STATE OF NEW JERSEY
DEPARTMENT OF TRANSPORTATION
TRENTON, NEW JERSEY 08625

METRIC SPECIFICATIONS FOR A LONG DISTANCE VIDEO TRANSMISSION SYSTEM

N. J. Specification No. EBM-LDV-1 Effective Date: July 1, 2001

New Jersey Department of Transportation Specifications for a Microprocessor Based Long Distance Video Transmission System.

The purpose of these specifications is to describe the minimum acceptable design and operating requirements for a microprocessor based long distance transmission video system.

GENERAL - I

1-1 The long distance video transmission system shall consist of Slow Scan Video Workstation camera transmitters, modems, switcher/controller, signal distribution unit, and software.

1-2 The long distance video transmission system will be used as an Incident detection and management system. The system will provide for the control of all cameras in the Closed Loop Traffic Control system to which this specification applies.

1-3 The long distance video transmission system when used with a Closed Loop System that conforms with the current New Jersey Department of Transportation Specification No. EBM-CL-1 shall provide camera transmitters, and modems at each On-Street Master.

1-4 The long distance video transmission system when used with a Closed Loop System that conforms with the current New Jersey Department of Transportation Specification No. EBM-CL-2 shall provide camera transmitters, modems at the Operator Console site for retransmission to remote workstation locations.

1-5 The complete camera transmitter, and modem shall be enclosed in an environmental enclosure that conforms to the requirements of current NEMA Standards No. TS-1, section 2, Environmental Standards and Test Procedures, except as amended and supplemented hereinafter. The manufacturer shall supply certification for equipment compliance with NEMA environmental standards in accordance with NEMA testing procedures.

1-6 Materials not specifically covered in these specifications shall be in accordance with the accepted standards of the National Electrical Manufacturers Association, The Underwriters Inc., The National Electrical Code, and the American Society for Testing and Materials.

1-7 The Slow Scan Video Workstation shall be in conformance with the current New Jersey Department of Transportation Specification No. EBM-VIDWS-2.

1-8 The system shall use the components specified in paragraph 1-1 in a "Building-Block" fashion that will allow future expansion of the system to its maximum capacity without modifications to the Slow Scan Video Workstation.

1-9 The capacity of the system is as follows:

A. The microprocessor of the Slow Scan Video Workstation shall control a minimum of 100 remote camera locations. The microprocessor shall provide for the real time control of the PTZ functions of the video switcher/controller as specified in the current New Jersey Department of Transportation Specification Number EBM-TOCVCE-1 over standard phone lines.

B. Each camera transmitter provide for sixteen camera inputs.

C. A Modem shall provide for the two-way communications between the Slow Scan Video Workstation and the Camera Transmitter or Camera Receiver.

1-10 The system shall include all cabling, connectors, cards, and other ancillary equipment required for interconnection of the processors and peripheral equipment to perform the functions as required by these specifications.

SYSTEM CAPABILITIES - II

2-1 The slow-scan system shall be designed to operate with the remote control CCTV assembly described in the New Jersey Department of Transportation Specification Number EBM-CCTV-COLOR. The system shall be capable of as a minimum transmitting a color video image from a color camera over a voice grade telephone line with a line impedance of 600 ohms ± 10% meeting the requirements of Bell 3002 unconditioned.

2-2 The system shall provide for the transmission of high definition 512 by 480 pixel video frame in less than four seconds.

2-3 The system shall provide for the control of the PTZ through the video switcher/controller.

CAMERA TRANSMITTER - III

3-1 The camera transmitter shall interface with the Modem specified in Section V. The device shall accept up to 16 NTSC color composite video input via a BNC connector located on the rear panel. The unit shall utilize a 256 by 256 digital memory array in conjunction with a motion detection system to separate the portion of the video that has changed for priority transmission.

3-2 Individual alarms for each camera shall allow for automatic dial-up of receivers from transmitters.

3-3 The transmitter shall be mounted in an aluminum case suitable for shelf mounting. The camera transmitter shall not exceed the physical dimensions of 432 millimeters W by 89 millimeters H by 356 millimeters D. The assembly shall weigh approximately 6.4 kilograms.

