

PUBLIC UTILITIES FORTNIGHTLY

Impact the Debate

FCC Allows Utilities Private LTE Broadband

Landmark May 13 Order

By PUF Staff



Washington, DC, May 13 – The Federal Communications Commission today made a key segment of spectrum available for electric utilities to use for the broadband data platforms that will support the modern electric grid.

“For decades, this band has been allocated for narrowband communications like two-way dispatch radios used by business, industrial, and land transportation licensees,” wrote FCC Chairman Ajit Pai in advance of today’s action. “The new regulatory framework would allow 900 MHz licensees, like utilities, to obtain broadband licenses.”

The FCC’s action caps a five-year process to reconsider how it regulates a block of spectrum in the 900 megahertz band previously restricted to narrowband uses. Though some of that spectrum has been put to use by utilities and other industries over the years, it remains largely underutilized in most parts of the country. The spectrum is unused in about eighty percent of counties nationwide.

Because the frequencies are low-band, that is, below one gigahertz, the wireless industry considers them highly desirable, “beachfront” spectrum. It is also particularly attractive because it is one of the bands in which LTE, the leading mobile broadband technology worldwide, can operate. A number of progressive electric utilities, including Ameren and Southern Company, did not wait for the FCC’s final decision and have been running LTE trials in the band using experimental licenses.

In 2014, the Enterprise Wireless Association and the largest holder of 900 megahertz licenses, Anterix, petitioned the FCC to reconfigure the spectrum. The goal, to accommodate broadband-sized channels and the modern applications broadband networks can support.

Then, in a March 2019 Notice of Proposed Rulemaking, FCC 19-18 in Wireless Telecommunications Docket 17-200, the FCC proposed to grant the petition. Setting out a new broadband channel plan, the technical rules for operating in those channels, and a

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Extra. Extra. Read All About It

We Stopped the Presses

By Steve Mitnick, Editor-in-Chief



From the dawn of the electric utility industry, when Nikola Tesla and George Westinghouse built the first major hydroelectric power plant – Adams Station at Niagara Falls – and electrified Buffalo twenty-two miles away, through World War Two, “extra extra read all about it” was how paperboys alerted the public that news of such great importance had just taken place, monumental enough that their paper published an extra

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Inside: Click to View



Chair of the FCC, Ajit Pai



U.S. Senator Mark Warner



NARUC President Brandon Presley



Southern Company CEO Tom Fanning



Commissioner Rachelle Chong



FCC Allows Utilities Private LTE Broadband

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process for transitioning to the new plan. The FCC established a sixty-day period for comments on its proposal, followed by thirty days for reply comments.

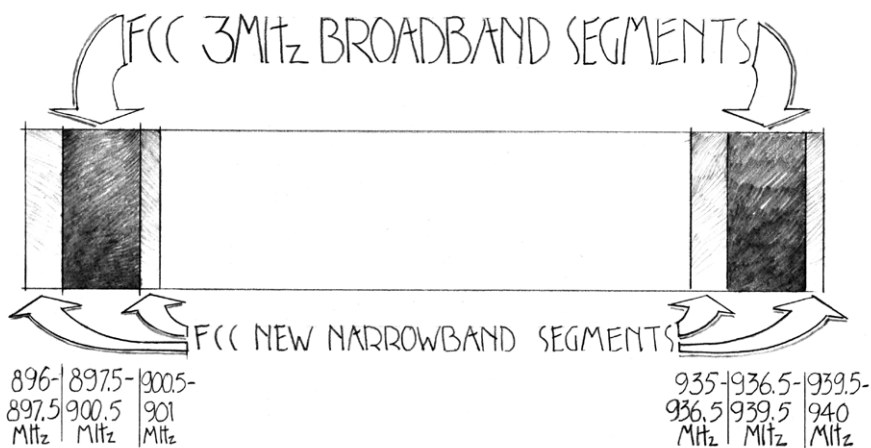
The commenters responding to the NPRM generally favored the proposal. Many highlighted the shortage of appropriate spectrum options for utilities seeking to operate broadband networks to support their operations. “That shortage is particularly acute in the rural areas,” commented the National Rural Electric Cooperative Association. “Broadband spectrum is necessary to support deployment of smart grid technologies in rural areas, such as digital supervisory control and data acquisition systems (“SCADA”) to remotely monitor and control substation and field devices, teleprotection to guard against potentially hazardous faults, distribution automation to intelligently

route power through the grid, metering, video, security, and other applications.”

Others, such as Duke Energy, stressed the importance of the spectrum for private networks, stating that “energy utilities have been forced to rely heavily on the broadband wireless services offer (sic) by commercial carriers. However, these commercial networks have not been designed and implemented to provide the robust and highly reliable mission critical communications services required by energy utilities. A private LTE system owned, operated and maintained by energy utilities for their exclusive use would improve both capacity and connectivity, and would provide such utilities with a wireless network that is inherently more reliable, more secure, and less susceptible to disruptions or other malicious activity than are the commercial services and other private network systems currently available.”

In its final Report and Order, the FCC generally adopted its earlier proposal by creating two broadband channels of three megahertz each and making them available for use by critical infrastructure industries, including electric utilities. The FCC also adopted its proposed technical rules and process for implementing the new band plan.

With this action, “we provide a variety of 900 MHz users a new opportunity to leverage broadband capacity for more robust communication networks, especially for industries that provide crucial services »



to the American public,” the Commission wrote in its Report and Order. “The record demonstrates that there is an ever-growing need by utilities and other industries for increased access to reliable broadband services [and that] businesses need wireless capacity that can accommodate a variety of applications to secure their operations against cyber security threats and natural disasters.”

“The telecommunications methods, equipment, and networks of the 20th century are no longer up to

the task of meeting 21st century climate conditions and security threats, not to mention the increasing complexity of administering the interconnected grids that make up the nation’s electrical infrastructure,” wrote Southern California Edison in comments to the FCC last spring. “SCE views the current proceeding as holding nothing less than the potential to have a defining, once-in-a-generation impact on the ability of utilities to continue to deliver safe and reliable power to their customers for decades to come.” ○

Extra. Extra. Read All About It

Continued from page 1

edition. Indeed, if the breaking news was so important, such as death of a president or declaration of war, the extra edition was devoted entirely to this development.

And that’s exactly why Public Utilities Fortnightly is publishing its very first extra edition on these pages. The breaking news that is the subject of this extra edition will have such an enormous impact on utilities that this edition’s immediacy and singular focus is, in our opinion, well-deserved.

The Federal Communications Commission, a federal regulatory body most readers of PUF follow far less closely than the Federal Energy Regulatory Commission and other federal and state regulators, shook our industry on a Wednesday in mid-May. In a single order, the FCC carved out of the radio spectrum ample “beachfront property” for utilities particularly to deploy private broadband LTE.

Wow! This means utilities can secure their communications separate from the Internet where everything from the loading of cat videos to the unloading of cyber-security attacks from hostile nation states resides.

This is what the FCC accomplished on May 13. Enabling utilities to migrate their critical communications, like for the bulk transmission system, from open public networks to closed private networks. And enabling utilities to create protected communications links with customers as the grid becomes two-way and more customer-centric.

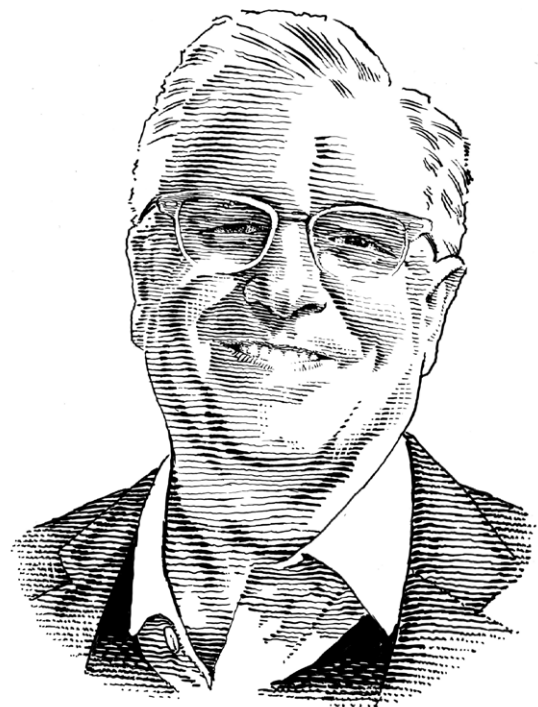
When it appeared that the FCC’s Chair would talk with the PUF team about the broadband order’s implications, and a U.S. Senator as well, we realized this might really be big stuff. Then the question became, could our team actually publish an extra edition of PUF in the tradition of those papers of the early twentieth century with their shouting newsies?



