



Technical Solutions

Cross-System Interconnect

THIS CROSS-SYSTEM INTERCONNECT ANALYSIS HIGHLIGHTS THE FOLLOWING

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

CROSS-SYSTEM INTERCONNECT CAN LINK SYSTEMS TO ACHIEVE INTEROPERABILITY AMONG LOCAL, STATE, AND FEDERAL PUBLIC SAFETY ORGANIZATIONS

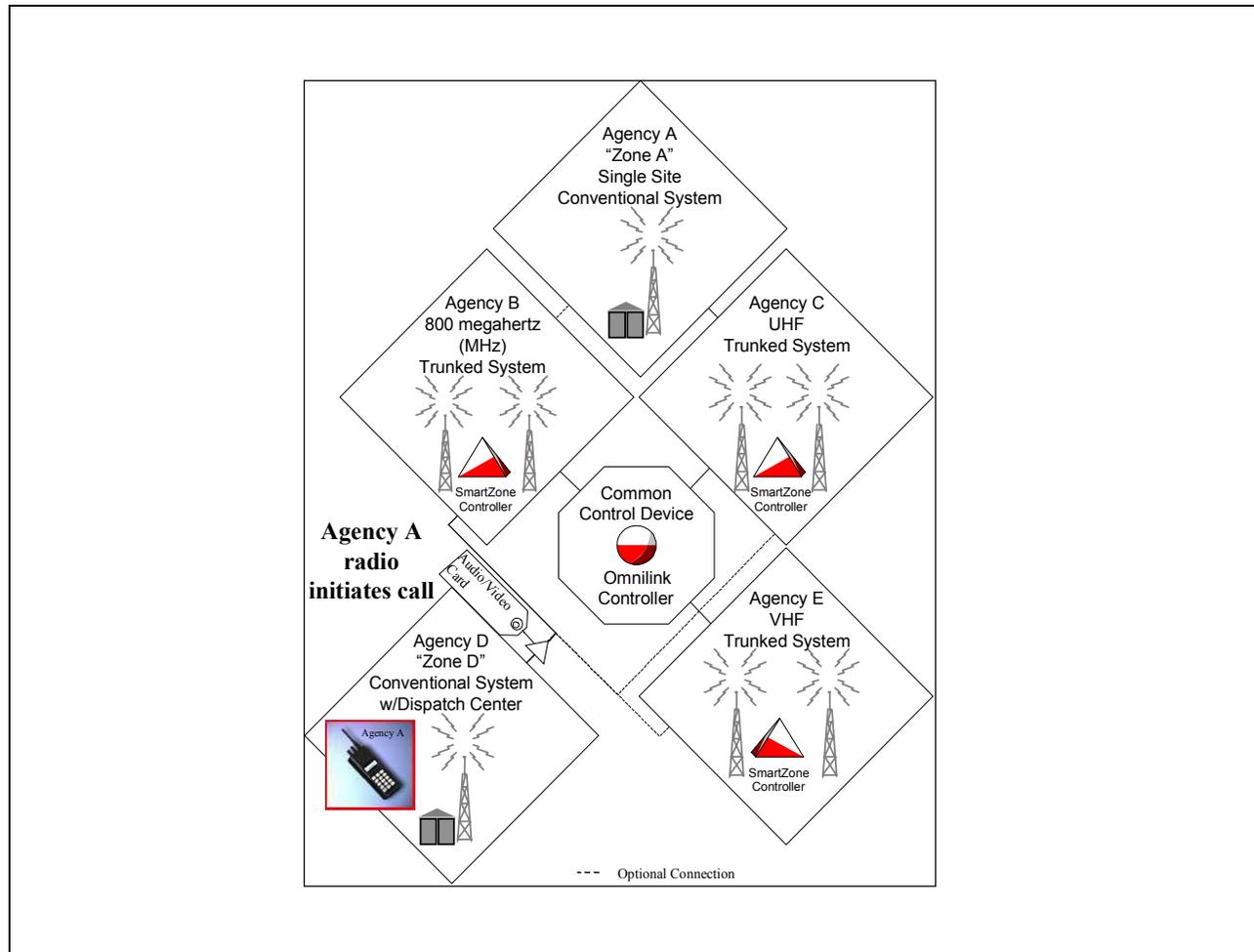
- Systems must have a common architecture. This solution is specifically targeted for Motorola-based land mobile radio infrastructure
- The cross-system interconnect is a SmartZone OmniLink switch that
 - Links multiple SmartZone systems into a single, very wide area trunking system
 - Provides each system with autonomous control
 - Provides areawide roaming
 - Allows operation consolidation
 - Increases efficient use of system resources (frequency channels, radio sites, equipment, link media, and end user equipment)
 - Provides multiagency interoperability
 - Increases system reliability through infrastructure redundancy.

