



A Report for
CAL FIRE



Wide-Area Network (WAN) Upgrade
Feasibility Study Report

27 June 2008

Engagement: 221662640

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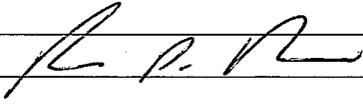
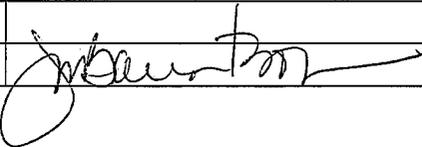
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1.0 Executive Project Approval Transmittal

Information Technology Project Request Feasibility Study Report Executive Approval Transmittal		
1.1. Department Name		
CAL FIRE		
1.2. Project Title		
CAL FIRE WAN Feasibility Study Report (FSR)		
1.3. Project Acronym	1.4. Department Priority	1.5. Agency Priority
Wide-Area Network Upgrade	Priority 1	
1.6. Approval Signatures		
I am submitting the attached Feasibility Study Report (FSR) in support of our request for the Department of Finance's approval to undertake this project.		
I certify that the FSR was prepared in accordance with State Administrative Manual Sections 4920-4930.1 and that the proposed project is consistent with our information technology strategy as expressed in our current Agency Information Management Strategy (AIMS).		
I have reviewed and agree with the information in the attached Feasibility Study Report.		
Chief Information Officer		Date Signed
		17 June 08
Printed name: Ron Ralph		
Budget Officer		Date Signed
		7/1/08
Printed name: Janet Barentson		
Deputy Director—Management Services		Date Signed
		7/8/08
Printed name: Bill Robertson		
Department Director		Date Signed
		7/8/08
Printed name: Ruben Grijalva		
Agency Secretary		Date Signed
		7/14/08
Printed name: Mike Chrisman		

2.0 IT Project Summary Package

2.1 Executive Summary

1.	Submittal Date	June 2008
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		FSR	SPR	PSP Only	Other:
2.	Type of Document	X			
3.	Project Number				

			Estimated Project Dates	
4.	Project Title	WAN Upgrade Feasibility Study Report	Start	End
	Project Acronym	WAN Upgrade	July 2009	June 2016

5.	Submitting Department	CAL FIRE
6.	Reporting Agency	CAL FIRE

7	Project Objectives
	<p>General Objectives</p> <p>The general objectives of the WAN Upgrade are to:</p> <ul style="list-style-type: none">■ Minimize the risk of disruption to CAL FIRE’s operations that support public safety. This risk is increasing due to an aging and obsolete WAN infrastructure. Minimizing this risk will be accomplished by:<ul style="list-style-type: none">□ Providing a technology refresh to replace obsolete WAN hardware□ Providing a robust WAN backbone to address current and future bandwidth and performance demands■ Increase public safety efficiencies, streamline business processes and support CAL FIRE’s future business vision. This will be accomplished by extending the WAN footprint to all CAL FIRE locations.■ Enable CAL FIRE to better support the communication needs of Incident Command locations during big fires and large incidents. CAL FIRE currently provides high speed data connectivity to ICCs on an ad hoc basis that is dependent on where the command center is established and the availability of rental satellite equipment from a local satellite services provider. This will be improved upon by providing better high-speed data connectivity options for Incident Command locations. <p>Specific Objectives</p> <ul style="list-style-type: none">■ Replace aging WAN hardware before it fails and cannot be serviced■ Include a one-time hardware budget refresh in Year 5 to further extend the CAL FIRE WAN life expectancy■ Provide an infrastructure to support electronic distribution of CAL FIRE information to all full time employees regardless of location■ Provide the infrastructure to support electronic transfer of critical public safety information to external stakeholders■ Ensure a consistent and reliable means for situational support at ICCs■ Ensure readiness to integrate into future Statewide financial accounting and budget applications

8.	Major Milestones	Estimated Completion Date
	Phase 1 ■ Project Initiation and Planning (7/1/2009–7/28/2009)	July 2009
	Phase 2—CORE WAN Upgrade ■ Procurement and Project Management (8/3/2009–11/30/2009) ■ Technical Design and Implementation (11/30/2009–4/30/2010)	April 2010
	Phase 3—Remote WAN and ICC ■ Procurement and Project Management (5/3/2010–12/31/2009) ■ Technical Design and Implementation (1/1/2010–6/30/2011)	June 2011
	Phase 4—One Time WAN Refresh ■ Procurement and Project Management (1/1/2013–6/17/2013) ■ Technology Implementation (5/1/2013–1/16/2014)	January 2014
	Phase 5—One Time Remote WAN and ICC Refresh ■ Procurement and Project Management (1/1/2015–4/30/2015) ■ Technology Implementation (5/1/2015–12/31/2015)	December 2015

Proposed Solution	
<p>The proposed solution for CAL FIRE’s WAN Refresh Project consists of three core technical areas: Core WAN, Remote WAN and Incident Command and Control Centers (ICCs). These areas are critical components of the WAN infrastructure and funding must include all aspects of each component. Funding of the WAN solution and the ongoing support will ensure CAL FIRE meets its current business and technical needs by:</p> <ul style="list-style-type: none"> ■ Ensuring business process efficiency through consistent and persistent connectivity to all CAL FIRE Regional and Executive Headquarters, Operational Units and Emergency Command Center locations, and ensuring that reliance upon obsolete technical components does not result in communication failures that impair CAL FIRE’s ability to fulfill its mission. This solution will include bandwidth and capacity upgrades to support existing and future CAL FIRE business and technical requirements stated in this FSR. ■ Improving situational awareness (real time awareness of fire conditions and available resources necessary for decision making) by providing the communications infrastructure necessary to support automatic vehicle locator (AVL) and real time fire mapping. ■ Reducing risk and improving business operations through a Remote WAN infrastructure that supports the mission-critical CAL FIRE locations that today lack the ability to effectively access required CAL FIRE applications and services. These locations include fire stations, air bases, conservation camps, demonstration forests and nurseries. ■ Improving fire fighter and public safety through a state-of-the-art mobile satellite-based communications infrastructure that provides CAL FIRE personnel with the ability to access critical data feeds (e.g., weather conditions, satellite/aerial imagery) and communicate by voice and data (e-mail, instant messaging) from incident locations (e.g., large fires) to other CAL FIRE and external locations and personnel. This solution will provide mobile flexibility and the data integrity that is a requirement of CAL FIRE Incident Commanders. <p>The following is a summary of the three aspects of the proposed solution:</p>	
<p>Core WAN: Provide advanced function “any to any” WAN network topology</p>	<ul style="list-style-type: none"> ■ Replace the current hub and spoke topology with a modern flat topology that provides “any to any” connectivity among the current 40 Core WAN locations ■ Maintain current levels of security and availability in the Core WAN ■ Provide bandwidth for situational awareness and AVL ■ Increase network performance by adding bandwidth and advanced application prioritization and optimization capabilities ■ Allow CAL FIRE partners (Schedule C cooperators) to connect to the Core WAN at their expense
<p>Remote WAN: Provide secure broadband connectivity for all CAL FIRE locations and provide an extranet access option to partners willing to pay</p>	<ul style="list-style-type: none"> ■ Provide persistent, secure broadband-type connectivity to all CAL FIRE owned and Schedule A locations that are not currently connected to the Core WAN today ■ Allow CAL FIRE partners (Schedule C cooperators) an option to “buy-in” to CAL FIRE provided extranet services as part of the their local agreements
<p>Incident Command Centers (ICCs): Provide trailer-based data and voice connectivity</p>	<ul style="list-style-type: none"> ■ Provide rapid response to major incidents via the deployment of portable, trailer-based communications infrastructure ■ Trailers can act as platform for ECC backup if required ■ Locate three trailer units in the North and three in the South

2.2 Project Contacts

	First Name	Last Name	Area Code	Phone #	Area Code	Fax #	E-mail
Agency Secretary	Mike	Chrisman	916	653-5656	916	653-8102	secretary@resources.ca.gov
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Fiscal Officer	Janet	Barentson	916	653-1686			janet.barentson@fire.ca.gov
CIO	Ron	Ralph	916	324-3382	916	324-3374	ron.ralph@fire.ca.gov
Project Sponsor	Bill	Robertson	916	653-7709			Bill.robertson@fire.ca.gov

	First Name	Last Name	Area Code	Phone #	Area Code	Fax #	E-mail
Doc. Prepared by	Gartner	Consulting	916	414-2250	866	630-9110	brett.rugroden@gartner.com
Primary Contact	Ron	Ralph	916	324-3382	916	324-3374	ron.ralph@fire.ca.gov

2.3 Project Relevance to State and/or Department/Agency Plans

	What is the date of your current Operational Recovery Plan (ORP)?	Date	January 2008
	What is the date of your current Agency Information Management Strategy (AIMS)?	Date	August 2002
	For the proposed project, provide the page reference in your current AIMS and/or strategic business plan.	Doc.	Strategic Business Plan
		Page #	

Project #	
Doc. Type	FSR

		Yes	No
Is the project reportable to control agencies?		X	
If YES, CHECK all that apply:			
X	a. The project involves a budget action.		
	b. A new system development or acquisition that is specifically required by legislative mandate or is subject to special legislative review as specified in budget control language or other legislation.		
	c. The project involves the acquisition of microcomputer commodities and the agency does not have an approved Workgroup Computing Policy.		
X	d. The estimated total development and acquisition cost exceeds the departmental cost threshold.		
	e. The project meets a condition previously imposed by Finance.		

2.4 Budget Information

Project #	
Doc. Type	

Budget Augmentation Required?																
No																
Yes	X	If YES, indicate fiscal year(s) and associated amount:														
		FY	2009/10	FY	2010/11	FY	2011/12	FY	2012/13	FY	2013/14	FY	2014/15	FY	2015/16	
			\$11,413,714		\$3,995,349		\$3,081,699		\$3,081,699		\$3,081,699		\$13,048,322		\$3,280,305	

PROJECT COSTS

1.	Fiscal Year	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	TOTAL
2.	One-Time Cost	9,592,470	2,010,500	933,140	0	0	0	0	\$12,536,110
3.	Continuing Costs	2,105,700	4,211,400	4,375,110	5,594,315	5,594,315	15,560,939	5,792,921	\$43,234,700
4.	TOTAL PROJECT BUDGET	\$11,698,170	\$6,221,900	\$5,308,250	5,594,315	5,594,315	15,560,939	5,792,921	\$55,770,810

SOURCES OF FUNDING

5.	General Fund	\$11,413,714	\$3,995,349	\$3,081,699	\$3,081,699	\$3,081,699	\$13,048,322	\$3,280,305	\$40,982,787
6.	Redirection	\$284,456	\$2,249,410	\$2,249,410	\$2,537,620	\$2,537,620	\$2,537,620	\$2,537,620	\$14,788,023
7.	Reimbursements								\$
8.	Federal Funds								\$
9.	Special Funds								\$
10.	Grant Funds								\$
11.	Other Funds								\$
12.	PROJECT BUDGET	\$11,698,170	\$6,221,900	\$5,308,250	\$5,594,315	\$5,594,315	\$15,560,939	\$5,792,921	\$55,770,810

PROJECT FINANCIAL BENEFITS

13.	Cost Savings/ Avoidances	\$	\$	\$	\$	\$	\$	\$	\$
14.	Revenue Increase	\$	\$	\$	\$	\$	\$	\$	\$

2.5 Vendor Project Budget

Vendor Cost for FSR Development		\$225,000
Vendor Name	Gartner Consulting	

Project #	
Doc. Type	FSR

VENDOR PROJECT BUDGET

Fiscal Year	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	TOTAL
Primary Vendor Budget	\$0	\$0	\$0	\$0	\$0	\$0	\$
Independent Oversight Budget	\$0	\$0	\$0	\$0	\$0	\$0	\$
IV&V Budget	\$0	\$0	\$0	\$0	\$0	\$0	\$
Other Budget	\$60,000	\$30,000	\$0	\$0	\$0	\$0	\$90,000
TOTAL VENDOR BUDGET	\$60,000	\$30,000	\$	\$	\$	\$	\$90,000

2.6 Risk Assessment Information

	Yes	No
Has a Risk Management Plan been developed for this project?	X	
General Comment(s)		
<p>CAL FIRE has developed a Risk Management Plan that is detailed in Section 7 of this Feasibility Study Report. The Risk Management Plan is based on State Information Management Manual (SIMM) guidelines. Key components include:</p> <ul style="list-style-type: none"> ■ Identification of roles and responsibilities for the various parties involved in Risk Management, including the Project Director, Project Manager and overall Project Team. ■ Use of the Risk Management Plan on an ongoing basis to identify risks, quantify the potential impact of each identified risk, present mitigation plans and enact appropriate risk responses. Mitigation measures and contingency plans will be developed and implemented as high-priority risks are identified and monitored. ■ Initial identification of a risk management process, to be supplemented by the Project Manager who will be required to develop a baseline Risk Management Plan within 30 days of project initiation. It is expected that the Risk Management Plan will cover all areas of project risk. 		

3.0 Business Case

The purpose of this section is to provide a clear understanding of the business environment of the California Department of Forestry and Fire Protection hereafter referred to as CAL FIRE and the business rationale for making an investment in CAL FIRE's WAN infrastructure.

This section of the Feasibility Study Report describes the CAL FIRE organization, its major programs and functions, identifies internal and external customers, and articulates the business/opportunities and the desired objectives of the proposed solution. This section also includes the requirements that the proposed solution must fulfill to meet the business needs.

This business case is comprised of the following sub-sections:

Table 1. Business Case Sub-Sections

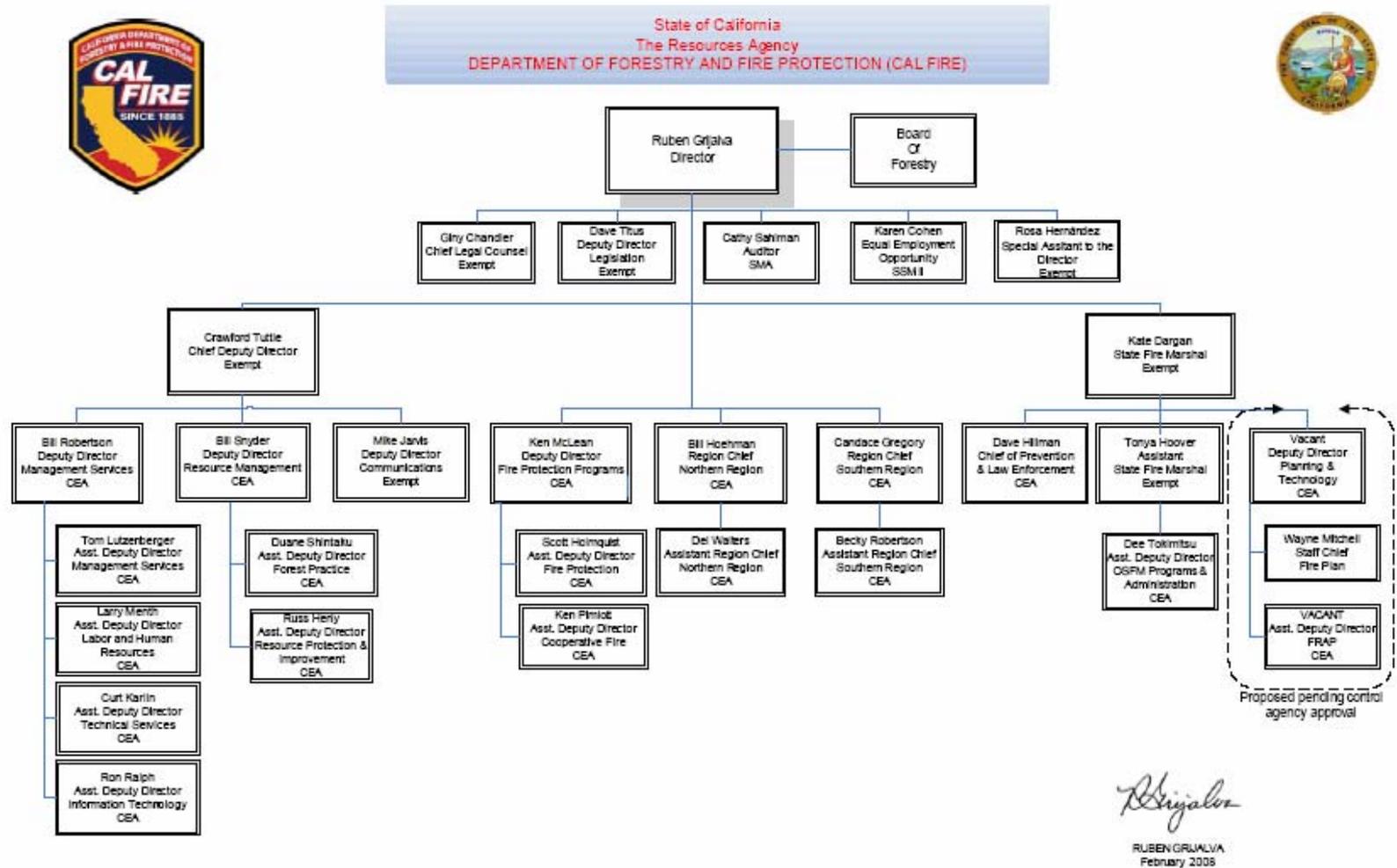
3.1	Business Program Background
3.1.1	Program Description
3.1.2	Business Process Description
3.1.3	Impact of the Proposal
3.1.4	Customers and Users
3.1.5	Program Experiencing the Problem
3.1.6	Conditions Creating the Problem
3.2	Business Problem Or Opportunity
3.2.1	Business Problems
3.2.2	Business Opportunities
3.3	Measurable Business Objectives
3.3.1	General Objectives
3.3.2	Program Process Analysis
3.3.3	Specific Program Objectives
3.4	Business Functional Requirements
3.4.1	Conceptual Model
3.4.2	Business Functional Requirements
3.4.3	Infrastructure Requirements
3.4.4	Traceability Matrix

3.1 Business Program Background

The Department of Forestry and Fire Protection celebrated its 100th year anniversary in 2005. The original State agency provided fire protection and fire prevention services through two independent business units—the California Department of Forestry and the Office of the State Fire Marshal. On January 1, 2007 under Assembly Bill 1423 the two business units were officially rolled into one and renamed CAL FIRE.

The following figure provides the organizational structure of the current CAL FIRE organization.

Figure 1. CAL FIRE Organization Chart



3.1.1 Program Description

CAL FIRE’s mission is to protect the people of California from fires, respond to emergencies, and protect and enhance forest, range, and watershed values providing social, economic, and environmental benefits to rural and urban citizens.

CAL FIRE’s mission incorporates Emergency Response and Fire Protection, Fire Prevention, and Resource Management. These areas are further described in the following text.

Emergency Response and Fire Protection

CAL FIRE provides emergency response and fire protection services throughout the State. In FY 2004/2005 CAL FIRE firefighters, fire engines and aircraft responded to an average of more than 5,600 wildfires and over 300,000 non-wild land emergencies. A summary of the CAL FIRE emergency response and fire protections statistics is provided in the following table.

Table 2. CAL FIRE Emergency Response and Fire Protections Summary

Quantity	Statistic
31 million	Total # of acres under CAL FIRE protection
305,600	Total # of CAL FIRE responses in FY 2005/06 (emergency and non-emergency).
13,900	Total # of non-permanent and volunteer personnel CAL FIRE must communicate with at any given time during an emergency
4,580	Total # of permanent CAL FIRE personnel
2,483	Total # of CAL FIRE temporary help personnel (seasonal)
1,133	Total # of fire engines managed, maintained and inventoried by CAL FIRE
299	CAL FIRE Locations—Schedule A (equipped and operated by CAL FIRE under contract))
297	CAL FIRE Locations—(CAL FIRE owned and operated)
22	Air Bases (Plane and Helicopter)
41	Conservation Camps (including 2 training centers)

Many of the key personnel involved in the provision of these services depend on the WAN infrastructure for access to e-mail and critical CAL FIRE software applications as well as access to important Internet-based weather and fire information sites/databases maintained by other fire and emergency response agencies.

Fire Prevention—Office of the State Fire Marshal

The Office of the State Fire Marshal (OSFM) supports the mission of CAL FIRE by focusing on fire prevention. Through proactive efforts in engineering, education and enforcement the OSFM is out front in the effort to stop fires before they start. Through programs such as fire fighter training, public education, assessment of forest and rangelands the OSFM works toward eliminating the risk of fire by raising the standards and consciousness of those involved. Programs under the State Fire Marshals’ organization affected by this WAN infrastructure FSR include:

- Fire Planning
- Training
- Fire and Life Safety

- Fire Engineering
- Pipeline Safety Division
- Regulation and Analysis Division
- Fire and Resource Assessment Program (FRAP)
- Wild Land Urban Interface (WUI)

Personnel involved in the provision of these Fire Prevention services are impacted by poor performance of dial-up communications infrastructure, which affects their ability to efficiently document, track and disseminate information critical to the various aspects of fire prevention. This inefficiency is directly related to the existing CAL FIRE WAN infrastructure, which prevents access to standard business process for exchanging information.

Resources Management

CAL FIRE's Resource Management Program monitors and manages timber and land use throughout the state. The Resource Management Program oversees enforcement of California's forest practice regulations which guide timber harvesting on private lands. This process is managed through a permit system called Timber Harvesting Plans (THP). THPs are submitted by private landowners and logging companies who want to log or develop their land. CAL FIRE Foresters review the request, create an application and manage the permit process through to completion. On an annual basis, foresters review an approximately 400-500 THPs and conduct over 6,500 site inspections.

The THP permit system is the primary Resource Management application, the performance of which is adversely impacted by limitations in the existing communications infrastructure. Other programs supported and managed by Resource Management include:

- Managing Natural Resources
- Forest Practices
- Urban Forestry
- Fuel Reduction
- State Forests
- Pest Management
- Nurseries
- Land Owner Assistance
- Archaeology

3.1.2 Business Process Description

CAL FIRE Emergency Response and Fire Protection

CAL FIRE's presence throughout the State is delivered through programs executed at the city and county level. Information detailing the CAL FIRE programs and infrastructure is provided in the following sections.

Emergency Command Centers (ECCs)

CAL FIRE provides support to the communities it serves from its 21 Emergency Command Centers (ECCs), also referred to as operational units. In 2006 ECCs handled approximately 260,000 – 300,000 calls. The ECC is where support services such as 9-1-1 dispatch, administration and CAL FIRE local management (Battalion Chief, Captains) are located. Through access to e-mail and other applications and services via the Internet, ECCs provide services such as emergency response reports, safety initiative compliance, financial administration, technical support and resource management.

ECC dispatchers receive 9-1-1 calls and respond by dispatching the information to the nearest CAL FIRE emergency response location (typically a fire station). The primary dispatch communication mechanism is radio.

At least two, and preferably three, different methods of communication are recommended to ensure emergency profile information is captured and communicated to the fire station. The following mechanisms are currently utilized to provide this communication redundancy:

- The information is dispatched over the radio. In the event of emergency activity it is understood that dispatches over the radio are a priority. All other radio communication is discontinued until after the emergency.
- The information is verbally dispatched over the fire station intercom system.
- An electronic message is sent to the pager assigned to each engine. The fire fighter assigned to the engine has access to the pager and is responsible for responding.
- A document is sent with the emergency detail to the fire stations local printer. The document is queued behind any other print jobs currently in memory. The information is printed at the fire station and the first responders take the printed document with them as they exit the fire station. This action of receiving and retrieving the emergency information from the printer is referred to as “Rip and Run” or “Rip and Tear.”
 - The technology needed to execute the Rip and Run capability is currently only available in Riverside County. All other fire station personal capture the emergency data by hand, based on radio or intercom communications. An upgraded WAN is required for Rip and Run capabilities at all fire stations.
- Post Dispatch Acknowledgement
 - The CAL FIRE first responders acknowledge receipt of the emergency message and confirm their response. After receiving confirmation Dispatch records the data in the dispatch management application system called Computer Aided Dispatch Application (CAD). The information in CAD is used to track and account for available resources. The use of this application is mandated by legislation and State compliance regulations.

Incident Command Centers (ICCs)

In the event of an emergency CAL FIRE establishes an ICC as close to the incident as possible to monitor the situation and establish a support area for the CAL FIRE services that will be involved in the emergency. The ICC base primarily supports the firefighters on the front lines and is usually established in a large area that can be accessed easily by air and ground support services. The ICC is a staging area and command post that includes support services such as lodging, cafeteria, showers, and laundry.

ICCs are the center of emergency management. The Incident Commander (IC) is located at an ICC during an emergency. Situational briefings pertaining to the status of the emergency, and conditions affecting the fire fighters as well as the public take place from the ICC. In emergencies the ICC is considered ground zero and where information specific to the emergency (like weather) is monitored aggressively and communicated often. This critical information and its timely dissemination is crucial to command and control operations, as well as fire fighter and civilian safety.

The IC's role is to monitor the local emergency, direct and control resources, and communicate requirements to CAL FIRE Operations. Through the use of CAD, visual observation as well as verbal communications and other assessment methods the IC identifies the resources needed to support the emergency effort. Resources are defined as people and equipment (e.g., bull dozers, air tankers, fire engines, etc.) and are deployed from all areas of the State. Resource requirements are identified and documented by the IC using a standard CAL FIRE form (ICS209) and process. The IC submits the ICS209 form twice a day to request emergency response resources. The ICS209 is currently delivered either by fax or e-mail. The delivery mechanism is influenced by both the situational conditions and the technology available at the ICC location.

Operations Centers

The ICS209 form is sent to one of two Operations centers. These centers are called "Ops" and defined further by their location and area of responsibility. The Northern Ops is located in Redding, California and services the area from Tahoe and Santa Cruz to the Oregon border. The Southern Ops is located in Riverside, California and services the area south of Sacramento to Mexico. The organizational structure of the Operation centers consist of an Assistant Region Chief of Operations reporting to a Region Chief (Deputy Director Level) reporting to the CAL FIRE Director in Sacramento.

The Region and Assistant Region Chiefs receive the ICS209 forms from the ICs, assess the situation based on a strategic analysis of current conditions going on in the State at the time, and decide on resource allocation and allotment. These decisions are dependent on the priority level of each emergency, the available resources, and the forecast of future conditions (e.g., weather patterns, and fire conditions, etc.) occurring in the State at the time. After review and analysis, requests are addressed.

Fire Station, Air bases and Conservation Camps

CAL FIRE maintains a presence in the State of California through several location type profiles. These location profiles are identified as Schedule A, B or C locations. These profiles are explained in the following list.

- Schedule A locations are local government-owned facilities that are equipped and operated by CAL FIRE under contract. There are approximately 299 Schedule A fire stations.
- Schedule B locations are CAL FIRE-owned facilities that are equipped and operated by CAL FIRE for the State of California. There are approximately 228 fire stations, 22 airbases, 39 conservation camps, eight demonstration forests and two nurseries classified as Schedule B.
- Schedule C locations are local government-owned, equipped and operated facilities that are managed by CAL FIRE under cooperative contract. There are approximately 376 Schedule C fire stations.

All Schedule A, B and C locations are constrained in performing required business tasks as well as emergency response tasks because many of the locations do not have persistent, or in some cases any Internet connectivity to the CAL FIRE infrastructure.

Office of State Fire Marshal (OSFM)

The focus of the OSFM is on prevention through education as well as policy and procedure implementation. The OSFM delivers a variety of Programs at both the city and county level. The OSFM Executives, technical support services, finance, legal and government relations and administrative functions are combined with other CAL FIRE departments and are located in various office buildings throughout downtown Sacramento. A description of the OSFM Programs and functions is described below.

Fire Planning

The focus of CAL FIRE's fire planning program is to prevent emergencies from occurring by developing a Fire Plan that identifies the risk and response to potential fire dangers facing the community. This program weighs the use of funds against the best protection methods and/or mechanisms available to the community. This distinguishing factor of obtaining the best Return on Investment (ROI) from the funds provided requires a very proactive and engaging relationship with each community. To this end, fire planning representatives solicit and encourage input from the community and local governments to develop a fire prevention plan that is strategically aligned with local requirements.

Developing fire planning programs for each community requires capturing an extensive amount of information from the community and local governments. Capturing this information is critical to providing the right fire plan to serve the community. Through local fire planning organizations called Fire Safe Councils, non-CAL FIRE and non-government personnel are invited to provide input on the levels and types of support required to meet the community's changing needs based on residential and business development. Council members are asked to represent their fellow landowners on issues such as fire lines, accessibility protocols, support for new development, and protection levels required from CAL FIRE. Members of this council are aware of and educated on technology and services available to them and are proactive in ensuring they have the best available resources in place to meet the demands of the community.

Information on fire history and any emergency incident in the community is documented and tracked for use in developing the community fire plan. Each community creates, captures, and archives their incidents separately in a database. The incidents are captured in the current incident tracking application called California All Incident Reporting System (CAIRS). Dispatch inputs the initial information into CAIRS and the Fire Captain provides specific detail on the incident after it has been completed. Fire planning representatives located at each unit are responsible for verifying the integrity of the data and ensuring that all errors and omissions are corrected.

Due to limitations of the current CAL FIRE WAN infrastructure, CAL FIRE OSFM staff lack access to feature-rich applications and CAL FIRE historical data. As a result, many local communities are putting together their own fire plans. In doing so, the local communities request information from CAL FIRE such as Geographic Information Systems (GIS) files, incident specific information and database information. Again because of the limitations in the CAL FIRE infrastructure the delivery mechanism currently available for this information is primarily manual. CAL FIRE copies the requested information to a file; the file is copied to a CD or DVD and CAL FIRE OSFM staff sends the information through the mail or delivers the information in person. The intent of this FSR is to provide an infrastructure which will allow access to both

electronic applications and historical data so that the information requested can be electronically disseminated and the fire plans developed in a much more efficient manner.