So, we stopped the presses and put together the publication before you. If we could be on the streets in front of your office building, you can be sure that we’d shout to the top of our lungs, extra extra read all about it. Followed by, FCC allows utilities private LTE.

If you happened to be passing by, you can be sure our shouting and the magnitude of this development would grab your attention.

And you’d likely say, hey kid, here’s a dime, hand me a copy. ○

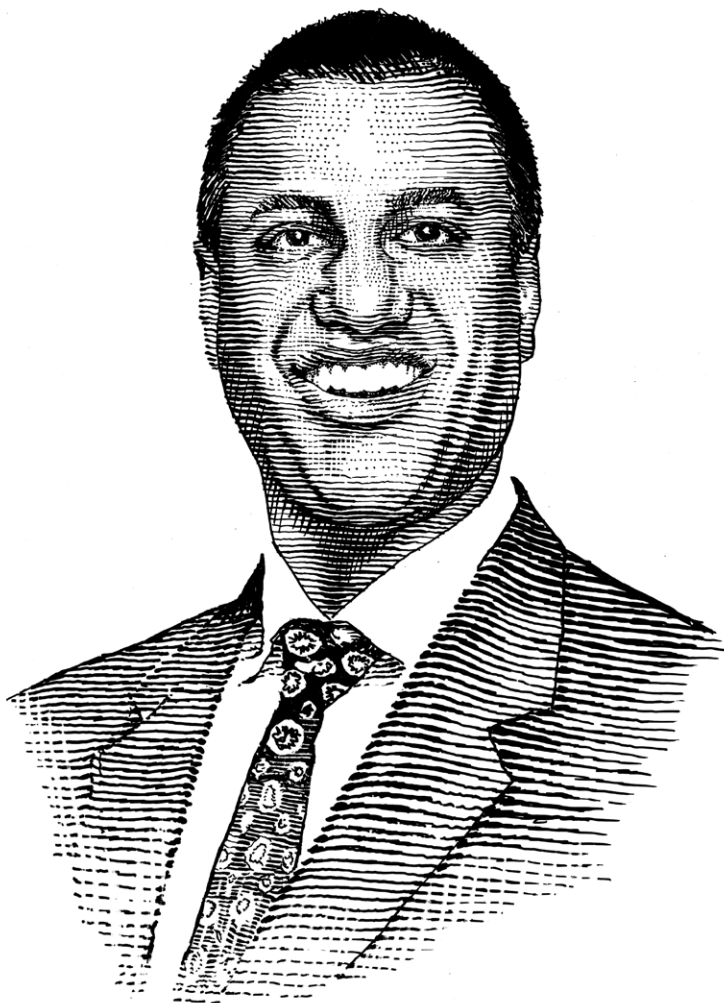


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Chair Pai's View

Why the FCC Acted

There are many heroes in this drama, that ends with utilities getting the spectrum they need to build private LTE broadband networks, air-gapped from the very public Internet. But if we had to choose only one, it would be the Chair of the Federal Communications Commission, Ajit Pai, who ushered the 900 megahertz proposal along an arduous path all the way to a final order. It's an understatement that the PUF team was delighted when Chair Pai agreed to talk with us about this achievement and the implications for the resilience of electric utility service, a conversation that makes for a fascinating read as you shall see below.



I'm excited to see what innovators in the electric industry are able to do with this new 900 megahertz broadband spectrum.

PUF's Steve Mitnick: This is big news. There's this 900 megahertz proceeding, and it has tremendous beneficial potential for utilities, so why should CEOs at electric utilities pay attention to this FCC proceeding and this action that you all are taking?

Chair Pai: I appreciate the question. Certainly, the FCC may not historically have been the normal place where utilities would look for initiatives that could benefit their businesses, but this is a very special case.

We think the 900 megahertz band can be a source of innovation for electric utilities. The reason is that technology has progressed to the point where, and the needs of utilities have progressed to the point where, this band in particular can help them accomplish their goals, which are to modernize their operations, improve the resiliency of the power grid, and otherwise use the airwaves to set up private networks that can help them do what they do best, and that's to deliver power in an efficient, effective way across the country.

PUF: What's the technicality? Some utilities have gone ahead and have really progressed like Southern Company, but you can't touch this spectrum, so how will they use it and leverage this action?

Chair Pai: We were wondering about that too, and that's one of the reasons why, when we kicked off this proceeding with a notice of proposed rulemaking, we asked utilities: how do you anticipate using the spectrum? The factual record that we compiled in response to the notice of proposed rulemaking suggests that there's a large appetite among utilities to use the spectrum for private LTE, or Long Term Evolution, wireless networks. Many parties have suggested that private LTE broadband is the key to the maintenance and improvement of the electric grid.

In addition to the use cases we've seen identified in that record of our proceeding, we've also granted six FCC experimental licenses in this band representing eleven utilities, the Department of Energy's National Renewable Energy Lab in Colorado, and one large enterprise company. Collectively, those experimental licensees have taken a look at a wide range of 900 megahertz private LTE use cases such as wildfire mitigation,

cybersecurity, grid modernization, and resiliency.

I know that for some, in either the electric or the telecom industry, when they hear 900 megahertz, they might think of 900 megahertz from a generation or two ago when it was essentially specialized mobile radio, things like two-way dispatch and the like. But now because of the evolution of technology, we have the ability to conceive a full range of use cases based on broadband.

I'm excited to see what innovators in the electric industry are able to do with this new 900 megahertz broadband spectrum.

PUF: Electric industry CEOs are concerned about resilience and cybersecurity, and a private LTE network can be air gapped away from the regular internet so the cybersecurity impacts could be impressive. Talk about that.

Chair Pai: An important aspect of this 900 megahertz proceeding is the potential to enhance the security of this critical infrastructure. I have learned the importance of that over the course of my time at the FCC, and in part I've been educated by some of the leaders in the electric industry, including some who just a couple of months ago sat down with me and talked about the need to better secure this critical infrastructure. That's one of the reasons why I'm so excited about the 900 megahertz proceeding.

By creating a private LTE network, an electric utility is able to rely not on the public internet, which may have a vulnerability here or there, but rather a purpose-built private LTE network that can avoid those vulnerabilities.

That's one of the things that's going to ensure that our electric grid is going to be there at all times, reliable as every consumer expects it to be. I'm excited to see how the electric industry uses this 900 megahertz spectrum in order to boost cybersecurity efforts.

PUF: Where does this 900 megahertz action fit into your overall plan for U.S. leadership in 5G and in technology and innovation?

Chair Pai: The 900 MHz proceeding is an important component of our comprehensive strategy. We've called that strategy the 5G FAST Plan, a plan to Facilitate America's Superiority in 5G Technology.

That plan has three basic components. Number one is to push more spectrum into the commercial marketplace.

Number two is to update our wireless infrastructure policy to make it easier to deploy the small cells and other components of wireless networks going forward.

Number three, modernizing outdated regulations to promote fiber deployment.

The 900 megahertz proceeding is an important part of that first component, pushing more spectrum

We want to make sure these airways benefit the American public, and having an electric grid that is more secure, more resilient, will mean better, more reliable, cheaper electricity.

into the commercial marketplace. About two years ago, we originally identified this as one of the bands where we wanted to make progress back and we are now poised to bring to fruition that vision. And I'm pleased about not just what it will mean for the electric industry, but what it will mean for consumers overall.

At the end of the day, we want to make sure that these airways benefit the American public, and having an electric grid that is much more secure, much more resilient, that allows electric operators to protect against everything from public safety threats to enhancing the efficiency of their operations – those are things that ultimately will mean better, more reliable, cheaper electricity for American consumers. That's a message that is very consistent with the goals of the 5G FAST plan.

PUF: There's a certain amount of spectrum, and in the order there's a lot about protecting incumbents, including utilities in different spectrum. There was discussion about the 6 gigahertz. Talk about how you balance, move innovation, but also protect incumbents.