THE CROSS-SYSTEM INTERCONNECT VIRTUALLY ELIMINATES JURISDICTION (ZONE) BOUNDARIES, CREATING CONSISTENT SYSTEM OPERATION OVER VERY LARGE GEOGRAPHICAL AREAS

- Thus, it establishes systemwide access, configuration, and management
- The service switching point (OmniLink Switch) enables a single repository for radio, talk group, and system-level parameter control
- The distributed call processing increases reliability against catastrophes
- The solution achieves maximum return on investment through reuse of existing infrastructure, radios, and expertise
- It retains security, control, and reliability of private systems through the distributed architecture
- The distributed architecture also allows for controlled system loading to ensure fast authorized radio user access
- It allows talk group calls across multiple zones
 - Example: A radio in talk group 1, which is based in Zone A, initiates a call in Zone D (see drawings that follow)
 - Zone D sends notification of the call request to Zone A, the home zone for talk group 1
 - The home zone coordinates with other required zones to determine call resources
 - Finally, each zone coordinates site resources, and the call is set up in all required zones

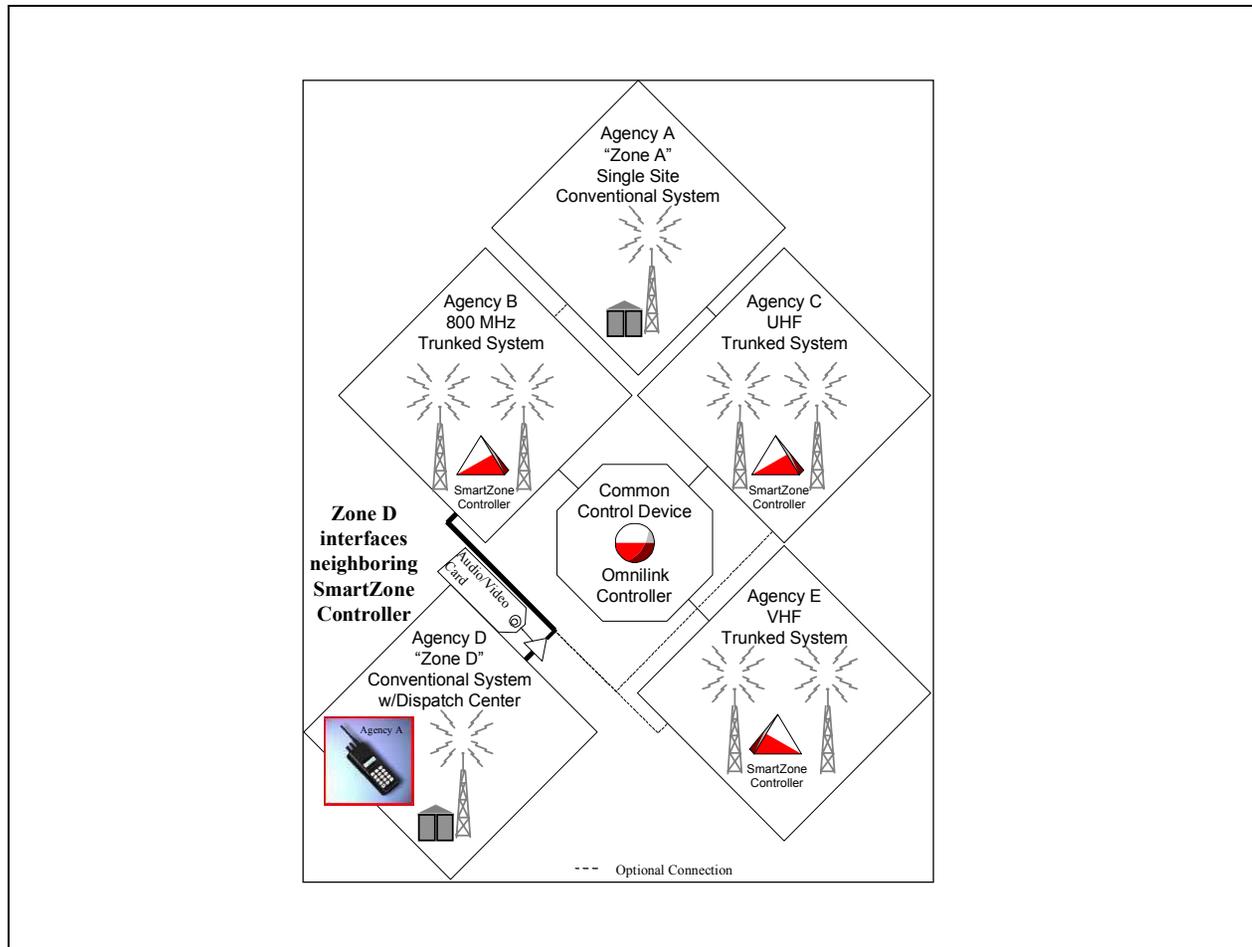
Cross-System Interconnect Solution...Conceptual Drawings...

