Minnesota Land Mobile Radio Interstate Interoperability Crosswalk Plan

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SECB

STATEWIDE EMERGENCY COMMUNICATIONS BOARD

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Summary

Interstate public safety land mobile radio (LMR) interoperability between Minnesota and its neighbors has historically been accomplished through a quilt work of means with varying degrees of success. The *Minnesota Land Mobile Radio Interstate Interoperability Crosswalk Plan* establishes a best technology practice to guide Minnesota's public safety agencies toward a uniform methodology. Through a standardized approach, interstate LMR interoperability will be strengthened.

While cognizant of each of the five lanes of the SAFECOM Interoperability Continuum—Governance, Standard Operating Guidelines, Technology, Training & Exercising, and Usage—this document focuses on technology. However, in order for the technical capability detailed in this plan to be successful, each of the five lanes of the *Interoperability Continuum* must be developed as far as possible. For instance:

- Governance must provide oversight.
- Standard Operating Procedures will need to guide operations.
- End users must train and exercise so that they become proficient with the technology.
- The technical tool must be used and its value must be regularly assessed.

The essence of this plan is to employ dedicated talkgroups that will provide a radio pathway between Minnesota's statewide public safety radio system (ARMER: Allied Radio Matrix for Emergency Response) and the radio systems of our interstate neighbors. These dedicated talkgroups are named "crosswalks" as they provide a crosswalk-like functionality between two radio systems much like how a crosswalk painted on the street connects two sides of a street.

The State of Minnesota will provide the interstate crosswalk resources necessary to implement this plan (e.g. talkgroups and radios). It will engage its state neighbors in formal interstate agreements addressing variables such as testing, maintenance, training expectations, and usage practices.

Crosswalk resources may be used by dispatch centers that have a network connection or by those that have a radio frequency (RF) connections to their state radio systems. While the intent is to provide state-to-state connectivity, crosswalk resources may be also used by regional and county radio systems of neighboring states that operate independently of their statewide radio system.

The chief benefits of this proposal are:

- Uniformity: By providing a singular best practice, each of the border county relationships can aspire to the same end goal which, in turn, should improve the understanding and implementation of the crosswalk resource.
- Simplicity: The crosswalk proposal is technologically and operationally simple.
- Financial: The crosswalk technology is inexpensive.
- Independence: The crosswalk process keeps each side on their own system which minimizes training of end users on the neighbor's radio system.

Scope

This plan is intended to complement the *Minnesota Land Mobile Radio Interstate Interoperability Best Practices Guide*. Where that document addresses all five lanes of the SAFECOM Interoperability Continuum—Governance, Standard Operating Guidelines, Technology, Training and Exercising, and Usage—this document addresses only the technology lane. (See Appendix A for the SAFECOM Interoperability Continuum.)

This plan is intended for participants of Minnesota's statewide public safety land mobile radio system, ARMER, and their interstate neighbors.

All references in this plan to "interstate" and similar are inclusive of the Canadian provinces of Manitoba and Ontario.

This plan does not prohibit a public safety entity to develop its own interoperability technology and procedures to connect to another radio system so long as the plan is consistent with Statewide Emergency Communications Board (SECB) standards.

Crosswalk Plan

This *Minnesota Land Mobile Radio Interstate Interoperability Crosswalk Plan* calls for ARMER talkgroups to be used as crosswalks, or radio pathways, between ARMER and neighboring radio systems. Dispatchers on each system will have the ability to patch talkgroups and channels from their own radio system to a crosswalk talkgroup linking the two radio systems. Crosswalks will be dispatch-only talkgroups and will not be installed in any subscriber radios. The sole purpose of the crosswalk talkgroups is create a crosswalk, or pathway, connecting the two radio systems.

Each crosswalk will be available as a system resource on any ARMER network-connected console. The talkgroup will also be installed in a dedicated donor radio located in the other state and connected to the neighboring state's radio system by way of a conventional channel gateway (CCGW). As such, the ARMER crosswalk talkgroup will be available as system resource on any network-connected console on the neighboring state's system.

