

STATE OF CALIFORNIA  
**Budget Change Proposal - Cover Sheet**  
 DF-46 (REV 08/17)

Fiscal Year 2019-20	Business Unit 0690	Department Office of Emergency Services	Priority No. 2
Budget Request Name 0690-102-BCP-2019-GB		Program <b>0395 – PUBLIC SAFETY COMMUNICATIONS</b>	Subprogram

Budget Request Description  
 California Interoperable Public Safety Radio System

Budget Request Summary

The Governor's Office of Emergency Services requests \$59.464 million General Fund over five years and 8 positions in Fiscal Year 2019-20 increasing to 13 positions in 2020-21, with ongoing funding of \$2.718 million General Fund beginning in 2024-25 to build a statewide public safety radio system, allowing agencies the ability to communicate seamlessly.

Requires Legislation <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Code Section(s) to be Added/Amended/Repealed	
Does this BCP contain information technology (IT) components? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <i>If yes, departmental Chief Information Officer must sign.</i>	Department CIO	Date

For IT requests, specify the project number, the most recent project approval document (FSR, SPR, S1BA, S2AA, S3SD, S4PRA), and the approval date.

Project No.                                      Project Approval Document:                                      Approval Date:

If proposal affects another department, does other department concur with proposal?    Yes       No  
*Attach comments of affected department, signed and dated by the department director or designee.*

Prepared By Budget Office	Date 1/8/2019	Reviewed By Tabitha Stout	Date 1/8/2019
Department Director Sara Stillwell	Date 1/8/2019	Agency Secretary	Date

**Department of Finance Use Only**

Additional Review:    Capital Outlay    ITCU    FSCU    OSAE    CALSTARS    Dept. of Technology

PPBA	Original Signed By <b>Emma Jungwirth</b>	Date submitted to the Legislature <b>1/10/19</b>
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# BCP Fiscal Detail Sheet

BCP Title: California Interoperable Public Safety Radio System

BR Name: 0690-102-BCP-2019-GB

## Budget Request Summary

	FY19					
	CY	BY	BY+1	BY+2	BY+3	BY+4
Personal Services						
Positions - Permanent	0.0	8.0	13.0	13.0	13.0	13.0
<b>Total Positions</b>	<b>0.0</b>	<b>8.0</b>	<b>13.0</b>	<b>13.0</b>	<b>13.0</b>	<b>13.0</b>
Salaries and Wages						
Earnings - Permanent	0	790	1,227	1,227	1,227	1,227
<b>Total Salaries and Wages</b>	<b>\$0</b>	<b>\$790</b>	<b>\$1,227</b>	<b>\$1,227</b>	<b>\$1,227</b>	<b>\$1,227</b>
Total Staff Benefits	0	412	641	641	641	641
<b>Total Personal Services</b>	<b>\$0</b>	<b>\$1,202</b>	<b>\$1,868</b>	<b>\$1,868</b>	<b>\$1,868</b>	<b>\$1,868</b>
Operating Expenses and Equipment						
5301 - General Expense	0	24	39	39	39	39
5302 - Printing	0	4	6	6	6	6
5304 - Communications	0	20	32	32	32	32
5306 - Postage	0	2	3	3	3	3
5320 - Travel: In-State	0	28	45	45	45	45
5322 - Training	0	8	13	13	13	13
5324 - Facilities Operation	0	32	52	52	52	52
5326 - Utilities	0	4	7	7	7	7
5342 - Departmental Services	0	395	614	614	614	614
5346 - Information Technology	0	9,055	8,937	9,500	9,689	9,728
54XX - Special Items of Expense	0	16	26	26	26	26
<b>Total Operating Expenses and Equipment</b>	<b>\$0</b>	<b>\$9,588</b>	<b>\$9,774</b>	<b>\$10,337</b>	<b>\$10,526</b>	<b>\$10,565</b>
<b>Total Budget Request</b>	<b>\$0</b>	<b>\$10,790</b>	<b>\$11,642</b>	<b>\$12,205</b>	<b>\$12,394</b>	<b>\$12,433</b>
<b>Fund Summary</b>						
Fund Source - State Operations						
0001 - General Fund	0	10,790	11,642	12,205	12,394	12,433
<b>Total State Operations Expenditures</b>	<b>\$0</b>	<b>\$10,790</b>	<b>\$11,642</b>	<b>\$12,205</b>	<b>\$12,394</b>	<b>\$12,433</b>
<b>Total All Funds</b>	<b>\$0</b>	<b>\$10,790</b>	<b>\$11,642</b>	<b>\$12,205</b>	<b>\$12,394</b>	<b>\$12,433</b>
<b>Program Summary</b>						
Program Funding						
0395 - Public Safety Communications	0	10,790	11,642	12,205	12,394	12,433

