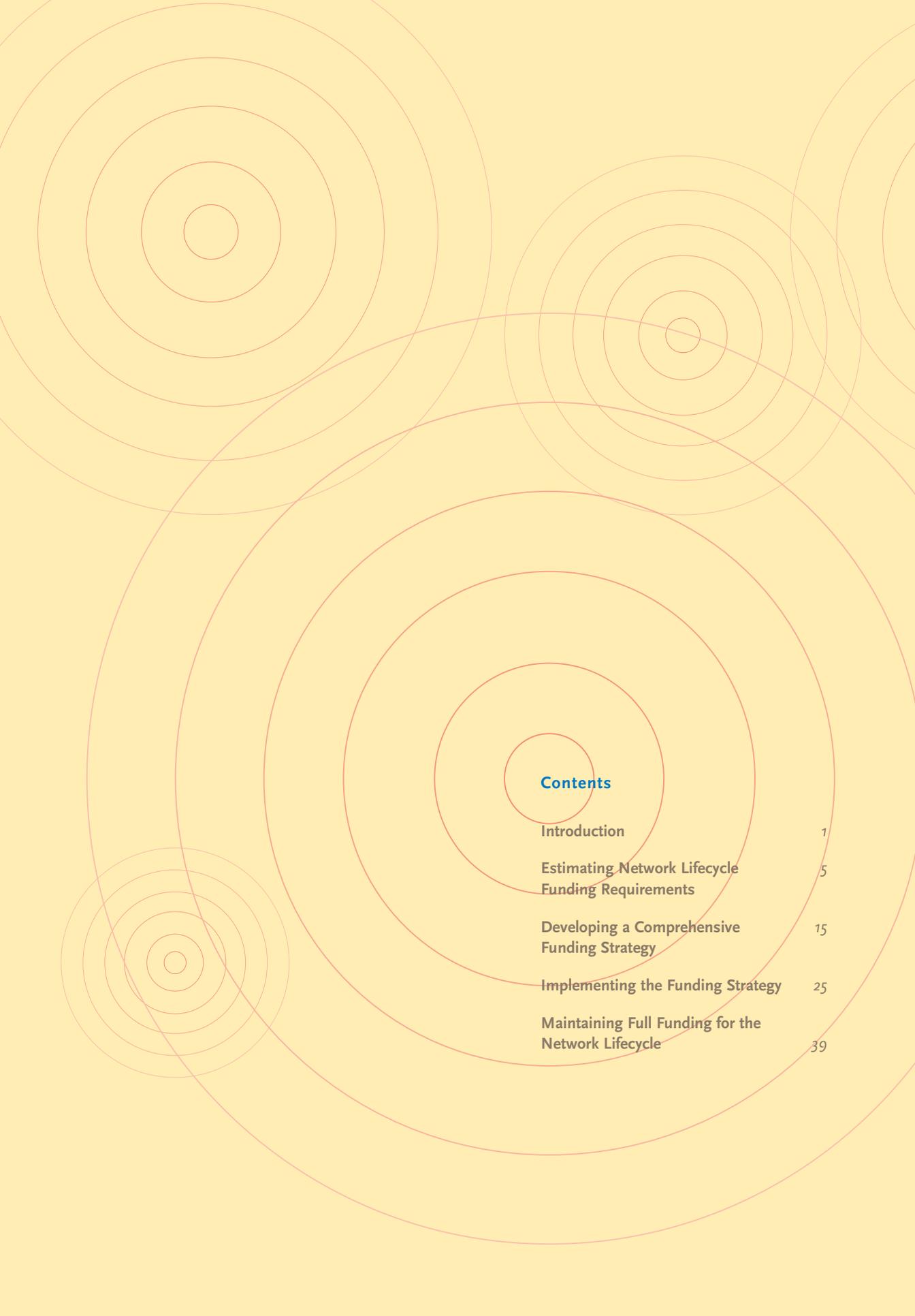# funding

ESTIMATE

develop

IMPLEMENT

maintain

how2

guide

for Funding State and

Local Public Safety

Wireless Networks

PUBLIC SAFETY
PSWN PROGRAM
WIRELESS NETWORK

Contents

introduction

Despite the critical need for effective operational communications, public safety agencies throughout the Nation often struggle to finance their wireless networks. Covering basic maintenance costs of the existing system is often a significant challenge, and obtaining funds for a major upgrade or for a complete system replacement is sometimes a daunting task. As a result, many existing public safety wireless networks and their component parts have been in service for more than 20 years—well beyond the typical 15-year lifecycle.

In addition, recent acts of domestic terrorism have elevated and highlighted the importance of public safety wireless communications and system interoperability. Government agencies have begun to reevaluate and restructure their emergency communications procedures and day-to-day operations in order to respond to new threats. This rapidly changing public safety environment is expanding the missions of the public safety community, placing a premium on interoperability and increasing the need for improved communications

and upgraded wireless infrastructure and subscriber equipment. Consequently, the funding requirements for all wireless networks, including regional and statewide wireless network systems, are expanding as well.

The lifecycle cost of a modern wireless network for a state or local jurisdiction can range from several to hundreds of millions of dollars, depending on the size and type of system being implemented. While equipment and infrastructure procurement represent a significant portion of these costs, ongoing operations and maintenance costs can often account for half of the total lifecycle costs. This holistic view is known as the total cost of ownership. The total cost of ownership for various system configurations can range from approximately $6 million for a small, citywide, conventional very high frequency (VHF) system to approximately $150 million for a large, regional, trunked 800 megahertz (MHz) system. Clearly, the significant up-front investment and long-term maintenance costs for wireless networks create one of the greatest funding challenges facing public safety agencies.

Audience for This Guide

A general lack of experience in procuring wireless networks can present a significant challenge for public safety agencies in pursuing funding for new or upgraded wireless networks. To help fill this gap and to provide a clear understanding of specific roles and tasks, this guide is designed to assist individuals with varying experience and skill levels in understanding how to manage the funding process for wireless networks. The audience for this guide includes—

- **System planners and managers**
  Public safety personnel developing and implementing funding strategies for the first time will find this guide useful because they are likely to have an immediate need for the information. The guide provides a thorough overview of lifecycle cost estimation and funding strategy development, and guidelines for specific tasks necessary when implementing a funding strategy.

- **Senior public safety professionals**
  Experienced public safety personnel will find this guide useful because it will assist in identifying the key mechanisms to use in funding a wireless network. In addition to learning how to meet the lifecycle funding requirements, senior public safety professionals can also gain an understanding of the importance of outreach communications and business case development for garnering political support.

- **State and local elected officials and government executives**
  This guide can help lawmakers and government executives understand the challenges faced by public safety agencies when seeking funding for wireless networks. Those officials interested in supporting a public safety wireless network initiative may learn more about the funding process and its problems, and therefore may become more effective champions of wireless network system projects.

In general, the audience for this guide includes those involved in funding public safety wireless networks. Each step in the funding process requires input and support from a diverse team of skilled professionals including those listed above. Some of the tasks (e.g., cost and budget estimation) require specialized skills while other tasks (e.g., marketing the business case) require a broad understanding of the public safety stakeholder community. Therefore, public safety agencies typically form multidisciplinary teams to support the funding process. Those asked to support these teams can use this guide to help them understand their specific roles and how they fit into the overall funding process.

State and Local Wireless Network Funding Process

estimating network lifecycle funding requirements **1**	developing a comprehensive funding strategy **2**	implementing the funding strategy **3**	maintaining full funding for the network lifecycle **4**

Overview of the Guide

This guide provides public safety professionals and government managers with a user-friendly introduction to the key steps in developing and implementing a comprehensive strategy for funding wireless networks. Securing funding for a wireless network can be a complex process, involving careful research, planning, and relationship building and management. System planners will need to understand how to estimate lifecycle costs, from what sources funds can be derived, and how to develop a strategy and win support for the wireless network. To help explain the funding process and make it more manageable, this guide provides an overview of each step that public safety agencies must take to secure funding for their wireless networking projects.

The core components and activities identified in this guide are intended to be applicable for most wireless network funding endeavors. As illustrated in the figure, the overall funding process involves identifying the specific funding needs, developing a plan of action to seek funding, performing specific tasks related to seeking funding, and maintaining funding throughout the life of the system.
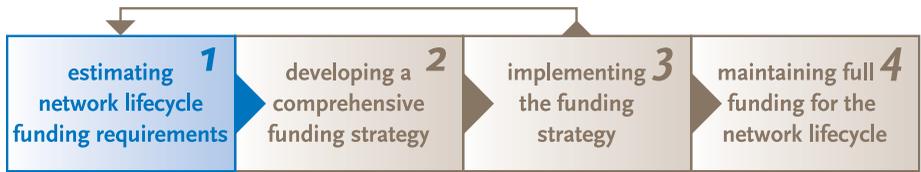
Consistent with the illustration, this guide contains four sections—

- Estimating Network Lifecycle Funding Requirements, the first section, discusses how public safety agencies can identify and quantify funding requirements for the entire lifecycle of the proposed wireless network.

