SECTION 685

VIDEO ENCODER

DESCRIPTION

685.01.01 GENERAL: This specification describes the functional, performance, environmental, submittal, documentation and warranty requirements, as well as the method of measurement and basis of payment, for a rugged field deployable and user selectable Moving Picture Experts Group (MPEG)2 / MPEG4 video encoder. This video encoder will transmit data via RS-232/422 and accept standard National Television Standards Committee (NTSC) composite video signal as input, digitally compress it and transmit it over the Freeway and Arterial System of Transportation (FAST) communication network. The Video encoder shall be fully supported by Barco® ARGUS controller using Apollo version 1.6 used for the video wall equipment to include decoding of encoded video by Barco®.

The video encoder shall comply with the requirements stated within this specification so as to operate within the FAST Arterial Management System (AMS) and Freeway Management System (FMS).

This specification is for equipment only, no installation, to be delivered to the FAST Traffic Management Center (TMC) for testing and approval prior to final acceptance. The agency Project Manager shall be notified prior to the delivery to the TMC. No partial shipments will be accepted. All equipment supplied on this project will be delivered during a single delivery, and shall be labeled clearly with the project and location designation.

All equipment shall be approved prior to purchase by the FAST Manager or designee.

MATERIALS

685.02.01 FUNCTIONAL REQUIREMENTS: The video encoder shall comply with the following standards:

1. National Electronics Manufacturers Association (NEMA) TS-1 Section 2 – Traffic Control System. The following clauses apply:
   1. 2.1.2: Voltage.
   2. 2.1.3: Frequency Range.
   3. 2.1.4.1: Power Interruption.
   4. 2.1.5: Temperature and Humidity, as modified herein.
   5. 2.1.6: Transients, Power Service.
   6. 2.1.7: Transients, Input-output terminals.
   7. 2.1.8: Nondestruct Transient Immunity.
   8. 2.1.12: Vibration.


3. Institute of Electrical and Electronic Engineers (IEEE) 802.3: Part 3 CSMA/CD Access Method and Physical Layer Specifications.

(5) Underwriters Laboratory (UL) 60950 Safety Requirements for IT Equipment (Applicable to equipment safety).


Detailed Requirement:

(a) The video encoder shall support the following video features:
   
   (1) Signal format: 30 fps, NTSC color.
   
   (2) Resolution: 720 x 480 (full Resolution).
   
   (3) Video Settings (contrast, saturation, brightness and hue).

(b) The video encoder shall support bi-directional serial communications over Ethernet via the following methods:
   
   (1) Encoder serial port to decoder serial port data stream.
   
   (2) Internet Protocol (IP) socket to encoder serial port.
   
   (3) The video encoder shall support full-duplexed serial interface and data rates up to 57.6 bps. The baud rate, stop bits, data bits and flow control shall be user configurable. The serial interface shall be transparent to the device (i.e. no additional or special protocols shall be required to communicate between the Closed Circuit Television (CCTV) control interface and the encoder).

(c) The video encoder shall support the following:
   
   (1) Encoding Formats: The unit shall be capable of being soft configured to perform MPEG-2 ISO/13818-2 video compression and MPEG-4 ISO/14496 video compression.
   
   (2) The encoder shall be capable of being soft configured to produce elementary, or transport stream.
   
   (3) Bandwidth: 1.5 Mb/s –10 Mb/s for MPEG 2 and 64 Kb/s to 5 Mb/s for MPEG 4 (The data rate shall be defined as the maximum committed bandwidth to be utilized, which includes bursting). The default bandwidth for the video encoder shall be set to 5 Mb/s for MPEG-2 and 1 Mb/s for MPEG-4.
   
   (4) Latency: The end-to-end latency between the video encoder and the video decoders shall be no more than 250 ms while operating at a rate of 5 Mb/s.

(d) The video encoder shall support the following network features:
   
   (1) Ethernet Interface (10/100 Mb/s, Full-Duplex, Auto Negotiate (802.3), (RJ-45).
   
