Florida Department of Transportation

RON DESANTIS
GOVERNOR

605 Suwannee Street
Tallahassee, FL 32399-0450

JARED W. PERDUE, P.E.
SECRETARY

September 1, 2026

Daniel Holt, PE, PTOE
Director, Project Delivery
Director, Technical Services
FHWA
400 West Washington Street, Suite 4200
Orlando, FL 32801

Re: State Specifications Office
Section: 996
Proposed Specification: **9960302 Intelligent Transportation System Device and Auxiliary Component Materials**

Dear Mr. Holt:

We are submitting, for your approval, two copies of the above referenced Supplemental Specification.

The changes are proposed by Ronald Meyer to update MFES and MHES requirements to reflect current technology, revise wireless system standards for modern backhaul and networking needs, fix punctuation and remove a duplicate requirement, and replace 'outlet' with 'receptacle' for consistent terminology.

Please review and transmit your comments, if any, within two weeks (10 business days). Comments should be sent via email daniel.strickland@dot.state.fl.us.

If you have any questions relating to this specification change, please call me at (850) 414-4130.

Sincerely,

Signature on File

Daniel Strickland, P.E.
State Specifications Engineer

DS/am
Attachment
cc: Florida Transportation Builders' Assoc.
State Construction Engineer

INTELLIGENT TRANSPORTATION SYSTEM DEVICE AND AUXILIARY COMPONENT MATERIALS
(REV 6-16-26)

SUBARTICLE 996-3.2.5 is deleted and the following substituted:

996-3.2.5 Management Capability: The MFES shall support all Layer 2 management features and certain Layer 3 features related to multicast data transmission and routing. These features shall include, but not be limited to:

1. An MFES that is a port-based VLAN and supports VLAN tagging that meets or exceeds specifications as published in the IEEE 802.1Q standard and ~~has a minimum 4-kilobit VLAN address table~~supports at least 255 VLANS (VID 1-4094).
2. A forwarding/filtering rate that is a minimum of 14,880 packets per second for 10 Mbit/s and 148,800 packets per second for 100 Mbit/s, and 1,488,000 packets per second for 1000 Mbit/s.
3. A ~~minimum 4 kilobit~~ media access control (MAC) address table that supports at least 8000 addresses.
4. Support of, at a minimum, IGMPv2.
5. Support of remote and local setup and management via Secure Shell Version 2 (SSHv2) and secure Web-based graphical user interface (GUI).
6. Support of the Simple Network Management Protocol (SNMP) version 2 and version 3. ~~Verify that the MFES can be accessed using a serial console port and a telecommunication network.~~
7. Support of Remote Authentication Dial-In User Service (RADIUS) or Terminal Access Controller Access-Control System Plus (TACACS+)
8. Support of remote monitoring (RMON) of the Ethernet agent and the ability to be upgraded to switch monitoring (SMON), if necessary.
9. Support of Secure Copy (SCP) or Secure File Transfer Protocol (SFTP) and either Network Time Protocol (NTP) or the Simple Network Time Protocol (SNTP). Ensure that the MFES supports port mirroring for troubleshooting purposes when combined with a network analyzer.
10. Data security compliant with the National Institute of Standards and Technology (NIST) requirements as defined in the Federal Information Processing Standard (FIPS) Publication (PUB)-197 and support for the Advanced Encryption Standard (e.g., AES-256).

SUBARTICLE 996-3.3.5 is deleted and the following substituted:

996-3.3.5 Management Capability: MHES shall support all Layer 2 management features and all Layer 3 features as defined by this Section. Devices must be capable of supporting the following Layer 2 and Layer 3 features ~~must include~~and minimum requirements simultaneously:

1. Port-based VLAN and VLAN tagging that meets or exceeds specifications as published in the IEEE 802.1Q standard and ~~has a minimum 4-kilobit VLAN address table~~supports at least 1024 VLANS (VID 1-4094).