Chair Pai: That's a great question. We always want to balance interests that might be involved in a particular spectrum band in order to maximize the value of that band for everybody.

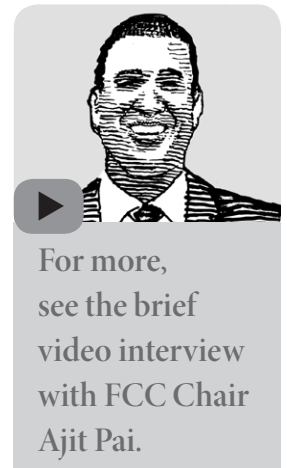
For example, in the 900 megahertz proceeding, we've relied on a system of privately negotiated agreements for those electric utilities that want to pursue broadband, so they're able to do that. For those that want to continue to use the band for narrowband operations, there will be an opportunity for them to do that as well. It's essentially the best of both worlds.

And that's the kind of approach we have to have when it comes to spectrum policy. The same applies in the 6 gigahertz band. We've seen a tremendous increase in consumer demand for Wi-Fi, which is why we looked at the 6 gigahertz band as an opportunity to make more spectrum available from licensed operations.

But I also recognize, and I mentioned this to the Edison Electric Institute when I spoke to them a couple of months ago, that electric utilities, among others, have important incumbent needs for that band.

That's part of the reason why we sat down with the

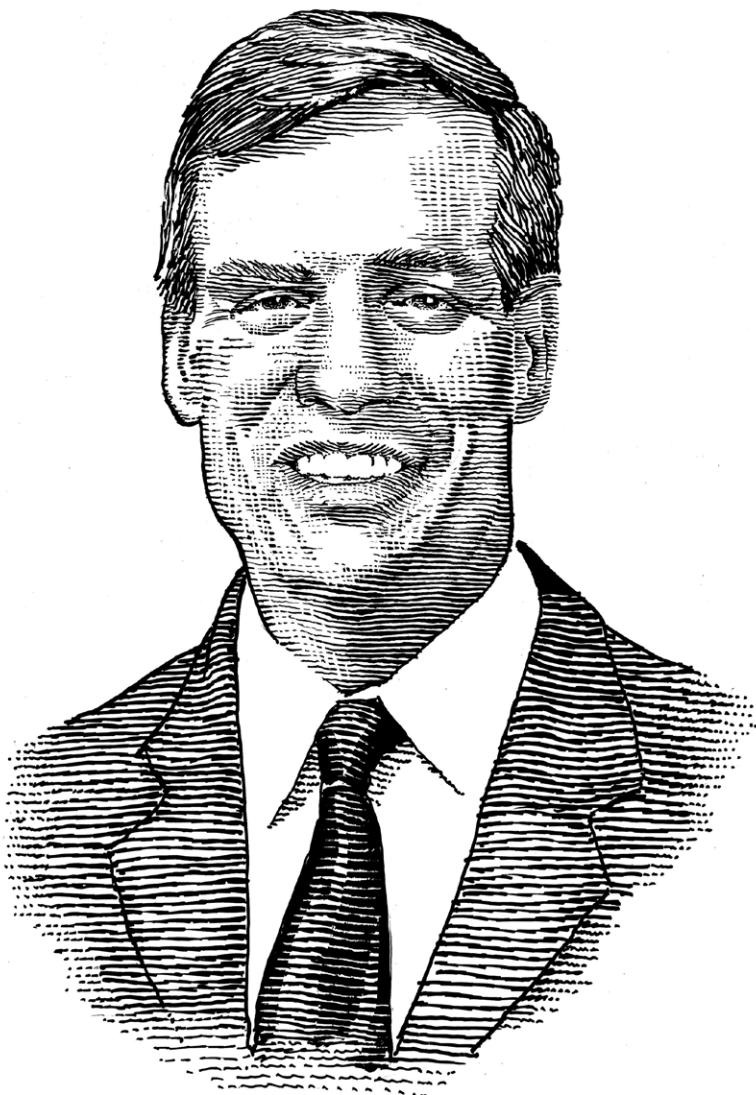
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Senator Warner's View

National Security Strengthened

United States Senator Mark Warner has represented Virginia since he was elected a dozen years ago. Prior to his career in Washington, and his term as Governor of the Commonwealth, he helped found or was an early investor in several tech companies including telecom giant Nextel. So, the Senator knows his telecom and remains passionate about what progress in that field can mean for the economy, and as Vice Chair of the Senate Intelligence Committee, what it can mean for improved cybersecurity. And he wanted to wax poetic about this new initiative at the Federal Communications Commission to make 900 megahertz spectrum available, to utilities in particular, for private LTE broadband networks. The PUF team was more than happy to accommodate the Senator as you can see below.



PUF's Steve Mitnick: In addition to being the U.S. Senate's leading expert on preparing a tuna melt, you're arguably its most knowledgeable member on wireless tech. So why is the new FCC action on 900 megahertz broadband important for the utilities industry?

Senator Warner: Oh, so you saw the tuna melt video! I do hope you enjoy that classic recipe – and don't forget to wash your hands before making it!

As you mentioned, I did get my start in wireless. In fact, my earlier business successes came because of the enormous potential we saw in the 900 megahertz band.

The FCC's action is important for utilities because it finally provides an opportunity for them to access a spectrum that can be used for the modern broadband communications they will need to keep the grid safe and reliable and resilient. I know a wide range of utilities supported this proceeding at the FCC and multiple utilities participated in FCC experimental licenses investigating different 900 megahertz broadband use cases.

If you think about it, the power grid was built over a century ago. Just about every other industry has taken advantage of the huge advances in digital technology and wireless communications to improve their products and processes, but electric utilities have been left behind because, for security and reliability reasons, they've felt they needed to have their own private networks.

A key barrier to that has been the lack of spectrum availability to support those specialized networks.

Now, thanks to this new FCC order, utilities can get access to that spectrum.

When I worked in the wireless industry, we called 900 megahertz "beachfront spectrum" to describe how desirable it is.

So, a big congratulations to the FCC for an important – and bipartisan – decision.

PUF: You were instrumental in launching the Senate Cybersecurity Caucus, so if utilities could use this spectrum for private networks separated from the Internet, how could that improve cybersecurity?

Senator Warner: Actually, this spectrum is good from a cybersecurity perspective for a number of reasons. Yes, it could be used for a private network that is not connected to the Internet, and that's important to protect against attacks launched from abroad by hostile states and other foreign actors.

We are seeing more and more cyberattacks across a wide range of our infrastructure. If you have a truly private network that you own and control, you can have more control in managing the network security of those communications.

A second great thing about a private network is that you can ensure that the most critical applications are treated accordingly. If you have an application that needs super-fast communications – like one that senses when a power line breaks and kills the power before it hits the ground – you really focus on developing specialized end-to-end solutions tailored to those use cases.

PUF: Is it helpful that this spectrum would be in the 900 megahertz band?

Senator Warner: It's very helpful. When I worked in the wireless industry, we called this "beachfront spectrum" to describe how desirable it is. The reason is that radio waves in low-band frequencies like 900 megahertz are better able to carry over large distances and to penetrate obstacles like foliage and buildings.

And those great characteristics mean the network doesn't require as many cell towers to provide coverage – which results in far lower construction and maintenance costs. 900 megahertz spectrum is also good because it's one of the bands included in the

LTE standard, which is the state of the art for mobile wireless technology. And that means relying on commercial grade capabilities rather than more brittle and opaque proprietary interface standards.

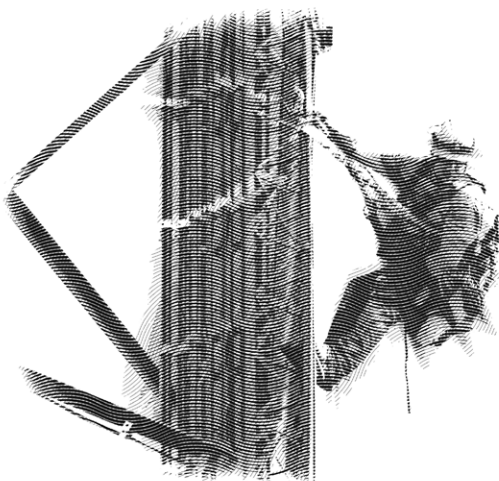
And last, it's important that this spectrum in the 900 megahertz band is licensed by the FCC. We've heard utilities express a desire for exclusive use spectrum rather than a shared or unlicensed model. That makes it more reliable for the utility – it can control all of the spectrum's capacity, because nobody else is using it for potentially incompatible operations.

