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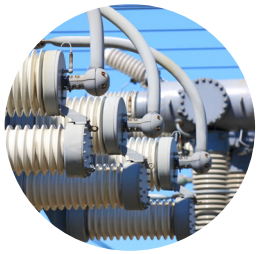


Future Forward: Getting Your Utility Communications On the Digital Path

By Kevin Sumrell, Vice President of Sales, Utility

Communications have become a significant and essential component to the safety and welfare of modern society. Like public safety agencies, utility providers rely extensively on their communications networks, often in dangerous and life-threatening situations.

The communications components of modern utility providers are recognized by the U.S. Department of Homeland Security as mission critical to our nation's national security infrastructure. Private land mobile radio (LMR) systems, while not as widely known as those of the public carriers (Verizon®, AT&T®, Sprint®, T-Mobile®), are quite advanced and are used by public safety organizations and critical infrastructure companies like electric, water and natural gas providers, airlines, and railroads. Major events like Hurricane Katrina and Superstorm Sandy demonstrated that land mobile radio systems are often the only means of communicating in a disaster.

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A Decade of Digital Communication

Mission critical communications systems are often built around a centralized communications hub.

Here, trained dispatchers closely monitor field activity and await new requests for assistance. At the genesis of an event or crisis, the dispatcher becomes the true "first responder," using their console — the heart of this mission critical environment — to direct resources to the location, facilitate data and radio transmissions, and ensure that the command structure is kept informed.

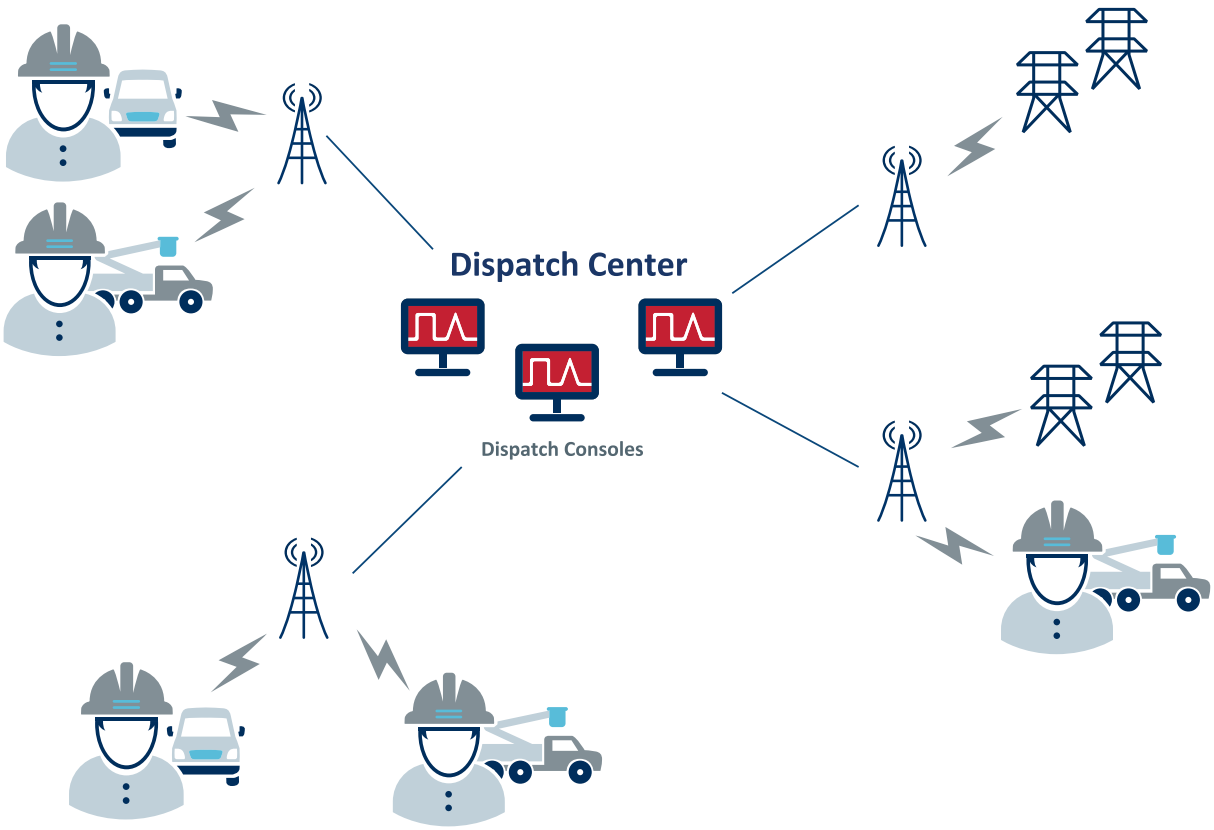
Over the past decade, land mobile radio systems have begun to incorporate the benefits of emerging digital technologies. High demand for spectrum has pushed the industry from traditional conventional analog radio systems, which support only one conversation per frequency, to modern "trunking" systems, which use spectrum more efficiently. These software controlled trunking systems move group conversations rapidly from one frequency to another, unbeknownst to the user, supporting several simultaneous conversations per frequency.

