



Technical Solutions

Dispatch Handoff

Dispatch Handoff Solution...Introduction...

THIS ANALYSIS OF DISPATCH HANDOFF HIGHLIGHTS THE FOLLOWING

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

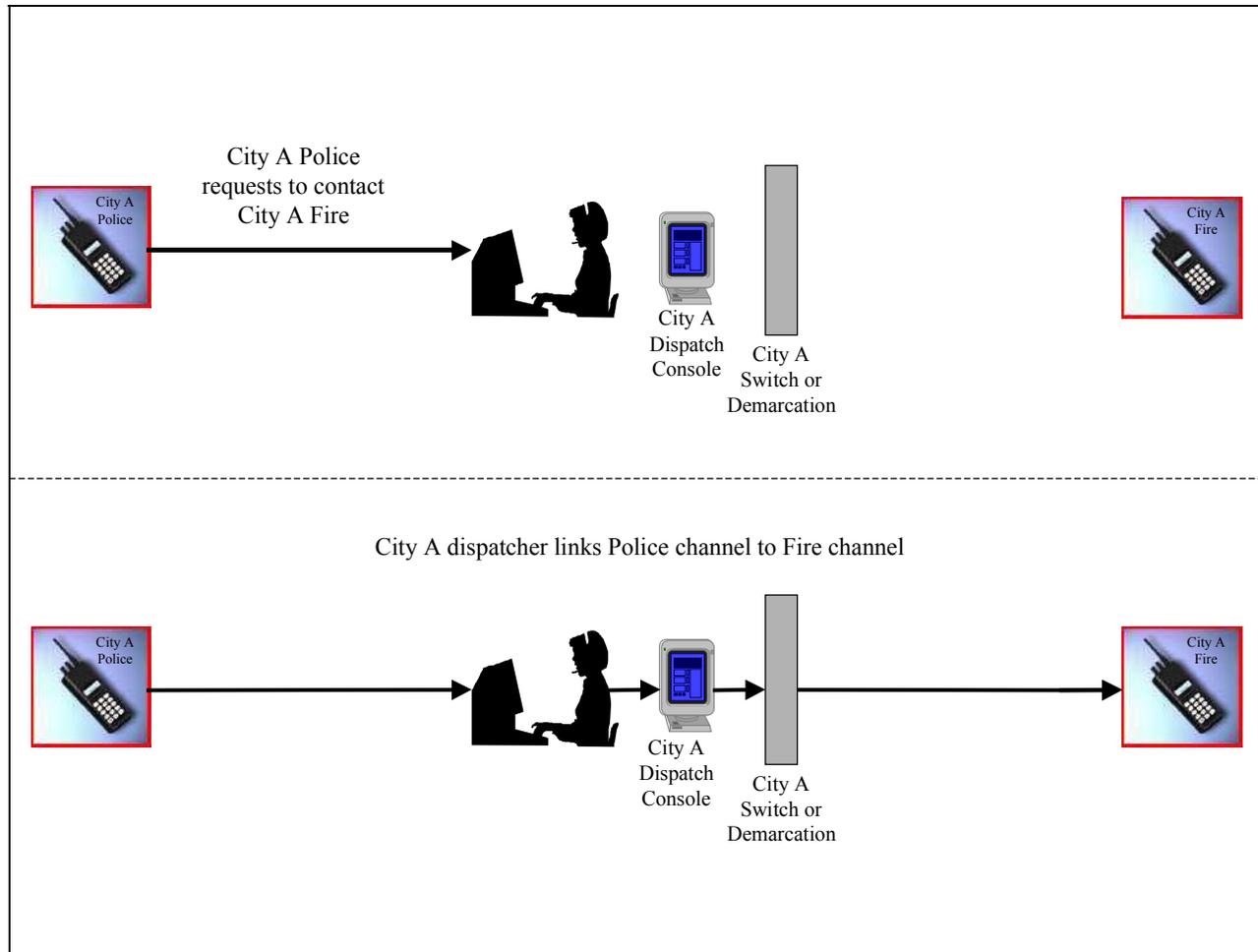
DISPATCH HANDOFF CAN ACHIEVE INTEROPERABILITY AMONG SUBSCRIBER UNITS ON THE SAME SYSTEM AND ON DIFFERENT SYSTEMS