   (2) Static IP Addressing (Class A, B and C).
   
   (3) SNMP (MIB2).
   
   (4) Unicast and Multicast (IGMP V2).
   
   (5) Gateway Configuration.
   
   (6) Adjustable Packet Payload Size.

(e) The video encoder shall support:
   
   (1) Command Line Interface (CLI).
   
   (2) Telnet.
   
   (3) Trivial File Transfer Protocol (TFTP) or FTP (new firmware download).
   
   (4) The video encoder shall have an integrated web interface, which provides remote configuration.
(5) Reset/Reboot and firmware upload shall be supported via all methods listed above.

(6) All video (i.e. resolution, contrast, etc.), data (i.e. baud rate, parity, etc.), encoder (i.e. bandwidth, etc.) and network (i.e. IP, subnet mask, gateway, etc.) parameters and settings shall be user configurable through the maintenance port, web interface, Telnet and all other supported remote management tools.

(7) All configurations and settings shall be downloadable/exportable in a document form. As a minimum, the exported settings shall include video, network, and data settings.

Failure and Reset Recovery: The recovery time of a hard or soft reset shall be less than 45 seconds.

Electrical:

(a) The video encoder shall support the following:

(1) Power: Nominal input voltage of 120 VAC 60 Hz. The unit shall contain all power conversion and regulation necessary to support electronics operation.

(2) Power consumption: Shall not exceed 70 Watts.

(3) All supplied video encoders shall have the same power connectors. Each unit shall be provided with a power cable that is at least 5 feet (1.5 meters) in length and terminated with a male, 3 prong UL-listed power connector for interface with the previously stated power system.

Ports:

(a) The video encoder shall have the following ports:

(1) Network: 10/100 Mbps RJ-45.

(2) Video: Composite Bayonet Neill-Concelman (BNC) and S-Video.

(3) Data: 2 Electronics Industry Association (EIA)-RS232/422/485, DB-9* (Female) I/F. These ports shall provide data pass thru for serial control (i.e. PTZ camera control). If EIA RS422 is not provided natively by the port, an EIA RS232 to 422 converter meeting all encoder environmental requirements shall be supplied.

(4) Data: 1 EIA-232 DB-9* (Female) I/F. This port shall provide maintenance interface for local configuration.

*RJ-45 may be provided in place of DB-9. For each RJ-45 port, a RJ-45 to DB-9 converter shall be supplied.

Status Indicators:

(a) The video encoder shall have the following minimum indicators:

(1) Activity.

(2) Power.

(3) Video Loss.

(4) Transmit.

(5) Receive.

(b) Status indicators shall be LED.

Physical Characteristics:

(a) The video encoder shall not exceed 2 ½” high x 12” wide x 13 “deep (2 ½” x 12” x 13”).

(b) The weight shall not exceed 10 lbs.
External Markings:

All connectors, indicators, and replaceable components shall be permanently marked and traceable to the supplied documentation, including schematics and parts list. The external markings shall include the product function name, model number, serial number and manufacturer’s name.

Environmental:

(a) The video encoder shall conform to the performance specification when operated in the following environment:

1. Temperature: -20°Celsius to +70°Celsius (-4°F to 165°F)
2. Humidity: 5 to 95 percent relative humidity, non-condensing.
3. The video encoder shall be conformal coated to prevent damage from blowing sand and dust.

(b) The video encoder shall have a minimum Mean Time Between Failures (MTBF) of 60,000 hours.

MAC Address:

Each unit shall have a unique MAC address, MAC address shall be derived from an address space of 10,000 sequential addresses.

Network Management Software:

All custom Management Information Base’s (MIB’s) required for network management shall be provided for use with third party network management software.

IP Addressing:

Each unit shall support and be delivered with 2 user settable IP addresses, 1 for command and control, and 1 for video multicasting.

685.03.01 SUBMITTALS: The following shall be submitted by the Vendor to the contracting agency:

(a) Acceptance Test Procedures (stand-alone and operational).
(b) Training Syllabus.
(c) Users Manual.
(d) Parts List.
(e) Description of MAC address scheme/space.
(f) Certifications/Statement of conformance to all standards listed in this section of the Uniform Standard Specifications. Testing for compliance will be performed by an independent party.

