



**IEEE TC 5: High Power Electromagnetics (HPEM) Technical Committee Meeting
Reno Virtual Meeting by WEBEX
Monday, 3 August 2020 (1:00 – 2:30 p.m. Central U.S. Time)**

Approved Minutes

1) Opening of the meeting and approval of the agenda – Bill Radasky, Chairman

Chairman Dr. William (Bill) Radasky brought the virtual meeting to order at 1:00 p.m. Central U.S. Time. Both the Chairman, Bill Radasky, and the Vice Chairman, Mike McNerney were present. The Secretary, Pina Dall' Armi-Stoks, was not present due to the time difference in Australia. Radasky welcomed the attendees, reviewed the agenda and asked for suggested changes; none were offered. Radasky made a motion to approve the agenda. Motion Seconded and Carried (MSC).

2) Review and approval of minutes of previous TC 5 meeting – Bill Radasky, Chairman

The unconfirmed minutes from the TC 5 meeting in New Orleans on 24 July 2019 were reviewed and approved without any changes.

3) TC 5 membership list update – All

The TC 5 membership list over the past 5 years was reviewed. Mike McNerney was able to make a screen shot of the online attendees for this WEBEX meeting; there were 29 attendees. There were a few new members, so the 5-year membership list will be updated. We do not publish the detailed 5-year list on the website or in the minutes, as there may be private information contained in it. Only the officers' and subcommittee chairs' email addresses are revealed on the website, and this procedure has been approved by the IEEE according to the new European privacy law.

The existing attendance list was shown at the meeting, and new members will be added to the 5-year list.

4) Report on the paper review process for Reno – Bill Radasky

Radasky reviewed the paper review process for Reno virtual and also the tutorials and special sessions presented virtually. There were 25 regular and special session papers submitted; 22 were accepted. We ended up with 3 technical sessions and 1 special session. The review process ran well, and the problems with the review system of the past were not

repeated as the TAC made an effort to improve the review schedule, which had been the main problem. It is noted that other TCs and the TAC had recommended that a new paper review system be used in the future, and we hope it will not introduce new problems.

There was a special session on EM Information Leakage titled, “Measurement Methods for Electromagnetic Information Security,” organized by Hayashi, and one tutorial on “Lightning Phenomenology and Engineering Models” organized by Rubinstein and Rachidi.

5) **Report from the Lightning Subcommittee – Farhad Rachidi and Marcos Rubinstein**

A comprehensive report was presented covering lightning conferences and other activities planned, held and/or cancelled for 2020 and those planned for 2021 (9 separate events). Three lightning working groups are actively working in CIGRE Study Committee C4 and a working group in the IEEE PES is also active. As for 2021, the lightning subcommittee plans to organize a lightning session at the planned EUROEM/ASIAEM Symposium in Abu Dhabi in late 2021, and will support both the Raleigh and Glasgow IEEE EMC Symposia through encouraging technical papers to be submitted. Since this IEEE EMC symposium was held virtually this year, we have decided to attach the charts presented at this WEBEX TC 5 meeting to these minutes. This is Attachment 1.

6) **Report from the EM Information Leakage Subcommittee – Yuichi Hayashi**

Yuichi Hayashi provided his report beginning with an overview of the special sessions he organized for 2020. He first organized a special session for APEMC in Sydney, Australia, with 6 papers. Unfortunately that conference was cancelled, but he was able to have two of the papers “transferred” to a special session at the virtual IEEE EMC Symposium in Reno. The result was a special session titled, “Measurement methods for electromagnetic information security” with a total of 6 papers. The special session was presented virtually on 18 August. He also provided an overview of conference activities in the field with a map indicating dates since 2009 for topics in the field. He has proposed a special session for APEMC 2021 in Bali in May 2021 dealing with “Hardware Security Related to EMC in Next Generation Information Systems.” Given that there was a special session at this IEEE EMC Symposium, there are no plans for EM Information Security activities at the IEEE EMC symposia in 2021. His report is Attachment 2.

7) **Report from the IEMI Subcommittee – Frank Sabath**

Unfortunately no report was submitted in time for the meeting for the second year in a row. The TC 5 management has decided to reorganize the IEMI subcommittee to include both HEMP and IEMI, with Mike McInerney as the Subcommittee Chair. Sabath will provide inputs to McInerney for IEMI, and Radasky will provide inputs to McInerney on the topic of HEMP for future TC 5 meetings. It is possible that there will be either a special session or a tutorial organized for Glasgow in 2021.

8) **Report from ESD Subcommittee – Joost Willemen and Misha Khazhinsky**

Joost Willems presented the report from the ESD subcommittee. There was a very good number of ESD related papers submitted to this Reno symposium, and a full session of 6 accepted papers was presented. The title of the session was “ESD: Touchscreens, Software and Protection.” The coordination between the IEEE EMC Society and ESDA has continued and an EMC session, five tutorials, and an expert EMC panel was organized at the 2020 EOS/ESD Symposium which was “broadcast” on 16-17 September 2020. There is also a plan in 2021 to continue a paper exchange program between the IEEE EMC Society and the EOS/ESD symposium. This report can be found as Attachment 3.

