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DEPARTMENT OF
GENERAL SERVICES

OFFICE OF THE DIRECTOR

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CALIFORNIA

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DIVISIONS:

COMMUNICATIONS
FACILITY MANAGEMENT
FLEET MANAGEMENT
PROCUREMENT SERVICES

September 24, 1991

APPROVED
BY THE CITY COUNCIL

SEP 24 1991

OFFICE OF THE
CITY CLERK

City Council
Sacramento, California

Honorable Members in Session:

SUBJECT: TRUNKED RADIO COMMUNICATION SYSTEM PROJECT

LOCATION AND COUNCIL DISTRICT

City Wide/All Districts

SUMMARY

The current Public Safety and Local Government Radio Communication Systems are over ten years old, utilization has exceeded its capacity, and cannot be expanded due to the non-existence of new UHF and VHF radio frequencies the result being major problems for growth in City operations. After an extensive review of the alternatives available for upgrading the City's radio communication, the City's Fire Chief, Police Chief, and Director of General Services are in agreement that at a minimum the need could be met with a City-wide Trunked Radio System capable of supporting all City users for a minimum of ten years. Additionally, it is agreed that the City explore developing a Multi-Agency Trunking Radio System with the County of Sacramento, City of West Sacramento and other agencies in the area.

STAFF RECOMMENDATION

This report recommends that the City Council adopt the attached resolution authorizing and directing the City Manager to:

1. Designate the Department of General Services as the coordinator for the development of a City-wide 800 MHz Trunked Radio System for the City of Sacramento;

2. Make an application to the Federal Communication Commission (FCC) for frequencies in the 800 MHz Band assigned to the City before the filing date deadline of November 29, 1991;

3. Establish a Trunked Radio System Management Task Force consisting of representatives from the City Manager's Office, Fire Department, General Services, Police Department, Public Works, Finance, and Data Management;

4. Immediately begin discussions with the County of Sacramento, City of West Sacramento, and other agencies for the development of a Multi-Agency System;

5. Should the consensus be that our direction be a Multi-Agency Trunked Radio System, make application to The Federal Communication Commission based on Multi-Agency System; and

6. Report back to the City Council within ninety days on the status of the discussions on a Multi-Agency System and financing methodology.

BACKGROUND

The City's Local Government and Public Safety Radio Systems are obsolete and incapable of meeting the City's current and future needs. There are six major problems with the systems:

- The City's Communication Center located at 111 Bercut is obsolete, overcrowded, and must be replaced.

- The age and deteriorating state of the current system is such that over 70% of the equipment will have to be replaced within the next four years.

- The saturation and overloading of the available channels causes waiting periods for available air time, impacting the productivity and response time for its users.

- No new channels are available in the frequency bands that the City is currently licensed for by the FCC.

- During emergencies the problem encountered is the inability of Departments and Agencies to communicate with each other. For example, when the Police

and Fire Departments are on a joint emergency incident they are unable to communicate with each other because their radio channels aren't compatible.

- The current system's inability to handle growth.

Since 1983, new UHF and VHF radio frequencies in the spectrum for Public Safety Communications have been non-existent. The City's ten plus year old radio system is old technology.

The FCC (Rule 90.633) considers a conventional radio system fully loaded when it has 70 mobile units operating on a single channel. The City current loading of the system far exceeds the FCC guidelines as indicated below:

| Activity | No. of Frequencies | No. of Radios | No. of Radios Per Frequency | Variance |
|---|---|---|---|---|
| Fire | 2 | 229 | 115 | +45 or 64% |
| Police | 7 | 875 | 125 | +55 or 79% |
| Local Gov. | 3 | 593 | 188 | +118 or 169% |
| Total | 12 | 1697 | 141 | +71 or 101% |

The Associated Public Safety Communications Officers (APCO), the frequency coordination agency for public safety, realized the need for additional frequencies and petitioned the Federal Communications Commission for additional radio spectrum. New frequencies were recently made available. These are described in the "Northern California 800 MHz Regional Communication Plan" which was approved by the Commission on November 29, 1990.

