ITEM 03680.9504 M – MPEG-4/2 VIDEO ENCODER-DECODER

DESCRIPTION.
This work shall consist of furnishing and installing an integrated MPEG-4/2 Video Encoder at the locations indicated in the contract documents. In this Special Specification, the Video Encoder is a CODEC device located within the CCTV equipment cabinet. The Video Encoder will convert and compress two analog video streams into two digital video data streams. The Video Encoder shall be configured so that the digital streams consist of a low and high quality MPEG-4 and MPEG-2 conversion of the analog video streams present at both video inputs.

The Video Decoder shall be a software package that will be provided with the hardware encoder. Five copies of the Video Decoder software shall be furnished for each unit of the Video Encoder furnished. The software based decoder shall run as a plug-in application at an individual user’s workstation. The MPEG-4/2 Video Encoder/Decoder shall contain all of the components described in the material specification and shall be configured as indicated on the plans.

MATERIALS.
The MPEG 4/2 Video Encoder/Decoder shall be equipped with a dual channel MPEG-4 and an MPEG-2 type of video encoder in the unit. The MPEG-4/2 Video Encoder/Decoder shall contain an encoder hardware unit and a decoder software package. The Video Encoder unit shall be installed in the CCTV equipment cabinet at each camera location and shall provide the digital video signals at low and high quality levels as specified by the Engineer. The digital video data will be sent as Unicast streams to the two Video Servers located at the Traffic Management Center and at the State Office Building. The Video Server will be paid under Item 03680.9501 M Video Server. The Encoder unit shall support IP protocol.

The equipment installation shall include pre-setting of the configuration of hardware and software components which shall allow automatic operation. The Contractor shall provide a fully operational assembly with all cabling and terminations matched to support the selected components.

The Contractor shall furnish, install, and test the MPEG 4/2 Video Encoder /Decoder, and ensure it meets the following specifications:

a) Video Encoder-

• Inputs
  - The Video Encoder Unit shall support input resolution Quarter Common Intermediate Format, QCIF at (176X128 pixels), SIF 320 x 240.
The Video Encoder Unit shall accept Serial Digital Interface input. The Video encoder shall accept two types of video inputs: S-Video or composite components (PAL and NTSC standards).

The Video Encoder shall accept two Analog Inputs with simultaneous/real time conversion and compression.

Stereo and Mono analog audio, balanced or unbalanced, inputs (1 Volt P-P).

**Outputs**

- The encoded video signal shall be transmitted over the digital network via 10/100Base-T Ethernet interface via RJ-45, using a static IP address or DHCP.
- The communications can be set to auto sense full or half duplex.
- The Video Encoder shall support Unicast, Multicast and UDP transmission.
- The Video Encoder shall support live dual channel encoding, where High Quality Image Resolution and Lower Quality Image Resolution can be sent through a 10/100Base-T Ethernet output. The Encoder shall support the Real Time Streaming Protocol (RTSP) and Real Time Transport Protocol.
- The Video Encoder shall support live dual channel encoding, where a high Quality MPEG-2 Image resolution and an MPEG-4 image shall be sent through a 10/100Base-T Ethernet output.

**Resolution and Performance**:

- The Video Encoder shall encode the video stream at multiple MPEG-4 compliant levels, where the data rate stream varies from 20 Kbps to 2 Mbps.
- The Video Encoder shall use a real-time MPEG-4 and MPEG-2 compression algorithm proven to provide satisfactory operation and performance in a full motion, video application involving surveillance of vehicles at speeds from zero (0) up to one hundred thirty (130) mph.
The MPEG-4 Encoder shall support different levels of video resolution from SIF (352x288) @ 25 fps or (352x240) @ 30fps, NTSC; QSIF (176x128) @ 30fps, NTSC; CIF (252x288), PAL; QCIF (176x144), PAL; and other lower custom resolutions.

In order to maintain real time response of the PTZ camera control that is in synch with the video received on the workstation, the end-to-end video latency must not exceed 600 milliseconds.

The Video Encoder shall support at least one form of encryption to protect video content from illegal viewing.

