SPECIAL SPECIFICATION

1838

Computer Room VoIP Gateway/Gatekeeper

1. **Description.** Furnish, install, and make fully operational a Computer Room Voice-over-Internet Protocol (VoIP) Gateway/Gatekeeper at designated locations as shown on the plans and as detailed in accordance with these specifications. Use the same manufacturer and model for each Computer Room VoIP Gateway/Gatekeeper.

2. **Materials.** Provide a Computer Room VoIP Gateway/Gatekeeper unit that meets the following requirements.

   A. **General Requirements.** Provide only equipment that is new, corrosion resistant and in strict accordance with the details shown on the plans and in the specifications. Provide a Computer Room VoIP Gateway/Gatekeeper that is fully compatible with existing Computer Room VoIP Gateway/Gatekeeper and Field VoIP Gateway hardware and software.

   B. **Digital Telephone Interface Configuration.** Provide a Computer Room VoIP Gateway/Gatekeeper with one digital telephone interface port that has the following features:
      - T1 digital trunk
      - Robbed Bit Signaling (RBS)/Dual-Tone Multi-Frequency (DTMF) signaling
      - Channel Associated Signaling (CAS)/EL7 signaling
      - G.703 signaling
      - G.704 signaling
      - G.733 signaling
      - 1.544 Mbps data rate
      - 100 ohm balanced Bantam connector
      - 100 ohm balanced RJ-45 female connector

   C. **Ethernet Port Configuration.** Provide a Computer Room VoIP Gateway/Gatekeeper with one Ethernet port that has the following features:
      - 10/100Base-TX
      - RJ-45 female connector

   D. **Protocols Supported.** Provide a Computer Room VoIP Gateway/Gatekeeper that supports the following protocols:
      - Internet Protocol (IP)
- Transport Control Protocol (TCP)
- User Datagram Protocol (UDP)
- Real Time Protocol (RTP)
- Telnet
- Trivial File Transfer Protocol (TFTP)
- ITU-T recommendation G.711 at 64 kbps
- ITU-T recommendation G.723 at 6.3 kbps
- ITU-T recommendation G.729AB at 8 kbps
- ITU-T recommendation T.38 over UDP/IP or TCP/IP
- ITU-T recommendation H.323 version 2 or later
- ITU-T recommendation G.168 echo cancellation

E. **Voice Services Supported.** Provide a Computer Room VoIP Gateway/Gatekeeper that provides the following voice services:
- Adaptive Comfort Noise Generation
- Adaptive Voice Activity Detection
- Alternate Routing
- Auto Attendant
- Automatic Call Distribution
- Call Conferencing
- Caller ID
- Call Forwarding
- Call Hold
- Call Transfer
- Common Dialing Plan
- Direct Inward Dialing (DID)
- Gatekeeper capability for 96 VoIP extensions internally
- Gatekeeper expandability through the use of an external gatekeeper
- Hunt Groups
- Internal and External Ring
- Trunk-to-Trunk Routing
- Voice Mail
- Voice-over-IP (32 simultaneous active voice channels)
- Wireless Access

F. **Management.** Provide a Computer Room VoIP Gateway/Gatekeeper that provides the following management capabilities:
• Simple Network Management Protocol (SNMP) version 2 device status, diagnostic, and alarm monitoring and remote configuration
• Graphical User Interface (GUI) management
• Telnet configuration and management
• Allow multiple management sessions or automatically terminate existing session when a new session is requested
• Remotely configurable device settings
• Remotely upgradeable firmware
• Request for Comments (RFC)-1213-compliant Management Information Base (MIB) files
• Standard and device specific MIB2 files

G. **Regulatory Approvals.** Provide a Computer Room VoIP Gateway/Gatekeeper that has been certified to the following regulatory standards:
• Product Safety: Underwriters Laboratories (UL) Standard 1950 or 60950
• Electromagnetic Emissions: Federal Communications Commission (FCC) Part 15, Class B

H. **Dimensions.** Provide a Computer Room VoIP Gateway/Gatekeeper with dimensions that do not exceed the following maximums:
• 19 in. rack mountable: 1 rack unit
• Depth: 15 in.
• Weight: 10 lb.

I. **Power.** Provide a Computer Room VoIP Gateway/Gatekeeper that meets the following power specifications:
• 120 V AC
• 60 Hz
• 100 W maximum power consumption

J. **Environmental.** Provide a Computer Room VoIP Gateway/Gatekeeper that is designed to operate in the following environmental conditions:
• 5°C to 45°C operating temperature range
• 0°C to 70°C storage temperature range
• 10% to 90% relative humidity (non-condensing)

3. **Construction Methods.**

A. **General.** Provide equipment that utilizes the latest available techniques for design and construction with a minimum number of parts, subassemblies, circuits, cards, and modules to maximize standardization and commonality.
Design the equipment for ease of maintenance. Provide component parts that are readily accessible for inspection and maintenance. Provide test points that are for checking essential voltages and waveforms.

