

**STATE OF NEW YORK DEPARTMENT OF PUBLIC SERVICE  
THREE EMPIRE STATE PLAZA, ALBANY, NY 12223-1350**

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September 16, 2008

Mr. Mark W. Earley  
Chief Electrical Engineer  
National Fire Protection Association  
1 Batterymarch Park  
Quincy, MA 02169-7471

Dear Mr. Earley,

The staff of the Department of Public Service is considering the grounding and bonding matters presented by Verizon New York Inc.'s (Verizon's) fiber-to-the premises service, offered under the brand name FiOS. We carefully reviewed the National Electrical Code and received an opinion from Underwriter's Laboratories (attached) advising that an interpretation from the National Fire Protection Association be sought:

We would recommend that you seek either an opinion from an NFPA staff member or a formal interpretation from the NEC technical committee responsible for Chapter 8 regarding the relevance of Chapter 8 grounding methods to the installation in question. (Letter from Donald Talka, September 9, 2008)

The Department of Public Service requests the National Fire Protection Association (NFPA) provide an opinion or interpretation regarding the following questions, and provide to the Department a written analysis of its findings:

1. Do the provisions of the National Electrical Code, in particular Articles 770, 800, and 820, apply to grounding and bonding of a fiber-to-the-premises system, specifically where the Optical Network Terminal (ONT) is installed inside a building and where the attached telecommunications or coaxial cables, television receiving equipment, and other devices that may be expected to be attached in such a system are also wholly within building and have no external appearance?
2. Is there an exception to the requirement of 820.100 (Cable Grounding, i.e., "The shield of the coaxial cable shall be grounded as specified in 820.100 (A) through (D).") such that it would not apply in a situation where the ONT is installed inside a building and the attached telecommunications or coaxial cables, television receiving equipment, and other devices that may be expected to be attached in such a system are also wholly within a building and have no external appearance?

3. In addition, if the answer above is those grounding provisions of those articles apply, does the National Electrical Code (NEC) allow a difference in the methods of grounding and bonding of the fiber-to-the-premises system for single family unit as opposed to a multiple dwelling unit, where the term "multiple dwelling unit" is defined as a dwelling containing more than one or two families (i.e., a three family and above dwelling, an apartment, or commercial building)?

Given the public safety responsibilities of the Department and the important business interests of Verizon, we request a quick assessment of the situation. This evaluation is to be conducted on behalf of the Department acting in its role as the authority having jurisdiction, and it is our objective to complete this review as soon as possible, but ideally by no later than September 25, 2008.

Please provide a response to this request as soon as possible detailing NFPA's willingness and ability to perform the evaluation within the constraints described above.

Sincerely,



Chad Hume  
Acting Director  
Office of Telecommunications

Attachment



the standard in safety

Underwriters  
Laboratories

Melville - September 9, 2008

State of New York Department of Public Service  
Mr. Peter McGowan  
Three Empire State Plaza  
Albany, NY 12223-1350

Re: Your request of August 21, 2008 to review Verizon M&P for FiOS Single Family Unit (SFU) ONT Grounding Practices

Dear Mr. McGowan:

This is in response to your letter dated August 21, 2008 requesting Underwriters Laboratories Inc. to review the Method and Procedure for Verizon FiOS Single Family Unit (SFU) Optical Network Terminal (ONT) Grounding Practices, Verizon Document No. 2006-00837-MDP, Issue D, Revised 9/5/2007.

During a telephone conversation with Dennis Taratus and Chad Hume of your office on September 2, 2008, I discussed the concerns of Department of Public Service, specifically dealing with the installation of the SFU ONT in such a manner so that the grounding lug of the ONT is not directly bonded to the grounding electrode system in accordance with the grounding methods described in Chapter 8 of the National Electrical Code (NEC). A letter of September 5, 2008 from Chad Hume provided additional clarification of your request of August 21, 2008.

The alternative grounding practice suggested by Verizon is found on page 7 of the Verizon M&P, with a description of the ground path verification test found on page 11, and diagrams of the installation found on pages 14 and 15. In short, in cases where conductive members of the optical fiber cable are terminated external to the dwelling via appropriate grounding electrodes, and only non conductive optical fiber cable members enter the dwelling, it is Verizon's opinion that the ground lug of the ONT need not be bonded directly to the grounding electrode system in accordance with the grounding methods described in Chapter 8 of the NEC.