The Video Encoder shall encode the video stream at multiple MPEG2 compliant levels for a maximum value of 16 Mbps.

The MPEG2 Encoder shall support the following different level of Video resolutions: Full D1 (720x576) @ 25 fps or (720x480) @ 30fps, to SIF (352x288) @ 25 fps or (352x240) @ 30fps and other lower custom resolutions.

Local and Remote Control:

The Video Encoder video functions must be software configurable remotely through RJ-45/10BaseT and RS-232 interfaces.

The Video Encoder shall be configured through an RJ-45 port using 10/100Base-T Ethernet protocol.

The video compression algorithm shall be tuned so as not to cause artifacts and distortion (i.e., jumping, blurring, blocking, etc.) when compressing and transmitting full-motion video with a high degree of motion / change between frames and control data over a wireless or wireline channel.

The Video Encoder must offer SNMP Network Management capability with Web server interface and command line over IP for remote control. The Encoder shall be equipped with front panel LCD for local control.

Each Video Encoder unit must as a minimum offer front panel LED indicators denoting: power on/off, link failure, built-in test failure, and test or operational mode.
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- **Cables and Connectors**
  - The Video Encoder shall accept the following types of video inputs: SDI with Embedded audio, Component, S-Video and Composite.
  - The video connectors must be BNC (f) 75 Ω unbalanced.
  - An IEC detachable power cord and separate power switch must be provided.
  - The encoder shall have a serial maintenance port.

- **Environmental Conditions**
  - The Video Encoder shall be fully operational at temperatures that range from -20°C to 70°C and relative humidity 0-95% non-condensing.
  - The Video Encoder shall be ruggedized to accept a storage temperature ranging from – 40°C to 70°C.

- **Physical and Power**
  - The Video Encoder shall be constructed for easy installation in standard, EIA, 485 mm “19 inch” equipment racks within the CCTV equipment cabinet.
  - The Video Encoder shall have a maximum height of 1.5 U (77 mm) and shall be rack mountable in accordance with EIA 310D and shall not exceed external dimensions of 485 mm (W) x 610 mm (D) x 77 mm (H).
  - The Video Encoder shall accept NTSC video input signals at 1Vp-p ±0.2 across 75 ohms.
  - The Video Encoder shall use an input voltage of 115 VAC, 60 Hz ±5% and shall not exceed a power consumption of 100 watts. The Power supply can be an external unit with 24 VDC output to the Video Encoder. An IEC detachable power cord and separate power switch must be provided.
Standards and Compliance

The National Television Standards Committee (NTSC) was responsible for developing, in 1953, a set of standard protocol for television (TV) broadcast transmission and reception in the United States. Two other standards - Phase Alternation Line (PAL) and Sequential Couleur avec Memoire (SECAM) - are used in other parts of the world. The NTSC standards have not changed significantly since their inception, except for the addition of new parameters for color signals.

- EMC: Designed to meet FCC Class A, CE marked
- Safety: UL, CUL and TUV
- The connector and UDP protocol supporting IP video destination addressing and CODEC control using TCP/IP. The encoded signal shall be a compliant ISMA IP stream. Both Unicast & Multi-cast transmission must be supported.
- The Video Encoder shall support and integrate RTSP server and comply with following protocols: DP, IP, RTP, RTSP, and RTCP.

b) Video Software Decoder

- The software decoder plug-in media player shall be compatible with the following operating systems: Microsoft Windows 2000 and Windows XP.
- The software plug-in shall be easy to install and uninstall if needed.
- The software decoder application shall be configurable for HTTP or UDP protocol settings.
- The software decoder plug-in shall be compatible with Apple QuickTime Player, MS Windows Media Player, and Real Networks Real One.
- MPEG-2 software decoder shall have maximum latency of 500 ms.
CONSTRUCTION DETAILS:
The Contractor shall prepare a shop drawing, which details the complete installation of the MPEG4/2 Video Encoder/Decoder and all components to be supplied. Particular care shall be given to the interconnection of all of the components and the cabling.

The Engineer reserves the right to inspect and/or factory test any completed assemblies prior to delivery of the material to the project site. Any deviations from these specifications that are identified during such testing shall be corrected prior to shipment of the assembly to the project site.

