

DEPARTMENT OF PUBLIC WORKS

Quality, Excellence, Innovation

DATE: June 28, 2017

TO: MERA Governing Board

FROM: Pat Echols, Operations Officer

SUBJECT: AGENDA ITEM **D-2**: Proposed Radio Communications System Contract Change Order – Fire Station Alerting

Recommended Action: Recommend approval of contract change order in the amount of \$2,777,880 for the inclusion of the Mach Alert fire station alerting solution into the MERA Next Gen System to the Board of Supervisors.

Discussion: While negotiating a vendor contract with Motorola during late 2016 and early 2017, there was considerable discussion regarding the capabilities of the MACH Alert fire station alerting (FSA) solution proposed by Motorola. In an effort to avoid schedule delay in executing a contract with Motorola to advance the design and implementation of the Next Gen system, MACH Alert FSA was not included in the base contract scope. This allowed additional time to explore an alternative FSA solution. During this time, staff identified the Phoenix G2 system as a potential alternative FSA solution. In recent months, staff has engaged in many technical discussions with Motorola and the G2 FSA vendor in order to verify system capabilities, compatibility, equipment requirements, and costs.

The G2 FSA proposal submitted by Motorola was reviewed and revised multiple times. Although the final proposed solution met all MERA functional objectives, the system cost (approximately \$4.3 million, including extended warranty/support cost of \$1.1 million) was deemed excessive. Accordingly, staff was compelled to reconsider the MACH Alert FSA solution and requested that Motorola submit a detailed cost proposal that was consistent with the G2 scope/terms. Motorola’s proposed cost for MACH Alert is \$2.8 million, including extended warranty/system upgrade agreement (SUA) costs of just over \$888,000.

The two FSA proposals were vetted by an ad-hoc technical working group consisting of MERA/County staff, Federal Engineering, several fire agency representatives, and dispatch agency representatives on June 7. The group concluded that the MACH Alert is the preferred FSA solution for the Next Gen system. Given the high cost of the extended warranty and SUA for years 4 through 15, the issue of whether to include this support was also vetted by the technical working group.

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The group concluded that the protection afforded by the extended warranty and system upgrade packages outweighs the risk of excluding it from the FSA change order. Dispatch agency representatives expressed concern about ensuring that future FSA software versions and firmware/hardware upgrades will be compatible with existing CAD systems and that the MACH Alert product would be supported for the duration of the Next Gen system. It was acknowledged that neither Motorola nor Mach Alert vendor (DCR Engineering) would be responsible for CAD application program interface (API) configuration costs in the event that a dispatch agency elected to upgrade to a newer CAD software version that required such programming, but requested that, as part of the extended support option, DCR would provide the necessary coding information and coordinate with the CAD vendor programmers.

The Next Gen Project Oversight Committee and Finance Committee reviewed this matter at a joint meeting held on June 15. Several members questioned the cost of the extended warranty and asked staff to consult with other public agencies currently using MACH Alert to see whether they purchased extended support. Staff reached out to five agencies. Three of four responding agencies included the warranty/SUA in their contracts. One agency included warranty only, but is now preparing to include the SUA in 2018. All responding agencies expressed satisfaction with the Mach Alert system, recommended including the warranty/SUA options, and praised DCR's customer support. Based on this feedback, it is recommended that MERA include the extended warranty and SUA options as part of the FSA change order.

Attachment: Motorola FSA Proposal dated June 14, 2017

FIRE STATION ALERTING (FSA)



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TABLE OF CONTENTS

Section 1

Statement Of Work	1-1
1.1 Motorola Responsibilities	1-1
1.2 Individual Fire Agencies of Marin County Responsibilities	1-1

Section 2

System Description	2-1
2.1 Overview	2-1
2.1.1 Proposed Equipment	2-2
2.2 Fire station alerting – dispatch center	2-2
2.2.1 MACH Alert Dispatch Center Hardware	2-2
2.2.2 MACH Alert Redundant Hardware	2-3
2.2.3 MACH Alert Dispatching Functionality	2-3
2.2.3.1 CAD Initiating Alerts	2-3
2.2.3.2 Tone to Talk	2-3
2.2.3.3 Manual Alerting with the MACH Alert Client	2-4
2.2.3.4 Cohabitation of MACH Alert Thin Clients on Motorola Dispatch Consoles	2-4
2.2.3.5 MACH Alert Manual Alerting	2-4
2.2.3.6 MACH Alert Browser Viewing	2-5
2.2.3.7 Outdoor Speaker Control	2-6
2.2.3.8 System Acknowledgments and Logging	2-6
2.2.3.9 System Health Monitoring	2-6
2.2.4 CAD System Support and MFD-P	2-7
2.2.4.1 MACH Alert CAD System Support Testing Laboratory	2-7
2.3 Fire station alerting – Fire Station	2-8
2.3.1 MACH Alert Fire Station Hardware	2-8
2.3.1.1 MACH Alert Station Controller	2-8
2.3.2 Station Audio Alerting	2-10
2.3.2.1 Station Zoning (Audio and Light Zones)	2-11
2.3.3 Dispatch Operator Voice Announcements	2-11
2.4 Network Connectivity	2-11
2.4.1 Private IP Network	2-11
2.4.2 Public IP Network	2-11
2.4.3 System Architecture and Interface Descriptions	2-12
2.4.3.1 MACH Alert FSAA Server	2-12
2.4.3.2 Alert Interface Controller (AIC)	2-13
2.4.3.3 Station Controller (SC)	2-13
2.4.3.4 VTS Internet Client (VIC)	2-14
2.4.3.5 Secure VPN (Remote Session)	2-14
2.4.4 Ethernet Throughput	2-14
2.5 Siren Alerting	2-16
2.6 training	2-17
2.7 warranty	2-17
2.8 Optional System Features	2-18

Section 3

Equipment List 3-1

Section 4

Pricing..... 4-1

STATEMENT OF WORK

Motorola is proposing a Fire Station Alerting (FSA) for the fire protection agencies within Marin County on behalf of the Marin Emergency Radio Authority (MERA).

	Major Equipment
ASTRO 25 700MHz Radio System	The MERA 700MHz ASTRO P25 TDMA based system provides the secondary path (primary if an IP connection is not available) between the FSA server and the remote Fire Station controllers
Mach Alert FSA (Servers, Alerting Interface Controller (AIC), ACE3600 Station Controllers)	FSA Server and the Alerting Interface Controller provide a interface between the Intergraph CAD and the fire stations which need to be alerted

The document delineates the general responsibilities between Motorola and individual Fire Agencies for the development and deployment of the FSA system.

1.1 MOTOROLA RESPONSIBILITIES

Motorola's general responsibilities include the following:

- Provide, configure, and install the redundant Mach Alert FSA Servers and redundant Alerting Interface Controller (AIC) at the Master Site equipment room
- Provide API to the individual fire agencies to allow Intergraph CAD to write associated code to interface to FSA server
- Configure and Install Fire Station Controller with embedded radios and antenna system at fire station. Existing FD SCAN radio will feed into the station controller as well.
- Configure and Install Fire Station Controller and embedded radio and antenna system for siren location
- Removal of legacy equipment after new FSA equipment is operational
- Coordinate the activities of all Motorola subcontractors under this contract.
- Administer safe work procedures for installation.

1.2 INDIVIDUAL FIRE AGENCIES OF MARIN COUNTY RESPONSIBILITIES

Individual Fire Agencies, acting on behalf of MERA, will assume responsibility for the installation and performance of all other equipment and work necessary for completion of this project that is not provided by Motorola. Individual Fire Agency's general responsibilities include the following:

- Provide IP connectivity between the dispatch center and each fire station as this is the primary means of network connectivity. If an IP connection is not available, the radio system will be considered the primary path for communications between the FSA server and the remote Fire Station controller
- Provide floor plans for each fire station that will have a Fire Station Controller and radio installed.