9) **Coordination with SC-1, Smart Grid – Bill Radasky**

Radasky introduced the activities of Special Committee 1 (Smart Grid), which is a coordinating committee, and he indicated that the SC 1 meeting was to be held virtually on 21 August. Radasky commented that TC 5 is keeping track of any issues involving Smart Grid, and both the Chair and the Vice Chair of TC 5 have been attending the SC 1 meetings for many years. Radasky mentioned that part of the Smart Grid work in the U.S. is actively considering HEMP and IEMI as special environments to be considered for the future, as there is concern that the planned high-speed communications systems for the power grid may actually increase the vulnerability of the grid to high power EM transients in the future.

10) **TC 5 web page – Mike McInerney, Vice Chairman**

McInerney reviewed the changes to the IEEE EMC website update procedures. A new procedure has been provided where each set of technical committee officers can make website updates for their committees. This will be our plan for the future. Send any comments on the web page to McInerney and Radasky.

11) **Review of HPEM activities since last TC 5 meeting in New Orleans – Bill Radasky**

Radasky indicated that 2020 was another active year for HPEM in the U.S. and especially for the topic of HEMP. The President of the United States published an executive order requiring the U.S. Federal Government to support the protection of the U.S. critical infrastructures from the effects of HEMP. This is having some impact on commercial organizations (power companies and data center operators) that consider that they should support this effort. It is noted that in this conference there were three papers dealing with the hardening of power substation electronics from HEMP, and one of the papers was nominated for best conference paper. The U.S. Executive Order is found in Attachment 4.

12) **TC 5 Tutorials/Special Sessions at EMC Symposia 2021, Raleigh and Glasgow**

Recommendations for tutorials and special sessions were solicited from the subcommittee officers present at the WEBEX, and they indicated that they will consider some activities in 2021. 2021 is a complicated year in that two conferences are planned (Raleigh in May and Glasgow in July-August). In addition, there is the question of whether the Raleigh conference will be in-person or virtual, and unfortunately the due date of conference

submittals for special sessions and tutorials for Raleigh is very early. It was recommended that due to the fact that most of the activity in TC 5 is outside of the U.S. that priority be given to Glasgow for special sessions and tutorials. The Chairman will follow up with the Subcommittee Chairs to determine the final plan for 2021.

13) **Update on aircraft lightning direct strike standardization - All**

After many years of discussion concerning the need for a new IEEE standard dealing with the effects on electronics when an aircraft is struck by lightning, a new PAR 28.38 has been submitted. It is titled, "Aircraft Component Lightning Strike Direct Effects Qualification." Fred Heather asked for the support of TC 5 in this work, and we recommend to our members that they join this standards committee, if they have interest in the subject. This PAR is attached as Attachment 5.

A separate discussion was held concerning the published IEEE Standard 1642-2015, "IEEE Recommended Practice for Protecting Publicly Accessible Computer Systems from Intentional Electromagnetic Interference (IEMI)." The IEEE EMC Society Standards Committee is looking to determine if existing standards need updating. While it was not clear that a great deal of new information was available (and there were no strong recommendations to update the standard from the attendees), it is possible that the standard could be updated by including more recent publications in the standard's bibliography. Radasky will discuss this with Ed Hare over the coming months to see if something formal needs to be done.

14) **Any other business - All**

Nicolas Mora mentioned that a webinar on Directed Energy was planned for the November/December time frame, and he indicated that information on this webinar would be forthcoming.

15) **Adjournment**

The WEBEX meeting was adjourned at 2:30 p.m. U.S. Central Time.

TC-5 Meeting, Wednesday, Aug 3 2020, Virtual

Report on Lightning Activities 2021/2020

F. Rachidi

M. Rubinstein

Main Events with Lightning Related Content in 2020

- ILDC/ILMC, Broomfield, Colorado, USA (Cancelled)
- APEMC, Sidney, Australia (Cancelled)
- GROUND & LPE conference (Postponed to June 2 to 5, 2021, Belo Horizonte, Brazil)
- IEEE EMC & SIPI, Reno, Nevada, USA (To be held online, Aug 3-28)
- EUROEM, Hamburg, Germany (To be held in 2021 as AEUROEM/ASIAEM in Abu Dhabi)
- URSI GASS, Rome, Italy (Postponed to 2021)
- EMC Europe, Rome, Italy (To be held virtually September 23-25)
- ICLP, Colombo, Sri Lanka (Postponed to 2021. To be held as ICLP/SIPDA in Colombo)

Main Events with Lightning Related Content in 2021

- AMS Annual meeting, New Orleans, Jan 10-14
- IEEE EMC & SIPI, Raleigh, NC, Apr 30- May 6
- APEMC & EMC 25-28 May, Bali, Indonesia
- GROUND & LPE conference, Jun 2 to 5, 2021, Belo Horizonte, Brazil)
- ICLP/SIPDA, Colombo
- International Symposium on EMC and EMC Europe, Glasgow, Scotland, Jul 30 – Aug 6
- EUROEM/ASIAEM, Abu Dhabi
- URSI GASS, Rome, Italy
- AGU Fall Meeting Dec 13-17, New Orleans