THE DRAWING BELOW ILLUSTRATES THE CONCEPT OF LINKING SYSTEMS THROUGH A CROSS-SYSTEM INTERCONNECT



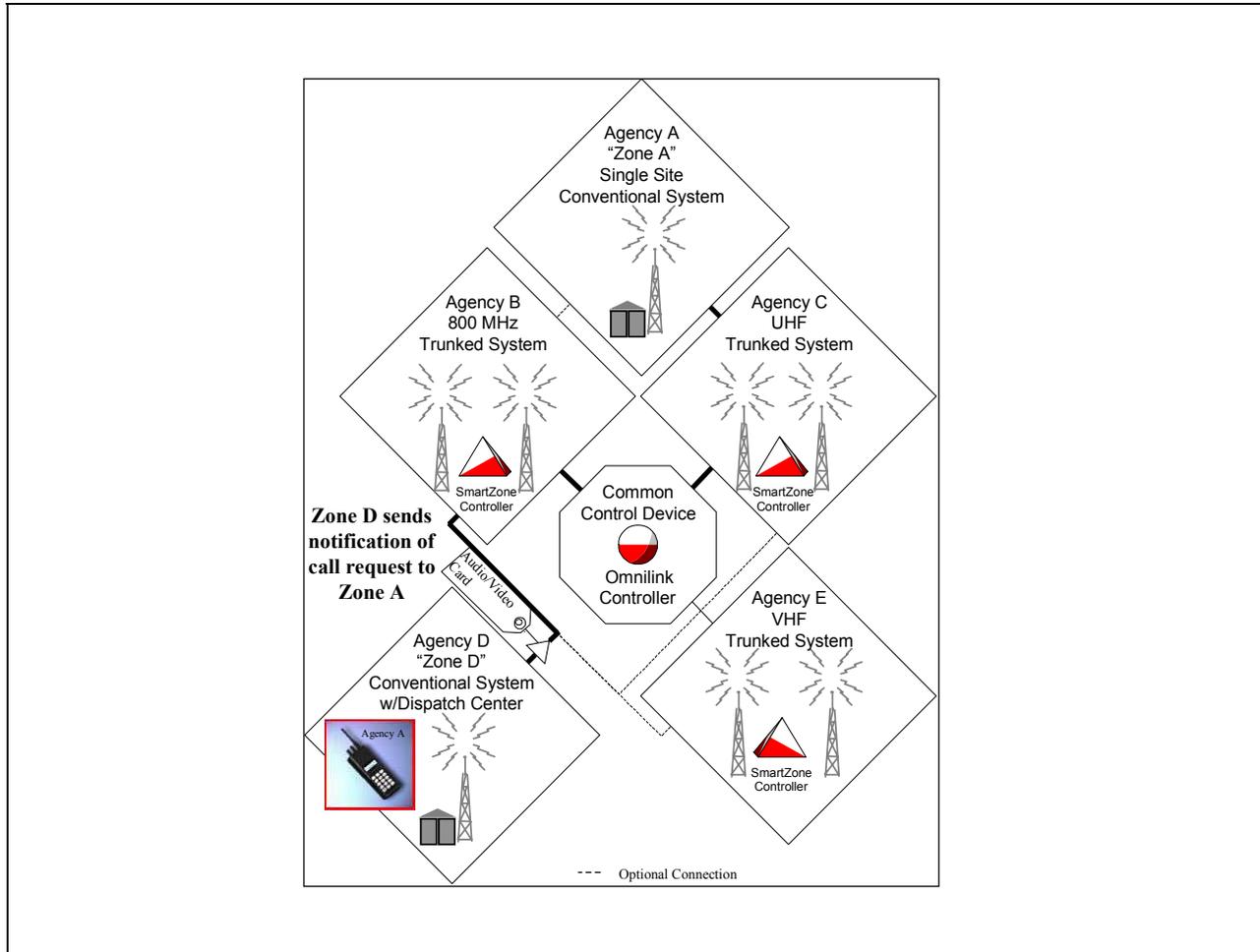
Cross-System Interconnect Solution...Conceptual Drawings...