- Provide FSA API to Intergraph so CAD vendor can develop appropriate interface to FSA server. The costs associated with CAD development fees are not included and are separate from this proposal.
- Provide mounting space at fire stations for Mach Alert Fire Station Controller. At the fire stations, the station controller must be wall mounted.
- Provide an outlet within 3 feet of mounting location of controllers and radio at fire station
- Provide a building ground bus bar within 3 feet of the radio enclosure at the fire station to provide a connection point for the antenna line surge suppressor.
- Provide a grounding point on the rooftop for the antennas.
- Provide a punch block for connectivity between the Mach Alert Fire Station Controller and equipment at the fire station. Punch block will be the demarc point between the FSA system and the controlled equipment at the fire station.
- Provide access to facilities for installation and testing.
- Provide VPN or other remote access to the IP addresses assigned the FSA servers, AIC, and Fire Station Controllers for use in implementation, troubleshooting, and maintenance of the system. Marin County will be notified before any access is needed and whenever access has been completed. Please see section 2.4 NETWORK CONNECTIVITY for specifics related to the IP network.
- Provide IP connectivity between CAD and MACH Alert FSA with proper socket number (default 5006). Please see section 2.4 NETWORK CONNECTIVITY for specifics related to the IP network.
- Provide IP addresses for FSA Servers, AICs, and Fire Station Controllers. Please see section 2.4 NETWORK CONNECTIVITY for specifics related to the IP network.
- Provide the specific alert tones in the form of .wav files (play length not to exceed seven seconds per file).
- Provide connection to existing 70 volt speaker system
- Provide technical documentation on all existing equipment to which the Station Controller or Peripherals are to be interfaced. NOTE: The Fire Agency is responsible for connections from the punch block demarc to the individual station equipment.
- At time of cutover to the new system, Customer is responsible for moving existing connections at the punch block to the new connection points on the punch block.
- Remediation after legacy equipment is removed will be the responsibility of the individual fire agencies
- Provide Siren Controller information to allow configuration of the Station Controller
- Provide a single point of contact for the project

Motorola has made several assumptions in preparing this proposal, which are noted below. Motorola will need to verify all assumptions or seek alternate solutions in the case of invalid assumptions.

- Installation costs are based on a typical installation. The individual fire agencies of Marin County have not provided floor plans prior to this submittal. Installation cost may vary based on the size, structure type, and antenna location.
- MERA is only providing the equipment and system up to alerting the fire station. Individual fire agencies are responsible for any equipment past the demarc point (punchblock) such as message boards, lighting, speakers, or any other ancillary equipment. These other items are not included as part of this proposal.
- Remediation after legacy equipment is removed will be the responsibility of the individual fire agencies

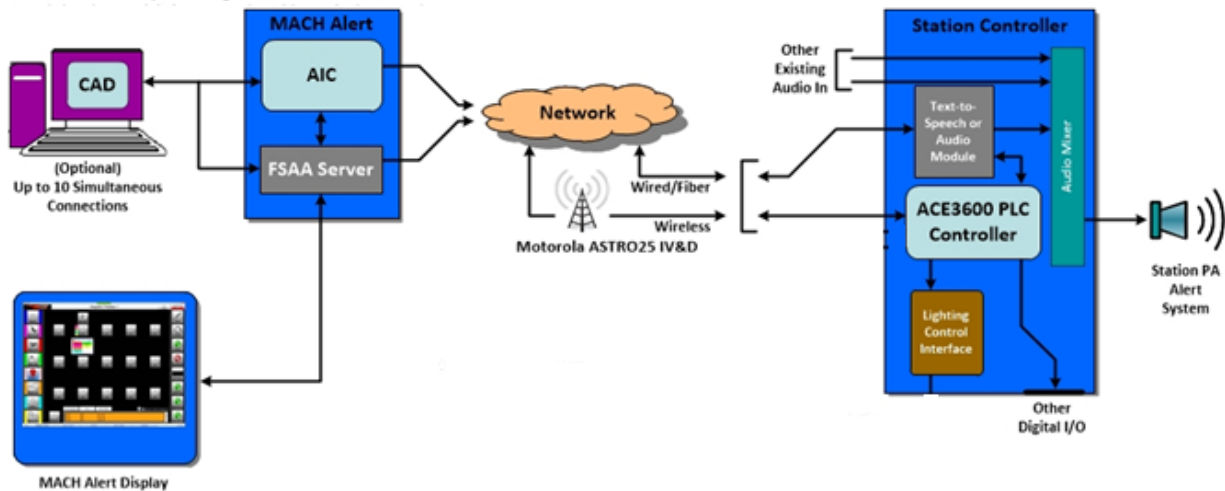
SYSTEM DESCRIPTION

2.1 OVERVIEW

MERA, on behalf of the individual fire agencies of Marin County, would like to replace their existing Fire Station Alerting system with a new Motorola Mach Alert FSA system. The individual fire agencies of Marin County utilizes an Intergraph CAD v9.3 which communicates with the FSA system to alert fire stations of events and to activate equipment, lights, and speakers at the fire stations. The existing FSA solution is FIRESCAD, a fire station ring-down and alerting system, which is deployed using a Motorola SCADA system on an analog talkgroup on the MERA trunked network.

Example of MACH Alert FSAA System

Simplified Notional FSAA System Diagram



2.1.1 Proposed Equipment

The proposed system is for a *primary dispatch center, 36 fire stations, and ten siren locations (3 sirens are co-located and will use the same controller as the fire station alerting system)* and is composed of the following equipment:

Master Site

- (2) Mach Alert Fire Station Alerting Server
- (2) Mach Alert Interface Controller (AIC)

Fire Stations (per station)

- (1) ACE3600 Fire Station Controller
- (1) APX6500 Radio (embedded in FSA Controller enclosure), antenna and lines for Fire Station Controller – Dedicated to the FSA Talkgroup
- (1) APX6500 Radio (embedded in FSA Controller enclosure), antenna and lines for Fire Station Controller – Dedicated to Fire Dispatch Talkgroup
- Antennas and lines for Fire Station Controller Radios

Siren Location (per siren location)

- (1) ACE3600 Fire Station Controller
- (1) APX6500 Radio (embedded in FSA Controller enclosure), antenna and lines for Fire Station Controller

Spare/Test Equipment

- (1) ACE3600 Fire Station Controller
- (1) APX6500 Radio (embedded in FSA Controller enclosure)
- (1) Mach Alert Interface Controller (AIC)
- Set of Recommended Spares

2.2 FIRE STATION ALERTING – DISPATCH CENTER

2.2.1 MACH Alert Dispatch Center Hardware

The MACH Alert Dispatch Center hardware consists of the MACH Alert FSAA Server and Alerting Interface Controller (AIC). The equipment will be located at the Master Site equipment room. Power will be supplied by the master site UPS.

- The MACH Alert FSAA Server hosts the primary MACH Alert software and provides a Graphical User Interface (GUI) to the fire station alerting system. The MACH Alert GUI is accessed by means of browser thin clients that normally cohabitate on the Motorola Dispatch Consoles but may also be located on separate dispatch operator terminals if required. The server also manages dispatch operator manual station alerting, automated optional text-to-speech incident announcements, remote system access, and system alarm and event logging. The server also provides the interface to the customer IP network for alerting over that network.
- The MACH Alert AIC is the fire station alerting interface to the Motorola Radio System. The Alerting Interface Controller is a Motorola ACE3600 high-performance controller that provides the means of communicating the alerting data over the radio network to the MACH Alert Station Controllers (SCs) located at the fire stations. The AIC also sends the alerting data over the IP network to provide redundancy to the FSAA Server in the event it is offline.

- **OPTIONAL – Text to Speech Over the Air Module –** The **OPTIONAL** Text to Speech Over the Air Module interfaces with the trunked radio system over a dedicated control station at dispatch. In this manner, the automated dispatch information is sent over the airwaves to the dispatched talkgroup.

The FSAA Server is normally mounted in the equipment rack with the AIC, although an alternate desktop version is also available. The following diagram shows a typical arrangement of the Dispatch Center hardware.



MACH Alert FSAA Typical Dispatch Center Hardwa

2.2.2 MACH Alert Redundant Hardware

In order to provide redundancy for the FSA Hardware, MACH Alert utilizes a Secondary MACH Alert Server and Secondary AIC. The MACH Alert Primary FSAA Server and Primary AIC are constantly synchronized with the Secondary FSAA Server and Secondary AIC. The MACH Alert System provides for seamless switching between the primary and secondary hardware should the primary hardware be offline. This occurs automatically and requires no human intervention.

Each FSA Server has redundancy built in, with RAID arrayed disk drives and redundant power supplies.

2.2.3 MACH Alert Dispatching Functionality

The alerting process may be either a fully automated process driven by a Computer Automated Dispatch (CAD) System integrated to the MACH Alert System or alternatively may be a manual process in which the MACH Alert System is utilized to manually alert the fire stations. The MACH Alert System also provides the means of manual dispatching if there is CAD in the system but it is unavailable due to maintenance or failure.

2.2.3.1 CAD Initiating Alerts

CAD is the primary means of initiating the alerts. The fire station alerting information from the Intergraph 9.3 CAD is passed to the FSAA Server and AIC. The FSAA Server processes the information and sends the alerting data over the IP network to the MACH Alert Station Controllers (SCs) located in the fire stations. Simultaneously the FSAA Server controls the AIC and the AIC

passes the alerting data to the SCs over both the IP network and the Motorola Radio System. The FSAA Server and AIC are in constant communications, and if the FSAA Server is offline, the AIC will automatically send the alerting information over both the IP network and the radio network.

2.2.3.2 Tone to Talk

Once the fire station has received the alert from either the CAD or from the Manual Client, it will play the appropriate tones in the station and send an ACK to the FSA Server to notify the server that the alert has been received and the tones have been played.