2. A forwarding/filtering rate that is a minimum of 14,880 packets per second for 10 Mbit/s, 148,800 packets per second for 100 Mbit/s, and 1,488,000 packets per second for 1000 Mbit/s.

3. A ~~minimum 4 kilobit~~ MAC address table that supports at least 16,000 addresses.

4. Support of IGMPv2.

5. Support of remote and local setup and management via SSHv2 and secure Web-based GUI.

6. Support of SNMP version 2 and version 3.

7. Support of RADIUS or TACACS+.

8. Support of RMON of the Ethernet agent and the ability to be upgraded to SMON, if necessary.

9. Support of SCP or SFTP and either NTP or SNTP. Ensure that the MHES supports port mirroring for troubleshooting purposes when combined with a network analyzer.

10. Sampled Flow Network Monitoring export protocol capable of being turned on or off on individual Ethernet ports without affecting traffic.

11. OSPF routing protocol~~.~~ supporting at least 12000 IPv4 routes and 2000 IPv6 routes.

12. RIP v2.

13. Virtual Router Redundancy Protocol (VRRP).

14. Data security compliant with NIST FIPS PUB-197 (e.g., AES-256).

SUBARTICLE 996-3.5.2 is deleted and the following substituted:

996-3.5.2 Networking Standards: ~~The WCS shall be Wi-Fi certified and comply with IEEE 802.11 Wi-Fi standards.~~ The WCS shall comply with all applicable IEEE networking standards for Ethernet communications, including:

1. IEEE 802.1Q Standard for Local and Metropolitan Area Networks - Bridges and Bridged Networks used with port-based VLANs and RSTP.

2. IEEE 802.1p for QoS.

3. IEEE 802.3 standard for LAN and MAN access and physical layer specifications.

4. IEEE 802.3u supplement standard regarding 100 BASE-X.

5. IEEE 802.3x standard regarding flow control with full duplex operation.

6. IEEE 802.3z supplement standard regarding 1000 BASE-X.

SUBARTICLE 996-7.2 is deleted and the following substituted:

996-7.2 Uninterruptible Power Supply (UPS): The UPS shall be either a line interactive or online/double-conversion UPS. UPS assemblies shall be designed for installation in a roadside NEMA 3R enclosure to provide battery backup functionality for traffic control systems, including traffic signal and intelligent transportation system (ITS) devices. ~~UPS assemblies shall include batteries provided by the UPS manufacturer or in accordance with manufacturer's requirements.~~

Loss of utility power, transfer from utility power to battery power, and transfer back to utility power shall not interfere with normal operation of connected equipment. In the event of UPS failure or battery depletion, connected equipment shall be energized automatically upon restoration of utility power.

The UPS shall operate in hot standby mode with power transfer being accomplished in 40 milliseconds or less.

Removal and replacement of the UPS shall not disrupt the operation of the equipment being protected.

All harnesses necessary to connect and operate the system shall be included. All connectors shall be keyed to prevent improper connection.

996-7.2.1 Configuration and Management: The UPS shall support local and remote configuration and management, including access to all user-programmable features as well as alarm monitoring, event logging, and diagnostic utilities. The UPS shall support SNMPv2, SNMPv3, including configurable alarm and event trap notifications.

Configuration and management functions shall be password protected.

Alarm function monitoring shall include the following: loss of utility power, inverter failure, low battery, voltage, and temperature out of range. The UPS shall include an event log that indicates the date and time of the following events: AC high, AC low, AC frequency error, AC fail/blackout, and over temperature. The UPS event log shall be able to store a minimum of 60 events.

The UPS shall include a front panel display and controls that allows password-protected configuration of network settings and review of operational status without the need for another input device. The UPS shall have visual indications for Power-On, Mode of Operation (utility power or inverter), Battery Status, Alarm Status, Load Levels, and AC Output Voltage.

996-7.2.2 Communication Interfaces: The UPS shall include an Ethernet port (RJ45) for local control using a laptop PC and remote control via a network connection.

