hospital, you could download a human genome file very quickly and get a baby out of the NICU faster. Or an orthodontist could upload a radiology image in less than a minute and achieve better utilization of an expensive imaging machine. Even medical procedures can be performed remotely if there is no latency. Just show people the benefits, and they'll get it.

Gigabit speeds will be available to 97 percent of the Fios footprint by the end of 2018, and 10 Gbps speeds or higher will be available in 2023. Verizon is customizing video packages to meet residents' changing video consumption habits.

Verizon is also testing 5G wireless in 11 cities and expects three commercial deployments by the end of 2018. "The speeds will be equivalent to Fios," Curtin promised.

Chris Denzin of **CenturyLink** said his company was focused on improving customer experience and the network. "We look at MDU services as an opportunity to enhance the lives of residents," he said. CenturyLink was the first North American company to use G.fast technology, which delivers high-speed service over copper, and is making progress deploying FTTH. It began offering CenturyLink ON (instant service availability) after customers told the company they didn't want "bills, contracts, installation fees, equipment fees, technician visits, bill changes or call centers." CenturyLink is also developing a variety of applications for building management and smart homes.

Michael Slovin of **Comcast**'s XFINITY Communities said his company's gigabit network would be complete by the end of 2018, and plans for a 10 Gbps network were in the works. XFINITY is offering platforms for smart-home and smart-building devices. "We're trying to demystify the smart home," Slovin said. The voice-operated, smart-home platform is open to devices made by all manufacturers. For example, parents can ask to be notified when their children arrive home (or fail to arrive home). At the community level, XFINITY envisions allowing property staff to manage both their own devices and residents' devices to provide security throughout a property.

Vickie Rodgers of **Cox** said that frictionless service enablement at move-in (with 30 free days of service as a bonus) was valuable to both residents and owners, particularly in light of the increasing complexity of smart homes. The strategy is working well for Cox, too – Rodgers said take rates had risen substantially. Some of this is due to the variety of pre-enabled services Cox offers. "People will pay to watch their cat during the day," Rodgers noted.

Anticipating the need for telehealth to allow the baby boomer generation to age in place, Cox is buying and investing in health-care companies. It is currently trialing devices with senior communities and trying to resolve cost and regulatory issues.

Cox now offers 300 Mbps service throughout its footprint and plans to have gigabit service available nearly everywhere by the end of 2019.

Emily Chin said **AT&T** had 8 million fiber locations today and plans to have 12.5 million by mid-2019. Most of these offer 100 Mbps service or higher. "Everything new out of the ground will be fiber to the unit," she said. AT&T is also beginning to offer services outside its traditional footprint, using G.fast and millimeter-wave wireless technologies.

Three major AT&T initiatives that Chin mentioned were the internet of things, 5G wireless and FirstNET (the public-safety network). The company will deploy 5G networks in 12 markets in 2018, hoping to support autonomous cars as well as traditional wireless applications.

Diana Nucera, Detroit Community Technology Project

Diana Nucera, Detroit Community Technology Project: The Equitable Internet Initiative is a 20-week program to teach residents of digitally redlined neighborhoods to build and maintain community wireless networks. We purchased gigabit connections and brought them to neighborhood anchor institutions, then trained digital stewards in each neighborhood and spread each gigabit connection wirelessly to 50 homes. We also trained young people to build apps. In a digital equity project, the most important lesson is to transfer leadership to those most affected by the issue.

Leo Carlson, Norvado

Leo Carlson, Norvado: Our Wisconsin service territory has seven people per square mile. An unsubsidized fiber-to-the-home network would take 99 years to break even, and fiber is expected to last anywhere between 35 and 40 years. With Universal Service Fund support and grants from the 2009 stimulus, we've been able to deliver FTTH throughout the service area and will be 100 percent complete by 2019. To expand the network beyond our service area, we are looking at other opportunities for funding, such as municipalities and tribal governments. In some cases, we can serve businesses without subsidies – we have to evaluate requests on a case-by-case basis. We think municipalities can benefit by partnering with us. It's hard for municipalities to build and operate FTTH networks on their own; leveraging telephone company knowledge and experience can make sense for them.

One notable feature of the major provider session was the lack of discussion of video services. In previous Summit presentations, video was front and center; this year, it got just a few throwaway lines. For AT&T, Chin said the company was investing heavily in DIRECTV NOW, its streaming video service, which was popular in MDU environments. "There will be new features coming up," she promised.