**Total All Programs**

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**\$0**

**\$10,790**

**\$11,642**

**\$12,205**

**\$12,394**

**\$12,433**

## Personal Services Details

Positions	Salary Information			CY	BY	BY+1	BY+2	BY+3	BY+4
	Min	Mid	Max						
3637 - Sr Telecomms Engr (Eff. 07-01-2019)				0.0	1.0	1.0	1.0	1.0	1.0
3640 - Assoc Telecomms Engr (Eff. 07-01-2019)				0.0	5.0	7.0	7.0	7.0	7.0
5135 - Telecomms Sys Mgr I (Spec) (Eff. 07-01-2019)				0.0	1.0	1.0	1.0	1.0	1.0
5171 - Telecomms Sys Analyst II (Eff. 07-01-2019)				0.0	0.0	1.0	1.0	1.0	1.0
6910 - Sr Telecomms Techn (Eff. 07-01-2019)				0.0	1.0	3.0	3.0	3.0	3.0
<b>Total Positions</b>				<b>0.0</b>	<b>8.0</b>	<b>13.0</b>	<b>13.0</b>	<b>13.0</b>	<b>13.0</b>
<b>Salaries and Wages</b>	<b>CY</b>	<b>BY</b>	<b>BY+1</b>	<b>BY+2</b>	<b>BY+3</b>	<b>BY+4</b>			
3637 - Sr Telecomms Engr (Eff. 07-01-2019)	0	118	118	118	118	118			
3640 - Assoc Telecomms Engr (Eff. 07-01-2019)	0	515	721	721	721	721			
5135 - Telecomms Sys Mgr I (Spec) (Eff. 07-01-2019)	0	76	76	76	76	76			
5171 - Telecomms Sys Analyst II (Eff. 07-01-2019)	0	0	69	69	69	69			
6910 - Sr Telecomms Techn (Eff. 07-01-2019)	0	81	243	243	243	243			
<b>Total Salaries and Wages</b>	<b>\$0</b>	<b>\$790</b>	<b>\$1,227</b>	<b>\$1,227</b>	<b>\$1,227</b>	<b>\$1,227</b>			
<b>Staff Benefits</b>									
5150350 - Health Insurance	0	75	116	116	116	116			
5150450 - Medicare Taxation	0	11	18	18	18	18			
5150500 - OASDI	0	49	76	76	76	76			
5150630 - Retirement - Public Employees - Miscellaneous	0	232	361	361	361	361			
5150900 - Staff Benefits - Other	0	45	70	70	70	70			
<b>Total Staff Benefits</b>	<b>\$0</b>	<b>\$412</b>	<b>\$641</b>	<b>\$641</b>	<b>\$641</b>	<b>\$641</b>			
<b>Total Personal Services</b>	<b>\$0</b>	<b>\$1,202</b>	<b>\$1,868</b>	<b>\$1,868</b>	<b>\$1,868</b>	<b>\$1,868</b>			

## Analysis of Problem

### A. Budget Request Summary

The Governor's Office of Emergency Services (Cal OES) requests \$59.464 million General Fund over five years, and 8 positions in Fiscal Year 2019-20 increasing to 13 positions in 2020-21, with ongoing funding of \$2.718 million General Fund beginning in 2024-25 to develop and implement the California Radio Interoperable System (CRIS), a statewide public safety radio system that provides agencies the ability to communicate seamlessly.