The MPEG-4/2 Video Encoders will be installed in the equipment cabinets as indicated in the plans. The power feed to MPEG-4/2 Video Encoder shall be connected to a 120 VAC power source. Appropriate connectors must be supplied to connect the CCTV camera located on the pole or rooftop to an analog video splitter in the cabinet. In order to ultimately provide high and low resolution digital video streams, the Contractor shall furnish and install an analog video splitter for the video signal connection from the CCTV camera. The Contractor shall connect the outputs from the video splitter to two video inputs on the Video Encoder. The Contractor shall provide the video splitter details to the Engineer prior to installation for approval.

The MPEG-4/2 Video Encoder connectivity to the Ethernet Switch shall be completed using a sufficient length of cable that shall reach the Ethernet Switch with one meter of slack. The Video Encoder configuration and video output stream shall be set to assure connection.

The Standalone Test shall be performed for each MPEG-4/2 Video Encoder. From the cabinet, the Video Encoder shall be connected to the CCTV Camera via the analog video splitter. The digital outputs from the MPEG-4/2 Video Encoder shall be connected to the Ethernet Switch. Using a laptop connected to the same switch, a client connection shall be opened from the MPEG=4/4 Video Encoder to view the video streams. The Standalone Test shall verify the MPEG4/4 Video Encoder is fully operative and can encode video data without misrepresentation. In addition, the test shall include the use of the management tool, where the Video Encoder performance and settings shall be demonstrated to be in accordance with specifications. The Contractor shall provide an MPEG-4/2 Video Encoder Standalone Test Checklist to the Engineer for review and approval prior to the test.

The Central Operation Test shall be performed after establishing all communication links from the field locations to the central hubs. The Central Operation Test shall be performed on the Video Servers to verify that the Unicast video streams sent from the MPEG4/2 Video Encoders located in the field cabinet get to the Video Server location and can be viewed in accordance with the specifications criteria and settings. The test
shall also be performed using the control management tool in order to have access to the MPEG4/2 Video Encoder unit and view or change the current settings. The Contractor shall provide the Central Operation Testing Procedure to the Engineer for review and approval prior to the test.

All components to be supplied under this specification shall be warranted for a minimum of two-years from the conclusion of the System Acceptance Test. This warranty shall include repair and/or replacement of all failed components via a factory authorized depot repair service. All items sent to the depot for repair shall be returned within two weeks of the date of receipt at the facility. The depot location shall be in the United States. Repairs shall not require more than two weeks from date of receipt and the provider of the warranty shall be responsible for all return shipping costs. The depot maintainer designated for each component shall be authorized by the original manufacturer to supply this service.

A warranty certificate shall be supplied for each component from the designated depot repair site indicating the start and end dates of the warranty. The certificate shall be supplied at the conclusion of the System Acceptance Test and shall be for a minimum of two years after that point. The certificate shall name NYSDOT as the recipient of the service. NYSDOT shall have the right to transfer this service to other private parties who may be contracted to perform overall maintenance of the facility. The System Acceptance Test shall be approved after 6 months of central operation of the equipment without any failure.

Two copies of all operations and maintenance manuals for each MPEG-4/2 Video Encoder shall be delivered for each unit installed.

METHOD OF MEASUREMENT:
The MPEG-4/2 Video Encoder/Decoder bid item will be paid for as each completed unit is furnished, along with associated materials, installed, made fully operational, tested, and accepted. For each Video Encoder Unit furnished, five copies of the Video Decoder software along with five licenses will be furnished and transferred to NYSDOT.

BASIS OF PAYMENT:
The unit price for the MPEG-4/2 Video Encoder/Decoder shall include the cost of furnishing all equipment, materials, testing, documentation, and labor as detailed in the contract documents.

Progress payments will be made in the following percentages of the bid price for each item after each milestone is reached.
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Approval of Shop Drawings - 10%
Delivery of Assembly to the Job Site - 30%
Standalone Test - 30%
Central Operations Test - 10%
System Acceptance Test - 20%