Missouri State-Wide Interoperable Radio Network (MOSWIN) Handbook

Record of Changes

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I. INTRODUCTION

In June of 2009, the State of Missouri, through a competitive bidding process, provided Motorola Solutions, Inc. of Schaumberg, IL a Notice to Proceed to assist in the development of a statewide interoperable communications network to service the needs of Missouri. Motorola's experience with implementation of similar systems in other states was instrumental in shaping a practical direction for Missouri.

During prior years, Missouri had consistently identified problems in the areas of public safety communications infrastructure, coverage, and interoperability. In this effort, the State resolved to go beyond general recommendations of the past and produce an actionable plan to serve as the foundation for the formal procurement of a new statewide interoperable radio system. The system would provide internal communications capabilities to Missouri State agencies while providing a statewide platform for interoperable communications between and among Missouri's local first responder community.

The recommended system, known as the Missouri Statewide Interoperability Network (MOSWIN), is a Project 25**,** digital, trunked VHF High Band /(150 MHz) network of 72 fixed, interconnected sites that provide ubiquitous coverage throughout Missouri's 114 counties plus the City of St Louis. The system will provide 95% mobile coverage in each Missouri County.

The Statewide Interoperability Network will serve two primary functions:

- Providing internal communications capabilities for state agencies, including the Missouri State Highway Patrol, Missouri Capital Police, Department of Natural Resources and State Emergency Management Agency.
- Providing a statewide interoperable platform for access by local agencies to achieve interoperable communications with local, state, regional and federal agencies, as needed.

MOSWIN will provide the following critical benefits to the citizens and Public Safety providers in Missouri:

- Seamless roaming across Missouri and interoperability between and across all participating state, local, and federal agencies. MOSWIN also plans to interface to Missouri's existing 800 MHz systems allowing appropriately equipped users access to those system, as well as providing interoperable access to users that choose to not access MOSWIN full time .
- Improved statewide mobile coverage to 95% mobile coverage with a Delivered Audio Quality of 3.4.
- Full compatibility with the current and emerging APCO standards.
- Project 25 Digital Technology, which is the technology of choice in public safety communications today and into the future.
- Added features such as encryption and Integrated Voice and Data
- Increased capacity through the addition of new talkgroups.

- The ability to use trunking to set up efficiently tailored talk groups of emergency personnel to talk with exactly those others they need to, when they need to talk to them, without congestion.
- Improved reliability and disaster recovery capabilities through replacement of obsolete radio infrastructure at the state and local level along with the addition of multiple control points across Missouri that can access the network.

II. INTENT

To describe the basic radio communications procedures for the statewide digital trunked radio system, MOSWIN. The goal of these procedures is to ensure the availability of consistent, clear radio communications for routine operation and effective standardized emergency incident communications by Missouri's state and local public safety community.

III. DEFINITIONS OF TERMS

Affiliate -- Radios on the trunked system will send a signal with radio ID and the talkgroup selected by the user to the master controller. This occurs when the radio is turned on, when a new talk group is selected, or when the radio selects a new site by checking RSSI levels of tower sites.

Alert Tones: (Each of these has to link to a specific audio file that allows the user to hear the specific tone after reading the description of the function) It may also be beneficial to remind the reader to TURN UP TO SPEAK on their laptop NEED LINK)

1. **Busy tone** similar to phone busy signal. This tone is heard when a member attempts to transmit a message on a trunked talkgroup when all frequencies are in use**.** **NEED LINK**
2. 4 short beeps received after a busy tone. **Automatic Callback** – A frequency is now available for you to transmit. Press PTT and begin the transmission. **NEED LINK**
3. 4 beeps every six seconds. **Call Alert** has been received by the radio. **NEED LINK**
4. 1 beep followed by 5 beeps. The **Emergency button** has been pressed and was acknowledged by the system. **NEED LINK**
5. 3 short rapid beeps when the "PTT" is pressed. **Talk permit tone** – The member must wait for these tones before talking on a trunked talkgroup. **NEED LINK**
6. A continuous tone when pressing the PTT. **Talk prohibited** – Occurs when pressing PTT and radio is out of range of the trunked system or system is out of service. **NEED LINK**
7. A continuous tone. **Time out timer** – This continuous tone indicates your transmission is approaching 60 seconds, and will be discontinued at the 60-second point. **NEED LINK**
8. Momentary higher pitched tone. **Valid key chirp** – This tone confirms that you have selected a valid, programmed button. **NEED LINK**
9. A low pitched tone every 10 seconds. **Failsoft** – Trunked system failure where multiple agencies share a conventional channel. **NEED LINK**
10. Momentary lower pitched tone. **Invalid Chirp** – Indicates that you have selected an un-programmed function. **NEED LINK**
11. High pitched chirp. **Low battery** - Portable radio's battery needs charging. **NEED LINK**

Affiliate --Radios *affiliate* with MOSWIN sites while in their service area until they move to the next service area.

Alias – A unique identifier that is displayed on dispatch's screen when a radio is transmitting on a talkgroup that is being monitored. The alias corresponds with a specified subscriber ID.

Analog Signals -- Analog radio systems continuously transmit radio waves that are usually modulated by a voice. A typical analog voice radio consists of a transmitter and receiver.

APCO – Association of Public-Safety Communications Officials – International, Inc.

Authorized Service Provider (ASP) - means a radio service provider that is approved, certified and/or authorized by a radio equipment manufacturer and registered with MOSWIN to service MOSWIN compatible equipment.

Call Alert – A call can be sent to a specific user radio to alert the operator, much like how a pager functions.

Channel -- This term is used rather generally to denote a *physical* communications path or mode. It is an older term and is often used interchangeably with "frequency," "mode," or "talk-group." This is why it can be confusing and imprecise. In trunked radio system discussions "channel" typically refers to a talk group that consists of multiple users at one or multiple radio sites.

Channels & Zones - When a user radio is programmed with a large number of channels, those channels are accessed by the user in two ways: (1) The channel knob, which typically accesses 16 channels, and (2) either a multiple position switch with up and down zone buttons on a radio with a associated display. A large number of channels can be organized overall into a series of zones for easy access by the user.

Control Channel – A dedicated channel on each radio tower site that continually passes information between the radio and the zone controller.

Digital Signals -- A combination of zeros and ones that are the result of analog voice that has been converted (analog to digital) into a digital data stream and transmitted over the air. These digital signals are received over the air by the radio and then converted back to analog voice in the digital radios that can be heard and understood by the user. Digital Project 25 radios utilize error correction tools to compensate for reduced signal strengths and continue to promote quality audio for the user even in less than optimal locations and conditions.

Duplex Repeater -- A 2 channel repeater system that uses different transmit and receive frequencies.

Emergency Response Support – Those who are involved in the critical mission areas surrounding the incident response, such as protecting against the incident, preventing the incident, or recovering from the incident.

First Responder – Those individuals in the early stages of an incident who are responsible for the protection and preservation of life, property, evidence, and the environment, including emergency response providers as well as emergency management, public health, clinical care, public works, and other skilled support personnel, who provide immediate support services during prevention, response and recovery operations. Emergency response providers includes: Federal, State, and local emergency public safety, law enforcement, emergency response, emergency medical (including hospital emergency facilities), and related personnel, agencies, and authorities**.**

Frequency - Frequency is defined as the number of cycles that occur each second. Thousands of radio wave cycles usually repeat themselves each second, so engineers have adopted the practice of writing kilohertz (shortened to KHz), which means 1,000 cycles per second, megahertz (MHz), which means 1 million cycles per second, or gigahertz (GHz), which means 1 billion cycles per second, when they refer to radio frequency. Thus, 10 million cycles per second can also be written as 10 MHz. The Missouri system is in the 150 - 170 MHz range (VHF). In a trunked radio system each repeater uses two frequencies, an input and output frequency. In a trunked radio system the user never changes the frequency of their radio; they remain on virtual channels called a "talk groups" and the the control channel automatically assigns the user radio an available channel as they dynamically become available. This is why the capacity of trunked radio systems is so much greater than that of conventional radio systems.

Master Site Controller -- The network management equipment that directs all activities of the radio system. All of the MOSWIN RF sites connect to the Master Controller via either microwave or wire line phone circuits. With all of the MOSWIN sites connected to one of two Master Controllers, Master Controllers have the ability to manage all of the MOSWIN network's resources.

Mode – This is a newer term and is used to denote the different configurations in which a user radio may operate. For example, two different modes may use the same radio channel with one mode using encryption while the other does not. The term mode has been adopted because it signifies a broader range of variables that can be programmed in a radio.

MON—Monitor button allows the radio to receive analog signals without protection tones.

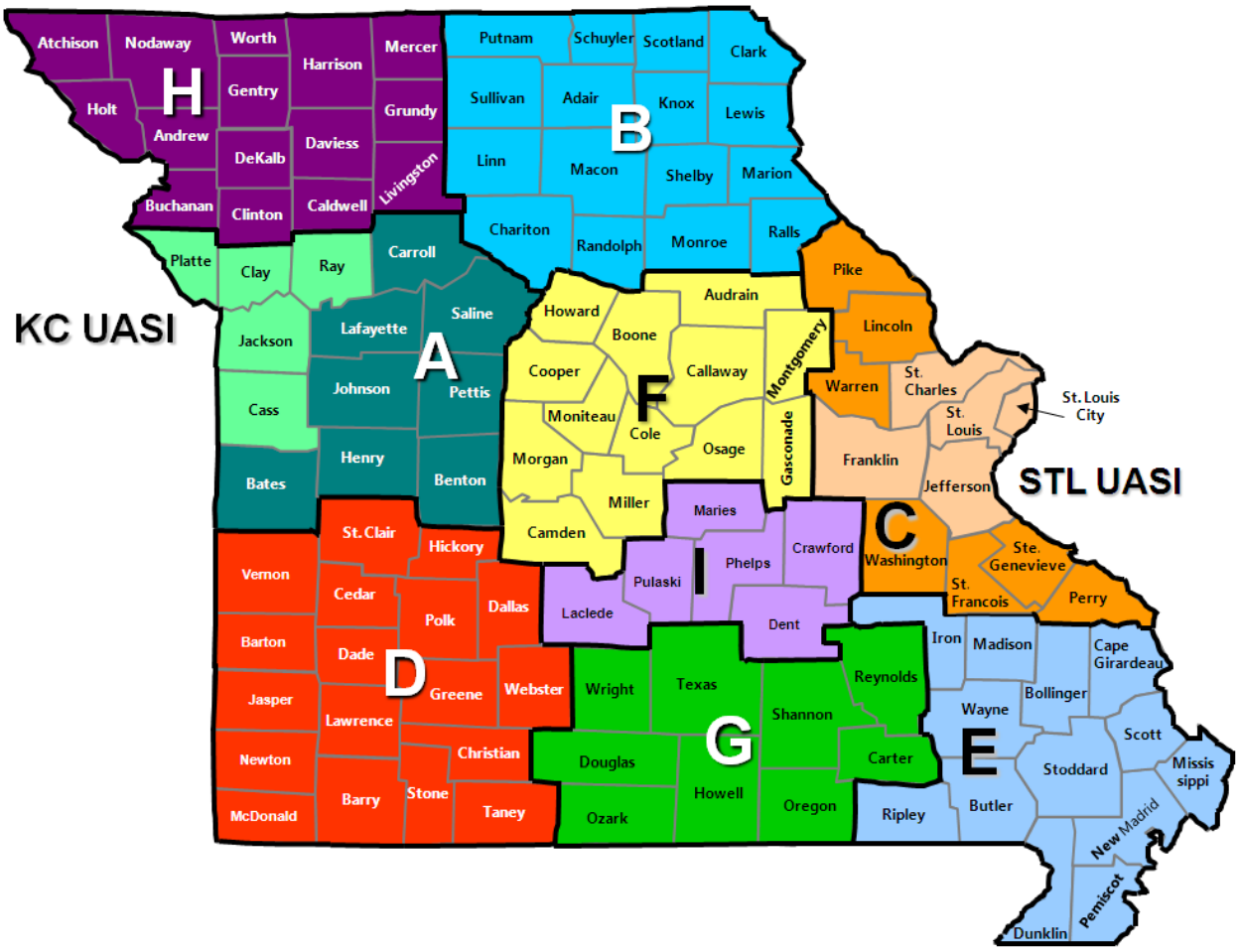
Out of range – Indication of no service available to radio. You will hear a long tone at regular intervals. See Audio Clip

Project 25 (P-25) – A digital standard for public safety radio communications. This standard was developed by public safety for public safety and its evolution takes into account public safety's continues needs and requirements. The standard also allows for multiple vendor equipment to work together on a single network in a standardized, non-proprietary manner.

