

MARIN EMERGENCY RADIO AUTHORITY

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DATE: September 25, 2019
TO: MERA Governing Board
FROM: Ernest Klock, Operations Officer
SUBJECT: AGENDA ITEM C-1: Next Gen Project Oversight and Finance Committee
 Recommendations: Motorola Change Order #8: Multi-Protocol Label Switching (MPLS)
 for Microwave Network

Recommended Action: Provide direction to either include or preclude the inclusion of Multi-Protocol Label Switching (MPLS) as part of the microwave system for the MERA Next Gen System project.

Discussion: The MPLS contract change order #8 (CCO#8) item has been presented at various meetings in 2018 and 2019. On August 25, 2019 the Next Gen Project Oversight Committee reviewed several options for inclusion of MPLS and recommended that options 1, and 4a be brought forward to the Finance Committee for consideration. The Finance Committee met on September 11, 2019 and reviewed the Next Gen project budget and found that there are sufficient unobligated funds to include MPLS through either option 1 or 4a. A summary of the options considered by these committees were:

	OPTION 0	OPTION 1	OPTION 4A	OPTION 4B	OPTION 4C	OPTION 4D
Description	Stay with Motorola Layer 2 per contract	Motorola implements MPLS now, before design complete	Motorola implements MPLS now, no SUA II	Motorola implements MPLS now, SUA II via NASPO – closest to CCO#8	Motorola implements MPLS now, SUA II via NASPO, no Adv. Replace	Motorola implements MPLS now, SUA II via NASPO, no repair SUA II
Cost - No SUA, no hardware refresh	\$0	\$640,562.86	\$502,009	\$502,009	\$502,009	\$502,009
Added Cost - 15 yr. SUAII, Year 6 hardware refresh	\$0	\$1,140,530	\$0	\$2,520,020	\$2,487,302 + repairs covered, but no Adv. Replacement = downtime	\$1,710,079 + repairs via Time and Materials
L2 Network Refresh Credit	N/A	(\$413,000)	(\$413,000)	(\$413,000)	(\$413,000)	(\$413,000)
Price after Layer 2 Network Refresh Credit	\$0	\$1,367,840	\$124,356.08	\$2,608,777	\$2,576,058	\$1,798,835

Option 0 – This option involves no immediate actions, nor cost impacts to MERA, however, the non-Land Mobile Radio (LMR) services will need to be terminated at cutover to the Next Gen System as Motorola will not support them on Layer 2. The FBI and CHP voice circuits would be disabled impacting those agency resources in the areas served, MERA technician troubleshooting tools would be disabled potentially increasing service time, and security cameras for several MERA sites would be disabled. APCO International ANSI standards for public safety communication sites (recently revised for 2019) includes recommendations for site hardening and systems monitoring that would not be able to

be accommodated if option 0 is selected. Some of the APCO recommendations are: equipping sites with one or more remote cameras and audible sirens; remote management of site access authentication (secure card entry to sites); connection of alarms and monitoring tools via a Network Operation Center (NOC or SOC). These types of services cannot be accommodated with the current Layer 2 design.

Option 1 - MPLS for the Microwave Network - \$1,781,092.86 less Layer 2 Credit = \$1,367,840

Inclusion of MPLS would allow for accommodation of non-LMR traffic and future system growth – i.e., APCO site hardening recommendations per above. CCO#8 includes the replacement of Layer 2 with MPLS for the NextGen System microwave network. The cost includes approximately \$640k in MPLS equipment and \$1.14m in SUA II services including one MPLS network refresh in year 6 after cutover to the Next Gen System. This update represents utilization of \$413,000 in L2 credit applied to CCO#8 pricing to result in a \$1,367,840 final CCO#8 price (Attachment 3). The services provided under this CCO#8 are commensurate with the services as outlined in Attachment 2 – Warranty and Post-Warranty Costs currently provided for MERA’s Layer 2 Microwave. This CCO#8 price is contingent upon implementation concurrently with the overall NextGen system design/implementation. Decision on this item should be made ahead of the completion of the Customer Design Review (CDR) package to defer additional costs. CDR will be presented for MERA approval following completion of CEQA.

Option 4A - MPLS by Motorola Now via Layer 2 SUAII Network Refresh Credit – no SUA II Services

As presented at the August 28, 2019 NGPOC, Option 4A included implementing MPLS now with Motorola (equipment, configuration, and training only – NO SUA II Services). By eliminating the service agreement for one of the two included network refreshes and receiving SUA and layer 2 credits, the cost would be \$124,356.08 for this item (Attachment 4). Attachment 2 highlights where this credit would come from and preserves one network refresh for MERA under the existing SUA II services. It is important to note that MERA may not necessarily need to use either Layer 2 network refreshes during the 15-year SUA II period (determined by Motorola product releases and need to upgrade) and the contract structure does not allow for credits after the fact. The Layer 2 credit approach provides the advantages of upgrading the microwave network at a lower cost while delivering the benefits of MPLS mentioned above with the risk of no SUA II services.