- Dispatcher-initiated patching and handoff techniques can enable subscriber units from the same agency or from different agencies to interoperate with each other
 - If the subscriber units are on the same system, the dispatcher can provide interoperability by using console electronics to link—
 - Talk group-to-talk group in a trunked radio system
 - Conventional channel to conventional channel in a conventional radio system
 - If the subscriber units are on different systems, a link must be established between the console electronics banks of the systems that need to interoperate
 - The link can be a four-wire leased circuit, a fiber optic cable, a four-wire microwave circuit, a wireless control station link (see the Proprietary Trunked Systems solution), or various combinations of these alternatives
 - Once the wireless or wireline link has been set up, the dispatchers can "hand off" the interoperability link to the users and attend to other dispatching operations. When the need for the interoperability link is completed, the dispatchers can disconnect the console patch, or link, and resume normal operations

DISPATCH HANDOFF CAN ACHIEVE INTEROPERABILITY AMONG SUBSCRIBER UNITS ON THE SAME SYSTEM AND ON DIFFERENT SYSTEMS (CONTINUED)

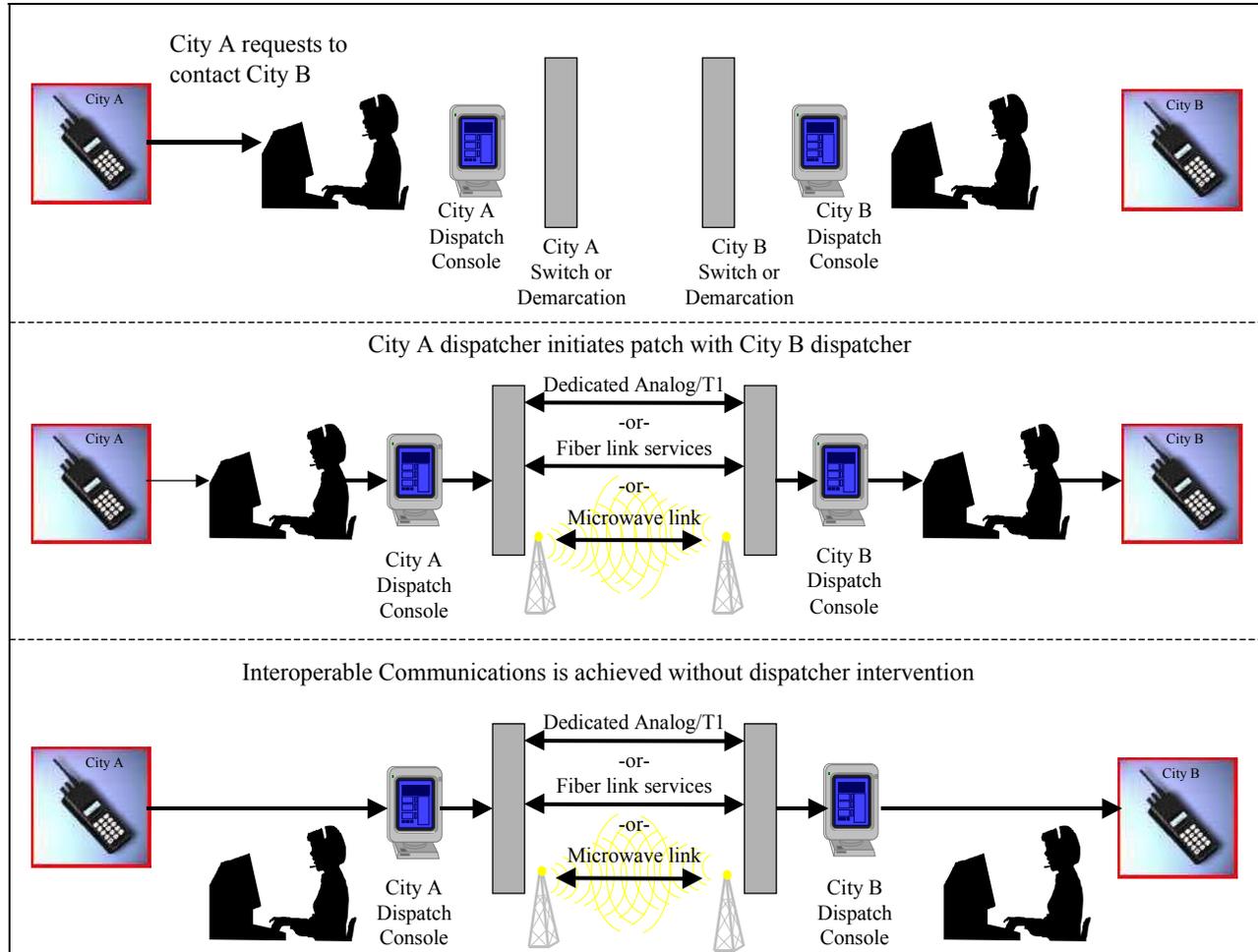
- Example: The City of Houston, Texas, police chief (using a Motorola conventional system) talks directly to the Harris County, Texas, sheriff (using a Motorola trunked system)
 - The City of Houston chief contacts his dispatcher and requests a link to the Harris County system and to its sheriff
 - The Houston dispatcher signals the Harris County dispatcher directly over the four-wire circuit that links the two console electronics banks together and requests a patch to the sheriff
 - The Harris County dispatcher responds to the Houston dispatcher that the sheriff is being called on the appropriate talk group. Once the police chief and the sheriff are available on their respective systems, the dispatchers create the final link to allow car-to-car communications and hand off the interoperability link to the users. When the conversation is complete, the dispatchers "knock down" the link and resume normal operation
 - Assumptions: The police chief and the sheriff are each located within the coverage footprint of their own system, and both are in radio contact with their respective dispatchers