Approved CIGRE Working Groups on Lightning (2019 and 2020)

- ◆ WG C4.59, “Real-time Lightning Protection of the Electricity Supply Systems of the Future”, Chair: Chong Tong
- ◆ JWG B2_C4.76, “Lightning & Grounding Considerations for Overhead Line Rebuilding and Refurbishing Projects, AC and DC”, Chair: Bill Chisholm
- ◆ WG C4.57, “Guidelines for the Estimation of Overhead Distribution Line Lightning Performance and its Application to Lightning Protection Design”, Chair: Koji Michishita

Other Working Groups

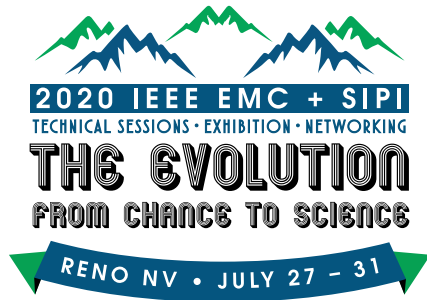
- ◆ IEEE PES Lightning Performance of Overhead Lines Working Group
 - ◆ Annual meeting will be held in early August this year in conjunction with Virtual 2020 IEEE PES GM.
 - ◆ In 2021, the meeting will be held July 25 - 29, Washington, DC, US.

This year's activities

- ◆ 2020
 - ◆ Organized tutorial on upward lightning for the IEEE EMC&SIPI Symposium Reno (Thu, August 6, 8:45-12:00)
 - ◆ Organized a Lightning: Ask the Experts Discussion (Friday, Aug 7, 10:30-12:00)
 - ◆ Both will be given online
 - ◆ Solicited papers for lightning session for EUROEM, Hamburg.
 - ◆ Ten researchers had accepted our invitation.
 - ◆ The conference was postponed
 - ◆ It will be held as a joint ASIAEM / EUROEM conference in Abu Dhabi in 2021
 - ◆ Papers submitted to the biennial ICLP conference in Colombo
 - ◆ Postponed to 2021
 - ◆ To be held in Colombo as a joint ICLP/SIPDA conference

Proposed work for 2021

- ◆ Lightning session EUROEM/ASIAEM in Abu Dhabi.
- ◆ Submission of a paper to the 2021 IEEE EMC/SIPI Symposium (Raleigh) or to the 2021 IEEE International Symposium (Glasgow)



3 August 2020

Activity Report

IEEE EMC Society TC5 Subcommittee: Electromagnetic Information Leakage

Yuichi Hayashi



Special Sessions in APEMC 2020

Hardware security issue due to EM passive/active attacks on devices complying EMC standards

Co-Chairs: **Yuichi Hayashi** (Nara Institute Science and Technology, Japan) ,
William Radasky (Metatech Corporation, Goleta, CA, USA)

The number of papers: 6 papers

Special session proposals, 6 papers were accepted, but due to COVID-19, this session was cancelled because the APEMC was not held due to COVID-19.

Two papers will be presented in IEEE EMC + SIPI 2020.

Four papers were cancelled.