Five Year Cost (in millions)						
	2019-20	2020-21	2021-22	2022-23	2023-24	Total
<b>Personnel</b>	\$1.743	\$2.718	\$2.718	\$2.718	\$2.718	\$12.615
<b>System</b>	\$9.047	\$8.924	\$9.487	\$9.676	\$9.715	\$46.849
<b>Total by Year</b>	\$10.790	\$11.642	\$12.205	\$12.394	\$12.433	\$59.464

### B. Background/History

Public safety radio systems allow public safety personnel in the field to communicate with each other, dispatch centers, and allied agencies during everyday business and life and death "critical voice" situations. Public safety radio systems provide superior reliability, timeliness, and clarity of voice communication across California's vast and varied terrain compared to any other technology. Land Mobile Radio (LMR) systems are critical for California and are the primary means of reliable voice communications among public safety personnel for decades. They deliver secure, mission-critical, life safety voice communications in a variety of California's urban and rural unique environments, scenarios, and emergencies.

California currently utilizes antiquated conventional radio systems. They operate on different radio frequencies and dissimilar infrastructure, and do not interoperate with other radio systems. California's multiple systems also cause congestion and there are a limited number of radio frequencies available. Conventional systems are very limiting and have dedicated frequencies and channels assigned to an individual group of users. This makes it difficult for a first responder on one system to communicate with a first responder on another system. Also, when a user selects a channel to make a call, other members of the group cannot use that channel until the call is over. When a first responder on one system needs to coordinate with another they must relay messages through a dispatcher, which is a slow and inefficient process. Along with communication delays, these systems are redundant, overlapping, and cost California more because multiple systems must be maintained and refreshed at a greater cost. It is also more labor intensive to repair disparate equipment.

Fourteen states have already invested and successfully implemented statewide public safety radio interoperable systems. These states and other government organizations use an interoperable radio system to connect and leverage state and regional trunked radio systems, allowing users to talk directly with other agencies' radio users and to roam across the state without losing coverage.

California can dramatically improve interoperability by implementing an interoperable radio system that will allow state, local, and federal public safety responders to seamlessly communicate with each other across the state.

### C. State Level Considerations

The Cal OES Vision:

The leader in emergency management and homeland security through dedicated service to all. We will realize our vision by building towards a safer more resilient California, leveraging effective partnerships, developing our workforce, enhancing our technology, and maintaining a culture of continuous improvement.

## Analysis of Problem

The Cal OES Strategic Plan contains the following goal:

Goal 6: Strengthen capabilities in public safety communication services and technology enhancements.

### D. Justification

More advanced digital radio technology is now available and is very reliable and cost effective. This advanced technology allows for trunked systems where radio channels can be shared among many public safety first responders. Trunked radio systems assign a pool of channels for use by multiple individuals. When a call is made by a user an available channel is automatically selected by the system from the pool of channels, leaving the remaining channels available for other users to communicate. While these systems are complex and require more infrastructure than conventional systems, they allow for the sharing of channels among a large group of users, increase capacity and interoperability, reduce congestion, and enable the more efficient use of limited communication channels.

The radio frequency spectrum is a finite resource, with California being one of the most congested areas in the country for public safety. This new statewide trunked system will eventually alleviate the need for additional frequency allocations as well as allow for unused frequencies to be returned to the pool. This proposed radio system will be shared by multiple first responder agencies thereby leveraging the limited frequency bandwidth. The system would leverage existing radio systems and the state would not need to replace multiple existing systems to create one interoperable system. During major emergencies and disasters, there are often communication failures and overloading of California's communications infrastructure—which leads to slower response times and potentially the loss of lives. Additionally, there can be degradation or loss of the electrical grid, cellular phone network, Internet, and landline systems. In such cases, a reliable interoperable public safety radio system is necessary for use by public safety personnel until the public communication networks are restored.