Queue - Circumstance where member keys up on a site that is fully utilized. As all resources are in use, the radio system puts the member in a "queue", or waiting line for the first open resource. Member will first hear the "busy" signal followed by a chirp when a resource is available to transmit on. When at capacity, the system acknowledges the user that is trying to access the system and puts them in a queue. When a resource is available, it will assign the channel to the "queued" user. Each time a user keys their radio when affiliated at a site that is at capacity, the user will place their radio at the bottom of the queue so it is important to realize that if a queue response is received by the network, continuing to key the radio will not hasten the assignment of a channel but will continually reset the user to the bottom of the queue for access to that particular site.

Regional Interoperable and Event Talkgroups – MOSWIN will utilize five (5) regional Interoperable talkgroups for each Missouri Homeland Security Region – Interoperability talkgroups include one (1) Regional *Calling* Interoperable talkgroup per region (ex. REGX IO Call where "X" is the Homeland Security Region Designator A thru I) and four (4) Regional *Work* Interoperable talkgroups 1 thru 4 per region (ex. REGX IO 1 thru REGX IO 4)

See Missouri Homeland Security Regional Map below.



RF – (Radio frequency) MOSWIN utilizes VHF High Band (150 MHz) and 700 MHz frequencies in its design.

Roaming - The ability of a radio on a trunked radio system to move from site to site without any interaction by the user.

RSSI—Receive Signal Strength Indication.

SCAN—Allows radios to search programmed channels/talkgroups for activity.

Simplex - Non-trunked radio channel that uses a common frequency for receive and transmit.

Site busy – An Indication from the network that no repeater resources are available at the tower the radio is affiliated at, accompanied by short repeated tones, much like telephone busy signal.

Site lock - Optional button that allows member to "lock" radio on a particular site, this prevents the radio from roaming.

Site Trunking - Indication that site connectivity to network master controller has been lost. Radio will be operational only when in the coverage area of the tower on which it is affiliated.

Subscriber ID – An identifier that is used to identify individual radios on a trunked system. No two radios will use the same subscriber ID number.

Talkgroup - This term is used to denote the channels in a trunked radio system. This term is sharply distinct from "frequency," as the radio user never actually changes the frequency. A talkgroup is a voice path developed by software in the trunked network while effectively utilizing the physical channels at the site. The trunked radio controller will automatically configure the system and the pertinent user radios so that all radio users that have selected a given talk-group may communicate with one another. Unlike a radio frequency, a talk-group is a virtual-channel derived from physical assets, in much the same manner as an e-mail address.

1. Statewide and Regional Common Talkgroup – Is a talkgroup established by MOSWIN System Administration for the benefit and good of all MOSWIN Members to promote interoperable communications and is *required* for MOSWIN users in that specific region to have implemented in their subscriber equipment. MOSWIN System Administration expects these common talk groups to be included in all subscriber equipment upon first use of MOSWIN.

2. Agency Specific Talkgroup – Is a Talkgroup assigned exclusively to a MOSWIN member agency for their internal communications use while performing their duties.

3. Conventional Channel – Is a non-trunked radio channel that may be programmed into a MOSWIN member's radio.

4. Multi-group – a special talkgroup that is comprised of multiple talkgroups that are pre-configured and activitated *dynamically* through programming by MOSWIN System Administration

System Busy – What results when a user requests a channel grant when there are no channels available.

Trunked - Trunking permits a large number of members to share a relatively small number of communication paths or trunks. This sharing of communication paths is managed

automatically by a computer. Channel selections and other decisions normal handled by the radio member are made by a computerized switch in the zone controller. Thus, the member needs only to pick up the radio, select a talkgroup and talk, just as one does an ordinary telephone. Channel assignment is automatic and completely transparent to the individual member.

MODOT – Missouri Department of Transportation.

MSHP—Missouri State Highway Patrol

MOSWIN System Administrator – The State of Missouri-Department of Public Safety representative responsible for the day-day operations and management of the MOSWIN network.

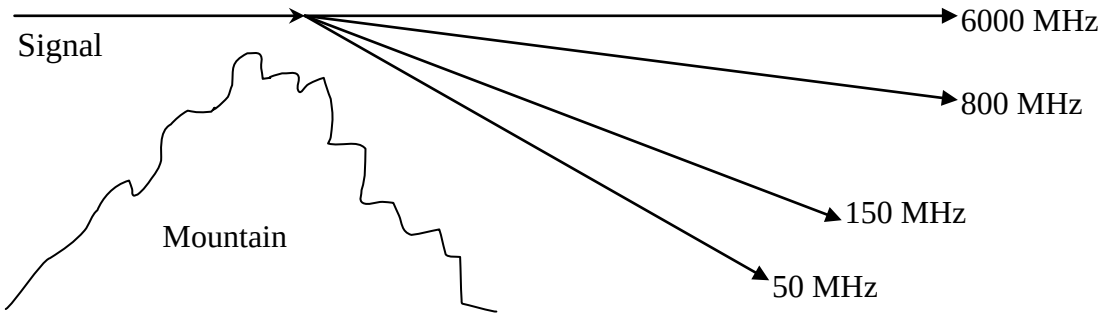
Zone – **Subscriber Units** -A grouping of channels/talkgroups for ease of use or configured within the radio.

IV. UNDERSTANDING RADIO TERMS

A. Radio Frequencies

Radio frequencies are divided into different bands based on their wavelength. The names of these radio bands were put in place years ago before technology changed as much as it has. The bands were: low frequency (LF), medium frequency (MF), high frequency (HF). AM radio broadcast uses "medium frequency" radio. As technology advanced, radios were introduced at frequencies above the original bands; these were designated very high frequency (VHF) and ultra high frequency (UHF). As technology advanced farther, and radios began to use even higher frequencies, the entire naming convention was dropped.

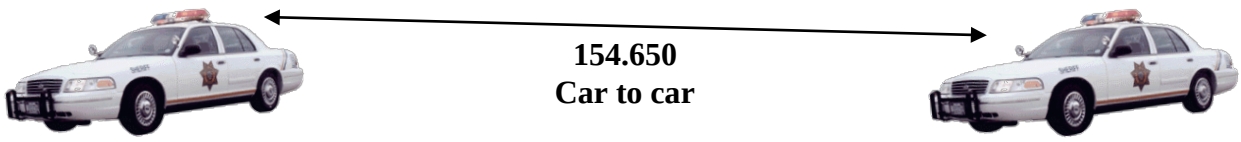
As the frequency goes higher the wavelength becomes shorter. This is why the length of a CB radio antenna (27 MHz) is so much longer than a cell phone antenna (800 MHz).
Different radio frequencies behave differently; the higher the frequency the more the signal behaves like light and less like sound. Lower frequencies will bend around obstacles, higher frequencies will not and are limited to "line of sight" operation and, due to their limited propagation characteristics, are capable of being reused more frequently in any one system.

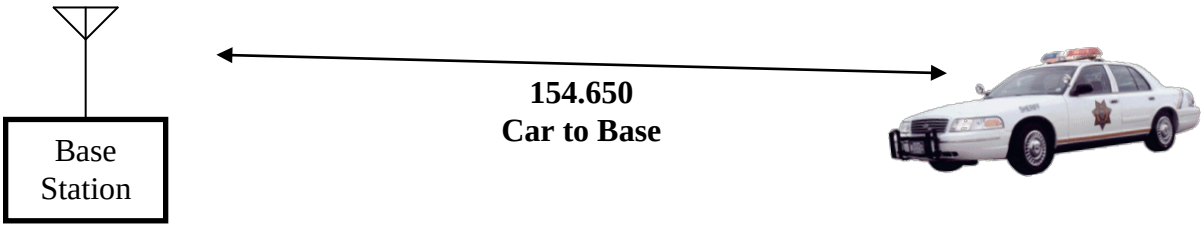


B. Operating Modes

1. Simplex Operation

The most basic mode of two-way radio operation is called "simplex." In simplex operation one radio communicates with another radio (or more than one) using a single radio frequency to send and receive messages. The radios can only talk one at a time. This may be either car-to-car or car-to-base.

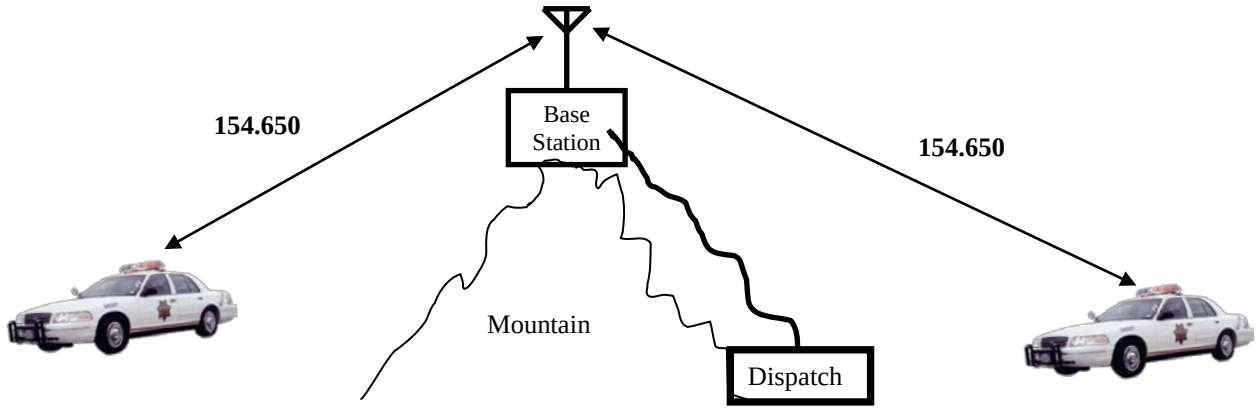




This mode of operation has the advantage of **simplicity**. Only the two radios are involved; no other technology or infrastructure is required. However, this mode has the disadvantage of the operating range being limited by the location of the participating units. If the units are too far apart, they will not be able to directly talk to each other.

2. Remote Simplex Operation

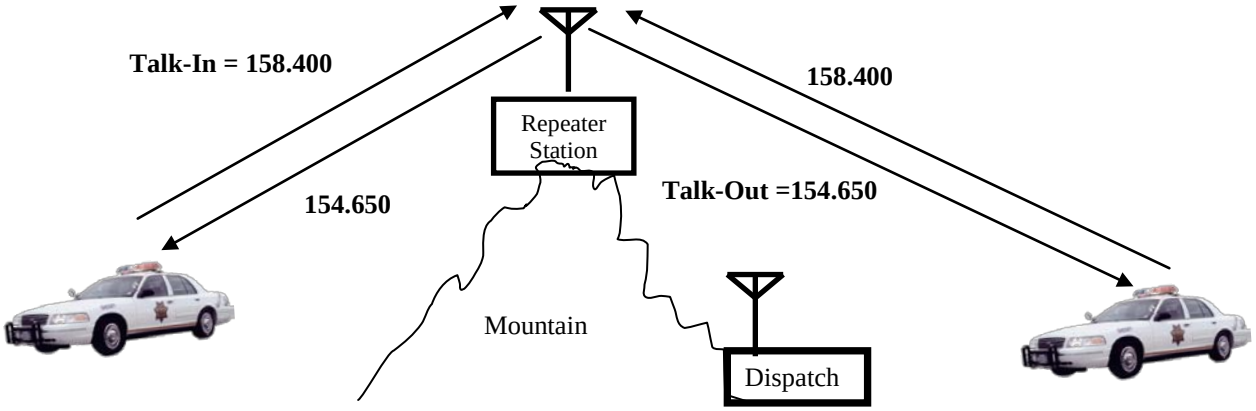
One method to overcome the limited range of simplex operation due to the distance between users is to move one of the radios (a base station preferably) to a mountaintop or high location that overlooks the operating area. In doing this, the control of the base station must be routed back to the dispatch location via telephone wires or another medium.



In this illustration, the dispatcher will be able to communicate with both patrol cars. However, with the mountains separating them, the two patrol cars will not be able to communicate with one another. The dispatcher will have to relay messages between the two cars.