The application period for the new 800 MHz trunked channels will be open until November 29, 1991 for government agencies. The City is in a unique position, having the opportunity to take advantage of the availability of 800 MHz frequencies at a time when the City's radio systems need to be replaced. After November, there will be no other similar opportunity to acquire the 800 MHz frequencies. The choice made now will impact the City's radio

communication services well into the next decade.

If the City should elect to transition to a trunked radio system later, they would be limited to whatever frequencies remain unassigned, if any. BART, Sacramento County and West Sacramento are requesting approximately 38 channels over and above those currently allocated in the Northern California Regional 800 MHz Communications Plan.

Although the trunking technology is relatively new to mobile radio systems, it has been widely used by the telephone industry for many years. Trunking is the mutual sharing of a small number of communication paths among a large number of users. In a mobile radio system it would be the sharing of radio frequencies by a large number of radio users with a microprocessor controller acting as the switch.

Exhibit I, Figure I illustrates a conventional radio system with Channel 2 idle while Talk Group C is waiting to use Channel 1. In the Figure I trunked system, the problem is solved because all talk groups have access to all channels.

Some of the advantages of trunked radio systems over present City systems are:

- Faster system access
- Better channel efficiency
- User privacy
- Flexible expansion

The proposed new 800 MHz service would be configured as a trunked radio system. This system will provide a common backbone for all City Radio communications and a better, centralized approach to radio system use. There are currently three separate radio systems used by City departments, the police, local government, and fire systems. If the City Council approves this plan and obtains the new frequency assignments, it has the opportunity to pool resources and implement a City-wide trunked radio system capable of supporting all City radio users. This approach would eliminate the problems of congestion and non-availability of a common system channel. A major benefit of trunking is the shared use of frequencies by public safety and Local Government. During the day, Local Government frequencies are heavily used, while public safety frequencies are more lightly used. During the night, Local Government frequencies are very lightly used, while public safety frequencies are heavily used. A trunked radio system will also give the City the much needed flexibility to meet anticipated expansion and growth in radio communications requirements. The growth rate in radio equipment has been an average of 10% per year over the last 7 years (from 774 radios to 1,527 radios). It is anticipated that the future demand for new radio services will

continue at the rate of 9% per year. A trunked system will have sufficient capacity to allow growth in radio communication beyond the year 2005.

## ALTERNATIVE APPROACHES

There are four alternative approaches in addressing the current situation for the City: 1) Replace existing equipment; 2) A partial Trunked System; 3) A full Trunked System; and 4) Multi-Agency Trunked Radio System

### 1. Replacement With Like Equipment

Over 70% of the current systems need to be replaced within the next four years. The average age of the equipment needing replacement is ten years old. The cost to replace the old systems with like equipment is approximately $5,385,200. The breakdown of the cost for each system's replacement is:

| | |
|---|---|
| Police | $2,152,000 |
| Local Government | 1,559,000 |
| Fire | 624,000 |
| Communication Center/Remote Receivers | 1,050,000 |
| | $5,385,000 |

The consequences of perpetuating the status quo are indicated below:

- A program that replaces equipment in kind will not relieve the existing congestion. Additional channels are not available.
- The available channels are completely saturated. There is no potential for growth with the current system regardless of whether the equipment is replaced or not.
- Inter-agency communication will not be possible because other agencies have different frequencies. This becomes very important during disasters.

This alternative will improve the reliability of the existing systems but is not recommended because of the concerns listed above.

2. Partial Trunked Systems

Rather than converting all departments over to a City-wide trunked system, one of the systems could be converted to trunking and the others could utilize the conventional channels that would be freed up. Although the partial trunked system alternative would have a lower initial cost the consequences of this approach are as follows:

- Inter-agency communications problems would worsen because 800 MHz equipment would be incompatible with existing 150 MHz and 450 MHz equipment.