A key barrier has been the lack of spectrum availability to support those specialized networks. Now, thanks to this new FCC order, utilities can get access to that spectrum.

PUF: Could utilities' build-out of their private networks help advance Internet service for under-served rural areas in Virginia and elsewhere nationally?

Senator Warner: Yes, and I'm proud to say Virginia is a leader in this area. We have a law currently being implemented by state utilities and regulators that encourages utilities that build grid communications infrastructure to share that infrastructure with projects, bringing Internet access to rural parts of the state that don't have it.

The federal government has provided funding to subsidize the cost of deploying service, but there still are areas that lack service. Now that utilities will build out new private networks for grid communications using this 900 megahertz spectrum, the towers and fiber they install could also be used to support rural broadband. The infrastructure, once deployed, can be used to close the digital divide that exists in some of our rural communities. ○



The Federal Communications Commission order of May 13 may spark a boom among utilities building out private LTE broadband networks of their own. The aim, to improve their grid's cybersecurity with non-Internet telecommunications and increase their capacity to support a smarter grid for customers and operational efficiency.

President Presley's View

NARUC on Broadband

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ARUC President Brandon Presley hails from the great state of Mississippi, where he promoted broadband access and bridging the divide aimed at closing the gap in access to utility services, prior to announcing his platform as NARUC's President. Call him prescient, as his platform was thrust front and center not only by the pandemic, but by the FCC's May 13 order presenting unprecedented opportunities for electric utilities, making a key segment of spectrum available to use for broadband data platforms to support the modern electric grid.

PUF's Steve Mitnick: If someone didn't know rural broadband was one of the top priorities for our industry before, doesn't this current crisis show how important a priority this is?

President Presley: Some of us have been talking about the need for broadband access, particularly in rural communities, but even in urban and suburban communities. The pandemic has shown how not only that the digital divide exists, but how deep it is, and even how it's growing in this time.

Much of America today, as far as commerce and day-to-day life, is held together by the broadband network.

I say it's growing because more and more people are relying on broadband and connectivity in some form to conduct their daily lives, their business or their schoolwork. There are obviously strains on the system and it's not only exposed the digital divide, but it's maybe even gotten deeper simply because of the utilization of infrastructure.

This has shown, in stark terms, up close and personal, why I consider this an issue of not only national security, but economic security. Much of America today, as far as commerce and day-to-day life, is held together by the broadband network.

PUF: I've heard stories of teachers and families where their internet went out and they had to stop working.

President Presley: As an elected Commissioner, I represent counties in which school teachers are having to drive a county over to sit in a parking lot of a fast food restaurant, or libraries, to be able to do Zoom calls with their students to keep them in line.

That has exposed this, and I feel firmly that we have to come out of this with a response that is rock-solid and are going to get this fixed once and for all. There are roles for everyone to play in this and there are models around the country that show where partnerships can exist with electric utilities, for instance. Many of our electric cooperatives are taking up this challenge and then fixing it in many places in rural America.

We've got to have an all hands-on deck approach going forward. We've got a broadband expansion task force that I created. This is a bipartisan issue. It's a bipartisan problem. We've got to get it fixed.

PUF: The FCC Chair put this on the agenda so it looks like there's a chance that they're going to carve out some broadband for utilities, which might be a growth spurt for them. Have you seen that and what do you think?

President Presley: Of course, I support any efforts to increase our capability. I know that the six megahertz is there, and I have supported that. I think that we can walk and chew gum at the same time.

While we're not only taking care of utility needs, there are other ways that the FCC is working now in rural digital opportunities funds. States are being collaborative in finding ways to solve this problem.

Mississippi has been a leader in that and now we've done it. You're seeing throughout the nation an emphasis on this. It's important for utilities to have access as well, and there are multiple ways in which to do that.

PUF: What got me excited is it seems as if with the 900 megahertz, a number of the utilities are going to invest in sending crews out and spending money. We want them to hook up everybody at the same time, right?

President Presley: It's important right now for us to look at shovel ready projects and things that can happen. There's no doubt electric utilities have a major role to play.

The practical aspects are that they have electricity to their homes. Second, they are drivers of investment. As we're going forward, it's important that we

look at that through both those lenses.

Again, I go back to an all hands-on deck approach. There's a role for electric utilities. There's going to be a need for fiber throughout the entire utility spectrum.

We need to face the reality that you have a need for fiber in the utility space, at the same time that you look at the needs of the people. How can those be combined? We try to get the maximum benefit out of investment projects as we go forward.

As a Mississippi Commissioner, I've supported and advocated for grid modernization projects that couple smart grid investments and the investment for broadband in rural areas by fiber. We just formalized fiber investment for smart grid/broadband partnerships as a priority in our integrated resource plan with the ability for our utilities to spend up to ten million dollars per year on fiber optic format to meet the utilities' needs, obviously also looking for ways to leverage that investment with broadband expansion where possible.

One of the tests in there is, are we also meeting the broadband needs of the state? We're in a new world and part of that new world is the fact that we've got to view, clearly, broadband access as part of it.

That's where we're going, and that's for the American people. They want to see this fixed, and we all want to see this corrected. It's a part of what we've got to do.

PUF: What can the regulator, your fellow Commissioners and their Staffs throughout the states, do to push this forward, especially at this unique time when the FCC is acting?

President Presley: We should be encouraging our utilities to look at this in a new sense. Are we scooping up every advantage of this view pushed by the FCC? How do we meet the holistic needs of our people?

Are there smart grid projects that come with broadband access that could help across the spectrum? Again, we have to somewhat do away with the old preconceived notions of looking at things in a silo and move to looking at them holistically as ways in which to meet these needs, because they're all interconnected. They're all intertwined.

The need for broadband is commensurate with the need that utilities have for smart grid and grid modernization. How do those two intersect? What are the benefits?

I'm not saying that we have all the answers, but this is a question we all should be asking. If we're deploying smart grid technology into an area in which you are passing a home with the smart grid project, is there a way to stop off at that home and provide broadband?

There is a mutual interest between the utilities and

Are we scooping up every advantage of this view pushed by the FCC? Are there smart grid projects that come with broadband access that could help across the spectrum?



meeting the needs of their customers in a non-traditional sense. Those opportunities exist. Monopoly utilities, those who were in a regulated market, must have economic growth within their specific service territory for the health of the utilities, and for the good of the customers.

We know in Mississippi that if you're able to get fiber to the home, that increases the value of that home around seven percent. Well, you have just grown the value of your area. Number two, we know that it increases economic development.

People are able to connect more, or there is a self-interest for the utilities if you're looking from a pure business side. From their perspective, there is a self-interest to see their service territory grow. One of the ways we know we do that is to increase

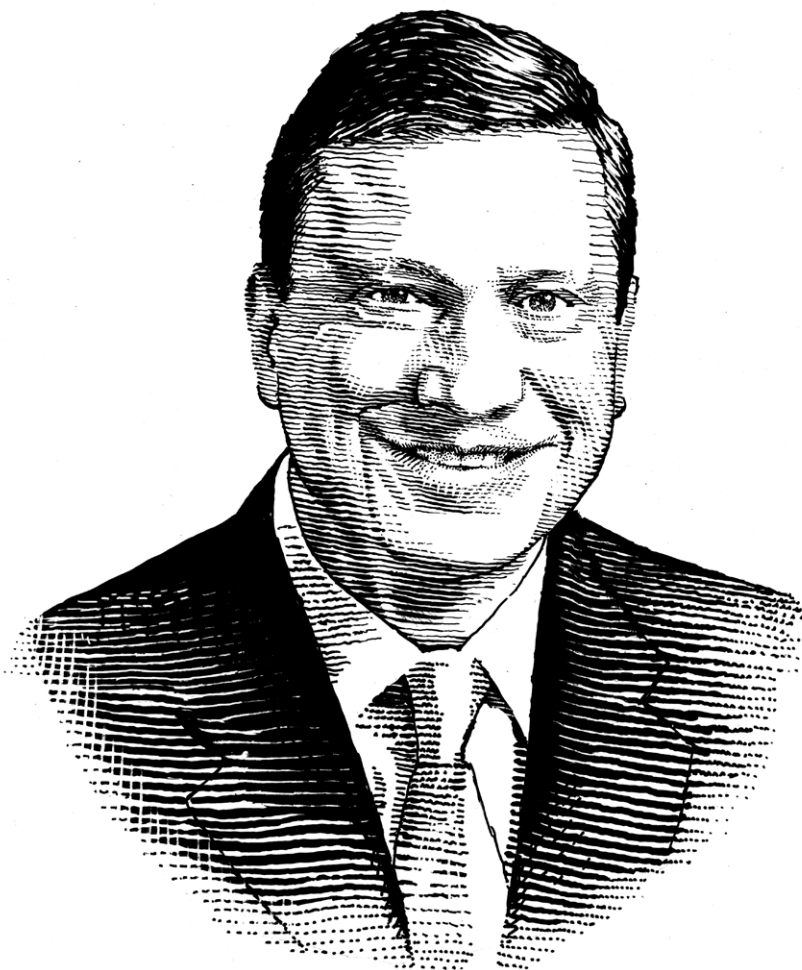
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CEO Fanning's View