Once the ACK has been received by the FSA Server, the Server will send an audible alert to the dispatcher to let them know that the station PA is open and the dispatcher can transmit the incident information over the Fire Dispatch talkgroup.

The Tone to Talk signal will be played over a separate speaker at the dispatch position. While the MCC7500 computers are remotely mounted in an equipment room, the speaker will be at the dispatch position.

2.2.3.3 Manual Alerting with the MACH Alert Client

If the CAD is offline, MACH Alert provides a backup means of initiating the alerts to the fire stations. The dispatch operator, utilizing a thin browser client on the MCC7500 console, accesses the MACH Alert GUI located on the FSAA Server for the purpose of alerting the stations. The dispatch operator chooses the incident type, selects the fire stations to be alerted, and presses a button on the screen to initiate the alert. The FSAA sends the alerting data over the IP network to the MACH Alert Station Controllers (SCs) located in the fire stations. Simultaneously the FSAA Server controls the AIC and the AIC passes the alerting data to the SCs over both the IP network and the Motorola Radio System.

2.2.3.4 Cohabitation of MACH Alert Thin Clients on Motorola Dispatch Consoles

The *MACH* Alert thin client is annually verified and tested at Motorola headquarters for cohabitation on both the Motorola MCC7500 and MCC7100 Dispatch Operator Consoles. The thin browser client utilizes Microsoft Internet Explorer to provide the access to the GUI located on the server. The utilization of these clients negates the need for a standalone computer at the dispatch position, and thus helps avoid unnecessary hardware clutter at the dispatch position. In addition, with proper connectivity and credentials, the thin client can be loaded on Microsoft Windows based PCs for remote dispatching or for access by technical personnel.

2.2.3.5 MACH Alert Manual Alerting

The Manual Station Alerting Screen is used to alert the fire stations when the CAD system is unavailable or if there is no CAD in the system. The Station Alerting Screen permits dispatch operators to quickly identify and select the type of incident and the station(s) to be alerted. Operators then select one or any combination of stations to be alerted.





Multi-station select buttons may be pre-configured so the dispatch operator can instantly select groups of stations on the *MACH Alert* Dispatch Screen GUI. ALL ALERT can be configured on a per agency basis. When the operator selects the station(s) to be alerted, a “Select” bar appears next to the selected station icons. All other operator positions will see a “Busy” bar next to the selected station icons indicating those stations are currently being alerted. The operator then selects the “Send” icon and the alert is sent to the selected station(s).

A green “ACK” bar next to the Station Icon is displayed when the Station Controller acknowledges the alert. There is also an audio notification presented to the dispatcher to alert them that the PA is now open at the station and they can transmit on the Fire Dispatch Talkgroup. The notification is played over a separate speaker from the MCC7500 select/unselect speakers. If the alert does not successfully go through to the selected fire station(s), an “Alert Fail” alarm is illuminated at the dispatch operator position that initiated the alert and the station(s) that did not acknowledge the alert will display a red “NACK”. There is also an audio notification presented to the dispatcher to if the alert failed. After a station alert has been sent and the toning is complete, the “PA Indicator” icon changes to green informing the operator the live voice announcement can begin. Multiple operator positions can also alert fire stations at the same time (concurrent dispatches). The system meets NFPA 1221 recommendations and ISO requirements for Dispatch Centers.

The *MACH Alert* GUI provides positive acknowledgement (ACK) of alerts received by the fire stations. It also indicates the Public Address (PA) system status at each of the fire stations by utilizing an audio sensing device to provide confirmation that the alert is being heard in the fire station. The GUI also indicates to the dispatch operator the remaining time to talk before the Station Controller (SC) in the fire station is automatically reset in preparation to receive the next alert event.

2.2.3.6 MACH Alert Browser Viewing

The MACH Alert System software is installed on the MACH Alert FSAA Server and the MACH Alert GUI can be viewed on the existing radio consoles, CAD workstations, or any PC with network access to the FSAA Server and an Internet Explorer Browser. This integrated approach will allow

each dispatch operator position to have control over the fire alerting process without CAD input. Additional workstations, monitors, and keyboards are not needed at the dispatch operator positions that would take up valuable desktop space at the dispatch positions. No GUI software is loaded on the PCs accessing the FSAA Server. The browser will call and load an ActiveX client on the PC during initial system setup. Nothing needs to be pre-loaded.

2.2.3.7 Outdoor Speaker Control

The FSAA system provides a feature allowing control of outdoor speakers at each station. The outdoor speakers can be configured from the FSAA Server. Day / Night operation is automatically displayed on the MACH Alert Client GUI. This feature allows authorized personnel to make the following adjustments:

- Turn on or off individual outdoor speakers.
- Set up individual outdoor speakers or group of speakers on a timer. Time On and Time Off settings will automatically turn on/off the speakers at any time during the day or night. Easily adjustable.
- The Outdoor Speaker Control Screen also permits authorized personnel to have control of the station audio. For example, settings are provided to allow the main fire dispatch audio to always be played through the station speakers (“Day Mode”), or dispatch audio only if the station(s) is alerted (“Night Mode”).
- Note – Day / Night operation can be initiated at the station through the Day/Night switch or by the dispatcher on the MACH Alert Client GUI.

2.2.3.8 System Acknowledgments and Logging

The dispatch operator receives a positive “Acknowledgment” (“ACK”) indicator on the dispatch screen when the fire station SC receives the alert command. The ACK will be sent back over both communications links. The MACH Alert system sends success or failure messages to CAD for all alerts received from CAD including the success or failure in sending to the Station Controllers. This information is logged and stored in the FSAA Server’s historical database. The system meets NFPA 1221 recommendations.

2.2.3.9 System Health Monitoring

The MACH Alert System conducts automated “health checks”. The FSAA Server is configured to look for an “ACK” from each Station Controller (SC) periodically. Any status changes at the fire stations are transmitted when the change occurs. This reporting by “exception” utilizes less FSAA system and communication link resources than a polling scheme to all fire stations. Periodically the FSAA Server also polls the CAD server for a “heart beat” confirmation. If there is a communication issue with any SC or the CAD server, an alarm notification is displayed in the “Alarm Window” on the Station Alerting Screen at all operator positions identifying the specific alarm. In addition, these alarms can be sent to email addresses. The Communications Status Screen and the Event Log Screen will display the alarm conditions in more detail. All alarm and event information is time and date stamped, logged into the system, and stored in the FSAA Server for future reference. Any SC may be manually interrogated from the Communications Status screen. The system meets NFPA 1221 recommendations.

2.2.3.10 Redundant Transport Pathways

The *MACH Alert* FSAA system supports up to two (2) redundant communications links for station alerting (data) and an independent communications link for announcements (voice). The system design offers “high-availability” fire station alerting operation through multi-level redundancy.

Both the existing IP network and the new radio system will be used to alert the fire stations. Station alerting is transmitted over the redundant communications links concurrently. The key point here is that the *MACH Alert* FSAA system does not have to make a selection if one link fails, as is often the case with PC-based systems. This assures the alert data will reach each fire station controller selected to be alerted with minimal delays. Alerting over Redundant Communication Links meets NFPA 1221 requirements.

In the event that the IP link fails, alerting is still supported with the IV&D system. The IV&D system has a lower bandwidth (9.6Kbps) than wired IP and when used in backup mode supports an alerting cadence of approximately 3 seconds per station for alerts to be received and acknowledged.

Group Call is not supported on IP Radio networks such as ASTRO 25.

2.2.4 CAD System Support and MFD-P

The CAD is interfaced to the FSAA Server and AIC by means of either an IP connection or serial connection. The interfacing software API (Application Program Interface) is accomplished by means of the Motorola Fire Dispatch Protocol (MFD-P) which is a bi-directional protocol between the CAD Server and the *MACH Alert* hardware. This protocol was design by Motorola exclusively for the purpose of the fire station alerting market. The *MACH Alert* System utilizes MFD-P to receive the alerting information from the CAD Server and also provides acknowledgements back to the CAD Server to verify that the information has been correctly received. Health checks are also constantly employed to verify the health of the connection between the CAD Server and the *MACH Alert* System and the dispatch operator is notified if this automated alerting mechanism becomes unavailable so that the operator knows to switch to manual alerting of the stations using the *MACH Alert* GUI until this connection is re-established. To assist the Intergraph CAD developer in their integration of the MFD-P API, Motorola will provide the Interface Control Documents (ICDs) as well as full technical support from the *MACH Alert* engineering team.

