

**Before the
Federal Communications Commission
Washington, D.C. 20554**

In the Matter of)	
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Reliability and Continuity of Communications Networks, Including Broadband Technologies)	PS Docket No. 11-60
)	
Effects on Broadband Communications Networks of Damage or Failure of Network Equipment or Severe Overload)	PS Docket No. 10-92
)	
Independent Panel Reviewing the Impact of Hurricane Katrina on Communications Networks)	EB Docket No. 06-119
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To the Commission:

Additional Comments from Nickolaus E. Leggett

My third set of comments in this docket address some of the resources available for the development of regulations for the protection of communications from electromagnetic pulse (EMP) and intense solar storms.

My background is listed below in Appendix A.

Standards Developed by the International Electrotechnical Commission

Dr. William A. Radasky (Ph.D., P.E.) has pointed out the extensive standards developed by the International Electrotechnical Commission (IEC) in the area of high-altitude electromagnetic pulse (HEMP) and related sources of damage to civilian communications equipment (Reference 1).

The IEC Subcommittee 77C has been developing standards for protecting

commercial buildings and their equipment from HEMP for over 15 years (Reference 2). To date, they have published a set of standards that can be obtained from the IEC. Refer to Appendix B of this document for a list of these standards.

Obviously, these standards represent a precious resource that the Commission can use to develop its own policies and regulations in relation to EMP and intense solar storms. The existence of these standards also is proof of the view that EMP and solar storms are serious issues that must be dealt with.

In addition, Dr. Radasky has discussed the threat of intentional electromagnetic interference (IEMI). This is a relatively short-range system where a radio frequency (RF) source such as a radar set is used to induce interference into a building (Reference 3). The Commission should consider this threat as well as the EMP and solar storm threats. My comments are primarily focused on the long-range wide-area threats involved in EMP and solar storms. However, IEMI is of interest because it could be carried out by low-budget terrorist groups or domestic insurgents.

Dr. Radasky also pointed out the International Telecommunications Union (ITU) telecommunication standardization sector standards:

- Series K: Protection Against Interference – High Altitude Electromagnetic Pulse Immunity Guide for Telecommunications Centres (Recommendation ITU-T K.78)
- Series K: Protection Against Interference – High-Power Electromagnetic Immunity Guide for Telecommunication Systems (Recommendation ITU-T K.81)

Scope of the Standards

Much of this standards engineering work has focused on the protection of communications equipment installed within a building. In this work the shielding provided by the building itself (with enhancements) is considered as well as any shielding of the equipment itself.

This scope makes a lot of sense for a commercial telecommunications organization. However, the Commission may need to consider a much wider scope of protections. For example, the Commission will need to consider protective steps for consumer communications devices including the simple telephone. Having a HEMP pulse disable most of the telephones in the country would reduce the value of having some telecommunications central offices still functional. Similarly, HEMP can also disable large numbers of computers connected to the Internet. Also, the Commission needs to look at protecting network equipment that is not contained within shielded buildings. In addition, the vulnerability of broadcast stations, broadcast receivers, public service radios, and radio navigation systems needs to be considered. Clearly, the Commission needs to deal with very broad EMP and solar storm issues.

Mandatory vs. Voluntary

Fine standards are useful, but they depend on organizations voluntarily adopting them into actual practice. In contrast, mandatory regulations can obtain protections over a vast number of devices that are essential for the operation of the American communications and economic infrastructure. I personally do not think that we can depend on voluntary standards alone. We will need to force the marketplace to offer useful protection against EMP and intense solar storms. The intense social cost of not

providing this protection will motivate this movement to mandatory regulations.

Requested Action

The Commission should issue a public notice of how it intends to address the issues of EMP attacks and solar storm events. If the Commission intends to have a separate Notice of Inquiry (NOI), then it should say so within the current docket so that parties can keep their comments on these subjects until that new NOI appears. If the Commission is going to include EMP attacks and solar storms in this docket (11-60), then it should issue a list of questions for the public on these issues.

Respectfully submitted,

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May 25, 2011

References

Reference 1. Personal communication, May 2011. Note: Dr. Radasky is an IEEE Fellow and a recipient of the Lord Kelvin Medal. He is Chairman of the IEC Subcommittee 77C.

Reference 2 Dr. William A. Radasky, “Protection of Commercial Installations from the ‘Triple Threat’ of HEMP, IEMI, and Severe Geomagnetic Storms”, Interference Technology EMC Directory, April 2009. (Preprint) page 5.

Reference 3 Ibid. page 2

Appendix A Mr. Leggett's Background

I am a certified electronics technician (ISCET and iNARTE) and an Extra Class amateur radio operator (call sign N3NL). I hold an FCC General Radiotelephone Operator License with a Ship Radar Endorsement. I am an inventor holding three U.S. Patents. My latest patent is a wireless bus for digital devices and computers (U.S. Patent # 6,771,935). I have a Master of Arts degree in Political Science from the Johns Hopkins University.