3. Repeater Operation (Duplex)

One way to overcome the limitations of Remote Simplex Operation requires an additional level of complexity: duplex operation, which is commonly referred to as a "repeater." A repeater is a base station radio that receives on one frequency and simultaneously retransmits the information it is receiving on a different frequency.



As illustrated above, the repeater receives the frequency being transmitted by the patrol cars (talk-in or repeater input) and the patrol cars receive the frequency being transmitted by the repeater (talk-out or repeater output).

The telephone line from the dispatch center to the base station can be removed as a radio at the dispatch center will now receive everything that the base station receives. A radio being used in this manner is referred to as a Control Station Radio. This has the benefit of simplicity as installing a telephone circuit to a mountaintop location many miles away can be complicated and expensive. However, the use of a Control Station radio has one significant limitation: If there is a second or third mountaintop location that is not in range of the dispatch center a Control Station radio will not be able to operate through those repeaters; a wire line control circuit would be required to reach those locations.

4. Multi-site Repeater Operation

Where multiple mountaintop repeaters are used to create a larger system it is possible the use the same input and output frequencies by adding control tones, which are not heard by the operator, to access each repeater individually.

From the user perspective, the mobile radio users are required to change channels as they drive from area to area, which allows them to use the frequency for the repeater that serves each geographic area. On the other hand, the dispatch radio operators will have a separate control button on their radio consoles that allow them to select the correct radio site based on the location of the mobile radio user they want to reach.

5. Trunked Operation

Trunking involves the sharing of a common communications resource; the term is easily pictured by the way the branches of the tree share the common trunk in drawing nutrients from the roots. A trunked radio system requires a complex control system to manage communication resources.

An easily understood illustration of trunking is an office telephone system. In the average home a single telephone line connects to all of the telephones. In an office telephone system the incoming telephone lines and all of the telephone sets are connected to an electronic switch. This electronic switch can be used to connect one telephone set to another telephone set for internal calls, or can be used to connect one telephone set to an outside line, placing a call

outside the office phone system. When a user hangs up from outside call the telephone line you use is now available for other users. Efficiency is achieved by sharing the outside telephone lines: The number of telephone lines required is a function of how many calls will be made at a time rather than the number of telephone sets in the office.

A trunked radio system operates in very much the same way. Multiple radios at one or multiple sites are shared between radio users and controlled by a central electronics switch. Like a cellular telephone system, there is a great deal of complexity that the user never sees and with which they never need be concerned.

There are advantages and disadvantages to a trunked radio system. A trunked radio system is very efficient in that it shares communications resources. Likewise, a trunked radio system is very reliable, as the control channel is capable of routing communications around a failed communications channel and the control channel employs multiple levels of redundancy. Flexibility is provided in that talk-groups are *virtual* communications channels, which can be added by configuring software rather than adding hardware as would be required in a conventional radio system. The two primary disadvantages to a trunked radio system are the technical complexity of the control channel and the connectivity costs associated with maintaining an inter-connected network .

Before explaining the features of a trunked radio system, the meaning of certain terms must be established.

a. **Frequency**: This is the actual radio frequency used by the radio. In a trunked radio system each radio at a site is a repeater using two frequencies, an input and output as a *channel pair*. In a trunked radio system the user never changes the frequency of their radio; the control channel at each site does that automatically.

b. **Channel**: This term is used rather generally to denote a communications talk path or mode. It is an older term and is often used interchangeably with "frequency," "mode," or "talk-group.". In the discussion of trunked radio systems a "channel" typically refers to the individual transceivers at radio site that each operate on disparate channel pairs .

c. **Channels & Zones**: When a user radio is programmed with a large number of channels, those channels are accessed by the user in two ways: (1) The channel knob, which typically accesses 16 channels, and (2) either a three position switch or up/down zone buttons and a display. A large number of channels can be organized into a series of zones with up to 16 channels in each zone.

d. **Mode**: This is a newer term and is used to denote the different configurations in which a user radio may operate. For example, two different modes may use the same radio channel with one mode using encryption while the other does not. The term mode has been adopted because it signifies a broader range of variables that can be programmed in a radio.

e. **Talk-Group**: This term is used to denote the channels in a trunked radio system. This term is sharply distinct from "frequency," as the radio user never actually changes the frequency. The trunked radio controller will automatically configure the system and

individual radios on the network so that all radio users that have selected a given talk-group may communicate with one another. Unlike a radio frequency, a talk-group does not really exist but is a virtual-channel derived from software to efficiently access the physical channel pair at each transceiver site.

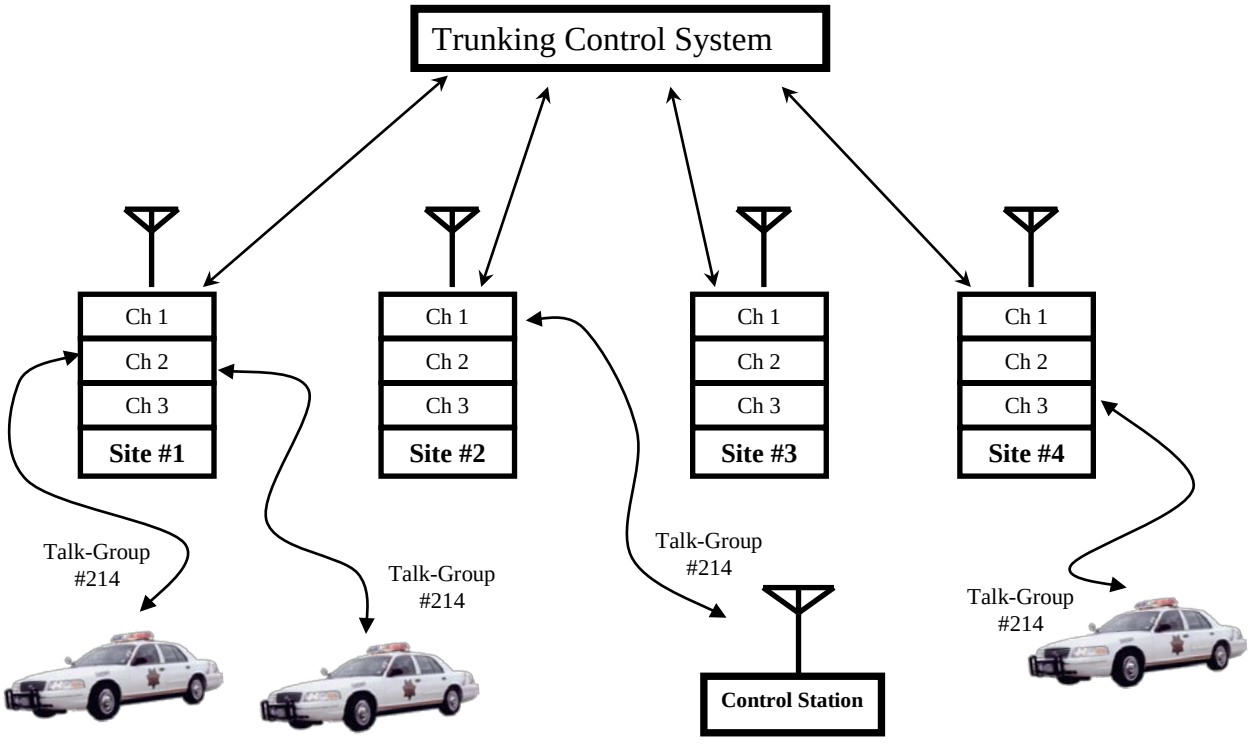
6. Wide-Area Trunked Operation

Trunked radio operation involves great deal of activity takes place without user intervention or awareness.

a. When a trunked radio is turned on **it automatically registers its presence with the nearest radio site that is part of the trunking system**. In registering its presence, the trunked radio communicates its unit identification and talk-group that has been selected by the user.

b. When a radio user presses their push-to-talk button the radio automatically requests that a call be established with other users of the talk-group.

c. The control Channel responds by assigning communication resources (channels) at each of the radio sites where users are registered on the requested talk-group.



In this illustration shows three cars and one control station radio on the same talk-group. The control system has assigned radio channels at three different sites in order to establish the call. The two cars on the left are both registered on the same radio site while the other units are registered on different sites.

8. Shared Radio Sites

In a trunked radio system, unlike a conventional repeater system, a radio is not limited to the repeater sites within range. The trunking control system configures a call so a radio will communicate with other users in the selected talk-group. Thus, the coverage of a trunked radio system is the sum of the coverage of all the radio sites. Likewise, all radio sites are available to all trunked system users, depending on how the system controller is configured. In the same way a cell phone allows a customer to move from place to place, a with a trunked radio system as a radio user drives from location to location their radio will automatically register with the appropriate radio site without user intervention. The talk-group they have selected will follow them from radio site to radio site automatically.

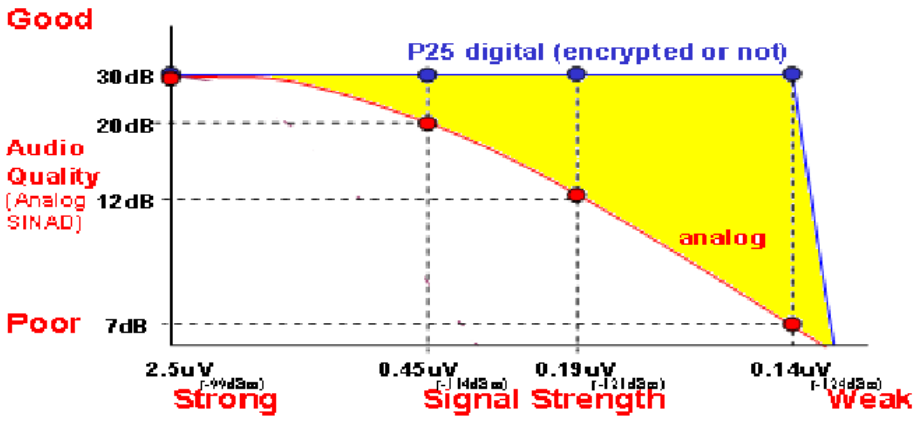
The number of radio sites located in a given county has no relationship to the actual radio coverage provided. Coverage is a function of terrain, and the location of radio sites is selected to overcome obstacles.

The Motorola Astro Project 25 trunked radio system, which was selected in the MOSWIN procurement process, is capable of supporting up to 64,000 radio users, up to 16,000 talk-groups, and up to 700 radio channels per zone. The system can be expanded to support up to 7 zones. The MOSWIN system is projected to support 12,000 radio users and will provide statewide mobile radio coverage utilizing at least 72 radio sites and approximately 370 radio channels collectively. The use of trunking technology will automatically allow MOSWIN radio users the coverage benefit of multiple radio sites.

9. Digital/Analog Radio Coverage Comparison

The chart below shows how sensitivity and received signal strength compares between analog and Project 25 radio signals. The Project 25 radio does “more with less” as it continues to provide quality audio to the user as signal strength from the transmitter diminishes. The digital processing within the Project 25 radio allows the end user to enjoy consistent audio quality in a non-linear fashion right up until the point where the signal diminishes, shown at less than .14 uV of signal. In comparison the analog signal diminishes in quality to the user in a linear fashion and more quickly allows the radio performance to be compromised to the user.

This comparison of performance between analog and digital radios is one reason why Project 25 digital radios are higher priced than analog radios. The Project 25 radios have been designed specifically for public safety’s needs and the radios are more complex in both their design and performance.



11. Mobile Data Subsystem

The MOSWIN system has the capabilities of low speed mobile data traffic. Initial access will be granted to public safety for locations based applications (GPS) and others that can be met with minimal data speeds. Additional applications for data service from the MOSWIN network will be reviewed on a case by case basis by the MOSWIN Statewide Interoperability Governance Body (SIGB) and MOSWIN System Management

The data system will utilize low-speed data (9600bps) via the Project 25 protocol.

V. RADIO INFORMATION

A. How It Works

Each radio is a computer with a receiver and transmitter attached. The computer allows each radio to have a unique ID that enables the Master Site Controller to identify that radio and which talkgroup is selected on the device. Each radio is in constant communication with the tower through the control channel at each tower site where the radio is affiliated. This control channel passes on information such as surrounding site information, adjacent site control channels and site status.

The radio also samples the signal strength (RSSI) of the control channel and compares it with other control channels that the radio is receiving. At preset degrees of signal strength, a radio will switch from one radio site to another that has improved signal strength. This allows the radio to roam between sites without user action, similar to today's wide area cell phone technology.