- Developing a Comprehensive Funding Strategy describes the process for reviewing the possible funding mechanisms and integrating them into a comprehensive funding strategy.

- Implementing the Funding Strategy discusses the key steps involved in pursing and acquiring funding through activities designed to garner support from public safety, and elected and appointed officials.

- The final section, Maintaining Full Funding for the Network Lifecycle, explains the activities necessary to sustain full funding throughout the complete lifecycle of the system.

section one

estimating network lifecycle
funding requirements

| estimating network lifecycle funding requirements **1** | developing a comprehensive funding strategy **2** | implementing the funding strategy **3** | maintaining full funding for the network lifecycle **4** |

• Identify network development alternatives
• Establish a methodology to estimate network costs
• Estimate the lifecycle costs of the network

Purpose

This section describes how to develop cost estimates for the lifecycle funding requirements for wireless network systems. Estimating the funding requirements of a system involves documenting all relevant costs associated with the entire life of the system and planning the phasing of the costs over time. Comprehensively assessing the wireless network system lifecycle costs is critical to ensuring all network costs are fully understood and therefore adequate funding is sought. In addition, lifecycle cost estimate information is useful for logistical and technical planning, and the information can be used as a basis for evaluating technical alternatives in a cost-benefit analysis or business case.

Objectives

By the end of this section, readers will understand how to—

- Identify network development alternatives

- Establish a methodology to estimate network costs
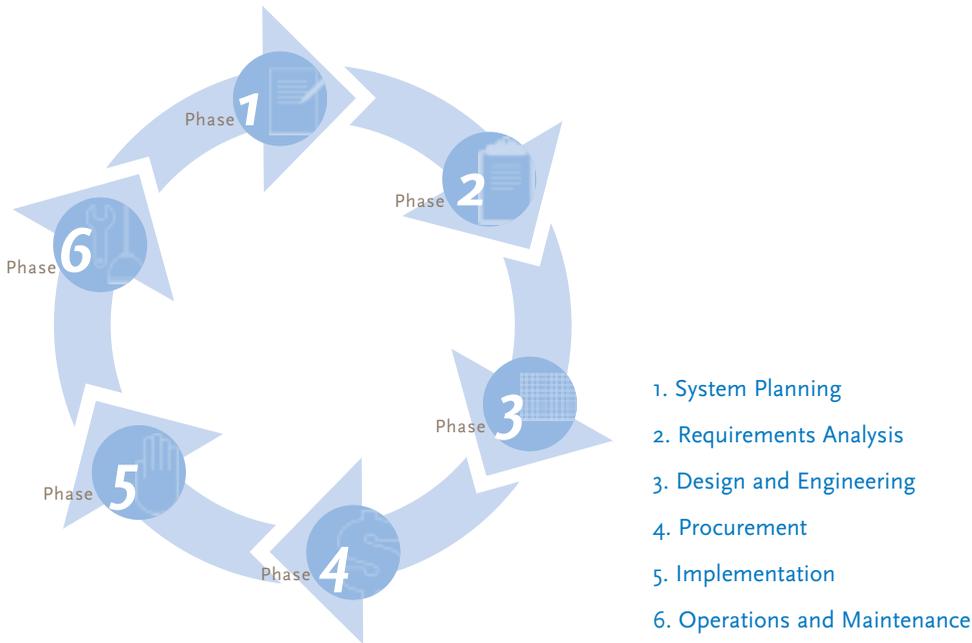
- Estimate the lifecycle costs of the network.

Key Steps

Identify Network Development Alternatives

To estimate the wireless network lifecycle funding requirements, systems planners typically calculate the costs of several system development alternatives, compare the costs and other relevant system characteristics in a cost-benefit analysis, and determine the preferred alternative. The cost estimate for the preferred alternative represents the system funding requirements. If the system planners are not prepared to specify the preferred alternative, the cost estimates for the most likely alternatives can be used to estimate a range for the funding require-ments, allowing the funding process to begin even if the final system design has not been determined.

The first step in assessing funding requirements is to identify the likely system development alternatives. An in-depth description of the system development process is beyond the scope of this guide; however, the PSWN Program How2 Guide for Managing the Radio System Lifecycle provides a detailed system planning approach that describes how to develop operational, functional, and technical requirements, and how to identify system

Figure 1-1: *Wireless System Lifecycle Development*

1. System Planning

2. Requirements Analysis

3. Design and Engineering

4. Procurement

5. Implementation

6. Operations and Maintenance

development alternatives that meet those requirements. In addition, the guide reviews the six phases of the systems development lifecycle as illustrated in Figure 1-1.

In the planning, operational requirements, and design and engineering phases, systems planners start by developing high-level conceptual system alternatives and finish with a specific system design. In general, the system development alternatives considered are those that best leverage existing technology, meet most of the needs of the user community, and can be implemented in a reasonable period of time.

The estimation of the funding requirements for multiple alternatives is not only necessary for estimating network lifecycle funding requirements, but also for performing cost-benefit analyses. Cost-benefit analyses are used to objectively measure several alternatives. For wireless

networking projects, the measures include lifecycle cost, system capabilities, and other factors of interest to the a typical cost-benefit analysis includes identifying the alternatives that could meet the overall objectives of the project, calculating their lifecycle costs, measuring their performance against other important factors, and then comparing the relative performance of the alternatives. A thorough and well-documented cost-benefit analysis can serve as the basis of a business case, which can be used to explain the purpose and need for the project and ultimately win support from stakeholders. Section 3 of this guide explains the process for developing a business case.

Cost estimates are subject to the highest degree of uncertainty at the beginning of a wireless network system development effort.

Establish a Methodology to Estimate Network Costs

Once system planners have identified system options that meet key objectives, the next step is to establish a methodology for estimating the costs of the wireless network system development alternatives. By establishing an estimation methodology, the program manager sets a standard to guide the assessment of the system lifecycle funding requirements. This step is particularly important when attempting to compare system development alternatives and in justifying the preferred technical alternative in a business case. A typical methodology includes three steps—

- Defining and accounting for all the categories and components required throughout the life of the system

- Identifying the data sources and collecting the data for each cost component

- Developing a cost model and generating an estimate of the cost of the components and the total system for some specified period of time.

A typical method for identifying the resources requiring financial support is to segment the system lifecycle into manageable categories (i.e., activities, phases, years, or milestones). Across these categories the necessary cost components (i.e., equipment, personnel, facilities, or other resources required to meet the needs of the specified category) must be identified [see Table 1-1 for an example]. Once the cost components are defined, a methodology for estimating cost within each component must be addressed.

Cost estimates are subject to the highest degree of uncertainty at the beginning of a wireless network system development effort. Because the funding process for new systems must begin while the system is still being planned, it is necessary to attempt to estimate the cost of a system even if it is not yet designed. Although this guide does not detail the specific calculations or models used to develop cost estimates, three primary methods can be employed—

- Perform an engineering buildup based on the expected system configuration and staff-hours multiplied by the rates required

- Apply costs from an analogous effort or previous experience

- Use parametric (or "top-down") estimating techniques such as industry benchmarks.

Determining the proper methodology depends in large part on the reliability and availability of data. Different methodologies can be applied to unique components within the same system estimate based on obtainable data. An engineering buildup often provides the most detail and defensibility, but specific equipment costs may not be readily available for new technologies. At the other extreme, parametric estimates take less time but may not stand up as well to outside scrutiny. Therefore, sources for cost data must be identified as part of the process of selecting an appropriate methodology.

The methodology may also include a calculation that addresses the uncertainty associated with specific cost components. Because there are many variables to consider, projecting the system costs without a finalized design introduces uncertainty into the cost estimates. For example, when building a new system, site construction can be hindered by localities opposed to the building of new radio towers in their communities. The delays and possible added costs associated with addressing this opposition are not included in cost estimates, but nonetheless affect the cost of the tower installations, and consequently the cost of the entire system. Therefore, with very large system procurements, it may be necessary to develop a cost estimate that accounts for these variables. There are common approaches for estimating the effect of cost fluctuations. These estimates are calculated by using "optimistic," "most likely," and "pessimistic" cost estimates for each component to provide a range to bound the overall system costs. With these estimates, planners obtain a range of cost estimates that may help develop a funding strategy that even addresses the worst-case cost scenario.