As described below, the CAL FIRE OSFM fire planning program also works with other State and Federal agencies in a variety of capacities.

Map of State Vegetation Lands

CAL FIRE OSFM works with the National Parks Service (NPS), Bureau of Land Management (BLM), The Department of the Interior (DOI) and the United States Department of Agriculture Forest Service (USDA Forest Service) to map the vegetation parcels throughout the state. Each agency is responsible for mapping the land they manage. Each agency uses a different process and methodology to complete this task. CAL FIRE OSFM has dedicated 1.5 PY to executing this task. In addition, the Fire Planning Chief spends 10-15% of his time managing this effort.

Fire Planning Emergency Support

Fire Planning representatives are stationed at the 21 operational units throughout the State. Fire Planners are responsible for providing data and information used to assess the emergency situation. Fire planning representatives use a variety of tools to assess the potential risk of danger (fire) in the State. Fire history statistics, fire weather, fire mapping and GIS are some of the tools used to gather information in the fire planning assessment process.

The backbone of the fire planning assessment process is the GIS application. Currently CAL FIRE uses the application from the Environmental Systems Research Institute (ESRI) via a laptop at the emergency site location (the ICC). The Fire Planner needs to access this strategic information to provide the Incident Commander with pertinent information pertaining to the emergency.

Because the current CAL FIRE WAN infrastructure does not support consistent and persistent connectivity at the emergency locations (ICC), CAL FIRE often works with partner agencies (Office of Emergency Services, Universities, the U.S. weather service, and others) to establish connectivity on an "as needed" ad hoc basis. This has proven to be unreliable and inefficient, causing operational and network security issues.

The objectives of this FSR support providing persistent connectivity at the ICC, which would allow CAL FIRE to access both the needed GIS and weather data directly, without having to go through other organizations that do not have the same supports services as does CAL FIRE, as described in Section 4.

Training

The OSFM develops and approves curriculum on fire prevention methods, building codes, permit procedures and many other prevention techniques. The OSFM is responsible for certifying the State's 60,000 fire fighters on these various procedures. Approximately 30,000 fire fighters participate annually in various OSFM training programs.

The OSFM offers accredited classes through local colleges and universities. Currently 35 different academic institutions are working with CAL FIRE to provide training. Much of the training provided at these academic institutions is to certify instructors who will then provide training at fire stations (the "Train-the-Trainer" approach.)

All the training is currently delivered in a classroom setting or on site at a fire station—not necessarily the fire station that a firefighter is assigned to. As a result, firefighters are often "out of position" while either delivering or receiving training.

In addition, CAL FIRE provides information on classes and schedules to students through an intranet. Internet access is not available because CAL FIRE does not have the infrastructure to support the applications and protocol required to send and receive student transcript information and other student-specific files electronically. This results in files and reports being sent via the postal service. The objectives address the need for CAL FIRE to put a WAN infrastructure in place that supports a more efficient means to document, track, and disseminate information such as the firefighter certifications.

Fire and Life Safety

Fire and Life Safety is responsible for the permit process of state-owned or state-occupied buildings. The permits are renewed annually for existing buildings. Building code for new construction is defined in the State Fire Marshal building code, mandated by the State and managed by field deputies/operators. There are 28,000 existing state-owned or state-occupied buildings in California. Approximately 50 % of all jails and 100% of prisons are currently managed by this program, which is currently executed by 25 field operators working remotely and supported by 12 PYs working in offices in Sacramento and Monrovia.

This program also enforces fireworks policy in the State. Events that include a fireworks display must get a permit from this entity in order to be compliant with state policies.

Fire Engineering

Fire Engineering provides the licensing of all fire related tangible objects and companies that distribute them, e.g., fire extinguishers, extinguishing systems, fire works, and chemicals. The fire engineering program is involved in the Certified Unified Program Agency (CUPA) which involves six different environmental forecast functions and provides oversight in hazardous material enforcement areas.

Pipeline Safety Division

There are 8000 miles of pipeline typically transporting petroleum-based products throughout the state. The Pipeline Safety Division is a federal Department of Transportation mandated program that monitors the transport of hazardous materials via pipeline. This program provides installation support services, performs corrosion tests to maintain State requirements and investigates any accidents that occur in the system.

Regulation and Analysis Division

Regulation and Analysis Division is responsible for adoption of OSFM regulations and standards, building and fire codes. This program tracks and reviews proposed legislation that would have an impact on the CAL FIRE organization. Legislation affecting other State agencies, for example the California Highway Patrol, is also tracked and reviewed for potential impact to CAL FIRE. By law, code interpretations must be available from OSFM.

Fire and Resource Assessment Program (FRAP)

State law requires that CAL FIRE periodically assess California's forest and rangeland resources. FRAP performs the required assessments in cooperation with federal, state and local agencies, public and private organizations, and California's academic research community.

Wild Land Urban Interface (WUI)

WUI is the zone where natural areas and development meet. The attraction of living outside the city limits continues to push urban sprawl to more remote areas of the state. Providing fire protection and prevention support to these areas falls under the OSFM.

Resource Management Program

The Resource Management Program has its headquarters in Sacramento, CA. The focus of this program is to manage the use, logging and development of private land through a legal process called the Timber Harvest Plan (THP). The THP defines the conditions by which the private land may be used by the land owner.

The THP is developed by Registered Professional Foresters—private consultants or lumber industry representatives. This application (typically averaging 300 pages in length) is completed by hand and mailed (in paper form) to one of three regional offices (Santa Rosa, Fresno and Redding) for processing.

The objectives address the need for CALFIRE to put a WAN infrastructure in place that supports a more efficient means to document, track, and disseminate information such as the THP permit documentation.

3.1.3 Impact of the Proposal

As detailed in the following sections, many of CAL FIRE's fundamental business processes are being impacted negatively by the current WAN infrastructure. Specific examples include support to the ECCs, communication at the ICCs, operations at the Northern and Southern Operations (Ops) locations, fire planning, tracking and dissemination of the required training and certification documentation, the Timber Harvest Plan approval process, and distribution of the CAL FIRE newsletter.

3.1.4 Customers and Users

Customers and Users of the CAL FIRE WAN system within the scope of this FSR are internal and external constituents of the organization. Specific user groups are as follows.

Direct Project Stakeholders

- CAL FIRE
 - Executive Branch
 - Administrative and Legislative Branch
 - Fire Stations
 - Air bases
 - Conservation Camps
 - Incident Command Centers
 - Demonstration Forests and Nurseries
- Office of State Fire Marshal
 - Fire Planning
 - Training

- Fire and Life Safety
- Fire Engineering
- Pipeline Safety Division
- Regulation and Analysis Division
- Fire and Resource Assessment Program (FRAP)
- Wild Land Urban Interface (WUI)
- Resource Management
 - Timber Harvest Program (THP)

3.1.5 Program Experiencing the Problem

The problems detailed in Section 3.2 are experienced by the following programs.

- Emergency Command Centers
 - Location of 9-1-1 Dispatch and emergency response services.
 - Mission-critical communication operations originate here and are dispatched to the appropriate resource.
- Incident Command Centers.
 - Staging area established close to the emergency where support services and CAL FIRE Incident Commanders are located.
 - Decisions made have the greatest impact on fire fighter and public safety.
- Incident Commanders
 - The Senior CAL FIRE employee at the ICC.
 - Responsible for monitoring, controlling, allocating resources and communicating requirements and status to CAL FIRE operations, the public and government entities.
 - The ability to access real time incident-related information and data is critical to the safety of the fire fighters on the ground, the public as well as ensuring that the emergency is brought under control as expeditiously as possible.
- Operation Centers
 - Location where Region Chiefs receive information and make strategic decisions about Statewide emergencies.
 - Access to all information pertaining to each emergency (e.g., GIS, fire plans, and available resources) is critical.
- Fire Stations, Air bases and Conservation Camps
 - Locations where primary staff and resources reside.
 - Many venues are in remote and rural areas of the State.
 - Immediate access to emergency profile information is essential in ensuring a timely response.
- Fire Planning
 - Responsible for assessing the risk of fire in an area.

- Responsible for creating plans of buildings and structures that describe entry and exit routes in the event of an emergency.
- Ability to access information about the geography and history of the area or structure is critical to decisions made relating to fire fighter and public safety.
- Responsible for training and certifying the State's 60,000 firefighters on various fire fighting, fire prevention and permitting procedures.
- Resource Management
 - Responsible for managing use of private land in the State.
 - Interacts with ten or more State agencies to review timber harvest permit plans.
 - Must meet aggressive timelines and interoperability demands from landowners and agencies.

3.1.6 Conditions Creating the Problem

WAN Infrastructure

As described in Section 4.1.1, the current persistent WAN infrastructure covers approximately five percent of CAL FIRE's locations. These locations house a very small percentage (<10%) of CAL FIRE's personnel. Most front-line fire protection personnel are not housed at these 40 sites. The rest of the CAL FIRE locations connect to the WAN through low speed dial-up. In relatively few cases, local units, on their own initiative and out of their own budget, have acquired Internet-based broadband (DSL or Cable Modem-based VPN connections). This has only been done where this type of connectivity is available and where the local unit has been able to fund the additional cost (typically \$50-\$150/month) of providing this higher speed connectivity. Currently, for remote sites, the central CAL FIRE IT budget funds low-speed dial up connectivity only.

The vast difference between the high speed connectivity available in the 40 HQ and administrative locations and the dial-up available in the hundreds of fire stations, air bases, conservation camps and remote administrative offices adversely affects CAL FIRE employee's ability to share information in a timely manner, and therefore, significantly reduces CAL FIRE employee productivity. Users located at the 40 sites connected to the Core WAN have relatively high speed and persistent connectivity and are able to share e-mails, share rich attachments (PowerPoint, word documents, video files), access critical information on the Internet and obtain good response times when accessing CAL FIRE applications to include but not limited to:

- ROSS
- ePay
- Incident Management Base System (InciNet)
- Intranet Access
- E-Mail
- FIRE PLAN
- AIMS
- EFC33
- CAIRS

The remaining 95% of CAL FIRE locations (>90% of CAL FIRE users) are connected through low speed dial-up connections and are severely hampered in their ability to effectively access applications, share data and even receive and send e-mail. A typical chief's e-mail may take anywhere from two to four hours to download because of poor response time caused by inadequate bandwidth. A simple daily task such as entering time sheet information which would take a few minutes at most at one of the 40 sites connected to the Core WAN often takes hours over a dial up connection.

The persistently connected sites utilize frame relay circuits connected to their respective hub site (Riverside, Redding, Fresno and Sacramento). The hub sites utilize point-to-point T1s for connectivity to the core ITS data center in Sacramento. All mission-critical applications are hosted at ITS and/or have independent operating capability within the ECC if a true disaster were to occur.

Business-critical applications are all hosted within the CAL FIRE ITS Data Center. All Internet bound traffic must traverse the ITS core to get to the public Internet via Cal FIRE's centralized connection point. For example, as a result, a site connected to the Fresno hub must first traverse to the Fresno hub then to the ITS hub before it reaches the Internet. Each hub is connected to the ITS core via a T1 circuit, however each hub site might have numerous frame relay sites connected to it which can overburden the T1 for ITS connectivity. This topology will limit CAL FIRE's ability to provide more persistently connected sites. This is another example of why CAL FIRE needs a WAN infrastructure refresh.

The remainder of the CAL FIRE locations, fire stations, air bases, conservation camps and remote administrative branches use dialup RAS or (in a few cases, as mentioned above) VPN connections over broadband DSL or Cable Modem links for connectivity. The negative impact of the existing WAN infrastructure is most significant for this subset of CAL FIRE locations because of dial-up connectivity is not persistent and because it does not provide adequate amounts of bandwidth given the types of data being downloaded and the types of applications being accessed.

CAL FIRE also utilizes external services which are accessed over the Internet. This includes the mission-critical rostering application, ROSS, and some external Geographic Information System (GIS) applications used by fire fighters for planning responses to fire conditions. In addition, CAL FIRE must meet the needs of federal, state and local government agencies as well as private industry cooperators to access data and telecommunications services at incident command and emergency recovery operation sites.

Benchmarking Results

CAL FIRE engaged Gartner to perform an in-depth analysis of CAL FIRE's current WAN infrastructure. Gartner's benchmarking methodology is based on the following principles:

- Gartner uses consensus models with a standard chart of accounts and accompanying definitions for all benchmarks.
- Definitions are the same for all clients.
- Every item of "workload" (e.g., volumes, units) Gartner captures has a corresponding cost.
- Both the amount of work and cost are reviewed to determine if they are within the expected range.
- Peer groups are selected for each IT Service Area independently, based on workload and support profile.

- The peer groups represent as close a match as possible to the range of parameters that define the profile of CAL FIRE's IT operation, as reported to Gartner.
- The peer group's spending and support profile is used to simulate what the comparative groups would expend in dollars and headcount to support CAL FIRE's workload.

Gartner's benchmarking credentials include the following:

- Gartner conducts nearly 5,000 benchmarks each year for both public sector and commercial clients. These benchmarks utilize a standard chart of accounts that ensures the consistency of cost and resource data we collect to conduct the benchmark, as well as the comparisons and conclusions that result from these benchmarks.
- Gartner is the industry leader in IT benchmarking – its Database, Global Coverage and Breadth of offerings, analysts and quality of deliverables based on 17,000 total benchmarks since 1994.
- Gartner's database is unparalleled for the depth, accuracy and volume of peer group data (1,800 benchmarks over the last 18 months).
- Gartner peer group data is never more than 18 months old.

Through this extensive benchmark analysis, Gartner has identified key cost under spends in CAL FIRE's technology and personnel as compared to peers of a similar size, network workload and technology environment.

This benchmark compared CAL FIRE's WAN workload (e.g., size and complexity of network, number of devices) and related costs with those of other similar public sector organizations. This benchmark analysis included both the technical and operational WAN environment, and the categories used in the Gartner analysis include Personnel, Bandwidth (Transmission¹), Facilities (Occupancy²), Software, and Hardware.

Gartner's benchmark analysis is detailed on the following pages, and describes and supports the key spending conditions that are creating the problem.

¹ Transmission is defined as sending information in the form of electrical signals or electromagnetic waves over wires, optical fibers or the air. For purposes of the CAL FIRE benchmark transmission encompassed the following components:

- **Wide-Area Data Network (WAN)** — Connectivity to support business critical data between enterprise locations and business partners.
- **Local-Area Data Network (LAN)** — Connectivity to critical business systems within enterprise sites and campuses.
- **Internet Access Services (IAS)** — Enterprise access to the Internet, both for the use of its personnel, and for the use of its external customers to access enterprise WEB sites.
- **Remote Access Services (RAS)** — Enterprise network and business systems access to end users working remotely, such as from a home office, hotel room, or small office location

² Occupancy includes fully burdened costs for the facilities being used by the staff supporting the CAL FIRE IT operation under analysis. Some examples include office space, furniture, electricity, maintenance, property taxes, security and office supplies

Total Spend for Data Networking

The Gartner Benchmarking analysis indicates that when compared to its peers, CAL FIRE is spending only 67% of what would be expected, i.e., CAL FIRE is under spending on its infrastructure by \$1,255,436 per year when compared to peer organizations. In Gartner’s opinion this result is evidence of a significant under-investment by CAL FIRE in its WAN infrastructure.

The following figure and table describe CAL FIRE’s under spend for data infrastructure compared to peers with similar size, network workload, and technical environment. It should be noted that CAL FIRE is spending 33% less than the peer average. This under spend is significantly impacting CAL FIRE’s ability to support the development of efficient mission- and business-critical processes which require a high level of collaboration among CAL FIRE personnel at all locations.

Figure 2. Total Spending for Data Networking

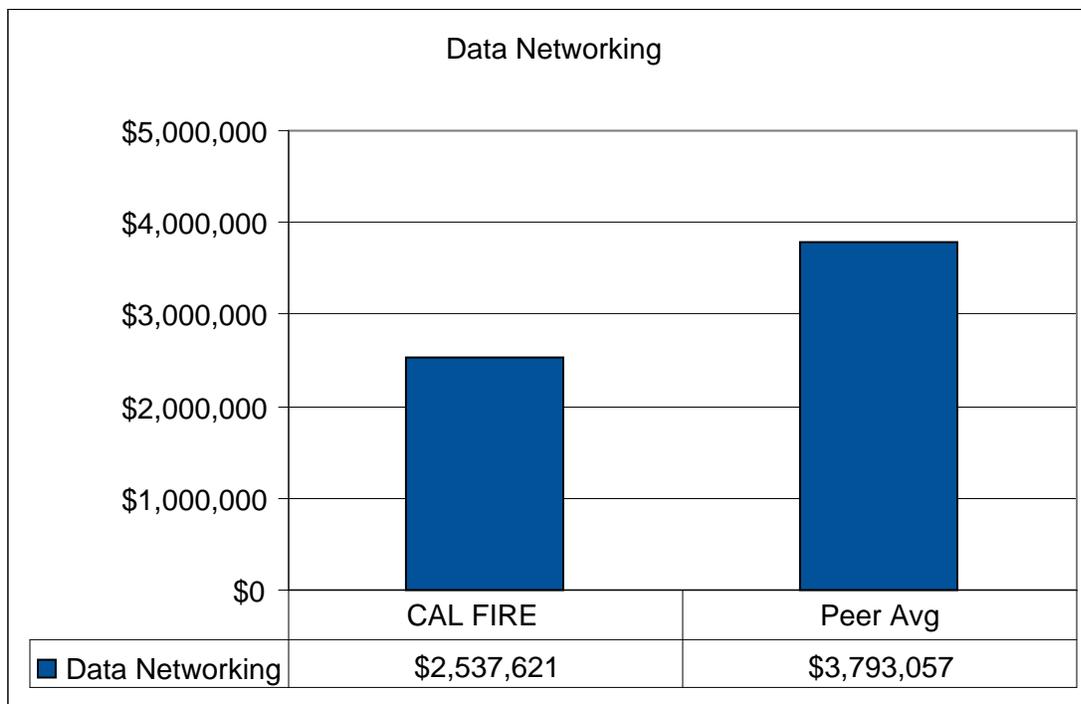


Table 3. Data Spending vs. Peer Averages

Total Spending Data Networking				
	CAL FIRE	Peer Avg.	Difference	Percent
Data Networking	\$2,537,621	\$3,793,057	\$(1,255,436)	67 %
Total	\$2,537,621	\$3,793,057	-\$1,255,436	67 %

The following figure and table describe CAL FIRE’s under spend by total data network cost categories. The cost categories used in the Gartner analysis include Personnel, Bandwidth (Transmission), Facilities (Occupancy), Software, and Hardware.

In comparison to peer organizations, CAL FIRE is under spending by 47% for software costs, by 76% for occupancy costs, by 39% for transmission costs, and by 56% for personnel. CAL FIRE has a combined total under spend of 33% (i.e., is spending only 67% of what would be expected) in these cost categories when compared to peers. This under spend is limiting the CAL FIRE ITS organization’s ability to implement modern business practices across the organization.

Figure 3. Data Network Cost Spend

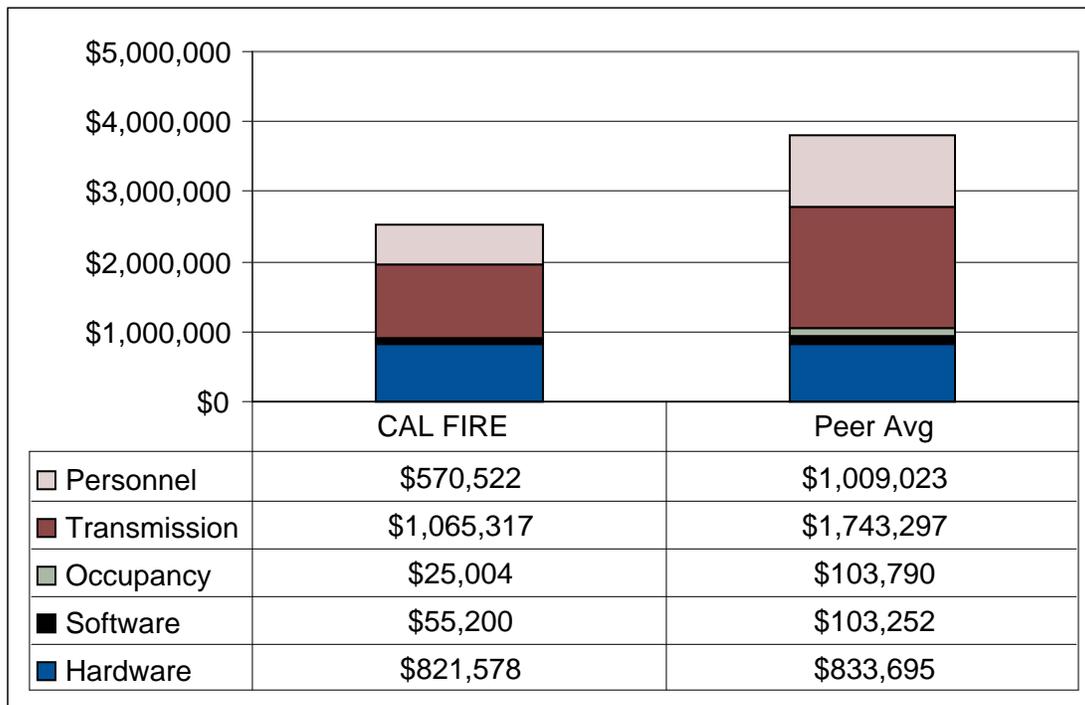


Table 4. Data Network Cost Spend

Total Spend for Data Network by Cost Type (HW, SW, Personnel, etc.)				
	CAL FIRE	Peer Avg.	Difference	Percent
Hardware	\$821,578	\$833,695	\$(12,117)	99 %
Software	\$55,200	\$103,252	\$(48,052)	53 %
Occupancy	\$25,004	\$103,790	\$(78,786)	24 %
Transmission	\$1,065,317	\$1,743,297	\$(677,980)	61 %
Personnel	\$570,522	\$1,009,023	\$(438,501)	57 %
Total	\$2,537,621	\$3,793,057	-\$1,255,436	67 %

Personnel

Gartner's benchmark analysis categorized CAL FIRE's personnel using the following four categories, or service towers.

- **WAN Service Tower**—this service tower tracks the quantity of personnel associated with connecting CAL FIRE's locations together using persistent connectivity. This tower corresponds to the part of the Core WAN Infrastructure that interconnects the 40 most critical CAL FIRE locations.
- **LAN Service Tower**—this service tower tracks the quantity of personnel associated with providing Local-Area Network (LAN) connectivity at CAL FIRE locations. For the most part, LAN services are only provided at the 40 most critical CAL FIRE locations. These are the same locations that are inter-connected by the CORE WAN.
- **Remote Access Tower**—this service tower tracks the quantity of personnel associated with providing dial-up remote access services for all the locations connected to the Remote WAN Infrastructure. As previously mentioned, approximately 95% of CAL FIRE locations, including almost all Fire Stations and Air Bases use dial-up as their primary and only means of data connectivity.
- **Internet Access Tower**—this service tower tracks the quantity of personnel associated with providing CAL FIRE users with the ability to access the public Internet.

The following figure and table describe key CAL FIRE full-time support personnel by service tower related to peers. As this table and figure demonstrate, CAL FIRE is understaffed by 64% (i.e., has only 46% of personnel that would be expected) when compared to its peers. CAL FIRE's current staffing levels are significantly limiting CAL FIRE's ITS operations. CAL FIRE is currently meeting operations demand on a "shoe string" staffing level. This affects the organizations ability to support the current environment, expand the current environment and bring new modern business services and practices to the CAL FIRE organization. For example CAL FIRE is unable to release new Web-based service offerings regarding OSFM and THP program objectives such as online Web casting, online training and fire permitting process efficiency. The current staff is primarily focused on meeting immediate support needs to keep the CAL FIRE organization running at status quo.

Figure 4. Personnel by Service Tower

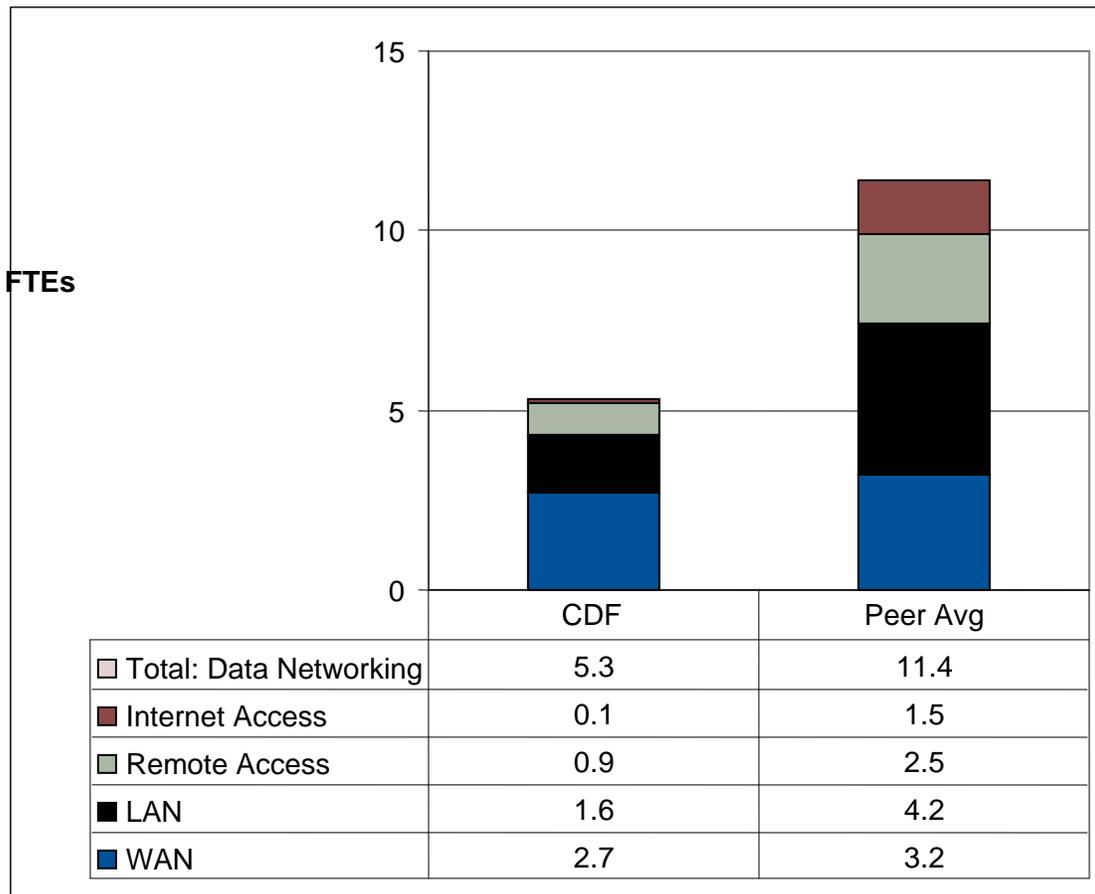


Table 5. Service Tower Personnel Totals

	CDF	Peer Avg.	Difference	Percent
WAN	2.7	3.2	-0.5	84 %
LAN	1.6	4.2	-2.6	38 %
Remote Access	0.9	2.5	-1.6	36 %
Internet Access	0.1	1.5	-1.4	7 %
Total: Data Networking Personnel Spend	5.3	11.4	-6.1	46 %

Infrastructure Obsolescence

In addition to under spending, CAL FIRE's WAN Infrastructure is also fast approaching the point at which it can be considered obsolete. Industry research from Gartner indicates that there are two principle reasons that data networking infrastructure becomes obsolete. The reasons are as follows.

Support and Maintenance Obsolescence

A piece of equipment is said to be approaching support and maintenance obsolescence when it has been discontinued or is no longer fully supported by the OEM (Original Equipment Manufacturer) vendor and/or when maintenance/support costs charged by the vendor rise to the point where reducing the maintenance and management costs can substantially defray the cost of acquiring new equipment. In the case where support for the product has been discontinued, CAL FIRE is forced to rely on used or refurbished equipment for spare parts which could result in extended outages due to longer repair times. Over time this can often lead to an increase in outages due to the fact the refurbished equipment is more likely to fail than new equipment. The following descriptions and table depict the CAL FIRE WAN infrastructure hardware that is currently obsolete.

- *Routing Infrastructure* provides the ability for separate networks to communicate and transfer traffic to each location. Each location has its own piece of equipment that makes this possible.
- *Security Infrastructure* protects the CAL FIRE data network from unethical outside intruders. These devices keep information systems safe from unauthorized access, known as hacking. This infrastructure also provides VPN access to external, non-persistently CAL FIRE locations. This connection provides 95% of the connectivity for personnel located at fire stations, air bases, conservation camps and branch administrative offices.

