

Dual Mode P25 Digital / Analog Simulcast Radio System

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Dual Mode P25 Digital / Analog Simulcast Radio System

Executive Summary

A new technology is helping public safety radio users bridge the gap between analog and digital radio systems.

One of the biggest challenges with P25 digital radio systems is that they are not interoperable with analog radios. Analog radio users can not talk on digital systems or receive digital transmissions, impairing the interoperability between users.

The new RSI dual mode **simulcast** radio system solves this problem by enabling the end user to transmit and receive in either analog or digital form of communications as the situation or environment dictates.

Dual-mode simulcast systems will work with analog radios while at the same time offering many benefits of P25 digital technology.

Dual mode simulcast systems allow gradual migration to P25 digital, ensuring investments in the current analog technology is not going to waste with the advent of P25 digital.

As an added benefit, analog radio users can now directly communicate with digital radio users thanks to the new **Cross Mode** feature. Digital transmissions will be received by analog radio users because the RSI cross mode feature enables the system to rebroadcast both analog and digital transmissions in analog. Multiple departments can now assist each other without having to switch from digital to analog channels during an emergency.

Simulcast – enables multiple transmitters to transmit at the same time, providing improved talk-out coverage.

Dual Mode – radio system is capable of operating in either analog mode or digital mode. Also known as “mixed mode”.

Cross Mode – converts incoming transmissions into analog (i.e. digital in=analog out), thus providing interoperability between digital and analog radios.

Requirements Of A True Public Safety Radio System

Expected to provide reliable means of communications with all the features to overcome a variety of challenging environments:

Reliability

- Near 100% coverage
- Reliable in-building coverage
- Maximum up time
- Serviceability
- No single points of failure
- Remote system diagnostics and trouble reporting
- Built in redundancy
- Audio clarity in high noise environments
- Emergency Signaling

Interoperability

- System capable of operating in both analog and digital modes
- Follows P25 standards
- Utilizes non proprietary technology

Economic Design

- Affordable to acquire and operate
- Investment made today to last for years
- Uses existing network infrastructure where available
- No reoccurring PSTN line lease costs

P25 Digital – is a public safety communications standard dedicated to ensuring interoperability in communications. It is designed to ensure fast and secure communications between local, state and federal agencies when protecting the public's welfare.



Technology Challenges

Traditional non-simulcast radio systems are limited to one transmitter and most of the time a single transmitter site can not provide **reliable** coverage. If simulcast transmitters are used they will be dependent on site to site connectivity(i.e leased phone lines, T1's, ext.) to operate. Most leased circuits repeatedly fail resulting in impaired coverage or complete system shut down. A failure of a remote radio site might not be discovered until it is already too late.

Traditional systems inherently have multiple "single points of failure". A single failure can make the entire system inoperable. Some examples are receiver voters, dispatch console gateways, wire line circuits, power supplies, etc.

The benefits of **interoperable** P25 digital technology can not be realized if surrounding users(i.e. mutual aid) don't all have digital radios. Normally radio systems are only capable of operating in P25 or analog mode and if analog radios are used by mutual agencies they will not be able to receive digital radio transmissions. A traditional non simulcast dual mode radio system will work in either digital or analog mode however, analog radios still will not receive digital radio transmissions.

P25 radio systems with the latest technology still need to be **economically designed** to be affordable to acquire and to operate. Agencies purchasing a new radio system in addition to ensuring radios work with today's analog radios but will also work with the P25 digital radios. If an agency is planning on using the radio system long term it will likely have to be upgraded over its lifespan so an investment today must last for years. The reoccurring costs of PSTN leased lines over many years can deplete budgets and leave little room to upgrade equipment.



The Reliable Solution

TAIT-RSI Dual Mode IP-Based P25 Simulcast System

No single points of failure – the system can be designed with full redundancy with both microwave network and radio infrastructure.

No phone lines, no leased circuits – the system backhaul can be designed with 4.9GHz microwave links combined with fiber where available. Links are designed with full backup redundancy - Each site has at least two links to the rest of the system and failure of any one (or more) links will not degrade the system performance.

Distributed receiver voting means improved portable talk-in coverage with no voter as a single point of failure; voting is done in software within each repeater.