California's radio agencies own, fund, and control 38 separate radio systems across the State, each with its own infrastructure, used only by that agency. These separate systems typically operate on different radio frequencies and disparate infrastructure, and are not interoperable with other key systems. This infrastructure makes it difficult for a responder on one system to communicate with a responder on another system. As a result, when a responder on one system needs to coordinate with another they typically must relay messages through a dispatcher, a slow and inefficient process. Many of these radio systems are redundant and antiquated. An interoperable radio system will:

- Provide seamless, interoperable communications among system users.
- Improve radio coverage to clients whose radio systems are geographically limited.
- Allow radio clients to replace part or all of their legacy system, allowing the State to maintain fewer legacy systems and focus on building one stronger statewide interoperable system.
- Leverage and link to existing state and regional digital trunked radio systems.
- Provide priority for public safety users while allowing non-public safety agencies to use the system.
- Reduce radio programming workload and increase interoperability during emergencies.

With CRIS, Cal OES will be able to link the existing compatible state and regional trunked radio systems together to expand geographical radio coverage to all users without the expense of adding new radio sites to the system. The system also provides secure end-to-end encrypted communications. CRIS will be a subscriber based services, Cal OES will recover costs for participating agencies, which will be used to support the ongoing maintenance of the system.

The Governor has decided to opt in to the First Responder Network (FirstNet) State Plan. FirstNet is meant to complement land mobile radio systems. Based on the economics of cellular service and proposals from the FirstNet vendor, FirstNet is not expected to reach all areas of California. Therefore, FirstNet is not a replacement for public safety radio systems. Without CRIS, the State's ability to communicate will be compromised during day-to-day incidents, emergencies, and disasters.

## Analysis of Problem

### E. Outcomes and Accountability

Cal OES will be able to manage emergency communications throughout California.

**Table: Projected Outcomes**

Workload Measure	BY	BY+1	BY+2	BY+3	BY+4
Statewide coverage by % of population	20%	40%	60%	80%	90%
Statewide coverage by % of geography	20%	30%	40%	50%	60%
Linkage to regional radio systems	1	2	3	4	4
Sites added to the system	5	15	25	35	45

### F. Analysis of All Feasible Alternatives

Alternative 1: Approve \$59.464 million General Fund over five years and 8 positions in 2019-20 increasing to 13 positions in 2020-21, with ongoing funding of \$2.718 million General Fund beginning in 2024-25 to develop and implement CRIS, a statewide public safety radio system that provides agencies the ability to communicate seamlessly.

#### PROS:

- Provides radio service to State agencies that do not have the resources to develop their own radio system.
- Provides seamless interoperable radio coverage for State agencies and local county and city departments.
- Increases capacity for the State. The existing radio systems are limited to 1 or 2 voice channels; CRIS will provide a minimum of 10.
- Reduces the number of standalone radio systems needed, resulting in cost efficiencies.
- Ongoing maintenance will be supported by a subscription based fee structure.

#### CONS:

- Additional General Fund expenditures to implement the system.
- Requires governance, rates, policies, and procedures.

Alternative 2: Approve \$15.06 million over three years and 3 positions to modify the existing California Multiple Agency Radio System to provide some limited interoperable connections to other agency radio systems in the Central Valley.

#### PROS:

- Some improvement to interoperability.
- Provides radio coverage for agencies in the Central Valley.

#### CONS:

- Additional GF expenditures to implement the system.
- Does not provide statewide interoperability and instead focuses on one less-densely populated region
- Requires governance, rates, policies, and procedures.

## Analysis of Problem

Alternative 3: Deny proposal.

PRO:

- No additional General Fund expenditures.

CONS:

- Perpetuates current interoperability limits.
- No improvement in coverage for public safety radio agencies.
- Leaves California trailing in public safety communications compared to other states.
- Continues increased costs related to maintaining multiple public safety radio systems within California.

### **G. Implementation Plan**

Implementation would begin July 1, 2019.

### **H. Supplemental Information**

- Workload Measures.
- Equipment Cost Worksheet.

### **I. Recommendation**

Approve Alternative 1 requesting \$59.464 million General Fund, over five years, and 8 positions in 2019-20 increasing to 13 positions in 2020-21, with ongoing funding of \$2.718 million General Fund beginning in 2024-25 to develop and implement CRIS, a statewide public safety radio system that provides agencies the ability to communicate seamlessly.