While the demands for spectral efficiency have driven the need for sophisticated computer control, it has also required the providers of dispatch center technology to evolve their systems as well. Traditional dispatch systems were interfaced with conventional radio systems through dedicated copper lines. Console switching equipment used analog Time Division Multiplexing (TDM) – the same as the "Ma Bell" era telephone carriers that was centralized in a back room and required numerous racks of hardware. Digital communications, computer control of these systems, and the introduction of IP-based technologies have created dispatch consoles with extraordinary capability and a new level of reliability and functionality. This paper will discuss some of the advantages of an IP-based system and review some of the details of transitioning from legacy systems to modern technologies.

The Land Mobile Radio Legacy

While the dispatch center and associated dispatch console is the nerve center of land mobile radio systems,

other key components include fixed radio infrastructure consisting of base stations and antennas, mobile radios mounted in vehicles, and portable radios carried by field personnel. Antenna sites contain the base station and antennas that broadcast the radio signals (typically mounted on buildings or large towers) and connected to radio transmitters (RF amplifiers and filters). A commercial cellular site is an example of an antenna site. Staff with field roles can communicate between themselves directly, over longer distances where their signal is relayed by the radio infrastructure, and with the dispatch center console users.



Digital Standardization: A Bold Step Forward

Dispatch centers are staffed by professionals who use a variety of tools to manage the flow of information to and from the workforce, instructing workers where they need to be and when and providing each other with vital information for situational awareness.

There are now several digital voice communications protocols available in the land mobile market. The public safety standard, APCO Project 25 (P25), has been in place for over a decade in a frequency division multiplex (FDMA) format and is available in "Phase 2" solution that utilizes digital time division multiplexing (TDMA) to provide for two voice conversations over one radio frequency. Other vendors offer systems compatible with the European Telecommunications Standards Institute (ETSI) driven Digital Mobile Radio (DMR) standards. NXDN™ is a digital Common Air Interface (CAI) radio standard created by Icom® and Kenwood (under the brand names iDAS and NEXEDGE®, respectively). It uses FDMA (Frequency Division Multiple Access) technology to fit two 6.25 kHz channels into a single 12.5 kHz channel.

The Cost of 100 Percent Uptime

Dispatch centers for public safety entities and utility providers are, at their core, call answering points where problems are reported and workers dispatched to the scene for timely resolution.

A caller may report a fire, an automobile accident, or power outage disrupting service. The call taker, often utilizing a computer-aided dispatch system, captures the information and ensures that it is transmitted to the appropriate field personnel. Most often, dispatchers communicate to field personnel using radios and voice communications, but often event information is communicated electronically via vehicle-based laptop computers.