Cybersecurity Implications

Don't let Tom Fanning's title of CEO of Southern Company deceive you. He has a long history with telecommunications too, with subsidiaries Southern Telecom and Southern Linc, making him especially knowledgeable on cybersecurity issues facing our nation's electric grid operators.

PUF's Steve Mitnick: Due to your national leadership on the Electricity Subsector Coordinating Council, or ESCC, you're a believer in the importance of upping the game on secure networks for utility operations and all the sectors. Talk about how important it is to be air gapped with the internet and have private LTE networks.



My sense is as we progress into this new telecom environment, it will open up a whole new level of security and resilience for this industry.

Tom Fanning: This principle of operation way precedes me. If you go back to the eighties, Southern Company made a practice of developing our own fiber networks. We never relied on the public networks in order to run our system. I believe we had over three thousand miles of fiber that we were putting in place to operate our system effectively.

With our enormous investment in this kind of technology, we felt it made sense because it was unique. We cover corn fields. We don't operate our system just based on dense population areas. We literally have coverage all over the Southeast and it's dense coverage.

We wondered if there is a way to spread the fixed cost over a bigger base. That gave rise to the formation of what became Southern Telecom and ultimately Southern Linc. When I was still a junior employee in the company, I became the first chairman of the board of Southern Telecom. We went through some iterations, but it has worked so well.

Our system is four function. It's phone, data, packet data, and push to talk. It is especially suitable for public safety that has to get off the highways and go on the back roads and be able to serve customers. As that strategy evolved, we did that for the pristine nature that we required in order to operate our systems better than even the standards of AT&T and others.

We also started to see the emerging threats of cyber and physical national security issues. All of a sudden, we started to say two plus two. That is, with the benefit we have in operating a private network the way we do, we also now create the added benefit of having a more secure system.

The operational aspect of this predated the secure aspect of other outside threats. We have added to the value of the system in that way. Now as we progress from the old iDEN Motorola system, we're moving to the 5G world, and we're excited about its promise for the system.

All four of the operating company presidents, which are the three electrics – Georgia, Alabama, and Mississippi – as well as Southern Company Gas, are tied in with our marketing people and also our

technology organization in helping maximize the potential of this system.

PUF: With what the FCC is doing on May thirteenth, it may cause a gold rush of other utilities to do what Southern has been doing for a while. How's that good for the industry, the country, and even for Southern?

Tom Fanning: This is one of the things that we have been talking about relentlessly lately. Whether this is through my leadership role at the ESCC or my role on the Cyberspace Solarium Commission, we know there are billions of threats against the infrastructure of America every day. Big electric companies get hit millions of times a day.

What we've got to do is not only understand how to design a system that operates well during normal times. I call that reliability metrics. We also have to design systems that are resilient, and will operate well under unusual times, whether that's a hurricane, snowstorm, or cyberattack.

My sense is as we progress into this new telecom environment, it will open up a whole new level of security and resilience for this industry. It may also open up unintended business opportunities as technology changes, and customer requirements change. The nature of our product and its offering to customers may likewise change. This may prove to be a gateway to new businesses and help our current system.

PUF: We talked with NARUC President Brandon Presley. He's a real believer in rural broadband. He figures utilities can move the ball on that important national priority of rural broadband.

Tom Fanning: All of our operating electric utilities are thinking that way. Alabama in particular has made some big inroads in thinking about how to deliver that service to underserved communities.

This may be an old statistic, but something like forty percent of our customers make less than forty

Am I going to let other people innovate around me, or am I going to participate in shaping the innovation that affects my product offering to customers?

thousand dollars a year as household wages. I guarantee you they don't have the access to the kind of infrastructure that most Americans have. This notion of bringing this kind of infrastructure development to underserved communities will make America better for decades to come.

PUF: The resilience and breadth of utilities service is demonstrated in the current crisis with so many people at home. Imagine if we have to deal with cybersecurity and weather events simultaneously.

Tom Fanning: That's a hundred percent right. As Southern Company has moved into this environment, we have about thirty thousand employees, sixteen thousand of which are telecommuting.

Imagine trying to do your work at home, and if you're spread over a variety of locations, the challenge becomes much more complex. This kind of power in that environment is something that America needs.

PUF: You talk to other CEOs across the country often, and what would you tell them about what you've learned and the importance of this for them, their communities, and companies?

Tom Fanning: It's a broad message, and it's the message that the waves of technology innovation are hitting the beach relentlessly. We can't keep the waves off the beach. You have to make a simple choice.

Am I going to let other people innovate around me, or am I going to participate in shaping the innovation that affects my product offering to customers? There are two choices. The passive choice isn't a bad choice, but it is a choice that limits your opportunity to grow. ○



For more, see the brief video interview with Southern Company's executive vice president for operations, Stan Connally.



The Federal Communications Commission met on the morning of May 13. On the agenda was: Transitioning the 900 MHz Band to Enable Broadband Deployment. This item, WT Docket No. 17-200, was considered and in a landmark decision approved by the Commission.

Commissioner Chong's View

Utilities' Next Steps



When Commissioner Rachelle Chong speaks, everyone listens, being that rare double Commissioner, having served at the federal and state levels, at the FCC and the California PUC. Her experience says a lot, and here she explains why the FCC's 900 megahertz spectrum order is a game-changer, and what forward-looking utilities might do next.

PUF's Steve Mitnick: You're a rare person who's had experience in regulation from both telecom and energy. How did you become a double Commissioner?

Rachelle Chong: Double Commissioners have double the fun! I started out as a Commissioner on the Federal Communications Commission at the tender age of thirty-four and then moved to the state level as a Commissioner for the California Public Utilities Commission at age forty-seven. I'm a career telecom regulatory lawyer, but I painfully learned energy regulation as a Cal PUC Commissioner mid-career.

This FCC order impacts every electric utility in the nation.

Here's the story. I started out as a young FCC practice lawyer in '84. I represented broadcasters and some of the early cellular pioneers in the nation. I was drawn to D.C. for my first law job because the FCC was working to license the first cellular phones. I was fascinated by the idea of a mobile wireless phone. I pictured in my mind a Star Trek communicator; you know the one that Captain Kirk wears on his uniform. That's what I thought a mobile phone was going to look like. It took a while, but smartphones are small now. In fact, I am wearing one on my wrist. I've got an Apple watch that I can speak into just like Captain Kirk.

At the FCC, we held the first spectrum auctions, launched many new wireless services, and implemented the 1996 Telecom Act, which brought new local competition to the telephone marketplace.

After the FCC, I served on the California PUC. I was brought in because of my deep telecom and Internet expertise. But when I arrived in 2006 under Governor Arnold Schwarzenegger, I was thrust into this forward-looking energy regulatory world. At that time, the California PUC was leading the nation in

terms of climate change work, integration of renewable energy, and encouraging electric vehicles.

It was hard work to learn a whole new industry quickly – especially with all these difficult energy acronyms. I was drinking from a firehose but learning from some of the nation's best minds on how to combat climate change for the energy sector. Due to my communications technology background, I was given – as the assigned Commissioner – the nation's first electric vehicle docket and the nation's first smart grid docket. I also had the broadband over power line dockets, which was a complete waste of time, in retrospect.