THE DRAWING BELOW ILLUSTRATES THE CONCEPT OF DISPATCH HANDOFF AMONG SUBSCRIBER UNITS ON THE SAME SYSTEM



Dispatch Handoff Solution...Conceptual Drawings...

THE DRAWING BELOW ILLUSTRATES THE CONCEPT OF DISPATCH HANDOFF AMONG SUBSCRIBER UNITS ON DIFFERENT SYSTEMS



Dispatch Handoff Solution...Appropriate Uses...

DISPATCH HANDOFF IS THE MOST FLEXIBLE 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

THE DISPATCH HANDOFF SOLUTION HAS SEVERAL ADVANTAGES

- Dispatchers can easily set up and remove the interoperability link
- Agencies can establish more than one simultaneous interoperability talk group or channel 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 or channel into the control station radios to give the users a choice of interoperability talk groups or channels
- Outside agencies can be added into the interoperability talk groups or channels via a mutual aid channel
- Each agency retains control over its control station and can disable it remotely with the system manager terminal should the need arise
- Interoperability can be achieved using a radio frequency (RF) channel, telephone leased circuits, or a combination of both
- If an RF channel is used—
 - 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

THE DISPATCH HANDOFF SOLUTION ALSO HAS SEVERAL DISADVANTAGES

- In emergencies, the delay while dispatchers establish the link at each location could be undesirable
- The Federal Communications Commission (FCC) licenses for each system must be modified to show each agency's additional radio control points
- RF intermodulation interference problems may occur at shared transmitter locations when linking console electronics banks of different systems
- The interoperability link requires the following
 - Each agency's system must provide a link—either a circuit (a four-wire audio channel) between the remote site where the control station radio is located and the dispatch center or, in the case of a console-console link, a four-wire audio channel between the console electronics banks of each dispatch center
 - An interface card must be added to, or enabled in, each console's electronics bank for either the remote site control station radio or the console-console link
 - 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, a task typically done by outside vendors

DEPENDING ON THE IMPLEMENTATION, THE DISPATCH HANDOFF SOLUTION CAN BE INEXPENSIVE OR COSTLY

- The solution that links a console to a remote control station radio requires a high initial equipment investment, including—
 - Desktop console trunked or conventional 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
- The console-console solution requires only—
 - 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 to initiate the link and knock it down are usually minimal because dispatchers are typically already available

Dispatch Handoff Solution...Spectrum Requirements...

THE DISPATCH HANDOFF SOLUTION REQUIRES NO ADDITIONAL SPECTRUM

This solution typically uses previously licensed spectrum

THE DISPATCH HANDOFF SOLUTION REQUIRES SIGNIFICANT MANAGEMENT BY THE PUBLIC SAFETY AGENCIES INVOLVED

- A control station link requires time and effort to—
 - Coordinate the additional control station radio at each agency's site
 - Apply for each agency's license modification
- A link consisting only of a four-wire circuit between the different agencies' consoles requires little coordination and no license modification
- 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

THE DISPATCH HANDOFF SOLUTION CAN AFFECT COMMUNICATIONS SYSTEM SECURITY

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

Dispatch Handoff 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, talk group-to-talk group 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
- This implementation illustrates a subset of the larger Dispatch handoff solution that provides console-console connectivity via remotely controlled base station radios