Special Sessions in IEEE EMC + SIPI 2020

W3 TU PM B: Measurement methods for electromagnetic information security

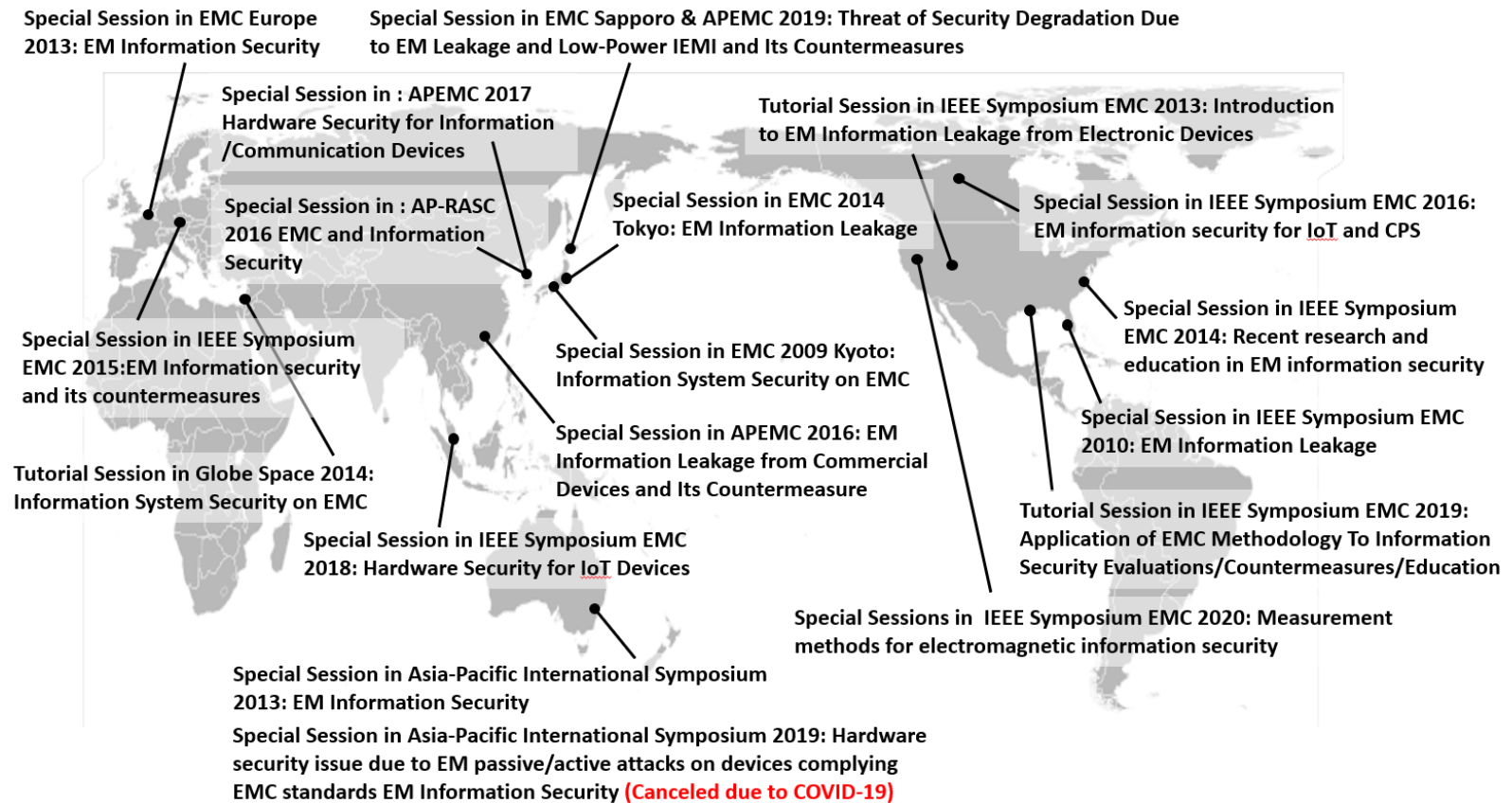
Co-Chairs: **Yuichi Hayashi** (Nara Institute Science and Technology, Japan) ,
William Radasky (Metatech Corporation, Goleta, CA, USA)

The number of papers: **6 papers**

This session is scheduled for the afternoon of August 18.

- 1. Introduction to Measurement Methods for Electromagnetic Information Security** (Yuichi Hayashi, Bill Radasky)
- 2. Eavesdropping a (Ultra-)High-Definition Video Display from an 80 Meter Distance Under Realistic Circumstances** (Pieterjan De Meulemeester, Guy A. E. Vandenbosch, Bart Scheers)
- 3. Design and Evaluation of a Spark Gap Based EM-fault Injection Setup** (Arthur Beckers, Josep Balasch, Ingrid Verbauwhede, Yuichi Hayashi, Masahiro Kinugawa)
- 4. Possibility of Injecting Malicious Instructions from Legitimate Communication Channels by IEMI** (Masahiro Kinugawa, Yuichi Hayashi)
- 5. A Study on Evaluation Board Requirements for Assessing Vulnerability of Cryptographic Modules to Side-Channel Attacks** (Kengo Iokibe, Yoshitaka Y_Toyota, Tomonobu Kan)
- 6. Efficient Electromagnetic Analysis Based on Side-channel Measurement Focusing on Physical Structures** (Shinpei Wada, Youngwoo KIM, Daisuke Fujimoto, Yuichi Hayashi, Naofumi Homma)

Research activity of EM information security in commercial devices (since 2009)



Outreach activity in future

To promote the field of information leakage, we would like to have a special session in future EMC symposiums.

Special session in APEMC 2021

Topic: Hardware Security Related to EMC in Next Generation Information Systems

Abstract: New information processing devices are being connected to modern information systems, including devices with a large number of sensors, conventional devices used in standalone, transportation infrastructure, robotics, and even quantum computers. In addition, the hardware is the root of trust in modern information systems, and new hardware connected to information systems must also be security diagnosed. In this session, we focus on the hardware security of new devices added to the information system, especially on the category related to the EM information security and introduce the latest research trends.



ESD Update

Joost Willemen

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Michael Khazhinsky

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Virtual TC-5 (HPEM) Meeting

Aug 3, 2020

ESD Technical Exchange – 2020 Updates

- ESDA Representative (Joost Willemen) participated in ESD paper review
- Joost Willemen chairs TC-5 sponsored ESD session: W1_TH_PM_B ESD: Touchscreens, Software and Protection (Thursday, Aug 6, 2020, 1:00 pm - 4:00pm CDT), with Michael McInerney as co-chair
 - 6 technical papers on System Level ESD from universities (5x from ESD Lab, Missouri University of Science and Technology), and industry (ASUSTek)
- ESDA hosts a virtual booth at the EMC/SIPI Symposium Exhibition
- The 2020 EOS/ESD Symposium puts special focus on EMC
 - Wednesday, Sep 16, AM: technical paper session “EMC Special Session”
 - 4 invited talks from the EMC Community (including papers from 2019 EMC/SIPI Symposium)
 - Wednesday, Sep 16, PM: “EMC Short Tutorials”
 - 5 tutorials presented by experts from the EMC community
 - 40 min. each
 - Wednesday, Sep 16, Evening workshop “EMC Expert Panel”
 - Thursday, Sep 17 AM “System Level EOS/ESD/EMC”
 - This years System Level EOS/ESD session has extended its scope to include more EMC topics
 - EOS/ESD Symposium is a hybrid event with an on-site symposium in Reno, NV and virtual video stream (with on-demand viewing option)
 - Special thanks to IEEE EMC Society members who contributed to this exciting program (Ross Carlton, Colin Brench, Derek Walton, Vladimir Kraz, David Pommerenke, Robert C. Scully, Shubhankar Marathe, Omid Hoseini Izadi)

