



## **Technical Solutions**

### **Proprietary Trunked Systems**

**THIS ANALYSIS OF SHARING TALK GROUPS ACROSS PROPRIETARY TRUNKED SYSTEMS HIGHLIGHTS THE FOLLOWING**

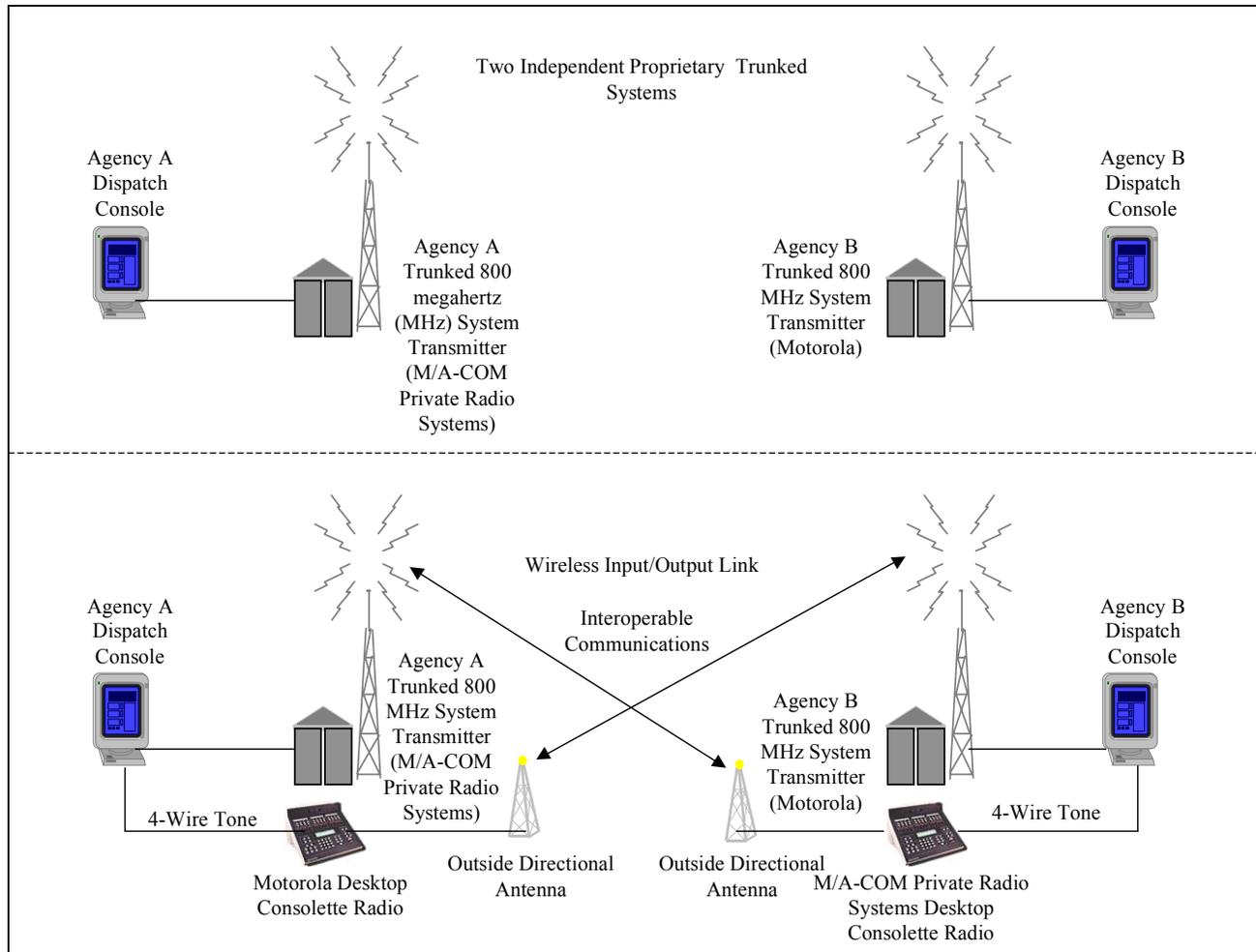
- Technical description and conceptual drawing
- Appropriate uses
- Advantages and disadvantages
- Costs
- Spectrum requirements
- Management issues
- Security and standards issues
- Implementation

## **INTEROPERABILITY BETWEEN TWO TRUNKED RADIO SYSTEMS FROM DIFFERENT MANUFACTURERS CAN BE ACHIEVED**

- Agencies with proprietary trunked communications systems from different manufacturers can interoperate with each other by sharing talk groups. If each agency provides the other with access to its trunked radio system, subscriber units in one agency can talk to subscriber units in the other
- Interoperability can occur via a wireless, fixed-site, talk group-to-talk group link that requires—
  - Desktop console trunked radio units mounted in designated remote transmitter sites of each agency's system
  - Directional antennas that can communicate with a transmitter site belonging to the other system
  - A four-wire tone remote capability to complete the interoperability link by connecting the desktop console to the designated agency dispatch center via a dedicated leased line or a dedicated microwave or fiber link
- Example: The Las Cruces, New Mexico, police chief (M/A-COM Private Radio Systems trunked system) talks directly to the El Paso, Texas, police chief (Motorola trunked system)
  - The Las Cruces chief contacts his dispatcher and requests a link to the El Paso system and to its chief
  - The Las Cruces dispatcher turns on the link radio and calls the El Paso dispatcher directly
  - The dispatchers “patch” their respective interoperability talk groups to the desired operational talk groups, creating a direct talk group connection between the chiefs
  - Assumptions: Each chief is located within the coverage footprint of his own system, and both are in radio contact with their respective dispatchers

Proprietary Trunked Systems Solution...Conceptual Drawing...