Traditional dispatch communications were built on separate radio and telephone switching systems with little integration. Inbound and outbound telephone calls utilized a phone desk set connected to a Private Branch Exchange (PBX), providing access to lines and speed dials. High capacity copper phone circuits were needed into these facilities to ensure adequate capacity when disaster struck. Radio communications required proprietary consoles to transmit communications between antenna sites.

Structurally, these consoles required enormous resources to operate and maintain. A centralized, powerhungry, backroom rack provided the "brains" for the individual consoles.

As a result of this centralization, entire redundant systems — replete with their own power sources, copper line connections and consoles — were required. Often, these backups were located at a secondary and mostly idle site — further draining resources and nearly doubling the budget required for maintenance, upkeep and training.

IP Communications: Reshaping the Paradigm

The Internet and the associated internet protocol (IP) has reshaped communications worldwide in recent years.

Many homes now use a combination of cellular mobile phones and IP-based Internet phones (cable or satellite systems) for their primary communications. The significant move away from traditional telephone landlines has made it uneconomical for carriers to maintain their legacy networks. In addition to the migration to IP-centric technologies at communications providers, the corporate PBX transition to IP-based technologies is nearly complete as well. While some critical infrastructure industries and public safety agencies have migrated, others are only beginning and are

https://www.apcointl.org/spectrum-management/resources/interoperability/p25.html
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The Digital Advantage

struggling to ensure compatibility with their legacy systems. Utilities are replacing legacy landline-based architectures with IP systems; increasing reliability, reducing costs and improving efficiencies. This is having a positive impact, not only on voice and data communications between people, but also between substations, generating plants, and other large organizational assets.

In addition to the cost and maintenance advantages, a 100% IP architecture allows for inherent flexibility in scale and deployment. Traditional systems rely on processing within a centralized hardware platform. In contrast, IP solutions leverage standard Ethernet connections and network capacity to provide a ubiquitous and far reaching transport backbone. IP devices rely on distributed processing, so they allow components to be easily added or relocated to accommodate growth and organizational changes. IP networks also provide a natural foundation for the geographic separation of subsystems. Unlike conventional voice systems that employed proprietary hardware and dedicated wiring, IP voice platforms are comprised of modular components that use network connections to communicate. New systems enable geographic diversity, moving interface components out to locations where connections are most economical and efficient. Conversion from analog voice to digital IP occurs at points of origin anywhere around the network, facilitating easy transport to one or more dispatch locations.

The dispatch center also benefits from the communications revolution underway. Primary dispatch centers remain the hubs of communications with monitors displaying weather, traffic, workforce location, and the location of incidents along with video and relevant situational information. This provides all that is needed to turn a dispatch center into a command and control information fusion center. Today's mobile dispatch command and control solutions can be loaded onto a rugged laptop or tablet and deployed at virtually any location. With available LTE, WiFi or satellite connectivity, this mobile command and control center can be deployed in an instant — adding significant flexibility, efficiency and improved responsiveness to an organization in the thick of an emergency response situation.

The ability to implement advanced land mobile radio capabilities– existing corporate broadband assets using standard components– creates a powerful business case for migrating to IP-based dispatch technology.

Modern communications systems have changed rapidly in the last decade and are continuing to evolve – and the concept of the dispatcher is evolving with it. In addition to increased reliability and an overall reduction in life-cycle costs, the dispatch console is increasing in functionality and providing the capability of integrating formerly disparate systems under one comprehensive and capable umbrella.

The Utility IP Revolution

Utility companies have not missed this revolution and the majority are in the process of converting to IP-based communication systems.

Utility dispatchers have access to information on the status of the power grid and watch Internet-based weather monitors. Connectivity with electric substations provides status of critical parameters, including power outages or intruder alerts. Supervisory Control and Data Acquisition (SCADA) systems control breakers, switches, and capacity banks that help keep the grid operating. These functions are all being converted to digital technology using IP transport. As with land mobile radio systems, eventually each device on the power, gas, and water systems will have a routable IP address and will be directly accessible for status and control.