Summary

Research on SUA II pricing conducted for the August 28, 2019 NGPOC meeting yielded varying results depending on the level of service desired by MERA. The NGPOC decided to abandon options 4B, 4C, and 4D because they did not provide commensurate services, nor competitive pricing. At a minimum, 24-hour telephone support and software subscription will ensure that the microwave network can be diagnosed by technicians and is updated with the latest software releases - \$1,350,000 for 12 years. Combined with Option 4A, this results in an MPLS solution costing approximately \$1,474,356 – which is slightly higher than CCO#8 with a severe reduction in SUA II services. Given that some existing diagnostic and security services will not be available in the Layer 2 microwave design that is currently planned, there will be increased maintenance costs and higher risk of system busy or temporary outages as technicians would have to drive to remote sites to diagnose certain system performance that currently is monitored remotely via the microwave network. Another significant benefit of MPLS is that the vast amount of unused bandwidth on the new microwave network could be utilized for MERA to support applications (as recommended via APCO) and transmission of third-party traffic that could generate revenues for MERA.

Attachment 1 – Options Comparison Matrix

Attachment 2 – Warranty and Post-Warranty Costs

Attachment 3 – Motorola Contract Change Order #8 – MPLS with SUA II

Attachment 4 – Motorola Contract Change Order #8A – MPLS Equipment Only

Attachment 1 - MPLS Comparison Matrix

	OPTION 0	OPTION 1	OPTION 4A
Description	Take no action. Configuration in the original contract. Maintains Layer 2 architecture. Non-LMR services are not permitted on network.	Motorola implements MPLS now as part of current design of Next Gen System.	Motorola implements MPLS now as part of current design of Next Gen System, paid for by reduction in Layer 2 SUAII services.
Data Transfer	Layer 2 - used predominantly in single-use networks.	MPLS - commonly used in high performance networks.	MPLS - commonly used in high performance networks.
Traffic	Conventional voice channels, interoperability voice channels, 700 MHz trunked voice channels, and basic system management data.	Conventional voice channels, interoperability voice channels, 700 MHz trunked voice channels, and system management data, plus data traffic from other applications (cameras, site security, radio system diagnostics, etc.)	Conventional voice channels, interoperability voice channels, 700 MHz trunked voice channels, and system management data, plus data traffic from other applications (cameras, site security, radio system diagnostics, etc.)
Pros	<ul style="list-style-type: none"> - According to Motorola, it can robustly and reliably support single-use traffic at no additional cost to current project. 	<ul style="list-style-type: none"> - MPLS is specifically designed to carry many kinds of traffic simultaneously. - More reliable network. - More flexible and more future oriented. - Motorola alone is responsible for correcting all implementation issues. - Various diagnostic and security tools for the P25 radio system can be added. 	<ul style="list-style-type: none"> - MPLS is specifically designed to carry many kinds of traffic simultaneously. - More reliable network. - More flexible and more future oriented. - Motorola alone is responsible for correcting all implementation issues. - Various diagnostic and security tools for the P25 radio system can be added.
Cons	<ul style="list-style-type: none"> - Low-level protocols may not have the logic built in that would be required to compensate for a broadcast storm or other sudden network event. - May not support future upgrades to the P25 radio system. - Uses only a fraction of the available bandwidth of the Next Gen microwave network. - Existing troubleshooting services will be removed. - Current non-MERA users (CHP, FBI) will be required to find another path. - Provides less functionality than today's microwave system. - Not industry best practice. 	<ul style="list-style-type: none"> - Significant additional cost to project. - Requires additional hardware. - Adds some complexity to the network. - Hardware refresh is only for hardware that is not compatible with updated Motorola software. - Reduces contingency funds in current project. 	<ul style="list-style-type: none"> - Additional cost to project. - Requires additional hardware. - Adds some complexity to the network. - Hardware refresh is only for hardware that is not compatible with updated Motorola software. - Reduces contingency funds in current project. - Reduces Layer 2 network hardware refresh from two instances to one. - SUA II services for microwave network reduced from existing contract.
MPLS Hardware Cost - No SUA, no Refresh	\$0	\$640,562.86	\$537,609.08
Add'l Cost - 15-Yr SUAII, Yr-6 MPLS Hdwr Rfsh	\$0	\$1,104,930	N/A
Estimate - manufacturer's support for 12 yrs purchased in year three - 24 hour telephone support	N/A	Included	N/A
Estimate - software subscription plan for 12 yrs purchased in year three	N/A	Included	N/A
Estimate - Part repair/replacement for 12 yrs purchased in year three	N/A	Included	N/A
Estimate - one hardware refresh in year six	N/A	Included	N/A
Subtotal		\$1,781,092.86	\$537,609.08
Apply Layer 2 Network Refresh Credit		\$413,253.00	\$413,253.00
Total		\$1,367,839.86	\$124,356.08