- The Northern California Regional 800 MHz Communications Plan requires that users release existing channels upon activation of the new 800 MHz channels. Channels for police and fire services are not available for local government use. Licenses for the channels released would be returned to the FCC. There are no guarantees that the FCC would allow the surplus channels to be allocated for reuse by the City.

- In order to expand services in the 150 MHZ and 450 MHz bands, many existing radios would have to be refurbished or replaced to use the reallocated channels, if any were made available. In the case of the Police Department, there isn't any capacity in existing mobile radios to add a channel.

- Because there would be two duplicate systems, the operating costs would be greater than for a single common network.

3. Full Trunked System

A full trunked system would cost approximately $8 million. The main benefits to the City of a City-wide trunked radio system are:

- **Reliability** - The new trunked system will replace the City's overloaded and aging radio systems, thereby providing more reliable and effective radio communications in support of public safety and Local Government.

- **Improved Inter-agency Coordination** - Multi-agency disaster situations where communications among the Police Department, Local Government, and County agencies would be greatly improved with an integrated trunked radio

communications system. The Sacramento County Board of Supervisors approved a County-wide system on August 6, 1991. The users include the Sheriff, emergency medical, county Fire and Local Government.

- **Future Growth** - The trunked radio system will provide the City with the ability to handle future radio communication growth. Radio equipment growth has averaged 10% per year over the last 7 years. It is projected to continue at the rate of 9% per year. At that rate, a 20 channel trunked system will last through 2005. Presently, the City does not have any other alternatives to support that growth.

- **System Efficiency** - A full trunked system will eliminate the need for standby base equipment. During the day, Local Government frequencies are heavily used, while public safety frequencies are lightly used. During the night, Local Government frequencies are very lightly used, while public safety frequencies are heavily used. The frequency sharing of trunked radio makes these services very compatible.

4. Multi-Agency Trunked System

It is envisioned that various agencies will be brought together in some form, perhaps a new Radio Communication Governing Body. Agencies which have already held informal discussion and expressed serious interest in a Multi-Agency Concept are as follow:

| | |
|---|---|
| City of Sacramento - | City Manager's Office |
| | Fire Department |
| | Police Department |
| | Data Management |
| | Finance |
| | General Services |
| County of Sacramento - | County Executive's Office |
| | Airport Operations |
| | Data Management |
| | General Services |
| | Health |
| | Public Works |
| | Sheriff |

Sacramento County Fire

A Multi-Agency System would be in the overall best interests of the public in that it would:

- Reduce the cost of each entity system as the result of sharing base equipment located in a single Multi-Agency Communication Facility.
- All units of government participating would be capable of communicating with each other in emergencies, disasters, etc. because of equipment compatibility.
- Multi-Agency applications for 800 MHz frequencies that have funding will receive the highest priority in the assignment of frequencies.
- A system of this size would provide the City with flexibility and growth for the next decade.

## FINANCIAL DATA

The 1991-92 Capital Improvement Budget provided the City Council with an Issue Statement (Pg 36) addressing the condition of the City's current radio system and the need to make application for the new 800 MHz frequencies. There was no funding budgeted for this project.

The preliminary estimate for the City to convert its current radio communications system in its entirety to a Trunked Radio System is approximately $8 million. If the City participates in a Multi-Agency System the system cost would be reduced by $1 million due to the sharing of the base equipment, antennas, etc., by a users group.

Following application to the FCC for 800 MHz frequencies and discussion with the County of Sacramento, City of West Sacramento, and other agencies, staff will return to the City Council with a financial plan for this project.

## POLICY CONSIDERATIONS

The proposed action in the staff report of pursuing the opportunity to establish a Multi-Agency Communications Systems to effect economies of scale, eliminate duplication of equipment, and provide for equipment compatibility to enable radio communication between

agencies is consistent with Council's desire to consolidate City and County functions where practical, etc.

