



LMR Replacement Cost Study Report

Final Document

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1. OVERVIEW

This cost study was performed to estimate the replacement value of the Nation's public safety land mobile radio (LMR) equipment and infrastructure. Commissioned as part of the ongoing efforts of the Public Safety Wireless Network (PSWN) program, the study represents the first known comprehensive effort to estimate the replacement value of the LMR communications infrastructure currently installed and used by public safety agencies of local state, and federal governments.

The results of this study will enable the public safety wireless communications infrastructure to be compared with other critical infrastructures, such as transportation or electrical power systems. Additionally, as the administration, Congress, the National Telecommunications and Information Agency (NTIA), and the Federal Communications Commission (FCC) consider policies or standards regarding LMR communications, this estimate can serve as a baseline to gauge the fiscal impact of key decisions.

1.1 Replacement Value Defined

For the purpose of this study, "replacement value" was defined as the 1998 cost to replace a piece of equipment with one that is similar in both function and features. The use of replacement values normalizes costs across all agencies regardless of actual acquisition costs, thus enabling comparisons of systems purchased in different years. It also establishes a baseline to which future systems can be compared. Replacement values used in this study do not include testing, installation, training, documentation, operation and maintenance, or other lifecycle costs.

1.2 Strategy

The strategy for estimating this value was systematically developed to ensure consistency across the diverse public safety community. First, a comprehensive survey effort collected equipment information from agencies. Second, independent research determined the replacement value for each type of equipment by gathering and analyzing prices across multiple vendors. Finally, a cost model was developed to calculate the overall replacement value by combining the cost data with equipment data from survey respondents.

The methodology for performing this study is described in the Cost Study Methodology Report, dated February 4, 1998. The methodology report is being updated to provide a detail accounting of the complete approach used to arrive at the replacement values reported in this document.

1.2.1 Development of the Equipment Survey

Surveys were designed to collect equipment inventory data consistently across many different agencies. Accurate accounting was essential because quantity is such a significant determinant of infrastructure value. Survey questions also distinguished between levels of sophistication and features within a particular equipment type. This enabled more specific application of replacement values within each survey response.

The survey included both user and network equipment that would generally be used in any given public safety LMR system. Table 1 lists the hardware included in the study.

Table 1
LMR Equipment Included in Survey

User Equipment	Network Equipment	Miscellaneous Equipment
Portable Radios	Base Stations	Remote/Collar Microphones
Mobile Radios	Repeaters	Earpieces
Mobile Data Terminals	Satellite Receivers	Headsets
Mobile Data Computers	Antenna Towers	Battery Chargers
	VSATs	Dialup Modems
	Microwave Links	Pagers
	Dispatch Consoles	Recorders
	Desktop Controllers	Spare Antennas and Batteries
	Control Center Systems	
	Receiver Combiners	
	Duplexers	

This study encompassed only equipment currently *owned* by agencies. Although lease arrangements or commercial services could represent a significant financial investment, the replacement value methodology considered only equipment that generally would be acquired through capital means.

1.2.2 Targeted Survey Population

The study targeted all public safety agencies in the United States. Because of the distinct nature of local, state, and federal agencies, three separate survey tools were administered. Although the format of these tools varied, the basic content was consistent throughout.

The survey strategy for each level of government differed as well. Federal entities, relatively few in number, were polled through a census methodology. Federal departments and agencies traditionally considered as first responders to emergency situations or providers of other public safety services, most of which participate in the Federal Law Enforcement Wireless Users Group (FLEWUG), received a survey. Because the response rate was 100 percent, calculating the results required no projections. Table 2 lists the federal departments and agencies surveyed.

