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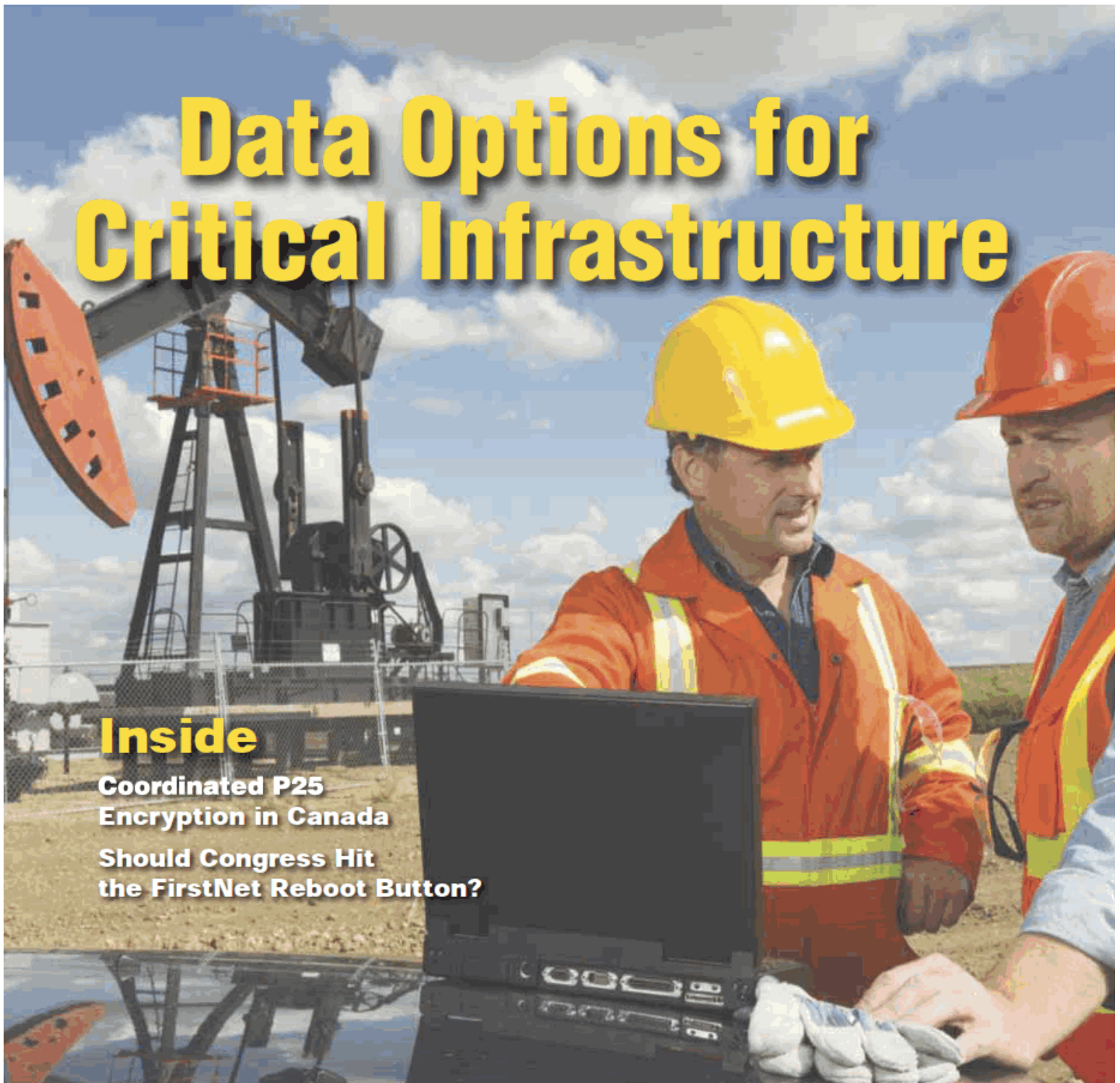
C O M M U N I C A T I O N S

Data Options for Critical Infrastructure

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Images courtesy Infrastructure Networks

Data Options for Critical Infrastructure

The nation's critical infrastructure industries (CII) need data capabilities to modernize communications systems. Several solutions are available, each with its own pros and cons. By Kristen Beckman

U.S. critical infrastructure industries (CII) are in the midst of a major modernization as they deploy advanced technologies to create efficiencies and increase resiliency during disasters. Legislation has encouraged and provided funding to further the goal of modernizing the electric power grid and other CII systems.

While voice communications has always been crucial to CII, data communications is becoming increasingly important. Just as broadband is in high demand in the consumer segment and is viewed as essential to public safety, data communications is expected to be critical to CII companies in the future. Advanced technologies will rely on connectivity to provide advanced metering, field reporting, system monitoring and control operations.

But in the push to modernize their networks, CII companies face challenges at all turns in looking for both wireline and wireless connectivity options. Telephone companies are

moving away from legacy copper systems, and they want CII companies to move with them to more efficient but more expensive fiber options. Wireless options present an alternative solution. Some CII companies have built private wireless networks to handle their voice and data communications needs, but leasing or buying suitable spectrum can be difficult and expensive. As a result, many CII companies rely on commercial cellular networks to carry their data traffic, but they must cede some network control and compromise on reliability and priority access.