SIGNAL DISTRIBUTION UNIT - IV

4-1 The unit shall provide up to 64 control code outputs from a single RS232 control code input for operating the PTZ functions of the receiver/driver units.

4-2 The unit shall be rack mounted.

MODEM - V

5-1 An external RS232 based Hayes Compatible dial-up modem shall be supplied for each camera transmitter and the Workstation. The modem shall meet V.FC bis standards and shall be equipped with V.42 error correction protocol. The modem must be fully compatible with the camera transmitter described in Section lII and a standard MSDOS based computers specified in paragraph 1-5. The modem shall provide full duplex operation using a 2 wire dial up or leased lines. The modem shall comply with part 68, FCC docket 19528.

5-2 The data rate shall be 28.8 kilobits per second, and support asynchronous communication.

5-3 The modulation shall be frequency shift keying (FSK) for low speed and phase shift keying (PSK) on a dibit basis for high speed.

5-4 AT Command Set

The modem must support a full implementation of the AT Command set Hayes standard. This command set shall include the following options:

A. ATS0=XAuto-Answer-Number of Rings

B. ASBAutomatic Speed Buffering

C. AT&VListing of Modem Settings

D. AT&W0Ability to store modem configuration in permanent memory

E. ATBXNegotiation Specification

F. ATS36Fallback Negotiation

G. AT&CXControl of External Carrier Detect

H. AT&DXControl of External DSR Signal

5-5 The modem shall have a hard switch which will allow the unit to operate in "dumb mode". This capability disables the AT command set and is useful for devices that are designed for operation with dedicated service. The modem shall have a line impedance of 600 ohms ± 10% transformer coupled and transient protected. The transmitter output level shall be 0 to -12 dBm programmable, with an external programming resistor.

5-6 The modem shall provide a RS-232-C with V.42 error correction, digital interface via a DB-25S connector. The modem shall be configured with a DB-25 Female connector configured for DCE operation.

5-7 The carrier detect sensitivity at low speed shall be -50 dBm ± 4 dB and at high speed shall be -45 dBm ± 4 dB.

5-8 The modem shall provide an auto disconnect function that will disconnect the modem due to a lack of carrier for approximately 18 seconds.

5-9 The front panel of the modem enclosure shall contain 8 diagnostic LEDs. The indicators shall indicate modem ready, terminal ready, make busy, high speed, modem check, receive data, transmit data and test modem.

5-10 A power on-off switch shall be mounted on the modem along with the DB-25S connector, an 8-pin RJ45 data jack, and an RJ-11 telephone jack. The modem shall have a 2-wire modular phone jack and be supplied complete with a 1.8 meters minimum modular phone jack for connection to the public switched network.

SOFTWARE - VI

6-1 MSDOS PC based software shall be supplied to interface with the camera transmitter assembly defined in Section III and the modem in Section V. The purpose of this software is to receive frames transmitted from the field and their subsequent display on VGA or better monitor.

6-2 The long distance transmission video system software shall operate on the computer equipment specified in paragraph 1-5 and shall convert the computer to the systems picture receiver and workstation.

6-3 The system software shall include an installation program which initially checks the computer system for proper components and sets up configuration and reports any deficiency. The system software shall be licensed to the Office of ITS Engineering and shall allow a unlimited disk to computer transfers. The system software shall include a context sensitive help system which shall be invoked from any operating screen. The system software shall include error messages for common transmission system configuration and minimum memory errors.

6-4 The main operating screen shall provide a display of the incoming or file retrieved picture(s), control area including picture display format, video input selection, picture file mode, and special function selection including alarm point active/inactive relay location on/off and audio communication channel on/off, status bar indicators including site name, international date, time, on/off line, and ready/wait state.

6-5 Once connected to a camera transmitter, the software shall be able to display a video image of at least 512 by 480 pixel resolution, in color format. This image shall be totally refreshed in under four seconds. In addition, the software shall be able to update a 256 by 240 pixel image in a second or less. Via a hot-key or other user friendly command, the current video image shall be storable on disk. A file name convention must be established which shall allow each stored file to be individually identified. A program to re-display frames stored in this fashion must be provided as part of the software.