2.2.4.1 MACH Alert CAD System Support Testing Laboratory

In an effort to streamline the CAD integration process, *MACH Alert* has implemented the *MACH Alert* Test Laboratory located in Tampa, Florida for just this purpose. The *MACH Alert* Test Laboratory consists of two FSSA Servers and two AICs representing a primary and secondary dispatch center. The lab also has hardware for 25 Station Controllers with all optional *MACH Alert* features representing twenty five fire stations all integrated as one fully functional *MACH Alert* FSAA System. The CAD Vendor can create a Virtual Private Network (VPN) connection to the FSAA Test Servers for the testing of their side of the API. This process is monitored and logged to provide feedback to the CAD Vendor. The formation of this *MACH Alert* Test Laboratory has proven to streamline the development of the CAD Vendor’s API significantly and allows full testing of their interface to the *MACH Alert* system before ever stepping foot on-site at the customer’s location. This significantly reduces the on-site time required, or interruption in service, for the development and testing of this CAD interface. The *MACH Alert* Test Laboratory has proven to reduce the system downtime time and significantly minimized the stress of the cut-over and go live day for all dispatchers and technical personnel.

2.2.4.2 Interface to Intergraph CAD

As part of our standard CAD Integration Services, Motorola and DCR Engineering will commit to assisting Intergraph with their side of the API. Intergraph may have additional fees that are not included in this proposal related to Intergraph's efforts to develop their interface to the Mach Alert FSA system.

Mach Alert has interfaced with Intergraph CAD version 9.2 at Newport News and Intergraph CAD version 9.1 at Toronto. Utilizing the DCR Engineering System Support Lab noted above, DCR Engineering has interfaced successfully with 10 different CAD vendors and their various releases and would extend the same type of support to Intergraph for the development of their FSA/CAD interface for Marin County.

2.2.4.3 DCR Engineering Assurance:

Motorola and DCR Engineering will ensure that the MACH Alert FSA system will seamlessly interface with the Intergraph CAD release 9.3 as long as Intergraph writes to the Interface Control Document provided by Motorola/DCR. The MACH Alert engineering team will support the Intergraph technical team during the integration process that should ultimately result in a seamless end-to-end FSA solution using Intergraph's CAD V9.3. When the interface from Intergraph communicates properly per the ICD, stations will be alerted, without the requirement of operator intervention. DCR Engineering will provide remote, VPN access to their testing lab, so that Intergraph can verify that their 9.3 release is sending the correct information to the FSA system, and is handling information from the FSA system, in the proper fashion. Any future Intergraph releases must continue to write to the MACH Alert FSA interface in the same manner in order to ensure proper end to end operation.

Motorola/DCR Engineering is not responsible for providing the Intergraph side of the interface. While Motorola/DCR Engineering will assist as noted above, we cannot be responsible for the specific code coming from Intergraph.

2.3 FIRE STATION ALERTING – FIRE STATION

At the fire station, the Station Controller activates the alert tones based on data received on the first (quickest) link and does not process data from the other link. However, both the radio and IP communication links send an acknowledgement (“ACK”) back to the AIC to verify that both communication links are operational. ACKs are also sent to the CAD system, if present, for updating. After the alert tones are played, the dispatch operator can begin the voice announcement.

2.3.1 MACH Alert Fire Station Hardware

The following sections detail the *MACH Alert* Hardware that is available for installation in the fire stations.

2.3.1.1 MACH Alert Station Controller

The *MACH Alert* Station Controller (SC) is a Motorola ACE3600-based high-performance RTU installed in a UL 508A certified NEMA-1 wall-mount industrial panel. The SC is located at each fire station typically in a communications utility room. The SC processes information to and from the

AIC and FSAA Server, generates alert tones, and provides station audio control including optional text-to-speech decoding.

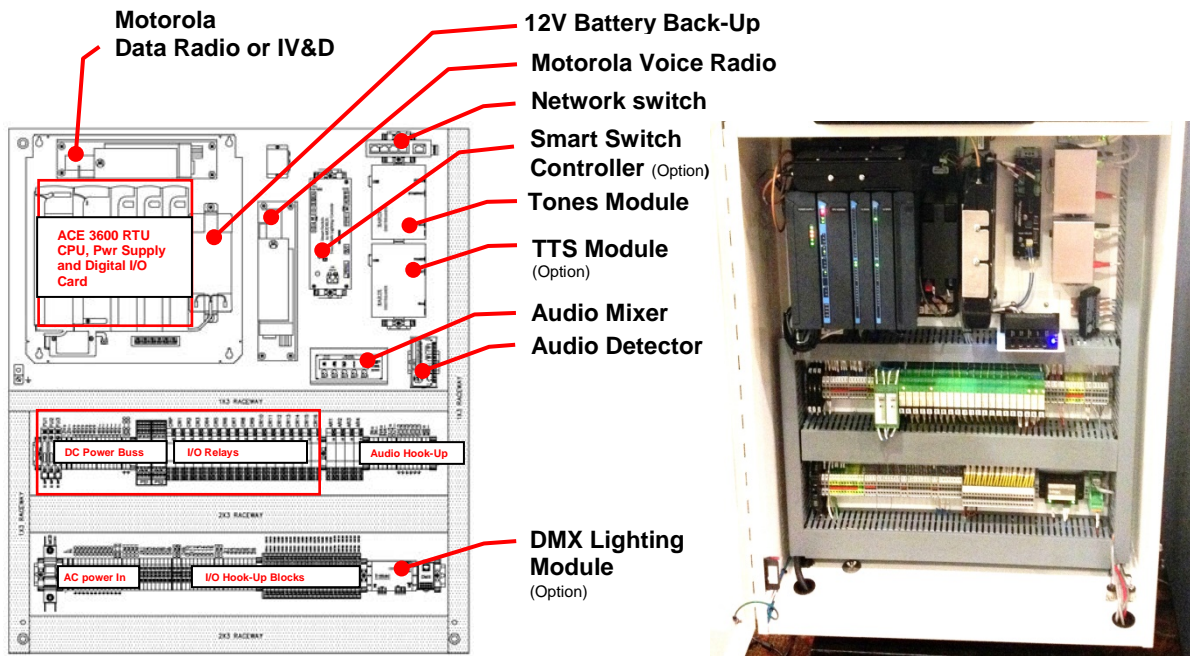
The Station Controller (SC) is a modular unit containing the following hardware:

- Motorola ACE3600 Power Supply Module.
- Motorola ACE3600 CPU Module.
- Motorola ACE3600 Digital Input/Output Module - additional modules are available to support additional I/O functionality.
- Motorola Radio – Dedicated to the FSA Talkgroup
- Motorola Radio – Dedicated to the Fire Dispatch Talkgroup
- Integrated 6.5 Ah Backup Battery.
- A balanced line-level audio output connection is provided to interface with the fire station PA amplifier.
- A Tones module for the storage of audio tones. 35+ default tone library pre-loaded. Custom tones are supported.
- OPTIONAL TTS Module for in-station TTS.
- 8 Digital Output Relays standard – may be purchased with up to 40 Output Relays for additional output control.
- 8 Digital Input Terminal Blocks standard – may be purchased with up to 24 Terminal Blocks for additional monitoring capability.
- Audio mixer and audio relays to control the flow of audio to the station PA system.
- Live audio sensing device.
- 4-port Ethernet switch.
- Transient Voltage Surge Suppression.
- Automatically resets after an alert is completed in preparation for the next alert.

Below is a mechanical design view of the *MACH Alert* Station Controller:



Station Controller



Mechanical Design Concept

Sample Installed Custom SC System

MACH Alert Station Controller

2.3.2 Station Audio Alerting

The *MACH Alert* Station Controller hardware and software automatically controls the alerting process. When stations are alerted, unique alert tones are played over the station’s PA system. To prevent additional stress, these tones are ramped (“heart saver”); that is, they start at low volumes and escalate in volume to a desired level for a specific period of time. The tones can also be unique based on incident type, apparatus, company, and/or personnel. They can include a combination of tone and recorded voice. Custom, user-supplied tones are a standard feature of the system design. Toned alerting meets NFPA 1221 recommendations.

An Audio Tones Module supplies ramped alert tones and a brief pre-recorded voice alert designating for the type of alert, followed by opening the station PA system for the dispatch operator to verbally alert personnel. This is a standard feature of *MACH Alert*.

An optional Text-to-Speech (TTS) function can translate a CAD generated text string containing specifics of the alert message (or a type-written message generated via the dispatcher if there is no CAD in the system, or it is unavailable) into human-voice quality speech and transmit it over the IP and radio network to the Station Controller as a compressed audio file for playback after completion of the locally stored alert tone.

All TTS Automated Voice Announcements are based on text input from CAD. When CAD sends dispatch announcements, announcements of move-ups, and non-emergency messages, these will be processed with the TTS functionality. Manual TTS messages can be initiated through the MACH Alert Client GUI with the “operator text entry” functionality. When CAD sends detailed dispatch information, including apparatus to respond, incident type, street address, map page / grids and comments (examples include gate codes, address history, etc), these will be processed with the TTS functionality.