There seems to be no silver-bullet solution that neatly solves all the communications requirements CII companies face. However, a new group of companies is hoping to fill the void with plans to offer data services tailored to the needs of CII companies.

Applications

Advanced metering automates col-

lection of energy consumption information via communications devices installed at meters and uses wireless links to transfer information back to the company. Utilities in the U.S. are expected to deploy 65 million smart meters this year, according to a Department of Energy (DoE) estimate.

Integrating communications networks with supervisory control and data acquisition (SCADA) systems facilitates automatic energy balancing activities.

"We have to be able to balance the input of energy with the withdrawal of energy," says Aryeh Fishman, associate general counsel for regulatory legal affairs at Edison Electric Institute (EEI), an association of shareholder-owned electric companies. "This is where the telecom system becomes important because you're trying to get data from the generator or the customer to understand if they are injecting or if they are withdrawing and how much so you can balance the system."

Data communications also can facilitate analytics that may be useful in maintaining equipment. Typically, a technician visits network assets to assess their condition, which is generally inefficient and potentially dangerous. With connected sensors, network conditions can be monitored daily and issues predicted before they become larger problems, potentially extending equipment lifecycles, Fishman says.

In the oil and gas industry, companies are hungry for higher capacity communications capabilities to support drilling activities, with both data and voice communications flowing from rigs, says Carl MacKinnon, executive vice president of sales and marketing with Infrastructure Networks, which offers a broadband solution for the CII market. Once a well is drilled, seismic work and fracking activity can

create large amounts of data that can be collected and sent to geologists off site for analysis.

Communications devices will be able to report production data to headquarters and create efficiencies by automatically monitoring equipment, turning off valves and viewing tank battery levels. Broadband networks can provide live video to not only enhance facility security but also alert the company in real time to situations such as leaks in wells and pipelines.

Specialized Carrier Options

CII companies that can't or don't want to build a private network have the option to buy service from cellular carriers. But in addition to control and priority access challenges, some CII operations are too remote to be serviced by commercial carriers, says MacKinnon. This has given rise to several specialized carrier options.

"It's good to see the market responding," says EEI's Fishman. "The question is whether the market can provide a really viable opportunity."

SouthernLINC Wireless plans to offer Long Term Evolution (LTE)-Advanced data services for Southern Co.'s electric utilities, local businesses and governments in the utilities' service territories. The first LTE Release 10 broadband service offerings will be available in Alabama in mid-2016. The company also continues to invest in its existing iDEN wireless network, which delivers push-to-talk (PTT) group radio, cellular and packet data services.

Specialized carriers are approaching the CII communications market with different opportunities and offerings. Following are three additional carriers targeting the CII space.

M2M Spectrum Networks is deploying a purpose-built network specifically for machine-to-machine (M2M) communications that can be used for smart metering and other narrowband applications.

"As we continue to shrink size and increase processing power of devices, there are more and more things out there that have information and could

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benefit from being connected,” says Barclay Knapp, co-founder and CEO of the company. “While carriers do a fairly good job of addressing M2M communications, they increasingly are focusing on more broadband types of applications like video security or full-motion video. And because of their own spectrum shortages, they are tending to price their services accordingly.”

Knapp says this created a market for a service catering to specific narrowband needs at an affordable price.

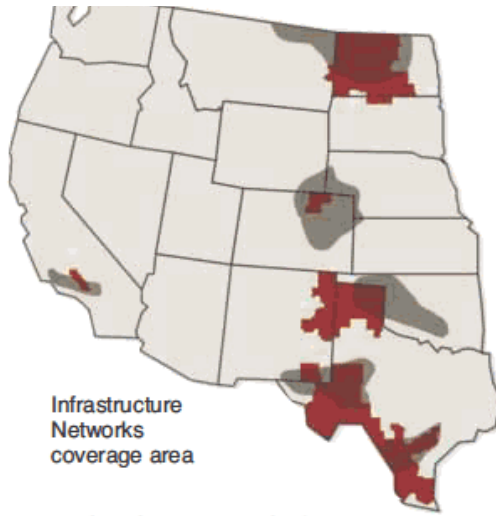
“I use the analogy that cellular carriers are very good at building semi-trailer trucks to haul big packages across town, but typical M2M communications could fit in a shoebox,” says Knapp. “For the same reason you don’t call up a semi to come get your shoebox and take it across town, the cellular carriers aren’t really equipped to do this. There exists this very lower end of the market where the carriers are basically just too expensive.”

M2M Spectrum Networks recently launched service with live customers and is expanding nationwide using 800 and 900 MHz spectrum. The company recently filed a petition for rulemaking with the FCC proposing that the commission’s rules be amended to permit SMR systems on 900 MHz business/industrial/land transportation (B/ILT) channels provided that the end users are B/ILT-eligible.