Table 6. WAN Infrastructure Hardware

WAN Hardware	Percentage Obsolete	Date Obsolete
Routing Infrastructure		
Cisco 2620 and 2621	100%	April, 2008
Cisco 7206VXR Chassis	100%	January 27, 2007
Security Hardware		
Cisco Pix 515 Firewall	100%	May 24, 2007
Cisco PIX 520 Firewall	100%	June 23, 2006

Functional and Technology Obsolescence

A piece of equipment is said to be functionally or technical obsolete when it is incapable of being upgraded to support required business functionality, capacity or technology requirements. Industry research from Gartner indicates that the majority of private and public sector organizations budget for the replacement of most networking gear on a three- to four-year cycle for data equipment. The majority of CAL FIRE WAN infrastructure has been in place for more than seven years. This means that CAL FIRE has extracted more business value from this equipment than have most private and public sector organizations. However, it also means the equipment is at the point where functional and technical shortcomings are limiting CAL FIRE's

ability to effectively communication between sites. A few examples of the functional and technical obsolescence of the equipment are as follows:

- Limited support for Quality of Service (QOS) which allows different types of traffic to be prioritized differently across the network. This is critical to ensuring the performance of fire mission-critical applications when the network bandwidth is fully loaded. Without QOS, CAL FIRE is unable to allow many highly useful, but non fire mission-critical applications to be deployed. This feature also makes it difficult for CAL FIRE to deploy streaming audio and video on the network.
- Limited support for multi-cast broadcasting prevents CAL FIRE from broadcasting radio channel traffic or video broadcasts over the network.
- Limited support for voice/data convergence which would allow future voice traffic over the WAN infrastructure.
- Limited support for integrated security services.

3.2 Business Problem or Opportunity

The conditions described in Section 3.1.6 have created problems that need to be addressed in order for CAL FIRE to meet its Mission, Objectives and most importantly, the safety needs of the citizens of the State. The problems identified are primarily related to an aging and now insufficient WAN infrastructure as well as the lack of needed personnel support.

3.2.1 Business Problems

Problem #1: The risk of disruption to CAL FIRE's operations that support public safety is increasing due to an aging and obsolete WAN infrastructure.

CAL FIRE is experiencing a natural decline in the life cycle of technology sustainability. CAL FIRE's current WAN infrastructure includes pieces of equipment that are approaching the end of their life cycle. This condition results in a state of obsolescence and occurs when the following factors take place;

- The Original Equipment Manufacturer (OEM) has discontinued or is no longer fully supporting the equipment; and/or
- When the costs required to support and sustain the piece of equipment are significantly higher than the cost of purchasing a newer product.

CAL FIRE needs a stable WAN infrastructure to carry out its mission to protect and serve the constituents of the State of California. Without an upgrade, the risk for CAL FIRE's current WAN infrastructure to become incapable of supporting CAL FIRE's business functionality continues to increase.

In addition, the current WAN system was scoped and designed to align with requirements of CAL FIRE in 1999/2000. At this time CAL FIRE had only a comparatively few critical software applications, few employees used or desired to use e-mail for communication, and it was not yet possible to access critical situational information (such as weather, equipment status or cooperators status) over the public Internet.

Problem #2: CAL FIRE currently provides high speed data connectivity to ICCs on an ad hoc basis that is dependent on where the command center is established and the availability of rental satellite equipment from a local satellite services provider.

A key risk of this approach is that in a major disaster, rental equipment might not be available because CAL FIRE uses the same type of equipment that would be in high demand by other disaster responders, including other agencies, local agencies, media companies and insurance companies.

2007 Southern California Fire Storms

During the fire storms in southern California of October 2007, it quickly became clear that the network resources CAL FIRE currently has deployed were not adequate to serve the public or departmental needs. As more and more people accessed web services and operational applications, deployed bandwidth became overwhelmed. At one point, the public web server effectively became inaccessible as the bandwidth could not meet operational need due to heavy load.

The situation further degraded as the lack of available bandwidth started to act as a contagion to the CAL FIRE Virtual Private Network (VPN), degrading access to systems for CAL FIRE remote users. VPN is a technology that allows secure access to the CAL FIRE Intranet via an Internet connection, and is used by remote users (fire stations, camps and airbases). Because the Internet bandwidth was saturated, and dedicated bandwidth was not available, these emergency responders experienced significantly degraded performance levels to the point that many found system access unusable, causing performance problems at a critical time.

As the fire storms progressed, the entire Southern Region experienced operational degradation as the available bandwidth was not sufficient to meet operational need, causing delays in delivery of people and equipment to the fire fighting effort (resource ordering), timekeeping, and other critical tasks.

The existing WAN does not have enough capacity to meet operational need when it is needed most, at times of local and regional emergencies.

The Incident Commander requires the ability to receive and transmit information on a real-time basis. Without this capability, CAL FIRE command and control functions are significantly impaired. Even out in the remote areas of California fighting fires, CAL FIRE firefighters rely on real-time communications for command and control and base camp operations in order to perform critical job functions. Access to real time data such as weather, traffic and geographic information systems (GIS) information is imperative for tactical emergency support.

CAL FIRE must also meet the real time information sharing needs of federal, state and local government agencies as well as private industry cooperators who participate in incident response and are based at the ICCs.

In addition, all CAL FIRE personnel at ICCs must perform the following administrative functions:

- Submit Resource Ordering Supply System (ROSS) information daily. This information is utilized for situational and response support functions regarding CAL FIRE's public safety mission.
- Submit Timesheets. This function allows non-exempt CAL FIRE employees timely paychecks. These employees include all fire fighting personnel.
- Submit Personnel Time Reporting (FC33) information. This information is used for incident and resource management costs during large CAL FIRE response operations.
- Fire Planners are not able to access GIS and other important data from their laptops because of poor or nonexistent connectivity at the ICC. This results in CAL FIRE having to depend on the U.S. National Weather Service to provide support, resources and equipment to fulfill the Fire Planners mission.

3.2.2 Business Opportunities

The problems listed in Section 3.2.1 provide CAL FIRE with the following business opportunity.

Opportunity: Enable front-line CAL FIRE employees (such as fire fighters and forest rangers) to more efficiently and effectively perform their duties.

The current persistent T1-speed WAN infrastructure covers only approximately five percent of the CAL FIRE locations. The remaining CAL FIRE locations, including nearly all the fire stations, air bases and camps connect to the WAN through very low performance dial-up remote access service (RAS) or Internet-based VPN connections. This disparate connectivity adversely effects CAL FIRE employee's ability to share information in a timely manner and to execute routine administrative or management tasks in an efficient and productive manner. For example:

- Fire fighters stationed at remote fire stations are leaving their posts and driving to a different CAL FIRE location with connectivity in order to submit time sheets, ROSS information and other administrative documents over the Internet or via fax. This approach takes the CAL FIRE personnel out of position which impacts response time and resource availability.
- For a chief located at an Fire Station, Camp, or Airbase a typical e-mail can take from up to two to four hours to download because of poor response time caused by inadequate bandwidth.
- Very slow and sometimes unavailable Internet connectivity or dial up connectivity from remote locations sometimes precludes the fire fighter from completing the roster update. Consequently, ROSS information does not get always updated and decisions in an emergency response situation are sometimes made without a complete set of critical information.

- Information pushed out to the field such as the CAL FIRE newsletters and Human Resources Policy and Procedure documents is not being received ubiquitously due to the limitations of the current infrastructure.
- Resource tracking is done manually because of the information in the current application is not accurate, current or reliable. Accounting of fire fighters and equipment is inconsistent because ROSS and CAD are not updated regularly. As a result, at the time an incident occurs, ECC personnel must waste valuable time and use scarce radio bandwidth to confirm the location and status of key pieces of equipment and personnel.
- GIS information is often available but not accessible to ICs and other emergency commanders because of limitations of the current infrastructure. For example, remote controlled drone aircraft provide real time GIS data to CAL FIRE personnel during a large scale emergency. The information captured by this unmanned aircraft is available immediately upon landing but is not accessible to CAL FIRE due to limitations in bandwidth caused by the current infrastructure, which results in lack of access to needed feature-rich applications.
- CAL FIRE needs access to weather information 24 hours a day. Currently, critical near time weather mapping data as well as weather projection (three to seven day simulated forecast) is provided to CAL FIRE by the United States Geological Survey (USGS) in Colorado via “gridded weather modeling.” However, USGS does not provide the 24 X 7 access and support required by CAL FIRE. Consequently, CAL FIRE’s access to needed weather information is sometimes unnecessarily delayed.
- The current delivery method of executing a Timber Harvest Permit does not meet the deadline requirements of the organization, is very expensive and inefficient. The current process is manually generated, submitted and executed. In order to meet the requirements of the State all documents salient to the application (application, supporting documentation, addendums, etc.) must be shared with other State and Federal agencies. Consequently, under the current infrastructure the Resource Management Program does not meet deadlines, is wasting valuable resources and incurring unnecessary PY expenses.
- The fact that CAL FIRE’s current infrastructure does not allow for efficient information exchange has resulted in increased workload, additional business operations expense, and cumbersome process in the provision of both Fire Prevention services such as Fire Planning and Fire Fighter Certification and Training.

3.3 Measurable Business Objectives

3.3.1 General Objectives

The general objectives of the WAN Upgrade are to:

- Minimize the risk of disruption to CAL FIRE's operations that support public safety. This risk is increasing due to an aging and obsolete WAN infrastructure. Minimizing this risk will be accomplished by:
 - Providing a technology refresh to replace obsolete WAN hardware
 - Providing a robust WAN backbone to address current and future bandwidth and performance demands
- Increase public safety efficiencies, streamline business processes and support CAL FIRE's future business vision. This will be accomplished by extending the WAN footprint to all CAL FIRE locations.
- Enable CAL FIRE to better support the communication needs of Incident Command locations during big fires and large incidents. CAL FIRE currently provides high speed data connectivity to ICCs on an ad hoc basis that is dependent on where the command center is established and the availability of rental satellite equipment from a local satellite services provider. This inconsistent and unreliable communications infrastructure will be replaced with dedicated, available, and strategically positioned trailer-based communications infrastructure.

3.3.2 Specific Program Objectives

The following objectives have been identified in order to meet current and future CAL FIRE business requirements.

- Replace aging WAN hardware before it fails and cannot be serviced
- Include a one-time hardware budget refresh in Year 5 to further extend the CAL FIRE WAN expectancy
- Provide an infrastructure to support electronic distribution of CAL FIRE information to all full time employees regardless of location
- Provide the infrastructure to support electronic transfer of critical public safety information to external stakeholders
- Ensure a consistent and reliable means for situational support at ICCs
- Ensure readiness to integrate into future Statewide financial accounting and budget applications

3.4 Functional Requirements

3.4.1 Functional Requirements

- Maintain CAL FIRE's existing WAN availability, fault tolerance, security and disaster recovery
- Improve WAN performance, security and coverage
- Support electronic transfer and utilization of critical public safety information for all front-line CAL FIRE personnel
- Ensure a consistent and reliable means for situational support at ICCs including real/near time data for:
 - Weather
 - GIS
 - Resource allocation provisioning
 - Digital and voice communications
- Provide the ability for all CAL FIRE personnel to have ready-access to CAL FIRE's existing business applications
 - Improve the performance of current applications
 - Enable deferred applications to be "activated"
 - Enable the deployment of new applications in the future via a higher capacity WAN infrastructure
- Establish audio and video broadcasting capabilities to support both internal and external communications
- Provide videoconferencing capabilities to support distance learning for training of fire personnel
- Support electronic processing of business applications (ROSS, CAIRS, THP process, etc.) with reasonable average response times at all CAL FIRE locations
- Support a more efficient means to document, track, and disseminate information such as the firefighter certifications, THP process information, Fire Plans, internal communications (e.g., CAL FIRE newsletter)
- Provide CAL FIRE with the infrastructure to integrate into future Statewide financial accounting and budget applications

3.4.2 Infrastructure Requirements

The primary infrastructure requirements for the WAN Upgrade are documented below. There is no impact to the DTS network or data center.

Table 7. Technical Infrastructure Requirements

Aspect	Description	Requirement
Core WAN	Replace the current hub and spoke topology with a flat topology that provides any to any connectivity among the current 40 Core WAN locations.	<ul style="list-style-type: none"> ■ Replace the current hub and spoke topology with a flat topology that provides “any to any” connectivity among the current 40 Core WAN locations ■ Maintain current levels of security and availability in the Core WAN. ■ Increase network performance by adding bandwidth and advanced application prioritization and optimization capabilities. ■ Bandwidth—Full T1 access at small locations with NxT1 or DS3 access for medium and large locations (former hubs) ■ Able to support future voice/data network convergence ■ Implement a redundant Internet pipe at the CAL FIRE ITS core
Remote WAN	Provide persistent, secure broadband-type connectivity to CAL FIRE locations that are not currently connected to the Core WAN today	<ul style="list-style-type: none"> ■ Utilizes DSL, Wireless or Satellite for network connectivity based on availability and cost ■ Includes additional bandwidth and equipment to the core WAN required to support additional new locations
ICC	Provide 6 CAL FIRE owned trailers equipped with the necessary satellite and network hardware to provide on-site data and voice connectivity	<ul style="list-style-type: none"> ■ Provide satellite Auto deploy functionality for fast and convenient no hands setup ■ 2 MB transmission and 2 MB download bandwidth capabilities ■ Wired/wireless switch for personnel and cooperator connectivity ■ Network termination to either the CAL FIRE private IP network or straight Internet access depending on chosen solution

3.4.3 Traceability Matrix

The following traceability matrix provides a visual representation of the relationship between business problems or opportunities, business objectives and system functional requirements.

Table 8. Traceability Matrix

Business Need (Problem or Opportunity)	Business Objective	Functional Requirement
Problem		
<p>Problem #1: The risk of disruption to CAL FIRE’s operations that support public safety is increasing due to an aging and obsolete WAN infrastructure</p>	<ul style="list-style-type: none"> ■ Replace current aging and obsolete WAN hardware before they fail and cannot be serviced. ■ Include a one-time hardware budget refresh in Year 5 to further extend the CAL FIRE WAN expectancy 	<ul style="list-style-type: none"> ■ Maintain CAL FIRE’s existing WAN availability, fault tolerance, security and disaster recovery ■ Improve WAN performance, security and coverage
<p>Problem #2: CAL FIRE currently provides high speed data connectivity to ICCs on an ad hoc basis that is dependent on where the command center is established and the availability of rental satellite equipment from a local satellite services provider.</p>	<ul style="list-style-type: none"> ■ Ensure a consistent and reliable means for situational support at ICCs 	<ul style="list-style-type: none"> ■ Support electronic transfer and utilization of critical public safety information for all front-line CAL FIRE personnel ■ Ensure the capability to include real/near time data for: <ul style="list-style-type: none"> <input type="checkbox"/> Weather <input type="checkbox"/> GIS <input type="checkbox"/> Resource allocation provisioning <input type="checkbox"/> Digital and voice communications

Business Need (Problem or Opportunity)	Business Objective	Functional Requirement
Opportunity		
<p>Opportunity: Enable front-line CAL FIRE employees (such as fire fighters and forest rangers) to more efficiently and effectively perform their duties.</p>	<ul style="list-style-type: none"> ■ Provide an infrastructure to support electronic distribution of CAL FIRE information to all full time employees regardless of location ■ Provide the infrastructure to support electronic transfer of critical public safety information to external stakeholders ■ Ensure readiness to integrate into future Statewide financial accounting and budget applications 	<ul style="list-style-type: none"> ■ Provide the ability for all CAL FIRE personnel to have ready-access to CAL FIRE’s existing business applications <ul style="list-style-type: none"> □ Improve the performance of current applications □ Enable deferred applications to be “activated” □ Support the deployment of new application in the future via a higher capacity WAN infrastructure ■ Establish audio and video broadcasting capabilities to support both internal and external communications ■ Provide videoconferencing infrastructure capabilities to support distance learning for training of fire personnel ■ Support electronic processing of business applications (ROSS, CAIRS, THP process, etc.) with reasonable average response times at all CAL FIRE locations ■ Support a more efficient means to document, track, and disseminate information such as the firefighter certifications, THP process information, Fire Plans, internal communications ■ Provide CAL FIRE with the infrastructure to integrate into future Statewide financial accounting and budget applications

4.0 Baseline Analysis

The purpose of this section is to provide a clear understanding of the WAN infrastructure that currently supports CAL FIRE’s mission. This section builds on the Business Case provided in Section 3, further highlighting the need to implement the Proposed Solution described in Section 5.

Table 9. Baseline Analysis Sub-Sections

4.1	Current Method
4.1.1	Objectives of the Current System
4.1.2	Ability to Meet Workload
4.1.3	Internal User Satisfaction
4.1.4	External User Satisfaction
4.1.5	Technical Satisfaction
4.1.6	Application Characteristics
4.1.7	Data Characteristics
4.1.8	Security, Privacy and Confidentiality
4.1.9	Personnel Requirements
4.1.10	System Documentation
4.1.11	Failures of the Current System
4.2	Technical Environment
4.2.1	Expected Operational Life
4.2.2	External Systems(s) Interface(s)
4.2.3	State-Level Information Processing Policies
4.2.4	Financial Constraints
4.2.5	Legal and Public Policy Constraints
4.2.6	Department Policies and Procedures Related to Information Management
4.2.7	Anticipated Changes in Equipment, Software or the Operating Environment
4.2.8	Availability of IT Personnel
4.3	Established Infrastructure
4.3.1	Network Diagrams
4.3.2	Application Development Software
4.3.3	Personal Productivity Software
4.3.4	Operating System Software
4.3.5	Database Management Software
4.3.6	Application Development Methodology
4.3.7	Project Management Methodology

4.1 Current Method

4.1.1 Objectives of the Current System

The primary objective of CAL FIRE's wide-area network (WAN) infrastructure is to enable CAL FIRE's broad and diverse workforce and other local, state and federal cooperators to protect and serve the constituents of the State of California. It does this by facilitating data communication with CAL FIRE and between CAL FIRE and its partners. Cooperators are agencies and departments that work in unison with CAL FIRE personnel on large incident response emergencies such as fires, floods, earthquakes and other catastrophes. Cooperators interact with CAL FIRE for business-critical functions to include but not limited to information knowledge sharing, command and control, GIS services, fire planning, and policy and regulatory compliance (fire permitting) initiatives.

The WAN infrastructure consists of hardware, software and services which allow CAL FIRE users located at CAL FIRE facilities to establish data communication with CAL FIRE and Internet-based software applications. This infrastructure is used to facilitate the use of a variety of software applications including e-mail, CAL FIRE business applications, Internet-based resources, and Cooperator-based applications.

The availability and operation of the WAN infrastructures is vital to CAL FIRE's mission.

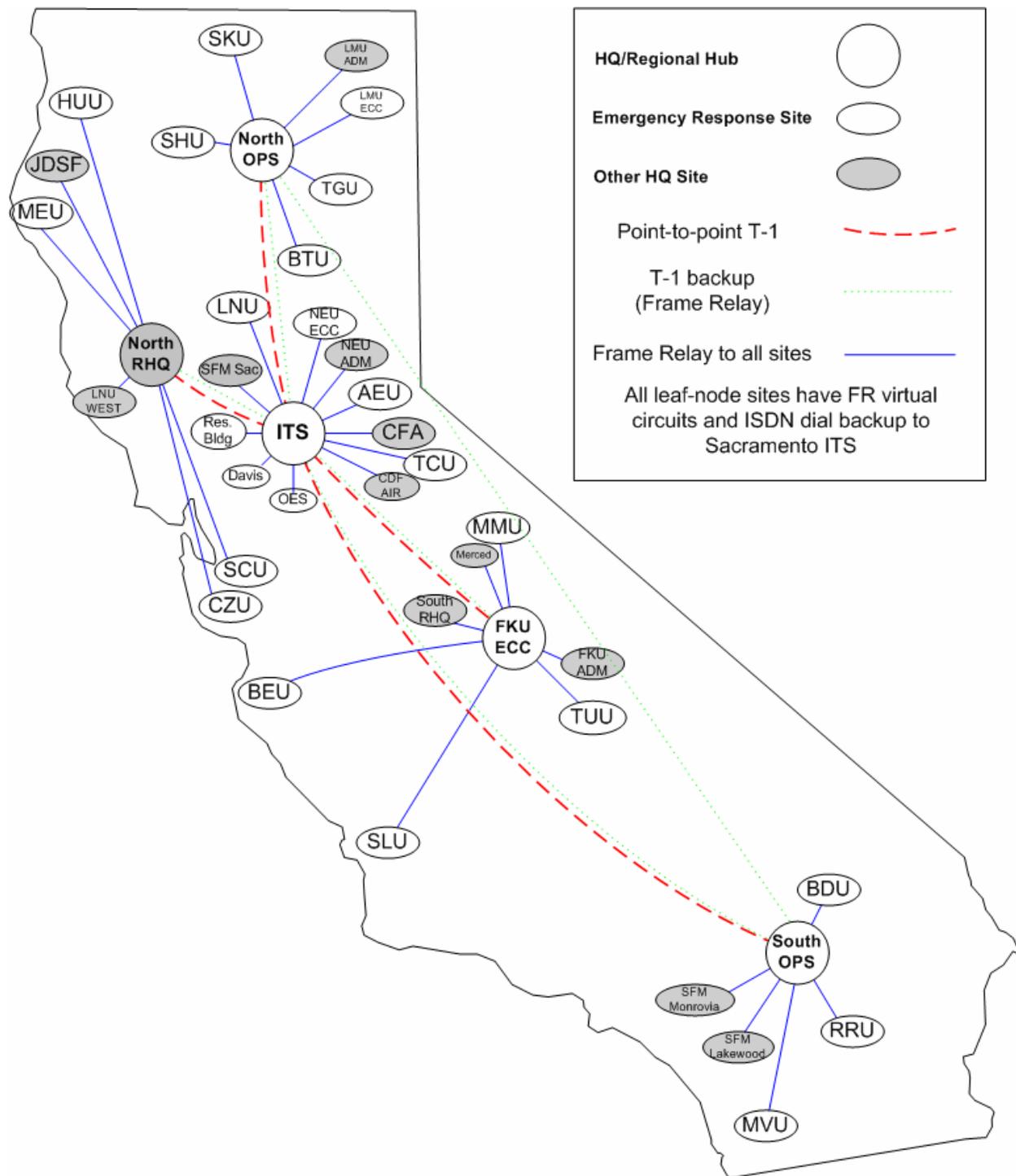
WAN Infrastructure

The CAL FIRE WAN is used to connect local-area networks (LANs) campus area networks (CAMs), remote personal computers located at various CAL FIRE sites together and provide them with the ability to access applications and information located at CAL FIRE Data Center, business partner data centers and other locations accessible via the Internet. CAL FIRE's WAN infrastructure consists of three separate infrastructures: Core WAN Infrastructure, Remote WAN Infrastructure, and Incident Command Infrastructure

Core WAN infrastructure

The Core WAN infrastructure is a seven-year-old Frame Relay-based network which provides persistent connectivity to approximately 40 sites. This includes the most critical CAL FIRE locations which includes the 21 Operational Units (also referred to as Emergency Command Centers, or ECCs), North, South and Central Headquarters and the Sacramento administrative offices. The Core WAN infrastructure provides T1 (1.55megabits/sec) or fractional T1 connectivity to each of these sites. The network is configured in a hub and spoke configuration with regional hubs in Redding, Sacramento, Fresno and Riverside. ECC Units are connected to the closest regional hub location. This network is also configured for fault tolerance with redundancy and diversity between the hub locations. ISDN-based dial backup is utilized to protect against "local loop" failures at the non-hub locations in case of T1 failure. While the Core WAN connects the most critical CAL FIRE locations together, it is worth noting that it currently connects less than five percent of CAL FIRE's locations in total. The current Core WAN infrastructure is summarized in the following figure.

Figure 5. CAL FIRE Core WAN Infrastructure



Remote WAN Infrastructure

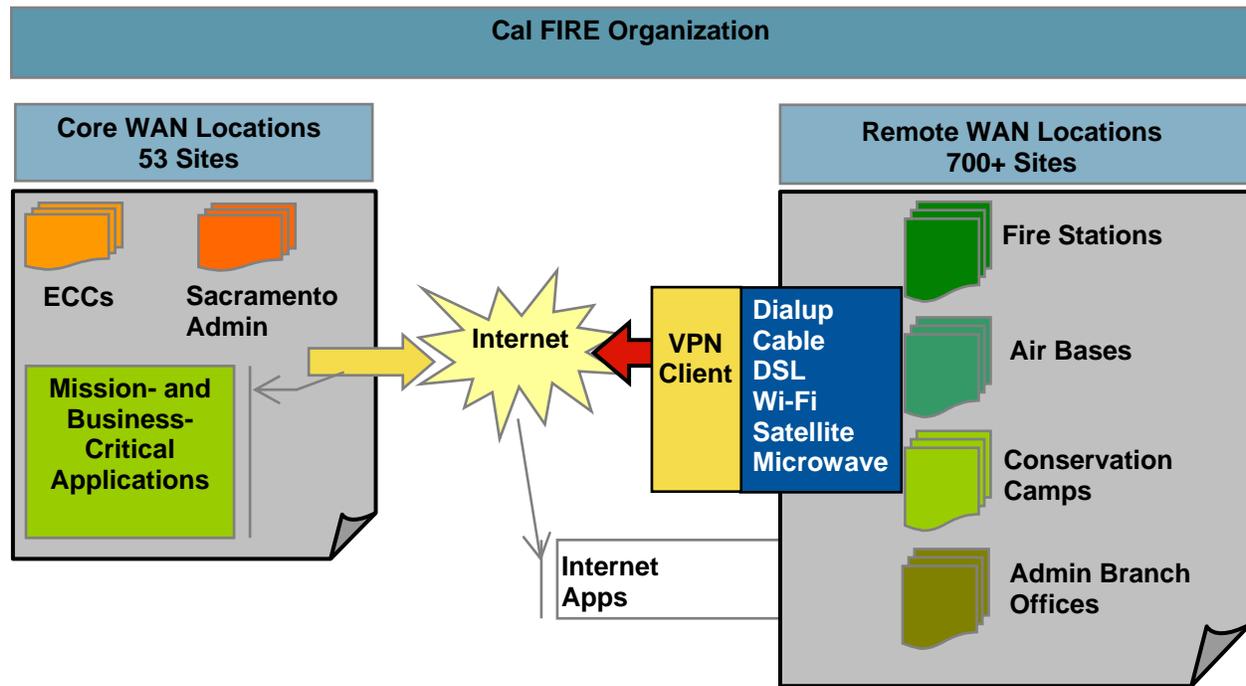
The Remote WAN infrastructure provides data connectivity for the remaining 95% of CAL FIRE’s locations. These locations are fire stations, conservation camps, air bases, branch administrative offices and ranger/lookout stations. Users at these locations utilize Virtual Private Network (VPN) software running on individual Personal Computers to establish secure connections to a VPN concentrator running inside CAL FIRE’s network in Sacramento. Most of these locations utilize standard dial-up connections to connect to the network. Dial-up provides only low-speed connection between 9.8Kbs and 48Kbs depending on the connection integrity. It is worth noting that 95% of CAL FIRE locations, including most all the personnel directly supporting the delivery of fire and emergency services are limited to the dial-up connectivity provided by the Remote WAN infrastructure. The following table summarizes the number of Remote WAN locations.

Table 10. CAL FIRE Remote WAN Locations

Description	Type	Count
CAL FIRE Owned		
	Fire Stations	228
	Airbases	22 (2 currently connected to Core WAN)
	Conservation Camps	39
	Demonstration Forests	8
	Nurseries	2
Schedule A		
	Fire Stations	299
Schedule C		
	Fire Stations	376

The purpose of this FSR is to obtain funding so that CAL FIRE can provide secure, persistent WAN connectivity for all CAL FIRE locations. Providing this WAN infrastructure will enable CAL FIRE to provide mission and business-critical functionality to all of its constituents as well as lay a foundation for future modern mission and business-critical processes. The current Remote WAN Infrastructure is illustrated in the following figure.

Figure 6. CAL FIRE Connectivity



CAL FIRE Operations

CAL FIRE's operations cover California and extend from Mexico to Oregon, from individual locations (stations, camps, forests, airbases) to Executive, Administrative, Operational and Unit Headquarters. The following table summarizes the number of CAL FIRE Locations and access point to the WAN.

Table 11. CAL FIRE Locations WAN Access Type

Description	Type	Count
CAL FIRE Core WAN Locations with Persistent Connectivity		
Large	<ul style="list-style-type: none"> ■ Executive HQ ■ ITS HQ ■ 4 Regional HQ's ■ 1 ECC/Unit HQ 	7
Medium	<ul style="list-style-type: none"> ■ Operational Units/ECCs ■ Other Administrative 	23
Small	<ul style="list-style-type: none"> ■ Other Administrative 	10

Description	Type	Count
CAL FIRE Remote WAN Locations without Persistent Connectivity		
CAL FIRE Owned		
	■ Fire Stations	228
	■ Airbases	22 (*2 currently connected to Core WAN via Operational Unit)
	■ Conservation Camps	39
	■ Demonstration Forests	8
	■ Nurseries	2
Schedule A		
	■ Fire Stations	299
Schedule C		
	■ Fire Stations	376

The large majority of CAL FIRE locations access CAL FIRE resources via remote access technologies that are not persistent and provide very low bandwidth connectivity.

4.1.2 Ability to Meet Workload

As described in Sections 3.1.6 and 3.2, CAL FIRE is heavily reliant on its WAN infrastructure to carry out both its daily operations as well as emergency response. CAL FIRE's ability to facilitate communication both internally and externally are significantly impacted by the WAN.

All CAL FIRE staff requires and benefits from the WAN infrastructure. Without it, CAL FIRE command and control functions are significantly impaired. Even out in the remote areas of California fighting fires, CAL FIRE firefighters rely on this infrastructure for command and control and base camp operations. There are many CAL FIRE employees that require the WAN infrastructure to perform critical job functions. For example personnel at remote WAN locations such as fire stations, air bases, incident command sites and conservation camps must perform the following administrative functions:

- Submit Resource Ordering Supply System (ROSS) information daily. This information is utilized for situational and response support functions regarding CAL FIRE's public safety mission.
- Submit Timesheets. This function allows non-exempt CAL FIRE employees timely paychecks. These employees include all fire fighting personnel.
- Submit FC33 information. This information is used for incident and resource management costs during large CAL FIRE response operations.
- Access e-mail and Intranet services. These services are essential means of digital communications.
- Access Real time data such as weather, traffic and geographic information systems (GIS) information. This information is used to support tactical emergency support.
- Access numerous other business-critical CAL FIRE applications, including After Action Reporting, Forest Practice, Timber Harvest Plans, Financials, Personnel, and Training.