Technician Workload Worksheet  
BCP for the California Interoperable Public Safety Radio System (CalPSRS)

<b>Workload Measure (hours) (Senior Telecommunications Technician)</b>	<b>2019-20</b>	<b>2020-21</b>	<b>2021-22</b>	<b>2022-23</b>	<b>2023-24</b>
<b><u>Installation Coordination and Staging</u></b>					
Review work packages/instructions, review shipping/transportation plan, stage equipment and pre-test equipment as necessary. Provide weekly installation status updates to the Project Management Office. Assumes coordination, staging, reporting effort of 10% per year.	230	436	412	412	412
<b><u>Vault and Tower Preparation and Installation for P25 Radios and Site</u></b>					
<b>Vault preparation:</b> Upgrade radio vaults to accommodate new SoS P25 radios. Typically includes drive to remote sites, install new battery plant, grounding, connectors and other required equipment, removal of old radio equipment.	800	1600	1600	1600	1600
<b>Tower work:</b> Drive to sites, remove old antennas, install new antennas, cables, connectors.	300	600	600	600	600
<b>Install P25 equipment at remote sites:</b> Drive to remote sites, install new site controller and radios, conduct radio frequency survey to verify coverage.	200	400	400	400	400
<b><u>Install Microwave Circuits to Connect Existing Sites, Install New Microwave Paths Where Not Available.</u></b>					
<b>Install microwave circuits:</b> Drive to remote sites, install equipment, connect new P25 equipment to microwave path, verify functionality	150	300	300	300	300
<b>Install new microwave paths to SoS sites:</b> Drive to remote sites, install new microwave antennas, waveguide, radios and connect to P25 radio controller	305	1220	1220	1220	1220
<b><u>Master Controller (One-time installation)</u></b>					
Training: Includes training on system fundamentals, monitoring, maintenance, troubleshooting, repair.	480	240	0	0	0
P25 master controller Installation: Install master controller in a data center. includes rack/server installation, connectors, power.	65	0	0	0	0
<b>Total Hours for Senior Telecom Technicians</b>	<b>2530</b>	<b>4796</b>	<b>4532</b>	<b>4532</b>	<b>4532</b>
<b>Senior Telecom. Technician Requested (hours/1778 = PY's)</b>	<b>1</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>

Engineering Workload Worksheet  
BCP for the California Interoperable Public Safety Radio System (CaIPSRs)

Workload Measure (hours)	2019-20	2020-21	2021-22	2022-23	2023-24
<b>SENIOR TELECOMMUNICATIONS ENGINEER - TASKS</b>					
<b>Supervision:</b> Plan, direct, and supervise the work of all program staff; including performance appraisals, training opportunities, mentoring and motivating employees, hiring employees, and approving timesheets.	500	500	500	500	500
<b>Program and System Management:</b> Manage and administer the California Interoperable Public Safety Radio System by establishing policy, standard operating procedures, system permissions and access levels, establishing capacity planning , approving the technical system architecture, and managing customer quality of service/priority.	1500	1500	1500	1500	1500
<b>Subtotal Hours - Senior Telecommunications Engineering</b>	<b>2000</b>	<b>2000</b>	<b>2000</b>	<b>2000</b>	<b>2000</b>
<b>Senior Telecom. Engineers Requested (hours/1778 = PY's)</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>

<b>ASSOCIATE TELECOMMUNICATIONS ENGINEER - TASKS</b>					
Note: Workload estimates assumes installation of 45 sites, 7 ISSI gateways.					
<b>Site-related work</b>					
Site Selection/ preparation: Set up predictive radio coverage template, map prospective sites, select antenna types and height on tower, travel to sites, check radio interference and "noise" at sites, identify required vault upgrades, determine new equipment to purchase	1000	2000	2000	2000	2000
Prepare documentation and radio intermodulation studies needed to ensure non-interference at existing radio sites.	720	360	360	180	180
<b>FCC Licensing:</b> Work needed to identify radio frequencies and license radio frequencies through the FCC	500	1000	1000	1000	1000
Equipment installation support and field RF survey, optimizing equipment during and after installation	400	800	800	800	800