ESD Technical Exchange – Future Plans

- For 2021 EOS/ESD Symposium in September of next year there is continuous interest in promoting an EMC-ESD topic in special ESD EMC session. A dedicated EMC-ESD sub-committee will be formed. The goal of this committee is to solicit and review regular and invited papers on the EMC-ESD subject for 2021 EOS/ESD Symposium. Participation from EMC TC is strongly encouraged.
- Continue paper exchange program between the ESD Symposium and the EMC Symposium. Select papers presented at 2020 EMC Symposium will be invited to be re-presented at 2021 ESD Symposium. These papers will not be republished at IEEE Xplore. However, they may be included in the ESD Symposium proceedings with the note that they are re-publications from the 2020 EMC Conference proceedings. A proposal for a paper to be invited for the ESD Symposium presentation will be prepared by Joost Willemen and Michael Khazhinsky by the end of October. A similar reciprocal proposal will be also made for paper(s) from 2020 ESD Symposium to be invited for the presentation at 2021 EMC Symposium.
- Explore opportunities for further cooperation with TC-10 (Signal Integrity, Chunfei Ye) on USB 3.1/3.2 ESD and other ESD-related Signal and Power Integrity issues as well as with TC-9 (Computation Tools and Techniques, Matthias Tröscher)
- Explore opportunities for joint standards groups.

EXECUTIVE ORDERS

Executive Order on Coordinating National Resilience to Electromagnetic Pulses

INFRASTRUCTURE & TECHNOLOGY

Issued on: March 26, 2019

By the authority vested in me as President by the Constitution and the laws of the United States of America, it is hereby ordered as follows:

Section 1. Purpose. An electromagnetic pulse (EMP) has the potential to disrupt, degrade, and damage technology and critical infrastructure systems. Human-made or naturally occurring EMPs can affect large geographic areas, disrupting elements critical to the Nation's security and economic prosperity, and could adversely affect global commerce and stability. The Federal Government must foster sustainable, efficient, and cost-effective approaches to improving the Nation's resilience to the effects of EMPs.

Sec. 2. Definitions. As used in this order:

(a) "Critical infrastructure" means systems and assets, whether physical or virtual, so vital to the United States that the incapacity or destruction of such systems and assets would have a debilitating impact on security, national economic security, national public health or safety, or any combination of those matters.

(b) "Electromagnetic pulse" is a burst of electromagnetic energy. EMPs have the potential to negatively affect technology systems on Earth and in space. A high-altitude EMP (HEMP) is a type of human-made EMP that occurs when a nuclear device is detonated at approximately 40 kilometers or more above the surface of Earth. A geomagnetic disturbance (GMD) is a type of natural EMP driven by a temporary disturbance of Earth's magnetic field resulting from interactions with solar eruptions. Both HEMPs and GMDs can affect large geographic areas.

(c) "National Critical Functions" means the functions of government and the private sector so vital to the United States that their disruption, corruption, or dysfunction would have a debilitating effect on security, national economic security, national public health or safety, or any combination thereof.

(d) “National Essential Functions” means the overarching responsibilities of the Federal Government to lead and sustain the Nation before, during, and in the aftermath of a catastrophic emergency, such as an EMP that adversely affects the performance of Government.

(e) “Prepare” and “preparedness” mean the actions taken to plan, organize, equip, train, and exercise to build and sustain the capabilities necessary to prevent, protect against, mitigate the effects of, respond to, and recover from those threats that pose the greatest risk to the security of the Nation. These terms include the prediction and notification of impending EMPs.

(f) A “Sector-Specific Agency” (SSA) is the Federal department or agency that is responsible for providing institutional knowledge and specialized expertise as well as leading, facilitating, or supporting the security and resilience programs and associated activities of its designated critical infrastructure sector in the all-hazards environment. The SSAs are those identified in Presidential Policy Directive 21 of February 12, 2013 (Critical Infrastructure Security and Resilience).

Sec. 3. Policy. (a) It is the policy of the United States to prepare for the effects of EMPs through targeted approaches that coordinate whole-of-government activities and encourage private-sector engagement. The Federal Government must provide warning of an impending EMP; protect against, respond to, and recover from the effects of an EMP through public and private engagement, planning, and investment; and prevent adversarial events through deterrence, defense, and nuclear nonproliferation efforts. To achieve these goals, the Federal Government shall engage in risk-informed planning, prioritize research and development (R&D) to address the needs of critical infrastructure stakeholders, and, for adversarial threats, consult Intelligence Community assessments.

