



P25^{IP} *Technical Overview*

tyco / Electronics

M/A-COM



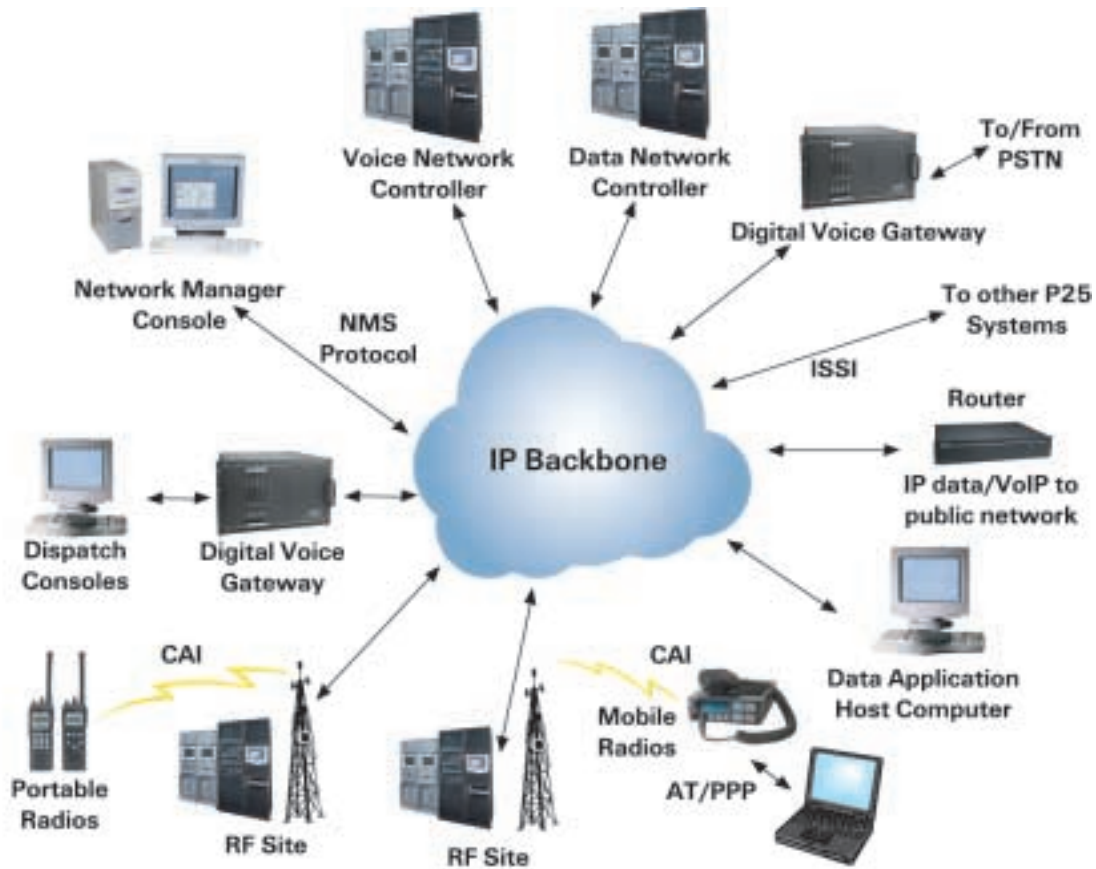
P25^{IP} – Expanding Digital Communications

P25^{IP} - Secure and Reliable Digital Voice and Data Communications

M/A-COM has combined the user-defined requirements of the Project 25 over-the-air protocol with the advanced functionality of a Voice-over-IP (VoIP) infrastructure to provide P25^{IP}; an IP-based digital communication network for agencies with mission-critical communications.

P25^{IP} is part of a portfolio of solutions that M/A-COM offers for wide-area communi-

cation systems - each of which are capable of meeting the communications requirements of Public Safety, Public Service and First Responders. Within the M/A-COM portfolio, the P25^{IP} network provides an excellent fit for those agencies using 12.5 kHz channels or which have lower user densities (few users covering larger geographic areas) but still require feature-rich secure voice and data communications. P25^{IP} is also particularly appropriate for users operating with non-exclusive VHF and UHF frequencies. For federal users, P25^{IP} meets the Congressional and NTIA mandates for the narrowband (12.5 kHz) migration.



M/A-COM's P25^{IP}: A Full-Featured Critical Communications Network



P25^{IP} - Advanced Digital Features for the Trunked or Conventional Narrowband User

P25^{IP} advances Project 25 technology by bringing trunking features to the conventional radio system user. Because the Project 25 CAI provides digital signaling between subscriber radios and the network, features that radio users traditionally associated with digital trunked systems are now available to conventional users. Traditional trunking features such as caller identification, digital emergency, prioritization of group calls, and console preemption of lower priority calls are all available with P25^{IP}. In addition to the conventional implementation, P25^{IP} is also available as a fully compatible Project 25 trunked system. The P25^{IP} trunked system offering provides all the features and benefits of conventional, and in addition adds improved channel and user management.