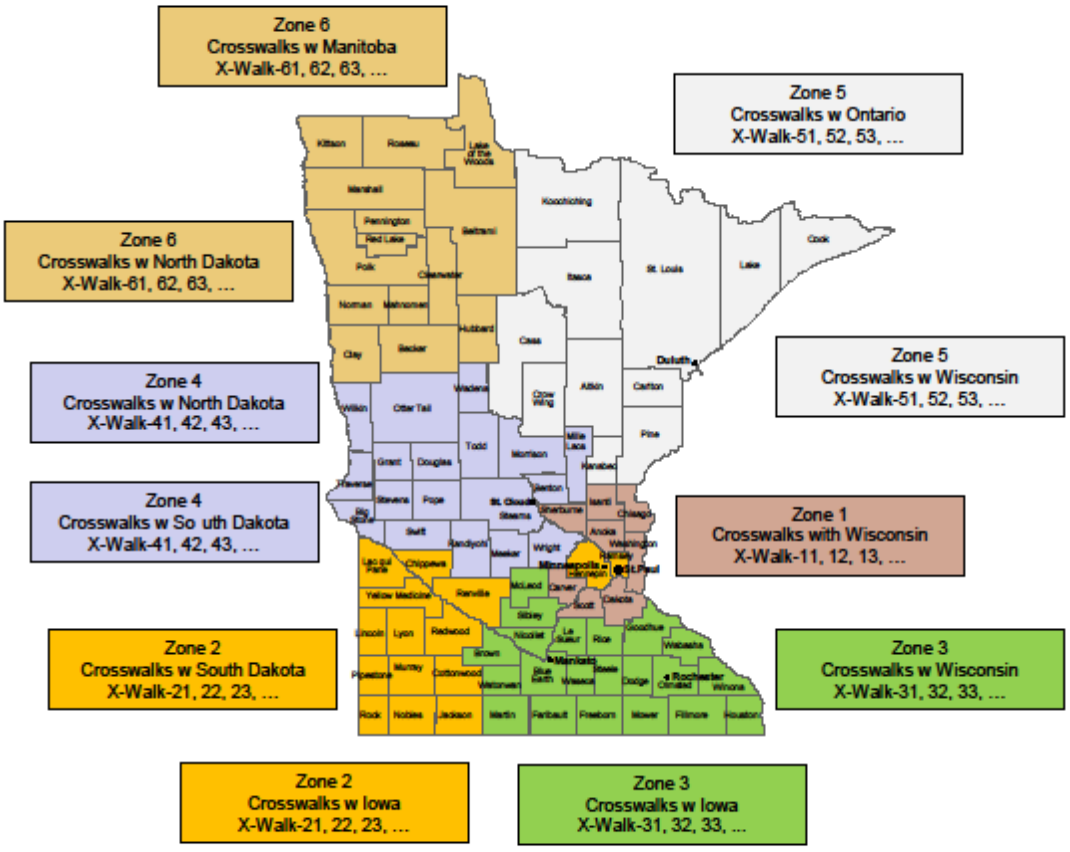
Dispatch centers within Minnesota or of a neighboring state utilizing radio frequency (RF) connectivity to their state radio system may utilize the crosswalks by way of a dedicated donor radio.

Dispatch centers of a neighboring state using their own radio system (not their statewide system) may also utilize the crosswalks by way of a dedicated donor radio.

Crosswalk Talkgroups

Minnesota will create a minimum of one crosswalk talkgroup per state and per ARMER zone. Additional crosswalk talkgroups may be created to meet demand. Each of ARMER's six zones border another state.

Because patching can negatively impact system resources, it is incumbent that system efficiency be addressed by this crosswalk plan. This plan calls for crosswalk talkgroups to be created within each ARMER zone. As zone-level tools, most patching to a crosswalk will create a "super-group," which is an efficient use of RF resources.



ARMER ZONE	BORDERING	FULL NAME	ICON NAME
1	Wisconsin	Minnesota Crosswalk Zone 1 Number 1, 2, 3, …	X-Walk 11, 12, 13, …
2	Iowa & South Dakota	Minnesota Crosswalk Zone 2 Number 1, 2, 3, …	X-Walk 21, 22, 23, …
3	Wisconsin & Iowa	Minnesota Crosswalk Zone 3 Number 1, 2, 3, …	X-Walk 31, 32, 33, …
4	South Dakota & North Dakota	Minnesota Crosswalk Zone 4 Number 1, 2, 3, …	X-Walk 41, 42, 43, …
5	Wisconsin & Ontario	Minnesota Crosswalk Zone 5 Number 1, 2, 3, …	X-Walk 51, 52, 53, …
6	North Dakota & Manitoba	Minnesota Crosswalk Zone 6 Number 1, 2, 3, …	X-Walk 61, 62, 63, …

While it is preferred that the crosswalk is patched to other talkgroups from the same home ARMER zone, this is not mandatory. If a second cross-border patch was needed, a crosswalk resource from another zone could be used but, in this case, two RF channels will be consumed.