(b) To implement the actions directed in this order, the Federal Government shall promote collaboration and facilitate information sharing, including the sharing of threat and vulnerability assessments, among executive departments and agencies (agencies), the owners and operators of critical infrastructure, and other relevant stakeholders, as appropriate. The Federal Government shall also provide incentives, as appropriate, to private-sector partners to encourage innovation that strengthens critical infrastructure against the effects of EMPs through the development and implementation of best practices, regulations, and appropriate guidance.

Sec. 4. Coordination. (a) The Assistant to the President for National Security Affairs (APNSA), through National Security Council staff and in consultation with the Director of the Office of Science and Technology Policy (OSTP), shall coordinate the development and implementation of executive branch actions to assess, prioritize, and manage the risks of EMPs. The APNSA shall, on an annual basis, submit a report to the President summarizing progress on the implementation of this order, identifying gaps in capability, and recommending how to address those gaps.

(b) To further the Federal R&D necessary to prepare the Nation for the effects of EMPs, the Director of OSTP shall coordinate efforts of agencies through the National Science and Technology Council (NSTC). The Director of OSTP, through the NSTC, shall annually review and assess the R&D needs of agencies conducting preparedness activities for EMPs, consistent with this order.

Sec. 5. Roles and Responsibilities. (a) The Secretary of State shall:

(i) lead the coordination of diplomatic efforts with United States allies and international partners regarding enhancing resilience to the effects of EMPs; and

(ii) in coordination with the Secretary of Defense and the heads of other relevant agencies, strengthen nuclear nonproliferation and deterrence efforts, which would reduce the likelihood of an EMP attack on the United States or its allies and partners by limiting the availability of nuclear devices.

(b) The Secretary of Defense shall:

(i) in cooperation with the heads of relevant agencies and with United States allies, international partners, and private-sector entities as appropriate, improve and develop the ability to rapidly characterize, attribute, and provide warning of EMPs, including effects on space systems of interest to the United States;

(ii) provide timely operational observations, analyses, forecasts, and other products for naturally occurring EMPs to support the mission of the Department of Defense along with United States allies and international partners, including the provision of alerts and warnings for natural EMPs that may affect weapons systems, military operations, or the defense of the United States;

(iii) conduct R&D and testing to understand the effects of EMPs on Department of Defense systems and infrastructure, improve capabilities to model and simulate the environments and effects of EMPs, and develop technologies to protect Department of Defense systems and infrastructure from the effects of EMPs to ensure the successful execution of Department of Defense missions;

(iv) review and update existing EMP-related standards for Department of Defense systems and infrastructure, as appropriate;

(v) share technical expertise and data regarding EMPs and their potential effects with other agencies and with the private sector, as appropriate;

(vi) incorporate attacks that include EMPs as a factor in defense planning scenarios; and

(vii) defend the Nation from adversarial EMPs originating outside of the United States through defense and deterrence, consistent with the mission and national security policy of the Department of Defense.

(c) The Secretary of the Interior shall support the research, development, deployment, and operation of capabilities that enhance understanding of variations of Earth's magnetic field associated with EMPs.

(d) The Secretary of Commerce shall:

(i) provide timely and accurate operational observations, analyses, forecasts, and other products for natural EMPs, exclusive of the responsibilities of the Secretary of Defense set forth in subsection (b)(ii) of this section; and

(ii) use the capabilities of the Department of Commerce, the private sector, academia, and nongovernmental organizations to continuously improve operational forecasting services and the development of standards for commercial EMP technology.

(e) The Secretary of Energy shall conduct early-stage R&D, develop pilot programs, and partner with other agencies and the private sector, as appropriate, to characterize sources of EMPs and their couplings to the electric power grid and its subcomponents, understand associated potential failure modes for the energy sector, and coordinate preparedness and mitigation measures with energy sector partners.

(f) The Secretary of Homeland Security shall:

(i) provide timely distribution of information on EMPs and credible associated threats to Federal, State, and local governments, critical infrastructure owners and operators, and other stakeholders;

(ii) in coordination with the heads of any relevant SSAs, use the results of risk assessments to better understand and enhance resilience to the effects of EMPs across all critical infrastructure sectors, including coordinating the identification of national critical functions and the prioritization of associated critical infrastructure at greatest risk to the effects of EMPs;

(iii) coordinate response to and recovery from the effects of EMPs on critical infrastructure, in coordination with the heads of appropriate SSAs;

(iv) incorporate events that include EMPs as a factor in preparedness scenarios and exercises;

(v) in coordination with the heads of relevant SSAs, conduct R&D to better understand and more effectively model the effects of EMPs on national critical functions and associated critical infrastructure — excluding Department of Defense systems and

infrastructure — and develop technologies and guidelines to enhance these functions and better protect this infrastructure;

(vi) maintain survivable means to provide necessary emergency information to the public during and after EMPs; and

(vii) in coordination with the Secretaries of Defense and Energy, and informed by intelligence-based threat assessments, develop quadrennial risk assessments on EMPs, with the first risk assessment delivered within 1 year of the date of this order.