1. Sounds:

a. Listen for other radio traffic before attempting to transmit.
b. Wait until the quick chirp is done (channel grant) before you begin talking after pressing the radio button.
c. If a continuous beep is heard, radio is not affiliated with a radio site.
d. Two longer beeps indicate local site is busy, wait, and the system will give you the quick beeps indicating when access is ready**.**

2. **If a "busy tone" is received**. The user should wait until receiving a talk permit tone. At this time the radio will key up for a few seconds. ***Do not continue to push the Push-to Talk button once you hear the busy tone, each push-to-talk lowers the queue, extending the time for callback*.**

3. Alert Tones:

a. **Busy tone** similar to phone busy signal. This tone is heard when a member attempts to transmit a message on a trunked talkgroup when all frequencies are in use. NEED AUDIO TONE SAMPLE LINK HERE
b. 4 short beeps received after a busy tone. **Automatic Callback** – A frequency is now available for you to transmit. Press PTT and begin the transmission. NEED AUDIO TONE SAMPLE LINK HERE
c. 4 beeps every six seconds. **Call Alert** has been received by the radio. NEED AUDIO TONE SAMPLE LINK HERE
d. 1 beep followed by 5 beeps. The **Emergency butto**n has been pressed and was acknowledged by the system. NEED AUDIO TONE SAMPLE LINK HERE
e. 3 short rapid beeps when the "PTT" is pressed. **Talk permit tone** – The member must wait for these tones before talking on a trunked talkgroup. NEED AUDIO TONE SAMPLE LINK HERE

f. A continuous tone when pressing the PTT. **Talk prohibited** – Occurs when pressing PTT and radio is out of range of the trunked system or system is out of service. NEED AUDIO TONE SAMPLE LINK HERE

g. A continuous tone. **Time out timer** – This continuous tone indicates your transmission is approaching 60 seconds, and will be discontinued at the 60-second point. NEED AUDIO TONE SAMPLE LINK HERE

h. Momentary higher pitched tone. **Valid key chirp** – This tone confirms that you have selected a valid, programmed button. NEED AUDIO TONE SAMPLE LINK HERE

i. A low pitched tone every 10 seconds. **Failsoft** – Trunked system failure where multiple agencies share a conventional channel. NEED AUDIO TONE SAMPLE LINK HERE

j. Momentary lower pitched tone. **Invalid Chirp** – Indicates that you have selected an un-programmed function. NEED AUDIO TONE SAMPLE LINK HERE

k. High pitched chirp. **Low battery** - Portable radio's battery needs charging. NEED AUDIO TONE SAMPLE LINK HERE

4. Radio usage outside of Normal Operating Area:

a. Any digital trunked talkgroup will work across the required operational area, as authorized.

b. To contact local PSAP's or units, turn to the closest Regional Interoperable calling channel and call. i.e. "Cole County Dispatch/Cole County Deputy Smith – on REGF IO Call"

c. Unless for an approved activity outside an area's jurisdiction, it is not advised to leave radio on a busy local talkgroup when traveling outside the normal service area. The impact of such action could be:

i. Encumbering system resources outside an agency's service area, possibly limiting access to other system users.

ii. System users may miss important emergency traffic in the area that is being traveled through. If this becomes critical, the MOSWIN System Administration may force the offending radio that is operating outside of its service out of the system temporarily.

iii. Switching to the appropriate regional interoperable talkgroup is an effective method of communicating outside a users service area without limiting system resources in the area of operation.

B. Member Priorities

Trunked system access priority can be designated by the network administration. There are different levels of system access from 1-Emergency (highest) to 10 (lowest). **The access priority affects the position in a queue when the system is busy.** The queue is the order in which system access is granted when all radio site resources are busy, if system resources are available when initiating a call, the priorities are not used.

1. The order in which user priority is assigned is as follows:

1 – Emergency — Highest priority when emergency button, if programmed, is activated.

2 – Blank
3 – Public Safety Dispatch, All Group Calls, Car to Car
4 – Blank
5 – Interoperability, Common Dispatch/Shared Talk Groups
6 – Blank
7 - Administrative
8 - Blank
9 – Other Agencies and roaming
10 – Training

C. ID and Alias Administration

Each agency or entity will be responsible for maintaining a current list of radio serial numbers, radio ID's and aliases. A master list of Radio Member Aliases and IDs will be created and maintained on a web based database by MOSWIN System Administration. This will be readily accessible for all who have rights on that part of the system. Each agency will be responsible for updating and maintaining their information on the database, as alias names are created and approved. The web based database will be available for all appropriate parties for operations and planning. The database project is located on the MOSWIN website: http://dps.mo.gov/dir/programs/intercomm/default.asp

The MOSWIN System Administration will be responsible for ensuring that all subscribers utilizing the system have complied with these requirements. The MOSWIN System Administration will also furnish, upon request, new subscriber ID's for radios that authorized agencies need to add to the system. In addition to this, the MOSWIN System Administration will also coordinate additional alias needs with the requesting agency.

1. The current configuration has the alias displayed on calls received by dispatch centers that are connected to a MOSWIN Master Site..

2. Every Radio Member ID in the system has to be unique; there can be no duplicated IDs.

3. System limitation is 8 characters – including radio zone identification and alias.

4. The only figures that the system will accept are: Upper Case Alpha, Numeric, Period, Dash, Forward Slash, and Number Sign.

5. The MOSWIN System Administration is responsible for seeing that the defined naming standard is followed and maintained.

D. Agency Unit and Talk Group Identifiers (Alias)

Agency identifiers of state and local agencies utilizing MOSWIN will adhere to an established assignment method and protocol. Any agency utilizing MOSWIN must provide specific radio unit serial numbers to MOSWIN administration so radios can have unit identifiers assigned to

them. The MOSWIN System Administration will ensure that units and talkgroups will be assigned consistent with the radios and talk groups developed for use by the agency. All aliases must conform to the agency/jurisdiction structure specified below, as follows.

1. State Agencies:
   State Agencies will format in MOSWIN multiple talk group and unit ID alias beginning with a phonetic designator indicative of the issuing agency followed by a additional details designator, i.e. ***DOT, MHP, DNR, MDC, DOC, DFM, ATC, CAP, etc.***
   The remainder of the identifier will be established consistently within each agency.

2. Local Agencies:
   Local public safety agencies that seek to operate on MOSWIN will develop unit and talkgroup alias's indicating the agency name and jurisdiction first (Name/County, Name/City) with the remaining elements of the identifier to then be established at the agencies discretion.

3. Federal Agencies:
   Federal Agencies that seek to operate on MOSWIN will develop unit and talkgroup alias's indicating the agency name and jurisdiction first with the remaining elements of the identifier to then be established at the agency's discretion.

4. Public Service Agencies
   Public Service Agencies that seek to operate on MOSWIN will develop unit and talk group alias's indicating the agency name and jurisdiction first with the remaining elements of the identifier to then be established at the agency's discretion.

5. Interagency Radio Traffic:

   Agency specific talk group alias are not widespread and often may not be available to other users from other agencies. Subsequently, a number of common regional and statewide **interoperable** talk groups are implemented in the system along with regional and state wide **event** talk groups will be required to be programmed in every MOSWIN radio so it can be expected that these talk groups will be an effective medium for necessary communications between users during multi-agency incidents.

   a. Once Incident Command has been established, a radio plan will be developed identifying the appropriate MOSWIN interoperable/event talk groups and how they are used along with other communications procedures. At incident scenes where Incident Command has been established, each agency with personnel on-scene should have a person designated as a Liaison Officer (LO) to Incident Command that will assist in the coordination of common talk groups between users, as necessary.

VI. FAILURE MODES

A. Description

Trunking system failures may occur due to software problems or equipment failures. Additionally, storms, vandalism, and other events can damage system equipment and support. Radio operations under the most significant failure mode are described below.

All system failures create significantly increased demand for radio airtime on the available channels as well as limitations in power and coverage. Radio discipline must be maintained at a high level. Radio use will be limited to emergency related and resource management traffic only during System Failure conditions.

B. Site Trunking Failure

1. Failure of the communications link to a trunked site. Radio displays "SITE TRUNKING". Radios are limited to coverage of the tower where affiliated. Trunking radios are programmed to affiliate to radio sites that are not in "Site Trunking", but in some cases the radios will only be able to affiliate with a site in "Site Trunking". MOSWIN subscriber units will always seek access to the wide area MOSWIN network when provided a choice of sites. If the only site a subscriber unit can access is in site trunking than it will operate in site trunking until alternative sites are available.

2. When degraded MOSWIN capabilities and/or connections require site trunking, MOSWIN System Administration shall notify affected agency contact personnel. Affected agency supervisors may direct personnel to shift to alternative communication systems or they may arrange for appropriate communications relay of traffic on agency talkgroups at sites in "Site Trunking". For many local user agencies affiliating with a single MOSWIN site, "Site Trunking" will only impact them when they have users affiliated outside their area with sites other than their "home" site.

VII. OPERATIONAL PROTOCOL SUMMARY

A. Routine Protocols

1. All communications regardless of nature shall be restricted to the minimum practical transmission time and employ an efficient operating procedure.

2. Unit to unit tactical communications, when feasible, shall be conducted on the appropriate Conventional Channel in the "talk around" or Direct Mode.

3. Pronounce words distinctly and slowly.

4. The voice should be as emotionless as possible, emotion tends to distort the voice and render it unintelligible.

5. Attempt to make your voice a regular monotone.

6. Emergency messages require no expression, but a high degree of intelligibility.

7. Do not try to be humorous on the air, it never sounds as funny as you think.

8. Do not let anger or impatience be heard in your voice.

9. The FCC forbids profanity and any superfluous or extraneous transmissions.

10. Procedure of initiating a radio call – the calling radio unit shall state the name of the receiving unit (the unit to be called) followed by their unit. For example, "Johnson County Dispatch, Charlie16" or "Unit 15, Unit 8". The unit being called shall answer with their own radio call. For example, "Jefferson County Dispatch" or "PUnit 15".

11. Procedure for when not on agency specific talkgroup – When a unit of dispatch center makes a call that is not the user's primary talkgroup or conventional channel, the name of the talkgroup or channel shall also be transmitted. For example, "Sedalia Dispatch, Off 57 on REGA IO 2"

12. Calling Talkgroups (Dispatch) – Regional and Statewide calling talkgroup are used to dispatch calls for service, contact local dispatch centers and coordinate day-to-day activities of each agency and for units to call into requesting assignments to additional resources. Lengthy transmissions and specific tactical operations are NOT to be conducted on calling talk groups and should be assigned appropriate tactical talkgroup/channels.

13. Tactical Talkgroups – MOSWIN Regional and Statewide Interoperable talkgroups are to be used for tactical communications between field units and the dispatch centers or between field units. Given MOSWIN is designed for mobile coverage, portable based on-scene communications between users and disciplines may perform better on designated conventional interoperability channels on larger incidents, separate and unique tactical talkgroups shall be designated by the Incident Commander and utilized for specific functions. Agency specific assignments using agency specific talkgroups/channels are made by the appropriate local dispatch center. Assignments using regional or statewide talkgroups/channels are made by dispatch as requested by the Incident Commander or designee.

14. Clear speech shall be used for all radio communications on the MOSWIN network. The use of agency specific ten-codes, have been found to be a barrier in the transmission of information and a hindrance to interoperable communications during multi-agency response.

15. Phonetic Alphabet – A phonetic alphabet shall be used for spelling out unusual names, license plate letters and so forth. They are always transmitted as "Alpha," "Bravo," or "Charlie" not "A as in Alpha," etc. Due to the variations of phonetic alphabets, no one

phonetic alphabet will be required. The use of any phonetic alphabet the clearly identifies a letter is acceptable.

B. Routine Traffic

1. All radio communication should be brief and concise. Radio system traffic shall be limited to an agency's official business only. Agency leaders are responsible for the appropriate use of the system in accordance with adopted standard protocols. Proper radio etiquette is expected on any communications system. Agency protocols will dictate operations locally on agency specific talk groups.

2. Radio traffic will be initiated and received in the following manner:

   a. Caller waits for talk permit tone on selected talkgroup.

   b. When initiating communication on the statewide radio system regional interoperable/event talkgroups or statewide interoperable/event talkgroups, the following format will be used.

