

Welcome to MissionCritical Communications' "State of the Industry" issue...an opportunity to share information on the status of land mobile communications as a whole. On the following pages, you'll find a wide range of individual perspectives – from users to manufacturers, policy-makers to lobbyists – on the regulatory, technology, and business issues that our industry currently faces, as well as a forecast of how these issues are likely to affect our livelihood. The editors would like to thank all those who participated in this very special issue. Read on for insights from industry experts.

- **Warren B. Causey** – Causey is founder, president, and CEO of Dallas, Georgia-based Warren B. Causey Ltd., a research, analysis, and consulting firm specializing in the utilities industry. He has been a researcher, writer, and analyst for more than 30 years.

- **Jeremy Denton** – Denton is director of government affairs with the Industrial Telecommunications Association (ITA), an advocacy group representing wireless service organizations and radio dealers.

- **John Facella** – Facella is the director and market manager for public safety markets for radio systems provider M/A-COM Wireless. He has more than 24 years of experience in LMR, cellular, and military radio communications.

- **Ralph Haller** – Haller is president of wireless telecom consultancy Fox Ridge Communications in Gettysburg, Pa. Previously, he served as chief of the FCC's Private Radio Bureau.

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- **Frederick M. Joyce** – Joyce is chair of the Venable LLP law firm's Communications Practice Group, located in Washington, D.C. He has more than 20 years of experience in the communications field.

- **Warren B. Causey** – Causey is founder, president, and CEO of Dallas, Georgia-based Warren B. Causey Ltd., a research, analysis, and consulting firm specializing in the utilities industry. He has been a researcher, writer, and analyst for more than 30 years.

- **Paul Kolodzy** – Kolodzy is director of the Center for Wireless Network Security (WiNSeC) at Stevens Institute of Technology in Hoboken, N.J. Prior to his appointment at WiNSeC, Kolodzy was senior spectrum policy advisor at the FCC and director of the commission's Spectrum Policy Task Force.

- **Jill Lyon** – Lyon is vice president and general counsel for the United Telecom Council (UTC), an association that provides advocacy, research, and frequency coordination services for critical infrastructure organizations.

- **Greg Meacham** – Meacham is vice president of federal programs and homeland security for wireless carrier Nextel Communications. His focus is on delivering products

and services for the federal market and public safety community.

- **Amalesh Sanku** – Sanku is vice president of marketing for EF Johnson, a provider of wireless communications systems for federal, state, and local agencies.
- **Eric Schimmel** – Schimmel is an independent telecommunications consultant in Bethesda, Md. He is a retired vice president of the Telecommunications Industry Association (TIA).
- **Catherine Seidel** – Seidel is deputy chief of the FCC's Wireless Telecommunications Bureau (WTB). Her oversight includes the bureau's Broadband Division and Public Safety and Critical Infrastructure Division.
- **Alan Shark** – Shark is president and CEO of the International Wireless Telecommunications Association (IWTA) and the American Mobile Telecommunications Association (AMTA). Headquartered in Washington, D.C., IWTA and AMTA represent specialized mobile radio (SMR) operators.
- **Jeffrey L. Sheldon** – Sheldon is a partner in the Washington, D.C. law firm of McDermott Will & Emery, LLP. He is a member of the firm's Telecommunications Practice Group, which specializes in services such as radio spectrum management, telecommunications infrastructure development, and contract negotiations.
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- **Jason Smith** – Smith is vice president of business development for MariTel, where he is responsible for developing and promoting use of the firm's VHF assets for private marine and land mobile communications networks.

Private/Commercial Radio

How are new technologies/applications changing private wireless?

Causey (W.B. Causey Ltd.): We are seeing more investor-owned utilities, for instance, going with public systems despite new technologies that would enable them to upgrade their existing private infrastructure. In many cases, private systems are being replaced with public systems and/or being relegated to a backup position.

Denton (ITA): New technologies are permitting private wireless operators to provide a number of services previously considered outside the realm of private land mobile communications, such as broadband data.