Lessons From Summit 2018

By Rollie Cole / Sagamore Institute of Policy Research

On the supply side, technology continues to get faster, better and cheaper. I saw several impressive technology breakthroughs at the Summit.

First was the almost-invisible fiber in a sheath that 3M offered. The sheath was both clear and jagged so it would not glare or otherwise reflect light. Placed next to a molding in a hallway, it was almost invisible.

The armored cable offered by FibNet (and the subject of Dr. Haruo Okamura's presentation) is suitable for DIY installation because it can be laid

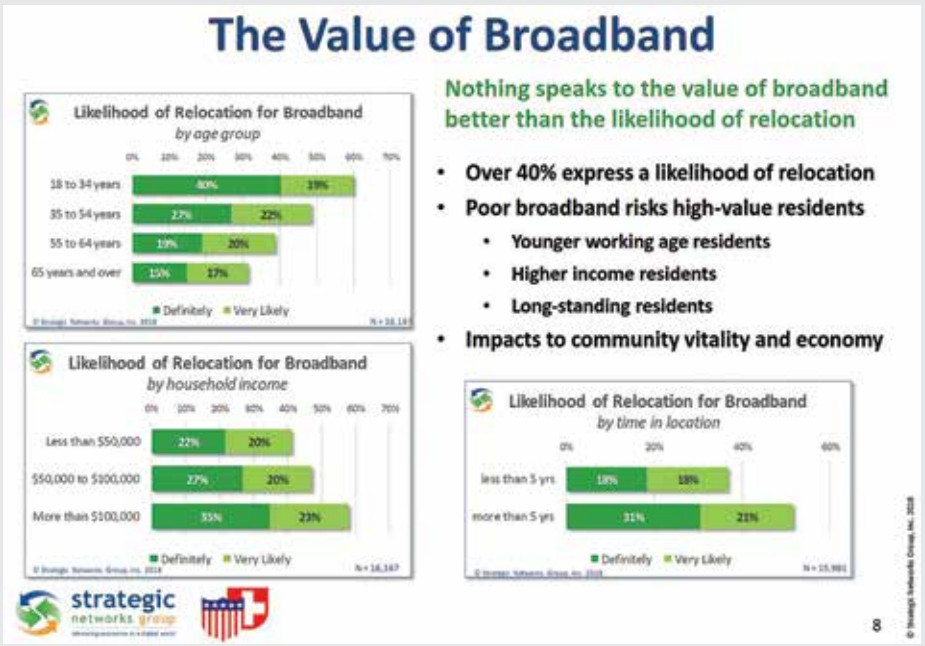
Angela Imming, City of Highland, Illinois: To maximize the potential impact of our municipal fiber network, we held a broadband impact symposium and invited business owners, neighboring cities and anchor institutions. We asked them where they wanted the network to go, and we told them we wanted a large data set so we could talk about numbers. With help from the Strategic Networks Group, we performed a lot of research.

One thing we found was that we risked losing a substantial part of the population if people didn't have access to good broadband. Younger residents, high-income residents and long-standing residents were the most likely to relocate – exactly the people we needed to stay.

The network has had a stabilizing effect in an otherwise unstable area. We're starting to see increases in assessed valuation, and the electric utility is implementing a smart grid. More people are teleworking and starting home-based businesses. We were shocked by the number of people using broadband to find jobs, keep their jobs and do telework. People can work from home in case of illness or bad weather.

Now we've started asking questions about telehealth and distance education. Should we go after grants for telemedicine or aging in place? As people age, when do they start slowing down? When do they stop driving? When do they need to have someone respond immediately to a call? And how can we respond to this? We found that one-third to one-half of residents are willing to consider using telehealth, even though fewer than 10 percent use it today. Only a small number are concerned about the difficulty of telehealth technology; more are concerned about privacy and security, and about whether the network will be robust enough to support it.

Finally, we found that the pricing of our gigabit service was too high – at $320 per month, we have never sold a gigabit connection. At $100 per month, a large number of residents would be interested, and we expect average revenue per user to increase considerably once gigabit pricing is reduced.



More than 40 percent of Highland's population was willing to relocate for broadband.

Craig Settles, Gigabit Nation

Craig Settles, Gigabit Nation: Telemedicine requires good broadband. The better the broadband service is for both institutions and residents, the more effective telemedicine is. At the same time, network operators are trying to get more subscribers on their networks. So the telemedicine vendors can't sell their application without good technology, and the network owners need applications to sell their technology. Instead of having two silos, there needs to be a blending of the two. Can the network owners forge relationships with telemedicine vendors to increase their marketing clout?