B. **Electronic Components.** Provide electronic components in accordance with Special Specification, “Electronic Components”.

C. **Mechanical Components.** Provide external screws, nuts and locking washers that are stainless steel; no self-tapping screws will be used.

Provide parts made of corrosion resistant material, such as plastic, stainless steel, anodized aluminum or brass.

Protect materials from fungus growth and moisture deterioration.

Separate dissimilar metals by an inert dielectric material.

4. **Documentation Requirements.** Provide 5 complete sets of operation and maintenance manuals. Include the following:

- Complete and accurate schematic diagrams.
- Complete installation procedures.
- Complete performance specifications (functional, electrical, mechanical and environmental) on the unit.
- Complete parts list including names of vendors for parts not identified by universal part number such as JEDEC, RETMA, or EIA.
- Pictorial of component layout on circuit board.
- Complete maintenance and trouble-shooting procedures.
- Complete stage-by-stage explanation of circuit theory and operation.

5. **Testing Requirements.** It is the policy of the Texas Department of Transportation to require performance testing of all materials and equipment not previously tested and approved. If technical data are not considered adequate for approval, samples may be requested for test by the Engineer. The contract period will not be extended for time loss or delays caused by testing prior to final Texas Department of Transportation approval of any items.

The equipment referenced to this specification is subject to Design Approval Tests and Factory Demonstration Tests at the equipment manufacturer's facility to determine conformance with all the specification requirements except that the Engineer may accept certification by an independent testing laboratory in lieu of the design Approval Tests, to verify that the Design Approval Tests have previously been satisfactorily completed. The Contractor must arrange for and conduct the tests in accordance with the specification requirements stated herein.
Unless otherwise specified, the Contractor is responsible for satisfying all inspection requirements prior to submission for the Texas Department of Transportation's inspection and acceptance. The Engineer reserves the right to have his/her representative witness all Design Approval Tests and Factory Demonstration Tests.

Compare the results of each test with the requirements specified herein. Failure to conform to the requirements of any test shall be counted as a defect, and equipment shall be subject to rejection by the Engineer. Rejected equipment may be offered for retest provided all non-compliances have been corrected and retested by the Contractor and evidence thereof submitted to the Engineer.

6. **Warranty.** Guarantee that equipment furnished and installed for this project will perform according to the manufacturer's published specifications. Warrant equipment against defects and/or failure in design, materials and workmanship in accordance with the manufacturer's standard warranty. Assign to the Department all manufacturers’ normal warranties or guarantees on all electronic, electrical, and mechanical equipment, materials, technical data, and products furnished for and installed on the project. Repair or replace defective equipment, at the manufacturer's option, during the warranty period at no cost to the Department. Provide equipment with 95% of the manufacturer's standard warranty remaining on the date that equipment invoices are submitted by the Contractor for payment. Any equipment with less than 95% of its warranty remaining will not be accepted by the Department.

7. **Experience Requirements.** Personnel involved in the installation and testing of the “Computer Room VoIP Gateway-Gatekeeper” must meet the following requirements:

- Three years experience in the installation and testing of VoIP Gateway-Gatekeepers.

- Two installed systems where VoIP Gateway-Gatekeepers, as described within these specifications, are installed and the systems have been in continuously satisfactory operation for at least 2 years. Submit photographs or other supporting documents as proof, and the names, addresses and telephone numbers of the operating personnel who can be contacted regarding the systems.

- One system with VoIP Gateway-Gatekeepers (which may be one of the two in the preceding paragraph) which the Contractor can arrange for demonstration to the Engineer and/or his representatives.

8. **Training.** Conduct a training class (minimum of 8 hours) for up to 10 representatives designated by Texas Department of Transportation on procedures of installation, operations, testing, maintenance and repair of all equipment specified within these specifications. Submit to the Engineer for approval 10 copies of the training material at least 30 days before the training begins. Conduct training within the local area unless otherwise authorized by the Engineer. Customize the training specifically for the TransGuide System. Videotape the entire training on VHS (1/2 in.) tapes and deliver to TransGuide for later use.

9. **Measurement.** This Item will be measured as each unit furnished, installed, and tested.

10. **Payment.** The work performed and materials furnished in accordance with this Item and measured as provided under “Measurement” will be paid for at the unit price bid for
“Computer Room VoIP Gateway-Gatekeeper”. This price is for compensation for equipment, cables and connectors; documentation and testing; and labor, materials, warranty, training and incidentals.