      "Receiving agency/unit—sending unit— on talkgroup used".
      i.e. " Highway Patrol Troop F-Cole County Deputy 114 on Reg F I/O 1".

   c. Receiver acknowledges by stating their state assigned/approved call sign.
      i.e. "Cole County Deputy 114-Highway Patrol Troop F go ahead"

   d. When utilizing agency specific talkgroups, call sign protocol is at agency discretion.

3. Local Operation:

   a. Normal internal agency operations will be conducted on assigned agency talkgroups.

   b. Interagency traffic will be conducted on Regional Interoperable Talkgroups or on Statewide Interoperable Talkgroups depending on the users involved and the geographic area being covered by the users.

4. **<u>Operation outside of local area on a wide area ntwork</u>**.

   a. The drawback to this wide area operation is that when a talkgroup is transported to another area of the state, all traffic associated with that talkgroup is then repeated over the local tower on which that the member is affiliated. This can cause an overload situation for the local radio site and impact site capacity, especially if a large number of members are affiliated on their home talkgroups on a single radio site. This may result in a busy condition for not only the local members where the outside

talkgroups are brought into, but a potential talkgroup busy back in the home area of the member.

b. The MOSWIN digital trunked radio system will permit agency specific internal talkgroups to be utilized throughout the Homeland Security Region the agency is located in. For example, the Cole County Missouri Sheriff's Department will be capable of utilizing their internal assigned talkgroups throughout Region F but not within Region E in Southeastern Missouri. This allows agencies accessing MOSWIN to utilize their agency specific talkgroups beyond their initial service area but still in their respective region in which they may respond during a mission critical incident. . This also allows for proper resource management ensuring that user talkgroups will not be utilized in areas beyond the scope of any one agency's service area. For multi-agency operations associated with response to mission critical incidents outside an agencies immediate service area, all system users will have programmed into their subscriber units regional and statewide interoperability channels to utilize for interoperable purposes under these conditions. This configuration allows necessary communications outside of the normal service area of an agency as necessary. Examples of such operation are prisoner transports, EMS & fire support outside of area.

c. To ensure system capacity at all locations, most local agency based talk groups do not work on MOSWIN tower sites outside the agency's home area. To the extent that MOSWIN supports communications outside a user's home area through statewide interoperability talk groups or event talk groups, users should limit such transmissions outside of their home area to those that are extremely necessary. In addition, users operating outside of their service area can will need to have their talkgroup monitored

5. The **Monitoring of talkgroups outside of home area for non-service related business is prohibited.**

b. Monitoring is defined as the actual affiliation of the radio on the talkgroup selected.

c. Non-selected talkgroups being scanned do not have the same impact on system. When the radio is scanning it listens to each site but does not affiliate with a radio site and consume/occupy a channel at that RF location making that channel NOT available for us by a local responder.

An example would be a Cole County Deputy heading to Ripley County for training. Ripley County uses the MOSWIN system as a primary communications system and generates a considerable amount of traffic. If the Cole County deputy would leave the radio selected to the local Cole County dispatch talkgroup, all of the traffic generated in his home area of Cole County would "follow" the deputy all of the way to Ripley County. As the deputy traveled, each radio site that the deputy's radio roamed to would repeat all of the traffic from the Cole County area to the site in Ripley County. If the local sites

along the way had many agencies active, or an active emergency, the additional traffic from Cole County might be enough to cause busies in the system for those local agencies. Additionally, by not being tuned into the local traffic, the deputy might not be aware that an emergency exists in the area they are passing through.

C. Event Talkgroups

An event is defined as a non-scheduled significant incident that requires the coordinated response and interoperability of multiple agencies or jurisdictions, this includes incidents that move between jurisdictions.

1. When a situation or incident dictates coordinated resources from agencies without common talkgroups that need to communicate throughout a situation or incident, MOSWIN will allow users to access communications on Event Talkgroups. Five (5) Event Talkgroups will be assigned to each Missouri Homeland Security Region (Regions A thru I). These talkgroups are normally "turned off" and will be activated on a region by region basis, as needed. It is imperative that all users have the Event Talk groups for their Missouri Homeland Security Region.

2. All responding units will monitor either the Regional Interoperable Calling talkgroup or the tactical talkgroup designated by the initiating agency or the Incident Commander. Users can be assigned to a Regional or Statewide Event talk group depending on their role and function during the incident as available.

3. Event Talkgroup(s) will be assigned for the duration of the incident or situation, upon request.

4. The responsible radio dispatch will be notified by the requesting agency or Incident Commander when the requested Event Talkgroup(s) will no longer be needed.

5. If the event "travels" from one Missouri Regional Homeland Security Area to another (i.e. a law enforcement pursuit or a series of severe weather events that span a wide area), it is recommended that the radio traffic be routed through the appropriate Dispatch Center in that area for coordinated communications.

D. Planned/Scheduled Events

Any event, known in advance, that requires additional communications resources.

1. MOSWIN Event Talkgroup(s) will be assigned as available for the duration of the event upon request. Talkgroup assignment is subject to pre-emption if required for reassignment to an emergency incident.

   a. MOSWIN Event Talkgroups should be scheduled as far in advance as possible.

   b. Appropriate radio dispatch will be notified by requesting agency or Incident Commander when the requested talkgroup will no longer be needed.

E. Heavy Radio Traffic Conditions

1. If a Communications Center or an Incident Commander feels that excessive non-essential radio traffic is impacting dispatch operations or incident operations, the Incident Commander or Communications Center will make a radio traffic restriction announcement. This announcement will be made on appropriate talkgroup(s). The radio traffic restriction announcement will normally be, "Hold all non-emergency traffic".

   a. An alternate agency talkgroup can be assigned by Communications Center for non-incident related communications.

2. When the condition is over, the Communications Center or the Incident Commander will broadcast a message announcing resumption of normal radio traffic conditions.

F. Use of Equipment in Electronically Sensitive Areas

Radio equipment generates Radio Frequency Interference (RFI) that may interfere with blasting operations, operation of medical or other sensitive electronic equipment. Caution needs to be observed when operating radio equipment in such areas. Trunked radios continually transmit and receive information on the control channel. In known or marked areas of RFI, the trunked radio shall be shut off.

VIII. TALKGROUPS

MOSWIN System Administration will work with and prepare a Fleetmap for each agency that utilizes MOSWIN for internal communications. The Fleetmap process allows for the introduction of agency specific talk groups into the MOSWIN on behalf of local agencies. These talk groups are designed to provide for a user agency's internal current and ongoing communication needs and priorities. Fleetmap programming by MOSWIN will commence once the User Agency approves the its proposed Fleetmap and the Authorization for New Talkgroup

or System Access and Membership Agreements are received by MOSWIN System Administration. MOSWIN will work with each User Agency and their radio programmers to identify agency specific talkgroups to be used by the User Agency. The number of talkgroups allowed is determined by agency scope, size and service delivery area. All users will have in their subscriber equipment a minimum number of Regional Interoperable Talk Groups, Statewide Interoperable Talk Groups and Even Talk Groups.

MOSWIN advocates and supports multi-agency sharing of county-wide talkgroups between User Agencies within a county.

A. Regional and Statewide Talkgroups

All MOSWIN Statewide Interoperability talkgroups are available for use by all MOSWIN Member Agencies. The following talkgroup descriptions and allocations are recommended for operational usage however individual events will govern the actual assignment and usage of any MAT talkgroup. Five (5) Statewide Interoperability talkgroups (1 statewide CALL and 4 statewide I/O talkgroups) have been assigned to each of the nine (9) Missouri Homeland Security Regions geographic areas for multi-agency coordination at the local, state and federal level, as necessary. All dispatch centers within each Missouri Homeland Security Region area shall monitor Statewide Interoperability Talkgroups in their respective region.

In addition, each Missouri Homeland Security Region has 5 Regional Interoperable talk groups assigned to it (1 Regional CALL and 4 Regional I/O talkgroups). Counties in each Missouri Homeland Security Region are listed below:

Region A: Bates, Henry, Benton, Pettis,, Johnson, Lafayette, Jackson, Cass, Saline, Carroll, Clay, Ray and Platte Counties.
Region A Interoperable Talkgroups are labeled as:

Reg A IO Call
Reg A IO 1
Reg A IO 2
Reg A IO 3
Reg A IO 4

Region B: Putnam, Schuyler, Scotland, Clark, Sullivan, Adair, Know, Lewis, Linn, Macon, Shelby, Marion, Chariton, Randolph, Monroe, and Ralls Counties
Region B Interoperable Talk Groups are labeled as:

Reg B IO Call
Reg B IO 1
Reg B IO 2
Reg B IO 3
Reg B IO 4

Region C: Pike, Lincoln, Warren, Franklin, St Charles, St Louis County, St Louis City, Jefferson, Washington, St Francois, Ste Genevieve, and Perry Counties

Region C Interoperable Talkgroups are labeled as:

Reg C IO Call
Reg C IO 1
Reg C IO 2
Reg C IO 3
Reg C IO 4

Region D: Taney, Stone, Barry, McDonald, Newton, Lawrence, Christian, Greene, Webster, Lawrence, Jasper, Barton, Dade, Polk, Dallas, Cedar, Vernon, St Clair, and Hickory
Region D Interoperable Talkgroups are labeled as:

Reg D IO Call
Reg D IO 1
Reg D IO 2
Reg D IO 3
Reg D IO 4

Region E: Pemiscot, Dunklin, Mississippi, New Madrid, Wayne, Ripley, Butler, Madison, Iron. Bollinger, Stoddard, Scott, Cape Girardeau.
Region E Interoperable Talkgroups are labeled as:

Reg E IO Call
Reg E IO 1
Reg E IO 2
Reg E IO 3
Reg E IO 4

Region F: Cole, Osage, Camden, Morgan, Miller, Moniteau, Cooper, Howard, Boone, Audrain, Callaway, Gasconade, Montgomery Counties
Region F Interoperable Talkgroups are labeled as:

Reg F IO Call
Reg F IO 1
Reg F IO 2
Reg F IO 3
Reg F IO 4

Region G: Ozark, Douglas, Wright, Texas, Shannon, Oregon, Carter, and Reynolds Counties.
Region G Interoperable talkgroups are labeled as:

Reg G IO Call
Reg G IO 1
Reg G IO 2
Reg G IO 3
Reg G IO 4

Region H: Atchison, Holt, Nodaway,, Andrew, Buchanan, Clinton. Dekalb, Gentry, Worth, Harrison, Daviess, Caldwell, Livingston, Grundy, and Mercer Counties

Region H Interoperable talkgroups are labeled as:

Reg H IO Call
Reg H IO 1
Reg H IO 2
Reg H IO 3
Reg H IO 4

Travel Talkgroups

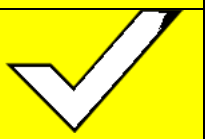
One of the most valuable resources in the MOSWIN system is the availability of sufficient voice channels at each communication site. The system features support roaming from tower site to tower site without users having to manually switch subscriber units as they migrate from site to site. The trunking technology allows communication throughout the state and can enable users to monitor their home talkgroups while travelling throughout the system. Utilization of the system in this manner, while convenient to the subscriber, presents the potential of overloading the communications channels available at a given site.

To address this issue, MOSWIN will offer a "Travel" channel in the Fleetmap of all users for use outside their home county in each Missouri agency fleetmapping process. This "travel" channel (labeled as "Maries_Co_travel" or "Cole_Co_travel") will allow any user in that county to travel outside their "home" county in Missouri while retaining the ability for them to continue to speak to users in their home county on that county's "travel" channel. This designation of a "travel" channel in each county is designed to manage the needs of users that at times have to retain the ability to communicate users in their local community while outside of their county while at the same time ensuring that wide area operations do not impede channel availability at sites outside of a users normal operating area.

While it is important to provide a mechanism for statewide interoperable communications for subscribers who road throughout the system, it must be realized that the overall system design (the channel capacity at each site) has been based upon the anticipated number of public safety users *to be served in the area of the site.* The ability for subscribers to routinely monitor any localized talkgroup not normally affiliated to that tower site over the course of the entire system, may cause available channels to be busy for all users of the site.