CAL FIRE personnel located at core WAN locations such as Emergency Command Centers (ECCs are the primary call dispatch location for emergency response), administrative and headquarter sites must be able to do all the above as well as:

- Provide dispatch management capabilities utilizing the Computer Aided Dispatch (CAD) application at the ECCs. This system alerts CAL FIRE emergency responder personnel of an incident. These systems synchronize data to a core server located in the Sacramento Information Technology Services (ITS) Data Center. This information is used for compliance as mandated by legislation and dispatch reporting.
- Perform daily administrative communications via e-mail, intranet access and application services to include but not limited to reporting, compliance initiatives, finance administration, technical support and resource management.

CAL FIRE requires a WAN infrastructure that supports all CAL FIRE department personnel needs to communicate and exchange data in supporting business and administrative functions as well as providing situational awareness during disaster response. CAL FIRE’s personnel are summarized in the following table.

Table 12. Summary of CAL FIRE Personnel

Personnel	Number
Permanent	4,580
Seasonal	2,483
Local Government Volunteer Firefighters (organized by CAL FIRE)	5,600
Inmates, Wards, Conservation Corps	4,300
Volunteers In Prevention (VIPs)	2,600
Total	19,563

4.1.3 Internal User Satisfaction

As demonstrated by the preceding analysis and described in Section 3.1.6 Conditions Creating the Problem, end users are impacted in their day to day jobs by the inefficiencies and performance of the existing connectivity.

WAN Infrastructure

Most CAL FIRE personnel experience operational inefficiencies on a daily basis related to an inability to communicate digital data with colleagues and constituents in an efficient manner. This low level of satisfaction can be attributed to:

- Limited WAN coverage and limited high performance network connectivity
 - The current partial WAN coverage and limited high performance network connectivity prevents CAL FIRE from implementing modern fire department technologies and best practices. The following list describes modern fire department practices which are not being utilized due to the small WAN footprint.
 - Data connectivity at incident command locations
 - » This is essential for receiving timely, situational support and information management to include real/near time data concerning weather, GIS, resource allocation provisioning and digital and voice communications.

Currently all of these processes occur by utilizing the public safety radio network and/or private entity gofer services utilized to shuttle paperwork back and forth.

- Efficient dispatch technology
 - » This is the ability for ECCs to dispatch location information to a fire station printer, receive acknowledgment of the transmission and track the location of the unit. This capability will result in less human error in the dispatch process by reducing the dependency on writing down the information. It will also free up asynchronous public radio transmission by not having to repeat the information in route.
- Efficient administrative processes
 - » Poor connectivity options at fire stations utilizing dial up RAS services for administrative functions is cumbersome and potentially puts personnel out of location for emergency response. Personnel at locations with RAS often times cannot perform daily administrative tasks in a timely matter including, but not limited to, receiving daily administrative e-mail announcements, submitting timesheets and payroll, performing daily ROSS input and utilizing online training technologies. Often the personnel at a fire station with poor connectivity must leave the station and drive to another location to perform these tasks. This can leave the unit out of position for an emergency if a dispatch call comes in while personnel are out performing these tasks.
- ❑ The small WAN footprint and poor connectivity options also limit CAL FIRE administrative efficiencies from occurring. For example, the Timber Harvest Program (THP) and permitting functions currently utilize a manual paper process requests often times exceeding the 60-day requirement to complete. This also uses about two million pieces of paper a year. A larger WAN footprint would lay the framework to allow for digital transaction efficiency.
- ❑ The ITS organization is also constrained by poor connectivity and the small WAN footprint. This includes the ability to provide timely and efficient technical support, security (antivirus) and desktop management. For example, if a new security vulnerability comes out ITS can only update in real time the remote systems that have persistent connectivity, i.e., the 40 sites with core WAN connectivity. As this leaves the majority of CAL FIRE's computer assets vulnerable to security breaches.
- Limited WAN network capacity
 - ❑ WAN capacity is also an issue as evidenced by the ITS organization's moratorium on new applications and functionality from being released across the WAN as noted by the following examples.
 - CAL FIRE has limited video streaming applications due to the existing WAN. These applications include Web-based video training, Web-based two-way video conferencing, and Web-based video streaming for inter agency communications such as video teleconferencing for incident debriefings and daily administrative ECC communications.
 - Fire and Resource Assessment (FRAP) GIS information management, collaboration and sharing is suffering. Current GIS information is provided on CD to ECC units due to the amount and size of its contents. This information should

be obtained over the WAN. This would support real time updates and reduce manual process for information knowledge transfer.

- ❑ Lack of ability to provide dynamic emergency response routing
 - This capability would allow the ECC to allocate resources to a new incident more efficiently by knowing where a resource is utilizing automatic vehicle resource identification within the CAD environment. Enhanced CAD functionality of this type cannot currently be deployed due to bandwidth constraints and/or poor connectivity at remote locations.
- Aging architectural infrastructure design and infrastructure
 - ❑ The existing aging hub and spoke architecture limits the number of persistent connections available at any given endpoint within the CAL FIRE WAN. This limitation forces remote locations to utilize a high overhead VPN connection and/or a slow remote dialup access connection that is unreliable and often times disconnect mid-process of a business stream forcing the user to reconnect and start over.
 - ❑ The aging WAN infrastructure is degrading application performance across the WAN. This includes limited ability to perform acceptable levels of QOS. Quality of Service technology allows a network administrator to prioritize, shape and route traffic by business-criticality. This is needed to provide reliable and consistent application service levels for high priority functions consistently throughout the organization. This is affecting current mission-critical applications such as:
 - CAD—Computer Aided Dispatch
 - InciNet—Incident Management Base System

4.1.4 External User Satisfaction

External users of the WAN infrastructure include:

- Local, state and federal agencies such as Office of Emergency Services, California Dept. of Fish and Game, California Dept. of Water Resource, U.S. Dept. of Homeland Security, U.S. Forest Service, Local Governmental Fire entities, and local incident law enforcement.
- External constituents, both public and private entities also need access to Timber Harvest Program data, Resources Management information and other public CAL FIRE information accessible via CAL FIRE websites.

CAL FIRE is not currently able to achieve its vision to support strategic state cooperator interactions with dedicated extranet access to CAL FIRE resources in a secure and reliable manner. For example the California Department of Fish and Game and the Department of Water Resources need access to CAL FIRE data from the Resource Management and Timber Harvest Programs. This access is obtained from the Internet in a non secure environment. As was described in Section 3 of this FSR, the current WAN Infrastructure prevents efficient electronic dissemination of documents like the Timber Harvest Plan. Therefore, external users in this category are currently less than satisfied with the CAL FIRE WAN infrastructure.

Another example of external user dissatisfaction is from federal agencies that respond to major catastrophes (fire, flood, earthquake, etc) within California to provide support and relief efforts. These cooperators also rely on the CAL FIRE Incident Command and Control infrastructure to access data and communication services at a remote incident. These users are often less than

satisfied with CAL FIRE's WAN infrastructure because of the non-standard connectivity currently provided at the Incident Command Centers.

4.1.5 Technical Satisfaction

The technical satisfaction of the current WAN infrastructure is low due to the circumstances specific to key spending on and age of the WAN infrastructure as described in Section 3.1.6, Conditions Creating the Problem.

4.1.6 Application Characteristics

The CAL FIRE WAN infrastructure supports the applications described in this section. The applications are presented both by criticality and the impact of the current WAN infrastructure shortcomings as related to these applications.

Applications criticality includes the following three categories:

1. **Mission-Critical**—these applications have the highest order of importance for CAL FIRE's public safety mission. These applications must be accessible to CAL FIRE personnel 24/7. Mission-critical applications are a top priority for operational disaster recovery.
2. **Business-Critical**—these applications provide CAL FIRE the mandatory business operations functionality.
3. **Business Enhancer**—these are information management systems applications used to extend core business functionality.

CAL FIRE's WAN shortcoming characteristics are categorized by the following:

- **Application performance due to poor connectivity options**—Software applications usage suffers due to poor and/or zero WAN persistent connectivity. This category is correlated directly to 95% of CAL FIRE locations.
- **Limited network capacity/small WAN footprint**—Software applications featuring rich functionality are limited due to the current WAN's ability to support the growing CAL FIRE Application Portfolio. CAL FIRE's ability to maximize its investment on its current applications is suffering from the inefficiencies of the current WAN.
- **Aging infrastructure**—the current WAN's infrastructure capability to provide robust software application service levels has degraded beyond acceptable levels new applications are routinely not deployed.

CAL FIRE applications are summarized, by criticality, in the following table.

Table 13. CAL FIRE Applications

Criticality	Acronym	Service	Description	WAN Shortcoming
1	CAD	Computer Aided Dispatch System	Used to support the dispatching process in each Emergency Command Center.	Unable to support AVL and Rip and Run technology Application performance due to poor connectivity options Limited network capacity/small WAN footprint Aging infrastructure
1	InciNet	Incident Base Management (INCINET)	System used to support the on-scene management of large-scale incidents. Includes modules for personnel, supplies, financials, etc. Dispatched as a resource to individual events as needed.	Application performance due to poor connectivity options Limited network capacity/small WAN footprint Aging infrastructure
1	ROSS	Resource Ordering Support System	Used to order resources (equipment and staffing) during large fires	Application performance due to poor connectivity options Limited network capacity/small WAN footprint
2	AFAS	Automated Fiscal Accounting System	System used to track day-to-day fiscal operations. Allows Units to manage their budgets in much more detail than CalSTARS allows. Used by all Units	Aging infrastructure
2	ERD	Emergency Resource Directory	Automated system used to look up information about the capabilities of CAL FIRE staff and contracted vendors. The system is used in the ECCs and Region Command Centers.	Aging infrastructure
2	AP	Accounts Payable	System used to automate the upload of financial transactions from CAL FIRE Accounting directly into the State's CalSTARS (accounting) system.	Aging infrastructure
2	ePay	Electronic Payroll	System used to capture time-sheet information and to calculate overtime using the Unit 8 contract specifications. Available for use by all Unit 8 employees.	Application performance due to poor connectivity options Limited network capacity/small WAN footprint Aging infrastructure

Criticality	Acronym	Service	Description	WAN Shortcoming
2	FIREPLAN	California Fire Plan	Used to analyze past fire behavior, fuels, assets at risk, and other factors in order to build a proactive plan of action to minimize either the risk or the impact of wild land fires. Used by a pre-fire engineer at each Unit and cooperating county. Products are used by people at the Unit level.	Limited network capacity/small WAN footprint Aging infrastructure
2	PACMANS	Personnel Allocation Control Mgmt System	System used to track personal services budgets at a highly detailed level. The system includes benefit rates, funding sources for positions, and provides Units with the ability to produce billing information for contract counties. The system "consumes" the data produced by ePay to acquire actual payroll data.	Aging infrastructure
2	ARC	Activity Reporting and Costs	System used to compile billing packages for civil cost recovery, FEMA, and other instances where reimbursement is possible. The system creates an "invoice" that calculates the total cost of an incident by documenting the costs of each resource utilized in response to the incident. System currently used at the Unit, Region, and HQ levels, but it is desirable to be extended to remote locations	Aging infrastructure
2	HFD	Historical Financials db	Historic repository of all CAL FIRE financial information. The data is downloaded directly from CalSTARS and is available for analysis and research to all CAL FIRE Units, Regions, and HQ.	Limited network capacity/small WAN footprint Aging infrastructure
2	AIMS	Aviation Information Mgmt System	Used to track flight times and costs for aviation activities. Primary use of data is cost recovery. System is utilized at each Air Attack Base, Helitack Base, and AMU.	Application performance due to poor connectivity options Limited network capacity/small WAN footprint Aging infrastructure
2	FFII/FAE	Fire Fighter II/Fire Apparatus Engineer Exam Application	Supports HR administration of FFII/FAE exams including maintenance of candidate information, preparation and printing of supplemental applications, capturing responses, scoring and management reports. Includes interface with SPB.	Aging infrastructure

Criticality	Acronym	Service	Description	WAN Shortcoming
2	MX	Computerized Maintenance Management—Maximo	System used to track inventory, maintenance, and procurement of aircraft and component parts.	Application performance due to poor connectivity options Limited network capacity/small WAN footprint Aging infrastructure
3	PWA	Project Workload Analysis	Project tracking and planning component of the Fire Plan effort. Used by PFEs at each Unit	Aging infrastructure
3	FPS	Forest Practice Suite	Used to assist in the processes of accepting, reviewing, and managing Timber Harvesting Plans. FPS also tracks the license status of Licensed Timber Operators and enforcement activities related to THPs.	Application performance due to poor connectivity options Limited network capacity/small WAN footprint Aging infrastructure
3	CFIRS Reports	California Fire Incident Reporting System (CAIRS Data Warehouse)	Historic repository of all OSFM-collected after-action reports submitted from fire departments across the state in the old CFIRS data format. Provides OSFM the ability to report summary statistics to the State and Federal levels of Government.	Aging infrastructure
3	NFIRS Reports	National Fire Incident Reporting System (CAIRS Data Warehouse)	Historic repository of all OSFM-collected after-action reports submitted from fire departments across the state in the current NFIRS format. Provides OSFM the ability to report summary statistics to the State and Federal levels of Government.	Aging infrastructure
3	RPP	Respiratory Protection Program (RPP)	System used to track the requirements and status of CAL FIRE staff that are required to wear respirators as part of the duties. Used in tracking the "currency" of employees and the need for testing of new applicants.	Aging infrastructure
3	Intranet	Intranet publishing	System used to publish Departmental information for access by all CAL FIRE staff via standard computer equipment.	Application performance due to poor connectivity options Limited network capacity/small WAN footprint Aging infrastructure

Criticality	Acronym	Service	Description	WAN Shortcoming
3	CAIRS	California All-Incident Reporting System	After-action reporting system. Federally mandated reporting system used by fire personnel to document fire response activity.	Application performance due to poor connectivity options Limited network capacity/small WAN footprint Aging infrastructure
3	eFC33	Automated FC33	Automated FC33 Personnel time reporting used in conjunction with ARC, ePAY and PACMANS for tracking personnel costs and cost recovery.	Application performance due to poor connectivity options Limited network capacity/small WAN footprint Aging infrastructure
3	FDID	Fire Department Identification System	System used to assign and track unique identification numbers for fire agencies across the State. Used only by OSFM HQ.	Aging infrastructure
3	THP on Net	Electronic THP filing	Prototype of process to accept and process THPs received electronically.	Application performance due to poor connectivity options Limited network capacity/small WAN footprint Aging infrastructure

4.1.7 Data Characteristics

CAL FIRE’s data characteristics are categorized by three distinct business capabilities. These categories map directly to Software characteristic in Section 4.1.6 Application Characteristics.

Table 14. Summary of CAL FIRE Data Characteristics

Rating	Description	Description
1	Mission Critical	Data that has the highest order of importance for CAL FIRE’s public safety mission
2	Business Critical	Data that provide CAL FIRE the mandatory business functions for operation
3	Business Enhancer	Data that are classified to extend core business functionality

Mission-critical data support CAL FIRE’s core mission of public safety. There are currently two applications that support this data characteristic.

- Computer Aided Dispatch (CAD)
- InciNet (Incident Management Base Management)
- ROSS (Resource Ordering Support System)

Business-critical data supports mandatory CAL FIRE business operations. These systems account for the majority of CAL FIRE’s data characteristics. Examples of these systems include:

- ERD (Emergency Resource Directory)
- ePay (Electronic Payroll)
- GIS (Geographic Information Systems)

Business enhancing data are classified to extend core business functionality and are often times are for reporting and information management systems. Examples of these systems that utilize these data characteristics include:

- CAIRS (California All-Incident Reporting System)
- NFIRS (National Fire Incident Reporting System (CAIRS Data Warehouse))
- E-mail
- Intranet
- Web browsing

4.1.8 Security, Privacy and Confidentiality

CAL FIRE’s WAN infrastructure security is provided through several persistent and non-persistent technologies. These include

- Private network link
- RAS Dial-up
- VPN client over broadband connection

The private network, which allows persistent connectivity between sites, covers five percent of the CAL FIRE organization. These sites include the 40 persistently connected sites and are composed of ECCs and headquarter operations.

RAS dialup services supply very slow connection speeds at 14.4 Kbps, 28.8 Kbps and 48KBS Kbps. CAL FIRE remote locations that utilize dial up connectivity are 10 to 100 times slower than the standard connection. CAL FIRE locations that utilize dialup RAS include fire stations, conservation camps, and some administrative sites. RAS connections often drop due to the nature of dialup and policy enforcement to keep dialup cost under control. When a drop occurs the user must re-establish the connection to continue his/her work. The CAL FIRE ITS policy is to drop dialup connections after two hours of idle time.

The Cisco VPN concentrator and its client architecture utilize high bandwidth overhead and often time clog the single 10mbit, now redundant, Internet pipe. VPN connections come from the CAL FIRE locations over DSL and/or cable broadband connectivity.

4.1.9 Personnel Requirements

WAN Infrastructure

As described in Section 3.1.6 - Conditions Creating the Problem, CAL FIRE is under spending on personnel. The following table below describes CAL FIRE WAN infrastructure personnel count to similar peers for comparison. It should be noted that CAL FIRE is below the expected (as measured by peer comparison) level for FTE (Full Time Employee) equivalents. CAL FIRE is six FTEs under staffed when compared to peers with a similar WAN footprint and complexity.

Table 15. WAN by Staff Category

	CAL FIRE	Peer Avg.	Difference	Percent
WAN	2.7	3.2	-0.5	84 %
LAN	1.6	4.2	-2.6	38 %
Remote Access	0.9	2.5	-1.6	36 %
Internet Access	0.1	1.5	-1.4	7 %
Total: Data Networking	5.3	11.4	-6.1	46 %

4.1.10 System Documentation

CAL FIRE system documentation for the WAN infrastructure was derived from several sources. These include AT&T, the WAN outsourcer, and the CAL FIRE ITS group. The documentation can be characterized by the following:

- 5+ years old
- Two to five years old
- Recent to two years old

Though the accuracy levels of the WAN infrastructure documentation vary within these categories, overall the documentation is acceptable.

4.1.11 Failures of the Current System

As outlined throughout this FSR, the majority of CAL FIRE's WAN infrastructure has not been upgraded since implementation. All of CAL FIRE's technology being requested in this FSR is either already obsolete (i.e., there is improved and/or superior equipment currently available in the marketplace) or will be obsolete within the next year. Section 3 further describes the business problems associated with the current WAN infrastructure.

4.2 Technical Environment

The WAN network backbone consists of an ATM circuit that includes endpoints for point-to-point frame relay services as well as providing a 10 MB Internet connection. The wide-area network is configured with a combination of point-to-point and frame relay T1s. The network protocol topology is architected to form five core hub and spoke endpoints with 40 persistently connected sites total. The main hub sites consist of:

- ITS Headquarters at Sacramento
- North Administration at Santa Rosa
- North Operations at Redding
- Fresno-Kings Emergency Communication Center
- South Operations at Perris

There are T1 backups (Frame Relay) between ITS and the four regional hubs. There is also a single T1 Frame relay circuit between North and South operations if the ITS hub is non-functioning. Each site also has a 128kbs ISDN line for fault tolerance for WAN fail over directly to ITS regional hub. The CAL FIRE Core WAN Infrastructure diagram in Figure 1 (Section 4.1) depicts the current persistently connected sites.

WAN routing infrastructure is by Cisco 2600 series routers and Visual Network channel and data services unit (CSU/DSU). The Telecom vendor is ATT/MCI via DGS CALNET I MSAs. Monitoring and maintenance of the network is outsourced to ATT at the LAN port of the router. This is the endpoint where management responsibility terminates for the outsourcer. The CAL FIRE ITS team manages the rest of the network (LAN) infrastructure.

Internet ingress and egress access points is protected with a highly available redundant pair of Cisco PIX 520 firewalls at ITS and a single Cisco PIX 525 at the Riverside Unit. The ITS WAN is monitored with two Cisco IDS 4210, one internal and one external of the firewall. The VPN solution is a redundant pair of Cisco\Altiga 3030 Concentrators. There are 96 dial-up modem lines connected to four T1s.

There is one core switch located at ITS that is an Extreme Networks 6808.

The LAN infrastructure maintains a diverse and disparate platform architecture that includes Cisco, 3com, Extreme Networks and Netgear hardware.

CAL FIRE maintains a change policy that mandates minimal network changes during fire season.

- Local-Area Network— The CAL FIRE is standardized on twisted pair cabling, 10baseT and 100BaseT Ethernet, 3Com Hubs and Switches, and Cisco routed equipment. The only supported networking protocol is TCP/IP.
- Remote Access Services (RAS) is provided in Sacramento, and is based on Cisco 3660 and a Cisco AS5350. Clients access RAS using standard Windows dial-up networking with speeds of 14,400, 28,800 and 48,000 bps.
- Systems Management—Systems Management is provided by Landesk for office automation and wide-area networking is outsourced to vendor services. SNMP and various vendor solutions provide limited Local-Area Network systems management.

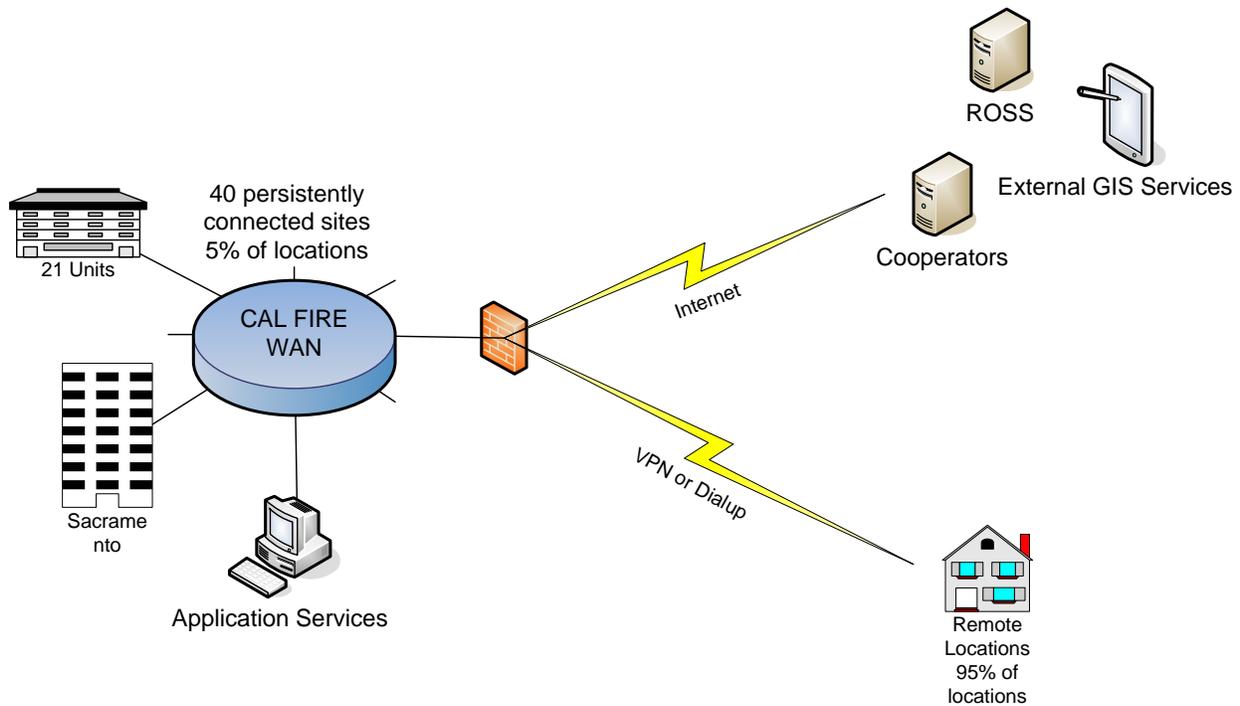
4.2.1 Expected Operational Life

Refer to Section 3.1.6, Conditions Creating the Problem for further information regarding Expected Operational Life.

4.2.2 External System(s) Interface(s)

The WAN infrastructure supports a myriad of CAL FIRE objectives. This includes co-operational support from many state and federal agencies such as Department of Homeland Security, U.S. Forest Service, and other EMS type agencies. Figure 7 represents external system interfaces.

Figure 7. External System Interfaces



4.2.3 State-Level Information Processing Policies

According to the State Administration Manual for Information Management Planning, each agency identifies opportunities to improve program operations through strategic uses of information technology. Each agency also “establishes and maintains an information technology infrastructure that supports the accomplishment of agency business strategies, is responsive to agency information requirements, and provides a coherent architecture for agency information systems.”

As explained in Section 3, the current infrastructure does not allow for or support:

- Timely and effective business data communication
- Efficient situational and resource management capabilities core to CAL FIRE’s mission
- New application functionality to be brought online
- Modern fire fighting technology and communication implementation regarding WAN infrastructure
- Efficient IT customer support backbone

4.2.4 Financial Constraints

Refer to Section 3.1.6, Conditions Creating the Problem for further information regarding Financial Constraints.

4.2.5 Legal and Public Policy Constraints

The current system must meet CAL FIRE security and privacy requirements.

4.2.6 Department Policies and Procedures Related to Information Management

The infrastructure upgrade is needed in order for CAL FIRE to support its IT goal of providing a “reliable, stable, and secure computing environment.” ITS cannot meet this goal without upgrading its current infrastructure.

4.2.7 Anticipated Changes in Equipment, Software, or the Operating Environment

CAL FIRE will upgrade the majority of their WAN infrastructure hardware and establish supportable technology standards.

4.2.8 Availability of IT Personnel

CAL FIRE will participate as members of the design and implementation teams. The necessary skills required will be based on the technical specifications of each component and future maintenance agreements established with infrastructure vendors during procurement efforts. This FSR includes costs related to additional training required.

4.3 Established Infrastructure

The following tables detail the current data network infrastructure.

Table 16. Data Network Infrastructure

Model	Count
CSU/DSUs	
Fluke Networks T1 CSU/DSU	52
Fluke Networks DS3	1
Total	53
Routing Equipment	
Cisco 2620	30
Cisco 3660	6
Cisco 7206VXR Chassis	3
Cisco 2621	1
Total	40

Model	Count
Security Equipment	
Cisco Pix 520	2
Cisco PIX 515	1
Cisco 3030 Concentrator	1
Cisco 3660	1
Cisco AS5350	1
Total	6
LAN Equipment	
3Com Superstack Switch 4200	40
3Com Baseline Switch 2226 Plus	75
3Com Baseline Switch 2250 Plus	17
3Com Baseline Switch 2824 Plus	13
3Com Baseline Switch 2250 Plus	6
Cisco Catalyst 2950	50
Extreme Networks BD 6808	1
Extreme Networks Summit 400-48t	4
Extreme Networks Summit 400-224t	4
Total	210

4.3.1 Network Diagrams

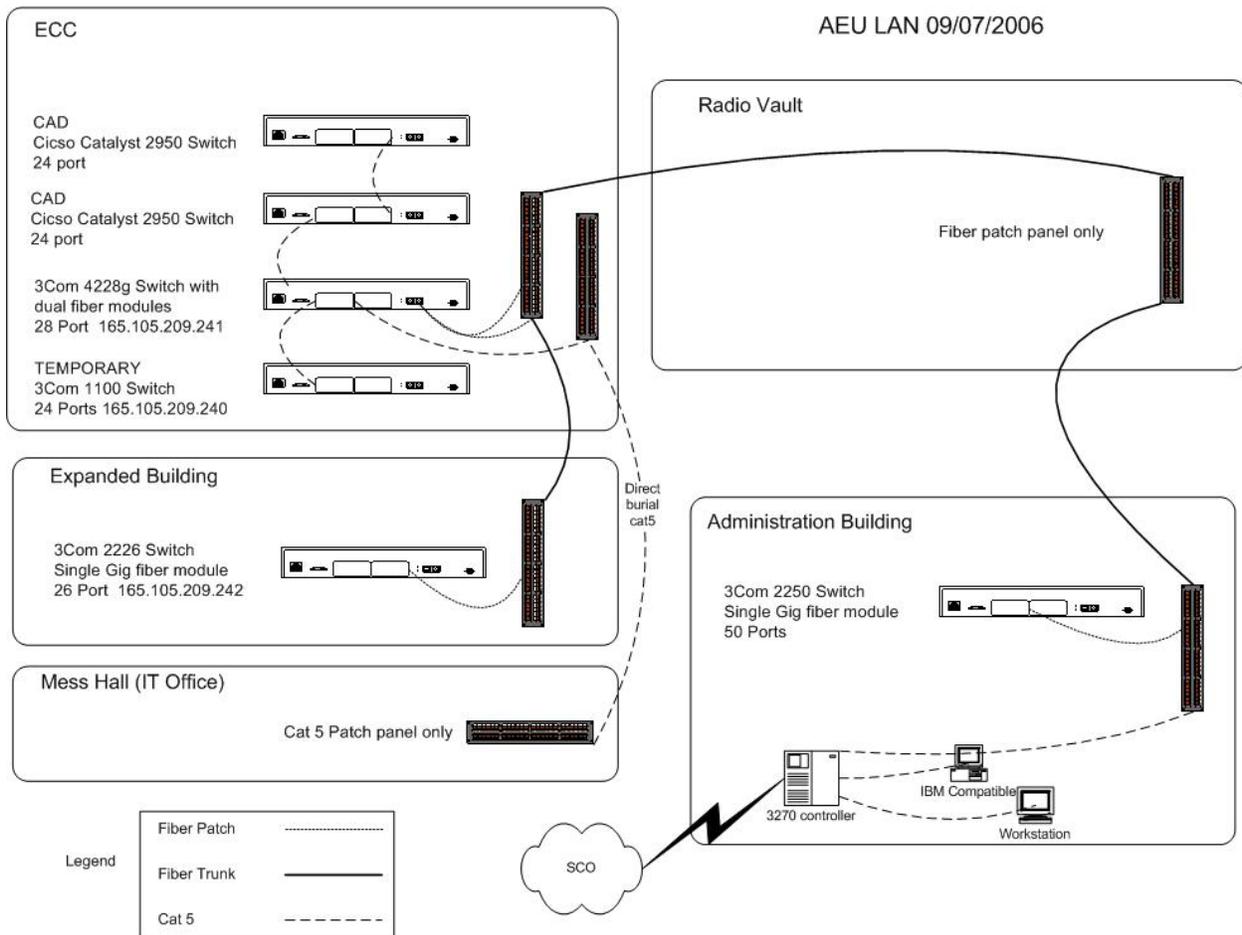
WAN Diagram

The CAL FIRE Core WAN Infrastructure diagram in Figure 5 (Section 4.1) represents CAL FIRE’s logical WAN architecture. The diagram details a dated hub and spoke network topology that is reaching its capacity and functional limits. The core network hub is located at Sacramento’s ITS headquarters with four remote hubs used for regional connectivity. All non-localized site data traffic must traverse the core for access. The CAL FIRE backbone consists of an ATM circuit, four Point-to-point T1s and 49 Frame Relay sites. All persistently connected sites utilize ISDN dialup for backup. The persistently connected WAN architecture represents 5% of all CAL FIRE locations.