Although the uncertainty related to underlying variables is difficult to account for in the cost estimation process, the inclusion of these variables could provide very valuable insights into the long-term costs of a system. In some cases, relatively small changes in a particular component may have dramatic effects on the overall funding requirements. The use of sensitivity analysis software tools can help identify the key variables that drive system costs and allow for the development of risk-adjusted cost estimates.

Estimate the Lifecycle Costs of the Network

The selected methodology guides the estimation of the lifecycle costs. In Table 1-1, the six phases of the system lifecycle are used to segment system resource costs into more basic, quantifiable elements. Table 1-1 is only an example of how to segment the system lifecycle. It is meant to illustrate the full breadth of activities that must be accounted for in the cost estimation process. Planners should be careful not to underestimate the personnel and resources needed to plan, procure, install, and maintain the wireless network system. To assist with this process, Table 1-1 provides a review of each phase and its particular cost characteristics.

Table 1-1: *System Lifecycle Cost Elements*

Phase	Activities	Cost Components	Cost Variables
System Planning	• Baseline assessment • Technical, financial, and strategic planning	• Skilled staff hours • Software needed for planning • Publishing of plans	• Complexity of current system • Number of interviews required • Number of system alternatives examined • Budget process/system of state or locality • Complexity of strategic plan
Requirements Analysis	• Definition of user requirements • Capability assessments	• Skilled staff hours • Wireless network system monitoring equipment	• Complexity of user needs • Number of users and user groups • Size and scope of documentation
Design and Engineering	• Technical planning • Evaluation of technical alternatives	• Skilled staff hours • Software • Hardware	• Availability of technology • System complexity • Required technical performance • Information technology (IT) resources needed for tasks
Procurement	• Program management • Purchase of facilities, subscriber units, and infrastructure	• Contractor fees • Skilled staff hours • Lease or purchase of land mobile radios • Base stations	• Contract vehicles used • Number of bidders • Availability of vendor discounts • Licensing and lease costs
Implementation	• Installation • Program management • Education and training	• Skilled staff hours • Contractor fees • Reports and filings • Training materials	• Personnel required • Construction needed • Documentation required • Testing and verification processes
Operations and Maintenance	• Program management • Replacement of equipment and parts • Facilities	• Skilled staff hours • Spare mobile and portable radios, and parts • Secure buildings	• Costs of maintenance agreements • Availability of parts and equipment • Lease costs

The costs associated with the planning phase of the lifecycle are relatively low and are sometimes financed by redirecting existing financial resources. For this reason, public safety agencies often neglect planning and expect full-time staff to perform planning tasks. However, because of the importance of this phase, it is critical that the associated planning costs are fully assessed so that planning activities can be fully funded. When planning activities are not fully supported, their results are less reliable, requiring significant changes later in the project. Often these changes require funding increases. Requests for significant increases in resources due to poor planning typically reduce stakeholder support for the system. The operational requirements and design and engineering phases also encompass specific planning activities. However, many planners outsource these tasks because of the time and skilled personnel required to perform requirements analysis and engineering design.

The procurement phase involves the acquisition of wireless network subscriber equipment and infrastructure. This phase is capital intensive, requiring a significant amount of funding within a relatively short period of time to purchase portable and mobile radios, antenna towers, facilities, and other network infrastructure. This part of the cost estimate will likely receive the most scrutiny. Successful implementation of the wireless network system will require the purchasing agency to perform both program management and contract admin-istration to ensure the vendor performs on time and within budget, and meets all contractual requirements. The agency will also face the difficult task of migrating to the new network and training the user com-munity. The operations and maintenance phase of a wireless system involves a wide

Comprehensive planning is the key to effective and predictable resource allocation.

variety of recurring elements such as program management, purchase of spare parts and equipment, and recurring costs for facilities. The actual cost of operating and maintaining a new or upgraded system could fluctuate over time based on a variety of factors. For example, the network may grow more rapidly than previously planned, significantly increasing operational costs. On the other hand, the expected adoption of standards (i.e., Project 25) by equipment manufacturers may increase competition and therefore reduce long-term component refresh and replacement costs.

While the six-phased system lifecycle provides a comprehensive method for identifying all of the activities and resources necessary for the system, most wireless network cost estimates typically include only three categories to simplify the process: planning, full acquisition, and operations and maintenance. The planning category can be thought of as including the first three phases of the standard system lifecycle. The full acquisition category accounts for the startup costs in the procurement and implementation phases. Table 1-2 provides a typical breakdown of the categories and their relative costs.

Using cost estimate categories similar to those in Table 1-2, system planners must then develop a specific estimate for each cost component. Collecting and calculating the most accurate and timely cost data is critical because the quality of the funding requirement estimate will only be as good as the quality of the cost data. As specified in their selected methodology, planners typically build the cost estimates from the "bottom up." An example of a notional lifecycle cost estimate is included in Table 1-3. Specific cost categories and components will vary depending on system and reporting requirements.

Table 1-2: *Cost Estimate Categories*

Categories	Definition	Cost Components	Overall Percentage of Total System Cost
Planning	• Strategic planning • Operational requirements analysis • Design and engineering	• Skilled staff hours	• 8–10%
Full Acquisition	• Procurement and installation of the wireless network infrastructure • Procurement and installation of the subscriber units • Refresh cost for infrastructure and subscriber equipment	• Base stations • Common electronics banks • Repeaters • Mobile radios • Portable radios • Consolettes	• 35–55%
Operations and Maintenance	• Operations and maintenance activities to ensure that the equipment is kept in good working order and replaced when its expected life span has been reached	• User equipment recurring costs • Radio frequency backbone maintenance agreements • Overhead	• 35–50%

Table 1-3: *Notional Lifecycle Cost Estimate (Specific cost categories & components will vary based on requirements)*

Thousands of Inflated $	Grand Total	2003	2004	2005	2006	2007	Total: 2008– 2015
1.0 Planning							
1.1 Program Office							
1.1.1 Ongoing Strategy Development and Program Planning							
1.1.2 Frequency Management							
1.1.3 Issuance/Management of Vendor Contracts							
1.1.4 Capital Planning							
1.1.5 Budget Development and Tracking							
Total PM Costs (Inflated)							
2.0 Full Acquisition							
2.1 Infrastructure							
2.1.1 Infrastructure (Conventional)							
2.1.2 Infrastructure (Trunked)							
2.1.3 Encryption							
2.1.4 Communications Center							
2.2 Subscriber Units							
2.2.1 Mobiles							
2.2.2 Portables							
2.3 Refresh							
2.3.1 Subscriber Refresh							
2.3.2 Infrastructure Refresh							
Total Investment Costs (Inflated)							
3.0 Operations & Maintenance							
3.1.1 Operations							
3.1.2 Maintenance							
3.1.3 Tower Rental							
3.1.4 Leased Lines							
3.1.5 Contracting Services							
3.1.6 Other Recurring Costs							
Total O&M Costs (Inflated)							
Total System Costs (Inflated)							

section two
developing a comprehensive funding strategy

estimating network lifecycle funding requirements **1**	developing a comprehensive funding strategy **2**	implementing the funding strategy **3**	maintaining full funding for the network lifecycle **4**

• Review state and local funding mechanisms
• Review federal funding mechanisms
• Develop a funding strategy

Purpose

This section introduces the key steps in developing a comprehensive funding strategy for a proposed wireless network system. A funding strategy is a comprehensive plan that identifies specific funding sources or methods that should be sought to financially support the system throughout its lifecycle. Funding strategies for wireless network systems can be simple or complex because funds can come from a variety of sources. Typically, the more difficult it is for a state or locality to fund a system, the more complex the strategy will be. A more complex funding strategy would identify multiple funding mechanisms.

Objectives

By the end of this section, readers will understand how to—

- Review state and local funding mechanisms

- Review federal funding mechanisms

- Develop a funding strategy.

Key Steps

Review State and Local Funding Mechanisms

As a first step to developing a comprehensive funding strategy, public safety agencies should review the current funding mechanisms. An array of financing methods and funding sources are available at different levels of government. However, government funding is limited, constrained, and in competitive demand. In addition, not all financing methods are appropriate to all public safety agencies. Consequently, public safety agencies should not only identify available and good candidates for their projects, but should also consider the level of effort required to win funding from the chosen sources. Success is more likely if system planners focus on the most appropriate funding mechanisms for their wireless network system development needs and avoid speculative efforts. For instance, planners should consider the stakeholders, laws, or outside issues that may influence the process when seeking funding from a particular source.