VHF Conventional Channels Utilized in Missouri with Standardized National Channel Nomenclature

Receive MHz	Transmit MHz	Eligible Usage (Base-Mobile-Fixed)	Primary Use	National Common Name	Missouri Authority	FCC Limitations	Requires approval from Missouri Agency
155.7525	SIMPLEX	Base-Mobile-Fixed	Any Public Safety Eligible	VCALL10	N/A	90.20 (80,83)	N/A
151.1375	SIMPLEX	Base-Mobile-Fixed	Any Public Safety Eligible	VTAC11	N/A	90.20 (80)	N/A
154.4525	SIMPLEX	Base-Mobile-Fixed	Any Public Safety Eligible	VTAC12	N/A	90.20 (80)	N/A
158.7375	SIMPLEX	Base-Mobile-Fixed	Any Public Safety Eligible	VTAC13	N/A	90.20 (80)	N/A
159.4725	SIMPLEX	Base-Mobile-Fixed	Any Public Safety Eligible	VTAC14	N/A	90.20 (80)	N/A
154.280	**SIMPLEX**	**Base-Mobile-Fixed**	**Fire Service**	**VFIRE21**	**Missouri Div of Fire Safety**	**90.20 (19)**	
154.265	**SIMPLEX**	**Base-Mobile-Fixed**	**Fire Service**	**VFIRE22**	**Missouri Div of Fire Safety**	**90.20 (19)**	
154.295	**SIMPLEX**	**Base-Mobile-Fixed**	**Fire Service**	**VFIRE23**	**Missouri Div of Fire Safety**	**90.20 (19)**	
154.2725	**SIMPLEX**	**Base-Mobile-Fixed**	**Fire Service**	**VFIRE24**	**Missouri Div of Fire Safety**	**90.20 (19)**	

154.2875	SIMPLEX	Base-Mobile-Fixed	Fire Service	VFIRE25	Missouri Div of Fire Safety	90.20 (19)	
154.3025	Simplex	Base-Mobile-Fixed	Fire Service	VFIRE26	Missouri Div of Fire Safety	90.20 (19)	
155.340	Simplex	Base-Mobile-Fixed	EMS	VMED28	Missouri Health and Senior Services	90.20 (40)	
155.3475	Simplex	Base-Mobile-Fixed	EMS	VMED29	Missouri Health and Senior Services	90.20 (40)	
155.475	Simplex	Base-Mobile-Fixed	Law Enforcement	VLAW31	Missouri State Highway Patrol	90.20 (41)	
155.4825	Simplex	Base-Mobile-Fixed	Law Enforcement	VLAW32	Missouri State Highway Patrol	90.20 (41)	

Missouri SIEC requirement: 700/800 MHz licensees requesting to utilize these interoperability channels in Missouri must all program the sixteen (16) "must carry" channel pair indicated in Yellow below into all subscriber units with the channel labels/designators as listed. These are multi discipline channels not assigned to any particular user discipline with on-scene usage under the control of the Incident Commander and should be carried by all users with capable subscriber units, programmed to operate in both the simplex and duplex mode of operation. Two (2) of the must carry channels are low speed "data only" channels. Non 700 MHz licensees can utilize these channels as well as they are "licensed by rule" by the FCC for mobile and portable use by any Part 90 licensee.

The use of designated channels above marked with Red, Blue and Turquoise will be permitted by users of specific disciplines for multi-agency/single discipline conventional on-scene communications, but not on an entirely exclusive basis. USERS OF ALL DISCIPLINES WILL BE ENCOURAGED TO PROGRAM CHANNELS SPECIFICALLY ASSOCIATED WITH THEIR DISCIPLINE IN ADDITION TO THE SIXTEEN (16) MANDATORY "MUST CARRY" CHANNELS. While these discipline specific channels will be generally utilized by those operating within a specific discipline, an on-scene Incident Commander(s) will have the authority and discretion to utilize ALL interoperability channels designated by the Commission and identified in this document as determined to be in the best interest of the public safety community. It is anticipated the "Must Carry" channels will be the platform utilized for cross discipline on-scene communications. Users should be aware of the use of the channels

designated “Other Service”, which can be utilized in a variety of ways to facilitate interoperability between traditional and non-traditional public safety users.

CHANNEL	CENTER in MHz	DESCRIPTION (Duplex/Simplex)	LABEL
23-24	769/799.14375	General Public Safety MANDATORY	7TAC51
23-24	***769.14375***	***MANDATORY (Talk Around) Secondary Trunked***	***7TAC51D***
103-104	769/799.64375	General Public Safety MANDATORY	7TAC52
103-104	***769.64375***	***MANDATORY (Talk Around) Secondary Trunked***	***7TAC52D***
183-184	770/800.14375	General Public Safety MANDATORY	7TAC53
183-184	***770.14375***	***MANDATORY (Talk Around) Secondary Trunked***	***7TAC53D***
263-264	770/800.64375	General Public Safety MANDATORY	7TAC54
263-264	***770.64375***	***MANDATORY (Talk Around) Secondary Trunked***	***7TAC54D***
39-40	769/799.24375	Calling Channel MANDATORY per 90.531	***7CALL50***
39-40	***769.24375***	***Calling Channel MANDATORY per 90.531 (Talk Around)***	***7CALL50D***
119-120	769/799.74375	General Public Safety MANDATORY	7TAC55
119-120	***769.74375***	***MANDATORY (Talk Around)***	***7TAC55D***
199-200	770/800.24375	General Public Safety MANDATORY	7TAC56
199-200	***770.24375***	***MANDATORY (Talk Around)***	***7TAC56D***
279-280	770/800.74375	General Public Safety MANDATORY MOBILE DATA per 90.531	7DATA69
279-280	***770.74375***	***MANDATORY MOBILE DATA per 90.531 (Talk Around)***	***7DATA69D***
63-64	769/799.39375	EMS	7MED65
63-64	***769.39375***	***EMS (Talk Around)***	***7MED65D***
143-144	769/799.89375	Fire	7FIRE63
143-144	***769.89375***	***Fire (Talk Around)***	***7FIRE63D***
223-224	770/800.39375	Law Enforcement	7LAW61
223-224	***770.39375***	***Law Enforcement (Talk Around)***	***7LAW61D***
303-304	770/800.89375	Mobile Repeater (MO3 use Primary)	7MOB59
303-304	***770.89375***	***Mobile Repeater***	7MOB59D
79-80	769/799.49375	EMS	7MED66
79-80	***769.49375***	***EMS (Talk Around)***	***7MED66D***
159-160	769/799.99375	Fire	7FIRE64
159-160	***769.99375***	***Fire Service (Talk Around)***	***7FIRE64D***
239-240	770/800.49375	Law Enforcement	7LAW62
239-240	***770.49375***	***Law Enforcement (Talk Around)***	***7LAW62D***
319-320	770/800.99375	Other Public Service	7GTAC57
319-320	***770.99375***	***Other Public Service (Talk Around)***	***7GTAC57D***
657-658	773/803.10625	General Public Safety MANDATORY	7TAC71
657-658	***773.10625***	***MANDATORY (Talk Around)***	***7TAC71D***
737-738	773/803.60625	General Public Safety MANDATORY	7TAC72
737-738	***773.60625***	***MANDATORY (Talk Around)***	***7TAC72D***
817-818	774/804.10625	General Public Safety MANDATORY	7TAC73
817-818	***774.10625***	***MANDATORY (Talk Around)***	***7TAC73D***
897-898	774/804.60625	General Public Safety MANDATORY	7TAC74

897-898	***774.60625***	***MANDATORY (Talk Around)***	***7TAC74D***
681-682	773/803.25625	Calling Channel MANDATORY per 90.531	7CALL70
681-682	***773.25625***	***MANDATORY per 90.531(Talk Around)***	***7CALL70D***
761-762	773/803.75625	General Public Safety MANDATORY	7TAC75
761-762	***773.75625***	***MANDATORY (Talk Around)***	***7TAC75D***
841-842	774/804.25625	General Public Safety MANDATORY	7TAC76
841-842	***774.25625***	***MANDATORY (Talk Around)***	***7TAC76D***
921-922	774/804.75625	General Public Safety MANDATORY DATA per 90.531	7DATA89
921-922	***774.75625***	***MANDATORY DATA per 90.531 (Talk Around)***	***7DATA89D***
641-642	773/803.00625	EMS	7MED86
641-642	***773.00625***	***EMS (Talk Around)***	***7MED86D***
721-722	773/803.50625	Fire	7FIRE83
721-722	***773.50625***	***Fire (Talk Around)***	***7FIRE83D***
801-802	774/804.00625	Law Enforcement	7LAW81
801-802	***774.00625***	***Law Enforcement (Talk Around)***	***7LAW81D***
881-882	774/804.50625	Mobile Repeater (MO3 use Primary)	7MOB79
881-882	***774.50625***	***Mobile Repeater***	***7MOB79D***
697-698	773/803.35625	EMS	7MED87
697-698	***773.35625***	***EMS (Talk Around)***	***7MED87D***
777-778	773/803.85625	Fire	7FIRE84
777-778	***773.85625***	***Fire (Talk Around)***	***7FIRE84D***
857-858	774/804.35625	Law Enforcement	7LAW82
857-858	***774.35625***	***Law Enforcement (Talk Around)***	***7LAW82D***
937-938	774/804.85625	Other Public Service	7GTAC77
937-938	***774.85625***	***Other Public Service (Talk Around)***	***7GTAC77D***

700 "Must Carry" Missouri required interoperability channels that must be programmed into every 700 MHz capable Missouri subscriber unit Sixteen (16 Channel Pairs) SHADED
Optional designation of Law Enforcement specific channels-Four (4) Channel Pair SHADED
Optional Designation of Fire Service Specific Channels-Four (4) Channel pair SHADED
Optional Designation of EMS Specific channels-Four (4) Channel Pair SHADED
Optional Designation of "Other Services" channels- Four (4) Channel Pair SHADED

The Missouri SIEC endorses this interoperability template as its recommended use for FCC designated interoperability channels in the 700 and 800 MHz band. The Missouri SIEC reserves the right to alter and update this plan when identified to be in the best interest of the Missouri public safety community. Changes to the 700 MHz public safety interoperable allocations by the FCC or their rules may also require modification of this document.

These recommendations are intended to serve as guidelines for agencies implementing 700 MHz interoperability channels. Should any questions arise from this interoperability template, please feel free to contact Stephen Devine, Missouri Department of Public Safety Interoperability Program Manager at 573-522-2382 or stephen.devine@dps.mo.gov

Stephen T. Devine, Chairperson

Missouri State Interoperability Executive Committee

National 800 MHz Interoperability Channels with National Standardized Naming Nomenclature

Name	Frequency (Rx)	Frequency (Tx)
8CALL90	851.0125	806.0125
8CALL90D	851.0125	851.0125
8TAC91	851.5125	806.5125
8TAC91D	851.5125	851.5125
8TAC92	852.0125	807.0125
8TAC92D	852.0125	852.0125
8TAC93	852.5125	807.5125
8TAC93D	852.5125	852.5125
8TAC94	853.0125	808.0125
8TAC94D	853.0125	853.0125

D = Direct or "Talk Around" use

D. Agency Talkgroups

Each Member Agency accessing MOSWIN for all of their communications needs is assigned talkgroups specifically designated for an agency's internal communications. Agencies are expected to use the talkgroups assigned to the department for all intradepartmental traffic within their service area. Policies and procedures for the use of the agency talkgroup are at the discretion of the department within the technical limitations for talkgroup use and roaming otherwise noted in this document.

E. Requests for Additional Talkgroups

Requests for new talkgroups will be submitted to the MOSWIN System Administration using the MOSWIN Application for System Access or New Talkgroup. Authorization of private talkgroups for operations and monitoring of other agencies will be processed through the. A.MOSWIN Application for initial system access or to add a talkgroup to an existing User Agency will be processed as received. A new application will be filled out for each authorization, a copy kept on file by the agency with a copy retained at:

MOSWIN System Administration at
2413 E. McCarty Street,
Jefferson City, MO 65101
573-522-2382
Fax 573-526-1632

IX. AUTHORIZED SYSTEM ACCESS

A. Access

Generally, access will be granted to first responders and emergency response support providers by the MOSWIN System Administration. However, all applications are subject to review by the MOSWIN Director and the Missouri Statewide Interoperable Governance Body. If the governmental response to emergencies would benefit from the participation of a non-governmental entity on the MOSWIN public safety interoperable communication system, that non-governmental entity shall apply for MOSWIN Membership with a sponsorship of a cognizant governmental first responder agency.