MBE/WBE EFFORTS

As the project developes M/WBE participation will be solicited.

Respectfully submitted:

Gary Costamagna
Fire Chief

John Kearns
Police Chief

Frank Mugartegui
Director of Gen Svcs

Recommendation Approved:

September 24, 1991

Walter J. Slipe
City Manager

CONTACT PERSON

Ron Costa, Communications Manager, 449-2126

# Conventional vs. Trunked Approach

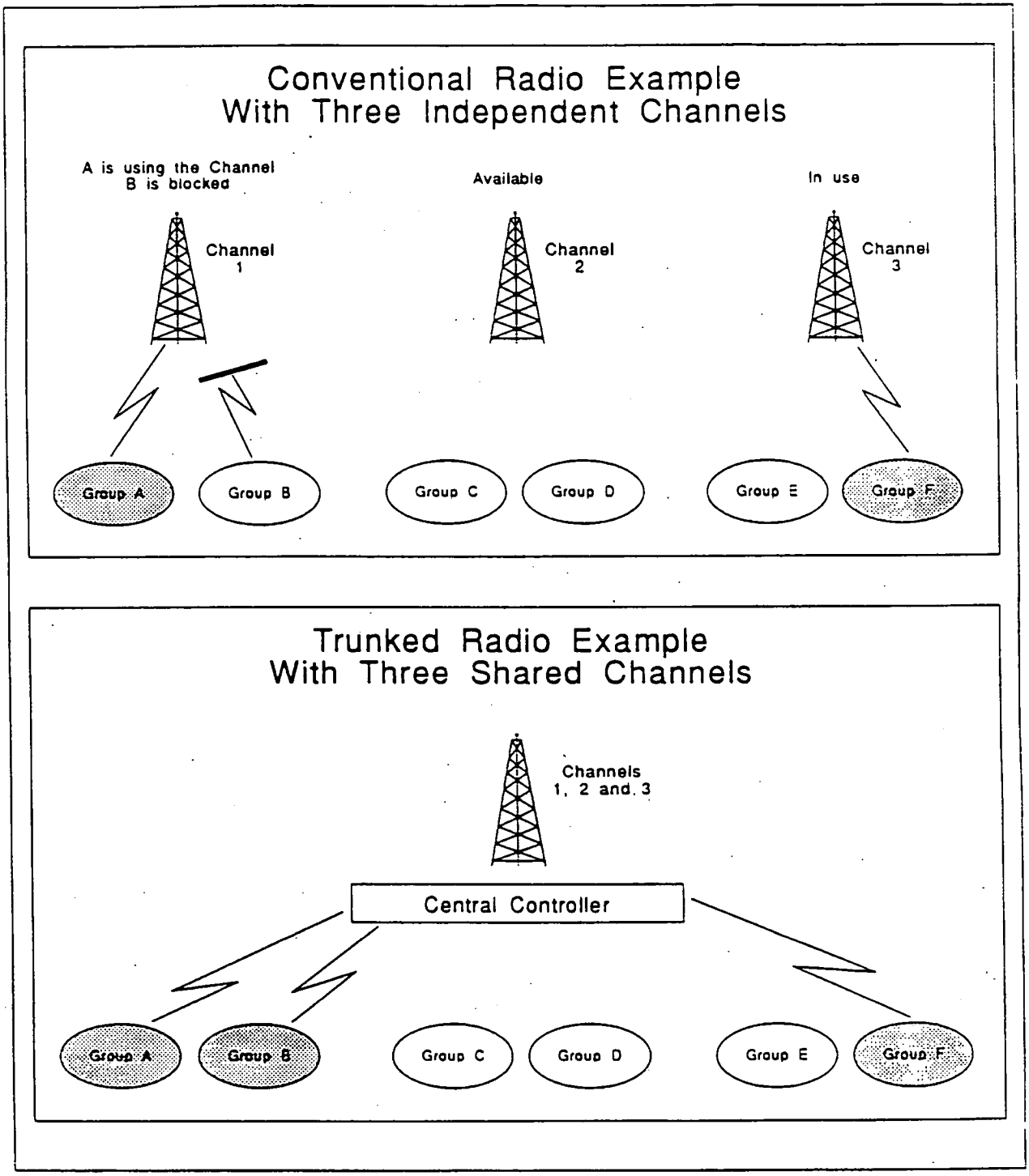


Figure 1

Exhibit II

# CITY OF SACRAMENTO
# TRUNKED RADIO COMMUNICATION SYSTEM
# DEVELOPMENT & IMPLEMENTATION SCHEDULE

| Phase | Fiscal Year | Month | Action |
|---|---|---|---|
| I | FY 91-92 | Sept - thru Nov | Submit Report to City Council for Project Approval |
| | | | Establish Trunk Radio System management Task Force |
| | | | Submit application to APCO for frequency coordination |
| | | | Begin discussion with County of Sacramento, City of West Sacramento, Sacramento County Fire, and other agencies |
| | | | Contract for Trunked Radio consultant |
| | | | Identify user requirements |
| | | | Develop RFP |
| | | | APCO forwards frequency applications to FCC |
| | | Dec - thru Mar | Report back to City Council on status of Multi-Agency Trunked Radio System and financing methodology |
| | | | Receive radio licenses from FCC |
| | | | Develop and establish System Organization Structure |
| | | | Design Communication Center and select site |
| | | | Issue RFP |

| Phase | Fiscal Year | Month | Action |
|---|---|---|---|
| | | Apr - thru June | Receive proposal from vendors<br>Select vendor and award contract |
| II | FY 92-93 | July - thru October | Begin common backbone installation (i.e., Towers, Antennas, Transmitters, and Systems Controller) |
| | | April | Order Fire and Local Government radios |