Engineering Workload Worksheet  
BCP for the California Interoperable Public Safety Radio System (CaIPSRs)

<b>Design/management documentation:</b> Research and design sites, develop workable solutions, resolve issues and document equipment as-built.	750	1500	1500	1500	1500
Engineer new microwave circuits to carry carry SoS radio traffic at 25 sites. Duties include verifying existing microwave circuits and infrastructure, developing instructions for new circuit and connections between SoS and the master controller documenting new circuit details.	350	500	500	500	400
<b>Engineer microwave path:</b> Perform computer analysis of microwave path, conduct physical verification of path and suitability of radio tower and vault, determine frequencies and get frequencies allocated, develop drawings and instructions to install microwave antennas, waveguide, radios, and install microwave circuits to carry voice traffic	2000	4000	4000	4000	4000
<b><u>Vault and tower preparation</u></b>					
<b>Tower work:</b> Engineering work needed to install new VHF antennas, cables, connectors, and remove old equipment	290	580	580	580	580
<b><u>Master Controller and Network-Related Work</u></b>					
<b>Training:</b> Training on system fundamentals, operation, administration, networking, troubleshooting	480	480	0	0	0
<b>Installation:</b> preparation and installation of the P25 master controller and configuration of the program load	500	0	0	0	0
<b>Technical system architect:</b> Develop P25 master controller requirements and solutions, requirements for ISSI gateways, develop network management scheme, gather and verify client requirements, coordinate over the air programming, manage and maintain environment and architecture, develop lifecycle refresh model, manage technical requirements for solicitation documents. This position is required after system buildout, circuit planning and installation (position is ongoing)	500	500	500	500	500
<b>Network designer:</b> Design Internet Protocol address scheme, optimizing the network, defining network policies and routing	500	500	500	500	500

Engineering Workload Worksheet  
BCP for the California Interoperable Public Safety Radio System (CalPSRS)

<b>System administrator:</b> Manage the system including adding/changing users, modifying permissions and access levels, developing and running reports, capacity planning, managing customer quality of service/priority, develop inventory model, develop user training, manage license support. This is required after system buildout	500	600	700	800	900
<b>Subtotal Hours - Associate Telecommunications Engineers</b>	<b>8490</b>	<b>12820</b>	<b>12440</b>	<b>12360</b>	<b>12360</b>
<b>Associate Telecom. Engineers Requested (hours/1778 = PY's)</b>	<b>5</b>	<b>7</b>	<b>7</b>	<b>7</b>	<b>7</b>

**TELECOMMUNICATIONS SYSTEM MANAGER I (SPEC) - TASKS**

<b>Program/Telecommunications Management:</b> Assumes coordination effort of 12% of hours per year; includes coordinating system permissions and access levels, communications with client agencies and customers, resolving customer issues, providing system status reports, leading site management request preparation and submittals, coordinating FCC licensing for program, and managing program documentation.	1692	2212	2166	2156	2156
<b>Subtotal Hours - Telecom. Systems Manager I (Specialist)</b>	<b>1692</b>	<b>2212</b>	<b>2166</b>	<b>2156</b>	<b>2156</b>
<b>Telecom. Systems Manager I (Spec.) (hours/1778 = PY's)</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>

**TELECOMMUNICATIONS SYSTEM ANALYST II - TASKS**

<b>Telecommunications analysis:</b> Procure equipment, manage inventory of subscriber radios and radio equipment, manage receipt and delivery of subscriber equipment	250	350	350	350	350
<b>Site coordination:</b> Prepare and process documents needed to modify lease agreements with state and private owners of radio vaults and towers	200	400	400	400	400
<b>System administration support:</b> Support engineering functions to manage the system including adding/changing users, modifying permissions and access levels, developing and running reports.	250	300	350	400	450

Engineering Workload Worksheet  
BCP for the California Interoperable Public Safety Radio System (CaIPSRS)