**THE DRAWING BELOW ILLUSTRATES THE CONCEPT OF SHARED TALK GROUPS ACROSS PROPRIETARY TRUNKED SYSTEMS**



Proprietary Trunked Systems Solution...Appropriate Uses...

**SHARING TALK GROUPS IS A VIABLE SOLUTION WHEN THE PUBLIC SAFETY AGENCIES THAT NEED TO INTEROPERATE USE—**

- Two proprietary trunked systems from different manufacturers
- Either the same frequency band or different frequency bands

## **SHARING TALK GROUPS ACROSS PROPRIETARY TRUNKED SYSTEMS HAS SEVERAL ADVANTAGES**

- Dispatchers can easily set up and remove the interoperability link
- Agencies can establish more than one simultaneous interoperability talk group by adding additional control station radios, coaxial cables, antennas, and associated console control hardware and programming
- System managers can program more than one interoperability talk group into the control station radios to give system managers a choice of interoperability talk groups
- Outside agencies can be added into the interoperability talk groups via a mutual aid channel
- Each agency retains control over its associated control station and can disable it remotely with the system manager terminal should the need arise
- Interoperability can be achieved via the radio frequency (RF) channel without using telephone leased circuits
  - No recurring leased circuit charges are incurred
  - No external wireline (leased circuit) connections are added to either site, thus avoiding potential leased circuit failure, audio path distortion, or transmission of external energy (such as lightning) into the communications shelters

## **SHARING TALK GROUPS ACROSS PROPRIETARY TRUNKED SYSTEMS ALSO HAS SEVERAL DISADVANTAGES**

- In emergencies, the delay while dispatchers establish the link at each location could be undesirable
- The FCC licenses for each system must be modified to show each agency's additional radio control points
- Radio frequency intermodulation interference problems may occur at shared transmitter locations
- The interoperability link requires the following
  - Each agency's system must provide a circuit, a four-wire audio channel, between the remote site where the control station radio is located and the dispatch center
  - An interface card must be added to, or enabled in, each console's electronics bank
  - Each agency's dispatch console must be programmed to operate the associated control station radios. Programming requirements range from use of a serial port and a dedicated terminal to removal of Erasable Programmable Read Only Memory (EPROM) modules, which is typically done by an outside vendor

## **SHARING TALK GROUPS ACROSS PROPRIETARY TRUNKED SYSTEMS IS COST INTENSIVE**

- This interoperability solution requires a high initial equipment investment, including—
  - Desktop console trunked radio units
  - Outside directional antennas
  - Console electronics bank interface cards
  - Four-wire tone remote capability connected to the agency dispatch center via a dedicated leased line or a dedicated microwave or fiber link
- Programming dispatch consoles may require outside vendor support
- Labor costs are usually minimal because dispatchers are typically already available

Proprietary Trunked Systems Solution...Spectrum Requirements...

**SHARING TALK GROUPS ACROSS PROPRIETARY TRUNKED SYSTEMS GENERALLY  
REQUIRES NO ADDITIONAL SPECTRUM**

This solution typically uses previously licensed spectrum

## **SHARING TALK GROUPS ACROSS PROPRIETARY TRUNKED SYSTEMS REQUIRES SIGNIFICANT MANAGEMENT BY THE PUBLIC SAFETY AGENCIES INVOLVED**

- Coordinating the additional control station radio at each agency's site and applying for each agency's license modification require time and effort
- Dispatchers must be trained to establish the interoperability link
- Users must be trained to accommodate the interoperability link delay
- Development of agreements governing agency cooperation is essential, but it requires substantial, time-consuming efforts
  - Detailed memorandums of understanding (MOU) are necessary so that all agencies understand their roles in the partnership
  - Formal interoperability procedures are needed to ensure that users follow established procedures on each other's systems

## **SHARING TALK GROUPS ACROSS PROPRIETARY TRUNKED SYSTEMS CAN AFFECT COMMUNICATIONS SYSTEM SECURITY**

- Even if each agency provides its own secure communications link, sharing talk groups on different radio systems reduces the level of security. Although both systems may use voice encryption, the common link between systems will be "clear" audio. This gap occurs because of the different signalling formats utilized by each proprietary trunked radio system
- This solution does not raise standards issues; its objective is to circumvent system incompatibility

Proprietary Trunked Systems Solution...Implementation...

**THE PUBLIC SAFETY WIRELESS NETWORK (PSWN) PROGRAM IS IMPLEMENTING A PILOT PROJECT TO SHARE TALK GROUPS ACROSS PROPRIETARY TRUNKED SYSTEMS**

A fixed-site, wireless, talkgroup-to-talkgroup interoperability link will soon connect the city of El Paso, Texas, which owns and operates a Motorola SmartNet trunked radio system, and the city of Las Cruces, New Mexico, which owns and operates a M/A-COM Private Radio Systems Enhanced Digital Access Communications System (EDACS) trunked radio system