Sunset for Circuit-Switched Technologies

As the advantages of IP technologies become more apparent, manufacturers of TDM and other circuit-switched technology products are rapidly discontinuing their production.

They are replacing them with IP-based products that reside on local-area and wide-area networks. The best of these products are IP end-to-end, minimize proprietary hardware, and support industry standard protocols. While in the past one vendor was expected to produce the entire suite of products, today's customers expect the ability to select flexible subsystems which integrate cleanly into their IP infrastructure. While the advantages of the resulting integrated system are well demonstrated, the process of transitioning from a legacy system to a new one and integrating all of the communications subsystems together is complex and must be expertly planned.

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Developing an IP Dispatch Console Migration Plan

Technology transitions can be complex undertakings and not only require a well-developed project plan and an experienced implementation team, but also require systems, hardware, and software that are designed with interoperability and migration in mind.

While project planning tools are readily available, the plan for a transition to IP dispatch must include:

A clear analysis of the organization's communications system performance requirements and the capabilities of the existing land mobile radio system. Often, special features in the land mobile system also require special features in the dispatch system.

An understanding of all communications resources connected to the dispatch system. Also, because the IP-based dispatch system likely will connect to the corporate WAN, the system design and its bandwidth requirements must be well understood and mapped against the network's capabilities.

The needs of dispatchers - what tools will allow them to perform more effectively and make their jobs less stressful? How would they like to arrange their console screens (the Graphical User Interface, or "GUI") and the other resources available at their workstation? Detailed interviews with dispatchers will often reveal critical aspects of the job unbeknownst to

An understanding of the requirements of a backup dispatch facility. Dispatch is critical and lives could depend on the backup center's ability to start up quickly and function properly. Planning an effective business continuity solution involves dispatch system capabilities, networking, processes, and staff training.

In addition to a capable, experienced, and well-integrated project team, technology integration and migration projects must be anchored in a set of products that have been designed with interoperability and migration in mind. Moving to newer, more capable technologies is essential, but can be daunting. The right team, the right leadership, and the right equipment partners are essential to a successful and smooth migration.

Future Forward and Future Proof

Many utility companies are facing the task of integrating disparate communications systems using different technologies supplied by multiple companies and, in some cases, originating in different decades.

In years past, wholesale replacements with complete turn-key platforms were not uncommon, but today's economics have made this impossible even for the most successful companies. IT managers must evolve their communication networks by integrating legacy and next generation radio and telephony systems with a modular, user-programmable dispatch platform.

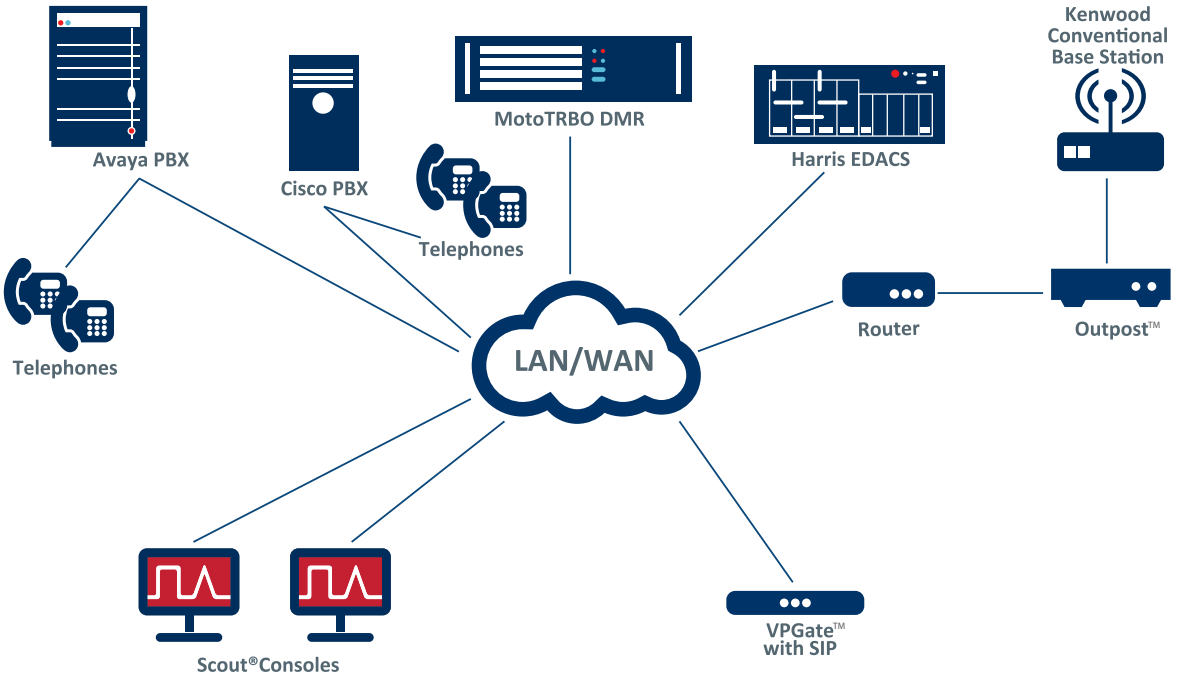
Avtec's Scout VoIP console system has been conceived, designed, and implemented with the complexities of such a transition in mind.