THE DRAWING BELOW DIAGRAMS THE CONCEPT OF LINKING SYSTEMS THROUGH A CROSS-SYSTEM INTERCONNECT (CONTINUED)



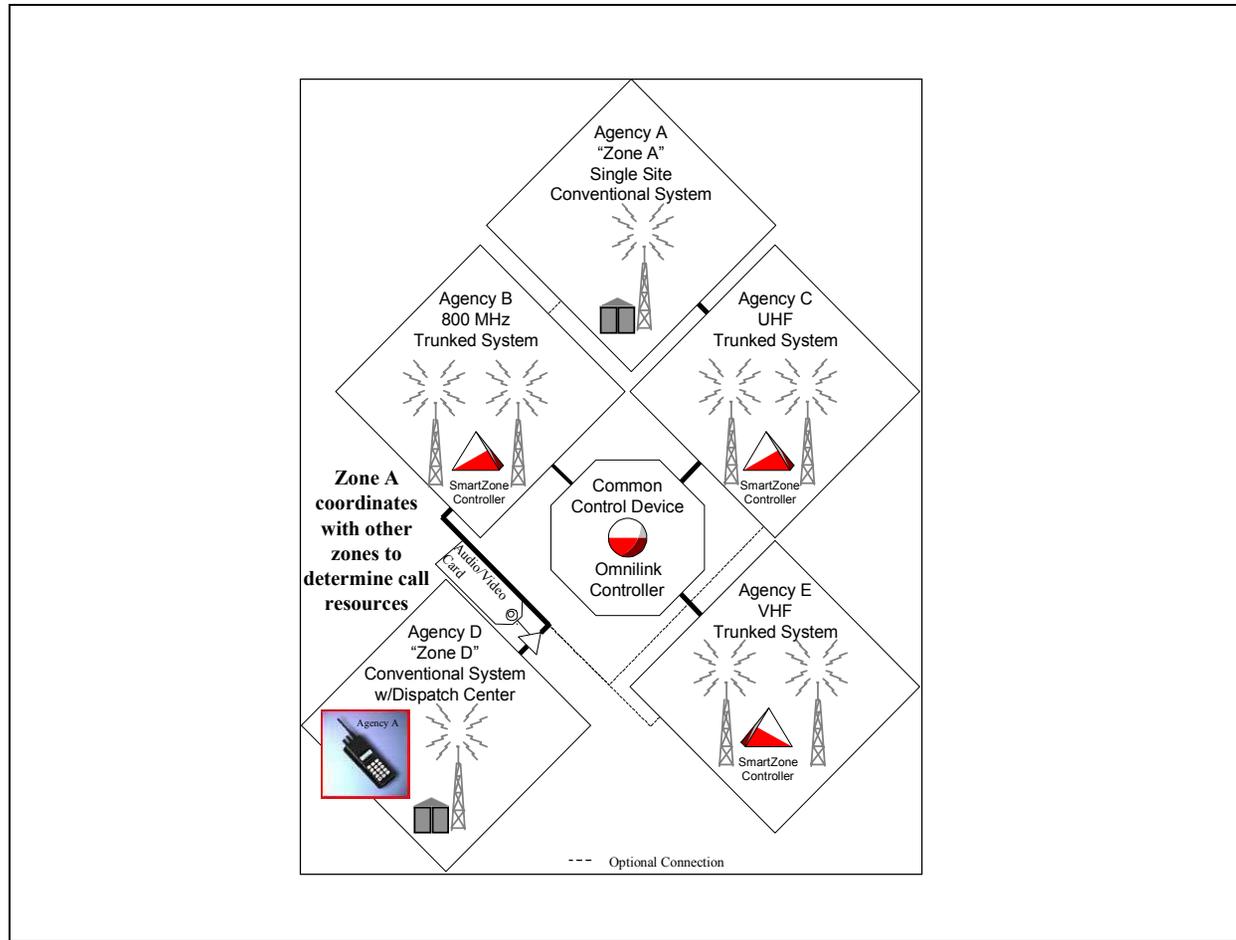
Cross-System Interconnect Solution...Conceptual Drawings...