Attachment 2 - NEXT GEN RADIO SYSTEM - Warranty and Post-Warranty Support Costs

Item Description		Total Cost	Years 1-3			Years 4-15											
BASE CONTRACT WARRANTY			2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Radio System, Microwave, Dispatch Consoles																	
Latest Software Versions	Motorola to install latest versions of all Motorola and third-party software at commencement of system final testing.	\$0.00	Available			Services Covered by Post Warranty											
Infrastructure Repair	Motorola to repair or replace all Motorola and third-party infrastructure equipment for covered issues. Advanced replacement applies. County to remove and ship.	\$0.00															
Technical Support Services by Phone	Telephone support 24 x 7 x 365 from Motorola Solution Support Center.	\$0.00															
System Update Agreement (SUA I)		\$2,156,874.00	Average \$719,000/year														
Minor Software Release	Motorola to provide (and the County installs) OS and application security updates, patches and service pack updates for Motorola equipment, Windows, Server OS, Red Hat Linux, and Sun Solaris.	\$0.00	Quarterly														
Major System Release	Motorola to provide Motorola system software release and third-party OS and application software releases. Motorola establishes the release schedule.	\$0.00	TBD														
Implementation Services	Motorola to provide all in-house and on-site resources to implement and test a major system release update.	\$0.00															
Hardware Refresh	Motorola to provide hardware version updates and/or replacements for Motorola field replaceable units and third-party networking and computing hardware, but only if the existing hardware is not compatible with a particular major system release. Maximum one per year.	\$0.00	Available														
Motorola System Manager Services	Motorola employee that assists the County in the support, monitoring, and maintenance of the system. Will make scheduled visits to Marin County. Total of 100 days per year to be provided.	\$428,571.43	Average \$143,000/year														
Mobile and Portable Radios, Consolettes																	
Repair / Replacement	Motorola to repair or replace subscriber units for covered issues. County to ship failed units to Motorola. Warranty for the radios will restart at System Acceptance if radios are purchased within two years prior to cutover.	\$0.00															
POST-WARRANTY OPTION (Purchased with the Contract)																	
Radio System and Dispatch Consoles																	
Infrastructure Repair and Technical Support by Phone	Motorola to repair or replace all Motorola and third-party infrastructure equipment for covered issues. Advanced replacement applies. County to remove and ship. Telephone support 24 x 7 x 365 from Motorola Solution Support Center.	\$4,143,378.10	Services Covered by Base Warranty			Average \$350,000/year											
System Update Agreement (SUA II)		\$5,932,942.00				Average \$500,000/year											
Minor Software Release	Motorola to provide (and the County installs) OS and application security updates, patches and service pack updates for Motorola equipment, Windows, Server OS, Red Hat Linux, and Sun Solaris.	\$0.00				Quarterly											
Major System Release	Motorola to provide Motorola system software release and third-party OS and application software releases. Motorola establishes the release schedule.	\$0.00				TBD by Motorola											
Implementation Services	Motorola to provide all in-house and on-site resources to implement and test a major system release update.	\$0.00															
Hardware Refresh	Motorola to provide hardware version updates and/or replacements for Motorola field replaceable units and third-party networking and computing hardware, but only if the existing hardware is not compatible with a particular major system release. Maximum once within two years.	\$0.00				Available if Necessary by Motorola											
Microwave System (Includes L2 Hardware)		\$919,454.55	Average \$56,000/year														
Gold Technical Support	Telephone support for troubleshooting. Product-specific technical content through Nokia's online technical support portal.	\$0.00	Included Services														
On-site Response	On-site trouble shooting of failures by Day Wireless Systems in Benicia.	\$0.00															
Advance Replacement	Motorola to provide a replacement component for the microwave network within one day of identification that it has failed. The failed component is then shipped to Nokia for repair and return.	\$0.00															
Software Subscription Plan	Software patches or maintenance releases.	\$0.00				Years 4-10											
Local Spares Pool	To be identified.	\$0.00										Years 11-15					
Up to 2 Network Refreshes	Motorola to provide a complete replacement of all 9500 MPR microwave radios. (Dishes, lines, dehydrators are excluded.)	\$826,000.00				X413,000 for one Network Refresh in Year 4-10X						\$413,000 for one Network Refresh in Years 11-15					
CONTRACT CHANGE ORDER #1 - Fire Station Alerting																	
Servers, AIC, Modules																	
Standard Equipment Warranty	Motorola to provide complete in-house testing and repair of all failed equipment. Technical support available by phone.	\$0.00															
Extended Equipment Warranty	Motorola to provide complete in-house testing and repair of all failed equipment. Technical support available by phone.	\$447,562.00				Average \$37,000/year											
Hardware/Software Update	Motorola to update or replace certain fire station alerting equipment if found to be incompatible with a Motorola major system release. Motorola to update fire station alerting software if needed whenever a Motorola major system release occurs.	\$441,084.00				Average \$37,000/year											
	Base Cost	\$15,295,866.08	Total of services taken from Motorola Price Sheets in Contract - Numbers Approximate														
	MERA Cost After Discounts	\$9,000,000.00	Approximate SUA/SUAII Cost to MERA after Applied Discounts														