But being a double Commissioner – at the federal and state levels with both communications and energy expertise – has given me a unique perspective on how advanced communications and technology can assist with revolutionizing the twenty-first century electric grid. Technology enables grid modernization, integrating renewable energy, and other innovations.

Wireless communications spectrum can make the grid more resilient, efficient, smarter, and provide a forward path for innovations that are happening across the globe.

PUF: The FCC is making big headlines with this new order. Is that going to make a difference for the utilities and customers in California, or anywhere?

Rachelle Chong: Absolutely. This FCC order impacts every electric utility in the nation. I see the FCC's order as nothing short of a game changer for energy utilities. What the FCC order did is to allow 900 megahertz spectrum to be converted from a voice-only service to a private, licensed wireless broadband service and, best yet, it's reserved for critical infrastructure and other private enterprise industries.

This FCC initiative launches electric utilities into the twenty-first century communications and broadband (fast Internet) era to build the foundation they'll need for the next several decades to modernize their electric grid. Utilities and regulators should move fast to take advantage of the FCC's order.

There are so many benefits. Private licensed wireless networks will improve the reliability of the

electric grid. Customers will have a more reliable network underlying their electricity delivery, instead of the mishmash of various fleet dispatch voice networks, unlicensed Wi-Fi spectrum, and leasing commercial mobile spectrum. The latter is attached to the public internet and thus at risk of hacking.

The FCC order also will provide tools to improve grid resilience. By that, I mean guarding against the almost daily cyberattacks that electric utilities suffer. This is a real threat – one that keeps C-Suite folks up at night. Because the 900 megahertz spectrum is private and licensed, it is more cybersecure.

Finally, 900 megahertz spectrum will improve efficiency – utility workers can do their work easier and faster on an integrated broadband network. For example, safety is enhanced using a wireless broadband network.

A field operator can take a picture or video of a safety incident out on a remote power line and immediately text or email that picture or video back to the headquarters over the wireless network. The headquarters supervisor can take a look and say, oh, this is serious, and immediately send a repair truck to the exact location to fix the problem before the issue worsens. That's what I mean by efficient.

You can see how this will improve the safety of our electric networks. And right now, safety is at the top of mind in California because of over a decade of terrible wildfires we've been suffering, some of which have been caused by electric utility facilities. Wildfire liability has put our largest California utility into Chapter 11 bankruptcy.

If electric utilities adopt licensed wireless broadband, it will help them be more effective in fighting fires, preventing fires, and reducing long lasting public safety power shut offs. Much of California suffered a two- to eight-day public safety power shut off last year in the fall. It was devastating to the economy as electricity is the lifeblood of our economy and our community life.

PUF: How will it do that? How will it help to have this special broadband communications? How will that help keep down the wildfire problem?

Rachelle Chong: The idea that I've had, I call it, The Big Idea, is to stand up a public-private partnership of government, utilities, and private tech companies for the express purpose of a wireless broadband network devoted to California wildfire prevention.

I serve on the board of a company called Anterix, a company that will help make private wireless broadband available for electric utilities nationwide. We have been speaking with the leadership of the state of California government agencies about The Big Idea, including CAL FIRE, Office of Emergency Services,

The FCC order allows 900 megahertz spectrum to be converted from a voice-only service to a private, licensed wireless broadband service and it's reserved for critical infrastructure and other private enterprise industries.



the Controller's office, and the Governor's office.

This public-private partnership will enable some of the following applications.

Utilities can deploy mountain top cameras that will be able to watch their vast, rural high fire risk areas at all times. The camera network can use artificial intelligence to spot a fire quickly, identify the location quickly, and alert senior executives. Then senior executives can alert the fire authorities of the fire location to send out an aircraft to dump water on the fire.

Another use of a wireless broadband network is to deploy a comprehensive network of wireless sensors throughout the high fire risk areas to detect dangerous weather conditions. Sensors can detect moisture, rainfall, and wind continually. All that data can flow back to the network brain and then be crunched to produce an accurate weather forecast for the high fire risk areas, and again alert senior utility executives in

advance if there's a weather situation that's conducive to sparking a wildfire. This enables readiness.

Finally, I want to mention San Diego Gas & Electric. This California utility has developed an amazing technology where, using a wireless broadband network, it can sense when an electric line is falling, like when a tree falls on a powerline in a windstorm. San Diego Gas & Electric can detect that, and then can, in 1.4 seconds, send back a signal to turn the electricity off on that line. By the time the power line falls and hits the dry brush on the ground, there's no electricity in the line to spark a wildfire.

This technology works in the lab, but it could be deployed widely in the high fire risk areas of California. These are just some of the public benefits of a private licensed wireless broadband network using advanced technology.

A key aspect about this particular 900 megahertz radio spectrum is that it has good propagation qualities, which means the radio waves travel very far. That characteristic is a positive, because most utilities have large service territories, and this spectrum will serve large areas effectively.

PUF: You know your colleagues across NARUC. Is there a role for state regulators? Is there some way they can get involved and make sure the potential benefits of this decision by the FCC in broadband can be used for the customers' benefit?

Rachelle Chong: Absolutely. In fact, state regulators have an important role at this moment. The FCC made this 900 megahertz spectrum available, but critical infrastructure industries other than electric utilities will also be vying for it.

Those are examples of how an enlightened state regulator could make regulatory procedures available to help utilities move more quickly to build new foundational broadband networks.

Time is of the essence for electric utility action to secure the spectrum for their service areas. As a result, some forward looking electric utilities will want to immediately enter into long-term leases to obtain the benefits of the spectrum. One problem from a regulatory point of view is that electric utilities usually get funded in a three- or four-year rate case cycle.

Due to that, utilities might feel like they have to wait until their next rate case comes up before they propose a new private licensed wireless broadband

network for initiatives. One issue I've been talking to regulators about at the NARUC meetings, is the need to make some type of regulatory procedure available to the electric utilities, so they could file out of cycle with their rate case, and obtain the benefits of getting this type of foundational network for their operations without having to wait for their rate case cycle.

There are several ways you can do that. I'm familiar with mechanisms that you can use to take up expenditures that are out of rate case cycle. For example, in California, we have a mechanism that allows utilities to put certain expenses in "memorandum accounts." Those expenses in the memo accounts are subject to further scrutiny by the Commission before they're recoverable in rate base. But if the underlying facilities are approved in the rate base, then those expenses in the memo accounts are allowed to be placed in the rate base.

Another recent example is the Florida Public Service Commission has put in new rules that break out resilience services from the traditional ratemaking process. The resilience project can be financed through a specific authorized customer surcharge. That would help streamline the process and let the utilities move ahead with critical resilience projects that would benefit consumers and make the electric grid system safer.

Another issue is regulatory treatment of a wireless spectrum lease. Regulators will want to make sure utilities know that a long-term spectrum lease is allowed into rate base, so that accounting issue does not stand in the way of quickly deploying a wireless network.

Those are examples of how an enlightened state regulator could make regulatory procedures available to help utilities move more quickly to build new foundational broadband networks.

PUF: What should utility leaderships be looking at? It's unusual for our industry to say the FCC did something that's monumental. What should a CEO be saying to the teams? What should we be doing in reaction to this to grasp the potential?

Rachelle Chong: Typically, utilities have left telecommunications systems to the IT department. This FCC order presents much bigger strategic opportunities for the utility. It's clear to me that the C-Suite should study this development immediately and decide whether this unique spectrum opportunity is one in which they will immediately invest.

A foundational wireless broadband network will change and enhance the entire company's operations in significant ways. It's sort of like how smart meters revolutionized how utilities gathered customer usage data, and empowered things like demand response and time of use rates. A smart network for electric utilities is the future, and that future is here.

I haven't even talked about how 900 megahertz will enhance ongoing grid modernization by utilities. If you're going to go from a one-way grid to a two-way grid integrating distributed renewables, you have to have a network that can manage two-way flows of energy coming in and out of the grid. This requires secure advanced technology.

The CEOs and the C-suite need to examine closely this rare spectrum opportunity and decide how it could enhance their grid modernization, disaster recovery, efficiency, resiliency, and cybersecurity concerns, all of those things.