Lyon (UTC): Data applications are finally starting to fulfill their promise and should continue to expand rapidly. For users who continue to rely on privately built and maintained systems for coverage and reliability, the major issue is spectrum in which to build them. Critical infrastructure must have access to an integrated voice/data platform that provides interoperability within the critical infrastructure community and with traditional public safety. It will soon mean the difference between a safe and reliable utility infrastructure and a lower standard than Americans demand.

Meacham (Nextel): Wireless data, which is expensive to deploy in a private wireless system, is gaining a great deal of traction. Additionally, wireless data applications are evolving rapidly. Most private systems are obsolete by the time they are fully deployed whereas commercial systems are ‘ever greening’, meaning users benefit from technological advances that are deployed in the commercial network at the carrier’s expense.

Schimmel (Consultant): The primary intent and effect of new technologies has been to make spectrum available for more services and applications by enhancing the efficiency by which all applications utilize spectrum. It’s not unlike trading up to a new car. The old one may still be functional, but the new one has more bells and whistles and may be more efficient – at a price. Radio systems probably have a longer life than the cars in which they are installed, so any pressure to make an involuntary change may become a market issue.

Shpigler (Shpigler Group): The ongoing trend is toward integrated voice and data systems with networks consisting of a series of repeaters, gateways, and switches. Data transfer of information is one of the fastest growing areas for land mobile radio. Some of the advantages digital technology provides over analog are increased call reliability, call privacy, easier multiplexing, easier encryption, and opportunities to support services including paging, messaging, e-mail, and voicemail.

Can existing land mobile radio products or services benefit from an environment of less regulation and more competition?

Causey (W.B. Causey Ltd.): We believe strongly in the free enterprise system and that if competition is given an opportunity to work in any field, the benefits will accrue to the general public. Less regulation is needed in many fields, including LMR products. Competition can be difficult and some companies might not want to face it; however, the lack of competition leads to stagnation and a decline in innovation. Innovation to meet competition is what made our system work for the past 150 years. It’s only been in the last 80 or so that tight regulation has become the rule rather than the exception.

Denton (ITA): As a frequency coordinator, ITA believes the land mobile industry would benefit from additional competition in frequency coordination services. In today’s age, a licensee should be able to pick the frequency coordinator that will provide the most accurate service tailored to their needs, in a timely and cost-effective manner.

Meacham (Nextel): The existing regulation is not necessarily excessive. In fact, it is probably necessary, particularly as emerging technologies create increased demands for spectrum.

Competition is always advantageous to the consumer. The LMR manufacturing industry is capital intensive with only a few companies positioned to offer total solutions in all frequency bands. Standards are important to ensure interoperability among components of systems supplied by different vendors. The significant downward pressure on total cost of ownership to LMR users occurs when commercial push-to-talk services evolve to the point that LMR users are comfortable with fee-for-service plans instead of owning their own systems.

Schimmel (Consultant): Traditionally, the FCC has regulated two aspects of radio telecommunications: spectrum access and control of interference. Given the ever-present contentiousness of these matters, I see no viable alternative to our present system. In the case of selecting a single standard for digital wireless a decade ago, the handwriting was on the wall that industry would not bite the bullet. I so advised the FCC, but it deferred to the marketplace. Who was right? The FCC, which abdicated its authority to mandate a single standard, or Qualcomm Founder Irwin Jacobs, who persuaded a critical mass of his potential customers that there could be two good mousetraps?

Shpigler (Shpigler Group): The overall movement toward less regulation and increased competition has resulted in a more demanding marketplace. Vendors offering system solutions must be prepared to document the value proposition being shown as users become savvier and demanding. This trend is particularly applicable to the LMR environment where many users are seeking to build their networks with advanced-feature systems.

Can commercial push-to-talk services fill a role in mission-critical communications?

Causey (W.B. Causey Ltd.): It already is doing so at many utilities. As commercial push-to-talk capabilities are married with data transmission as is being done now – these systems will continue to supplant private, proprietary systems.