Utilizing a highly customizable user interface, Scout eases the transition of dispatchers between console systems. Mimicking the current console GUI reduces the stress of change while minimizing training time. This flexibility allows the organization to evolve the user interface as the migration process unfolds, avoiding disruption to operations and allowing changes to be rolled out incrementally.

Avtec's Scout: A Best-of-Breed Solution

Scout supports more advanced radio and telephony interfaces from different vendors than any other solution.

Leveraging a modular, software protocol "driver" design, the Scout system offers the most direct IP control interfaces for land mobile radio technology and advanced telephony solutions. Radio interfaces include conventional analog, legacy trunked systems (Harris® EDACS®, TaitNET MPT1327) as well as advanced digital systems such as NXDN™ (Icom® IDAS™, Kenwood NEXEDGE®,) and DMR (MOTOTRBO™, TaitNET DMR, Simoco™). Scout completes the convergence cycle, at the dispatch desktop, by providing connectivity with a variety of telephony solutions including Sprint®-Nextel's™ IDEN™, Sprint's Direct Connect, AT&T®'s Enhanced PTT, as well as direct SIP integration to IP PBX platforms provided by Avaya, CISCO™, and others. In addition to these system-level solutions, Scout has robust interfaces for a number of control stations, base stations, and direct radio interfaces.



Zero-Downtime Transition

Rarely does an enterprise transition from a legacy radio system to a newer one overnight; often both are operational simultaneously for extended periods.

During transition, console operators must interface with both the old and new, managing the organization through a period of varying capability. Scout provides common user interface to old and new voice technologies and facilitates migration in a controlled, organized, and predictable manner. Communication errors are minimized, eliminating repeated transmissions, missed calls and confusion.

Scout's versatility provides tremendous choice for enterprises in search of new communications solutions. Utilities are free to choose the best radio and telephone technology for their needs while retaining a common user interface for the dispatcher. The IP-centric architecture and flexible software design enable compatibility with nearly any system that might be added in the future. Finally, Avtec's 35+ years of experience with these critical transitions is the other key to reducing transition risk.

Utility companies around the world are implementing IP-based communications solutions and migrating their legacy TDM dispatch systems to IP-based equipment. These companies are enjoying major benefits like risk mitigation through geo-diversity, network-wide portability, reduced operating and long-term lifecycle costs, simplified expansion when needed, and more technically advanced radio and telephony integration. The new capabilities will enable your organization to communicate and operate at a more effective level.

Avtec provides the complete package needed to integrate today's modern communications systems with yesterday's legacy solutions. We take the risk out of migration by providing a software-based, true IP dispatch console that connects most technologies and the deep expertise needed for a successful migration.

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