P25^{IP} supports all the Teleservices, Supplementary Services and Services to the Subscriber as defined by the Project 25 TSB-102A Systems and Standards Definitions and adds additional enhancements. Within the Project 25 standards, most features are "standard options" and the choice to include these features is left up to the individual vendor. M/A-COM is committed to providing the features that Public Safety demands to fulfill its mission.

Interoperability & Compatibility

Interoperability is a key requirement and a critical feature for any Public Safety system. As recent events have shown, an interoperable radio network is a vital component of Homeland Security, and interoperability is required in order to increase the effectiveness of all first responders. M/A-COM's P25^{IP} network is based on advanced wireless and network technology that allows seamless interoperability and compatibility with other types of currently fielded radio systems.

P25 Teleservices	P25^{IP} Supported Features	Project 25 Conventional	Project 25 Trunking
Broadcast Voice Call/Unaddressed Voice Call	Yes	Not Applicable	Mandatory
Group Voice Call	Yes	Standard Option	Mandatory
Individual Voice Call	Yes	Standard Option	Mandatory
Circuit Switched Data Network Access	Yes	Standard Option	Standard Option
Packet-Switched Data Network Access	Yes	Standard Option	Standard Option
Pre-programmed Data Messaging	Yes	Standard Option	Standard Option
P25 Supplementary Services	P25^{IP} Supported Feature	Project 25 Conventional	Project 25 Trunking
Encryption	Yes	Standard	Standard Option
Priority Call	Yes	Not Available	Standard Option
Pre-emptive Priority Call	Yes	Not Available	Standard Option
Call Interrupt	Yes	Standard Option	Standard Option
Voice Telephone Call	Yes	Standard Option	Standard Option
Discreet Listening	Yes	Standard Option	Standard Option
Silent Emergency	Yes	Standard Option	Standard Option
Radio Unit Monitoring	Yes	Standard Option	Standard Option
Talking Party Identification	Yes	Standard Option	Standard Option
Call Alerting	Yes	Standard Option	Standard Option
P25 Services to the Subscriber	P25^{IP} Supported Feature	Project 25 Conventional	Project 25 Trunking
Intra-system Roaming	Yes	Not Defined	Not Defined
Inter-system Roaming	Yes	Not Defined	Not Defined
Call Restriction	Yes	Not Available	Standard Option
Affiliation	Yes	Not Available	Standard Option
Call Routing	Yes	Not Available	Standard Option
Encryption Update	Yes	Standard Option	Standard Option



Public Safety User Requirements

M/A-COM's P25^{IP} Digital Network Benefits & Advantages

Advanced Network Architecture

Robust end-to-end IP Network with Industry Standard Protocols such as UDP/IP & SNMP with Open Architecture

- Allows use of field proven, standard networking and routing hardware for reliability, cost-effectiveness, and scalability
- Simplifies integration to other CAD, radio messaging & mobile data applications
- Provides flexible & reliable interoperability with other radio systems – local, regional or national
- Protects customers investment from obsolescence

Integrated Voice & Data Network

Integrated Voice and Data Network

- One system to meet the users current and future voice and data, encrypted communications needs
- Lower cost; less maintenance; easy to expand
- Effective and efficient throughput for both voice and data; will handle current & future data requirements, e.g. NCIC, AVL, messaging, and others

Scalability and Expandability to easily and economically add other State, Federal and Local Agencies to the Network

Scalable/Expandable System Architecture

- Provides spectrum efficiency by meeting FCC Guidelines for wideband, as well as narrowband operation with the potential of 2 voice or data calls per wide-band channel.
- Easy, cost-effective expansion of system – to add other state and local agencies to the network
- Easy, cost-effective addition of new features/capabilities

Reliable, Fault Tolerant Design

Distributed Processing and Redundancy

- Maximizes system reliability
- Network continues to operate even if key system components or site links were to fail
- Sites continue to operate with call validation even if links to the Voice Network Controller fail

Interoperability and Compatibility with other radio systems

Flexible, simple, reliable interoperability methods at the Network, Radio and Console Levels of the network.

- Allows interoperability with other radio systems (conventional, trunked, P25, iDEN, etc.)
- Allows interoperability with APCO Project 25 systems and equipment through the use of P25 Common Air Interface (CAI)

Seamless statewide roaming with sophisticated Public Safety network and user equipment capabilities

Many of the advantages of a Public Safety trunked system: Automatic, seamless wide-area roaming, emergency calls, unit ID, talk-around, over-the-air programming, management and alarm reporting, on-line programming of major components, fast channel access throughout the network, and more.

High level of voice and data security with over-the-air rekeying

Offers sophisticated voice and data digital encryption with over-the-air rekeying capability. Provides end-to-end Project 25-compliant encrypted transmissions using the DES-OFB and AES algorithms.