Chattanooga EPB is trying to do this, and so is Spark Fiber, a new competitive provider in Flint, Michigan. In Flint, children have been affected by lead in the water, and the city is providing free doctor visits to those affected. However, many parents have a difficult time getting their children to the doctor even if the visit is free. Telemedicine can help provide that access. Spark is also testing whether the availability of telemedicine applications increases the number of subscribers to its network. The program is just beginning, so its success hasn't been determined yet.

directly on the ground or in water. The cable itself is not new, but the super-cheap installation (no heavy equipment, little training required) is making a difference on Mount Everest and might well be helpful on Native American reservations in Arizona and other places.

The overall level of technology development is making smaller and smaller networks economically feasible. The most dramatic example was the story of a 38-unit condo that AT&T retrofitted with fiber at its own expense because it could make money with a 60 percent take rate.

Similarly, there was a wide variety of operating broadband solutions for small towns and even more rural areas.

To increase their adoption and use of broadband, the urban poor need affordable devices, affordable access and training.

One panelist commented that "we know how to reach rural areas because many approaches that we can study are up and running." Though coverage still has not been extended to many rural areas, concrete examples of how one might do it are available.

The biggest remaining gap surrounds the urban poor and minorities in public housing and other affordable housing. People operating programs in these areas have identified the need for affordable devices, affordable access and appropriate training. However, the success of these programs does not yet match the operating success of programs for rural areas, so outreach often requires designing new programs rather than choosing among proven models.

THE DEMAND SIDE: ARE WE THERE YET?

In an old Dennis the Menace cartoon, Dennis admits to hearing his dad calling him but doesn't feel the need to respond because Dad doesn't sound "real mad" yet. There are many examples, thanks to researchers Mike Render of RVA LLC, Michael Curri of Strategic Networks Group and others, of the benefits for end users of robust broadband, especially fiber. There are studies by Steve Ross of Broadband Communities about lack of broadband access contributing to population loss. But not everyone is responding to these studies. This suggests that broadband has not yet reached the level of necessity assigned to electricity or water.

For households with K–12 students, broadband is becoming an urgent necessity. Students need access to reasonable broadband to complete required assignments. Supplemental programs, such as games for preschoolers, tutoring and test preparation from organizations such as Khan Academy (now the official test preparation service for the SAT), and online resources such as library and reference materials also require good broadband.

The panoply of online health and safety services that allow seniors and those with disabilities to live independently or otherwise be served better than they would offline create additional urgency.

But Dad does not yet sound "real mad." Even those who acknowledge many of the benefits of widespread access to robust broadband still consider it more a want than a need.

5G WIRELESS AND SMART CITIES

According to an RVA study commissioned by Next Century Cities, emerging initiatives in 5G (next-generation wireless) and in smart cities (using sensors placed everywhere) are much further along in cities that already have fiber than in cities that do not. Fiber and wireless support each other; fiber and smart-city initiatives support each other. In some rural areas and some cities, the fiber middle mile is backhauling a fixed-wireless final mile in addition to supporting fiber-to-the-home and mobile wireless.

Several Summit sessions addressed the controversy surrounding state and federal efforts to intervene in city control over 5G installation. Blair Levin and others reminded us that political considerations often pit big cable and big telephone firms against cities in those debates. They also reminded us that both cities and providers have much to offer one another and learn from one another. Levin pointed out the role of asymmetries – what costs me little does you a lot of good, and vice versa. Political arrangements that encourage striking such asymmetrical deals are more beneficial than winner-take-all policies that reward the side that has better lobbyists.

Programs in rural areas and some arrangements reached by Google Fiber and others in urban areas provide models for how private firms and governments can take advantage of asymmetrical possibilities. Levin and other speakers strongly recommended learning from these examples and striking similar but different deals appropriate for each local situation. ❖

Doug Dawson, CCG Consulting

Doug Dawson, CCG Consulting: Independence, Oregon, a rural community with a municipal fiber network, has a creative approach to "one-on-one" economic development: Officials go to meetings in nearby Portland and Salem to recruit young, high-tech employees working in the agricultural technology industry. They hand out flyers about the advantages of living and raising children in Independence and working remotely via the fiber network. The network is something Independence can offer that other towns can't. The city tried the traditional path to economic development, with no success.

Fiber networks need economies of scale – they should have about 40,000 customers to be sustainable. Any small community that builds a network and then stops is missing an opportunity to become more efficient. Serving neighboring communities makes the network more affordable and profitable back home.