Table 2
Federal Agencies Surveyed

Department of Justice	Federal Bureau of Investigation Federal Bureau of Prisons Drug Enforcement Agency Immigration and Naturalization Service U.S. Marshals Service Inspector General
Department of the Treasury	Bureau of Alcohol, Tobacco and Firearms Bureau of Engraving and Printing Federal Law Enforcement Training Center Internal Revenue Service U.S. Customs Service U.S. Mint U.S. Secret Service
Department of Commerce	National Oceanic & Atmospheric Administration National Maritime Fisheries Service National Ocean Service National Institute of Standards and Technology Environmental Research Laboratory The Bureau of the Census
Department of Agriculture	Forest Service Animal & Plant Health Inspection Service National Resources Stabilization & Conservation Service
Department of the Interior	Bureau of Indian Affairs Bureau of Land Management Bureau of Reclamation Fish and Wildlife Service National Park Service U.S. Geological Survey
Department of Transportation	U.S. Coast Guard
Independent Agencies	Federal Emergency Management Agency

The survey population of state public safety agencies was established through research on each state's organizational structure and phone contacts with agencies. To attain statistically reliable results, every agency ascertained as having a public safety-related mission *and* a radio presence was sent a survey. In some cases, a central department was identified that could provide equipment information for all relevant agencies in that state. Agencies were categorized by type, and each state received at least one survey. The 7 states having a Radio/IT office were only sent one survey which was completed for all agency inventories in the state. Table 3 shows the breakdown of state agencies and the corresponding response rate.

**Table 3
State Agencies Surveyed**

<i>Agency Type</i>	<i>Population</i>	<i>Responses</i>	<i>Response Rate</i>
Corrections	42	24	57.8%
Emergency Management	38	14	36.8%
State Police	46	24	52.2%
Fire Marshal	7	7	100.0%
Medical Services	3	3	100.0%
Radio/IT	7	7	100.0%
Miscellaneous Public Safety	18	15	83.3%
Total	161	94	58.4%

Using the cost model, values were calculated for each survey response, then averaged by category. Total category values were derived by multiplying the averages by the total number of agencies in the respective categories. Adding the category values produced the overall state value. The survey methodology and response rate resulted in a 95.0 percent confidence level for the estimated LMR replacement value for state public safety agencies.

Local public safety agencies, the most abundant nationwide, were surveyed through a stratified random sample. A population of 51,835 agencies was established through the use of the *1997 National Directory of Fire Chiefs and Emergency Departments* and the *1996 National Directory of Law Enforcement Administrators*, both compiled by the National Public Safety Information Bureau (NPSIB). Agencies were stratified by the geographic region, population, and Metropolitan Statistical Area status of their respective counties (unlike state agencies, local agencies were *not* categorized by function). These local groups were then sampled in proportion to the population of agencies. Table 4 details the local public safety agencies included in the analysis and the associated response rate.

**Table 4
Local Agencies Surveyed**

<i>Agency Type</i>	<i>Population</i>	<i>Sample</i>	<i>Responses</i>	<i>Response Rate</i>
Campus Police	2,225	174	21	12.1%
Emergency	6,879	543	94	17.3%
Fire (paid and volunteer)	29,294	2,472	433	17.5%
Municipal Police	10,307	968	288	29.8%
County Sheriff	3,132	296	81	27.4%
Total	51,837	4,453	917	20.6%

To estimate the nationwide LMR value for local public safety agencies, an average value was calculated for each stratification category. Each average was multiplied by the number of agencies in the respective category. The sum of the category values produced the overall nationwide local value. The statistical sampling method and resulting response rate produced a 97.5 percent confidence level for the estimated LMR replacement value for local public safety agencies.

2. RESULTS

2.1 Results of Replacement Value Estimation

Based on review of the survey results, the overall replacement value of LMR communications equipment installed and in use in the United States by local, state, and federal agencies with public safety responsibilities is estimated to be \$18.3 billion. Table 5 provides a breakdown of the estimated LMR replacement values by level of government.

Table 5
LMR Replacement Value

Local	\$ 15.4 billion
State	\$ 1.7 billion
Federal	\$ 1.2 billion
Total	\$ 18.3 billion

2.2 Other Results

The information collected regarding public safety LMR equipment is informative in its own right, independent of its use in determining the replacement cost estimates. The survey results provide a rich set of data regarding the inventories of radio equipment held by local and state public safety agencies. The characterization of this data, which is the subject of a companion analysis document, should provide numerous insights into patterns and trends related to public safety LMR systems.