Intelligent, self-healing design – the system is designed to auto-detect any problems, take a corrective action and report the problem to the service provider via email and other means.

Remote service diagnostics – allows the service provider to remotely log into the system and troubleshoot each device on the system as well as to monitor system operation, view call statistics, listen to real-time audio, listen to recordings of all transmissions, view site environmentals and alarms, monitor site power supply, etc.

Two separate dispatch console gateway interfaces – (Console tie-in points) provided for backup and redundancy.

Extended battery backup – each site normally designed for 48-hour battery operation with 70/30 TX/RX duty cycle. Even longer battery backup time can be achieved easily and economically.

"Public safety communications continue to evolve today as more challenging user requirements and technology considerations put pressure on municipalities and their local public safety organizations to enhance and improve their systems."

Federal Communications Commission



The Interoperable Solution

TAIT-RSI Dual Mode IP-Based P25 Simulcast System

The new P25 / analog interoperability **Cross Mode** feature makes the RSI simulcast system **the most interoperable P25 system available**. This cross mode feature is the only interoperable simulcast solution to allow agencies with analog radios to communicate with digital radios without switching channels. The RSI system can automatically switch digital transmissions to analog when analog radios are introduced to the radio system.

Control and flexibility of the Cross Mode feature is transparent to users since dispatchers can choose to enable or disable it on the fly. The cross mode feature is the only way existing analog radios will receive digitally transmissions. Digital radio users who are busy do not have to switch channels just because help on the way has an analog radio.

"In general, interoperability refers to the ability of emergency responders to work seamlessly with other systems or products without any special effort."

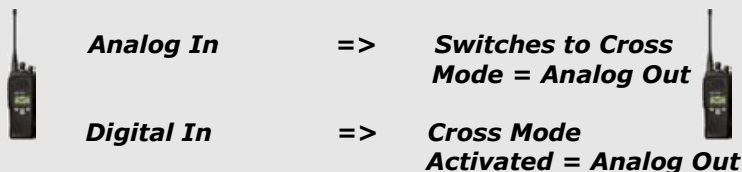
SAFECOM

Dual Mode



Dispatcher can choose either TX operations but will need

Cross Mode



Now both digital and analog RX in = analog out



The Economical Solution

TAIT-RSI Dual Mode IP-Based P25 Simulcast System

The RSI system can work with existing analog radios to make the transition to the new digital radio system financially possible. As the technology needs of the user continue to evolve the system can be easily upgraded to meet the needs of the end user. These highly sophisticated radio systems may only require software upgrades to be programmed with the latest features.

Choosing the latest digital technology will ensure that radios will work well into the future without need of replacement any time soon. The scalability of RSI's simulcast radio system allows agencies to start with less equipment with the ability to add additional transmitters and redundant equipment in the future. Allowing gradual migration to P25 ensures that the investments in current analog technology is not going to waste with the advent of P25 digital.

Public safety departments who wish to include other organizations can save with an RSI dual mode simulcast radio system by sharing network infrastructure. In many cases RSI radio systems can make use of available existing network infrastructure to eliminate PSTN leased lines. For example, an RSI radio systems with 4.9GHz microwave connectivity have decreased operational costs compared to a leased PSTN line. Building a state of the art radio system is possible on a limited budget through careful planning and consideration for available resources.

"In addressing these demanding core concepts for public safety, future networks would benefit from being dynamically adaptable and close to real-time reconfigurable in order to insure interoperability."

Federal Communications Commission
Consumer & Governmental Affairs
Bureau



Getting Started With Radio Solutions

Staying on top of the latest technology and industry developments, our engineering team works closely with equipment manufacturers to ensure that the solutions we offer is indeed the most advanced and the most reliable solution possible. Our technology consultants can help your department reach its goals for a reliable, interoperable and economical two-way radio system. Call us today for a no obligation consultation to see if a dual mode simulcast radio system is right for your department.

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About Radio Solutions, Inc.

Radio Solutions, Inc. offers a variety of communications products and services specializing in two-way radio systems for public safety, government, and private organizations. Since the year 2000 Radio Solutions has committed to developing cutting edge radio communications systems that utilize the latest products from leading manufacturers. Based in Norwell, Massachusetts, privately owned Radio Solutions, Inc. is a rapidly growing company that has successfully deployed communications networks throughout the world.



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