Rather than marketing a network solution to customers, Knapp says the company is focusing on building applications that appeal to different verticals and plans to offer packaged services that include a combination of connectivity, end-user devices and applications on a subscription basis. “We tend to look at business problems and ask how do we solve business problems using an M2M solution?” Knapp says.

While much of the focus is shifting to broadband, Knapp says narrowband is still an attractive service, and the company could offer more advanced services as technology changes.

“We’ve purposely stayed narrowband because that’s what makes it cheap, but the technology always advances,” says Knapp. “Today’s nar-



rowband was yesterday’s broadband. Our company is focusing particularly on the market for which 4G or LTE is overkill.”

Infrastructure Networks, founded in 2011, offers connectivity ranging from 128 kilobits per second (kbps) to 10 Megabits per second (Mbps) to the CII market. The network uses LTE technology and provides scalable service with the ability for CII companies to have network visibility and control. Many features of the system are hosted in the cloud, allowing customers to rapidly make changes to speed and capacity settings at the click of a mouse, MacKinnon says.

The company acquired unused spectrum in the 700 MHz, Advanced Wireless Services (AWS) and Broadband Radio Service (BRS) frequencies primarily from speculators and rural co-ops and launched its network more than two years ago. While network resources are shared among several clients, the technology allows traffic to be segregated so each client essentially has access to its own private network, says MacKinnon. The service is offered on a subscription basis.

Potential network congestion is addressed via quality of service guarantees and service level agreements (SLAs). If the network becomes congested, the company will deploy micro sites to offload traffic to ensure the system remains operational for all clients, MacKinnon says.

Infrastructure Networks also offers a continuously staffed network operations center (NOC) and employs field technicians throughout its operating area to provide a four-hour response

time. The company provides industrial-grade equipment designed for temperature extremes and other challenging conditions encountered in CII operating environments.

The company has more than 50 clients on its systems, situated near major shale faces in Texas, Colorado, California and North Dakota.

Pacific DataVision (PDV) has a plan to realign interleaved spectrum at 900 MHz to allow for a broadband service it plans to offer to CII. The company bought the spectrum from Sprint last year with about half of the \$220 million it raised from investors.

The company’s first goal was to get the narrowband channels back into use, and it did that by launching a dispatch-oriented service using existing Motorola Solutions MOTOTRBO technology in Houston earlier this year. Morgan O’Brien, vice chairman of PDV, says additional deployments are in the works and the company hopes to have 20 markets operating commercially in the next two years.

Meanwhile, the company filed a two-year 900 MHz broadband rebanding proposal with the FCC, and after a comment period, is waiting for a final decision from the commission. There have been a number of comments opposing PDV’s proposal because of interference and other concerns.

If its proposal is approved, PDV will have to pay to move incumbents to comparable facilities. O’Brien says the company’s proposal includes a willingness to deploy build-to-suit systems ranging from simple spectrum leasing to end-to-end funding and network buildout. It also gives CII companies priority access on any facilities it builds.

If the FCC chooses not to realign the spectrum, O’Brien says PDV will find creative ways to use the spectrum but will continue to advocate that it be realigned to support broadband.

“If you have broadband spectrum, you can use any technology you want including narrowband,” says O’Brien. “If you have a narrowband allocation, you’re locked in to narrowband technologies, and that’s going against the

way the world is going. It's always an uncomfortable process to reband or retune, but all spectrum is being used and that's going to be the name of the game going forward forever."

O'Brien expects PDV's network to provide functions and efficiencies for CII, including video services that can be useful for incident management.

"We don't know what types of applications specifically are going to enhance utilities' operations, but the utility industry has made a very big point over the years of saying they have to have access to broadband and they can't afford to have it pre-emptible," says O'Brien.

Network Sharing

Another option is the possibility of partnering with the First Responder Network Authority (FirstNet). The FirstNet mandate calls for the public-safety network to take on additional users to help offset the network's costs. CII companies may seem like a natural fit, but the question of access during incidents is critical.

"There's an interest in trying to

"FirstNet has to figure out who they want to bring into the system, on what terms and at what cost."

— Aryeh Fishman, Edison Electric Institute

marry up utilities with public safety because we have very similar needs for a reliable system — a system that can hold up under disaster events," says EEI's Fishman. "But that also makes for some real challenges because you don't want first responders disadvantaged in any way, but there's a nervousness that you're going to have a disaster event and then who's going to get kicked off the system? It becomes a discussion point on how you share."

Fishman says EEI is watching the FirstNet proceedings and has submitted comments related to the definition of public safety, how users should be treated and the potential fee structure, and now it is waiting to see what direction FirstNet will go.

"First and foremost, FirstNet has to figure out who they want to bring into

the system, on what terms and at what cost, which is obviously important to utilities that are regulated," says Fishman. "There's a lot of uncertainty, and we're waiting and watching, but right now we don't have a lot of answers."

Whether they build a private network, develop network-sharing arrangements or buy services from a carrier, CII companies have a few basic requirements, says Fishman. It comes down to finding an affordable, reliable and resilient option.

"We're basically looking to find reasonable options to be able to modernize our grid, and that's what we have to do," he says. ■

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