



**Verizon NEBS™ Compliance: MDU ONT
Backup Battery Reserve Time Test Plan**
Verizon Technical Purchasing Requirements
VZ.TPR.9506
Issue 1, February 2008





CHANGE CONTROL RECORD:

Version	Date	Action*	Reason for Revision
1	2/21/08	New	
* New, Add, Delete, Change, Reissue			

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1.0 PURPOSE

This document provides an overview of the setup and testing to be performed at a Verizon approved Independent Test Lab (ITL) on an FTTP MDU ONT FMPS with rechargeable lead-acid battery. These tests are intended to validate the FMPS backup power source reserve time at the operating ambient temperature of 25°C.

2.0 SCOPE

This document defines the Verizon test requirements for FTTP MDU ONT FMPS. The tests contained herein shall be used by equipment suppliers and the Verizon-approved Independent Test Laboratory as the baseline of tests to create the NEBS test plan.

The test plan shall be completed by the vendor and returned to the Verizon SIT organization for final approval prior to conducting testing. While it is preferred that the ITL prepare the final reports, they can be prepared by the vendor, but the test lab must review and approve, with signature, the final report before submission to Verizon.

3.0 REFERENCES

None	
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4.0 ACRONYMS

AH	Ampere-Hour
EUT	Equipment Under Test
FMPS	FTTP Multi-Purpose Power Supply
FTTP	Fiber to the Premise
ITL	Independent Testing Laboratory
MDU ONT	Multi-Dwelling Unit Optical Network Terminal
OLT	Optical Line Terminal
PON	Passive Optical Network
SIT	Systems Integration and Testing
VRLA	Valve Regulated Lead-Acid



5.0 SYSTEM OVERVIEW

The FMPS shall be tested with new batteries that have not been previously used for any testing and have not been recharged since shipment from the battery vendor.

The system shall be configured with an MDU ONT running video, 15 Mbps data traffic in both upstream and downstream and with 50% of the available POTS lines terminated to simulate an “off-hook” condition. The MDU ONT shall be connected to the OLT PON and transferring data, video and voice traffic through the PON. Voice, data, and video service shall be monitored and recorded throughout the testing. The battery’s voltage, current and temperature shall be monitored and recorded as the battery discharges during the test.

The vendor shall provide details of the system under test and the monitoring test equipment for review and approval by Verizon SIT prior to testing.

6.0 TEST ENVIRONMENT

The MDU ONT and FMPS shall be placed inside of an environmental chamber, while the rest of the support equipment will be located outside the chamber. The chamber temperature shall be set to 25⁰C and the equipment shall be allowed to reach thermal equilibrium prior to beginning the test.

The FMPS battery string shall provide backup power to the MDU ONT after disconnecting the AC power from the FMPS. Once the AC power is disconnected, video, voice and data traffic shall be maintained for the times indicated in the test procedure section of this document. ONT functionality shall be monitored throughout. The test ends when the ONT issues a “Dying Gasp” alarm to the OLT.

The vendor shall provide details of the test bed environment and all diagrams/ drawings of the system under test with the specific architectural design. The vendor shall document hardware and software components used for the testing, the pass/ fail criteria for each element (voice, data, and video), and provide details about the monitoring systems used to validate conformance to these requirements.



7.0 TEST PROCEDURE

For this test, new batteries must be removed from its factory-sealed box and placed inside the FMPS. The power cable between the ONT and FMPS shall be the maximum length of fifty (50) feet. The testing shall be repeated for both one and two battery strings. Each string consists of 4, 7.2 AH VRLA batteries.

Set up the equipment as described in Section 5.0. The following parameters shall be monitored and recorded throughout the testing:

- Chamber temperature
- The VRLA battery surface temperature
- Charging voltage, per string
- Charging current, per string
- MDU ONT internal air temperature
- FMPS output voltage
- FMPS output current
- MDU ONT input voltage
- Alarms
- LED status indicator operation

Setup the FMPS and MDU ONT inside an environmental chamber. Setup video, data traffic and POTS service on the MDU ONT and set the chamber temperature to 25°C. Allow the batteries to charge for a 24 hour period.

Test Cycle I:

- Disconnect the AC power to the FMPS to discharge the batteries.
- Once the batteries have discharged and the temperature of the batteries have stabilized at 25°C, restore the AC power to the FMPS, which will restore the MDU ONT and begin recharging the batteries. Maintain the chamber temperature at 25°C throughout.
- Once the MDU ONT has rebooted, restart video and data traffic, and terminate 50% of the available POTS lines with 600-ohm terminators.
- Monitor the battery's charging current until the batteries are fully charged



Test Cycle II:

- While maintaining the chamber temperature at 25⁰C, disconnect the AC power to the FMPS.
- Verify that the video traffic functions for a minimum of **15 seconds** after disconnecting the AC power.
- Verify that the data traffic functions for a minimum of **15 minutes** after disconnecting the AC power.
- **2 hours** into the test, remove 50% of the “off-hook” POTS line termination and leave the other 50% of the POTS lines terminated. This will represent 25% of the total available POTS lines for the EUT in an “off-hook” condition. Continue the test until the batteries are depleted and the ONT issues a “Dying Gasp” alarm to the OLT.
 - Measure and Record the total MDU ONT battery back up power reserve time.

Test Cycle III:

- With batteries recharged, repeat Test Cycle I and Test Cycle II with all available POTS lines “on-hook” for a one string (4 batteries) and a two string (8 batteries) arrangement.
- Video and data shall still be disconnected per the default power down sequences at 15 seconds and 15 minutes respectively as defined above.
- All POTS lines shall remain “on-hook” until the battery is depleted and the ONT issues a “Dying Gasp” alarm to the OLT.
 - Record the power draw of the MDU ONT while all POTS lines are ON hook and the video and data are disabled.
 - Measure and Record the total MDU ONT battery back up power reserve time.