Most state and local wireless networks are funded through state and local government funding mechanisms. State and local governments use a variety of funding mechanisms to support the development, deployment, and maintenance of public infrastructure projects, such as public safety wireless network systems. When researching state and local funding mechanisms, planners should be sure to take into account additional factors that can impact or constrain potential revenue sources for funding or the likelihood of receiving funds. For example, state and local appropriations are often derived from the government's operating budget. As a result, the amount and availability of these funds to pay for public safety wireless network systems is limited to the amount of discretionary funding available within a given budget year. As another example, funding mechanisms that are derived from debt, such as the sale of bonds, can be constrained by the debt limits of the government. Ultimately, these factors are important when developing a funding strategy because they help planners recognize which funding mechanisms and resources would be most appropriate. Some of the typical funding mechanisms found within most state and local budgets include—

- Budget Appropriations
  The most prevalent funding mechanism available at the state and local level is a direct appropriation from the state or local government budget. The allocation of funds from a direct appropriation depends on a state or locality's economic situation, which determines how much discretionary funding is available for the wireless project. In addition, based on the length and duration of the budget process, public safety agencies need to use a short- or long-term strategy when attempting to secure funding

Most state and local wireless networks are funded through state and local government funding mechanisms.

through a direct appropriation. An accelerated approach is necessary in states and localities operating on an annual budget cycle, in which the budget provides appropriations for one fiscal year. On the other hand, public safety agencies may have more time to build support and push for funding within states and localities that use a biennial budget cycle, in which the budget is developed for the upcoming two fiscal years.

The Governor of Arkansas signed a bill in April 2001 that allowed for an appropriation of $1.5 million for Arkansas' Statewide Enterprise Radio System Study to assess the merger of the current statewide wired and wireless networks. In another example, the Governor of Maine went a step further and used the state's continuous appropriation to establish a Statewide Radio and Network System Reserve Fund. The fund was established in January 2001 to administer the fees drawn from system users to pay for expanding and upgrading the system.

Once the system upgrades are paid for, the states can use the tax revenue to fund wireless networks.

• **911 and E-911 Surcharges**

E-911 surcharges are typically used to pay for 911 system upgrades required in a jurisdiction to meet Federal Communications Commission requirements. However, once the system upgrades are paid for, the states can use the tax revenue to fund wireless networks. Currently, 13 states have specifically designated some monies from this revenue stream for the maintenance of their current wireless systems.

The comptroller of the State of New York conducted an audit of the use of E-911 surcharges. Auditors found that the $.70 charges, which totaled $43 million in 2001, were used for a range of expenses, including the purchase of radio and microwave equipment. Alternatively, the State of Virginia currently generates $30 million a year to comply with the infrastructure requirement and meet radio equipment needs.

• **Targeted Taxes**

Many states collect revenue from motor-vehicle-related taxes and from targeted sales taxes to establish special revenue funds. If public safety agencies want to pursue the creation of a new targeted tax, they must determine whether the political climate will allow the establishment of a new targeted tax. Alternatively, it may be possible to redirect the revenue from an existing tax (e.g., 911 surcharges).

The Florida state legislature passed a bill that would allow a municipality that maintains an independent 800 MHz radio system and can interoperate with the county's system to draw $12.50 from each motor-vehicle violation to offset system operations and maintenance costs. Unfortunately, the bill was vetoed in June 2002 citing unclear language that could encourage municipalities to create and maintain independent systems. It is unclear at this time whether the state legislature is planning to re-submit the bill with new language for the 2003 session.

- **Bonds**

  Bonds can be a challenging funding mechanism to implement because voter approval is required for most bond issues. In addition, some governments have strict debt ceilings that limit the quantity of bonds that can be issued. Overall, two types of bonds are typically used for wireless networks—general obligation and revenue bonds. General obligation bonds can be used to finance any capital improvement approved by the voters, and the funding available can be relatively high. Revenue bonds are a type of municipal bond; the principal and interest are secured by revenues such as charges or rents paid by users of the capital project that was developed with the proceeds of the bond issue. This type of bond is ideal for wireless systems supported by subscription fees. In addition, these types of bonds are generally not tied to borrowing limits or voter approval. Some funding mechanisms, including bonds, are often dependent on legal limits on debt levels or the ability of the state or locality to incur debt. Nearly all state and local governments face an array of constitutional and statutory limits on the amount of debt they can incur for capital projects and on the processes employed to authorize such debt. At the state level, all 50 state constitutions contain strict constraints on borrowing. States and localities typically have one or several boards, departments, or executive officers that annually review the size and condition of tax-supported debt while estimating the maximum amount of new tax-supported debt that can be authorized for each budget cycle.

The Governor of Nebraska signed a bill in April 2002 that allows the state to issue bonds for the buildout of a statewide radio communications system. Before this bill became law, the state's purchasing capability was limited by law. The bill also initiates the creation of a telecommunications board, composed of public safety and government users, to assess the financial development of the system.

- **Certificate of Participation**

  Often, state law prohibits local jurisdictions (i.e., local fire and emergency medical services [EMS] agencies) from issuing bonds based on the state's credit. As an alternative, certificates of participation (COP) allow localities to raise funds through private investors. COPs function similarly to a home mortgage in which a bank acts as a broker between the lessor (the vendor) and the lessee (the government authority) to secure the funding for the certificate from the investment community. COPs are usually tax-exempt, which attracts a larger investment base than other mechanisms available to local areas. Jurisdictions that use this funding mechanism often form public authorities or new governmental entities that can invite a private firm or vendor to negotiate the lease or purchase of radio equipment.

Local public safety agencies within the City of Winston-Salem, North Carolina, City and County of San Francisco, and Maricopa County, Arizona, use COPs. In these cases, the COPs cover the operations and maintenance costs for the communications systems and provide funding for upgrades to allow the local systems to become interoperable with larger, surrounding systems.

Table 2-1: *Current Federal Funding Sources*[1]

Federal Source of Funding	Description	Limitations/Comments
Community Oriented Policing Services (COPS) and COPS Making Officer Redeployment Effective (MORE)	COPS MORE offered $81M in grant funding to law enforcement agencies in 2001 for IT systems. Grants up to $1M are available.	There is uncertainty whether the program will continue. Award amounts depend on population.
Federal Emergency Management Agency (FEMA)	State and local governments can apply to FEMA at any time for funds for disaster response or prevention. Grants can vary from thousands to millions of dollars based on need.	Money must be used for disaster relief or prevention. FEMA is slated to receive an additional $3.5B in the 2003 fiscal budget targeted at assisting state and local agencies in responding to potential terrorist attacks.
Firefighter Investment and Response Enhancement (FIRE) Act	The FIRE Act offers equipment, vehicle, and training grants. Equipment includes communication pagers and portable radios. Grants are intended for rural, tribal, and volunteer fire agencies. Grants up to $750K are available.	The grant requires a 30-percent match.
Local Law Enforcement Block Grant (LLEBG)	Typically, this grant funds training and education projects but can be used to purchase equipment. The possible grant amounts vary and are based on the amount of violent crime in the jurisdiction.	This program is ideal for local law enforcement.
National Institute of Justice (NIJ) Advanced Generation of Interoperability for Law Enforcement Program (AGILE)	The NIJ has a program within AGILE for communications interoperability and information sharing. Grants center on smaller projects with unique players. Grants up to $100K are available.	This program is ideal for law enforcement agencies that are attempting to link separate wireless networks.
U.S. Department of Transportation	Grant types include hazardous materials, training, safety programs, and Transportation Equity Act for the 21st Century (TEA-21) funds. Grants up to $15M are available.	Local agencies can apply for funding through multijurisdictional partnerships.

Table 2-1 (cont'd): *Current Federal Funding Sources*[1]

Federal Source of Funding	Description	Limitations/Comments
Edward Byrne Memorial State and Local Law Enforcement Assistance Program	Grants provide funding for agencies enforcing drug laws and performing drug interdiction.	Request for assistance must be directly related to reducing drug crimes. Grant amounts up to $50K are available.
U.S. Department of Health and Human Services (DHHS)	Grant funds are awarded under programs with diverse requirements. Money is disbursed from the DHHS to the state. In January 2002, DHHS released $1.1 billion to the states.	DHHS also sponsors GrantsNet, an Internet tool for finding information about grant programs and regulations.

[1] *The federal funding sources are expected to change due to the new homeland security initiatives and may result in increased funding for interoperable wireless networking equipment.*

Review Federal Funding Mechanisms

To take advantage of federal funding sources, system planners can first exhaustively research potential federal funding sources by using the Catalog of Federal Domestic Assistance (CFDA) (www.cfda.gov). Using this tool, system planners can explore federal funding sources that include grants, loans, equipment, technical assistance, direct payments, insurance, advisory services and counseling, and training. Federal funding sources include payments and mechanisms used to transfer federal revenues to state and local government entities. In addition, line-item, direct appropriations from the U.S. Congress to states and localities have historically been a source of funding for public safety wireless networks. These appropriations are typically related to special circumstances and are difficult to include in a planned strategy. Several sources for federal funding are listed in Table 2-1. Planners can determine the potential of each source listed in Table 2-1 relative to their funding requirements by examining each source's—

- Restrictions, eligibility, application and award process (including deadlines)

- Assistance considerations and selection criteria (i.e., formula and matching requirements, and timing)

- Post-assistance requirements, financial information, and program accomplishments

- Regulations (guidelines), contacts, related programs, and examples of funded projects.