| III | FY 93-94 | July thru Jan | Install Local Gov Radio<br>Acceptance Testing<br>Install Fire Radio<br>Acceptance Test<br>Order Police Radio |
| IV | FY 94-95 | July thru June | Install Police System to coincide with completion of Communications Building |

# RESOLUTION NO. 91-743

ADOPTED BY THE SACRAMENTO CITY COUNCIL

ON DATE OF _____

APPROVED
BY THE CITY COUNCIL
SEP 24 1991
OFFICE OF THE
CITY CLERK

RESOLUTION DECLARING THE CITY'S INTENT TO UPGRADE ITS PUBLIC SAFETY AND LOCAL GOVERNMENT RADIO COMMUNICATION SYSTEM

BE IT RESOLVED BY THE COUNCIL OF THE CITY OF SACRAMENTO:

That the City Manager hereby authorized and directed to -

1. Designate the Department of General Services as the coordinator for the development of a City-wide 800 MHz Trunked Radio System for the City of Sacramento;

2. Make an application to the Federal Communication Commission (FCC) for frequencies in the 800 MHS Band assigned to the City before the filing date deadline of November 29, 1991;

3. Establish a Trunked Radio System Management Task Force consisting of representatives from the City Manager's Office, Fire Department, General Services, Police Department, Public Works, Finance, and Data Management;

4. Immediately begin discussions with the County of Sacramento, City of West Sacramento, and other agencies for the development of a Multi-Agency System; and

5. Should the consensus be that our direction be a Multi-Agency Trunked Radio System, make application to Federal Communication Commission based on Multi-Agency System; and

6. Report back to the City Council within ninety days on the status of the discussions on a Multi-Agency System and financing methodology.

_____
MAYOR

ATTEST

_____
CITY CLERK

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**FOR CITY CLERK USE ONLY**

RESOLUTION NO.: _____

DATE ADOPTED: _____