2.3.2.1 Station Zoning (Audio and Light Zones)

The MACH Alert FSAA system supports the partitioning of fire stations into specific zones, each receiving specific types of alerts. The MACH Alert System can accommodate zone partitioning based on the individual needs of each fire station. It supports zoned alerting with ramped custom tones, bunkroom lighting, apparatus bay, common area alert lighting, and automated outdoor speaker control (day/night modes).

In lieu of alerting the fire stations based on incident type, *MACH Alert* offers optional alerting by apparatus type. *MACH Alert* Apparatus Alerting provides for the following features:

- Enables the ability to select apparatus items on the manual alerting interface, receive apparatus requests from CAD when the CAD interface is used, and plays a different tone at the station for each apparatus selected in the alert.
- Allows dispatch operators to contact specific areas of a station with unique tones associated with a specific apparatus as well as zoning support to send audio to a single area of the station where the fire station personnel associated with that item are located.

2.3.3 Dispatch Operator Voice Announcements

The dispatch operator voice announcements are sent on a separate and independent radio talk group / channel. The same Motorola Radio Systems that are supported for alerting are also supported for voice announcements. A second APX6500 radio is part of the FSA system and is dedicated to the Fire Dispatch Talkgroup. Once Dispatch has received notification that the Fire Station tones have been played, they can provide additional information on the Fire Dispatch Talkgroup.

2.4 NETWORK CONNECTIVITY

2.4.1 Private IP Network

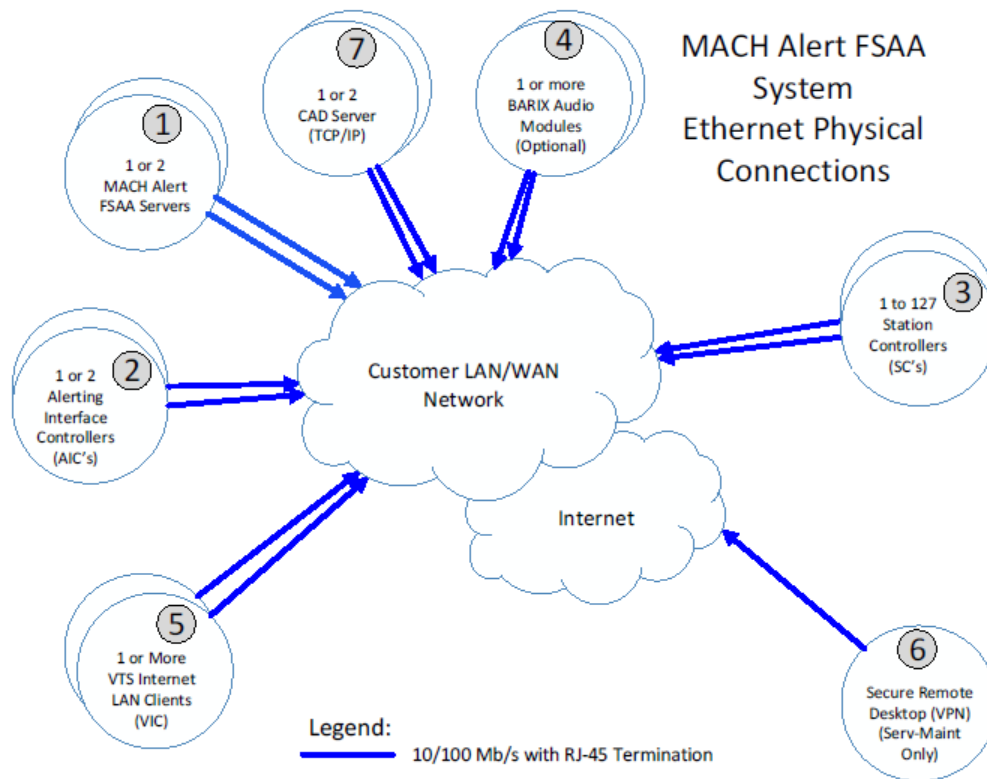
The MACH Alert Fire Station Alerting System is a Public Safety Mission Critical System. The FSA system therefore requires the priorities, reliability and securities of a Private IP Network. The recommended Private IP Network requirements are pointed out in the following document.

2.4.2 Public IP Network

The MACH Alert Fire Station Alerting System is not recommended to be used on a Public IP Network. If a Public IP Network is used as part or whole of the FSA IP Network structure, it is recommended that a VLAN IP Network configuration be utilized including VLAN capable hardware.

2.4.3 System Architecture and Interface Descriptions

The MACH Alert FSAA system consists of the following equipment, description, quantities, and Ethernet interfaces :



2.4.3.1 MACH Alert FSAA Server

There will be two rack-mounted PC-based computers running DCR's FSAA MACH Alert application software on top of Virtual Tag System (VTS) running on a Microsoft Windows Operating System (32 or 64-bit versions of Windows 7, 2008 Server R2). If one of the OPTIONAL Text-To-Speech (TTS) features (added

features is enabled, an FTP Server application software is also installed and configured on the server. Each server uses one or two RJ-45 10/100 Mb/s female Ethernet connection(s) and will use one or more of the following TCP/UDP Port protocols:

- i. VTS-RPC Port 5780.
- ii. HTTPS Ports 7443.
- iii. FTP Port 20, 21, 1026 - 1227.
- iv. SNMP Port 161.
- v. Modbus-TCP Port 502.
- vi. TTS module Control Port 12302.
- vii. VPN Port 8200.
- viii. Motorola MDLC UDP Port 2002.
- ix. DCR MAFD Port 5001
- x. CAD (TCP/IP) Port 5006 - 5016

2.4.3.2 Alert Interface Controller (AIC)

There will be two rack-mount Motorola ACE3600 RTU running DCR's AIC application Software that will be installed in a designated Communications/Data Room in close proximity of the associated MACH Alert FSAA server (each FSAA Server has an associated AIC). The AIC acts as a front-end processor and serves all SC's on the system. Each component must have a valid and routable IP address. Routing will be handled by the County's IP network, including any necessary network address translations that may be required. IP and Subnet Addresses for the AIC's, SC's and Server(s) on the "Network" are expected to be issued by Marin County's IT administration department. Each AIC (Primary and Secondary) uses at least one RJ-45 10/100 Mb/s female Ethernet connection (or may have two depending on features ordered) and uses the following protocols:

- i.** Motorola MDLC Port 2002.
- ii.** Modbus-TCP Port 502.
- iii.** DCR MAFD TCP Port 5001.

2.4.3.3 Station Controller (SC)

Each fire station has a Station Controller that is composed of an internal Motorola ACE3600 RTU running DCR's SC application software. If a certain Text-To-Speech (TTS) feature (OPTIONAL) is installed in the SC, a custom TTS module is provided, an unmanaged 10/100 Mb/s Ethernet switch is also provided within the SC so that only one Ethernet cable to the SC enclosure is required. If an unmanaged switch is not elected, two RJ-45 cables will need to be provided and connected to the enclosure, one for the ACE3600 RTU and one for the TTS Audio module. The alerting feature of the MACH Alert systems is such that one SC is typically enough to handle a single fire station that performs multiple alert response functions.

a. Each standard SC has at least one RJ-45 10/100 Mb/s female Ethernet connection (or may have two depending on features ordered) and supports the following protocols:

- i.** Motorola MDLC Port 2002.
- ii.** Modbus-TCP Port 502.
- iii.** DCR MAFD TCP Port 5001

b. If the OPTIONAL Text-To-Speech (TTS) feature is installed in the SC, at least one TTS audio module is provided (or two depending on redundancy) and has custom DCR firmware for operation with the MACH Alert system. It is controlled by the MACH Alert FSAA server and retrieves the required .mp3 files from the MACH Alert FSAA server. On command, it plays them through the audio mixer out to the customer-furnished audio amplifier system. It has one RJ-45 10/100 Mb/s female Ethernet connection. The TTS audio module and the Motorola ACE3600 use the following protocols:

- i.** Motorola MDLC Port 2002.
- ii.** Modbus-TCP Port 502.
- iii.** FTP Port 20, 21, 1026 - 1227.
- iv.** TTS module control Port 12302.
- v.** DCR MAFD TCP Port 5001.



2.4.3.4 VTS Internet Client (VIC)

VTS Internet Connectivity allows authorized users (operatives, dispatchers, etc.) to remotely monitor and control the MACH Alert FSAA Server dispatch screens over the LAN/WAN Ethernet Network via thin-clients (Active X) from standard Windows OS computers with Microsoft Internet explorer (IE Version 7 thru 11) installed. The dispatchers or operatives may use this VIC option when they sign on to the MACH Alert FSAA dispatch screens and uses the following protocols:

- i. HTTPS Port 7443 (SSL).