Only the Authority Having Jurisdiction can make the determination of the appropriate installation requirements contained in the National Electrical Code (NEC) and make the interpretation as to whether the installation under consideration is in accordance with those installation requirements. Underwriters Laboratories Inc. can provide input based upon its experiences and expertise with the equipment involved and the NEC, however this input cannot and should not be considered as final judgment.

Discussion:

No single Article of the NEC directly or completely addresses the installation in question. The primary issue at hand is whether Chapter 8 of the National Electrical Code (NEC) deals with the Verizon installations in question. The Articles contained within Chapter 8 very specifically describe the methods how the grounding conductors of the various communication systems covered by Chapter 8 must be connected to the grounding electrode system. The use of a grounding conductor contained within the power supply cord of the ONT or the use of a Signal Grounding Module installed into a general-use receptacle, provided with a #10AWG bonding jumper connected between the Signal Grounding Module and the ONT ground lug do not satisfy the requirements of Chapter 8 dealing with the bonding of the grounding conductor to the grounding electrode system. Neither of these methods can be deemed equivalent to those contained in Chapter 8.

The installation in question does not have any conductive members of the communication system entering the dwelling from the outside. The only member that enters the dwelling from the outside is the non-conductive optical fiber cable. The requirements for bonding the grounding conductor to the grounding electrode system appear to address hazards originating external to the dwelling such as lightning and induced transient conditions that would enter the dwelling via conductive elements. The interpretation as to whether the grounding conductor bonding requirements must be applied can only be answered by NFPA, the publishers of the NEC. We would recommend that you seek either an opinion from an NFPA staff member or a formal interpretation from the NEC technical committee responsible for Chapter 8 regarding the relevance of Chapter 8 grounding methods to the installation in question.

In addition to the above, it should be pointed out that Article 770, specifically section 770.100 deals with the grounding of optical fiber cable entering a building. Section 770.100 states "Where grounded, the non-current carrying metallic members of optical fiber cables entering a building shall be grounded as specified in 770.100(A) through (D)." Sections 770.100(A) through (D) effectively duplicate the grounding requirements contained in Chapter 8. Section 770.93 permits the interruption of a metallic member via an insulating joint, but is unclear in this article and the articles of Chapter 8 as to what the grounding requirements are for circuits or metal parts beyond the insulating joint.

If it is interpreted, that even though conductive members of the communication system do not originate external to the dwelling, that the grounding conductor of the ONT must be bonded to the grounding electrode system as per Sections 770.100, 800.100, 820.100 or 830.100, it is our opinion that the use of the grounding pin of a general-use receptacle does not satisfy the requirement of the above mentioned sections.

If on the other hand, it is interpreted that the grounding conductor of the ONT need not be bonded to the grounding electrode system we are of the opinion that the ONT and the derived coaxial system should still be properly grounded. In this case it is our opinion that if the coaxial cable system is installed and segregated in accordance with appropriate Articles of the NEC and all equipment connected to the coaxial system is properly certified for safety, that the use of the equipment-grounding conductor of a properly wired general-use receptacle will be acceptable to ground the ONT and its related coaxial cable. Of the two methods described in the Verizon M&P; power supply cord of the ONT, or the use of a Signal Grounding Module with #10 AWG copper wire, it is our opinion that the use of the Signal Grounding Module is more reliable. We state this for the following reasons:

- A. The Signal Grounding Module provides an indication that the receptacle is correctly wired and is provided with a reliable grounding connection.
- B. The Signal Grounding Module is provided with a means to affix it onto the receptacle. This will minimize the possibility of the SGM being removed or disturbed.
- C. Should the power supply to the ONT be disconnected for any reason the equipment connected to the ONT will still be grounded.
- D. Since the only function of the Signal Ground Module is to provide a reliable ground connection, there is greater likelihood that the receptacle ground will be verified as being properly wired to provide a low impedance path to the grounding electrode system of the facility.

As previously stated above, any formal interpretation or opinions concerning the application of Articles 770 and 800 through 830 of the NEC as they might apply to the Verizon installations can only be made by those having responsibility for the NEC.

Should you have any additional questions please contact me.

Very truly yours,



Donald J. Talka  
Senior Vice President and Chief Engineer