I am one of the original petitioners for the establishment of the Low Power FM (LPFM) radio broadcasting service (RM-9208 July 7, 1997 subsequently included in MM Docket 99-25). I am also one of the petitioners in the docket to establish a low power radio service on the AM broadcast band (RM-11287).

Appendix B

**Prepared by Dr. William Radasky, Ph.D.
4 July 2010**

Publications Dealing with the Protection of Civil Equipment and Systems from the Effects of HEMP and HPEM – Issued by the International Electrotechnical Commission (IEC) SC 77C

IEC/TR 61000-1-3 Ed. 1.0 (2002-06) : Electromagnetic compatibility (EMC) - Part 1-3: General - The effects of high-altitude EMP (HEMP) on civil equipment and systems. **Basic EMC publication**

IEC/TR 61000-1-5 Ed. 1.0 (2004-11) : Electromagnetic compatibility (EMC) – Part 1-5 : High power electromagnetic (HPEM) effects on civil systems. **Basic EMC publication**

IEC 61000-2-9 Ed. 1.0 (1996-02) : Electromagnetic compatibility (EMC) - Part 2: Environment - Section 9: Description of HEMP environment - Radiated disturbance. **Basic EMC publication**

IEC 61000-2-10 Ed. 1.0 (1998-11) : Electromagnetic compatibility (EMC) – Part 2-10 :Description of HEMP environment – Conducted disturbance. **Basic EMC publication**

IEC 61000-2-11 Ed. 1.0 (1999-10) : Electromagnetic compatibility (EMC) - Part 2-11: Environment - Classification of HEMP environments. **Basic EMC publication**

IEC 61000-2-13 Ed. 1.0 (2005-03) : Electromagnetic compatibility (EMC) – Part 2-13 : High-power electromagnetic (HPEM) environments - Radiated and conducted. **Basic EMC publication**

IEC 61000-4-23 Ed. 1.0 (2000-10) : Electromagnetic compatibility (EMC) - Part 4-23: Testing and measurement techniques - Test methods for protective devices for HEMP and other radiated disturbances. **Basic EMC publication**

IEC 61000-4-24 Ed. 1.0 (1997-02) : Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 24: Test methods for protective devices for HEMP conducted disturbance. **Basic EMC Publication**

IEC 61000-4-25 Ed. 1.0 (2001-11) : Electromagnetic compatibility (EMC) - Part 4-25: Testing and measurement techniques - HEMP immunity test methods for equipment and systems. **Basic EMC publication**

IEC/TR 61000-4-32 Ed. 1.0 (2002-10) : Electromagnetic compatibility (EMC) - Part 4-32: Testing and measurement techniques – HEMP simulator compendium. **Basic EMC publication**

IEC 61000-4-33 Ed. 1.0 (2005-09) : Electromagnetic compatibility (EMC) - Part 4-33: Testing and measurement techniques – Measurement methods for high power transient parameters. **Basic EMC publication**

IEC/TR 61000-4-35 Ed. 1.0 (2009-07): Electromagnetic compatibility (EMC) - Part 4-35: Testing and measurement techniques – High power electromagnetic (HPEM) simulator compendium. **Basic EMC publication**

IEC/TR 61000-5-3 Ed. 1.0 (1999-07) : Electromagnetic compatibility (EMC) - Part 5-3: Installation and mitigation guidelines - HEMP protection concepts. **Basic EMC publication**

IEC/TS 61000-5-4 Ed. 1.0 (1996-08) : Electromagnetic compatibility (EMC) - Part 5: Installation and mitigation guidelines - Section 4: Immunity to HEMP - Specification for protective devices against HEMP radiated disturbance. **Basic EMC Publication**

IEC 61000-5-5 Ed. 1.0 (1996-02) : Electromagnetic compatibility (EMC) - Part 5:

Installation and mitigation guidelines - Section 5: Specification of protective devices for HEMP conducted disturbance. **Basic EMC Publication**

IEC/TR 61000-5-6 Ed. 1.0 (2002-06) : Electromagnetic compatibility (EMC) - Part 5-6: Installation and mitigation guidelines - Mitigation of external EM influences. **Basic EMC publication**

IEC 61000-5-7 Ed. 1.0 (2001-01) : Electromagnetic compatibility (EMC) - Part 5-7: Installation and mitigation guidelines - Degrees of protection by enclosures against electromagnetic disturbances (EM code). **Basic EMC publication**

IEC/TS 61000-5-8 Ed. 1.0 (2009-08): Electromagnetic compatibility (EMC) - Part 5-8: Installation and mitigation guidelines –HEMP protection methods for the distributed infrastructure. **Basic EMC publication**

IEC/TS 61000-5-9 Ed. 1.0 (2009-07): Electromagnetic compatibility (EMC) - Part 5-9: Installation and mitigation guidelines – System-level susceptibility assessments for HEMP and HPEM. **Basic EMC publication**

IEC 61000-6-6 Ed. 1.0 (2003-04) : Electromagnetic compatibility (EMC) - Part 6-6: Generic standards - HEMP immunity for indoor equipment. **Basic EMC publication**