They need to decide right now on whether this is something that they would want to approach regulatory Commissioners about to say, "Hey, we want to take advantage of this spectrum opportunity. How can you help us do it quickly before we lose the spectrum to other critical infrastructure players who may snap it up in our service territory?"

I should preface that remark by again noting that the FCC did not reserve this spectrum only for electric utilities. The FCC is allowing any critical infrastructure player or major enterprise entity to deploy systems on this spectrum. That could include airports, manufacturing facilities, and package delivery companies. It could include well-heeled national companies like Amazon and UPS.

The 900 megahertz spectrum is not something that the FCC only reserved for electric utilities. That's why electric utilities need to seize upon the opportunity and evaluate it for their company and get right on it with their regulator if they think this is something they need in the coming decades.

PUF: Yes, because it could get used up by somebody else.

Rachelle Chong: That's right. Suppose you're UPS, with nationwide operations. UPS could go in and lease the spectrum from Anterix in a number of states or major metro areas for its operations. Then the electric utilities in those areas would miss out on this spectrum opportunity for the benefit of their customers.

There are a million things an electric utility could do with the spectrum. This is sort of like the iPhone when it was invented. We had no idea what the apps would do when it was invented, but just twelve years later, there's two million plus iPhone apps and the variety of things they can do to enhance our lives is mind boggling.

Similarly, we're at that moment with the electric utilities. They're now going to be looking at this beautiful swath of beachfront broadband wireless spectrum and say, holy cow, what can I do with this and make my operations more resilient, safe, and efficient?

I want to emphasize that in my view, it's a once-in-a-lifetime opportunity, similar to the FirstNet emergency responder spectrum after 9/11, which was the result of legislation. I'm excited for the electric utilities and the possibilities this 900 spectrum will bring them.

PUF: Assume our industry, regulators, policymakers, and utilities seize upon this. What's this going to look like in five to seven years as far as use of this specialized broadband? In particular, the benefit for the public, what could it look like?

The 900 megahertz spectrum is not something that the FCC only reserved for electric utilities. That's why electric utilities need to seize upon the opportunity.

Rachelle Chong: We will see the largest most forward-looking electric utilities using the foundational wireless broadband networks to play many roles in their grid modernization. For example, we will see rooftop solar, electric vehicle charging, and storage going into their systems. These wireless systems will be supporting fast broadband data exchange.

They will be using the private licensed network to send their most sensitive signals controlling the grid, and to protect the grid from hacking and other cybersecurity attacks by the bad guys.

They will be using a large sensor system distributed across their electric grid to predict weather conditions to prevent damage from natural disasters such as wildfires, hurricanes or tornadoes. In major disasters, the wireless broadband network will help efforts to find and repair the damage.

They will be using these systems to have more efficient safety inspections of all of their lines, particularly out in the field. The wireless systems will enable faster repairs and help utilities prioritize the repairs by delivering photos or videos by email or text of the anomalies found in the field equipment.

In the future, utility leaders will be meeting up at UBBA, the Utility Broadband Alliance, which is a new utility run association that has just formed. At UBBA conferences, utility leaders will be comparing notes about various new applications on these wireless broadband systems and challenging each other to develop more innovative applications to solve the knotty energy issues of the twenty-first century. They will be giving each other awards for the innovations that best improved grid operation. The FCC's order was the spark that lit this storm of activity. ○

Chair Pai's View

Continued from page 5

engineers and carefully went over some of the technical analysis for how the 6 gigahertz band could be used for unlicensed operations, essentially for Wi-Fi, consistent with protecting incumbents.

For example, in our 6 gigahertz order, we said that outdoor use of the 6 gigahertz band for Wi-Fi would be permissible, but only if there was what was called

By creating a private LTE network, an electric utility is able to rely not on the public internet, which may have a vulnerability here or there, but rather a purpose-built private LTE network that can avoid those vulnerabilities.

an AFC, automated frequency control, to ensure that if there's an electric utility in the area using that spectrum, then essentially that Wi-Fi channel would be off-limits.

Same thing with indoor uses for consumers – Wi-Fi routers and the like. We authorized the use of that indoors, but at a lower power level than some Wi-Fi advocates wanted, because we wanted to make

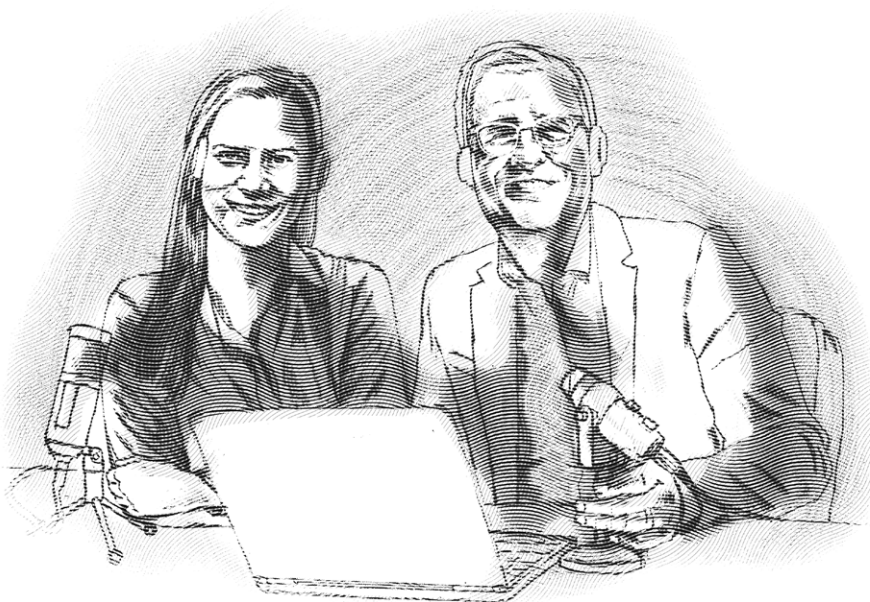
sure that the routers didn't emit too much energy that would ultimately bleed out of windows and potentially interfere with electric utilities.

We always have to strike that balance and we are always, of course, open to getting sophisticated engineers from any industry who want to give us more wisdom on these topics.

PUF: You're a lawyer by training but you have to understand all these engineering technicalities.

Chair Pai: It's a challenge and luckily we've been blessed with a fantastic career staff at the FCC and the Office of Engineering and Technology, as well as those from a variety of industries, from the electric industry, from the telecom sector, and others, who are always willing to come to the table in good faith and put data and calculations and facts and figures before us that we can meld them together in a thoughtful way to form a better policy.

In the 900 megahertz proceeding, in the 6 gigahertz proceeding and others, I've been grateful to those who, while they may not agree with each other on the final policy outcome, at least want to focus on the facts as opposed to pounding the table. That to me speaks to the best of public policymaking in this country. ○



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President Presley's View

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connectivity. Public utilities of all nature, of all deliverables, of all service types – gas, water, and electricity – are all opportunities to some degree that are possible.

I surely don't seek to dictate how that would look in other states. But it's important that we ask ourselves this question. We need a rock-solid determination that we will do everything we can.

I'm not talking about specific Commissioners, I'm talking about as a country, that as the American people, we knew there was a problem, and yet we let opportunities pass us by. I don't want to be in that position.

In Mississippi, we're going to push hard to understand that better.

We just created a neighborhood task force on emergency preparedness, response, and resiliency. I have a subcommittee in that task force dealing solely with lessons learned from COVID-19.

We're going to put together a real comprehensive look. I'm proposing that would be a two-year task force that will come out and make these reports that we will be able to learn from. I want to see us lead in all of these areas, and one of the facts is that we've got

Let me be clear. This is the issue of our day that affects everybody and every business, and it affects every sector of public utilities, period.

to look at this broadband issue.

Let me be clear. This is the issue of our day that affects everybody and every business, and it affects every sector of public utilities, period. It just does. Even if you're a water utility, there are issues related to broadband that affect your business, and it's certainly applicable if you're an electric utility.

Broadband is a common denominator that is something that is one of those very few issues in today's political climate that everyone on both sides of the aisle can agree is a problem.

Maybe we have disagreements on how to fix it, but we all recognize that this is an issue. Going past COVID-19, you're never going to have to spend a minute debating with somebody whether or not broadband access is needed and the fact that an internet service is not electric. ○



For more, see the brief video interview with NARUC President Brandon Presley.