The crosswalks will be entered into Minnesota's StatusBoard. As Minnesota-based dispatchers need a crosswalk, they will check StatusBoard and claim a crosswalk based on a ranked list. Rankings will consider home zone mapping as well as the neighbor with whom the dispatch center desires to patch. If a neighboring state dispatch center requests a patch using an ARMER crosswalk, the appropriate Minnesota dispatcher will determine its availability and claim it via StatusBoard.

The ARMER crosswalk talkgroups will be created within a security profile known as "Border" that will include all ARMER repeater sites around Minnesota's border and within radio range of a neighboring state.

Crosswalk Resource Connectivity to Neighboring State

Minnesota has already or will provide a minimum of one dedicated radio and associated hardware per crosswalk per ARMER zone per border state to achieve ARMER-to-neighboring-state-system connectivity. The donor radios are to be installed and connected to the neighboring state's LMR system by way of a conventional channel gateway. Using this methodology, the crosswalk should now be available to any network

connected dispatch console of the neighboring state. The fundamental benefits of this methodology are that, as system-level resources, one crosswalk may serve multiple entities. Additionally, the crosswalk is available to neighboring state agencies whose network-connected dispatch center may not be within radio range of ARMER (e.g. state patrols).

Responsibility for installation, programming, and maintenance will be determined on a case-by-case basis as many radios are already deployed to neighboring state dispatch centers and may be rededicated to fall in line with this plan.

The neighboring state's radio system will need to provide the conventional channel gateway port at a site well within radio range of the ARMER system.

Dispatch Console Connection Types

This plan identifies six types of crosswalk connections. The first four types are delineated first by state (Minnesota and Neighboring State) and then by how the dispatch console is connected to the applicable state system (Network and RF). Finally, two additional connection types are identified.

Minnesota/ARMER – Network Connected

In ARMER network-connected dispatch consoles (e.g. MCC-7500), the crosswalks should be installed in dispatch consoles as system level resources. They should be made readily available to dispatchers so that the crosswalks may be easily patched to daily use talkgroups (e.g. law mains, regional interoperability talkgroups, LTACs, and STACs).

Neighboring State – Network Connected

In the RF-connected dispatch consoles (e.g. MCC-7500) of neighboring state entities, the crosswalks should be available as a conventional channel gateway resource. They should be made readily available to dispatchers so that crosswalk resources may be easily patched to daily use talkgroups (e.g. law mains, regional interoperability talkgroups, and statewide interoperability talkgroups).

Minnesota/ARMER – RF Connected

In ARMER RF-connected dispatch consoles, crosswalks may be installed in a dedicated radio (e.g. control station). These crosswalks should be made readily available for patching to available daily use talkgroups (e.g. law mains, regional interoperability talkgroups, LTACs, and STACs).

Neighboring State – RF Connected

In RF-connected dispatch consoles of neighboring state entities utilizing the state's radio system, crosswalks may be installed in a dedicated radio (e.g. control station). These crosswalks must be made readily available for patching to available daily use talkgroups/channels (e.g. law mains, regional interoperability talkgroups, and statewide interoperability talkgroups).

Neighboring State Not Using State Radio Systems

In dispatch consoles of neighboring states not part of that state's statewide LMR system, crosswalks may be installed in a dedicated radio (e.g. control station). These crosswalks must be made readily available for patching to available daily use talkgroups/channels (e.g. law mains, regional interoperability talkgroups, and statewide interoperability talkgroups).

Mobile Dispatch Centers

Crosswalks may be installed in network-connected mobile dispatch centers (e.g. MCC-7500E). They should not be installed in RF-connected mobile dispatcher centers.

Dedicated Crosswalk Radio Configuration

Dedicated crosswalk radios may be able to connect to several ARMER repeater sites and the radio should be programmed so that it prefers one repeater site over another. Considerations should include channel count at the eligible repeater sites, current loading, zone affiliation, and repeater site ownership.