<b>Subproject schedule coordination:</b> Coordinate and track internal engineering work package schedules and provide periodic reports to the Project Management Office	100	250	300	350	350
<b>Subtotal Hours - Telecom. Systems Analyst II</b>	<b>800</b>	<b>1300</b>	<b>1400</b>	<b>1500</b>	<b>1550</b>
<b>Telecom. Systems Analyst II (hours/1778 = PY's)</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>

<b>TOTAL Staffing Hours</b>	<b>12982</b>	<b>18332</b>	<b>18006</b>	<b>18016</b>	<b>18066</b>
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Equipment Cost Worksheet  
BCP for the California Interoperable Public Safety Radio System (CaIPSRs)

Equipment Type	2019-20	2020-21	2021-22	2022-23	2023-24
Remote P25 radio equipment (radios, audio combiner, interface, network controller, licenses to provide required features) (5 sites year one, 10 sites per year on average remaining years)	\$ 1,750,648	\$ 3,501,295	\$ 3,501,295	\$ 3,501,295	\$ 3,501,295
Shipping of equipment	\$ 5,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000
Test equipment needed to install, optimize, maintain, and troubleshoot P25 Phase II trunked systems.	\$ 200,000				
Equipment to upgrade radio vaults to accept P25 equipment	\$ 180,000	\$ 185,400	\$ 190,962	\$ 196,691	\$ 202,592
Tower parts and antennas	\$ 90,000	\$ 90,000	\$ 90,000	\$ 90,000	\$ 90,000
Microwave equipment (2 microwave paths, 4 sites per year to be installed)	\$ 250,000	\$ 257,500	\$ 265,225	\$ 273,182	\$ 281,377
ISSI Gateways includes engineering work from Motorola to gather requirements, develop ISSI gateway (5 total). No gateway first year as master controller will be completed later that fiscal year.	-	\$ 600,000	\$ 1,200,000	\$ 1,200,000	\$ 1,200,000
Master Controller (includes purchasing for licensing reports, etc.)	\$ 1,200,000	\$ -	\$ -	\$ -	\$ -
Radio manager-allows remote over the air programming functionality for all radios (one-time purchase)	\$ 1,200,000	-	-	-	-
Software Upgrade agreement (\$10,000 per site per year), This will be an ongoing annual cost.	\$ 50,000	\$ 150,000	\$ 250,000	\$ 350,000	\$ 450,000
Mobile Radios (200 per year)	\$ 1,700,000	\$ 1,700,000	\$ 1,700,000	\$ 1,700,000	\$ 1,700,000
Portable Radios (200 per year)	\$ 1,700,000	\$ 1,700,000	\$ 1,700,000	\$ 1,700,000	\$ 1,700,000
Vehicular Repeaters (100 per year)	\$ 550,000	\$ 550,000	\$ 550,000	\$ 550,000	\$ 550,000
Data circuits (used to connect	\$ 12,000	\$ 12,000	\$ 12,000	\$ 12,000	\$ 12,000
Tier 3 data center (cost to house the master controller at a Tier III data center (ongoing cost)	\$ 9,000	\$ 18,000	\$ 18,000	\$ 18,000	\$ 18,000
System training on master controller and site controllers.	\$ 150,000	\$ 150,000		\$ 75,000	
<b>Total Equipment</b>	<b>\$ 9,046,648</b>	<b>\$ 8,924,195</b>	<b>\$ 9,487,482</b>	<b>\$ 9,676,168</b>	<b>\$ 9,715,264</b>

Funding Request by Fiscal Year - Table for BCP Request

	2019-20	2020-21	2021-22	2022-23	2023-24	Total
Position Standard Costing	\$ 1,743,000	\$ 2,718,000	\$ 2,718,000	\$ 2,718,000	\$ 2,718,000	\$ 12,615,000
Equipment and FCC Licenses	\$ 9,047,000	\$ 8,924,000	\$ 9,487,000	\$ 9,676,000	\$ 9,715,000	\$ 46,849,000
<b>Total</b>	\$ 10,790,000	\$ 11,642,000	\$ 12,205,000	\$ 12,394,000	\$ 12,433,000	\$ 59,464,000