Glossary of Telecom Terms

4G and 5G: Evolutions of the 3rd Generation Partnership Project cellular communications technology standards. The 4G standard deployed worldwide is known as LTE. 5G networks build on 4G and are in the early stages of deployment.

Broadband: High-capacity transmission capability. Modern applications that depend upon rapid communication of large quantities of data require networks with a greater transmission capacity. To provide that capacity, wireless broadband channels typically have bandwidths larger than one megahertz, while narrowband channels are usually two hundred kilohertz or less in bandwidth.

LTE: Long Term Evolution is today's leading mobile wireless technology, deployed in commercial carrier and private enterprise networks worldwide. LTE, which adheres to the 4G evolution of the 3rd Generation Partnership Project standards is a mature technology benefiting from an extensive ecosystem of available devices that can operate in the range of spectrum bands specified in the 4G standard.

Private Network: Closed communications network operated by an entity such as an electric utility for its own internal purposes. Private network owners control every aspect of the system, including for example the rigor of cybersecurity measures (such as separation from the public Internet), the number and type of user devices, and the priority of traffic types competing for bandwidth. As a key aspect of the system infrastructure, the spectrum used for private networks must be controlled, dedicated, and licensed to the network operator.

Spectrum: Electromagnetic frequencies or channels used for wireless communications. Broadband networks typically require wider bands of spectrum (that is, a wider range of consecutive frequencies) to provide higher transmission capacity than narrowband networks. Radio transmissions using spectrum comprised of lower frequencies below one gigahertz (called low-band, measured in cycles per second or hertz) are generally better able to carry across long distances and penetrate obstacles such as foliage and buildings.

Cooler Things FCC Has Done in Decades

Continued from page 20

than a carnival booth on the Internet, bad guys can't get at it from their cozy easy chairs. They'd have to take "The Russians are Coming, The Russians are Coming," a step further, sail a submarine over to the states, step up to a utility's telecom equipment, and then plug in. Now, I totally like that, how much more difficult it would be for the bad guys.

So for the first time in the years since the cybersecurity crisis first confronted our country and our utilities, I've become optimistic we can come out on top. I've sometimes daydreamed that someone would develop a new super duper Internet – air-gapped from the wide-open carnival of an Internet we're stuck with – where utilities and other vital institutions could locate securely from the Blue Meanies and other fiends. As it turns out, that's what private broadband LTE does.

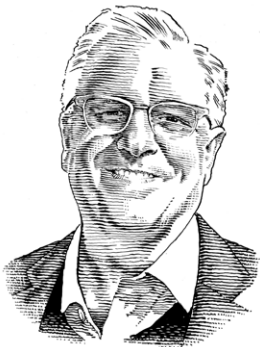
A real big thanks, therefore, to the FCC. This rededication of three megahertz segments of radio frequencies for broadband looks like the coolest thing the FCC has done since giving me my general amateur radio license decades ago. ○

I've sometimes daydreamed that someone would develop a new super duper Internet where utilities and other vital institutions could locate securely from the Blue Meanies and other fiends.

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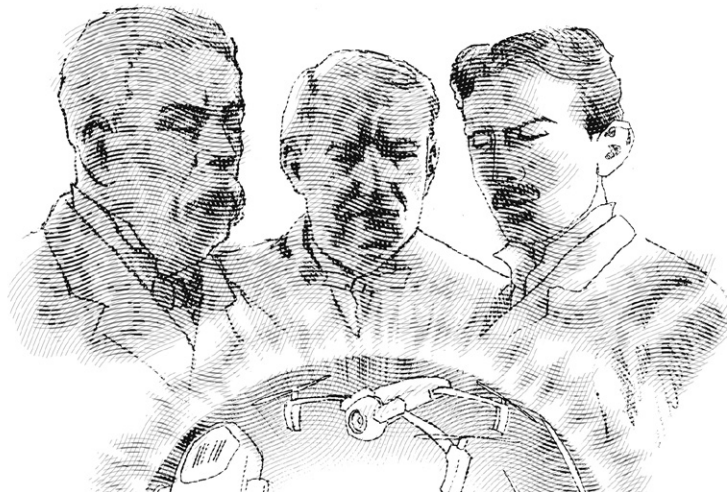
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PUF Annual Pulse of Power Survey

Cooler Thing FCC Has Done in Decades

By Steve Mitnick, Editor-in-Chief



Everybody in the telecom world calls it the 900 megahertz band. Though, as this energy guy sees it, that's a little odd since the 900 megahertz band extends from 896 megahertz at its lower boundary to 940 megahertz at its upper boundary. I guess the name 900 megahertz band stuck because the alternatives such as the 896 to 940 megahertz band is too much of a mouthful.

It took me awhile to really get what this is all about – this rededication by the feds of three megahertz segments of radio frequencies for broadband – until I recalled my teenage years fiddling with ham radio. Which did seem at the time to be a religious violation of some sort given ham was off limits in our Jewish family. After testing at twenty words per minute in Morse Code, at the Brooklyn offices of an obscure government agency called the Federal Communications Commission, this FCC officially assigned me my own call number, WB2IXU. Proud as a fifteen year old could be in the nineteen sixties, I purchased a set of QST postcards – QST is like yo in ham radio circles – with my call number imprinted on them to mail to folks I reached on the allowed radio frequencies in far off and exotic lands like Ohio, Texas, and once, Australia.

Something I learned in the process, and then soon forgot for decades until now, was that the FCC rules radio frequencies and determines who can use what intervals of hertz. Worth mentioning here that it was Heinrich Hertz who, in the late nineteenth century, was the first to prove the existence of electromagnetic waves that James Maxwell's famous equations had predicted. What did Heinrich Hertz get for his trouble and his brilliance? Not much of anything. He tragically died at the age of thirty-six and aside

It took me awhile to really get what this is all about – this rededication by the feds of three megahertz segments of radio frequencies for broadband – until I recalled my teenage years fiddling with ham radio.

from a medal or two, he was little lauded in life, but was eternally so in death since frequencies ever since are referred to as some number of hertz, kilohertz, megahertz, or gigahertz. For instance, anytime your favorite classic rock station announcer shouts out, stay tuned to ninety-nine point-five megahertz on your FM dial, they're honoring Heinrich, albeit unintentionally I suppose.

I said the FCC rules radio frequencies, which is true. But since the most desirable frequencies are limited in number given the constraints of telecom

technology and the physics of radio signal transmission – including the need to sufficiently separate uses of the airwaves to minimize interference with one another – there can be pretty intense clamoring and battling over this or that spectrum. So the FCC seems to me to be as much as a referee as a ruler, or more so I think.

About a year after the FCC issued a Notice of Proposed Rulemaking on broadband in the 900 megahertz band, and after nearly as many filings from the parties to rival a good-sized FERC proceeding, the FCC has gone and done it. From 897.5 megahertz to 900.5 megahertz and from 936.5 megahertz to 939.5 megahertz, each segment being three megahertz from end to end, utilities in particular can put their stakes in the ground, within these segments of the airwaves, and have their very own private broadband LTE telecommunications networks.

LTE? Other than the three tiny letters that often-times appear in an upper corner of your smart phone, what's that stand for?

You learn something every day. I've now learned that LTE, which strangely stands for Long Term Evolution (sounds like what happens at the climax of 2001: A Space Odyssey), has built-in cybersecurity defenses. I like it. Cybersecurity geeks say LTE is more granular. Huh? What's that mean? Well, different electronic components within a utility's telecom system that's granular can have different cybersecurity defenses. Which makes it very tricky for bad stuff from bad guys to get around in there – in telecom systems – and do bad things.

Then I found out that broadband LTE has extra room – because it's broad, duh – to add even more cybersecurity defenses. I really like that. Plus, the FCC went with three megahertz spaces on the spectrum, one channel that's three megahertz wide for transmitting and one for receiving, so the broadband could be super broad. Now that's a soft pitch right down Broadway!

And that's not all. Then I found out that private broadband LTE is, well, private. As opposed to the very public Internet that is a wide-open carnival of cat videos, news that is fake and otherwise, and bad guys trying to steal your personal info or screw-up your democracy. Those bad guys in Russia for example have plenty of handy ways at their disposal to compromise a utility's operations through the Internet. But if a utility's telecommunications are private rather

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