As not all dispatch consoles handle conventional patches equally, care must be taken to program dedicated radios to mitigate all potential for message clipping. It may be found that certain dispatch consoles cannot efficiently process a crosswalk patch and that the crosswalk patch should not be allowed in some circumstances.

In RF-connected dispatch centers with dedicated crosswalk radios (e.g. control stations), it is encouraged that 800 MHz National Interoperability Channels (8CALL-90 & 8TACs) be programmed in the dedicated crosswalk radios so that these national interoperability channels are also available for use or patching, if needed. When not in use, those radios should be parked on the national hailing channel of 8CALL90.

As will be discussed in the next section and as an alternative to parking the dedicated crosswalk radios on 8CALL90, the dedicated crosswalk radios may be set to the regional hailing talkgroup of the interstate neighbor.

Interstate Hailing

Before a crosswalk can be used, the dispatcher of one state needs to contact the dispatcher of the other state. Crosswalk resources should not be used for hailing. The following interstate hailing options are available:

1. Dispatch centers of each state make available the regular hailing channel of the other state.
   - This resource may be in a dedicated radio or programmed in to the dedicated crosswalk resource radio.
2. Identify a specific radio channel for interstate hailing. Examples:
   - 8CALL-90
   - VCALL-10
   - Point-to-Point
   - Other shared channel
3. Telephone

Formal Agreements

Interstate agreements between Minnesota and the neighboring state will be necessary. They should prescribe responsibilities including:

- Talkgroup ownership and maintenance responsibility
- Donor radio ownership and maintenance responsibility
- Testing expectations
- Training expectations
- Usage evaluations
- Conflict resolution

ARMER participation standards will need to be amended to prescribe how agencies of other states utilizing just crosswalk connectivity with ARMER should be vetted. The following are recommended:

- A new participant type should be established for entities that will only use ARMER through a crosswalk resource installed in their dispatch center.
- ARMER interoperability participants of neighboring state should include the crosswalk resource in their Interoperability participation plan.

Complimentary Crosswalks

Minnesota encourages its interstate neighbors to mirror this plan by providing their own crosswalks to ARMER and their other interstate neighbors.

Timeline

Due to varying circumstances of statewide radio systems of neighboring states and various existing capabilities, this plan cannot be uniformly implemented. It is recommended that this plan be implemented in the following order:

Phase 1: Implement the crosswalk plan between ARMER zones 2 and 3 with the Iowa Statewide Interoperability Communications System (ISICS). Work with individual counties on legacy VHF radio systems to take advantage of this plan. Identify challenges and resolutions. Modify this plan as needed. This may occur during Q3 and Q4 2020.

Phase 2: Implement the crosswalk plan between ARMER zone 2 and the South Dakota statewide radio system. Target the Sioux Falls and Watertown dispatch centers for partnerships. Work with individual counties on legacy VHF radio systems to take advantage of this plan. Identify challenges and resolutions. Modify this plan as needed. These may occur during Q1 and Q2 of 2021.

Phase 3: Evaluate the status of the North Dakota Statewide Interoperability Radio Network (SIRN) for inclusion in this plan. Work with individual counties on legacy VHF radio systems to take advantage of this plan. Identify challenges and resolutions. Modify this plan as needed. The timing of this phase should be determined during Phases 1 and 2.

Phase 4: Evaluate existing interoperability tools between ARMER and the Wisconsin Statewide Radio System (WISCOM). Determine if the crosswalk plan can replace or complement existing technologies and processes. Determine if any individual counties on legacy VHF systems could benefit from the crosswalk plan. Implement the Crosswalk Plan as needed. Identify challenges and resolutions. Modify this plan as needed. The timing of this phase should be determined during Phases 1 and 2.

Phase 5: Evaluate the status of the new Manitoba provincial radio system for inclusion in this plan. When feasible, implement the Crosswalk Plan. Identify challenges and resolutions. Modify this plan as needed. The timing of this phase should be determined during Phases 1 and 2.

Phase 6: Evaluate existing interoperability tool between ARMER and the Ontario Provincial Public Safety Radio Fleetnet radio system. Determine if the crosswalk plan can replace or complement the existing plan. If of value, implement the Crosswalk Plan. Identify challenges and resolutions. Modify this plan as needed. The timing of this phase should be determined during Phases 1 and 2.