Midsized CAL FIRE Location

The following figure represents a simple ECC local-area network infrastructure. This typically includes an ECC, expanded ECC and/or an administration function.

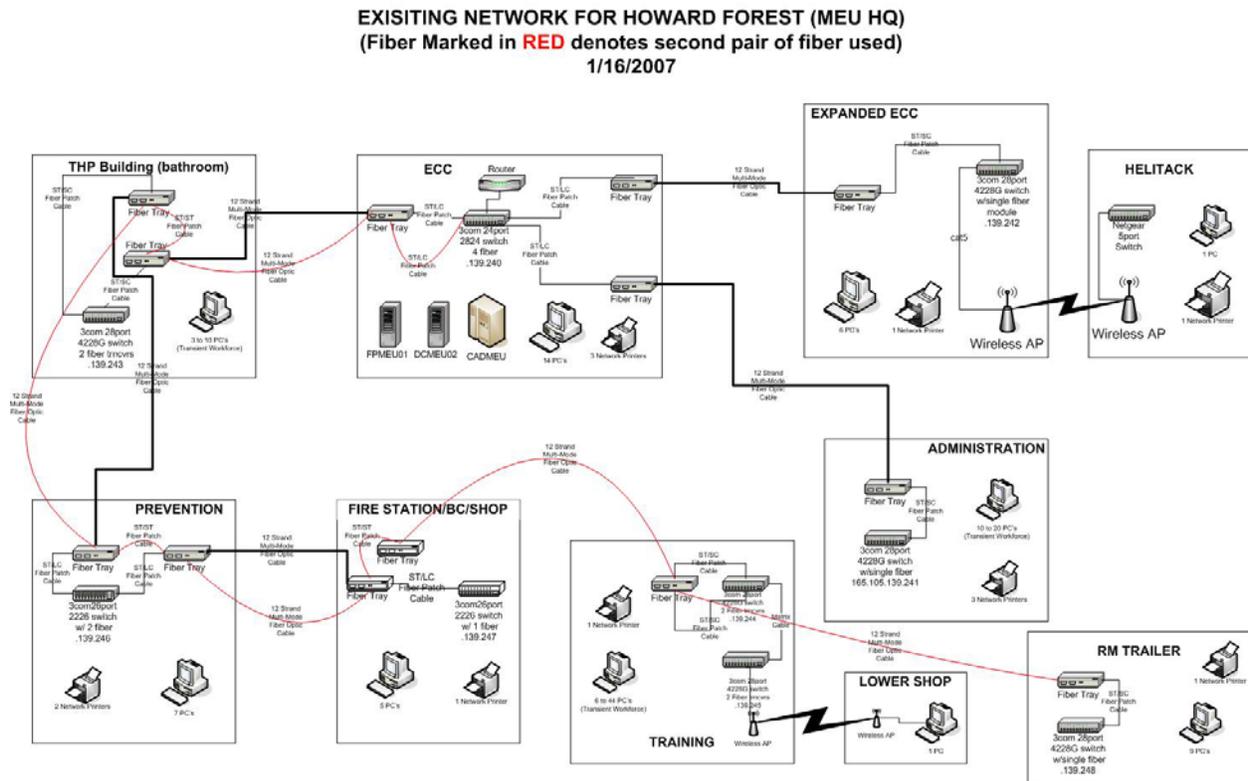
Figure 8. Network Diagram—Representation of a Midsized Location



Large Size CAL FIRE Location

The following diagram represents a complex CAL FIRE campus area network infrastructure. Please note that lines of services include ECC, expanded ECC, air attack, administrations, prevention, fire station, THP offices, training, a mechanical shop, and remote trailer access.

Figure 9. Network Diagram—Representation of Large Sized Location



4.3.2 Application Development Software

For a WAN infrastructure project, use of application development software does not apply.

4.3.3 Personal Productivity Software

All CAL FIRE permanent personnel utilize the following productivity software for digital communications across the LAN/WAN infrastructure.

Table 17. Digital Communications Productivity Software

Application	Purpose
MS Office	Business Productivity
MS Outlook E-mail	Business Productivity
Citrix	Business Productivity
Web Browser	Intranet Access

4.3.4 Operating System Software

The operating system is Windows XP Professional for all desktops.

4.3.5 Database Management System

For a WAN infrastructure project, use of a database management system does not apply.

4.3.6 Application Development Methodology

For a WAN project, use of an application development methodology does not apply.

4.3.7 Project Management Methodology

The CAL FIRE ITS organization subscribes to the Project Management (Institute's) Body of Knowledge (PMBOK) in all phases of the project life cycle. ITS supports ESI training and certification for our project managers, as well as other training useful to project management (e.g., leadership, strategic planning, BCP and FSR workshops, etc.)

Project status is continuously monitored from beginning to completion. Post Implementation Evaluation Reports (PIER) together with After-Action Reviews (AAR) serve as written self-evaluation documents, by which objectives can be measured. Additionally, qualification and training level information of project managers is tracked and maintained.

5.0 Proposed Solution

This section identifies the alternative that best satisfies the objectives and functional requirements as outlined in Section 3 of this FSR. As noted in the following table, this section provides details on the proposed solution, as well as information on the other alternatives that were analyzed.

Table 18. Proposed Solution Sub-Sections

5.1	Solution Description
5.1.1	Project Scope
5.1.2	Major Components of the Proposed Solution
5.1.3	Project Phasing and Schedule
5.1.4	Hardware
5.1.5	Software
5.1.6	Technical Platform
5.1.7	Architecture and Design Approach
5.1.8	Integration Issues
5.1.9	Procurement Approach
5.1.10	Technical Interfaces
5.1.11	Testing Plan
5.1.12	Resource Requirements
5.1.13	Training Plan
5.1.14	Ongoing Maintenance
5.1.15	Information Security
5.1.16	Confidentiality
5.1.17	Impact on End Users
5.1.18	Impact on Existing System
5.1.19	Consistency with Overall Strategy
5.1.20	Impact on Current Infrastructure
5.1.21	Impact on Data Centers
5.1.22	Data Center Consolidation
5.1.23	Backup and Operational Recovery
5.1.24	Public Access
5.1.25	Costs and Benefits
5.1.26	Sources of Funding
5.2	Rationale for Selection
5.3	Other Alternatives Considered
5.3.1	Alternatives Descriptions
5.3.2	Evaluation of Alternatives

5.1 Solution Description

The proposed solution for the CAL FIRE WAN Upgrade was selected based on analysis of the following three alternatives.

Table 19. Solution Alternatives

Alternatives Considered for the WAN Upgrade	
1.	Upgrade the Core WAN, provide broadband connectivity for all CAL FIRE-owned locations and Schedule A locations that are not persistently connected as well as connectivity options to partners (e.g., Schedule C) who are willing to pay, and provide connectivity for ICCs.
2.	Upgrade the Core WAN, provide public safety quality persistent connectivity for all CAL FIRE-owned and Schedule A locations that are not persistently connected as well as connectivity options to partners (e.g., Schedule C) who are willing to pay, and provide multiple connectivity options for ICCs.
3.	Maintain status quo—Do not upgrade Core WAN or provide any additional connectivity options for either the remote locations or ICCs.

After each alternative was analyzed individually and in contrast to the other alternatives, Alternative 1 was selected as the proposed solution because it is the most cost-effective solution that meets all of CAL FIRE’s business objectives and requirements by:

- Significantly reducing the current risk of disruption to CAL FIRE’s operations that support public safety is increasing. The existing risk is due to an aging and obsolete WAN infrastructure.
- Extending the WAN footprint to more CAL FIRE locations to increase public safety efficiencies, streamline business processes and support the future business vision.
- Providing better high-speed data connectivity options for Incident Command sites for big fires and large incidents.

The balance of Section 5.1 documents the key elements and supporting detail of the proposed solution, followed by the rationale behind the selection of this alternative in Section 5.2. Finally, the evaluation methodology and analysis of each alternative is provided in Section 5.3, Alternatives Analysis.

5.1.1 Project Scope

The WAN scope includes the following three aspects:

1. **Core WAN (Current ATT Network)**—This aspect will focus on the 40 CAL FIRE locations that are currently “persistently connected.”
2. **Remote WAN**—This aspect will focus on extending persistent data network connectivity to all 297 CAL FIRE owned (fire stations, air bases, conservation camps, forests, and nurseries) and 299 Schedule A locations (fire stations) as well as connectivity options to partners (e.g., Schedule C) who are willing to pay.
3. **Incident Command and Control (ICC)**—This aspect will focus on providing mobile units (trailers) that provide satellite data and voice connectivity for large incident command centers.

5.1.2 Major Components of the Proposed Solution

The WAN solution will provide infrastructure that can be grouped into the following three primary areas.

Core WAN

The Core infrastructure supports the 40 locations with persistent connectivity. These 40 locations are currently connected to the CAL FIRE Core WAN via the AT&T network backbone. These locations include Regional and Executive Headquarters, Operational Units and Emergency Command Centers.

The hardware will be upgraded with current networking technology devices to include but not limited to core routers, core switches, core security devices (firewalls, intrusion detection/prevention systems) and application prioritization accelerators. It will also include bandwidth and capacity upgrades to support existing and future CAL FIRE’s business and technical requirements as stated in this FSR.

The following table summarizes the locations impacted by this aspect of the proposed solution.

Table 20. CAL FIRE Core WAN Locations

Description	Type	Quantity
Large	Executive HQ	7
	ITS HQ	
	4 Regional HQs	
	1 ECC/Unit HQ	
Medium	Operational Units/ECCs	23
	Other Administrative	
Small	Other Administrative	10

Remote WAN

The Remote WAN infrastructure supports the myriad of CAL FIRE locations without persistent connectivity. These locations include fire stations, air bases, conservation camps, demonstration forests and nurseries. This solution will provide persistent, secure broadband-type connectivity to all 297 CAL FIRE owned and 299 Schedule A locations that are not currently connected to the Core WAN today. It will also provide options for Schedule C (cooperators) to connect to CAL FIRE at their expense.

The following table summarizes the locations impacted by this aspect of the proposed solution.

Table 21. CAL FIRE Remote WAN Locations

Description	Type	Count
CAL FIRE Owned		
	Fire Stations	228
	Airbases	22 (2 currently connected to Core WAN)
	Conservation Camps	39
	Demonstration Forests	8
	Nurseries	2
Schedule A		
	Fire Stations	299
Schedule C		
	Fire Stations	376

Incident Command and Control (ICC)

The ICC WAN infrastructure provides CAL FIRE personnel with the necessary satellite and network hardware to provide on-site data and voice connectivity at large incident locations (e.g., large fires). This will be a trailer-based solution with trailers located in both the north and south regions. These units can also provide backup network connectivity to ECCs if the wireline network is inoperable.

5.1.3 Project Phasing and Schedule

The proposed solution will be procured, configured and implemented in three phases over a period of approximately 36 months, from July 2008 through June 2011. In addition, this FSR includes an additional two phases to upgrade the Core WAN from January 2014 through January 2015, and to upgrade the Remote WAN and refresh the ICC from January 2015 through December 2016.

A detailed schedule of the five project phases is provided in Section 6.5.5.

5.1.4 Hardware

The following table describes the hardware necessary for the proposed solution.

Table 22. WAN Hardware

Hardware	Description	Estimated Quantity
Core WAN		
Core WAN Routers	These devices will provide transmit data between CAL FIRE locations with secure, private network links.	4
Edge Internet Routers	These devices provide data transmit capabilities to the Internet from secured to non-secured networks.	4
Core LAN Switches	These devices provide end point connectivity to CAL FIRE devices located within the local-area network.	2
Internet Firewalls	These devices protect CAL FIRE resources and assets with access control lists and security policies designed to block unwanted traffic and intruders.	4
Network Security Detection and Prevention	These device monitor, notify and make necessary security policy changes when unwanted traffic traverses the secure private network.	10
VPN Concentrator	These devices allow the capability for the Remote WAN locations to have a 'persistent,' secure network connection to the Core WAN. It also allows for individual devices (e.g., laptops and desktops) the ability to connect securely to the CAL FIRE Core WAN independent of location.	2
Application Prioritization Accelerators	These devices provide the ability for CAL FIRE to control, prioritize and accelerate application services across the WAN to meet system and end-users needs.	2
Remote WAN		
Router	These devices allow for the remote location to connect to the Internet and/or the Core WAN.	596 ¹
Switch	These devices allow locally connected devices access to the network.	
Firewall	These devices protect CAL FIRE resources and assets with access control lists and security policies designed to block unwanted traffic and intruders at the remote location.	
Satellite Equipment	These devices allow data connectivity at Remote WAN locations that are unable to receive DSL, CABLE or T1 wireline network access.	122 ²

¹ A single device will supply router/switch and firewall functionality

² Estimated number of locations that can only have satellite connectivity

Hardware	Description	Estimated Quantity
ICC		
Trailer	This mobile “trailer-able” unit will house the necessary equipment in a secure, environmentally sound environment that is adverse to climate conditions and change.	6
Router	These devices allow for the remote location to connect to the Internet and/or the Core WAN.	6
Switch	These devices allow locally connected devices access to the network.	6
Firewall	These devices protect CAL FIRE resources and assets with access control lists and security policies designed to block unwanted traffic and intruders at the remote location.	6
Satellite Equipment	These devices allow data connectivity at Remote WAN locations that are unable to receive DSL, CABLE or T1 wireline network access.	6
Rack	This equipment securely attaches the necessary networking equipment (routers, firewalls, switches, etc) inside the mobile trailer. This equipment is NEBS compliant and environmentally adverse.	12
UPS	This device is used for power protection to devices located within the trailer.	6
Phone Equipment	The necessary equipment to allow for voice and telephony services from the mobile trailer unit.	6

5.1.5 Software

There is no software associated with the proposed WAN Upgrade FSR solution.

5.1.6 Technical Platform

The technical platforms for each aspect will be based on standard and proven best practices.

Core WAN

The Core WAN technical platform will allow for a modern, scalable and secure WAN topology that will meet CAL FIRE’s business and technical requirements. It will be based on standard, proven architectures and designed with best practices.

Remote WAN

The Remote WAN technical platform will allow for a modern, scalable and secure connection topology that will meet CAL FIRE’s business and technical requirements. It will be based on standard, proven architectures and designed with best practices. It will provide at a minimum 768 kb/s broadband connection speeds to the Core WAN.

ICC

The ICC WAN infrastructure will be designed to withstand environmental abuse to include but not limited to fire and water externally. The interior platform will be a NEBS compliant design based on proven standards and best practices regarding mobile incident command and control infrastructure.

5.1.7 Architecture and Design Approach

The solution will be architected and designed by a third-party vendor. The design and topology will be standards-based and follow proven best practices for scalability, security, availability and performance across such an infrastructure.

5.1.8 Integration Issues

The introduction of new manufacturers and/or versions of hardware and software could lead to conflicts among components. A first step to avoid potential integration issues is through careful research and planning by Project Management with the assistance of Vendor provided subject matter experts. Then after installation, detailed testing is essential in order to ensure that all components are functioning properly and provide the necessary configuration for optimal performance and security.

5.1.9 Procurement Approach

The WAN Infrastructure Project will require a two phased procurement effort. Phase I will focus on the Core WAN. Phase 2 will focus on the Remote WAN and ICC.

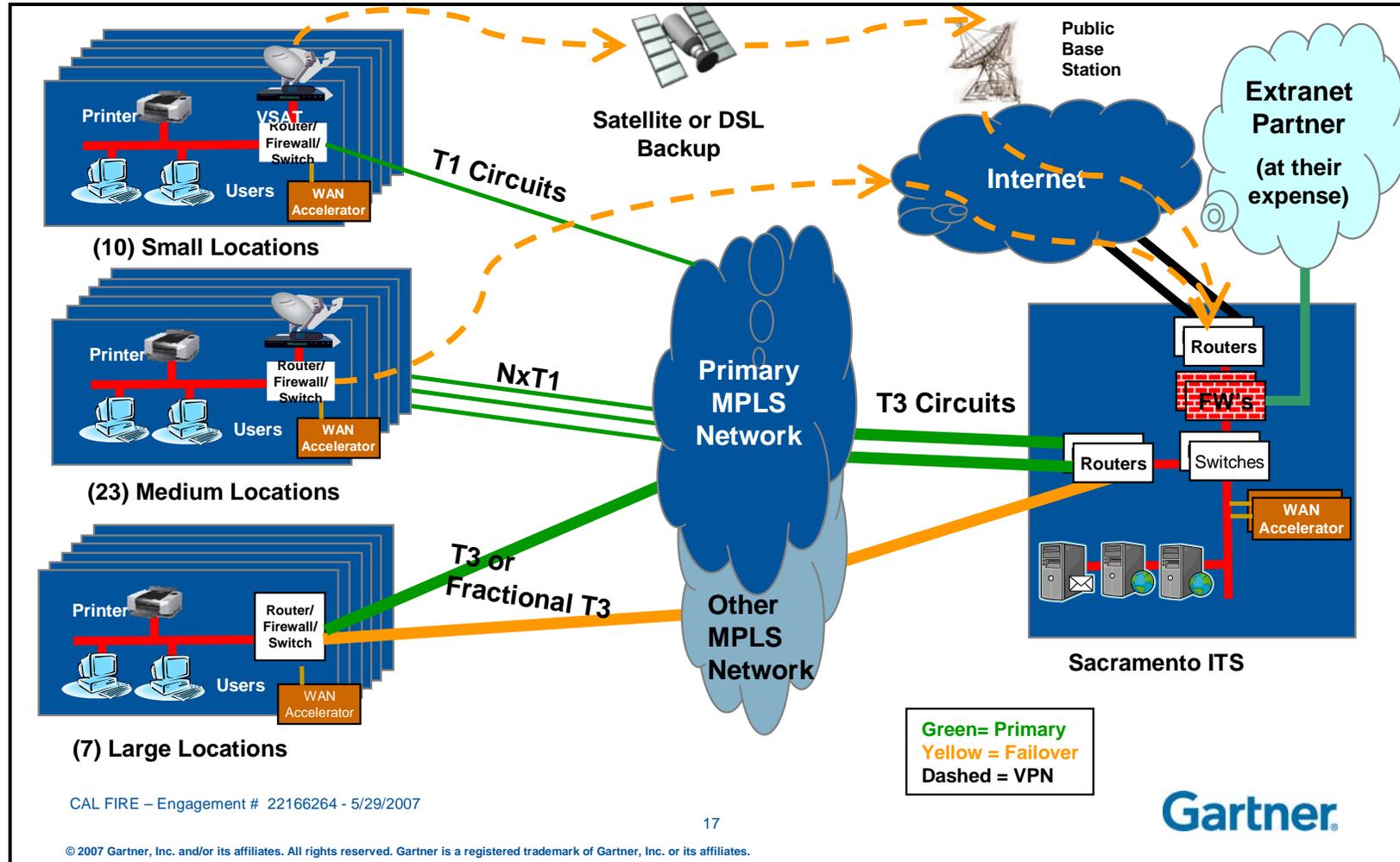
First, the Project Director and Project Manager will engage CALNET II Vendors able to provide the proposed solutions. As deemed necessary by CAL FIRE, they will also engage non CALNET II Vendors regarding the proposed solution. These engagements will include research into the products, service offerings and technologies appropriate for the Core WAN upgrade, Remote WAN and the ICC solutions. Focus will be given to components available through CALNET II, strategic sourcing, and other state contract options. The following detail how each aspect will be procured.

- Core WAN—Utilize the current CALNET II contract to negotiate best price between AT&T/Verizon (this may include development of an RFP).
- Remote WAN—For terrestrial-based connectivity (e.g., DSL), CAL FIRE will utilize the CALNET II procurement vehicle to negotiate the best price with Verizon and/or AT&T. For satellite services CAL FIRE will work with DTS to incorporate refinements into the current CALNET II MSA IV pricing which at its current cost structure is not viable. If DTS is unable to negotiate a competitive price structure for satellite services CAL FIRE will request an exemption and conduct a competitive procurement outside the CALNET II offering.
- ICC Connectivity—For the ICC, CDF will conduct a competitive procurement

5.1.10 Technical Interfaces

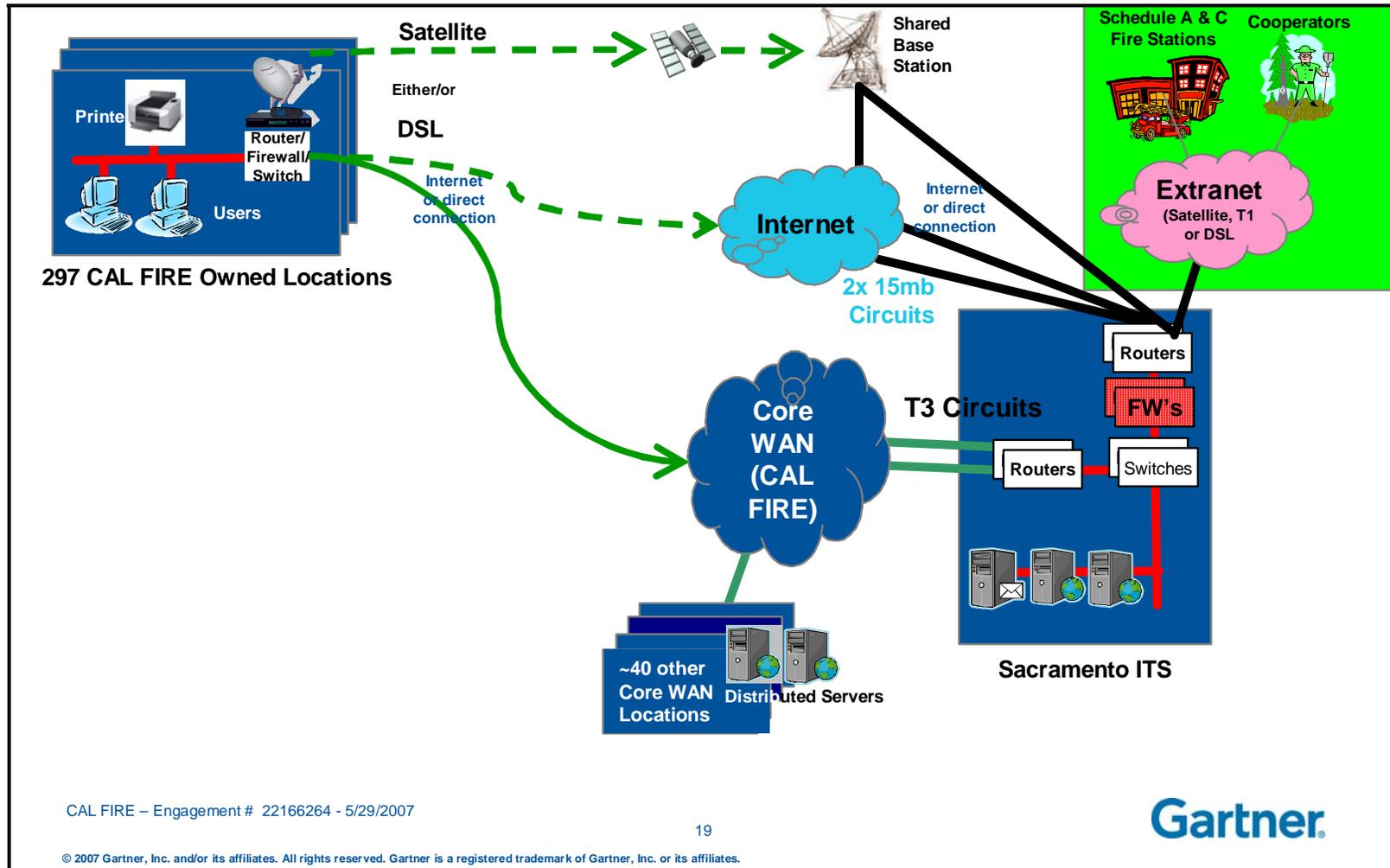
The Core WAN technical interfaces are detailed in the following figure. These interfaces provide the mandatory connections to achieve the minimum CAL FIRE business requirements.

Figure 10. Core WAN Technical Interfaces



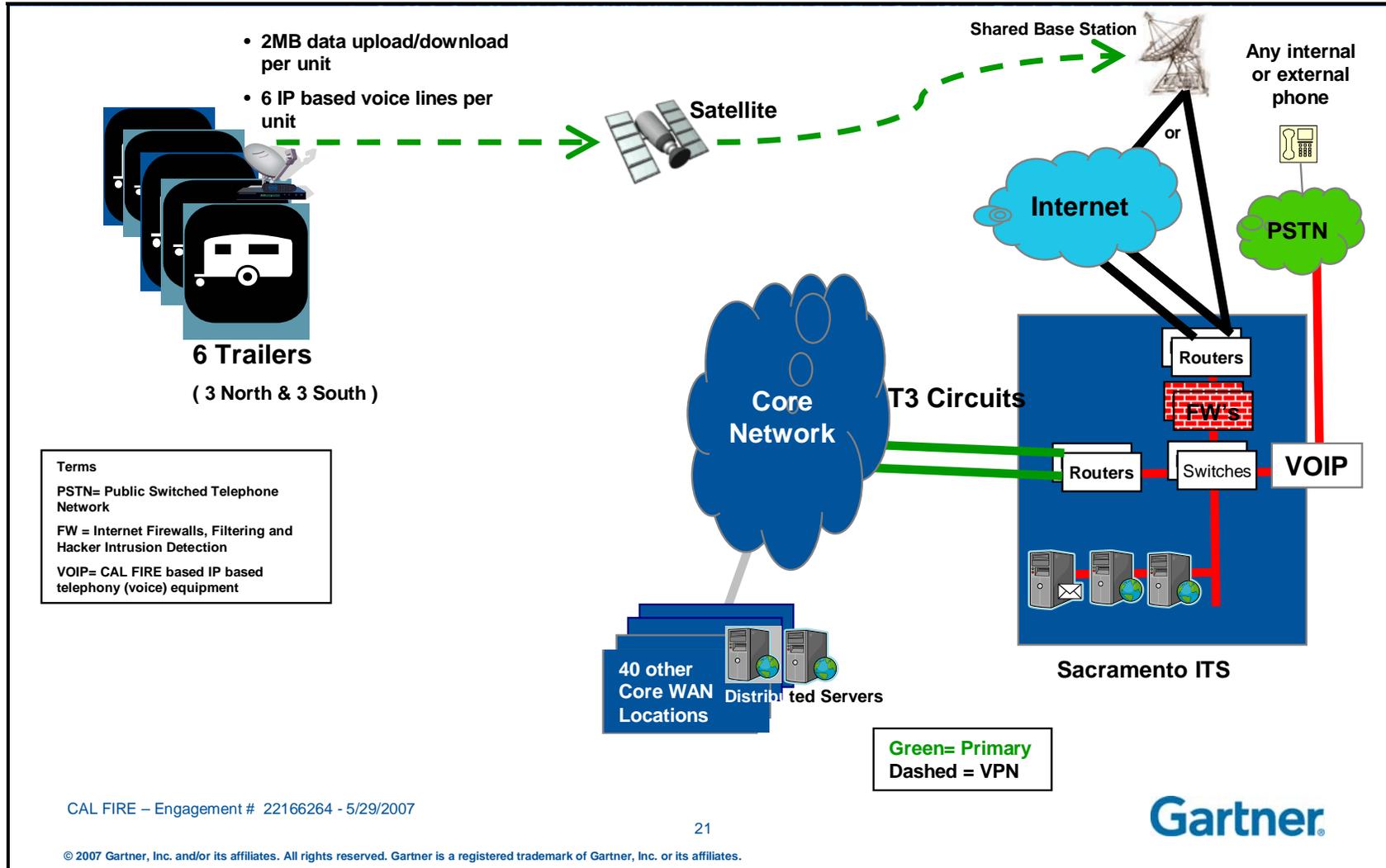
The Remote WAN technical interfaces are detailed in the following figure. These interfaces provide the mandatory connections to achieve the minimum CAL FIRE business requirements.