(g) The Director of National Intelligence shall:

(i) coordinate the collection, analysis, and promulgation, as appropriate, of intelligence-based assessments on adversaries' capabilities to conduct an attack utilizing an EMP and the likelihood of such an attack; and

(ii) provide intelligence-based threat assessments to support the heads of relevant SSAs in the development of quadrennial risk assessments on EMPs.

(h) The heads of all SSAs, in coordination with the Secretary of Homeland Security, shall enhance and facilitate information sharing with private-sector counterparts, as appropriate, to enhance preparedness for the effects of EMPs, to identify and share vulnerabilities, and to work collaboratively to reduce vulnerabilities.

(i) The heads of all agencies that support National Essential Functions shall ensure that their allhazards preparedness planning sufficiently addresses EMPs, including through mitigation, response, and recovery, as directed by national preparedness policy.

Sec. 6. Implementation. (a) Identifying national critical functions and associated priority critical infrastructure at greatest risk.

(i) Within 90 days of the date of this order, the Secretary of Homeland Security, in coordination with the heads of SSAs and other agencies as appropriate, shall identify and list the national critical functions and associated priority critical infrastructure systems, networks, and assets, including space-based assets that, if disrupted, could reasonably result in catastrophic national or regional effects on public health or safety, economic security, or national security. The Secretary of Homeland Security shall update this list as necessary.

(ii) Within 1 year of the identification described in subsection (a)(i) of this section, the Secretary of Homeland Security, in coordination with the heads of other agencies as appropriate, shall, using appropriate government and private-sector standards for EMPs, assess which identified critical infrastructure systems, networks, and assets are most vulnerable to the effects of EMPs. The Secretary of Homeland Security shall provide this list to the President, through the APNSA. The Secretary of Homeland

Security shall update this list using the results produced pursuant to subsection (b) of this section, and as necessary thereafter.

(b) Improving understanding of the effects of EMPs.

(i) Within 180 days of the identification described in subsection (a)(ii) of this section, the Secretary of Homeland Security, in coordination with the heads of SSAs and in consultation with the Director of OSTP and the heads of other appropriate agencies, shall review test data — identifying any gaps in such data — regarding the effects of EMPs on critical infrastructure systems, networks, and assets representative of those throughout the Nation.

(ii) Within 180 days of identifying the gaps in existing test data, as directed by subsection (b)(i) of this section, the Secretary of Homeland Security, in coordination with the heads of SSAs and in consultation with the Director of OSTP and the heads of other appropriate agencies, shall use the sector partnership structure identified in the National Infrastructure Protection Plan to develop an integrated cross-sector plan to address the identified gaps. The heads of agencies identified in the plan shall implement the plan in collaboration with the private sector, as appropriate.

(iii) Within 1 year of the date of this order, and as appropriate thereafter, the Secretary of Energy, in consultation with the heads of other agencies and the private sector, as appropriate, shall review existing standards for EMPs and develop or update, as necessary, quantitative benchmarks that sufficiently describe the physical characteristics of EMPs, including waveform and intensity, in a form that is useful to and can be shared with owners and operators of critical infrastructure.

(iv) Within 4 years of the date of this order, the Secretary of the Interior shall complete a magnetotelluric survey of the contiguous United States to help critical infrastructure owners and operators conduct EMP vulnerability assessments.

(c) Evaluating approaches to mitigate the effects of EMPs.

(i) Within 1 year of the date of this order, and every 2 years thereafter, the Secretary of Homeland Security, in coordination with the Secretaries of Defense and Energy, and in consultation with the Director of OSTP, the heads of other appropriate agencies, and private-sector partners as appropriate, shall submit to the President, through the APNSA, a report that analyzes the technology options available to improve the resilience of critical infrastructure to the effects of EMPs. The Secretaries of Defense, Energy, and Homeland Security shall also identify gaps in available technologies and opportunities for future technological developments to inform R&D activities.

(ii) Within 180 days of the completion of the activities directed by subsections (b)(iii) and (c)(i) of this section, the Secretary of Homeland Security, in coordination with the heads of other agencies and in consultation with the private sector as appropriate, shall develop and implement a pilot test to evaluate available engineering approaches for

mitigating the effects of EMPs on the most vulnerable critical infrastructure systems, networks, and assets, as identified in subsection (a)(ii) of this section.

(iii) Within 1 year of the date of this order, the Secretary of Homeland Security, in coordination with the heads of relevant SSAs, and in consultation with appropriate regulatory and utility commissions and other stakeholders, shall identify regulatory and non regulatory mechanisms, including cost recovery measures, that can enhance private-sector engagement to address the effects of EMPs.

(d) Strengthening critical infrastructure to withstand the effects of EMPs.

(i) Within 90 days of completing the actions directed in subsection (c)(ii) of this section, the Secretary of Homeland Security, in coordination with the Secretaries of Defense and Energy and in consultation with the heads of other appropriate agencies and with the private sector as appropriate, shall develop a plan to mitigate the effects of EMPs on the vulnerable priority critical infrastructure systems, networks, and assets identified under subsection (a)(ii) of this section. The plan shall align with and build on actions identified in reports required by Executive Order 13800 of May 11, 2017 (Strengthening the Cybersecurity of Federal Networks and Critical Infrastructure). The Secretary of Homeland Security shall implement those elements of the plan that are consistent with Department of Homeland Security authorities and resources, and report to the APNSA regarding any additional authorities and resources needed to complete its implementation. The Secretary of Homeland Security, in coordination with the Secretaries of Defense and Energy, shall update the plan as necessary based on results from the actions directed in subsections (b) and (c) of this section.