Denton (ITA): Mission-critical communications support the safety of life and property, as well as daily business operations for every sector of the U.S. economy. Given this critical task and considering that commercial push-to-talk services at this juncture tend to fall short in areas of reliability, security, and timeliness – characteristics that are the backbone of traditional two-way radio capabilities – commercial push-to-talk services cannot adequately supplant the need for traditional mission-critical communications.

Lyon (UTC): Competitive access to services is always preferable to a single provider, so multiple commercial push-to-talk offerings are unquestionably better than only one. That said, commercial wireless services are used almost exclusively by critical infrastructure for routine business communications – not in emergency situations. Unless commercial services can guarantee 24/7 service and ubiquitous coverage, they cannot take the place of private systems for critical infrastructure.

Meacham (Nextel): Absolutely! The physics of RF propagation and system reliability are not a function of ownership. Commercial systems can be deployed to meet mission-critical communications' needs with some modification of the ROI modeling by commercial providers. Post 9/11, we realize that disaster response must extend beyond police, fire, and EMS to include

the broader universe of responders such as transportation, schools, sanitation, utilities, healthcare, political leadership, and volunteer organizations. The limiting factor of a private LMR system is that it only facilitates communications among system users. Developments on the commercial side, such as priority on the network, close the gap on the most significant negative aspects associated with commercial services for mission-critical communications.

Shpigler (Shpigler Group): Push-to-talk services are definitely in demand in the area of mission-critical communications; however, it must be noted that quality and reliability standards are extremely high for utility operations, for instance, due to the critical responsibility for public welfare. Utility commission requirements are reflective of public safety standards, and the design criteria far exceed those of the telecom industry. For example, restoration of circuits used to protect the power grid must be achieved in two milliseconds, well below the 50-millisecond telecom industry standard.

Data Applications

Are mission-critical users comfortable using data for communications?

Causey (W.B. Causey Ltd.): Most executives are comfortable with the technology. In the field, many older service workers are less comfortable. It will require a continuing effort at education – and to some extent, time – to overcome some resistance among older workers.

Lyon (UTC): Sure. All utilities use data applications, and the infrastructure is controlled mostly by wireless data, albeit most of it is older technology.

Meacham (Nextel): Yes. Mission-critical users are increasingly relying on data. Everything from location-based services to wireless database access tools to CDPD replacement technologies is becoming more and more common.

Shpigler (Shpigler Group): For many users, voice systems have driven the bulk of communications migration activities to date; however, the need to support data, and the developments in applications have resulted in increasing interest in the data arena. The need is clearly present and mission-critical users are increasingly seeking solutions.

What obstacles must be overcome for greater acceptance of data?

Causey (W.B. Causey Ltd.): The reluctance of some field service workers and some lower- to middle-management personnel to accept change.

Meacham (Nextel): Adoption of data is growing but is still dependent on broader coverage and lower cost.

Schimmel (Consultant): Two words: user training. As humans, we will never change our preference for voice communications. We can, however, adapt to the use of data terminals if we are persuaded that there are benefits to doing so and it's not too difficult. We also have to admit that there is a learning process, which for some is more trouble than it is worth. In a business

environment, it may not be a choice, which brings us back to training.

Is there a demand for high-speed/broadband data in the mobile workforce? If so, what types of applications?

Causey (W.B. Causey Ltd.): Yes. Most needed are systems that can link and transmit workforce management documentation with GIS and preventative and predictive maintenance information. The ability to transmit a map with a work order superimposed, or at least linked, offers users considerable productivity benefits.

Lyon (UTC): Absolutely. The problem is that there is no private spectrum for it, and commercial service is spotty. Some immediate uses include the transmission of service orders, building blueprints, maps, equipment specs, and diagrams. Other applications include on-site video transmission during repairs for remote assistance and safety. Broadband applications were the purpose of the FCC's 4.9 GHz allocation to public safety, and the critical infrastructure is interested in working with public safety to explore opportunities that can benefit both communities.