Figure 11. Remote WAN Technical Interfaces



The ICC WAN technical interfaces are detailed in the following figure. These interfaces provide the mandatory connection to achieve the minimum CAL FIRE business requirements.

Figure 12. Incident Command and Control Technical Interfaces



5.1.11 Testing Plan

As part of the project management effort, a test plan for each solution aspect will be documented. Testing activities include steps such as load and performance and any other standard testing procedures recommended by the infrastructure vendor or CAL FIRE. CAL FIRE ITS personnel will be required to follow the testing procedures and track and report errors and results to ensure that newly deployed equipment and software will meet CAL FIRE requirements. The testing plan will cover the three aspects of the proposed solution and include.

- Core WAN
- Remote WAN
- ICC

5.1.12 Resource Requirements

The proposed solution requires current IT staff, six additional PYs and a temporary contractor in addition to the winning Vendor's outsourced services. Assumptions and costs for all the proposed resource requirements are detailed in Section 8, Economic Analysis Worksheets.

External Resources

The external resources will include a temporary contractor for two to three months that will work with CAL FIRE to design and be a liaison between CAL FIRE and the vendor who will provide configuration, and implementation of the proposed solution.

The selected WAN outsourcer will be responsible for most aspects of provisioning and managing WAN connectivity. This will include the following types of activities:

- Provision new WAN circuits
- Upgrade/augment existing circuits (when requested by CAL FIRE)
- Monitor WAN circuits
- Manage and resolve WAN related outages and replace/repair non-functioning WAN equipment

The Core WAN will be outsourced and as such will require support from the Vendor and a CAL FIRE service management employee. Related CAL FIRE personnel responsibilities are included in the following section.

Internal Resource

Internal PY estimates that represent the various CAL FIRE ITS employees involved in the WAN administration and support were made across phases based on prior CAL FIRE projects, information from relevant previous public sector implementations, and Gartner research. The estimates, call for six additional permanent personnel beginning with fiscal year (FY) 2009/10. Skills required are described in the following table.

Table 23. Additional PY

Internal Skills Required
SSA Contract and Billing Management
Two SS3 Technical Architect Personnel
Three SS2 Technical Support Personnel

As noted above, CAL FIRE personnel will be required to manage and coordinate outsourcer activities and to facilitate communications between the outsourcer and business users. In addition, CAL FIRE ITS personnel will be responsible for supporting most LAN equipment.

In addition, the Project Director and Project Management roles will be performed by current CAL FIRE ITS staff.

The exact PY requirements for the given fiscal year depend directly on the phase of the project and the skills required. Refer to Section 8, Economic Analysis Worksheets for details.

5.1.13 Training Plan

The WAN Infrastructure Project Manager will develop a training plan to address technical training required for the project.

Technical training is budgeted in the FSR to cover classes and other learning activities for CAL FIRE ITS personnel. Costs for this training have been incorporated into Section 8 Economic Analysis Worksheets.

The following training plans will be written specifically for each of the three aspects.

- **Core WAN**—The proposed Core WAN solution will be outsourced to a Vendor/s who will supply the necessary support and maintenance to the Core WAN.
- **Remote WAN**—The proposed Remote WAN solution will require a technology skills refresh for CAL FIRE personnel responsible for supporting this infrastructure. It is anticipated that there will be minimal impact for training purposes. Remote locations will also have third party ISP Vendor support depending on the specific implementation as deemed by contracted terms.
- **ICC**—The ICC WAN infrastructure training plan will include satellite operations, setup, maintenance and operations. There is a one-time training cost of \$30k for 12 personnel, which includes technical certification. These costs are supplied in the EAWs in Section 8.

5.1.14 Ongoing Maintenance

- **Core WAN**—Ongoing operations of the Core WAN network will be managed and supported by the outsourcing Vendor to include manufacturer warranties and maintenance with operations contracts where applicable.
- **Remote WAN**—Current CAL FIRE ITS staff and the additional six new PYs will maintain and support the Remote WAN infrastructure. CAL FIRE will also have the option for additional professional services by Vendor/Contractor which will be available under the ITS current budget.
- **ICC**—Current CAL FIRE ITS staff and the additional six new PYs will maintain and support the ICC infrastructure. CAL FIRE will also have the option for additional professional services by Vendor/Contractor which will be available under the ITS current budget.

5.1.15 Information Security

Security is tantamount to any infrastructure component implemented as part of this project as it must allow CAL FIRE to comply with State of California security requirements. Security requirements applicable to this project include:

- **Physical Security:** equipment secured within the CAL FIRE data center must be protected by physical access security.
- **Network Access Security:** Network security will continue to be maintained at various levels including firewalls, VPNs, and intrusion and prevention devices.

No changes to information security requirements need to be addressed by this project.

5.1.16 Confidentiality

As with the Information Security section above, any new equipment components must be configured and deployed to adhere to CAL FIRE confidentiality requirements and procedures. These are already in place for existing equipment, and there are no new confidentiality requirements that must be added to this project effort.

5.1.17 Impact on End Users

Across the data network locations, end users will be unaware of any changes except for witnessing the increased performance and availability of those environments. End users will also be aware of ease of access to critical mission and business application services.

5.1.18 Impact on Existing Systems

Barring potential problems (e.g., incompatibility, version conflicts) with the implementation of new or upgraded components, there is no impact on established systems such as business applications, office automation applications, or other standard CAL FIRE systems. As part of the implementation of any piece of equipment, CAL FIRE ITS staff will adhere to a formal testing process to be sure that any problems are identified before the item is deployed into the production environment.

5.1.19 Consistency with Overall Strategies

The proposed solution is consistent with the overall CAL FIRE Mission and Technology Strategies.

5.1.20 Impact on Current Infrastructure

The proposed solution has a significant impact on the current infrastructure. Much of the equipment in the Core WAN environment is obsolete and will be upgraded or replaced during this initiative. Additionally, a one time asset management/refresh in FY 2014/15 (for WAN) and 2015/16 (for ICC) will ensure that the current infrastructure remains up-to-date by following generally accepted refresh cycles.

5.1.21 Impact on Data Centers

The scope of the WAN Upgrade FSR concerns equipment at CAL FIRE locations only. There is no impact to any of the Department of Technology Services (DTS) data centers.

5.1.22 Data Center Consolidation

As noted above, the scope of the WAN Upgrade FSR concerns equipment at CAL FIRE locations only. There is no impact to any of the Department of Technology Services (DTS) data centers.

5.1.23 Backup and Operational Recovery

This system has the following business continuity requirements:

- Core WAN
 - Backup and Disaster Recovery:
 - The Core WAN network will have redundant and failover paths to minimize points of failure.
 - Availability:
 - 24 x 7 x 365
 - 99.95% up time, end-to-end for all Core WAN sites.
- Remote WAN
 - Backup and Disaster Recovery:
 - The Remote WAN network will have single connection options. Higher priority sites will have satellite failover for disaster recovery.
 - Availability:
 - 24 x 7 x 365
 - 99.9% up time, end-to-end for all Remote WAN sites.
- ICC
 - Backup and Disaster Recovery:
 - Satellite backup and recovery points are determined by vendor contract service levels when the solution is implemented. Since the only connection available for the ICC will be satellite connectivity hardware and professional support response times require four hour on-site response.
 - Availability:
 - As required to support incidents
 - 99.95% up time, end-to-end for all ICC sites.

These business continuity requirements are supported by CAL FIRE's current disaster recovery routines and will be in compliance with the State's Operational Recovery Plan (ORP) standards.

5.1.24 Public Access

There will be no general public access to the new infrastructure.

Secure Access

The proposed solution will allow for secure extranet access to CAL FIRE infrastructure. This access will be provided on an as-needed basis as determined by CAL FIRE information security policies.

5.1.25 Costs and Benefits

5.1.25.1 Costs

As detailed in Section 8, Economic Analysis Worksheets, and summarized in the following table, the total project cost for the proposed solution over seven years of the project is \$55,755,811.

- The total one-time Proposed Solution Project Costs, which include all contract costs, new PY and external and internal costs associated with both phases of the proposed WAN solution, are \$12,521,111.
- The total continuing IT costs, including a WAN refresh in FY 2014/15 and ICC refresh in FY 2015/16 are \$43,243,700.

Table 24. WAN Project Costs

Description	Cost
Total Project Costs	\$55,755,811
One Time WAN Upgrade Costs	\$12,521,111
<input type="checkbox"/> Staff	\$2,799,421
<input type="checkbox"/> Hardware/Software and Services	\$9,616,690
<input type="checkbox"/> Contract Services	\$75,000
<input type="checkbox"/> Training	\$30,000
Total Continuing IT Costs for 7 Years (2009/10–2015/16)	\$43,234,700
<input type="checkbox"/> Staff	\$4,876,820
<input type="checkbox"/> Hardware Lease Maintenance (Includes Bandwidth Costs, WAN Management Services and Maintenance Services)	\$28,102,650
<input type="checkbox"/> Hardware Refresh	
– Core WAN and Remote Refresh 2014/15 (\$9,966,623)	\$10,165,230
– ICC Refresh 2015/16 (\$198,606)	
<input type="checkbox"/> Contract Services	\$90,000

5.1.25.2 Benefits

The benefit of the proposed solution is that it meets the objectives described in Section 3.0, and is the most cost-effective solution that meets all of CAL FIRE’s business and technical requirements.

5.1.26 Sources of Funding

The proposed solution will be funded through a combination of existing CAL FIRE funding and a Budget Change Proposal (BCP) requesting additional funding to implement and maintain the system as follows. This BCP will request \$39,826,746 in additional funds.

Table 25. Sources of Funding

Description	Cost
Existing Project Funds	\$15,929,065
Proposed Solution Required Project Funds	\$55,755,811
Project Funding Needed	\$39,826,746

5.2 Rationale for Selection

Alternative 1 is the approach that best allows CAL FIRE to meet the objectives and requirements identified in Section 3. In particular, the alternative lessens the risk of failure of obsolete equipment by implementing a complete upgrade/replacement program, positions CAL FIRE to enhance and support future and existing mission and business-critical needs, and provides the infrastructure scalability and extensibility to meet future growth and capacity requirements.

The selection of this alternative over the others can be summarized as follows:

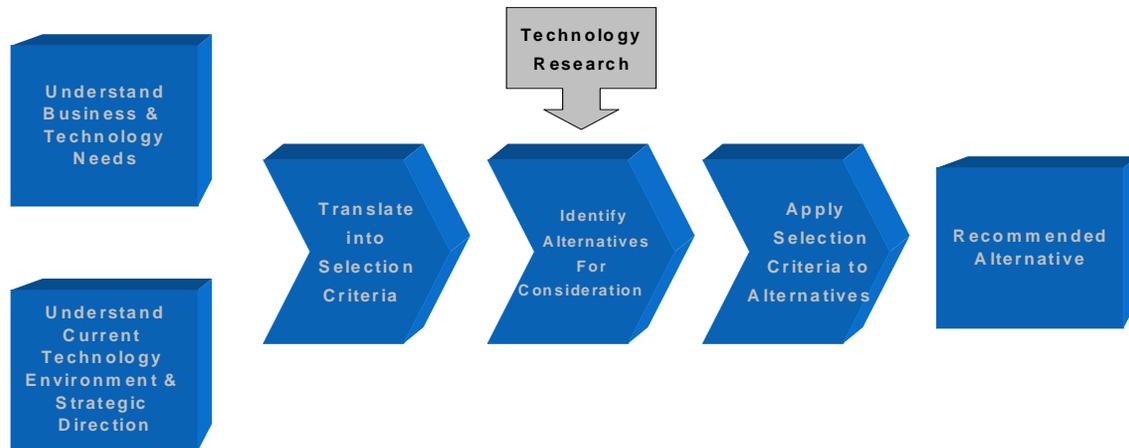
- **Implementing Alternative 1 is more advantageous to CAL FIRE than Alternative 2 due to its ability to meet CAL FIRE’s objectives and requirements with an acceptable total cost of ownership.** Upgrading of obsolete equipment will allow CAL FIRE to continue current mission and business-critical operations as well as provide the foundation for future mission and business-critical processes.
- **Implementing Alternative 1 is more advantageous to CAL FIRE than Alternative 3 due to its ability to meet CAL FIRE’s objectives and requirements and eliminate high risk operational outages.** Upgrading of obsolete equipment will allow CAL FIRE to continue current mission and business-critical operations as well as provide the foundation for future mission and business-critical processes.

The following section provides additional detail on the other alternatives considered and the rationale for selection of the proposed alternative.

5.3 Other Alternatives Considered

All viable options were explored in order to select the best alternative for CAL FIRE to meet its requirements and objectives for the proposed WAN. The options were researched to ascertain their suitability for CAL FIRE in light of its current situation, legislative/departmental goals and objectives, and the business and functional requirements. The figure below depicts the methodology for the selection and assessment of alternatives.

Figure 13. Alternatives Analysis Approach



Source: Gartner, 2005

After completing research and due diligence activities, three alternatives were considered for CAL FIRE. These alternatives are listed in the following table.

Table 26. Alternatives Identified for CAL FIRE’s WAN Proposed Solution

Alternatives	Description
Alternative 1	This alternative will encompass a cost-effective solution that meets all mandatory business and technical requirements
Alternative 2	This alternative will encompass a premiere alternative, and include all of mandatory business and technical requirements plus additional desired functionality.
Alternative 3	Status Quo

Each of these alternatives is described in the following sub-sections.

5.3.1 Alternatives Descriptions

5.3.1.1 Alternative 1 (Proposed Solution)

Description

The Alternative 1 WAN solution is a cost-effective solution that meets all mandatory mission and business-critical functionality. The table below provides information regarding each aspect to include description and key features.

Table 27. Summary of Alternative 1

Description	Key Features
Core WAN	
Provide advanced function “any to any” WAN network topology	<ul style="list-style-type: none"> ■ Replace the current hub and spoke topology with a modern flat topology that provides “any to any” connectivity among the current 40 Core WAN locations ■ Maintain current levels of security and availability in the Core WAN ■ Increase network performance by adding bandwidth and advanced application prioritization and optimization capabilities ■ Allow CAL FIRE partners (Schedule C cooperators) to connect to the Core WAN at their expense
Remote WAN	
Provide secure broadband connectivity for all CAL FIRE locations and provide an extranet access option to partners willing to pay	<ul style="list-style-type: none"> ■ Provide persistent, secure broadband-type connectivity to all CAL FIRE owned and Schedule A locations that are not currently connected to the Core WAN today ■ Allow CAL FIRE partners (Schedule C cooperators) the ability to connect to CAL FIRE-provided extranet services at their expense
ICC	
Provide trailer-based data and voice connectivity	<ul style="list-style-type: none"> ■ Provide a CAL FIRE owned trailer equipped with the necessary satellite and network hardware to provide on-site data and voice connectivity ■ Trailer can act as platform for ECC backup if required ■ Locate three trailer units in the North and three in the South

Recommendation

Alternative 1 is the proposed solution. Alternative 1 is the best solution to meet CAL FIRE’s mission and business-critical processes and provide a foundation for future needs and vision. It includes the three most viable and cost-effective solution to meet CAL FIRE’s requirements.

Alternative 1 is the best fit to meet the following CAL FIRE mission and business requirements:

- Maintain CAL FIRE’s existing WAN availability, fault tolerance, security and disaster recovery
- Support electronic transfer and utilization of critical public safety information for all front-line CAL FIRE personnel
- Support electronic processing of business applications (ROSS, CAIRS, THP processes, etc.) with reasonable average response times at all CAL FIRE locations

- Ensure a consistent and reliable means for situational support at ICCs including real/near time data for:
 - Weather
 - GIS
 - Resource allocation provisioning
 - Digital and voice communications
- Establish audio and video broadcasting capabilities to support both internal and external communications
- Provide videoconferencing capabilities to support distance learning for training of fire personnel
- Support a more efficient means to document, track, and disseminate information such as the firefighter certifications, THP permit information, Fire Plans, internal communications (e.g., CAL FIRE newsletter)
- Provide the ability for all CAL FIRE personnel to have ready-access to CAL FIRE's existing business applications.
 - Improve the performance of current applications
 - Enable deferred applications to be “activated”
 - Support future deployment of new applications via a higher capacity WAN

5.3.1.2 *Alternative 2 (Viable Alternative)*

Description

Alternative 2 is a premier alternative that meets all the mandatory business and technical requirements and provides additional desired functionality.

Table 28. Summary of Alternative 2

Description	Key Features
Core WAN	
Same as Alternative 1	<ul style="list-style-type: none"> ■ Same as proposed Alternative
Remote WAN	
Provide a robust public safety quality network for all CAL FIRE locations	<ul style="list-style-type: none"> ■ Extend the same persistent, secure, public safety quality network connectivity available today at Core WAN CAL FIRE locations to all CAL FIRE owned and Schedule A locations not currently connected ■ Allow CAL FIRE partners (Schedule C cooperators) the ability to connect to CAL FIRE-provided extranet services at their expense
ICC	
Provide a trailer-based data and voice connectivity, service via satellite. Also provide portable (luggable) based units for additional data and voice transmission flexibility.	<ul style="list-style-type: none"> ■ Provide a CAL FIRE owned trailer equipped with the necessary satellite and network hardware to provide on-site data and voice connectivity. ■ Trailer can act as platform for ECC backup if required. ■ Locate three trailer units in the North and three in the South. ■ Six “person” portable units allow for the ability to extend connectivity to multiple sites if trailers are in use.

Recommendation

Alternative 2 is a viable alternative however it is not recommended. This alternative offers a solution for \$81,826,033. This is 47% higher in cost compared to the proposed solution. The difference in cost is attributed to the following factors.

- All CAL FIRE owned and Schedule A locations receive public safety quality network (i.e., T1 bandwidth compared to broadband type bandwidth) connectivity. This cost difference is correlated to hardware costs and incremental refresh cost in years 2014-2016 associated to public safety quality network requirements.
- Alternative 2 provides six additional portable satellite units in conjunction with the ICC-based trailer units.

5.3.1.3 Alternative 3: Status Quo

Description

In Alternative 3, CAL FIRE would continue with the status quo of funding WAN infrastructure through its current budgets and any special projects that may allow for equipment purchases.

The advantages and disadvantages of Alternative 3 are summarized in the following table.

Table 29. Summary of Alternative 3

Aspect	Description	Key Features
Core WAN	Status Quo	<ul style="list-style-type: none"> ■ Does not meet any CAL FIRE mission and business-critical requirements ■ High risk of operational failure due to obsolete hardware
Remote WAN	Status Quo	<ul style="list-style-type: none"> ■ Does not meet any CAL FIRE mission and business-critical requirements
ICC	Status Quo	<ul style="list-style-type: none"> ■ Does not meet any CAL FIRE mission and business-critical requirements

Recommendation

Alternative 3 is not a viable alternative and is not recommended due to its inability to meet CAL FIRE’s objectives and requirements. The status quo would simply continue the practice of significant under funding of CAL FIRE infrastructure and likely lead to exacerbation of the many business problems identified in the Business Case section of this FSR.

5.3.2 Evaluation of Criteria

Specific criteria were established to evaluate the ability of each alternative to meet CAL FIRE’s objectives. Alternative 1 provides clear advantages over the other alternatives considered. The evaluation framework used to assess alternatives consists of Business Requirements, Technical requirements, Total Cost of Ownership, Implementation Time and Risk. The selection criteria are each given a relative weighting based on the importance to CAL FIRE objectives.

Table 30. Evaluation Criteria Definitions and Weighting

Criteria	Weight
Business Requirements The ability of the proposed solution to meet all mandatory business objectives	15 %
Technical Requirements The ability of the proposed solution to meet all mandatory technical objectives	15 %
Total Cost of Ownership The one-time, five year and ongoing operations and maintenance costs of the proposed solution.	50 %
Implementation Time The time necessary to implement the proposed solution.	5 %
Risk The ability of the proposed solution to mitigate risk associated with financial, technical and operational objectives	15 %
Total	100 %

5.3.2.1 Analysis of Alternatives

Using the evaluation criteria specified above, the score for Alternative 1 was higher than for other alternatives. The following table details the Alternative Analysis Summary based upon total numeric score by criteria.

Table 31. Summary Analysis of all Alternatives

Selection (Scorable) Criteria	Weight	Alternative 1	Alternative 2	Alternative 3
Business Requirements	15.00%	196.68	207.27	45.00
Technical Requirements	15.00%	132.19	144.38	56.25
Cost	50.00%	416.67	316.67	666.67
Implementation	5.00%	45.00	45.00	35.00
Risk	15.00%	192.86	192.86	53.57
Total	100.00%	983.40	906.17	856.49

Each aspect (Core WAN, Remote WAN, and ICC) of the proposed solution (Alternative 1) was determined to be the most cost-effective solution that met the CAL FIRE objectives and requirements. Information supporting the scores as well as the detailed scoring per for each aspect of the proposed solution follows.

Core WAN

The proposed Core WAN aspect of the proposed solution reduces the risk of technology failure due to obsolete and antiquated hardware and topologies. This solution provides a framework for

Table 33. Core WAN Alternative Analysis

Selection (Scorable) Criteria		Weight	"Import (H,M,L)"	Alternative 1	Alternative 2	Alternative 3
Business Requirements		15.00%		-	-	-
1	Mitigates risk associated with obsolete WAN equipment	2.31%	M	5	5	1
2	Improves performance of existing applications	3.46%	H	5	5	1
3	Enables deployment of video/audio broadcast applications	3.46%	H	5	5	1
4	Provides sufficient bandwidth to support future applications	3.46%	H	5	5	1
5	Enables optimization of critical enterprise business processes	1.15%	L	5	5	1
6	Improves IT's ability to provide remote desktop technical support	1.15%	L	5	5	1
Technical Requirements		15.00%		-	-	-
7	Provides same level of availability/diversity as today's Core WAN	2.81%	H	5	5	5
8	Provides or exceeds level managability/visability of today's network	2.81%	H	5	5	5
9	Meets or exceeds defined security standards	1.88%	M	3	3	1
10	Provides ability to prioritize applications and rate limit based on priority	2.81%	H	5	5	1
11	Leverages existing investments in IT and non-IT infrastructure	0.94%	L	3	3	1
12	Ability to leverage or transition existing staff and skills	0.94%	L	3	3	1
13	5 Year hardware refresh included in cost estimates	0.94%	L	3	3	1
Cost		50.00%		-	-	-
14	One-time Costs	16.67%	M	4	4	5
15	5 Year total cost of ownership	25.00%	H	3	3	5
16	Additional PYs required to support solution	8.33%	L	3	3	5
Implementation		5.00%		-	-	-
17	Time to full solution implementation	5.00%	M	3	3	5
Risk		15.00%		-	-	-
18	Financial Risk—Ability to accurately estimate costs	2.14%	L	4	4	5
19	Technical Risk—proven technology/approach	6.43%	H	5	5	1
20	Operational Risk—disruptions to business operations	6.43%	H	4	4	1
Total		100.00%		354.97	354.97	367.95

Table 34. Remote WAN Alternative Analysis

Selection (Scorable) Criteria		Weight	"Import (H,M,L)"	Alternative 1	Alternative 2	Alternative 3
Business Requirements		15.00%		-	-	-
1	Enables "Rip and Run" dispatch technology/application	2.65%	H	4	5	1
2	Improves performance of e-mail and web/Citrix based CDF/internet applications	2.65%	H	4	5	1
3	Can be scaled to support future vehicle or station-based applications	1.76%	M	5	5	1
4	Enables optimization of critical enterprise business processes	2.65%	H	5	5	1
5	Enables IT to provide remote desktop technical support	2.65%	H	4	5	1
6	Improves internal communications between CDF and front line personnel	1.76%	M	4	5	1
7	Improves line of business processes	0.88%	L	4	5	1
Technical Requirements		15.00%		-	-	-
8	Provides same level of availability/diversity as today's Core WAN	1.88%	M	3	5	1
9	Provides or exceeds level manageability/visibility of today's network	1.88%	M	3	5	1
10	Provides persistent connectivity to all required locations	2.81%	H	3	4	1
11	Meets or exceeds defined security standards	1.88%	M	4	5	1
12	Provides ability to prioritize applications and rate limit based on priority	2.81%	H	3	5	1
13	Leverages existing investments in IT and non-IT infrastructure	0.94%	L	3	3	1
14	Ability to leverage or transition existing staff and skills	0.94%	L	4	4	1
15	5 Year hardware refresh included in cost estimates	1.88%	M	5	5	1
Cost		50.00%		-	-	-
16	One-time Costs	8.33%	L	3	1	5
17	5 Year total cost of ownership	25.00%	H	3	1	5
18	Additional PYs required to support solution	16.67%	M	3	3	5
Implementation		5.00%		-	-	-
19	Time to full solution implementation	5.00%	M	3	3	1
Risk		15.00%		-	-	-
20	Financial Risk—Ability to accurately estimate costs	2.14%	L	5	5	1
21	Technical Risk—proven technology/approach	6.43%	H	5	5	1
22	Operational Risk—disruptions to business operations	6.43%	H	5	5	1
Total		100.00%		346.60	308.33	298.13

Table 35. ICC Alternative Analysis

Selection (Scorable) Criteria		Weight	"Import (H,M,L)"	Alternative 1	Alternative 2	Alternative 3
Business Requirements		15.00%		-	-	-
1	Provides instant connectivity to any incident anywhere in CA	4.09%	H	5	5	1
2	Provides support for required number and type of incidents	4.09%	H	3	3	1
3	Provides access to internet, e-mail and web/Citrix based CDF applications.	2.73%	M	4	4	1
4	Provides ability to replicate GIS information to laptop at ICC	2.73%	M	3	3	1
5	Provides voice connectivity to/from ICC via PSTN	1.36%	L	4	4	1
6	Improves fire related communications between CDF and front line personnel	4.09%	H	4	4	1
Technical Requirements		15.00%		-	-	-
7	Provides acceptable performance for web based applications	1.88%	M	4	4	1
8	Meets or exceeds defined security standards	1.88%	M	4	4	1
9	Provides ability to prioritize applications and rate limit based on priority	0.94%	L	5	5	1
10	Can be set up and configure at site by non-technical personnel	2.81%	H	5	3	1
11	Leverages existing investments in IT and non-IT infrastructure	0.94%	L	3	3	1
12	Ability to leverage or transition existing staff and skills	0.94%	L	4	3	1
13	Meets environmental control standards	2.81%	H	5	4	1
Cost		50.00%		-	-	-
13	One-time Costs	8.33%	L	3	1	5
14	5 Year total cost of ownership	8.33%	L	3	1	5
15	Additional PYs required to support solution	16.67%	M	3	3	5
Implementation		5.00%		-	-	-
16	Time to full solution implementation	5.00%	M	3	3	1
Risk		15.00%		-	-	-
17	Financial Risk—Ability to accurately estimate costs	2.14%	L	3	3	1
18	Technical Risk—proven technology/approach	6.43%	H	4	4	1
19	Operational Risk—disruptions to business operations	6.43%	H	3	3	1
Total		100.00%		260.26	221.31	210.10

6.0 Project Management Plan

CAL FIRE recognizes that a structured approach to project management is required to ensure the successful implementation of the wide-area network (WAN) upgrade project. The following table provides an outline of the Project Management Plan components to be described in this section.

Table 36. Project Management Plan Sections

6.1	Project Manager Qualifications
6.2	Project Management Methodology
6.3	Project Organization
6.4	Project Priorities
6.5	Project Plan
6.5.1	Project Scope
6.5.2	Project Assumptions
6.5.3	Project Phasing
6.5.4	Roles and Responsibilities
6.5.5	Project Schedule
6.5.6	Project Monitoring
6.5.7	Project Quality
6.5.8	Change Management
6.5.9	Authorization Required

6.1 Project Manager Qualifications

An experienced project manager is critical to the success of any project. It is the project manager's responsibility to ensure the project comes in on time, within budget and meets functional requirements. The project manager responsible for the WAN upgrade project should have, at a minimum, the following qualifications:

- Previous successful experience managing IT projects of similar scope, and complexity
- Demonstrated ability to apply team leadership principles
- Expertise in all areas of the CAL FIRE

CAL FIRE has a qualified candidate with experience and skills required to manage this project. CAL FIRE will realign this resource to ensure proper project management practices are followed in the execution of the WAN upgrade project.

6.2 Project Management Methodology

CAL FIRE has implemented a project management methodology that is in alignment with the State project management methodology (SIMM 200). As a result, the project will adhere to the following requirements:

- Completion and acceptance of project charter
- Development of comprehensive requirements (business and/or technical)

- Development of activities/work breakdown structures
- Clearly defined project roles and responsibilities
- Development of detailed project schedule, including milestones and deliverables
- Completion of a quality assurance (QA) plan
- Completion of a risk management plan
- Ongoing project performance review and project plan updates
- Comparison of planned and actual progress-to-date
- Completion of project closeout

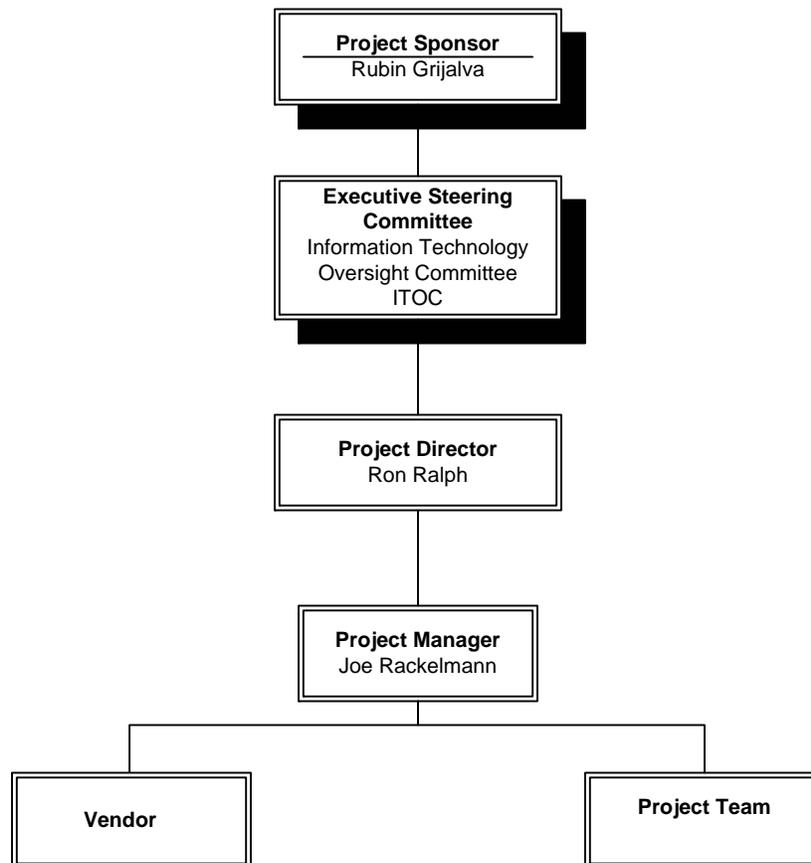
CAL FIRE will continue to use Microsoft Solutions Framework (MSF) methodology and application to manage technology projects.