THE DRAWING BELOW DIAGRAMS THE CONCEPT OF LINKING SYSTEMS THROUGH A CROSS-SYSTEM INTERCONNECT (CONTINUED)



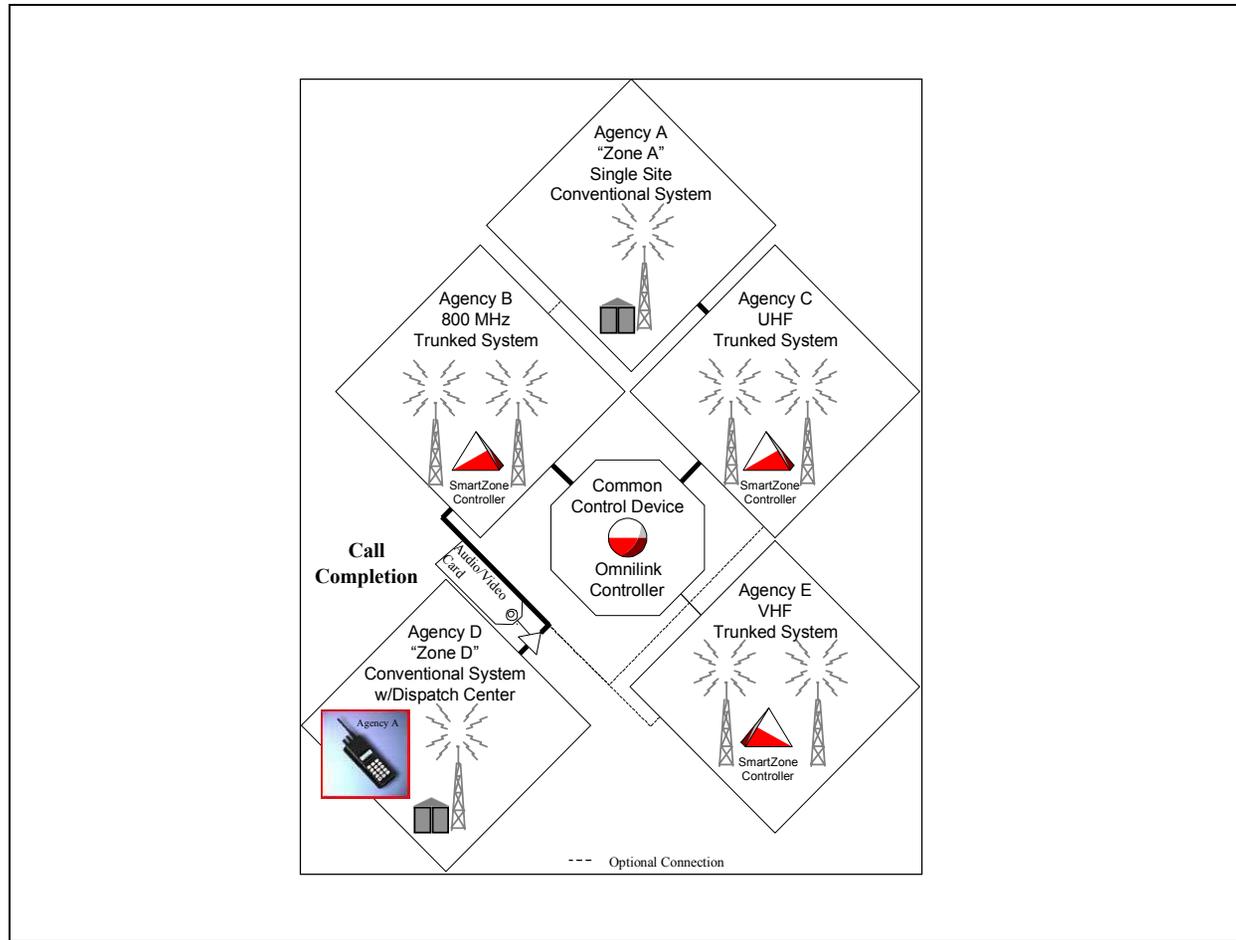
Cross-System Interconnect Solution...Conceptual Drawings...

