

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

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

**To the Commission:**

**Comments from Nickolaus E. Leggett**

I am a bit surprised that there are no questions or discussion of the impacts of electromagnetic pulse (EMP) attacks and intense solar storm phenomenon on the survival of broadband and other communications networks.

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).

**After the Federal Government Shutdown**

After the Federal Government shutdown, I will submit additional comments demonstrating the importance of EMP and solar storm events to the reliability and survivability of communications networks. These subjects must be considered for the safety of the citizens of the United States.

In addition, the reader can refer to Appendix A below for some of the previous discussion of these factors.

**Respectfully submitted,**

**Nickolaus E. Leggett  
1432 Northgate Square, #2A  
Reston, VA 20190-3748  
(703) 709-0752**

**April 8, 2011**

**Note 1**

The text of the Congressional **Commission to Assess the Threat to the United States from Electromagnetic Pulse (EMP) Attack** is available at the web site:

[www.empcommission.org](http://www.empcommission.org)

This document confirms the serious impact of an EMP attack on the infrastructure of the United States.

**Note 2**

**Severe Space Weather Events – Understanding Societal and Economic Impacts  
A Workshop Report  
National Academy of Sciences  
National Academies Press**

Publication Year 2008

PAPERBACK

ISBN-10:0-309-12769-6

ISBN-13:978-0-309-12769-1

This document can be accessed online at the URL:

[http://www.nap.edu/catalog.php?record\\_id=12507](http://www.nap.edu/catalog.php?record_id=12507)

### Note 3

H. Robert Schroeder, “**Electromagnetic Pulse and Its Implications for EmComm**”, QST magazine, November 2009, pages 38 through 41. [The term EmComm refers to emergency communication.]

### Note 4

Petitions to the Commission by Donald J. Schellhardt and Nickolaus E. Leggett

Docket RM-5528, **Request to Consider Requirements for Shielding and Bypassing Civilian Communications Systems from Electromagnetic Pulse (EMP) Effects.**

Docket RM-10330, **Amendment of the Commission's Rules to Shield Electronics Equipment Against Acts of War Or Terrorism Involving Hostile Use of Electromagnetic Pulse (EMP).**

### Note 5

Daniel N. Baker and James L. Green, “**The Perfect Solar Superstorm**”, Sky & Telescope, February 2011, Vol. 121 No. 2, Pages 28 – 34

## **Appendix A - Previous Discussion of Electromagnetic Pulse and Solar Storm Events**

An EMP attack consists of the detonation of a nuclear weapon at an altitude of a couple of hundred miles above the United States. This weapon can be enclosed in an orbiting satellite or delivered by a suborbital rocket. The radiation from the nuclear explosion interacts with the Earth’s atmosphere to generate an intense pulse of radio waves that can disable and destroy electronic communications and other electronic equipment over a wide area of the Nation. This threat is discussed in the report of the

Congressional Commission on EMP. (Note 1)

A related, but not identical situation can occur due to the stream of charged particles radiated by an intense solar flare. This natural event can induce damaging currents into communications and electric power grids. Also, such an event can disable communications satellites through the phenomenon of System Generated Electromagnetic Pulse (SGEMP). The impact of the intense solar flare phenomenon is discussed by a National Academy of Sciences panel. (Note 2)

### **Electromagnetic Consequences**

Both EMP attacks and intense solar storms can disable electronic communications and other electronic systems over wide areas of the United States. This is a situation where numerous network nodes are disabled at the same time. In these situations, the Commission's statement "Broadband core networks are generally presumed to be quite survivable" (Paragraph 7 Page 2 of the NOI in Docket 10-92) is completely incorrect.

The impact of EMP attacks and solar storms is so broad, simultaneous, and comprehensive that it would take a long time to restore service to the Nation. During this long period of time much of our modern communications would not be available and it could be difficult to maintain basic civil order. This situation goes beyond the dual failures considered in Paragraph 10 Page 4 (Docket 10-92) to the simultaneous failure of thousands of network nodes and endpoint equipment at the same moment. Thus the Commission's question "Besides single points of failure, are there dual failures that could impact a large number of users for an extended period of time?" is answered. Yes, you can have most of your network equipment failing at the same moment. This equipment will be down for a long period of time.

### **Protecting Electronic Equipment**

The field strengths involved in such events can be strong. In the case of EMP, the electric field strength can be on the order of 50,000 Volts per meter. Communications equipment can be protected against EMP by enclosing the equipment in conductive shielding and by using very high-speed bypassing components to deflect the incoming EMP pulse to the ground. (Note 3)

### **Previous Commission Actions**

In the past, Donald Schellhardt and I petitioned the FCC to obtain a docket on EMP threats and protections (Dockets RM-5528 and RM-10330. Refer to Note 4). The Commission did not act favorably on these petitions.

### **Commission Responsibility for Protecting Against these Threats**

The Commission shares responsibility for protecting American communications from extensive failure due to these threats. The Commission shares this responsibility with the Department of Defense and the Department of Homeland Security.

However, the Commission is not relieved of its responsibility merely because the responsibility is shared with other governmental organizations. In the past, the Commission avoided taking any responsibility when Mr. Schellhardt and I raised the issue in formal proceedings.

I suspect that if an EMP attack or an intense solar storm does occur, the surviving provisional government will judge the Commission quite harshly for any failure to act proactively to mitigate electromagnetic threats to network integrity.

### **Ethical Responsibility**

We all have the responsibility to help protect our fellow citizens from injury and

death arising from the failure of the Nation's communications and electronics infrastructure. If an EMP attack or an intense solar flare occurs numerous citizens could die or be injured by the failure of the infrastructure followed by lawless gang activity continuing after the failure. I have addressed my responsibility by working the issue of electromagnetic pulse protection for over 25 years. Despite my efforts, I have not been able to get constructive official governmental action on this subject. Now it is the Commission's turn to stand up and take reasonable proactive steps to protect America from these electromagnetic threats.

### **Recommended Actions**

As some of the industry comments in RM-10330 pointed out, protecting against electromagnetic pulse (and by implication solar storms) is an expensive and complex process. Thus the Commission should be sure to take a careful fact-based approach to protection.

The Commission should take the first step of issuing a Notice of Inquiry requesting specific engineering approaches and designs for practical protections. This NOI should also request specific draft language for regulations. Comments from the general public, governmental organizations, and EMP experts should be requested. This subject should not be left to just a few citizens trying to activate a generally lethargic governmental establishment.

In addition, the Commission should cooperate with the Department of Defense, Department of Homeland Security, Department of Transportation, National Academy of Sciences, the IEEE, and amateur radio organizations to consider initial designs for civilian equipment resistant to EMP and solar storm effects. This effort can benefit from

the large technical literature on EMP and the expertise already available within our military and contractor communities.

Most importantly, the Commission can publicize the subject of EMP and solar storm protection and engage in dialog with the Congress about possible steps to provide protections for America's basic electronic infrastructure.

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