The project team will work closely with the various vendors to ensure the vendors consistently meet project schedule and deliverable expectations.

6.3 Project Organization

The WAN upgrade project will involve various CAL FIRE stakeholders and departments in the planning, decision-making, issue resolution, implementation, tracking, and reporting processes related to project activities. The following organization chart and supporting descriptions detail roles and responsibilities and how these stakeholders will be organized to facilitate participation and effective tracking and reporting of the WAN upgrade project activities.

Figure 14. Project Organization



Project Sponsor—The Project Sponsor assumes project ownership, is the highest possible level of project review at CAL FIRE and provides policy leadership and oversight as needed. The Project Sponsor reviews and resolves policy, fiscal, and resource allocation issues that cannot be resolved at lower levels.

Executive Steering Committee—The Executive Steering Committee is comprised of senior management from CAL FIRE executive units (e.g., CAL FIRE and Office of State Fire Marshal). CAL FIRE refers to this entity as the Information Technology Oversight Committee (ITOC). In this role ITOC will be responsible for oversight of the project. When required, they will review and resolve project issues that are not resolved at lower levels and will provide advice and insight into project management issues. This entity is responsible for assuring that adequate resources are made available to the project team for successful completion of the project.

Project Manager—The Project Manager plans, directs, and oversees the day-to-day activities of the WAN upgrade program staff. He ensures that project management practices are being employed appropriately responds to change requests and coordinates project activities (e.g., project and stakeholder meetings). The Project Manager serves as the principal interface with the various WAN vendors. Functions of this role also include:

- Communicating project status
- Managing risks and issues and problem escalation
- Contract management

Project Team—The Project Team will be comprised of one contractor (short term contract), existing IT staff, the CAL FIRE Project Manager, six additional PYs and the solution vendor project support manager. The existing staff includes personnel supporting the existing WAN, LAN, IAS and RAS environment. The additional PYs will include:

- One Contract and Billing Management personnel
- Two SS3 Architects
- Three SS2 Technical Support personnel

The Project Team will ensure that all phases of the project are completed and ongoing support meets CAL FIRE's requirements.

6.4 Project Priorities

Managing a project requires the balancing of three factors: resources, schedule, and scope. These three factors are interrelated; a change in one of them causes the others to change as well. For the CAL FIRE WAN upgrade project:

- *Project scope* is constrained—there is a defined limit to the scope of the project that cannot be adjusted. The scope of the upgrade effort reflects the overall business case and full requirements of the project.
- *Resources* are accepted—if necessary, resources may be adjusted to accommodate the scope. Resources can be adjusted to utilize contracting services if additional PY are not in place
- The project *schedule* is improved—this component most easily adjusted.

Figure 15. Project Trade-off Matrix

Scope	Resources	Schedule
Constrained	Accepted	Improved

6.5 Project Plan

6.5.1 Project Scope

The scope of the WAN upgrade project includes planning, procurement, setup, installation, configuration, testing, training and deployment of a WAN allowing CAL FIRE to meet the business and technical needs of its constituents and delivering the department's next generation communications.

6.5.2 Project Assumptions

- The project will adhere to a Plan in which all milestones must be met.
- All WAN upgrade vendor procurements and contracts will be accomplished within planned timelines.
- There will be timely review/feedback on all project deliverables by reviewers.
- Problem/issue resolution will be handled on a timely basis.
- Proactive risk management strategies will be employed to minimize risk and ensure timely completion of the project.

- Technical staff and end users will receive training to be able to support and use the upgraded WAN equipment, as applicable.

6.5.3 Project Phasing

The project will be planned and implemented in five phases. The project also includes a one time technical upgrade in FY 2014/15 for all Core WAN and Remote WAN aspects, in FY 2015/16 to all ICC aspects of the proposed solution. The table below highlights the phases with a brief description of activities in each phase.

Table 37. Overview of Project Phases

Phase	Description
Phase 1—Project Planning and Staff Augmentation	<ul style="list-style-type: none"> ■ Project Planning and Initiation <ul style="list-style-type: none"> □ Development of WAN upgrade project charter, project plans and project scope to outline resource and time requirements and to identify key aspect milestones. ■ Staff Augmentation <ul style="list-style-type: none"> □ Recruit and hire 6 additional PYs
Phase 2—Core WAN	<ul style="list-style-type: none"> ■ Procurement and Project Management <ul style="list-style-type: none"> □ Develop project scope and detailed requirements □ Develop project workplan □ Conduct research into product technologies □ Review product availability □ Development and issuance of procurement documents □ Assessment of WAN solution provider responses, as applicable □ Selection of winning WAN solution providers □ Finalize contracts ■ Technical Design and Implementation <ul style="list-style-type: none"> □ Design of Core WAN solution □ Receive and install new equipment □ Configure and migrate □ Test and train □ Replacement of existing Core WAN ■ Operations and Maintenance

Phase	Description
<p>Phase 3—Remote WAN and ICC</p>	<ul style="list-style-type: none"> ■ Procurement and Project Management <ul style="list-style-type: none"> <input type="checkbox"/> Develop project scope and detailed requirements <input type="checkbox"/> Develop project workplan <input type="checkbox"/> Conduct research into product technologies <input type="checkbox"/> Review product availability <input type="checkbox"/> Development and issuance of procurement documents <input type="checkbox"/> Assessment of WAN solution provider responses, as applicable <input type="checkbox"/> Selection of winning WAN solution providers <input type="checkbox"/> Finalize contracts ■ Technical Design and Implementation <ul style="list-style-type: none"> <input type="checkbox"/> Design of Remote and ICC WAN solution <input type="checkbox"/> Receive and install new equipment <input type="checkbox"/> Configure and migrate <input type="checkbox"/> Test and train <input type="checkbox"/> Replacement of existing Core WAN ■ Operations and Maintenance
<p>Phase 4—One Time Core WAN Refresh</p>	<ul style="list-style-type: none"> ■ Procurement and Project Management <ul style="list-style-type: none"> <input type="checkbox"/> Develop project scope and detailed requirements <input type="checkbox"/> Develop project workplan <input type="checkbox"/> Conduct research into product technologies <input type="checkbox"/> Review product availability <input type="checkbox"/> Development and issuance of procurement documents ■ Implementation <ul style="list-style-type: none"> <input type="checkbox"/> Receive and install new equipment <input type="checkbox"/> Configure and migrate <input type="checkbox"/> Test and train ■ Operations and Maintenance
<p>Phase 5—One Time Remote WAN and ICC Refresh</p>	<ul style="list-style-type: none"> ■ Procurement and Project Management <ul style="list-style-type: none"> <input type="checkbox"/> Develop project scope and detailed requirements <input type="checkbox"/> Develop project workplan <input type="checkbox"/> Conduct research into product technologies <input type="checkbox"/> Review product availability <input type="checkbox"/> Development and issuance of procurement documents ■ Implementation <ul style="list-style-type: none"> <input type="checkbox"/> Receive and install new equipment <input type="checkbox"/> Configure and test <input type="checkbox"/> Train ■ Operations and Maintenance

Phase 1—Project Planning and Staff Augmentation

- **Project Planning and Initiation**—The WAN upgrade initiation and planning process will be executed with a focused effort to document and formalize a Project Charter, WAN aspect project plans, determine scope and a complete set of requirements, estimate a detailed project schedule and identify project resources and key milestones as needed to meet the proposed solutions phased approach. CAL FIRE will conduct this planning

effort during the approximately three months between approval of the FSR and release of funds in July 2009.

- **Staff Augmentation**—This involves the recruitment and hiring of the 6 new needed PYs. This needs to be completed prior to the start of the Technical Design and Implementation aspect of Phase 2.

Phase 2—Core WAN

- **Procurement and Project Management**—During this phase CAL FIRE will develop the project scope, detailed business and functional requirements and a project workplan. CAL FIRE will research and review the available technologies available to meet the proposed solutions desired objectives. CAL FIRE will then develop and issue the necessary procurement documents to begin the process of identifying a suitable vendor. Upon selection of the winning bidder CAL FIRE will enter and finalize contract negotiations.
- **Technical Design and Implementation**—During this phase CAL FIRE will design the proposed technical solution to meet the objectives of this FSR. CAL FIRE will receive and install the new equipment, configure and migrate to the new network as well as test and train as necessary. The completion of this phase upgrades the Core WAN.
- **Operations and Management**—CAL FIRE will continue to manage and operate as necessary with the outsourced service provider to maintain CAL FIRE's current WAN security, availability and fault tolerance.

Phase 3—Remote WAN and ICC

- **Procurement and Project Management**—During this phase CAL FIRE will develop the project scope, detailed business and functional requirements and a project workplan. CAL FIRE will research and review the available technologies available to meet the proposed solutions desired objectives. CAL FIRE will then develop and issue the necessary procurement documents to begin the process of identifying a suitable vendor/s. Upon selection of the winning bidder/s CAL FIRE will enter and finalize contract negotiations.
- **Technical Design and Implementation**—During this phase CAL FIRE will design the proposed technical solution to meet the objectives of this FSR. CAL FIRE will receive and install the new equipment, configure and migrate to the new network as well as test and train as necessary. The completion of this phase provides CAL FIRE owned and Schedule A locations with WAN connectivity. It also provides data and voice capabilities at ICCs.
- **Operations and Management**—CAL FIRE will continue to manage and operate as necessary to maintain remote WAN security, availability and fault tolerance.

Phase 4—One Time Core WAN Refresh (FY 2014/15)

- **Procurement and Project Management**—During this phase CAL FIRE will develop the project scope, detailed business and functional requirements and a project workplan to refresh the Core WAN. CAL FIRE will research and review the available technologies available to meet the desired objectives. CAL FIRE will then develop and issue the necessary procurement documents to begin the process refreshing the Core WAN.

- **Technical Design and Implementation**—CAL FIRE will receive and install the new equipment, configure and migrate to refresh the Core WAN network as well as test and train as necessary. The completion of this phase refreshes the Core WAN.
- **Operations and Management**—CAL FIRE will continue to manage and operate as necessary to maintain Core WAN security, availability and fault tolerance.

Phase 5—One Time Remote WAN and ICC Refresh (FY 2015/16)

- **Procurement and Project Management**—During this phase CAL FIRE will develop the project scope, detailed business and functional requirements and a project workplan to refresh the Remote WAN and ICC. CAL FIRE will research and review the available technologies available to meet the desired objectives. CAL FIRE will then develop and issue the necessary procurement documents to begin the process refreshing the Remote WAN and ICC.
- **Technical Design and Implementation**—CAL FIRE will receive and install the new equipment, configure and migrate to refresh the Remote WAN and ICC network as well as test and train as necessary. The completion of this phase refreshes the Remote WAN and ICC.
- **Operations and Management**—CAL FIRE will continue to manage and operate as necessary to maintain Remote WAN and ICC security, availability and fault tolerance.

Services and Support

The proposed WAN upgrade detailed in Section 5 includes a technical refresh of hardware/software and services in FY 2014/15 (Core WAN) and FY 2015/16 (Remote WAN and ICC). This refresh will provide maximum efficiencies and ensure CAL FIRE's long term objectives are met.

IV&V and IPOC

In accordance with the project scope, this FSR does not include IV&V or IPOC services.

6.5.4 Roles and Responsibilities

This section defines the roles and responsibilities of the key State participants in the WAN upgrade project, as identified in the project organization described earlier. These roles and responsibilities will be refined within the Project Charter during the beginning stages of the implementation project to ensure they are understood and accepted by all involved.

- **Project Sponsor**
 - Assumes project ownership, is the highest possible level of project review at CAL FIRE and provides policy leadership and oversight as needed
 - Reviews and resolves policy, fiscal, and resource allocation issues that cannot be resolved at lower levels
- **Executive Steering Committee**
 - Comprised of senior members from CAL FIRE executive units
 - Responsible for oversight of the project
 - Reviews and resolves project issues not resolved at lower levels and provides advice and insight into project management issues

- Responsible for assuring that adequate resources are made available to the project team for successful completion of the project
- **Project Director**
 - Responsible for overall success of the project and accountable to the Executive Steering Committee for project outcomes
 - Facilitates resolution of all issues and monitors and optimizes resource allocations
 - Approves changes to requirements, scope, and risk and monitors actual project progress against the planned activity schedules
 - Works directly with Project Manager to ensure agreed project management practices are being employed for project success
 - Reports project status to executive-level and external stakeholders
- **Project Manager**
 - Plans, directs, and oversees the day-to-day activities of State IT and program staff
 - Serves as the principal interface with the various WAN vendors
 - Ensures that project management practices are being employed appropriately
 - Acts as principal point of contact for resolution of issues
 - Responds to change requests and coordinates project activities
 - Coordinates Project Management team meetings, ensuring all appropriate parties attend and are kept apprised of day-to-day activities
 - Communicates project status
 - Manages risks and issues and problem escalation
 - Manages Vendor relations and contract management
- **Project Team**
 - Carries out day-to-day activities across all technical and program phases of the project
 - Conducts or directly manages daily activity such as requirements definition, environmental setup, quality assurance, testing, training, deployment, and other activities
 - Assists with various procurement tasks such as defining requirements (technical and/or functional), providing input and reviewing procurement documents, and evaluating WAN vendor proposal responses
 - Ensures that the implemented components meet the requirements defined within the vendors contracts through system and acceptance testing activities
 - Plans, develops and delivers training to technical staff and end users
 - After deployment, supports the on an ongoing basis with the goal of ensuring the proper functioning and management of each component

6.5.5 Project Schedule

The following MS Project Schedule excerpts show proposed project schedule by the five phases. At this early stage of the effort, start and end dates are very broad. During the approximately six months before project funding is available in July 2009, the CAL FIRE Project Manager will develop a detailed component-by-component work plan and schedule to stage the WAN upgrade appropriate to priorities, available resources and other constraints.

Figure 16. Phase 1—Project Initiation and Planning

ID	Task Name	Duration	Start	Finish
1	Phase 1 Project Planning and Staff Augmentation	66 days	Wed 7/1/09	Wed 9/30/09
2	Project Planning and Initiation	23 days	Wed 7/1/09	Fri 7/31/09
3	Develop project charter, project plans and project scope	15 days	Wed 7/1/09	Tue 7/21/09
4	Identify resources, time requirements and major milestones	8 days	Wed 7/22/09	Fri 7/31/09
5	Staff Augmentation	56 days	Wed 7/15/09	Wed 9/30/09
6	Recruit and hire 6 new Pys	56 days	Wed 7/15/09	Wed 9/30/09

Figure 17. Phase 2—Core WAN Upgrade

ID	Task Name	Duration	Start	Finish
7	Phase 2 - Core WAN	195 days	Mon 8/3/09	Fri 4/30/10
8	Procurement and Project Managment	85 days	Mon 8/3/09	Fri 11/27/09
9	Define scope and develop detailed requirements	10 days	Mon 8/3/09	Fri 8/14/09
10	Develop detailed workplan	10 days	Mon 8/17/09	Fri 8/28/09
11	Conduct research into product and technologies	9 days	Mon 8/31/09	Thu 9/10/09
12	Review product availability	10 days	Fri 9/11/09	Thu 9/24/09
13	Development and issuance of procurement documents	12 days	Fri 9/25/09	Mon 10/12/09
14	Assessment of WAN solution provider responses, as applicable	13 days	Tue 10/13/09	Thu 10/29/09
15	Selection of winning WAN solution providers	10 days	Fri 10/30/09	Thu 11/12/09
16	Contract finalization	11 days	Fri 11/13/09	Fri 11/27/09
17	Technical Design and Implementation	110 days	Mon 11/30/09	Fri 4/30/10
18	Design WAN	26 days	Mon 11/30/09	Mon 1/4/10
19	Receive new equipment	11 days	Tue 1/5/10	Tue 1/19/10
20	Install new equipment	20 days	Wed 1/20/10	Tue 2/16/10
21	Configure/migrate new equipment	41 days	Wed 2/17/10	Wed 4/14/10
22	Test and train (where applicable)	12 days	Thu 4/15/10	Fri 4/30/10

Figure 18. Phase 3—Remote WAN and ICC

ID	Task Name	Duration	Start	Finish
23	Phase 3 - Remote WAN and ICC	565 days	Fri 5/1/09	Thu 6/30/11
24	Procurement and Project Management	175 days	Fri 5/1/09	Thu 12/31/09
25	Develop project scope and detailed requirements	21 days	Fri 5/1/09	Fri 5/29/09
26	Develop detailed work plan	21 days	Mon 6/1/09	Mon 6/29/09
27	Conduct research into product technologies	21 days	Tue 6/30/09	Tue 7/28/09
28	Review product availability	21 days	Wed 7/29/09	Wed 8/26/09
29	Development and issuance of procurement documents	21 days	Thu 8/27/09	Thu 9/24/09
30	Assessment of WAN solution provider responses, as applicable	21 days	Fri 9/25/09	Fri 10/23/09
31	Selection of winning WAN solution providers	21 days	Mon 10/26/09	Mon 11/23/09
32	Contract finalization	28 days	Tue 11/24/09	Thu 12/31/09
33	Technical Design and Implementation	390 days	Fri 1/1/10	Thu 6/30/11
34	Design Remote WAN and ICC	30 days	Fri 1/1/10	Thu 2/11/10
35	Receive new equipment	91 days	Fri 2/12/10	Fri 6/18/10
36	Install new equipment	127 days	Mon 6/21/10	Tue 12/14/10
37	Configure/migrate new equipment	127 days	Wed 12/15/10	Thu 6/9/11
38	Test and train (where applicable)	15 days	Fri 6/10/11	Thu 6/30/11

Figure 19. Phase 4—One-Time Core WAN Refresh (FY 2014/2015)

ID	Task Name	Duration	Start	Finish
39	Phase 4 - One Time WAN Refresh	273 days	Wed 1/1/14	Fri 1/16/15
40	Procurement and Project Management -	120 days	Wed 1/1/14	Tue 6/17/14
41	Develop project scope and detailed requirements	30 days	Wed 1/1/14	Tue 2/11/14
42	Develop detailed work plan	45 days	Wed 2/12/14	Tue 4/15/14
43	Conduct research into product technologies	30 days	Wed 4/16/14	Tue 5/27/14
44	Review product availability	15 days	Wed 5/28/14	Tue 6/17/14
45	Technology Implementation	187 days	Thu 5/1/14	Fri 1/16/15
46	Receive new equipment	30 days	Thu 5/1/14	Wed 6/11/14
47	Install new equipment	60 days	Thu 6/12/14	Wed 9/3/14
48	Configure/migrate new equipment	90 days	Thu 9/4/14	Wed 1/7/15
49	Test and train (where applicable)	7 days	Thu 1/8/15	Fri 1/16/15

Figure 20. Phase 5—One Time Remote WAN and ICC FY (2015/16)

ID	Task Name	Duration	Start	Finish
50	Phase 5 Remote WAN and ICC Refresh	261 days	Fri 1/1/16	Fri 12/30/16
51	Procurement and Project Management -	86 days	Fri 1/1/16	Fri 4/29/16
52	Develop project scope and detailed requirements	22 days	Fri 1/1/16	Mon 2/1/16
53	Develop detailed work plan	24 days	Tue 2/2/16	Fri 3/4/16
54	Conduct research into product technologies	25 days	Mon 3/7/16	Fri 4/8/16
55	Review product availability	15 days	Mon 4/11/16	Fri 4/29/16
56	Technology Implementation	175 days	Mon 5/2/16	Fri 12/30/16
57	Receive new equipment	30 days	Mon 5/2/16	Fri 6/10/16
58	Install new equipment	80 days	Mon 6/13/16	Fri 9/30/16
59	Configure/migrate new equipment	60 days	Mon 10/3/16	Fri 12/23/16
60	Test and train (where applicable)	5 days	Mon 12/26/16	Fri 12/30/16

6.5.6 Project Monitoring

Project status will be tracked and reported on an ongoing basis. Regularly scheduled status meetings including the project manager and project team members will be held to discuss project progress, issues/issue resolution and next steps. The Project Director will advise CAL FIRE business leaders on a regular basis to discuss project progress, changes and open issues. The following standard reporting mechanisms will be used:

- Status reports
- Issues lists
- Risk management updates

CAL FIRE will undertake both a “top-down” and “bottom-up” approach to project quality. The Project Sponsor and Project Director will provide “Top-down” project oversight while the Project Manager will provide “Bottom-up” project oversight.

In addition, a Project Information Toolbox (PIT) will be developed as a single location to store, organize, track, control and disseminate all information and items produced by, and delivered to, the project. The PIT will include a file structure with defined access and permissions. It will also include an interface, such as a Web page, where individuals can obtain project information, the latest documentation, and input issues or comments to the project team. Some beginnings of this structure are currently in place (e.g., intranet sites, file structures) and additional PIT functionality can be developed when necessary for proper project control and communications

6.5.7 Project Quality

In order to ensure that the project meets identified business and technical objectives and requirements, CAL FIRE will develop a Quality Assurance/Risk Management Plan based on the State's Project Management Methodology. The plan will have the following elements:

- Measurable objectives and functional requirements
- Acceptance testing plan
- Regularly scheduled audits/reviews of key tasks
- Identification of quality assurance responsibilities

6.5.8 Change Management

The WAN upgrade Project Manager will jointly develop a change control plan and process and use the Project Director for the review and acceptance/rejection of change requests. For any decisions that cannot be made by the Project Director, the Project Sponsor will be used.

In the change control plan, change requests will be:

- Drafted by the Project Team
- Reviewed and edited by the Project Manager
- Approved by the Project Director with direction from the Project Sponsor if necessary
- Implemented by the Project Team

6.5.9 Authorization Required

In accordance with the reporting criteria in the Statewide Information Management Manual (SIMM), this project is reportable to the Department of Finance (DOF). The project requires an FSR in accordance with SIMM, Volume II, Guideline 5.0. Upon CAL FIRE approval of the FSR, the Department will submit a copy of the FSR project summary package to DOF. Any significant changes of 10% (+/-) to the cost, schedule or benefits of the original FSR estimate will be handled and approved in accordance with SIMM guidelines. A Special Project Report (SPR) will be submitted to DOF as appropriate and in accordance with SIMM guidelines. No other special authorizations are required.

7.0 Risk Management

In order to manage and reduce the overall risk of the WAN upgrade, CAL FIRE has developed the following Risk Management Plan. The Plan is based on SIMM guidelines and includes the components listed in the table below.

Table 38. Risk Management Plan Sub-Sections

7.1 Risk Management Approach
7.1.1 Responsible Parties
7.1.2 Risk Management Process
7.2 Risk Management Worksheet
7.2.1 Risk Assessment
7.2.2 Risk Identification
7.2.3 Risk Analysis and Quantification
7.2.4 Risk Prioritization
7.2.5 Risk Response
7.2.6 Risk Avoidance
7.2.7 Risk Acceptance
7.2.8 Risk Mitigation
7.2.9 Risk Sharing
7.3 Risk Response and Control
7.3.1 Risk Tracking
7.3.2 Risk Control

7.1 Risk Management Approach

The methodology of the Risk Management Plan will be consistent with the State of California's Project Management Methodology and the Department of Finance (DOF) Information Technology Project Oversight Framework. The following sub-sections detail the parties who will be responsible for risk management and the process they will follow.

7.1.1 Responsible Parties

CAL FIRE realizes that risk management is a dynamic process that occurs throughout the project life cycle. Therefore, several parties will be responsible for developing and implementing the Risk Management Plan. The Project Manager will be responsible for managing the risk management process and reporting to the Project Director. The specific roles of various parties are described below.

- **Executive Steering Committee (ITOC)**—The ITOC will ensure that all project goals and objectives are being met, and will resolve escalated issues as they arise. The Committee will be responsible for providing the project team with resources (time, staff or funding) necessary to help avoid or mitigate risks as needed
- **Project Director**—The Project Director will have overall responsibility for the implementation of the WAN upgrade project. The Project Director will approve the Risk Management Plan and will work with the Project Manager to develop the process for tracking and managing issues and risk factors. The Project Director will also be responsible for elevating risks to the Project Sponsor when appropriate, consistent with this plan.
- **Project Manager**—The Project Manager will be responsible for working with the Project Director and Project Team members to identify risks. The Project Manager will also monitor project risks, develop mitigation measures and contingency plans, and implement those contingency plans when necessary.
- **Project Team**—All members of the Project Team will be involved in identifying potential risks and working with the Project Manager to carry out mitigation actions and/or contingency plans.

7.1.2 Risk Management Process

The CAL FIRE risk management process includes further development of this Risk Management Plan in accordance with the State's Project Management Methodology. The Project Manager will submit a baseline Risk Management Plan to Project Director within 30 days of project initiation. This plan will be used on an ongoing basis to identify risks, quantify the potential impact of each identified risk, present mitigation plans for each identified risk, and enact appropriate risk responses. Mitigation measures and contingency plans will be developed and implemented as high-priority risks are identified and monitored. Project reserves (i.e., time, personnel, funding) will be allocated at the discretion of the Project Director and/or Executive Steering Committee (ITOC) as appropriate.

7.2 Risk Management Worksheet

Table 39. Completed Risk Management Worksheet

Risk Category/ Event	Prob.	Assumptions	Preventive Measures	Contingency Measures
Project Management Risks				
Staffing				
Identification of new PYs	Medium —0.50	Available technology talent is limited in Sacramento region due to pull from private sector.	Start recruiting immediately after approval of funding and BCP.	Hire temporary/contract staff.
Schedule				
Lack of timely identification of infrastructure components	Low —0.30	Most components will likely be available via CAL NET II. Competitive bid process for the remote WAN components could negatively impact the project plan, design phase and resources.	Plan early to identify what components can be acquired through leveraged procurements versus competitive bid.	Adjust the schedule as necessary.
Fire season window is expanded due to unanticipated factors associated with global warming	Low —0.30	Installation and field activity will be impacted due to CAL FIRE policy mandated no network changes during fire season	Create a project plan with contingencies and dependencies to support variable conditions.	Adjust schedule as necessary and communicate status changes regularly.
Unanticipated project schedule overruns	Medium —0.50	Project schedule may be difficult to meet due to the complexity of the solution, technical issues, or deployment difficulties.	The project will be staffed by an experienced project manager and will incorporate risk management and project management standards. Communicate resource demands to senior executives as early as possible as part of the Project Charter.	Delay scope of project to reflect available schedule.
Financial Risks				
Cost				
CAL FIRE underestimate project costs	Low —0.20	The cost of the project could be underestimated based on the fact that FSR project estimates are based on assumptions and past experience.	Develop cost estimates that consider future uncertainties.	Request additional funding.
Future price increases will exceed our budget augmentation	Low —0.20	Price increases may arise on existing technology Newer, costlier technology may become industry-standard	Utilize CAL NET II procurement vehicle for proposed solution to minimize the risk of unaccounted price fluctuations.	Develop new Budget Change Proposal.

Risk Category/ Event	Prob.	Assumptions	Preventive Measures	Contingency Measures
Technology Risks				
Technical				
Upgrade may cause unanticipated problems.	Medium —0.50	Implementing new equipment may bring incompatibility between new and old WAN infrastructure.	CAL FIRE to conduct detailed planning design of potential incompatibilities. Extensive testing of new infrastructure.	Conduct business using old system until incompatibilities are resolved.
Resource availability to operate new ICC Satellite solution will impact deployment and operations.	Low —0.20	High volatility fire season may impact resource availability.	Implement a “train the trainer” plan to create a backup team.	Buy vendor support.
Remote WAN best practice implementation could be an issue due to location constraints.	Medium —0.40	Remote WAN locations were not designed to include secure, environmentally controlled data points of entry.	Mitigate through design. Identify site profiles most likely to have constraints and create best possible implementation options.	Employ viable best practice implementation scenarios to meet location constraints.
Operational Risk				
Internal				
Multiple vendor solutions could introduce support challenges.	Low—0.30	Business operations could be interrupted.	Roles and responsibilities clearly defined during solution contracting phase.	Assign a dedicated vendor account service and support manager until issues are resolved.
Mobile ICC units availability could be impacted due to high risk operating environment	Low—0.40	All ICC trailers are will be at emergency ground zero during the fire season.	Design ICC trailers to withstand high risk operating environment.	Maintain regimented service schedule.

7.2.1 Risk Assessment

The risk management worksheet was completed to assess the risks involved in the implementation of the WAN upgrade project solution. Four broad risk areas were examined, including project management risk, financial risk, technology risk, and change management/operational risk. A preliminary assessment of the primary risk areas is outlined in the following table.