THE DRAWING BELOW DIAGRAMS THE CONCEPT OF LINKING SYSTEMS THROUGH A CROSS-SYSTEM INTERCONNECT (CONTINUED)



Cross-System Interconnect Solution...Conceptual Drawings...

THE DRAWING BELOW DIAGRAMS THE CONCEPT OF LINKING SYSTEMS THROUGH A CROSS-SYSTEM INTERCONNECT (CONTINUED)



LINKING SYSTEMS THROUGH A CROSS-SYSTEM INTERCONNECT IS A VIABLE SOLUTION FOR PUBLIC SAFETY INTEROPERABILITY IN THE FOLLOWING SITUATIONS

- Multiple agencies whose systems have a common architecture seek to consolidate resources and expand coverage, operations, and interoperability
- A very wide area system requires a large number of base stations and repeaters to be interconnected and more than a single zone controller to manage the entire system
- It is desirable to interface with conventional VHF or UHF systems, connections that are made by interfacing a base station or multiple base stations, as the requirement dictates, to a neighboring zone controller
 - Conventional base stations will be accessed through the interfacing zone controller
 - Mutual aid scenarios can be carried out by designating talk groups that will engage (key-up) all appropriate trunked base stations and all designated conventional base stations.
- Users who need to interoperate use
 - Different bands (for either conventional or trunked communications)
 - Otherwise incompatible systems, including
 - Analog versus digital modulation
 - Wideband versus narrowband
 - Digital versus analog squelch codes
 - Incompatible digital modulation types and vocoders

LINKING SYSTEMS THROUGH A CROSS-SYSTEM INTERCONNECT HAS SEVERAL ADVANTAGES

- The SmartZone OmniLink—
 - Enhances functionality of current systems
 - Comprehensive radio coverage
 - Seamless interoperability
 - Minimum dispatcher intervention
 - Leverages a single vendor architecture to achieve multiple-agency interoperability
 - Reuses existing infrastructure, radios, and expertise to achieve cost-effective, very wide area communication among multiple agencies
 - Virtually eliminates zone boundaries, creating consistent system operation over very large geographic areas
 - Strengthens security, control, and reliability of private systems
 - Makes interoperable communications independent of frequency bands
 - Increases network management capability
 - Creates a single repository, the service switching point, for radio, talk group, and system-level parameters
 - Allows controlled system loading to give authorized radio users quick access

Cross-System Interconnect Solution...Disadvantages...