BroadbandCommunities

BUILDING A FIBER-CONNECTED WORLD

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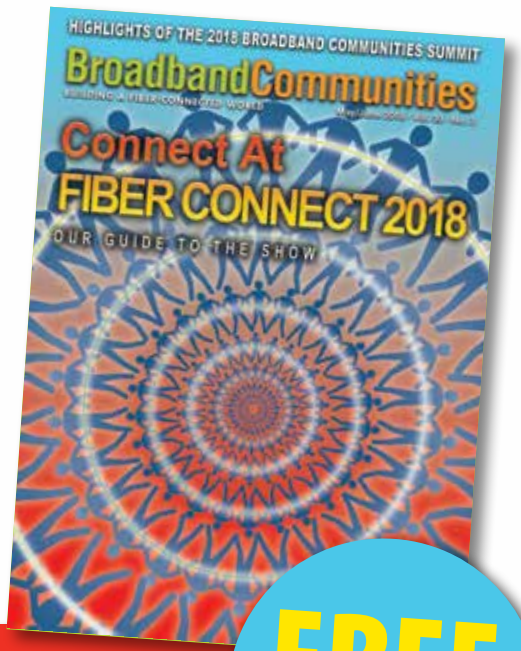

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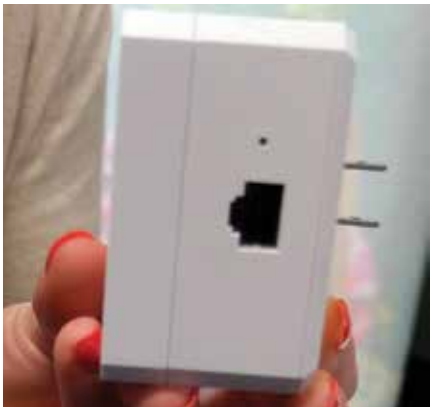
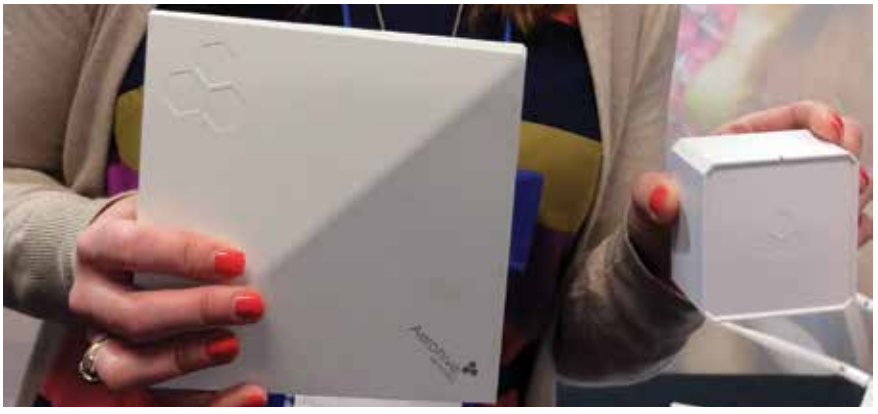
News From the Expo Floor

INSTANT MESH WI-FI NETWORKS

Aerohive (www.aerohiveworks.com) showed numerous variations of indoor and outdoor 802.11ac routers that self-organize into managed Wi-Fi meshes. The units, with similar form factors for various indoor and outdoor models up to 4x4:4 MU-MIMO with dual 5 GHz radios, offer aggregate data rates up to 3.46 Gbps per access point. The boxy little item is the Aerohive ATOM AP30 Dual Radio Access Point about the size of a large wall wart – and is its own wall wart. At the power socket, there is a choice of Ethernet (see the separate image) or mesh technology for data backhaul.





INSTANT WALL-SURFACE DUCTS

3M's hide-the-fiber-in-plain-sight division, on its way to being acquired by Corning, continually refines its offerings for MDU deployments. Here's the latest, which is due to be formally announced at Fiber Connect. The "duct" is a double row of mushroom-capped little nubs into which an installer can press fiber cable with up to 12 strands. The nubs protrude from self-stick flexible backing and allow the cable to be pulled out for splicing or rerouting (the image shows the red tape that protects the sticky stuff, partially peeled back).

Installed high on a wall (here, barely visible just below the bottom of the ceiling molding) with the little wheeled applicator, the fiber is all but invisible. The plastic box holds slack and allows an easy drop to an apartment. The applicator is a refined version of one first introduced years ago.