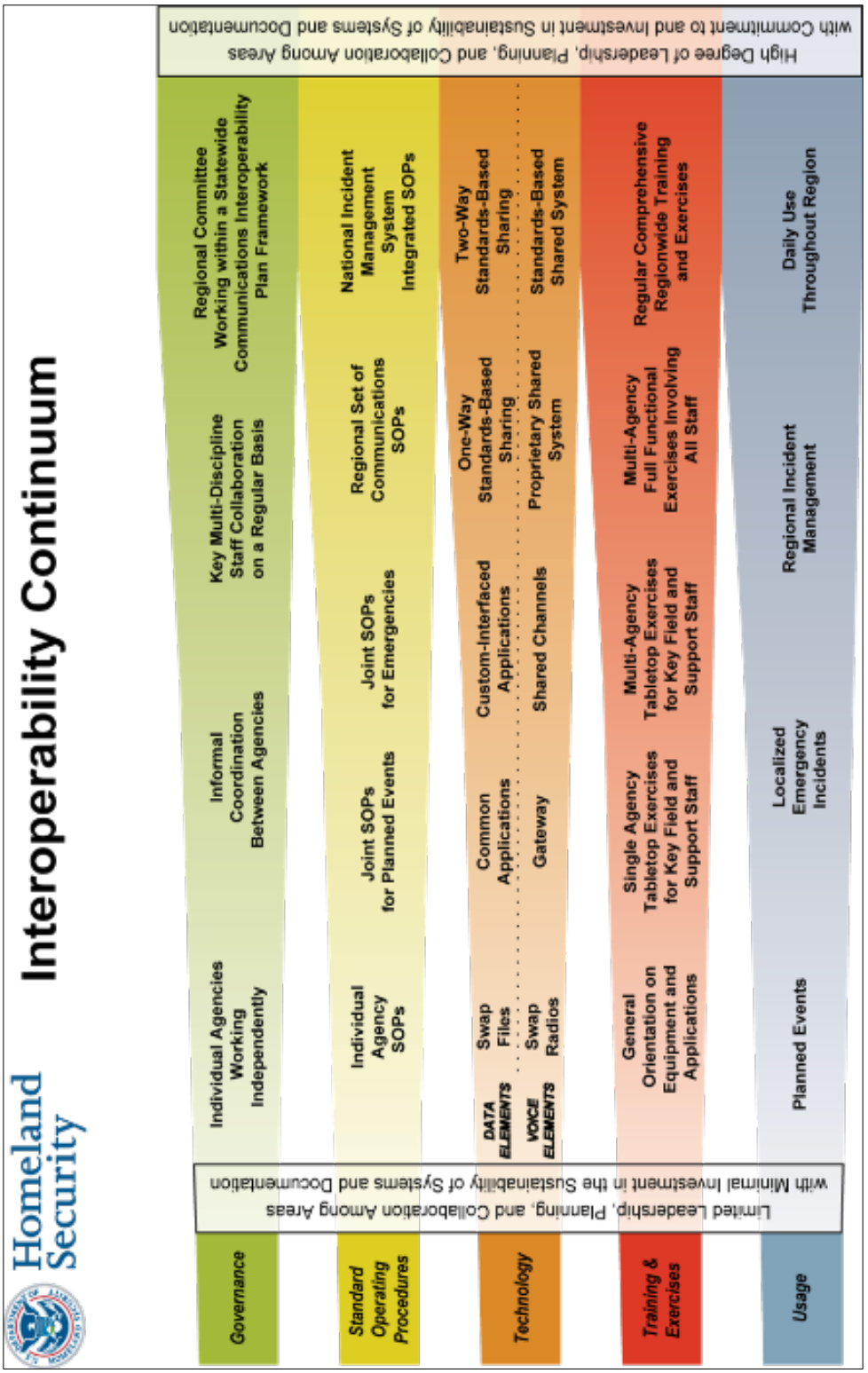
Conclusion

The Land Mobile Radio Interstate Interoperability Crosswalk Plan connects state LMR systems while providing a best practice for efficiently connecting dispatch centers regardless of their technical connectivity to state systems.

Document Revision History

Version	Date	Changes
1	08/27/2020	Original version. Approved by SECB.

APPENDIX A
SAFECOM Interoperability Continuum



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Emergency Communication Networks ● ecn.dps.mn.gov