2.4.3.5 Secure VPN (Remote Session)

Remote access, on an as needed basis only, VPNs will allow DcR Engineering support staff to connect to the MACH Alert FSAA server desktop through a secure connection over a TCP/IP network from the Internet. This process is site specific and varies from site to site according to the clients IT administration department and DcR's engineering recommendations. For security reasons at minimum it is expected that one or more of the following protocols are used:

- i. VPN Port 8200 (128 Bit EAS cypher)
GoToMyPC.com or Logmein.com.
- ii. CISCO VPN, SONIC Wall SSL Extender, Checkpoint Security VPN or equivalent.

2.4.4 Ethernet Throughput

In order to meet these standards, the network links communication must meet a standard requirement as outlined in this document. This document serves to define the required minimum network communication links specifications for the MACH Alert FSAA system.

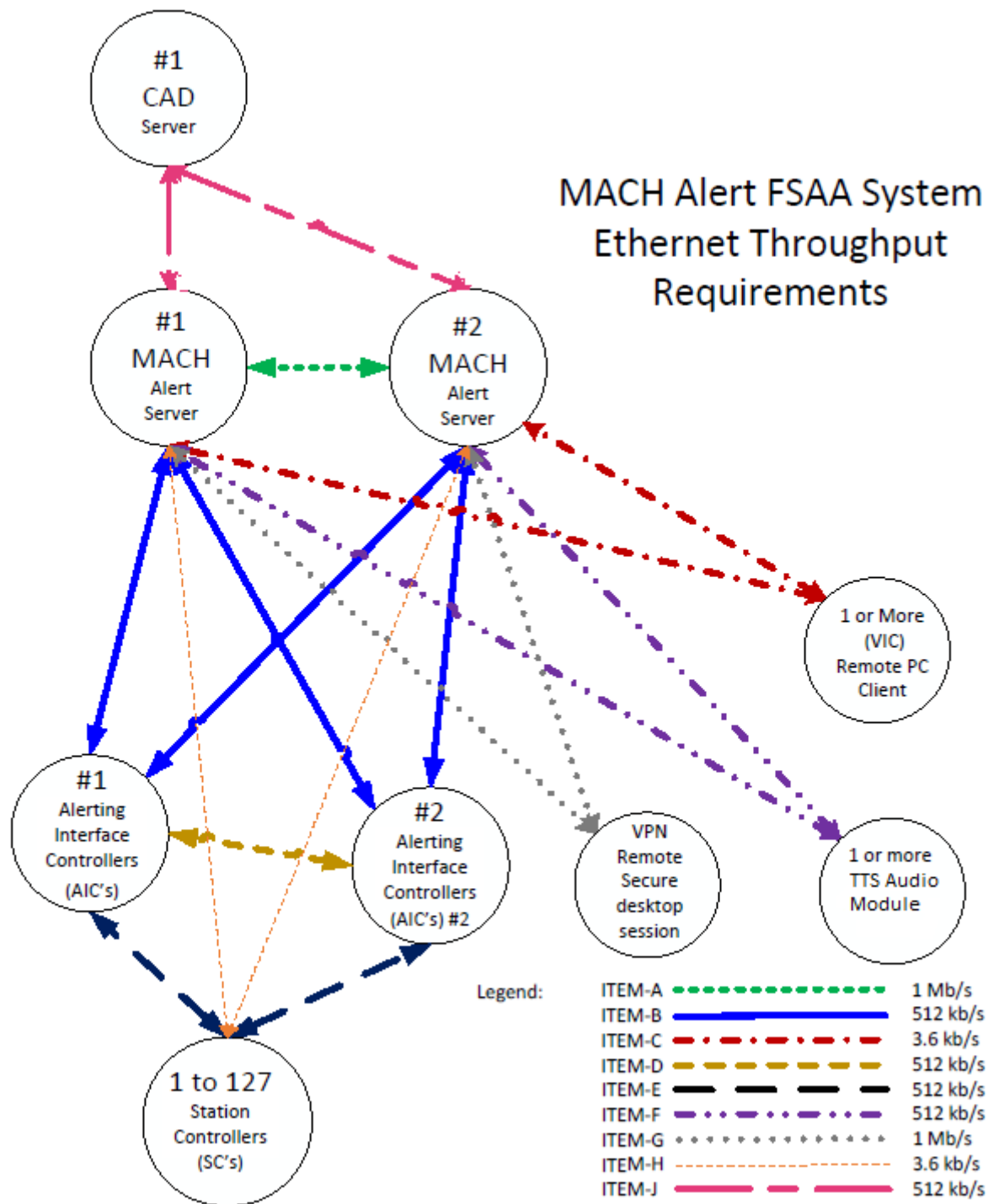


Figure 2 Item Ltr	Required Throughput	Communication Link Description
A	1 Mb/s	Primary MACH Alert FSAA Server to Secondary MACH Alert FSAA Server Synchronization.
B	512 kb/s	MACH Alert FSAA Server to Alert Interface Controller.
C	3.6 kb/s	FSAA Server to VTS VIC (per dispatch position).
D	512 kb/s	Primary Alert Interface Controller to Secondary Alert Interface Controller.
E	512 kb/s	Alert Interface Controller to Fire Station Controller.
F	512 kb/s	FSAA Server to BARIX Instreamer Module.
G	1 Mb/s	FSAA Server to VPN Remote desktop session.
H	3.6 kb/s	FSAA Server to Fire Station Controller
J	512 kb/s	MACH Alert FSAA Server to CAD Server

Additional Requirements:

1. The customer-supplied network should typically be equivalent to a “priority” class of service:
 - i. Latency (one way) < 100 ms
 - ii. Jitter (one way) < 2.5 ms
 - iii. Packet Loss (one way) < 0.01%
 - iv. Availability > 99.99%
2. IP network link to be dedicated by one of two means:
 - i. Complete dedicated LAN just for the FSAA system or,
 - ii. A VLAN system with QoS enabled with FSAA IP priority and routing.

The figure below shows the Link path from Device to device based on the MACH Alert FSAA Ethernet Link. Minimum system throughput requirements are shown in the diagram.



2.5 SIREN ALERTING

At each siren location, a Fire Station Controller will be pole mounted. When CAD needs to activate the siren, CAD will send the transaction to the FSA Server. Since there is no IP connectivity to the Siren locations, the FSA server will pass the transaction to the AIC. The AIC passes the transaction to the radio network.

At the siren location, the embedded radio receives the transaction and passes it to the Fire Station Controller. The controller then passes the configured message to the siren system which takes the appropriate action.

The individual fire agencies of Marin County are responsible for providing the codes or transactions that the siren is capable of handling, so the Fire Station controller can pass the correct signals to the siren.

Fire Station Controller will be pole mounted in a weatherproof enclosure. The enclosure will be mounted at the base of the pole and the cable to the siren will be run to the siren position on the pole.

For the 3 sirens located at the fire stations, the same controller that is used for fire station alerting can also be utilized to control the co-located siren at the station.

2.6 TRAINING

Motorola will provide training in a Train the Trainer format for the FSA System Administrators and for the FSA Dispatch Operators. Each session is a 4 hour session. After training, train the trainers will be able to provide training to end user personnel.

The Dispatch System Operation class is intended to give dispatch center personnel the skills to use the alerting system through the CAD system, to operate the Manual Alerting client and to recognize system faults.

FSA Maintenance/Technician training is also proposed. The Technical training is a 4 hour block with up to 10 personnel being trained. Training will be conducted at the dispatch center.

The Maintenance/Technician class is intended to give technical service personnel the skills to perform system configuration, basic diagnostics and troubleshooting on the station alerting system.

Training is expected to be conducted on consecutive days.

2.7 WARRANTY

Motorola will provide 3 years of initial warranty on all dispatch and fire station equipment. The warranty provides complete in-house testing and repair for all equipment, and technical support is always available by phone. Additional out years of service are also provided as an option.

The warranty does not apply to malfunctions, failures, or defects resulting from abuse, misuse, accident, alteration, neglect, improper maintenance, or unauthorized or improper repair or installation, or from acts of God such as fire, flood, etc.

2.7.1 Hardware Repair

Repaired or replaced equipment and software are warranted free from defects for the purchased warranty period.

2.7.2 Software Repair

For defective software under warranty, Motorola will, with end customer coordination and approval, remotely connect to the MACH Alert FSA System and perform system diagnostics to ascertain and resolve the problem. Motorola will furnish and install corrected software.

2.7.3 Hardware Spares

An adequate supply of spares has been proposed to minimize system downtime.

2.8 SUAI

Mach Alert is the certified FSA solution for Motorola's ASTRO P25 radio systems. As new radio system releases are developed by Motorola, the Mach Alert FSA solution is tested in conjunction with the ASTRO release to ensure proper operation. As the radio system is upgraded as part of the SUA II package, the FSA system will be upgraded in kind.