Planners should review the applicability of the potential federal grants available for public safety wireless networks. They should attempt to find a direct link between the wireless network system project and the grant being sought by looking for consistency between the purpose of the system and the grant program. In addition, planners should ensure that the grant program does not have administrative or other types of stipulations that make it unattractive. For example, many grant programs require matching funds, which means that the grantee must provide a specific percentage of funds before they can use the grant funds. For some agencies, this type of match would not be possible.

Develop a Funding Strategy

After reviewing the available funding mechanisms, planners should develop the funding strategy. This strategy should guide the pursuit of funding for the life of the system. As discussed above, system planners should consider the laws and limitations concerning capital projects, the legislature's budget process, the prevailing political climate, and the overall difficulty of pursuing specific mechanisms. To consolidate the results of the review and analysis of the funding mechanisms, planners could create a matrix as shown in Table 2-2.

As the illustration demonstrates, some mechanisms will be more accessible than others. Once those target funding mechanisms are identified, they should be incorporated into a lifecycle funding strategy. Table 2-3 is an example of a possible funding strategy.

The example funding strategy shows only one of many possible approaches for funding a wireless network. Many other mechanisms are available and some states and localities may be able to win the necessary funding with a simpler approach. Table 2-3 is meant to demonstrate that after a review of the available funding mechanisms, decisions must be made to identify which specific mechanisms will be pursued to meet the costs of each category. The strategy must also identify how much funding is expected from each mechanism. As the example demonstrates, a successful funding strategy must identify enough funding to meet all of the costs of the system for the entire lifecycle.

Table 2-2: *Funding Mechanism Review Matrix*

Funding Alternatives	Funding Mechanism Review and Analysis				Target Mechanism
	Availability	*Legal Issues*	*Stakeholder Issues*	*Overall Risk*	
Mechanism 1	○	○	○	○	
Mechanism 2	○	◐	●	●	
Mechanism 3	◐	○	●	○	
Mechanism 4	●	●	●	●	✓

Table 2-3: *Lifecycle Funding Strategy*

Cost Category	Funding Source	Target Funds ($)
Planning	Federal Grants	100K
	State Appropriations	3M
Infrastructure	State Bond	5M
	State Appropriations	5M
Subscriber Equipment	Federal Grants	3M
	State Appropriations	1M
	Local Appropriation	6M
Operations and Maintenance	State Agency Budget	5M
	Usage Fees	15M
Total Costs		43.1M
State Appropriations Total		9M
State Bonds Total		5M
State Agency Budget Total		5M
Local Appropriation Total		6M
Usage Fees Total		15M
Federal Grants Total		3.1M

section three

implementing the funding strategy

| estimating network lifecycle funding requirements *1* | developing a comprehensive funding strategy *2* | implementing the funding strategy *3* | maintaining full funding for the network lifecycle *4* |

- *Develop a business case for a wireless network*
- *Perform outreach communications and marketing*
- *Develop partnerships*
- *Request funding*

Purpose

This section reviews the primary activities that should be performed when executing a funding strategy. It provides a process for developing the necessary documentation to explain the need for the new wireless network. It also describes how to perform the analysis necessary to demonstrate that the proposed network is better than other alternatives. This documentation, along with an outreach communications effort, should help to build support and encourage stakeholders to dedicate funding to the system. This section also discusses resource-sharing partnerships, applying for grants, and making funding requests to various government organizations.

Objectives

By the end of this section, readers will understand how to—

- Develop a business case for a wireless network

- Perform outreach communications and marketing

- Develop partnerships

- Request funding.

Key Steps

Develop a Business Case for a Wireless Network

Developing a business case can be an effective way to justify and promote major wireless network development projects and pursue the funding mechanisms identified in the funding strategy. A typical business case incorporates a cost-benefit analysis and uses this information as one important piece in demonstrating the most effective investment decisions. It is increasingly important that radio planners view their systems as investments that must be clearly explained and justified. Until recently, some agencies did not consider IT and wireless network systems to be assets, but rather overhead expenses. Budget reductions and scarcity of resources have prompted some states to encourage agencies to develop business cases for their projects. At a minimum, a business case explains the wireless network system investment in detail and how it will support the mission of the relevant agencies.

A cost-benefit analysis details total costs for each alternative weighed against its total benefits.

When agencies need to make a complex business decision that includes multiple alternatives and numerous decision factors, a proven tool to support decision making is a cost-benefit analysis. A cost-benefit analysis details total costs for each alternative weighed against its total benefits. The intent of the analysis is to determine the optimum solution. A business case analysis goes one step further than the cost-benefit analysis in that it links each alternative to mission performance and identifies which alternative will allow an agency to optimize mission performance given cost and other constraints. While dollar-valued costs and benefits are important decision criteria, qualitative factors, such as security and availability, are also directly included in the analysis. The output of a business case analysis is the comprehensive documentation of all viable options along with recommendations for proceeding with the best alternative.

The process of strategic planning to determine the preferred future operating environment and the evaluation of implementation alternatives to achieve such an environment is collectively known as the investment analysis. This methodology serves as a core component of the overall business case development process; its general framework is outlined in Figure 3-1. As illustrated, it specifically includes the process of identifying the preferred operating environment and the preferred technical alternative. For a thorough and convincing business case, this process must be thoroughly documented and explained to the relevant stakeholders.

Figure 3-1: *Investment Analysis General Framework*
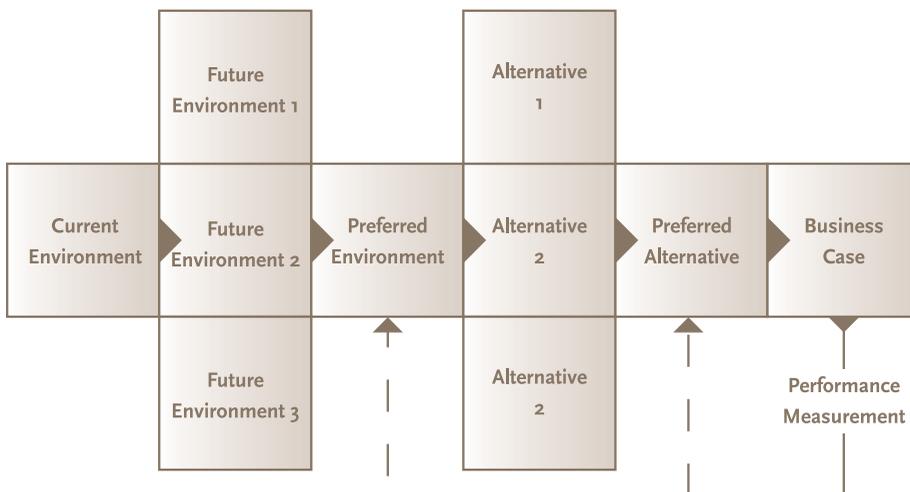
Business Case Development Outline

I. Identify key drivers

II. Document current and preferred operating environment

III. Assess current system

IV. Conduct Gap Analysis

V. Document selection of preferred environment

VI. Develop acquisition and implementation plans

I. Identify Key Drivers

As illustrated in Figure 3-1, the investment analysis process includes two major decision points for identifying the preferred operating environment and technical alternative. This process and the critical decisions should incorporate direct input from key stakeholders. Therefore, the first step in developing a business case is to identify the key "drivers" that will guide its development. Business case drivers include project objectives, constraints, and stakeholder interests. The identification of these drivers provides a checklist of critical issues to guide the development of the business case while ensuring the document addresses key technical, financial, managerial, and political issues. The key steps in this process include—

- Identify the objectives of the wireless network system project
  The need for and objectives of the system should be a central issue throughout the business case. Documenting how the system supports the agency's mission and operations allows the agency to describe clearly the relationship of the investment to the service it provides. Proposed investments without a clear relationship between the acquisition and organizational mission will have difficulty gaining political and financial support.

- Identify business case constraints
  Business case constraints include factors outside the control of the project team that could affect the scope and development of the system. Business case constraints could include legal constraints, political constraints, and/or financial constraints. Acknowledging and addressing constraints in the business case exhibits the project team's ability to address relevant external issues. Examples of constraints might include legal or regulatory limitations on sharing resources between certain entities; a financial constraint might involve the inability of the state to issue bonds or take on debt.