B. First Responder-Definition

1. Law Enforcement

   Any law enforcement agency recognized by the Missouri Department of Public Safety

2. Fire Departments

   Any Fire Department recognized by the Missouri Department of Public Safety and
   Any federally recognized fire agency/department

3. Emergency Medical Services

Ambulances/Medical Facilities: Any licensed ambulance service and/or any hospital or health care facility recognized by the Missouri Department of Health and Senior Services

4. Homeland Security and Emergency Management

Any emergency management agency recognized by the Missouri State Emergency Management Agency and the Missouri Office of Homeland Security

C. Emergency Response Support

1. Public Works with first responder and emergency response roles

State agencies with public works missions, such as Department of Transportation and Municipal based Town, City, and County Road & Bridge departments, etc.

2. **Support Providers**

Volunteer organizations explicitly named in official governmental emergency response plans such as Red Cross, Salvation Army, Amateur Radio Emergency Services and like emergency support providers. Communications service providers contracted by governmental agencies to support first responder radio maintenance or operations.

3. **Public Transportation**

Organizations with resources explicitly named in official governmental emergency response plans, including School Buses

4. **Other Governmental Agencies**

Court Services/Corrections and Regulatory, but not designated as law enforcement Others with first responder and emergency response roles in Missouri

D. Applying for System Access

1. Application Process

Agencies wishing to participate in MOSWIN should implement the following steps:

a. Complete the MOSWIN Membership Application and the MOSWIN Membership Agreement. The Membership Application and Agreement are separate documents and available from MOSWIN System Administration and are also available on the MOSWIN web site – http://dps.mo.gov/dir/programs/intercomm/default.asp

b. Mail/Deliver the original to MOSWIN at the address listed on the application.

c. Coordinate feasibility, agency radios and fleetmapping with the MOSWIN System Administration.
d. The MOSWIN Interoperability Executive Committee will review the application at a MOSWIN Interoperability Executive Committee meeting. The applicant is encouraged to attend this MOSWIN Interoperability Executive Committee meeting to answer any questions that may arise from the application. The MOSWIN Interoperability Executive Committee will make a recommendation to the Executive Board as to the application status – approved, further review or denied.
e. The Executive Board decision will be communicated to the applicant as well as any documentation needed and any provision made.
f. Any pending applications will be reviewed monthly for changes that would modify the applicant's status.
g. The applicant will coordinate with one of the authorized subscriber programming agencies for template development parameters.
h. The applicant is encouraged to begin attending MOSWIN and Statewide interoperability Governance Body meetings and may participate in committee meetings on topics in which they may be interested.

2. Acceptance of New Members

To ensure compliance with MOSWIN rules and regulations and to properly coordinate Subscriber ID and Talkgroup assignments on MOSWIN, the MOSWIN Program Manager will coordinate these assignments for the initial integration of the agency. This will include agency specific talkgroups as well as standard Multiple Agency Talkgroups that are available. The agency will need to discuss the talkgroup/channel layout for their radio equipment, available features and functions to be included in their programming template. The type and model of the agency's radios will also need to be provided. Upon receiving the talkgroup assignments, subscriber profiles and authorizations the agency can then contact an authorized service provider to program subscriber's radio equipment for use on MOSWIN. Upon the completion of the programming, the authorized service provider shall contact the MOSWIN Program Manager to have the subscriber ID's activated in the master controller.

E. Console Access

Direct connected dispatch consoles must be closely coordinated and conform to the technical requirements established by the MOSWIN Program Manager and MOSWIN Technical Support. Agencies requesting direct dispatch console connection to MOSWIN shall mark the "Communications Center" box on MOSWIN Membership Application and submit documentation indicating area and agencies served, channel or talkgroup recording capabilities, and console type and model.

Channel naming for conventional interoperability channels and/or frequencies for any console that connects to MOSWIN shall be consistent with the National APCO/NPSTC ANSI standard 1.104.1-2010 for national interoperable channel nomenclature.

X. MEMBER AGENCY LIASION/DISPUTE RESOLUTION

A. Member Agency Liaison

Each party to the Membership Agreement will designate a member of its senior management staff who will be single points of contact involved in the operational aspects of the relationship between MOSWIN and the Member Agency. MOSWIN will meet with the relationship manager annually at a minimum or by request, if needed, to discuss relationship strategies affecting both parties, to summarize current activities, performance results, service requests, error corrections, dispute resolutions, and other planned activities. These meetings will follow a pre-defined agenda focusing on the performance of MOSWIN. The member shall inform the MOSWIN System Administration of any changes to their relationship manager in writing.

B. Dispute Resolution

If any issue of MOSWIN non-compliance arises under this Agreement, the parties agree to resolve the issue at the lowest management level of each party. In the event the issue remains unresolved, the parties agree to immediately escalate the issue to the Member Agency Liaisons for their consideration. The Member Agency Liaisons will consider the details of the non-compliance issue, assess whether there have been past issues of non- compliance, determine how long the non- compliance has been continuing, determine the seriousness of the non- compliance, and negotiate, in good faith, a mutually agreeable solution. In the event the Member Agency Liaisons cannot agree on a solution, the non- compliance issue shall be directed to MOSWIN System Administration who will consult with and seek advice from the Statewide Interoperability Governing Board on resolution of the non- compliance issue.

1. Non-compliant actions may come to the attention of various personnel via multiple methods such as a result of routine system monitoring, an audit and/or a report or complaint from other Member Agencies, to name a few.
2. Regardless of how the issue arises, as soon as there is awareness of non-compliant actions:

    a. The individual discovering non-compliance is obliged to immediately report it to their respective relationship manager or administrator.

    b. The Member Agency Liaison shall negotiate, in good faith, a mutually agreeable solution.

    c. The Member Agency Liaison will follow up to ensure that all steps and or corrective action have been completed within the time frame.

    d. Should immediate action be required, the MOSWIN System Administration will notify the non-compliant agency of the required action. This will include a request to explain the reason for noncompliance.

3. If local management fails to resolve the situation within a reasonable time, the MOSWIN System Administration will notify the Statewide Interoperability Governing Board of the non-compliant action.

4. If necessary, the matter will be placed by MOSWIN System Administration on the next Statewide Interoperability Governing Board meeting agenda.

    a. The MOSWIN Program Manager will notify Member Agency Liaison of the agency not in compliance.
        I The date the matter will come before the Statewide Interoperability Governing Board
        ii. Their rights to appeal.

    b. The Statewide Interoperability Governing Board will hear the issue and recommend corrective action or consequences. These will be communicated to the violator within 10 days.

    c. For urgent situations where non-compliance with these procedures is degrading the overall system performance, the MOSWIN System Administration Manger or designee is authorized to take necessary technical measures to change the permissions on any user radio to correct the problem immediately. Appropriate follow-up notification will be made in accordance with the Member Agency Liaison management procedures.

C. Revocation of Privileges

The objective of this procedure is to describe the consequences of non-compliance. These consequences will be spelled out for varying degrees and duration of non-compliance.

The ability to communicate between full participants and non-participants in the statewide system is possible due to the inter-operational hardware and software being developed. The improper use of this hardware can have grave consequences. These standards, policies and procedures have been set forth to describe how and under what conditions the statewide radio system will be used. This is essential in order to maximize service to the citizens of the state and minimize potential negative consequences. Responsible management of this resource, therefore, requires that standards, protocols and procedures be enforced and that consequences of non-compliance be developed and implemented.

Recommended Protocol/ Standard: Consequences of failure to comply with these standards, protocols and procedures fall into two categories of non-compliance.

Moderate to high - potential for serious adverse affect on participants and/or non-participants of MOSWIN.

Low - potential for adverse affect on participants and/or non-participants of MOSWIN.

Executive Order 9-2-1101(a)(v) authorized the Statewide Interoperable Governing Board to promulgate necessary rules and regulations governing system operation and participation and, upon failure to comply with adopted rules and regulations, may suspend system use and participation by any participating and non-complying public safety agency or private entity. Failure to comply with the protocols may result in the following actions:

Moderate to high

First violation	Written order to immediately stop the non-compliant practice. Either the MOSWIN System Administrator or the Statewide Interoperability Governance Body may send this letter, with a copy to the all affected parties. The governing body of the violating agency shall be notified of the violation.
Failure to correct problem and respond within 30 days <u>or</u> 2nd offense within 180 days	Suspension of member privileges on the MOSWIN network to the extent of time recommended by the MOSWIN System Administrator and executed by the Statewide Interoperability Governing Body with prior notification to the affected agencies.
Failure to respond within 60 days <u>or</u> 3rd offense within 180 days	Revocation of member privileges on MOSWIN. This action must be recommended by the MOSWIN System Administrator and executed by the Statewide Interoperability Governing Body.

Low

First violation	Written warning calling attention to the non-compliant practice. The violator is asked to stop the non-compliant practice(s). The MOSWIN System Administrator may send the warning with a copy to the Statewide Interoperability Governing Board and affected parties. The governing body of the violating agency shall be notified of the violation.
Failure to respond within 30 days <u>or</u>	Written order to immediately stop the non-

2nd offense within 180 days	compliant practice or be subject to suspension or revocation of member privileges. The MOSWIN System Administrator may send this letter with a copy to the affected agencies and the Statewide Interoperability Governing Body.
Failure to respond within 60 days or 3rd offense within 180 days	Suspension or revocation of member privileges on MOSWIN. The specific penalty must be recommended by the MOSWIN System Administrator and executed by the Statewide Interoperability Governing Board.

D. Appeals

All members of MOSWIN, whether full participants or conventional members connecting by means of inter-operational infrastructure, have the right to appeal a procedure, a decision or a sanction set forth.

1. In the event of a dispute regarding the outcome of non-compliance procedures, an aggrieved party may file a written appeal to reverse recommendations or sanctions within 30 days of issuance of directives.

2. Within ten days of receiving a request for appeal, the MOSWIN System Administrator shall provide written notice of the request to all involved parties and set a date for an appeal hearing by the Statewide Interoperability Governing Board within 45 days.

2. DECISION – The Statewide Interoperability Governing Board, after a hearing on the matter, shall make a decision regarding the dispute within 60 days and transmit an order to all parties involved. The action called for shall be implemented in accordance with the order. Copies of the order will be mailed to all affected parties, the MOSWIN System Administration and the Statewide Interoperability Governance Body.

XI. SUBSCRIBER AND SYSTEM SUPPORT

A. Subscriber Equipment

Member Agency shall be responsible for the maintenance and repairs of the subscriber owned radio equipment including dispatch consoles, base stations, repeaters, mobile radios, portable radios and recording equipment. This assures that the Member Agency radios are in optimal operating order and will not have an adverse impact on any other Member Agency use of MOSWIN. The Member Agency and the service provider's programming/installation credentials

will need to be reviewed by MOSWIN System Administration to assure the service provider understands and can comply with MOSWIN standards, guidelines, and protocols and is "qualified" to service the Member's radio equipment.

The following chart outlines the responsibilities of MOSWIN Support and the agency responsible for the listed tasks or equipment.

	MOSWIN Zone & Master Site Equipment	All core MOSWIN RF Sites	Coverage Enhancement Sites	Non MOSWIN Sites	Console Equipment Connected to MOSWIN	MOSWIN Sub Systems
System Administration & Monitoring	MOSWIN	MOSWIN	TBD	TBD	Console Owner	Owner Agency
Connectivity Maintenance (T-1 Lines	MOSWIN	MOSWIN	TBD	TBD	Console Owner	Owner Agency
MOSWIN Software Upgrades	MOSWIN	MOSWIN	TBD	TBD	Console Owner	Owner Agency
Equipment Maintenance	MOSWIN	MOSWIN	TBD	TBD	Console Owner	Owner Agency
Fixed Infrastrucuture Radio Hardware Upgrades	MOSWIN	MOSWIN	TBD	TBD	Console Owner	Owner Agency
Site and Facility Maintenance	MOSWIN	MOSWIN	TBD	TBD	Console Owner	Owner Agency
Console Programming Changes	MOSWIN	MOSWIN	TBD	TBD	Console Owner	Owner Agency
Console Hardware Upgrades to Support MOSWIN Software Upgrades	MOSWIN	MOSWIN	TBD	TBD	Console Owner	Owner Agency

B. Problem Reporting

When a problem is detected on the MOSWIN system, the MOSWIN Member will first make every reasonable effort to determine that the problem is not due to malfunction of the Member Agency's equipment. Once the problem has been determined to be with MOSWIN equipment and infrastructure, the Member will call the **MOSWIN System Administrator to** report the

problem at 573-522-2382. Problems of all Severity Levels can be reported in this manner and will be attended to in accordance with the procedures outlined in this chapter

C. Severity Levels

With the 24/7 mission critical requirements for MOSWIN, it is absolutely necessary to strive for maximum system availability with minimum down time, service impairment or disruption. The overall design of MOSWIN provides several levels of redundancy that enables meeting this objective however, failures of varying degrees will occur. Depending on the location and type of failure or outage, the impact to the system and users can range from no impact to the total loss of service. Failures and outages must be defined in several levels according to the impact on the system and users. The level will then drive the type of response required. The following levels and definitions have been established. Specific failure and outage are listed in Table XI-A. The initial failure/outage level shall be determined by the affected agency/users using Table XI-A. The level may be escalated or de-escalated as described in Section E.