LINKING SYSTEMS THROUGH A CROSS-SYSTEM INTERCONNECT ALSO HAS SEVERAL DISADVANTAGES

- Requires high level of coordination
- Imposes several system and end user upgrades
- Makes network management complex
- Makes security management complex
- Depends on proprietary architecture
- Is very costly

LINKING SYSTEMS THROUGH A CROSS-SYSTEM INTERCONNECT CAN BE VERY COSTLY, DEPENDING ON THE CONFIGURATION OF EACH SYSTEM

- At a minimum, the transition from independent multiple SmartZone systems to a single OmniLink system requires—
 - Installation of redundant InterZone Communications Cards in all zone controllers
 - Upgrade of zone controller central processing unit (CPU)
 - Installation of SmartZone OmniLink Zone Controller/Zone Manager application software
 - Transition from 10Base-2 to 10Base-T Ethernet
 - Addition of user servers, as required
 - Replacement of radio dispatch manager with radio control manager providing radio command (dynamic regrouping, selective inhibit) management and radio event (status/message, emergency alarm) display
 - Addition of InterZone Ambassador Cards
 - Software upgrades to existing SmartZone Ambassador Electronic Bank Module Base Interface (ZAMBI) and Ambassador Cards
 - Console upgrades, as required
 - Software upgrade for the 6809 Central Controller
 - Installation of the SmartZone OmniLink software option in InterZone user radios
- The relative cost of this option depends highly on the configurations of each system under consideration
- An alternative solution would consolidate all systems under a single zone controller, capacity permitting. It would assign management of all systems to the single zone controller and would require considerable resources to reconfigure all systems to operate as a single system. The OmniLink option requires fewer resources to configure all systems to operate in a consolidated format with efficient use of existing system resources

LINKING SYSTEMS THROUGH A CROSS-SYSTEM INTERCONNECT GENERALLY REQUIRES NO ADDITIONAL SPECTRUM

Use of the OmniLink switch typically relies on previously licensed spectrum

- It increases efficiency of existing spectrum use by allowing users to roam from zone to zone without retuning their radios
- All channel assignments are preprogrammed and allocated on demand regardless of user location
- It offers frequency band independence. Individual zones can operate on different bands provided they have an overlap in their radio coverage area

Cross-System Interconnect Solution...Management Issues...

LINKING SYSTEMS THROUGH A CROSS-SYSTEM INTERCONNECT REQUIRES SIGNIFICANT MANAGEMENT BY THE PUBLIC SAFETY AGENCIES INVOLVED

This solution requires extensive coordination and system management of—

- Home zones
- Zone-to-zone reconnection (roaming)
- Interzone calls
- Trespass protection
- System configuration
- System performance
- System accounts
- System fault management

OMNILINK ENSURES COMMUNICATIONS SECURITY BUT ADHERES TO A PROPRIETARY STANDARD

- Security
 - Because OmniLink is a networking solution, all networking security parameters apply
 - Its security management allows partitioning to control access to system data, applications, and features
- Standards
 - OmniLink is a proprietary Motorola solution; it does not adhere to an open system architecture
 - It conforms to the Project 25 common air interface standard in the talkaround mode

Cross-System Interconnect Solution...Implementations...

CROSS-SYSTEM INTERCONNECT SOLUTIONS HAVE BEEN IMPLEMENTED TO LINK LOCAL, STATE, AND FEDERAL PUBLIC SAFETY SYSTEMS

Agencies implementing the OmniLink switch to manage very wide area trunking systems include—

- Michigan's Public Safety Communications System (MPSCS). This system currently serves 83 local, state, and federal agencies with an additional 106 agencies and ten counties indicating interest
- Utah Communication Agency Network (UCAN). After the conclusion of the 2002 Winter Olympic Games, this system will serve all local police, sheriff, and fire departments in nine counties. It will also provide interoperability with the federal departments of Justice and the Treasury