- Identify stakeholder interests
  A stakeholder can be defined as any person or group with a vested interest in or with expectations of a certain level of performance or compliance from the individuals responsible for the wireless network system. Stakeholders may not necessarily use the system; they may be advocates or opponents, depending on the circumstances. The identification and acknowledgment of stakeholder interests allows planners to shape the business case to most effectively meet the concerns and preferences of these important decision makers.

II. Document Current and Preferred Operating Environment

The second step in developing a business case is to document the preferred operating environment of the wireless system. This section of the business case exposes the high-level limitations of the current operating environment and the need for a replacement system. To determine the preferred operating environment, system planners should first perform an assessment of the existing communications system. System planners must assess the existing system to understand and evaluate its operational processes, technical operations, and the total cost of ownership. By examining these components, system planners increase their accuracy in identifying deficiencies in the existing system while allowing for accurate financial estimations that form the basis for the cost model used later in the business case. Overall, this documentation should comprise three areas of concern: history, current infrastructure, and high-level operational characteristics.

Once a baseline assessment of the current system is established, system planners must determine the current and future mission and operational requirements of the wireless network. This process, known as a needs assessment, is used to define the functional requirements of the system by articulating the desired coverage, capacity, and capabilities. In the simplest terms, this process establishes the "to be" requirements of the new system. As such, this assessment will establish the basis for analyzing alternatives that meet wireless communication needs while forming the foundation for justifying an investment in a new system.

IV. Conduct a Gap Analysis

After completing the documentation of the current and preferred operating environments, a gap analysis should be performed to provide a critical analysis that results in a clear justification of the preferred operating environment. The gap analysis evaluates the current operating environment using preferred operational requirements. Each high-level operational requirement reflects an important criterion for evaluating the current operating environment. In this manner, specific limitations or "gaps" in the capabilities of the current system can be identified by assessing the current environment relative to the set of preferred criteria.

This section of the business case involves a high-level qualitative and quantitative investment assessment of several potential wireless network system options.

V. Document Selection of Preferred Environment

Documenting how the public safety agency selected the appropriate technical alternative is the next part of the business case. This section of the business case involves a high-level qualitative and quantitative investment assessment of several potential wireless network system options. The qualitative analysis can and at times should precede the investment analysis in the business case because developing specific cost and benefit estimates requires greater rigor. Several options can be eliminated through the qualitative examination, allowing planners to reduce the amount of time and resources necessary to complete a thorough investment analysis of the remaining options. Overall, the documentation and rationale of this analysis should demonstrate to decision makers that all viable options have been identified and studied carefully. The key steps when documenting the appropriate technical alternative include—

- Identify all possible technical alternatives
  The process of recommending a preferred technical alternative begins with an identification of all feasible technical alternatives. Each technical alternative serves as a possible solution for improving the current operating environment. From these technical solutions, system planners should perform a high-level qualitative analysis to narrow the field of remaining potential candidate approaches. Criteria commonly used in qualitative analysis for radio systems include technical feasibility, agency mission require-ments, and legislative mandates.

- Document cost-benefit analysis
  In this step, viable alternatives are compared to determine which is the most cost beneficial. The cost-benefit analysis consists of several key steps. First, both the system costs and benefits must be determined and measured, in monetary terms when possible. Although costs will be tangible, in many cases, benefits may be intangible. Next, the monetary benefits and costs should be discounted to their present value to account for the time value of money and to allow for consistent economic comparisons. Key assumptions should be documented to improve audience understanding and acceptance. Using this information, the system alterna-tives can be evaluated based on their tangible benefits, their intangible benefits, or a combination of both measures. The quantitative portion of the cost-benefit analysis yields investment metrics such as net present value (NPV) and return on investment (ROI) that are likely to be expected by legislators as well as boards and executives.

- **Perform a risk/sensitivity analysis of the alternatives**

  The risk analysis rates each technical alternative against several broad-based risk categories, providing an overall risk status for each technical alternative. It is important to explain each risk category. For statewide public safety wireless network initiatives, some key risk categories include coordination complexities, technical risks, spectrum risks, financial risks, and implementation risks. An alternative's high sensitivity to risk may make it undesirable, although it may have a low cost and otherwise strong benefits. For this reason, wireless network system cost variables and scenarios that are sensitive to changes may require further study and analysis.

Overall, these analyses (i.e., costs, benefits, and risks) provide an objective, quantitative, and qualitative evaluation of the possible alternatives. Therefore, the results of this exercise should point to a clearly superior alternative—the recommendation.

VI. Develop Acquisition and Implementation Plans

After a public safety agency has selected a wireless system alternative based on an investment analysis, it will next need to determine how the system will be acquired and what needs to be done to implement the solution. Through the process of acquisition and implementation planning, an agency can develop a comprehensive implementation plan that describes the actions that can be taken to fulfill the procurement of a system in a timely manner and at a reasonable cost. To document this implementation plan, system planners may want to include the following sections—

- **Acquisition Strategy**

  The development of an appropriate acquisition strategy, one of the concluding steps in the business case, provides an outline of the overall approach for managing the acquisition of the wireless network system. The selection of the appropriate acquisition strategy can affect a number of procurement issues, including the extent of vendor competition, the type of notice provided to vendors, the solutions, prices and incentives offered by vendors, the timing of the contract award, the overall contractual terms and conditions, and the degree of control over contract management by the public safety agency. As such, the decision on which acquisition strategy to use involves many trade-offs that an agency will need to weigh in making its ultimate decision. Once a strategy is decided on, the public safety agency should document this strategy in an acquisition plan that ultimately defines how the procurement contract is structured to satisfy the system's goals and objectives in a timely manner and at a reasonable cost.

- **Risk Mitigation Plan**

  The risk mitigation plan is an integral aspect of management activities that guides an uninterrupted implementation of the recommended technical alternative. Risks are defined as potential events or outcomes that negatively impact the implementation of the recommended technical alternative. The mitigation plan forecasts, analyzes, and prioritizes risks, as well as defines mitigation strategies for accepting, transferring, or reducing the impact of each risk throughout the project's lifecycle. The risk mitigation plan is best recorded using a table, which at a minimum should include columns for risk (listed in order of priority), entity responsible for addressing risk, risk measures (e.g., cost, impact on public safety, and probability of occurrence), and risk mitigation strategy.

- **Performance Measures**

  Performance measures ensure that the implementation plan meets the initiative's strategic end goals. These measures are typically few in number and are relatively high level. Performance measures focus the project team on the key program measures for success and are useful for reporting program results to stakeholders. They exhibit the standards set for the project team and the vendor partners, and offer opportunities to explicitly address business case drivers.

- **Schedule and Milestones**

  The schedule, documenting the critical milestones, demonstrates thorough planning and can be used to promote vendor accountability. In general, the schedule is of great interest to the stakeholders and should clearly define when system procurement and eventual implementation and operation are expected to begin. This information is important for tracking the project and for informing the stakeholders of when they can expect to reap the benefits of the investment.

Perform Outreach Communications and Marketing

System planners need to engage in extensive outreach communications and marketing to convince key stakeholders to support the wireless network system in a visible and tangible way. Most of the information required to perform this task should be provided by the business case. This task involves careful and deliberate attention to the primary interests of key audiences through raising awareness. The outreach communications and marketing increase the understanding of how— technically and operationally—the initiative would benefit each stakeholder audience.

Public safety agencies need to garner support from key decision makers within the legislative and executive branch. Because many legislators and executive aides do not always fully understand the importance and urgency of replacing antiquated public safety wireless network systems, education and marketing communications are vital to the success of the system. After development of the business case, a great deal of information of interest to key stakeholders should be available for educational and marketing communications. Project and system managers, as well as planners, should recognize that even the best business case for a public safety wireless network system will not sell itself. Initiating the outreach campaign can occur in tandem or after the development of the business case, depending on the time constraints of the targeted audiences (e.g., scheduling conflicts and budgetary cycles) and resources available to the public safety agency proposing development of the system.

After development of the business case, a great deal of information of interest to key stakeholders should be available for educational and marketing communications.

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The team assembled for outreach communications and marketing should be composed of a diverse collection of advocates, ranging from those developing the business case to high-level champions (e.g., state or local representatives). Because an effective education outreach campaign involves careful and deliberate attention to the primary interests of key audiences, the team must rely heavily on the business case for guidance and recommendations on how to shape the messages and determine the outreach channels needed to obtain financial support. However, in many cases, who delivers the message can be more important than the details of the message. Therefore, the team should be carefully selected and trained if necessary.

The team can define the potential target audiences by identifying the major stakeholders of the system. Educational outreach campaigns aimed at multiple stakeholder groups ensure that well-rounded influential officials understand the importance of public safety wireless networks, recognize current network shortfalls, and are able to support future network development efforts. Table 3-1 lists a comprehensive group of stakeholders from whom the team would likely seek support.