Critical (Level 1) – A system failure or outage that creates total system unavailability to one or more sites, one or more coverage areas, or one or more groups of users.

Severe (Level 2) – A system failure or outage that impacts or reduces the coverage, the capacity, or the operational capability of the system, site, coverage area or group of users. (Approximately 1/3 or more of the available resources have failed)

Impaired Service Affecting (Level 3) - A system failure or outage that reduces the coverage, capacity, operational capability of the system, sites, coverage area or group of users. (Approximately less than 1/3 of the available resources have failed.)

Impaired Non Service Affecting (Level 4) - A system failure or outage that has little or no reduction in coverage, capacity, and operational capability of the system, sites, coverage area or group of users.

Table XI-A

MOSWIN Severity Classifications			Reporting Requirments			
Classification Type	Classification Level	Failure or outage type	Intial Mobilzation Plan	Initial Follow up after mobilization	Subsequent follow up notifications	Maximum Restoring time upon arrival
Critical	1	Entire zone down	1 hour	2 hours	4 hours	4 hours
Critical	1	Multiple Sites Down	1 hour	2 hours	4 hours	4 hours
Critical	1	Single site down with no overlapping coverage	1 hour	2 hours	4 hours	4 hours
Critical	1	Dispatch center down (all consoles)	1 hour	2 hours	4 hours	4 hours
Critical	1	Microwave backbone down effecting 2 or more sites	1 hour	2 hours	4 hours	4 hours
Critical	1	More than 66% of site channels down	1 hour	2 hours	4 hours	4 hours
Critical	1	No interzone traffic	1 hour	2 hours	4 hours	4 hours
Severe	2	Single site down with overlapping coverage	2 hours	2 hours	4 hours	8 hours
Severe	2	More than 33% of site channels down	2 hours	2 hours	4 hours	8 hours
Severe	2	microwave system down at a single site	2 hours	2 hours	4 hours	8 hours
Severe	2	Primary power outage, no generator	2 hours	2 hours	4 hours	8 hours
Impaired - Service Effecting	3	Single channel down at a high traffic site	4 hours	2 hours	4 hours	8 hours
Impaired - Service Effecting	3	Single site reduced coverage	4 hours	2 hours	4 hours	8 hours
Impaired - Service Effecting	3	Interference at 1 or more sites	4 hours	2 hours	4 hours	8 hours
Impaired - Service Effecting	3	HVAC alarm	4 hours	2 hours	4 hours	8 hours
Impaired - Service Effecting	3	Single dispatch console down	4 hours	2 hours	4 hours	8 hours
Impaired - Non Service Effecting	4	Single channel down	4 hours	NA	24 hours	72 hours
Impaired - Non Service Effecting	4	Primary power outage, generator running	4 hours	NA	24 hours	72 hours
Impaired - Non Service Effecting	4	Primary power up, generator out of service	4 hours	NA	24 hours	72 hours

D. Maintenance Response and Service Restoration

In order to meet the system availability objectives, a specific response and service restoration level must also be defined based of the failure/outage level. Due to the remote locations of MOSWIN sites and the access conditions, methods and seasonal changes, it is not possible to provide specific or guaranteed service restoration times. It is however reasonable and necessary to provide specific response plans including target service restoration times, depending on the failure/outage level. The response plan for each level is defined as follows:

Critical (Level 1) - Upon notification of a failure/outage by either automatic or manual means, the responsible agency shall immediately begin investigation into the reasons, location and system/user impact. Additional notifications should be made as soon as practical to the MIC at 573-522-2382, affected areas, users and/or other service providers as necessary. Service personnel shall strive to have the location and failure/outage identified within 1 hour after the initial notification. Mobilization of the required resources necessary for service restoration should begin within 1 hour after the location and failure is determined. Initial follow up notifications should take place within 2 hours after initial notification to the affected areas, users and/or other service providers as necessary and every 2 hours thereafter until service is fully restored or the level reduced to Impaired Non Service Affecting. The follow up notifications shall include the estimated time for service personnel to be on site at the failure/outage location, overall system impact, temporary work around if applicable. Within 1 hour after arrival at the failure/outage site a restoration plan and time estimation shall be communicated to the affected areas, users and/or other service providers as necessary. Follow up notification on the progress with revised restoration time estimates shall be made every 2 hours. If the estimated restoration time frame exceeds 4 hours from arrival on site, a notification call with details of the failure/outage and the restoration plan including estimated time to repair shall be made to all affected parties and all service providers. Once service is restored the affected areas, the MOSWIN, users and/or other service providers shall be notified to confirm system restoration prior the leaving the site or demobilization. Outage reporting and documentation shall be completed and submitted as required in Section F.

Severe (Level 2) - Upon notification of a failure/outage by either automatic or manual means, the responsible agency shall immediately begin investigation into the reasons, location and system/user impact. Additional notifications should be made as soon as practical to the WSC, affected areas, users and/or other service providers as necessary. Service personnel shall strive to have the location and failure/outage identified within 2 hours after the initial notification. Mobilization of the required resources necessary for service restoration should begin within 2 hours after the location and failure is determined. Initial follow up notifications should take place within 2 hours after initial notification to the affected areas, users and/or other service providers as necessary and every 4 hours thereafter until service is fully restored or the level reduced to Impaired Non Service Affecting. The follow up notifications shall include the estimated time for service personnel to be on site at the failure/outage location, overall system impact, temporary work around if applicable. Within 1 hour after arrival at the failure/outage site a restoration plan and time estimation shall be communicated to the affected areas, users and/or other service providers as necessary. Follow up notification on the progress with revised restoration time estimates shall be made every 4 hours. If the estimated restoration time frame exceeds 8 hours from arrival on site, a notification call with details of the failure/outage and the

restoration plan including estimated time to repair shall be made to all affected parties and all service providers. Once service is restored the affected areas, the MSC, users and/or other service providers shall be notified to confirm system restoration prior the leaving the site or demobilization. Outage reporting and documentation shall be completed and submitted as required in Section F.

Impaired Service Affecting (Level 3) - Upon notification of a failure/outage by either automatic or manual means, the responsible agency within 1 hour shall begin investigation into the reasons, location and system/user impact. Additional notifications should be made as soon as practical to the WSC, affected areas, users and/or other service providers as necessary. Service personnel shall strive to have the location and failure/outage identified within 2 hours after the initial notification. Mobilization of the required resources necessary for service restoration should begin within 4 hours after the location and failure is determined. Initial follow up notifications should take place within 2 hours after initial notification to the affected areas, users and/or other service providers as necessary and every 4 hours thereafter until service is fully restored or the level reduced to Impaired Non Service Affecting. The follow up notifications shall include the estimated time for service personnel to be on site at the failure/outage location, overall system impact, and a temporary work around if applicable. Within 1 hour after arrival at the failure/outage site a restoration plan and time estimation shall be communicated to the affected areas, users and/or other service providers as necessary. Follow up notification on the progress with revised restoration time estimates shall be made every 4 hours. If the estimated restoration time frame exceeds 8 hours from arrival on site, a notification call with details of the failure/outage and the restoration plan including estimated time to repair shall be made to all affected parties and all service providers. Once service is restored the affected areas, the MSC, users and/or other service providers shall be notified to confirm system restoration prior the leaving the site or demobilization. Outage reporting and documentation shall be completed and submitted as required in Section F.

Impaired Non Service Affecting (Level 4) - Upon notification of a failure/outage by either automatic or manual means, the responsible agency within 4 hours shall begin investigation into the reasons, location and system/user impact. Additional notifications should be made as soon as practical to the MSC, affected areas, users and/or other service providers as necessary. Service personnel shall strive to have the location and failure/outage identified within 24 hours after the initial notification. Mobilization of the required resources necessary for service restoration should begin within 24 hours or the next business day after the location and failure is determined. If the estimated restoration time frame exceeds 72 hours from the initial notification, a notification call with details of the failure/outage and the restoration plan including estimated time to repair shall be made to affected areas, users and/or other service providers as appropriate. Once service is restored the affected areas, the MSC, users and/or other service providers shall be notified to confirm system restoration prior the leaving the site or demobilization. Outage reporting and documentation shall be completed and submitted as required in Section F.

E. Escalation Procedures

The initial failure/outage level shall be determined by the affected agency/user as described in Section C. Due to the complexity of the system, the initial determination may not be correct or the circumstances, current events or actual failure/outage may require the level to be changed.

Table XI-B

Timeframe	Event that Triggers Escalation	Escalation Response
Immediately on Receipt of Notification of MOSWIN Maintenance Requirement	• No response from technician on duty	• MOSWIN's Support Staff calls the first person in the escalation directory. If that person cannot be reached, the next person in the directory is called until a technician is reached.
2 Hours from open action request	• Technician has not arrived at the site • Non-conformance with MOSWIN Standards of Maintenance Performance requirements stated in agreement	• MOSWIN calls the Member to inform them the technician has not arrived; advises the Member of the estimated time of arrival. • If original Technician cannot reach the site on time, another Technician will be dispatched. • MOSWIN Support Staff will notify the Member of change in status.

4 Hours After Receipt of Action request	• Restoration has not been completed and resolution is still unknown • Non-conformance with MOSWIN Standards of Maintenance Performance stated in agreement	• MOSWIN calls the Member to inform them the repair has not been completed. MOSWIN advises Member of the estimated time of restoration and any conditions that affect restoration. • If restoration cannot be accomplished, MOSWIN will notify the Member, and outline emergency procedures to be implemented. MOSWIN will work with the Member to identify operational work options needed to continue system operations.
6 Hours After Receipt of Action request	• No restoration accomplished	• MOSWIN Support Staff notifies Member. • MOSWIN Help Desk Staff notifies appropriate project engineering staff personnel and the Program Administrator.
8 hours after receipt of action request	• No restoration accomplished	• MOSWIN Support Staff requests specialized assistance from product service depot.

F. Maintenance History Reporting

Any agency that has a service disruption, outage or failure should report the problem to the **MOSWIN Support Center (MIC) at 573-522-2382**. The MOSWIN Support Center will enter the failure or outage in a Failure/Outage Log, assist with classifying the severity level of failure/outage and obtain other relevant information. Based on the location and type of failure/outage the WSC will then contact the appropriate agencies to initiate the response if necessary. All required follow up notifications should be communicated to the MSC so they can be entered into the Failure/Outage Log Action Plan. The MSC may assist with the notifications.

At a minimum the following information will be entered into the Failure/Outage Log:

Reported failure, outage or trouble
Date & time reported
Reporting person, agency and contact information
Affected Site or area
Initial Severity Classification
Responsible service provider
Action plan for responding to or correcting the failure/outage (Action Plan)

The maintenance provider will provide updates to the "Action Plan" as they are required according to the severity level of the failure/outage.
Failure/Outage corrected date & time.

The Failure/Outage Log information may be shared among all service providers to establish a knowledge base for future issues.

G. Maintenance Safety

Regardless of the categorized condition, times can be delayed or given an alternate suspense time/date if the repair would jeopardize the safety of response personnel. i.e., if the repair would require the climbing of an icy tower, the response can be delayed until safe passage and work conditions can be achieved. Or, a risk analysis needs to be performed.

H. Wire line Dispatch Consoles

Members are responsible for coordination of their agency console maintenance. Members experiencing communication problems that they believe are console related should follow any agency operating procedures for maintenance. Member requested configuration changes to dispatch consoles will be forwarded to the MOSWIN Support Center (MIC) at 573-522-2382 MOSWIN support and member will develop an action plan for completing the requested changes. Loss of dispatch services will be attended to according to Section C

XII. ATTACHMENTS

1. Fleetmap
2. System Maps
    a. Site Locations
    b. Mobile Radio Coverage
    c. Portable Radio Coverage
    d. Regional Response Areas
3. Dealer/Contact List

Attachment 6
Dealer/Contact List