Please note that the SUA II **does not cover** upgrades that occur on the CAD. Mach Alert provides an Interface Control Document which specifies the format and configuration for the interface to the CAD. The CAD vendor must write to this interface. Any upgrades to the CAD must also address the interface to the FSA system. Mach Alert provides a laboratory testing environment which allows the CAD vendor to test their interface for each CAD release prior to implementing the release.

2.8.1 Hardware included in the SUAI

A change in the ASTRO P25 release does not necessarily require a change on the FSA system. The following items will be update if required to operate on the latest ASTRO P25 release:

- FSA Server
- AIC
- Station Controller Module located in each fire station including ACE3600 and associated radios
- Tone Module located in each fire station
- TTS Module located in each fire station (if purchased)

2.8.2 Software Upgrade Services

The assumption is the MACH Alert upgrade will coincide with the ASTRO system upgrade.

Services for implementation of the upgrade will include onsite functional testing of the upgraded software and hardware (if needed).

The Software Upgrade includes the MACH Alert software on the server, clients and ACE3600 RTUs.

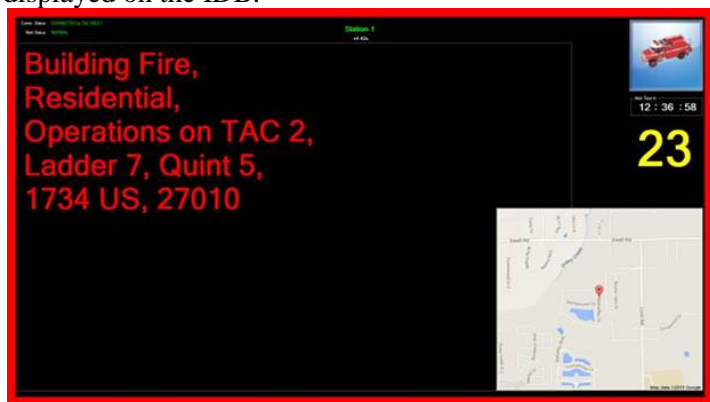
The software upgrade does not implement new feature functionality available in the release. A separate proposal can be provided to implement new feature functionality.

2.9 OPTIONAL SYSTEM FEATURES

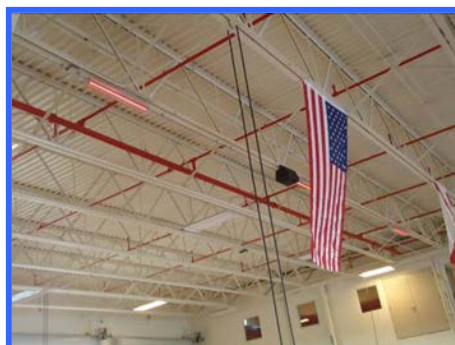
Optional fire station auxiliary functions can be added to the MACH Alert FSAA system to further enhance how a department responds to emergencies. Auxiliary functions may include, but are not limited to the following:

- Incident Display Boards- Incident Display Boards (IDBs) - IDBs can be provided for each fire station as an option. High Definition (HD) LED or LCD monitors can be provided and configured to display incoming alert incident information based on input from the CAD system (for example, units responding, address/location, incident type, cross streets, etc.) When alerted, the displays present a screen border color coded to indicate the call type. A "count-down" and "count-up" timer is displayed indicating the amount of turnout time left and the amount of time

past the required departure. The count-down timer is yellow. When it indicates 00, it turns red for the count-up time. If Internet access is granted, a map of the incident location can also be displayed on the IDB.



- Zoned LED Lighting - The optional use of LED lighting strips for the FSAA installation are for visual alerting in addition to the audio alert (PA) system. The optional LED lighting is connected to the Station Controller. The LED lighting can be configured for ramp time, maximum intensity and colors. The LED lighting strips are activated and controlled in various colors and sequences to alert station personnel of conditions and warnings. The RGB lighting strip is compatible with a commercially available controller. Bunkroom LED lighting is ramped. Each bunkroom can have a LED light strip that will activate based on the type of alert. For example, if the bunkroom is reserved for engine, the LED strip can be set to ramp to a red display. If the bunkroom is reserved for rescue, the LED strip can be set to ramp to a blue display. These high-intensity, RGB color LED strips can also be used in the common areas, bays, weight rooms, outside, offices, etc. When used in the hallways, they provide adjustable soft white egress lighting.



- RGB Color Mixing
- High power LEDs
- Extruded aluminum housing
- Input power of ~ 1 Amp @48VDC

- Turnout Timers - The MACH Alert system can trigger an optional wall-mounted turnout timer when an alert is received. The TOT has configurability settings that allow for the adjustment of the countdown time interval. The countdown time is also configurable based on alert type and can be automatically reset upon the next alert or can be reset by means of an external (optional) pushbutton. The display is a 3-digit LED display that has a character viewing distance of 125 feet.



- Opening bay doors
- Manual acknowledgement to dispatch that the station was alerted
- Manual acknowledgement to dispatch that the first responder has exited the station
- Automating exhaust systems
- “Safe Zone” door bells can be heard over the PA system
- Appliance shut-off (automatic upon alert or button push)
- Station audio and lighting zones
- Bunkroom zoning
- Monitoring station intrusion alarms
- Monitoring of fire alarm panels
- Control of traffic signals
- Monitoring generators (on/off, failures)
- Status of appliances (on or off)
- Status of fire station alerting equipment
- Thermal Rip and Run Printers - MACH Alert offers optional “rip-and-run” thermal printers at each fire station. Upon alert, the Station Controller transmits alert information (sourced from CAD or manual entry) to the thermal printer, which prints a perforated slip of paper with the critical information from dispatch. MACH Alert also supports existing printers via a serial interface.

EQUIPMENT LIST

This section lists the equipment necessary for a *primary and backup FSA Server and AIC, 36 fire stations, and ten siren locations (3 sirens are co-located and will use the same controller as the fire station alerting system). A spare Station Controller, its associated radio, and a recommended set of FSA Spares is also included.*

Primary FSA Server and AIC		
1	T8399	FSA Server
1	TT2509	MACH ALERT PRIMARY SOFTWARE LICENSE UP TO 64 STATIONS
1	TT2514	MACH ALERT CLIENT LICENSE FOR UP TO 64 STATIONS
1	DSB02000817	SWITCH, 8 PORT KVM,17 INCH CONSOLE (WITH BUILT-IN SLIDE OUT KEYBOARD
2	DSP778006	CABLE, KVM USB-PS2 COMBO KIT FOR B020/22-U08/16 SERIES SWITCHES 6 FT
1	TT2490	AIC - ALERTING INTERFACE CONTROLLER LESS ACE3600
1	TT2511	AIC-128 SOFTWARE
1	F7509	ACE 3600 MAIN MODEL
1	V212	ADD: PLUG-IN ETHERNET 10/100 M PORT
1	V261	OPTN,CHGR,ADD: AC PWR PS 100-240 V W/ BAT CHGR
1	V114	ADD: 6.5 AH BACKUP BATTERY
1	V051	19 ADJUSTABLE INSTAL BRACK
1	V269	ADD: EXPANDED 19 CHAS
1	V448	ADD: ACE3600 CPU3680
Redundant FSA Server and AIC		
1	T8399	FSA Server
1	TT2503	MACH ALERT SECONDARY SOFTWARE LICENSE UP TO 64 STATIONS
1	DSB02000817	SWITCH, 8 PORT KVM,17 INCH CONSOLE (WITH BUILT-IN SLIDE OUT KEYBOARD
2	DSP778006	CABLE, KVM USB-PS2 COMBO KIT FOR B020/22-U08/16 SERIES SWITCHES 6 FT
1	TT2490	AIC - ALERTING INTERFACE CONTROLLER LESS ACE3600
1	TT2511	AIC-128 SOFTWARE
1	F7509	ACE 3600 MAIN MODEL
1	V212	ADD: PLUG-IN ETHERNET 10/100 M PORT
1	V261	ADD: AC PWR PS 100-240 V W/ BAT CHGR
1	V114	ADD: 6.5 AH BACKUP BATTERY
1	V051	19 ADJUSTABLE INSTAL BRACK
1	V269	ADD: EXPANDED 19 CHAS
1	V448	ADD: ACE3600 CPU3680
Fire Station Equipment - Per Station		
36	TT2867	ENHANCED STATION CONTROLLER ASSEMBLY LESS ACE3600
36	TT2497	MOUNT DIGITAL VOICE DISPATCH RADIO
36	TT2488	STATION CONTROLLER SOFTWARE LICENSE
36	F7509	ACE3600 BASIC MODEL NO RADIO