TESTING

685.04.01 TESTING: Prior to acceptance by the contracting agency the video encoder shall require testing as described below. The supplier shall absorb all costs associated with the testing including and not limited to shipping and handling, all material and equipment and any labor required from the bidder. Prior to acceptance of any video encoder the following tests shall be performed:

(a) Stand Alone Acceptance Test (SAT): Using the FAST approved vendor-supplied test procedures, FAST will perform the SAT in a test area provided by FAST. A vendor representative may be
present during the SAT. The Vendor will be provided with a schedule of the test, including time and place.

(b) The SAT will be performed as follows:

(1) The video encoder will be assembled and connected to power in a stand-alone configuration.

(2) The video encoder will be powered up and allowed to initialize, boot and run self-diagnostic tests as defined in the FAST approved test procedures.

(3) After the video encoder has started and initialized, any additional test procedures will be executed.

(4) After the test procedures have been executed, the video encoder will be allowed to run, uninterrupted, for a burn-in period of 72 hours.

(5) At the end of the burn-in period, the unit will be restarted and configuration verified.

(6) Upon completion of all test procedures, the Vendor will be notified of SAT acceptance or failure.

(c) Operational Test: After successful completion of the SAT, FAST will configure and connect the video encoder to the FAST test network. A FAST provided CCTV assembly will be connected (video and data) to the video encoder. Along with the video encoder, the network will also have a video decoder unit with a video monitor, and a Personal Computer (PC) operating the video decoder software and camera control application provided by the County. The following tests will be performed by FAST:

(1) Video Image (subjective quality acceptable to FAST).

(2) Serial Data Channel both point-to-point (encoder to decoder), and IP.

(3) User programmable parameters and functions.

(4) Network management.

(d) While connected to the network, the video encoder shall not, in any way compromise the function or functions or any other connected network device(s).

(e) Upon completion of all the tests, the Vendor will be notified of operational test acceptance or failure. If the unit fails the test, the Vendor shall supply a new unit and the test shall be restarted.

685.05.01 WARRANTY: The video encoder shall be warranted for a minimum of 3 years. The warranty shall guarantee the video encoder to be free from defect from assembly, fabrication, and materials. The FAST and contracting agency may exercise the option of purchasing an extended warranty for an additional 2 years utilizing the video encoder, extended 2 year warranty item as indicated in Section 685.07.01 “Payment.”

The warranty shall be provided in writing. If the normal manufacturers warranty extends for a longer period, the video encoder shall be warranted for that period.

The warranty shall be measured from the date of receipt by the contracting agency. The manufacturer shall be responsible for maintaining a list of equipment supplied and warranty information during the period of the warranty contract. A report shall be submitted to FAST annually which details the status of equipment warranties.

Video encoders found to be defective during the warranty period shall be replaced free of charge by the manufacturer. The vendor shall be responsible for all shipping and handling costs for equipment under warranty.

The manufacturer shall also provide technical support coverage for all equipment and software furnished. This support shall as a minimum include the following:
(a) Software and firmware upgrades.
(b) Software patches.

METHOD OF MEASUREMENT

685.06.01 MEASUREMENT: The video encoder shall be measured per each. The unit will include furnishing all material required for facilitating an operational video encoder including all necessary jumpers. The video encoder, extended 2 year warranty shall be measured by lump sum.

BASIS OF PAYMENT

685.07.01 PAYMENT: The accepted quantity of video encoder will be paid at the contract unit price per each. The unit will include furnishing and configuration, and all labor, material and equipment required for facilitating an operational video encoder. The lump sum price for video encoder, extended 2 year warranty shall be full compensation for the extended warranty.

Payment will be made under:

PAY ITEM:  

Video Encoder .................................................................................................................................................. Each
Video Encoder, extended 2 year warranty ........................................................................................................... Lump sum