Table 3-1: *Potential Audiences*

Audience	Description/Role
Agency/State Capital Investment Review Boards	The investment review board serves as the corporate body for IT and non-IT investment decisions for many federal and state agencies.
Central Budget Offices	Most state and local governments have a central budget office to help decision makers analyze investment decisions. This office provides data to the governor for use in making annual budget recommendations.
State and Local Elected and Appointed Officials	These decision makers are responsible for passing spending bills and authorizing statutes necessary to fund the wireless network system.
State and Local Public Safety Officials	These are users or potential users of the system.
Public Safety Organizations	Regional planning committees, (i.e., the Association of Public-Safety Communications Officials—International, Inc.) can help lend support to an initiative.
Civic Leadership Forums	Forums like Kiwanis International and the Lions Club can lobby for system support efforts. These organizations also represent the opinions of the general public.

Once all of the possible stakeholders have been identified, messages tailored for each group should be developed. These targeted messages explain the major benefits of the wireless system and why funding is necessary. The most effective messages address the need for the project and how the initiative meets stakeholder needs effectively. The outreach team should gather, analyze, and evaluate input from a selected number of members of each stakeholder group to aid in identifying the key messages that will drive the education outreach campaign. Overall, this analysis not only helps develop effective messaging, but it may also allow the campaign to gain traction and additional champions from the solicited members of the stakeholder groups.

Table 3-2: *Stakeholder Messages, Materials, and Channels*

Stakeholder Audience	Priority Message	Outreach Materials	Outreach Channels
State Legislators	The lack of interoperable public safety communications systems endangers lives and property.	• Briefing slides • Brochures • Fact sheets • Reports • Official and unofficial letters	• Speaking at legislative hearing • Impromptu meetings • Mail/delivery of materials • Media outlets (e.g., television and newspapers)
	The state is ill equipped to effectively coordinate public safety emergency response efforts across jurisdictions and agencies.		
	A shared statewide system will result in cost savings and more efficient use of resources.		

The next step for the team is to determine the outreach channels for the messages. Outreach channels refer to how the message is delivered (e.g., face-to-face meetings, groups, or community activities). Depending on stakeholder needs or schedules, a combination of channels may be needed. Once the channels are determined, the team can then begin to identify the most effective materials for each stakeholder (e.g., memos, business cases, slides, or letters). Because stakeholder interests include a distinct set of priority issues, each stakeholder may require tailored informational material formats (e.g., one-page glossy, presentation slides, and detailed report). Although the materials and presentation style may vary, it is vital that each presentation format include the core components of the business case. After each message is developed for each audience, the optimal communications channels can be scheduled based on the available resource commitment of the team and the stakeholders. Table 3-2 provides an example of how to develop the outreach materials and channels for a particular stakeholder audience.

The outreach campaign should follow the developed plan as closely as possible in order to maintain the focus of the campaign. However, as the campaign unfolds, the team should not hesitate to review and revise it as necessary. The team may also choose to solicit feedback during and after the campaign to determine the overall effectiveness of the outreach efforts. The results of this feedback can also help the team and system planners refine their messages and provide better focus for future outreach efforts.

Develop Partnerships

Developing partnerships can be a way to maximize the use of available funds, demonstrate to stakeholders the efficiency of the project, or seek funds that otherwise would not be available. Many public safety agencies at all levels of government share infrastructure, funding, and other resources as an alternative to building and operating systems individually. Multijurisdictional partnerships and public–private partnerships can reduce the resources (i.e., funding and/or spectrum) needed for the system and help build political and public support. Multijurisdictional partnerships and shared systems can take many forms, including—

- Systems shared by different levels of government (i.e., local, state, and federal)

- Systems shared by several jurisdictions at the same level of government (e.g., one system supporting several counties, cities, or towns)

- Systems shared by multiple agencies within one jurisdiction (e.g., one city system supporting many municipal agencies such as police, fire, EMS, and public works).

Public safety agencies that use or pursue a shared wireless network system among multiple public safety entities may need to create a new organization or governing body. The management and control of shared systems is typically similar to the management and control of other multi-agency or regional government services, with each agency or jurisdiction having representation for the oversight of the system. Public safety agencies typically develop formal agreements or create new organizations to formalize partnerships that facilitate the sharing of funds. These partnerships are necessary when one agency pays another to be a user on a system and when multiple agencies build and share a system together. Developing partnering and resource sharing arrangements is a key step for public safety agencies attempting to share resources. A basic sharing arrangement might involve towers, network infrastructure, engineering support, licensed frequencies, and network administrative responsibilities with local government agencies.

Memoranda of understanding (MOU) are agreements used to ensure that roles and responsibilities are equitably distributed among the participating partners. In general, these agreements describe the purpose and intent of the shared system, define the users, define the owner and operator responsibilities, establish methods of establishing interoperability, and determine how funds and resources are distributed. Agreements specific to each of the partners in the system should be finalized before approaching stakeholders for funding.

Regardless of the mechanism, resource-sharing arrangements should be formalized and documented so that each partner knows its obligations.

Specific policies and procedures are required to define agreements between the different partners regarding how the system will be financed. Financial policies formalize agreements between the partners for funding the ongoing operations and maintenance costs for participation in the shared system. These policies reflect resource and cost sharing as well as any cost matching to ensure each partner pays its fair share of the system. These policies can be adapted as new arrangements are developed over time. For example, agencies sharing resources should define which resources and costs will be shared by each partner in the system. In some cases, these costs might be funded through user fees or through in-kind contributions. Regardless of the mechanism, resource-sharing arrangements should be formalized and documented so that each partner knows its obligations.

Public–private partnerships are another method for public safety agencies to finance wireless networks or gain funds. A public–private partnership can take many forms, but in general involves a longer term relationship between a government entity and a commercial entity. For example, a public–private partnership may be one that involves a long-term leasing agreement for the procurement and operation of a new wireless network. The private entity provides the subscriber equipment and the towers, and ongoing services to operate and maintain the network. The benefit of this partnership to the public safety agency is that it provides a method to finance the network. The

viability of such arrangements may depend on the legal and political constraints of the state or locality. In some governments, there may be objections to entering into a long-term leasing relationship with one vendor. Other types of public–private partnership may involve private entities leasing space on public safety radio towers. In this case, there may be legal and political objections to selling or leasing public infrastructure to a private party or legal questions raised by competing companies regarding the revenues the government is receiving by selling or leasing such assets. Therefore, public safety agencies need to understand the laws and regulations regarding such arrangements. The benefit of these types of partnerships is that they provide funds that otherwise would not exist.

Request Funding

After developing the business case, performing outreach communication and marketing, and partnering with other organizations, the planning team should be ready to make formal requests for funding to its respective state or local government. The process for each legislative body should be closely examined when requesting appropriations or the issuing of bonds from the state or local government legislature. In many state governments, the formal budget cycle begins when a central budget director from the executive branch of the government issues a policy memorandum to agency heads. This memorandum outlines, in general terms, the executive branch's priorities for the coming year, alerts agency heads to any expected fiscal constraints, and informs agencies of the schedule for submitting requests for the executive budget. Of course, this guidance should be followed as closely as possible. The process for local government requests may be less structured because there are fewer members in the relevant councils and committees. In any case, understanding the process and early planning are critical to preparing an appropriate and successful funding request.

In addition to formal funding requests, planners should also apply for the grants identified in the funding strategy. When pursuing funding from grant programs, the information contained in the business case is useful. Grants generally require the completion of an application or equivalent qualifying device. Applications are typically made to a government agency responsible for administering grant programs. When writing the application, it is of paramount importance to follow the directions closely, highlight the need for the grant, show how the proposed project relates to the objectives of the grant, and provide detailed information on the proposed project that the grant would help to support. Writing and submitting a thorough, verifiable, and detailed grant application helps to increase the chances of garnering the necessary support of the granting agency. Structure, attention to specifications, concise persuasive writing, and a reasonable budget are the critical elements of a successful application.

section four

maintaining full funding for the
network lifecycle

estimating network lifecycle funding requirements **1**	developing a comprehensive funding strategy **2**	implementing the funding strategy **3**	maintaining full funding for the network lifecycle **4**

• Measure network performance for continued support
• Assess network funding requirements
• Plan for the end of the network lifecycle

Purpose

This section reviews how public safety agencies should go about allocating sufficient resources to monitor the performance of the system and any changes in the funding environment. These steps are important because if the system is implemented poorly, does not perform well, or external factors require new mission requirements, the actual costs of the radio system may increase significantly. Similarly, those systems that were funded with fluctuating funding schemes need to monitor potential shortfalls in funding and take measures to mitigate such variances. This section introduces the key steps in maintaining full funding for the wireless system after securing initial funding.