(ii) Within 180 days of the completion of the actions identified in subsection (c)(i) of this section, the Secretary of Defense, in consultation with the Secretaries of Homeland Security and Energy, shall conduct a pilot test to evaluate engineering approaches used to harden a strategic military installation, including infrastructure that is critical to supporting that installation, against the effects of EMPs.

(iii) Within 180 days of completing the pilot test described in subsection (d)(ii) of this section, the Secretary of Defense shall report to the President, through the APNSA, regarding the cost and effectiveness of the evaluated approaches.

(e) Improving response to EMPs.

(i) Within 180 days of the date of this order, the Secretary of Homeland Security, through the Administrator of the Federal Emergency Management Agency, in coordination with the heads of appropriate SSAs, shall review and update Federal response plans, programs, and procedures to account for the effects of EMPs.

(ii) Within 180 days of the completion of actions directed by subsection (e)(i) of this section, agencies that support National Essential Functions shall update operational

plans documenting their procedures and responsibilities to prepare for, protect against, and mitigate the effects of EMPs.

(iii) Within 180 days of identifying vulnerable priority critical infrastructure systems, networks, and assets as directed by subsection (a)(ii) of this section, the Secretary of Homeland Security, in consultation with the Secretaries of Defense and Commerce, and the Chairman of the Federal Communications Commission, shall provide the Deputy Assistant to the President for Homeland Security and Counterterrorism and the Director of OSTP with an assessment of the effects of EMPs on critical communications infrastructure, and recommend changes to operational plans to enhance national response and recovery efforts after an EMP.

Sec. 7. General Provisions. (a) Nothing in this order shall be construed to impair or otherwise affect:

(i) the authority granted by law to an executive department or agency, or the head thereof; or

(ii) the functions of the Director of the Office of Management and Budget relating to budgetary, administrative, or legislative proposals.

(b) This order shall be implemented consistent with applicable law and subject to the availability of appropriations.

(c) This order is not intended to, and does not, create any right or benefit, substantive or procedural, enforceable at law or in equity by any party against the United States, its departments, agencies, or entities, its officers, employees, or agents, or any other person.

DONALD J. TRUMP

THE WHITE HOUSE,
March 26, 2019.

P2838

Submitter Email: heather@tqci.net
Type of Project: New IEEE Standard
Project Request Type: Initiation / New
PAR Request Date: 26 Jul 2019
PAR Approval Date: 07 Nov 2019
PAR Expiration Date: 31 Dec 2023
PAR Status: Active

1.1 Project Number: P2838
1.2 Type of Document: Standard
1.3 Life Cycle: Full Use

2.1 Project Title: Standard for Aircraft Component Lightning Strike Direct Effects Qualification

3.1 Working Group: Aircraft Component Lightning Strike Direct Effects Qualification(EMC/SDCom/
Lightning Direct Effects Qual)

3.1.1 Contact Information for Working Group Chair:

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3.1.2 Contact Information for Working Group Vice Chair:

None

3.2 Society and Committee: IEEE Electromagnetic Compatibility Society/Standards Development
Committee(EMC/SDCom)

3.2.1 Contact Information for Standards Committee Chair:

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3.2.2 Contact Information for Standards Committee Vice Chair:

None

3.2.3 Contact Information for Standards Representative:

Name: Edward Hare
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4.1 Type of Ballot: Individual

4.2 Expected Date of submission of draft to the IEEE SA for Initial Standards Committee Ballot:
Mar 2021

4.3 Projected Completion Date for Submittal to RevCom: Oct 2021

5.1 Approximate number of people expected to be actively involved in the development of this project: 25

5.2 Scope of proposed standard: This standard specifies qualification levels and methods for aircraft component qualification to direct effects of lightning.

5.3 Is the completion of this standard contingent upon the completion of another standard? No

5.4 Purpose: The purpose of this standard is to qualify aircraft components for acceptable performance with the direct effects of a lightning strike to the aircraft in the air or on the ground.

5.5 Need for the Project: This project is needed to set standard requirements for levels and methods of qualification for aircraft components to direct effects of lightning; other industry documents only provide guidance and recommend practices which cannot be used to component qualification without creating major engineering effort and science projects for each time a qualification test is needed.

5.6 Stakeholders for the Standard: Aircraft industry (fixed wing, rotary aircraft, unmanned aircraft), spacecraft (launch vehicles, recovery vehicles) civil, and military aircraft and lightning related industry stakeholders

6.1 Intellectual Property

6.1.1 Is the Standards Committee aware of any copyright permissions needed for this project?

No

6.1.2 Is the Standards Committee aware of possible registration activity related to this project?

No

7.1 Are there other standards or projects with a similar scope? No

7.2 Is it the intent to develop this document jointly with another organization? No

8.1 Additional Explanatory Notes :