6-6 The software interface displays shall include as a minimum the current time and date, and a reference to the location being displayed. The interface display shall also display a reference that designates the State Route, Municipality, system section, intersection 7 digit number and intersection cross street.

6-7 The software shall include a database for all alarms. The software system shall also have the capability of providing reports of these alarms. The reports shall be presented in a format that identifies the intersection or location of the alarm. The Department's 7 digit number assigned to the location shall also be included in the report along with the time and date. All data from these reports must be available in an "SQL" file format.

6-8 In addition to the above software, a program shall be provided for full control of the PTZ. The software shall be a fully integrated spread sheet style program. The software shall allow the user to set and change system parameters, program camera sequences, lock cameras, monitors, and keyboards from certain operators.

TESTING - VII

7-1 All equipment defined in this specification shall be subject to factory testing as subsequently described. The factory test shall demonstrate or provide confirmation that all of the equipment operates over the specified environmental range for each component.

7-2 In addition, the test shall verify that the slow scan transmitter and central receiver are capable of returning video frames at the specified rate and detail. The vendor shall supply a suitable video monitor and PC equipment to simulate the work station. The test procedure shall also demonstrate that the PTZ mechanism of the CCTV is controllable through the video switcher/controller. If CCTV assemblies are to be delivered under the same contract, the test shall be conducted with that assembly. If no CCTV assemblies are included in the contract, the supplier shall emulate the video camera with a similar video generator (i.e., VCR) and set up a simulation of the RS232 commands sent to the switcher by the slow scan work station. The test shall utilize simulated or real telephone lines, complete with dial tone.

7-3 The supplier shall be responsible for submitting a test plan which has been designed to exercise and monitor the equipment for the purpose of determining compliance with the specifications.

TRAINING - VIII

8-1 As part of the closed loop system and prior to the observation period, training shall be provided for the Department's engineering and maintenance staff, at a facility provided by the Department, as follows:

A. Maintenance Training - The training shall be provided for a minimum of 32 hours for a minimum of 5 maintenance personnel. The training shall include the operation of the system, maintenance and repair of on-street master, etc.

B. Engineering Training - The training shall be provided for a minimum of 8 hours for a minimum of 20 engineering personnel. The training shall include a complete demonstration of the system, emergency procedures, operation, trouble procedures and equipment operation.

C. Operation Training - The training shall be provided for a minimum of 32 hours for a minimum of five (5) operation personnel. The training shall include the operation of the system and subsystem.

8-2 Training shall also be provided for all software. The training will be given to a minimum of ten (10) engineering personnel and will provide for a minimum of 40 hours of training each. The engineer will approve the training.

8-3 The schedule and the content of all training shall be submitted for approval.

DOCUMENTATION AND GUARANTEES - IX

9-1 No changes or substitutions in these requirements will be acceptable unless authorized in writing. Inquiries regarding this equipment shall be addressed to the Manager, Office of ITS Engineering, New Jersey Department of Transportation, P.O. Box 613, 1035 Parkway Avenue, Trenton, New Jersey 08625.

9-2 The complete system shall carry a Two (2) year guarantee from the date of operation and acceptance against any imperfections in workmanship or materials.

9-3 The company agrees upon the request of the Manager, Office of ITS Engineering to deliver to the Office, a sample of the equipment to be supplied in compliance with these specifications for inspection and test before acceptance. After completion of the test, the sample shall be returned.

9-4 The company shall furnish any and all equipment which they deem necessary for safe and reliable field operation of the system.

9-5 The company shall furnish any and all revisions to the system software for a five (5) year period from the date of delivery. Revisions shall include complete documentation and an explanation of any changes. Revisions shall be submitted with three (3) copies of the software resident on disk.

9-6 All equipment under this specification must be current production equipment and of recent manufacturer, identical models of which are field operational. Untried or prototype units shall not be considered for acceptance.

9-7 Any repairs made by a manufacturer or representative shall be documented and returned with units when warranty repaired. This documentation shall include an explanation of the exact repairs made and identification of parts replaced by part number and circuit number. All warranty repairs must be made within thirty days upon receiving equipment.

9-8 Complete system documentation shall be provided, and shall include as a minimum:

Four (4) complete system operating manuals

Three (3) copies of the operating software resident on disk