36	V214	38 X 38 CM METAL CHASSIS
36	V261	ADD: AC PS 85-264 V WITH BATTERY CHARGER
36	V114	ADD: 6.5 AH BACKUP BATTERY
36	V103	ADD: 3 I/O SLOTS FRAME
36	V184	ADD: PLUG-IN RS-232 PORT
36	V481	ADD: 32 DI / DO FET
72	V20	ADD: BLANK MODULE
36	V358	ADD: 40 WIRE CABLE W/ TB HOLDER 3 M
36	V448	ADD: ACE CPU3680
36	VA00196	ADD: ASTRO 25 DIGITAL TRUNKING
36	VA00201	ADD: 700/800 MHZ MOBILE RADIO
36	FUF1201A	APX6500 700/800 MHZ (A+D)
36	FLN1072	APX6500 DIGITAL INSTALLATION KIT
72	DSSY450SF1SNM	YAGI DIRECTIONAL ANTENNA, 6.5 DBD GAIN, 746-896 MHZ
72	DDN1089	L4TNF-PSA TYPE N FEMALE PS FOR 1/2 IN CABLE
72	TDN9289	221213 CABLE WRAP WEATHERPROOFING
72	DDN1088	L4TNM-PSA TYPE N MALE PS FOR 1/2 IN CABLE
72	DSSG1206B2A	SG12-06B2A 1/2IN SURE GROUND GROUNDING KIT
3600	L1705	LDF4-50A CABLE: 1/2" LDF HELIAX POLY JKT PER FOOT
72	DSISB50LNC2	RF SPD, 125-1000MHZ DC BLOCK BROADBAND BULKHEAD MT, NF ANT, NF EQUIP
72	DDN9769	F1PNM-HC 1/4" TYPE N MALE CONNECTOR FOR FSJ1-50A CABLE
372	DSF1MU	F1MU 1/4" MINI UHF MALE S FLEX CONNECTOR
1800	L1700	FSJ1-50A CABLE: 1/4" SUPERFLEX POLY JKT PER FOOT
		Siren Radios - 1 per station
7	TT2867	ENHANCED STATION CONTROLLER ASSEMBLY LESS ACE3600
7	TT2488	STATION CONTROLLER SOFTWARE LICENSE
7	F7509	ACE3600 BASIC MODEL NO RADIO
7	V214	38 X 38 CM METAL CHASSIS
7	V261	ADD: AC PS 85-264 V WITH BATTERY CHARGER
7	V114	ADD: 6.5 AH BACKUP BATTERY
7	V103	ADD: 3 I/O SLOTS FRAME
7	V184	ADD: PLUG-IN RS-232 PORT
7	V481	ADD: 32 DI / DO FET
14	V20	ADD: BLANK MODULE
7	V358	ADD: 40 WIRE CABLE W/ TB HOLDER 3 M
7	V448	ADD: ACE CPU3680
7	VA00196	ADD: ASTRO 25 DIGITAL TRUNKING
7	VA00201	ADD: 700/800 MHZ MOBILE RADIO
7	DDN1548	NEMA 4X UPGRADE OF SC ENCLOSURE
7	DSSY450SF1SNM	YAGI DIRECTIONAL ANTENNA, 6.5 DBD GAIN, 746-896 MHZ
7	DDN1089	L4TNF-PSA TYPE N FEMALE PS FOR 1/2 IN CABLE
7	TDN9289	221213 CABLE WRAP WEATHERPROOFING



7	DDN1088	L4TNM-PSA TYPE N MALE PS FOR 1/2 IN CABLE
7	DSSG1206B2A	SG12-06B2A 1/2IN SURE GROUND GROUNDING KIT
350	L1705	LDF4-50A CABLE: 1/2" LDF HELIAX POLY JKT PER FOOT
7	DSISB50LNC2	RF SPD, 125-1000MHZ DC BLOCK BROADBAND BULKHEAD MT, NF ANT, NF EQUIP
7	DDN9769	F1PNM-HC 1/4" TYPE N MALE CONNECTOR FOR FSJ1-50A CABLE
7	DSF1MU	F1MU 1/4" MINI UHF MALE S FLEX CONNECTOR
175	L1700	FSJ1-50A CABLE: 1/4" SUPERFLEX POLY JKT PER FOOT
		Spare/Test Fire Station Controller
1	TT2867	ENHANCED STATION CONTROLLER ASSEMBLY LESS ACE3600
1	TT2497	MOUNT DIGITAL VOICE DISPATCH RADIO
1	TT2488	STATION CONTROLLER SOFTWARE LICENSE
1	F7509	ACE3600 BASIC MODEL NO RADIO
1	V214	38 X 38 CM METAL CHASSIS
1	V261	ADD: AC PS 85-264 V WITH BATTERY CHARGER
1	V103	ADD: 3 I/O SLOTS FRAME
1	V184	ADD: PLUG-IN RS-232 PORT
1	V481	ADD: 32 DI / DO FET
2	V20	ADD: BLANK MODULE
1	V358	ADD: 40 WIRE CABLE W/ TB HOLDER 3 M
1	V448	ADD: ACE CPU3680
1	VA00196	ADD: ASTRO 25 DIGITAL TRUNKING
1	VA00201	ADD: 700/800 MHZ MOBILE RADIO
		Additional Recommended Spares (AIC, SC Modules)
1	TT2490	AIC - ALERTING INTERFACE CONTROLLER LESS ACE3600
1	TT2511	AIC-128 SOFTWARE
1	F7509	ACE 3600 MAIN MODEL
1	V212	ADD: PLUG-IN ETHERNET 10/100 M PORT
1	V051	19 ADJUSTABLE INSTAL BRACK
1	V269	ADD: EXPANDED 19 CHAS
1	V448	ADD: ACE3600 CPU3680
5	DDN1914	TONES MODULE
5	DDN1565	STANDARD MIXER
5	DDN1566	12/24 V CONVERTER
5	DDN1567	120V SURGE PROTECTOR
5	TT2868	5 PORT SWITCH



PRICING

Motorola is pleased to provide the following equipment and services for the individual fire agencies of Marin County. Pricing is based on **a primary and backup FSA Server and AIC, 36 fire stations, and ten siren locations** (3 sirens are co-located and will use the same controller as the fire station alerting system). A spare Station Controller, its associated radio, and a recommended set of FSA Spares is also included.

System Pricing	
Mach Alert FSA – Primary FSA Server, Audio Interface Controller	\$77,994
Mach Alert FSA – Backup FSA Server, Audio Interface Controller	\$49,944
Mach Alert FSA – 36 Fire Stations – Station Controller w/Embedded Radio	\$586,237
Mach Alert Siren Controller – 7 locations - Station Controller w/Embedded Radio (3 stations will have their controller also control co-located sirens)	\$92,492
Spares/Test Equipment (Fire Station Controller w/Embedded Radio)	\$10,858
Additional Recommended Spares (Spare AIC, Spare Station Controller Modules)	\$12,999
Installation – Primary Dispatch Center	\$8,628
Installation – (36) Fire Stations (Includes 2nd trip to fire station to remove legacy gear) (3 stations will have their controller also control co-located sirens)	\$260,922
Installation – (7) Siren (Includes 2nd trip to siren to remove legacy gear)	\$23,534
Training	\$10,185
Initial Warranty (1 year)	Included
Additional 2 yrs of warranty (dispatch, backup dispatch and 36 fire stations, 10 sirens, spares - \$34,781/year)	\$65,028
Equipment, Install, Training, Warranty Total	\$1,198,821
Motorola SI	
Motorola Services	\$384,364
DCR Engineering Services	\$294,085
Consolidated Storage space for Radio & FSA Equipment (new upon shipment – legacy on removal)	\$12,000
FSA System Total	\$1,889,270
OPTIONAL 12 years of FSA Warranty (years 4-15)	
Years 4 & 5 (per year)	\$32,514
Years 6, 7, 8, 9 (per year)	\$35,771
Years 10, 11, 12, 13 (per year)	\$38,614
Years 14, 15 (per year)	\$42,479
SUAll for FSA (Software/License/Modules Upgrade – No new features)	
Years 4,5,6,7 (per year)	\$33,414
Years 8,9,10,11 (per year)	\$36,757
Years 12,13,14,15 (per year)	\$40,100
OPTIONAL Text To Speech (Fire Station and Radio)	\$88,891



Additional Warranty Costs for OPTIONAL Text to Speech	
Years 1,2,3,4 (per year)	\$8,628
Years 5,6,7,8 (per year)	\$9,500
Years 9,10,11,12	\$10,357
Years 13,14,15 (per year)	\$11,392
Motorola Services for OPTIONAL TTS	\$5,454
DCR Engineering Services for OPTIONAL TTS	\$10,684
Cost for Additional FSA Client License	\$8,338

Installation costs include a second visit to remove legacy FSA equipment up to the existing punch block (radio and controller equipment only). Legacy equipment will be held for 180 days after the last station has been decommissioned.