Objectives

By the end of this section, readers will understand how to—

- Measure network performance for continued support

- Assess network funding requirements

- Plan for the end of the network lifecycle

Key Steps

Measure Network Performance for Continued Support

To maintain the support of key stakeholders and decision makers within and outside the government, it is important to track performance during the development, implementation, and operation of the wireless network system. This concept, known as performance measurement, links system planning with the use of specific feedback to manage projects and processes vital to the wireless network system. As part of the performance measurement process, appropriate measures should be developed. The establishment of such measures emphasizes what the agency needs to accomplish and helps focus the agency's time, resources, and energy on achievement of its goals and objectives. These measures ultimately provide the specific information of interest to those groups that influence the funding of the system. When results differ from objectives, an agency can analyze the gaps in performance and make adjustments.

Determining what to measure involves choosing measures to track outputs or outcomes, as well as program effectiveness or efficiency. Program efficiency measures the relationship of resources to achieving the desired results and can be measured by the expected outputs identified. In general, program efficiency is reflected in the financial performance measures, which determine the cost effectiveness of the development and implementation of a system. Program effectiveness, on the other hand, is the degree of success in achieving the desired results and can be measured in both outputs and outcomes. Management and technical performance measures largely reflect program effectiveness such as improvement in internal processes. If there are too many measures, the agency may become too involved in the measurement process and lose focus on efforts to improve results. A guiding principle is to measure that which matters most to the stakeholders and decision makers using a combination of measures.

Public safety agencies should keep in mind that these measures should be subject to annual review and modification. In the long term, performance measures will be refined and the agency will be able to accurately compare performance from one year to the next. Table 4-1 illustrates examples of technical, management, and financial performance measures.

The performance of the system and its progress is reported to stakeholders in a variety of forums depending on the funding source of the system. Systems funded through appropriations report to legislative and executive committees, while bonded systems primarily report to executive agencies that oversee capital infrastructure projects. Similarly, public safety agencies need to report performance and progress to grant funders and system partners in shared systems.

Table 4-1: *Funding Mechanism Review Matrix*

	Funding Alternatives	Target Mechanism
Technical Measures	User groups experiencing network congestion	Percentage/number of groups
	Entities with network-to-network interoperability	Percentage/number of entities
	Extent to which the design meets interoperability requirements of the stakeholders	Number of times interoperability is a problem per year
Management Measures	Program management cost to overall program	Percentage of cost
	User groups providing a representative for system requirements definition	Percentage of users
	User surveys contributing positive feedback about new system	Percentage of surveys
	Users receiving wireless network system training	Percentage of users
Financial Measures	Budget request funded	Percentage of requested budget
	Baseline savings achieved	Total savings
	Program management cost to overall program	Percentage of cost

Assess Network Funding Requirements

The success or failure of a wireless network system acquisition to achieve cost, schedule, and performance goals can significantly affect the public safety agency's ability to maintain budget discipline, implement the system, and maintain support for future funding. Consequently, system planners need to continually monitor not only the system's progress, but also external issues that could eventually require changes to the system's requirements and funding. System planners and managers should regularly monitor implementation of the system to identify potential problems. Such preventative actions allow time for contractors and the government to implement corrective actions before problems result in significant deviation from goals and cost increases.

Public safety agencies will also need to assess the external environment to determine whether system costs will change in the future. To assess any future costs, system planners need to go beyond internal documentation by collecting and examining information from outside sources. These outside sources can include judicial rulings that require agency response, gubernatorial evaluations and recommendations, as well as media commentary and its reporting of public perception. Issues identified early should be relayed to stakeholders and decision makers so they are aware of potential cost implications in the future.

Plan for the End of the Network Lifecycle

The end of the wireless network system's useful life is the culmination of the funding processes. As such, the projected costs of asset decommissioning are critical elements in the planning and budgeting of the system. These costs are likely to be separate from the cost estimates developed for the original funding strategy. Therefore, the end of the system lifecycle can be thought of as the start of a new funding process. The decision to decommission a wireless asset may be triggered by any number of events. Typically, decommissioning will be part of a systematic plan formulated in advance that integrates the asset into the public safety agency's broader capital resource management plan.

Once the decision to decommission is made, a number of funding related issues must be considered, including—

- Funding the old system while initiating funding for the development of a new system

- Removing the wireless asset from service

- Reusing network components elsewhere in the agency where they may continue to provide a benefit greater than their cost.

Decommission of a wireless system typically requires the phase-out of obsolete equipment and a transition to a new system. Depending on the type of asset, decommissioning may be as simple as transferring the item to another agency, turning it over to other entities as excess, or demolishing it and selling it as scrap. Alternatively, this process can take years to accomplish and can require extensive planning and coordination. For wireless network systems, the transition actually begins early in the planning stages for the new system. Acquisition planners must work with prospective contractors to establish a timeline and devise a transition plan. After the new system has been acquired, developed, and tested, deployment takes place according to the plan developed early in the acquisition phase. The elements of the transition may include—

- Operating both the old and new systems concurrently

- Ensuring users are trained on the new equipment and software

- Keeping the customers informed of transition progress

- Outlining these actions and agreements in an MOU signed by representatives from all parties affected by the conversion.
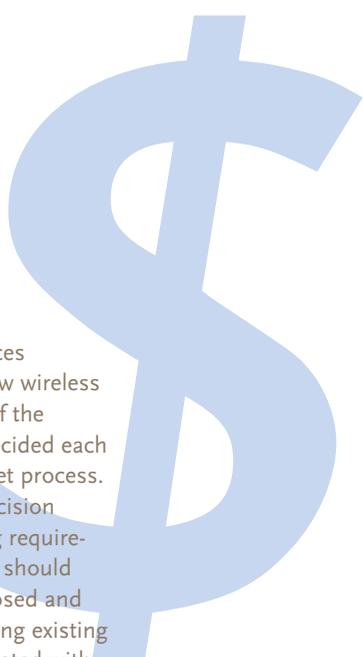
The amount of financial resources dedicated to the initiation of new wireless systems and the continuation of the ongoing system is ultimately decided each year as part of the annual budget process. To provide stakeholders and decision makers with the correct funding requirements, the public safety agency should carefully analyze both the proposed and current wireless system, reviewing existing costs, benefits, and risks associated with these investments. Acquiring adequate funding for both systems is ultimately based on an analysis of where needs are greatest. Eventually, the increasing funding required to maintain older, technologically obsolete systems can make system replacement an imperative.

About the Public Safety Wireless Network Program

The Public Safety Wireless Network (PSWN) Program, a jointly sponsored initiative of the Department of Justice and the Department of the Treasury, was created in 1996. The program is responsible for fostering interoperability among wireless networks so that local, state, federal, and tribal public safety communications requirements can be addressed. Through a variety of activities, the program strives to achieve the vision it shares with the public safety community—seamless, coordinated, and integrated public safety communications for the safe, effective, and efficient protection of life and property. Specifically, the program seeks to—

- Improve public safety wireless communications by addressing each of the five key issue areas of interoperability—coordination and partnerships, funding, spectrum, standards and technology, and security

- Listen to, learn from, and collaborate with local and state public safety officials to improve communications interoperability

- Encourage the implementation of regional interoperability by collaborating with major wireless systems development efforts.

During its first several years, the PSWN Program has promoted partnerships among public safety agencies and has pursued case studies and pilot projects, analytical studies, and outreach efforts. Examples of these activities include—

- Establishing a technical resource center and an information clearinghouse that helps unify and educate the public safety community regarding wireless interoperability issues

- Developing a national strategy for public safety interoperability that provides proven, high-level implementation guidelines, best practices, innovative designs, and operating procedures to help the public safety community improve and implement interoperable communications networks

- Collecting and analyzing data to assess the operational environment for public safety communications as it relates to the five key issue areas of interoperability

- Hosting regional shared systems symposiums that bring together local, state, and federal public safety agencies to share information on wide-ranging issues such as regional planning, site acquisition, funding, and systems planning

- Pressuring for further resolution of unanswered public safety spectrum needs at the Federal Communications Commission, within the Public Safety National Coordination Committee, and in open publications

- Developing "how to" guides on local, state, and federal system planning, system management, and spectrum management to assist public safety officials build and operate effective systems

- Providing leadership by partnering with state and local agencies to address interoperability obstacles in multiple regions of the country

- Developing the District of Columbia Metropolitan Pilot Project to demonstrate the feasibility of using a mobile switch to provide localized interoperability in a large, multijurisdictional area

- Assisting states in their efforts to develop shared wireless networks and develop interoperability links among existing networks.

Further information regarding PSWN Program products and services can be found at **http://www.pswn.gov.**