Field Proven IP Based Technology

M/A-COM is the most experienced provider of IP-based solutions for the Public Safety market. M/A-COM's IP-based radio systems carry mission-critical communications on a national, regional and local basis.

The P25^{IP} features and benefits go well beyond that which is defined in the Project 25 documentation. M/A-COM's experience with Public Safety has enabled it to develop a system that meets these broad-based requirements



With M/A-COM's design, interoperability is achieved at all three communications levels:

1. At the **network level** through M/A-COM's P25^{IP} network switch and Digital Voice Gateways for legacy systems
2. At the **radio level** with conventional analog mode and/or in the digital mode using the P25 Common Air Interface
3. At the **dispatch level** through a broad range of M/A-COM or existing third-party consoles

For all the users on the P25^{IP} network, interoperability is designed to be:

- Highly reliable and effective
- Transparent to the users
- Simple to use

Interoperability, the key to successful inter-agency operations, needs to be accessible on an instantaneous, and reliable basis.

Many incidents simply cannot wait for equipment to arrive, be programmed and tested. With P25^{IP} systems and components, instantaneous interoperability with other users is implemented in the following manner:

- Fielded Project 25 radios using the conventional or trunked P25 CAI
- Installed legacy analog and digital (P25) conventional or trunked systems using **NetworkFirst** infrastructure. Using **NetworkFirst**, instantaneous IP-based network interoperability can be established between agencies operating with



disparate radio systems, technologies, and radio frequencies. The use of **NetworkFirst** digital voice gateways allows talkgroups on any system to become accessible and interoperable with any or all of the users on the P25^{IP} network.

- Other manufacturer's currently installed trunked systems using Digital Voice Gateways
- Installed M/A-COM EDACS[®] and OpenSky[®] trunked systems using network interconnectivity

Scalability and Expandability

M/A-COM's P25^{IP} digital network was designed with expansion in mind; supporting not only current needs and requirements but also future subscriber growth and technology migration over the next decade. The architecture of M/A-COM's P25^{IP} network



creates a scalable solution that meets the requirements of small enterprises as well as cities, counties, states, and even nationwide networks. When other federal, state and local agencies decide to join the network, the system can easily and affordably be expanded, as needed, to handle whatever system loading may be required.

M/A-COM's P25^{IP} network is so scalable that adding equipment to the network is analogous to adding PCs to a LAN or WAN. An entire system build-out is not required to begin P25^{IP} operations, and system build-outs can begin with a simple and systematic migration from existing analog systems. Components of the P25^{IP} network, such as base stations and subscriber equipment, can be fielded and used in mixed mode (both Project 25 CAI and analog FM) operations, until a gradual phase out of analog operation is completed.

Partnering for Better Service: System Implementation, Support, Maintenance and Training

As the turnkey provider, M/A-COM offers implementation, maintenance and an on-going service support plan that is fully compliant with user requirements and tailored to the specific needs of its customers.

Installation of a P25^{IP} network is done by an experienced project team, including Project Management and System Engineering, M/A-COM's own Field Service organization, as well as Authorized Service Centers located throughout North America.

M/A-COM's Support and Maintenance Plans provide the following options:

- Single point of contact for system monitoring and support
- A toll free number for service requests 24/7
- Guaranteed response time to outage notifications and guaranteed restore time
- A 24-hour hotline telephone for emergency technical support
- Flexible service plans for flexible hours of coverage
- On-line system reprogramming services via modem to implement changes or upgrades to the system following installation
- Complete hardware and software on-site contract maintenance





MA-COM also provides complete user and technical training for administrative, maintenance and operational personnel.

M/A-COM: Proven Wide-Area System Experience and Technology Leadership

M/A-COM is widely recognized as the innovator in radio products and technology with a commitment to provide reliable, high-quality systems, components, and services to our customers at competitive prices. M/A-COM understands the requirements of complex radio projects and has successfully demonstrated this expertise with our customers throughout the world, including our implementation of the Pennsylvania and Florida Statewide radio systems.

Leader in IP-based Technology

M/A-COM is the leader in the development and implementation of IP-based radio systems for the Public Safety federal markets. Our IP networks are installed and provide mission-critical communications today. These systems are scalable and span from single site applications to multi-site networks covering tens of thousands of square miles. By providing reliable digital voice and data to users of these networks, M/A-COM helps ensure the safety and security of first responders.

P25^{IP} - The Right Choice

M/A-COM's P25^{IP} network, together with our dedicated team of installation and maintenance professionals, provides the solution for customers requiring a mission-critical voice and data communications system.

M/A-COM and P25^{IP}:

- Meet the technical requirements
- Meet the interoperability/compatibility objectives
- Provide the required scalability and expansion capability
- Offer a superior implementation plan
- Provide the required system implementation resources, including training and support
- Adhere to the ongoing maintenance requirements
- Meet the cost objectives
- Guarantee the continuation of a successful long-term partnership



P25^{IP} – Expanding Digital Communications



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