Table 40. Primary Risk Areas for the WAN Upgrade Project

Risk Area	Risk Level
Project Management Risk	Medium
Financial Risk	Low
Technology Risk	Medium
Operational Risk	Low

- Project management risk is medium due to staffing and schedule risks that challenge the existing IT resources to be able diligently execute the upgrade effort while still managing its existing workload.
- Financial risk is low since the cost uncertainty of infrastructure is much less than an application software implementation that requires extensive and sometimes unknown systems integration and customization.
- Technology risk is medium since IT staff must be vigilant to difficulties of implementation of new technologies and the potential incompatibility between software/hardware components.
- Operational risk is low with the impact on end users largely limited to new workstations and software (e.g., MS Office 2003).

7.2.2 Risk Identification

Risks for the IT Infrastructure project were identified through the use of project management and team brainstorming and historical information. The following risk areas were identified:

- Project Management Risk
 - Staffing
 - Schedule
- Financial Risks
 - Cost
- Technology Risks
 - Technical
 - Conversion/Migration
- Change Management/Operational Risk
 - Internal

As new risks are identified during the life of the project, they will be fit into these categories or new categories as appropriate. The Project Manager will meet with the Project Team regularly to review new risk assessments as well as ongoing risk efforts to:

- Evaluate and determine the risk exposure and severity
- Identify appropriate action to avoid or mitigate the risk
- When appropriate, elevate the risk assessment and response to the Project Director or Project Sponsor

7.2.3 Risk Analysis and Quantification

Project risks will be tracked and analyzed on an ongoing basis, and discussed as part of regular project management meetings. Risks will be analyzed based on the type of risk, probability of the risk occurring, impact of the risk, the ability to mitigate the risk and the potential effect of the risk.

7.2.4 Risk Prioritization

Based on the risk analysis, each risk has been prioritized and ranked. Those risks with high priority will receive the most attention from the project team. Low priority risks will be monitored on an as-needed basis. Risk handling will be based on Risk Severity and will conform to the following guidelines:

- Low Risk Severity—Risk assessment and management will generally be handled by the Project Manager. The Project Manager may choose to escalate the Risk handling to the Project Director if the situation warrants.
- Medium Risk Severity—After initial assessment, the Project Manager will escalate the risk to the Project Director with a recommendation for mitigation of the risk
- High Risk Severity—The Project Director will inform the Department of Finance that the risk qualifies as High Severity

7.2.5 Risk Response

As the project proceeds and risk events occur, appropriate risk response actions will be implemented. Preventative and contingency measures have been identified for each risk in the risk management worksheet.

Project risk management will be ensured by the project manager and team using standard project control procedures, including the risk management and escalation procedures defined in the Department of Finance's Information Technology Project Oversight Framework.

7.2.6 Risk Avoidance

The implementation of the CAL FIRE WAN upgrade solution involves inherent risks in terms of new technology implementation, system interoperability and employee acceptance. Many of these risks will be avoided as CAL FIRE develops a best practice design, a detailed project plan and work breakdown structure (WBS) and communication plan.

7.2.7 Risk Acceptance

CAL FIRE accepts the risks identified in the risk management worksheet.

7.2.8 Risk Mitigation

Preventive measures will be taken in each of the risk areas to mitigate the chances of risk occurrence. These measures are identified in the risk management worksheet. As new risks are identified throughout the project life cycle, appropriate preventive measures will be developed. Key risk-mitigation strategies include a best practice technical design and the development of a cut-over plan for the Core WAN project plan and schedule.

7.2.9 Risk Sharing

Efforts to share risks will be set in place by contracting with reputable and competent infrastructure vendors. Warranties and other service-level agreements will be established to share the risk of the infrastructure upgrade project as much as is appropriate.

7.3 Risk Response and Control

The CAL FIRE risk response and control process includes further development of this risk management plan in accordance with State and industry-standard methodologies. This plan will be used on an ongoing basis to identify risks, quantify the potential impact of each identified risk, present mitigation plans for each identified risk and enact appropriate risk responses. Mitigation measures and contingency plans will be developed and implemented as high-priority risks are identified and monitored. To ensure that project risks are monitored and responded to effectively, the project team will use a variety of methods to track and control potential risks. A description of these methods is outlined below.

7.3.1 Risk Tracking

As stated above, the solution vendor will be required to complete a full Risk Assessment and Risk Management Plan as one of its initial deliverables. The Plan shall include a system for tracking identified risks through all phases of the project.

The risk tracking system will include a tool that:

- Assigns a unique number to each risk
- Tracks the assigned ratings, as well as efforts to mitigate the risk
- Provides the capability to review and report on risks to the rest of the Project Team

The Project Management Team will meet regularly to review ongoing efforts to mitigate risk, as well as to assess any new risks identified.

7.3.2 Risk Control

Risk control is necessary to help prevent failure on a project. The project team will ensure the Risk Management Plan is executed so that it can respond to risk events before they become serious problems. As risk events occur, the project team will implement the appropriate contingency plans to ensure the success of the project. The Risk Management Plan will be updated as anticipated risk events occur or are surpassed, and as actual risk events are evaluated and resolved.

8.0 Economic Analysis Worksheets

The Economic Analysis Worksheets included in this section provide a comparative analysis of the costs associated with the two alternatives for the WAN Upgrade Project.

The instructions for the Economic Analysis Worksheets require full analysis of only those alternatives that “satisfactorily meet the objectives and functional requirements.” The existing CAL FIRE environment will not meet these requirements and therefore is not proposed as an alternative. As identified in the Alternative Analysis, the two alternatives that meet the minimum requirements are as follows:

Alternative 1

- **Core WAN**—Provide advanced function “any to any” WAN network topology
- **Remote WAN**—Provide secure broadband connectivity for all CAL FIRE locations and provide an extranet access option to partners willing to pay
- **ICC**—Provide trailer-based data and voice connectivity

Alternative 2

- **Core WAN**—Provide advanced function “any to any” WAN network topology
- **Remote WAN**—Provide a robust public safety quality network for all CAL FIRE locations
- **ICC**—Provide a trailer-based data and voice connectivity, service via satellite, and provide portable (luggable) based units for additional data and voice transmission flexibility

Summary worksheets and associated assumptions are provided in the following pages.

8.1 Established System Cost Worksheet

EXISTING SYSTEM/BASELINE COST WORKSHEET
All costs to be shown in whole (unrounded) dollars.

Date Prepared: 6/27/2008

Department: Department of Forestry and Fire Protection

Project: WAN refresh

	FY 2009/10		FY 2010/11		FY 2011/12		FY 2012/13		FY 2013/14		FY 2014/15		FY 2015/16		TOTAL	
	PYs	Amts														
Continuing Information																
Technology Costs																
Staff (salaries & benefits)	5.30	\$570,521	5.30	\$570,521	5.30	\$570,521	5.30	\$570,521	5.30	\$570,521	5.30	\$570,521	5.30	\$570,521	37.1	\$3,993,647
Hardware Lease/Maintenance		\$821,578		\$821,578		\$821,578		\$821,578		\$821,578		\$821,578		\$821,578		\$5,751,046
Software Maintenance/Licenses		\$55,200		\$55,200		\$55,200		\$55,200		\$55,200		\$55,200		\$55,200		\$386,400
Contract Services		\$1,065,317		\$1,065,317		\$1,065,317		\$1,065,317		\$1,065,317		\$1,065,317		\$1,065,317		\$7,457,219
Data Center Services		\$-		\$-		\$-		\$-		\$-		\$0		\$0		\$-
Agency Facilities		\$25,004		\$25,004		\$25,004		\$25,004		\$25,004		\$25,004		\$25,004		\$175,028
Other																\$-
Total IT Costs	5.30	\$2,537,620	37.1	\$17,763,340												
Continuing Program Costs:																
Staff	0.0	\$0	0.0	\$0	0.0	\$0	0.0	\$0	0.0	\$0	0.0	\$0	0.0	\$0	0.0	\$-
Other		\$0		\$0		\$0		\$0		\$0		\$0		\$0		\$-
Total Program Costs	0.0	\$-														
TOTAL EXISTING SYSTEM COSTS	5.3	\$2,537,620	37.1	\$17,763,340												

8.1.1 Existing System Cost Assumptions

Existing WAN costs were developed as part of the Gartner Benchmark activity described in Section 3.

Staffing costs are as follows:

- 5.3 PYs are supporting the current CAL FIRE WAN. This is below the peer average
- Annual fully burdened costs of existing PYs are \$570,521

Existing hardware costs are as follows:

- Existing annual hardware lease and maintenance costs are \$821,578
- Software lease and maintenance costs are \$55,200 annually
- Annual contract services for transmission/bandwidth fees paid to AT&T are \$1,065,317

8.2 Proposed Alternative System Cost Worksheet

PROPOSED ALTERNATIVE: CAL FIRE APPLICATION

Date Prepared: 6/27/2008

Department: Department of Forestry and Fire Protection
Project: WAN refresh

All Costs Should be shown in whole (unrounded) dollars.

	FY 2009/10		FY 2010/11		FY 2011/12		FY 2012/13		FY 2013/14		FY 2014/15		FY 2015/16		TOTAL	
	PYs	Amts	PYs	Amts	PYs	Amts	PYs	Amts	PYs	Amts	PYs	Amts	PYs	Amts	PYs	Amts
One-Time IT Project Costs																
Staff (Salaries & Benefits)	8.7	\$ 933,140	8.7	\$ 933,140	8.7	\$ 933,140									26.1	\$ 2,799,420
Hardware Purchase		\$ 8,599,330		\$ 1,017,360												\$ 9,616,690
Software Purchase/License																\$ -
Telecommunications		\$ -		\$ -		\$ -		\$ -		\$ -		\$ -		\$ -		\$ -
Contract Services																
Software Customization																\$ -
Project Management																\$ -
Project Oversight																\$ -
IV&V Services																\$ -
Other Contract Services		\$ 60,000		\$ 30,000												\$ 90,000
TOTAL Contract Services		\$ 60,000		\$ 30,000		\$ -		\$ -		\$ -		\$ -		\$ -		\$ 90,000
Data Center Services																\$ -
Agency Facilities		\$ -		\$ -		\$ -		\$ -		\$ -		\$ -		\$ -		\$ -
Other				\$ 30,000		\$ -		\$ -		\$ -		\$ -		\$ -		\$ 30,000
Total One-time IT Costs	8.7	\$ 9,592,470	8.7	\$ 2,010,500	8.7	\$ 933,140	0.0	\$ -	0.0	\$ -	0.0	\$ -	0.0	\$ -	26.1	\$ 12,536,110
Continuing IT Project Costs																
Staff (Salaries & Benefits)							11.3	\$ 1,219,205	11.3	\$ 1,219,205	11.3	\$ 1,219,205	11.3	\$ 1,219,205	45.2	\$ 4,876,820
Hardware Lease/Maintenance		\$ 2,105,700		\$ 4,211,400		\$ 4,357,110		\$ 4,357,110		\$ 4,357,110		\$ 4,357,110		\$ 4,357,110		\$ 28,102,650
Hardware Refresh												\$ 9,966,623		\$ 198,606		\$ 10,165,230
Software Maintenance/Licenses																\$ -
Telecommunications																\$ -
Contract Services						\$ 18,000		\$ 18,000		\$ 18,000		\$ 18,000		\$ 18,000		\$ 90,000
Data Center Services																\$ -
Agency Facilities																\$ -
Other		\$ -		\$ -		\$ -		\$ -		\$ -		\$ -		\$ -		\$ -
Total Continuing IT Costs	0.0	\$ 2,105,700	0.0	\$ 4,211,400	0.0	\$ 4,375,110	11.3	\$ 5,594,315	11.3	\$ 5,594,315	11.3	\$ 15,560,939	11.3	\$ 5,792,921	45.2	\$ 43,234,700
Total Project Costs	8.7	\$ 11,698,170	8.7	\$ 6,221,900	8.7	\$ 5,308,250	11.3	\$ 5,594,315	11.3	\$ 5,594,315	11.3	\$ 15,560,939	11.3	\$ 5,792,921	71.3	\$ 55,770,810
Continuing Existing Costs																
Information Technology Staff	2.6	\$ 286,065	2.6	\$ 286,065	2.6	\$ 286,065									7.8	\$ 858,195
Other IT Costs		\$ 1,967,099		\$ 25,004		\$ 25,004		\$ 25,004		\$ 25,004		\$ 25,004		\$ 25,004		\$ 2,117,123
Total Continuing Existing IT Costs	2.6	\$ 2,253,164	2.6	\$ 311,069	2.6	\$ 311,069	0.0	\$ 25,004	0.0	\$ 25,004	0.0	\$ 25,004	0.0	\$ 25,004	7.8	\$ 2,975,318
Program Staff	0.0	\$ -	0.0	\$ -	0.0	\$ -	0.0	\$ -	0.0	\$ -	0.0	\$ -	0.0	\$ -	0.0	\$ -
Other Program Costs		\$ -		\$ -		\$ -		\$ -		\$ -		\$ -		\$ -		\$ -
Total Continuing Existing Program Costs	0.0	\$ -	0.0	\$ -	0.0	\$ -	0.0	\$ -	0.0	\$ -	0.0	\$ -	0.0	\$ -	0.0	\$ -
Total Continuing Existing Costs	2.6	\$ 2,253,164	2.6	\$ 311,069	2.6	\$ 311,069	0.0	\$ 25,004	0.0	\$ 25,004	0.0	\$ 25,004	0.0	\$ 25,004	7.8	\$ 2,975,318
TOTAL ALTERNATIVE COSTS	11.3	\$ 13,951,334	11.3	\$ 6,532,969	11.3	\$ 5,619,319	11.3	\$ 5,619,319	11.3	\$ 5,619,319	11.3	\$ 15,585,943	11.3	\$ 5,817,925	79.1	\$ 58,746,127
INCREASED REVENUES		\$ -		\$ -		\$ -		\$ -		\$ -		\$ -		\$ -		\$ -

8.2.1 Proposed Alternative Cost Assumptions

A total one-time IT cost of **\$12,521,111** has been estimated for the proposed solution which includes:

- \$2,799,420 for staffing costs as follows:
 - \$853,369 for redirection of 2.65 existing CAL FIRE IT staff at a fully burdened cost of \$284,456 per year for Phases 1–3, three year period (FY 2009/10 through FY 2011/12)

- \$1,946,052 for six new PYs to be hired for Phases 1–3 (FY 2009/10 through FY 2011/12) at a fully burdened cost of \$648,684 per year
- \$9,616,690 for hardware purchases as follows
 - \$8,599,330 for Core WAN and Remote WAN hardware and connectivity purchases in FY 2009/10
 - \$1,017,360 for ICC trailer purchase and ancillary hardware and software purchases in FY 2010/11
- \$90,000 for contract services as follows:
 - \$60,000 for WAN design contractor in FY 2009/10
 - \$30,000 for technical training of 12 CAL FIRE personnel on ICC mobile trailers in FY 2010/11
- \$30,000 for ICC managed services in FY 2010/11

The following continuing annual IT project costs for the proposed solution have been estimated:

- \$1,219,205 in annual fully burdened salaries for 11.3 PYs to support the WAN environment beginning in FY 2012/2013 (This need is supported by the Gartner benchmark data presented in Section 3.1.6).
- Ongoing Core WAN, Remote WAN, and ICC maintenance costs as follows:
 - \$1,528,820 for Core WAN, beginning mid year FY 2009/10
 - \$2,682,580 for Remote WAN, beginning mid year FY 2009/10
 - \$145,710 for ICC, beginning FY 2011/12
- \$10,165,230 for Core WAN/Remote WAN and ICC hardware solution refreshed after five years as follows:
 - \$9,966,623 for Core WAN and Remote WAN in FY 2014/2015
 - \$198,606 for ICC refresh in FISCAL in FY 2015/2016
- \$18,000 for ICC-managed services costs beginning in FY 2011/12

8.3 Other Viable Alternative System Cost Worksheet

VIALE ALTERNATIVE: CAL FIRE APPLICATION

Date Prepared: 6/27/2008

Department: Department of Forestry and Fire Protection
Project: WAN refresh

All Costs Should be shown in whole (unrounded) dollars.

	FY 2009/10		FY 2010/11		FY 2011/12		FY 2012/13		FY 2013/14		FY 2014/15		FY 2015/16		TOTAL			
	PYs	Amts	PYs	Amts	PYs	Amts	PYs	Amts	PYs	Amts	PYs	Amts	PYs	Amts	PYs	Amts		
One-Time IT Project Costs																		
Staff (Salaries & Benefits)	8.7	\$ 933,140	8.7	\$ 933,140	8.7	\$ 933,140									26.1	\$ 2,799,420		
Hardware Purchase		\$ 10,658,530		\$ 1,418,220													\$ 12,076,750	
Software Purchase/License																	\$ -	
Telecommunications		\$ -		\$ -		\$ -		\$ -		\$ -		\$ -		\$ -			\$ -	
Contract Services																		
Software Customization																	\$ -	
Project Management																	\$ -	
Project Oversight																	\$ -	
IV&V Services																	\$ -	
Other Contract Services		\$ 60,000		\$ 30,000													\$ -	\$ 90,000
TOTAL Contract Services		\$ 60,000		\$ 30,000		\$ -		\$ -		\$ -		\$ -		\$ -			\$ -	\$ 90,000
Data Center Services																	\$ -	
Agency Facilities		\$ -		\$ -		\$ -		\$ -		\$ -		\$ -		\$ -			\$ -	
Other				\$ 30,000		\$ -		\$ -		\$ -		\$ -		\$ -			\$ -	\$ 30,000
Total One-time IT Costs	8.7	\$ 11,651,670	8.7	\$ 2,411,360	8.7	\$ 933,140	0.0	\$ -	0.0	\$ -	0.0	\$ -	0.0	\$ -	26.1	\$ 14,996,170		
Continuing IT Project Costs																		
Staff (Salaries & Benefits)							11.3	\$ 1,219,205	11.3	\$ 1,219,205	11.3	\$ 1,219,205	11.3	\$ 1,219,205	45.2	\$ 4,876,820		
Hardware Lease/Maintenance		\$ 3,676,700		\$ 7,353,400		\$ 7,659,220		\$ 7,659,220		\$ 7,659,220		\$ 12,353,236		\$ 198,606		\$ 12,551,842		
Hardware Refresh																\$ -		
Software Maintenance/Licenses																\$ -		
Telecommunications																\$ -		
Contract Services						\$ 18,000		\$ 18,000		\$ 18,000		\$ 18,000		\$ 18,000		\$ 90,000		
Data Center Services																\$ -		
Agency Facilities																\$ -		
Other		\$ -		\$ -		\$ -		\$ -		\$ -		\$ -		\$ -		\$ -		\$ -
Total Continuing IT Costs	0.0	\$ 3,676,700	0.0	\$ 7,353,400	0.0	\$ 7,677,220	11.3	\$ 8,896,425	11.3	\$ 8,896,425	11.3	\$ 21,249,661	11.3	\$ 9,095,031	45.2	\$ 66,844,862		
Total Project Costs	8.7	\$ 15,328,370	8.7	\$ 9,764,760	8.7	\$ 8,610,360	11.3	\$ 8,896,425	11.3	\$ 8,896,425	11.3	\$ 21,249,661	11.3	\$ 9,095,031	71.3	\$ 81,841,032		
Continuing Existing Costs																		
Information Technology Staff	2.6	\$ 286,065	2.6	\$ 286,065	2.6	\$ 286,065									7.8	\$ 858,195		
Other IT Costs		\$ 1,967,099		\$ 1,967,099		\$ 1,967,099		\$ 25,004		\$ 25,004		\$ 25,004		\$ 25,004		\$ 6,001,313		
Total Continuing Existing IT Costs	2.6	\$ 2,253,164	2.6	\$ 2,253,164	2.6	\$ 2,253,164	0.0	\$ 25,004	0.0	\$ 25,004	0.0	\$ 25,004	0.0	\$ 25,004	7.8	\$ 6,859,508		
Program Staff	0.0	\$ -	0.0	\$ -	0.0	\$ -	0.0	\$ -	0.0	\$ -	0.0	\$ -	0.0	\$ -	0.0	\$ -		
Other Program Costs		\$ -		\$ -		\$ -		\$ -		\$ -		\$ -		\$ -		\$ -		
Total Continuing Existing Program Costs	0.0	\$ -	0.0	\$ -	0.0	\$ -	0.0	\$ -	0.0	\$ -	0.0	\$ -	0.0	\$ -	0.0	\$ -		
Total Continuing Existing Costs	2.6	\$ 2,253,164	2.6	\$ 2,253,164	2.6	\$ 2,253,164	0.0	\$ 25,004	0.0	\$ 25,004	0.0	\$ 25,004	0.0	\$ 25,004	7.8	\$ 6,859,508		
TOTAL ALTERNATIVE COSTS	11.3	\$ 17,581,534	11.3	\$ 12,017,924	11.3	\$ 10,863,524	11.3	\$ 8,921,429	11.3	\$ 8,921,429	11.3	\$ 21,274,665	11.3	\$ 9,120,035	79.1	\$ 88,700,540		
INCREASED REVENUES		\$ -		\$ -		\$ -		\$ -		\$ -		\$ -		\$ -		\$ -		

8.3.1 Other Viable Alternative Cost Assumptions

A total one-time IT cost of **\$14,996,170** has been estimated for the other viable solution which includes:

- \$2,799,420 for staffing costs as follows:
 - ❑ \$853,368 for redirection of 2.65 existing CAL FIRE IT staff at a fully burdened cost of \$284,456 per year for Phases 1–3, three year period (FY 2009/10 through FY 2011/12)
 - ❑ \$1,946,052 for six new PYs to be hired for Phases 1–3 (FY 2009/10 through FY 2011/12) at a fully burdened cost of \$648,684 per year

- \$12,076,750 for hardware purchases as follows:
 - \$10,658,530 for Core WAN and Remote WAN hardware and connectivity purchases in FY 2009/10
 - \$1,418,220 for ICC trailer purchase and ancillary hardware and software purchases in FY 2010/11
- \$75,000 for contract services as follows:
 - \$60,000 for WAN design contractor in FY 2009/10
 - \$30,000 for technical training of 12 CAL FIRE personnel on ICC mobile trailers in FY 2010/11
- \$30,000 for ICC managed services in FY 2010/11

The following continuing annual IT project costs for the other viable alternative solution have been estimated:

- \$1,219,205 in annual fully burdened salaries for 11.3 PYs to support the WAN environment beginning in FY 2012/2013 (This need is supported by the Gartner benchmark data presented in Section 3.1.6).
- Ongoing Core WAN, Remote WAN, and ICC maintenance costs as follows:
 - \$1,528,820 for Core WAN, beginning mid year FY 2009/10
 - \$5,824,580 for Remote WAN, beginning mid year FY 2009/10
 - \$305,820 for ICC, beginning FY 2012/13
- \$12,551,843 for Core WAN/Remote WAN and ICC hardware solution refreshed after five years as follows:
 - \$12,353,236 for Core WAN and Remote WAN in FY 2014/2015
 - \$198,606 for ICC refresh in FISCAL in FY 2015/2016
- \$18,000 for ICC-managed services costs beginning in FY 2011/12

8.4 Economic Analysis Summary Worksheet

ECONOMIC ANALYSIS SUMMARY

Date Prepared: 6/27/2008

Department: Department of Forestry and Fire Protection
Project: WAN refresh

All costs to be shown in whole (unrounded) dollars.

	FY 2009/10		FY 2010/11		FY 2011/12		FY 2012/13		FY 2013/14		FY 2014/15		FY 2015/16		TOTAL	
	PYs	Amts	PYs	Amts												
EXISTING SYSTEM																
Total IT Costs	5.3	2,537,620	5.3	2,537,620	5.3	2,537,620	5.3	2,537,620	5.3	2,537,620	5.3	2,537,620	5.3	2,537,620	37.1	17,763,340
Total Program Costs	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
Total Existing System Costs	5.3	2,537,620	5.3	2,537,620	5.3	2,537,620	5.3	2,537,620	5.3	2,537,620	5.3	2,537,620	5.3	2,537,620	37.1	17,763,340
PROPOSED ALTERNATIVE																
Total Project Costs	8.7	11,698,170	8.7	6,221,900	8.7	5,308,250	11.3	5,594,315	11.3	5,594,315	11.3	15,560,939	11.3	5,792,921	71.3	55,770,810
Total Cont. Exist. Costs	2.6	2,253,164	2.6	311,069	2.6	311,069	0.0	25,004	0.0	25,004	0.0	25,004	0.0	25,004	7.8	2,975,318
Total Alternative Costs	11.3	13,951,334	11.3	6,532,969	11.3	5,619,319	11.3	5,619,319	11.3	5,619,319	11.3	15,585,943	11.3	5,817,925	79.1	58,746,127
COST SAVINGS/AVOIDANCES	(6.0)	(11,413,714)	(6.0)	(3,995,349)	(6.0)	(3,081,699)	(6.0)	(3,081,699)	(6.0)	(3,081,699)	(6.0)	(13,048,322)	(6.0)	(3,280,305)	(42.0)	(40,982,787)
Increased Revenues		0		0		0		0		0		0		0		0
Net (Cost) or Benefit	(6.0)	(11,413,714)	(6.0)	(3,995,349)	(6.0)	(3,081,699)	(6.0)	(3,081,699)	(6.0)	(3,081,699)	(6.0)	(13,048,322)	(6.0)	(3,280,305)	(42.0)	(40,982,787)
Cum. Net (Cost) or Benefit	(6.0)	(11,413,714)	(12.0)	(15,409,063)	(18.0)	(18,490,761)	(24.0)	(21,572,460)	(30.0)	(24,654,159)	(36.0)	(37,702,482)	(42.0)	(40,982,787)		
ALTERNATIVE #1																
Total Project Costs	8.7	15,328,370	8.7	9,764,760	8.7	8,610,360	11.3	8,896,425	11.3	8,896,425	11.3	21,249,661	11.3	9,095,031	71.3	81,841,032
Total Cont. Exist. Costs	2.6	2,253,164	2.6	2,253,164	2.6	2,253,164	0.0	25,004	0.0	25,004	0.0	25,004	0.0	25,004	7.8	6,859,508
Total Alternative Costs	11.3	17,581,534	11.3	12,017,924	11.3	10,863,524	11.3	8,921,429	11.3	8,921,429	11.3	21,274,665	11.3	9,120,035	79.1	88,700,540
COST SAVINGS/AVOIDANCES	(6.0)	(15,043,914)	(6.0)	(9,480,304)	(6.0)	(8,325,904)	(6.0)	(6,383,809)	(6.0)	(6,383,809)	(6.0)	(18,737,045)	(6.0)	(6,582,415)	(42.0)	(70,937,199)
Increased Revenues		0		0		0		0		0		0		0		0
Net (Cost) or Benefit	(6.0)	(15,043,914)	(6.0)	(9,480,304)	(6.0)	(8,325,904)	(6.0)	(6,383,809)	(6.0)	(6,383,809)	(6.0)	(18,737,045)	(6.0)	(6,582,415)	(42.0)	(70,937,199)
Cum. Net (Cost) or Benefit	(6.0)	(15,043,914)	(12.0)	(24,524,218)	(18.0)	(32,850,121)	(24.0)	(39,233,930)	(30.0)	(45,617,739)	(36.0)	(64,354,784)	(42.0)	(70,937,199)		

8.5 Project Funding Plan Worksheet

Project Funding Plan

Date Prepared: 6/27/2008

	FY 2009/10		FY 2010/11		FY 2011/12		FY 2012/13		FY 2013/14		FY 2014/15		FY 2015/16		TOTALS	
	PYs	Amts	PYs	Amts	PYs	Amts	PYs	Amts	PYs	Amts	PYs	Amts	PYs	Amts	PYs	Amts
TOTAL PROJECT COSTS	8.7	11,698,170	8.7	6,221,900	8.7	5,308,250	11.3	5,594,315	11.3	5,594,315	11.3	15,560,939	11.3	5,792,921		55,770,810
RESOURCES TO BE REDIRECTED																
Staff	2.7	284,456	2.7	284,456	2.7	284,456									8.1	853,369
Funds:																
Existing System				1,942,095		1,942,095	5.3	2,512,616	5.3	2,512,616	5.3	2,512,616	5.3	2,512,616	21.2	13,934,654
Other Fund Sources*																0
TOTAL REDIRECTED RESOURCES	2.7	284,456	2.7	2,226,551	2.7	2,226,551	5.3	2,512,616	5.3	2,512,616	5.3	2,512,616	5.3	2,512,616	29.3	14,788,023
ADDITIONAL PROJECT FUNDING NEEDED																
One-Time Project Costs	6.0	9,308,014	6.0	1,726,044	6.0	648,684		0		0		0		0	18.0	11,682,741
Continuing Project Costs	0.0	2,105,700	0.0	2,269,305	0.0	2,433,015	6.0	3,081,699	6.0	3,081,699	6.0	13,048,322	6.0	3,280,305	24.0	29,300,046
TOTAL ADDITIONAL PROJECT FUNDS NEEDED BY FISCAL YEAR	6.0	11,413,714	6.0	3,995,349	6.0	3,081,699	6.0	3,081,699	6.0	3,081,699	6.0	13,048,322	6.0	3,280,305	42.0	40,982,787
TOTAL PROJECT FUNDING	8.7	11,698,170	8.7	6,221,900	8.7	5,308,250	11.3	5,594,315	11.3	5,594,315	11.3	15,560,939	11.3	5,792,921	71.3	55,770,810
Difference: Funding - Costs	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
Total Estimated Cost Savings	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0