996-7.2.3 Batteries: Batteries must be provided by the UPS manufacturer or in accordance with manufacturer's recommendations. Batteries shall be sealed and require no maintenance, cause no corrosion, and be capable of maintaining 80% of original capacity and performance for a minimum of five years.

The UPS shall be supplied with a wiring harness for battery connections. The battery wiring harness shall allow 6 feet of separation between the UPS and its battery bank. Battery terminals shall include a protective covering to prevent accidental spark or shorting.

The UPS shall include battery management functions that includes monitoring of temperature, voltage, and amperage of charge and discharge; and temperature compensated automatic charging to maximize the life of the batteries.

996-7.2.4 Electrical Requirements:

Frequency shall be regulated to 60 Hz, plus or minus 0.5 Hz, while the UPS is supplying power. The UPS shall operate on 85 to 140 V_{AC} without requiring assistance from the batteries.

The UPS shall be listed to the requirements of UL 1778. Upstream back feed voltage from the UPS shall be less than 1 $V_{AC.}$

Double-conversion UPS shall be capable of simultaneously producing fully regenerated and regulated, conditioned, True Sine Wave power and hot standby AC output, and have a minimum operating efficiency of 90%.

996-7.2.4.1 UPS for ITS Cabinet: UPS assemblies used to provide backup power in an ITS cabinet shall provide a minimum of 350 watts (at 120 V_{AC}) of continuous backup power for a minimum of two hours.

996-7.2.4.2 UPS for Traffic Signal Controller Cabinet: UPS assemblies used to provide backup power in a traffic signal controller cabinet shall provide a minimum 400 watts (at 120 V_{AC}) of continuous power for a minimum of 6.5 hours.

996-7.2.5 Traffic Signal UPS Cabinet: Cabinets used to house traffic signal UPS assemblies shall be designed to be mounted to the side of a traffic cabinet or base mounted. Cabinets shall be currently listed on the APL or meet the requirements of Section 676. Cabinets shall include shelves and rack rails to house all UPS system components including the UPS, batteries, harnesses, switches, surge protective device, power terminal block and a generator hookup with transfer switch. The UPS cabinet shall allow a maintenance technician to safely insert power for traffic signal operation while the UPS or associated equipment is serviced or replaced.

A surge protective device shall be installed where the supply circuit enters the cabinet in accordance with Section 620-2.

The cabinet shall include a 20 A, 120 volt, 60 Hz GFCI receptacle. The receptacle shall be wired to utility power and not regulated by the UPS module. The cabinet shall include a main breaker and a breaker for the technician GFCI ~~outlet~~receptacle.

996-7.2.5.1 Transfer Switch and Generator Access Panel: The cabinet shall include an automatic transfer switch and generator access panel in accordance with Section 676. The generator access door shall not protrude more than 1 inch when closed.

996-7.2.6 Mechanical Requirements: All parts shall be made of corrosion-resistant materials such as plastic, stainless steel, anodized aluminum, brass, or gold-plated metal. All fasteners exposed to the elements shall be Type 304 or 316 passivated stainless steel.

996-7.2.7 Environmental Requirements: UPS assemblies, including batteries, shall provide continuous power with specified wattage and operate properly during and after being subjected to the environmental testing procedures described in NEMA TS 2, Sections 2.2.7, 2.2.8, and 2.2.9.

SUBARTICLE 996-7.3.1 is deleted and the following substituted:

996-7.3.1 Configuration and Management: Provide a RPMU that supports local and remote configuration and management, including access to all user-programmable features as well as alarm monitoring, event logging, and diagnostic utilities.

Configuration and management functions shall be password protected.

The RPMU shall include an event scheduler that can store a minimum of 60 events.

The RPMU shall include LED indicators for relay inputs and ~~outlet~~receptacle status.

Upon loss of communications the RPMU shall maintain each receptacle and relay in its currently stored state of operation.

Upon restoration of electrical power after an outage the RPMU shall automatically restore each receptacle and relay to its previously stored state of operation and all configurable parameters shall be retained.

The unit shall support SNMPv2, SNMPv3, including trap notifications of receptacle state changes.

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