Meacham (Nextel): I believe the demand is there today; unfortunately, funding for these applications is often not widely available. It's important to remember, however, that a network that is stable, tested, and proven is often more important than speed to mission-critical wireless data customers.

Schimmel (Consultant): Of course. The killer application is having access to information that would otherwise fill your trunk and backseat with paper. Perhaps the more profound question is, 'what does management expect a mobile employee to do with this resource?' By nature, data access may eliminate the need for an employee to interface with a supervisor. This might appear as an asset to efficiency, but it also creates a potential bypass of management and administrative control. In any event, it's not just coming – it's here, and we'd better learn to take advantage of its capabilities and manage any downside.

Emerging Technologies

Is VoIP/RoIP stable enough as a technology platform for use in mission-critical applications?

Kolodzy (Stevens Institute): The technology is rapidly progressing toward a fairly robust status. It is argumentative as to what is necessary for mission-critical applications. There are other critical applications that are using VoIP successfully; however, accurate delineations of the requirements are necessary.

Schimmel (Consultant): Probably not, but that's not to say we aren't getting close. My reservation is based on the knowledge that a lot of companies are still doing R&D, and standards programs are also incomplete. There will undoubtedly be some guinea pigs, so stay tuned. Unless some very big companies are wrong, VoIP is going to be a substantial development.

Shpigler (Shpigler Group): Network technologies supporting IP, such as VoIP, are expected to experience significant growth in response to the unification of divergent systems. The industry should expect increased market opportunities in equipment and hardware that allow migration to a unified network. Utilities may be reluctant to abandon current operating procedures in order to realize benefits associated with new technologies. Vendors wishing to benefit from the market should expect to shepherd the process. That is, vendors must first provide a clear delineation of economic value associated with transitioning to an IP network. A good job of communicating why the transition would be good for a user group is needed. Furthermore, vendors must stand ready to provide a guide path for potential customers, with a clearly defined methodology for any proposed transition.

How can the private wireless industry take advantage of advanced technologies such as Wi-Fi, mesh networking, and software-defined radio?

Causey (W.B. Causey Ltd.): We believe some of the new technologies are going to redefine the wireless industry. Seeing exactly how that will take place is not easy, but people with imagination are working on it and other new technologies now.

Kolodzy (Stevens Institute): The imagination and persistence of the developer are the only limitations. There are so many answers depending upon the application, the physical environment, and the location. Critical applications must be judicious of unlicensed technologies due to the interference potential, but for many applications, they may be sufficient and very cost effective.

Lyon (UTC): Utilities are already making use of these technologies and are very interested in exploring their capabilities. Mesh networks, for example, can be used as next-generation control systems among a large number of access points such as neighborhood substations or gas wells, while providing other wireless connectivity at the same time. With additional regulations likely in coming months to meet homeland security obligations, critical infrastructure entities will rely on wireless systems even more than they do at present and will need to find efficient and reliable technologies that they can fashion to meet their needs.

Schimmel (Consultant): I particularly like the prospects associated with SDR. The formal program to study and develop SDR technologies has taken more than a decade, but is now getting the attention of real-world sectors such as 3G. While the original thrust was fueled by the hope that the beltway bandits could find a way to provide the military services with interoperability at commercial radio prices, the same virtue applies to the bugaboo experienced by state and local public safety entities. Obviously, the FCC views SDR as potentially enhancing spectrum efficiency. The trade-off will be to accept less than traditional regulation of equipment that can change its operating characteristics and parameters with a software download.

Shpigler (Shpigler Group): Continued developments in the wireless arena have resulted in increased attention on the part of potential users. Many wireless systems feature relatively low costs and have grown in the potential applications supported. On an increasing basis, hybrid solutions offer much appeal in the market should be considered. As the marketplace becomes more demanding, we are seeing more attention being paid to solutions involving more than one

access platform. Furthermore, creative mesh solutions involving daisy-chain 802.11 deployments have gained quite a bit of momentum. The moral of the story centers on being flexible when considering a deployment strategy.