

High-Power Charging (HPC) Pillar Deep Dive Meeting Agenda

Tuesday, May 02, 2023 | [Meeting Link](#)

Time (EST)	Session	Presentation
11:00AM– 11:20AM	Welcome and Introductions for EVs@Scale Consortium and High-Power Charging Pillar [20min]	<ul style="list-style-type: none"> Welcome and Introductions (10 min) Lee Slezak/ Andrew Meintz High-Power Charging (HPC) Pillar: Overview (10 min) Chair: John Kisacikoglu; Co-chair: Dan Dobrzynski
11:20AM– 12:00PM	Session 1: State-of-the-Art HPC Ecosystem [40min]	<ul style="list-style-type: none"> High Power Charging Profiles (HPC) for New Generation EVs (15 min) Sam Thurston (ANL) QandA (5min) State-of-the-Art HPC Equipment Performance Characterization (15 min) Barney Carlson (INL) QandA (5min)
5-min Break		
12:05PM– 12:55PM	Session 2: Design and Implementation Approach of DC Charging Hub [50min]	<ul style="list-style-type: none"> Overview of DC Charging Hub Approach and Development of Experimental Test Platform (20 min) Alastair Thurlbeck and John Kisacikoglu (NREL) QandA (5min) DC-DC Converter (UPER) Development: 1000V and 1500V Class Chargers (20 min) Prasad Kandula (ORNL) QandA (5min)
5-min Break		
1:00PM– 1:50PM	Session 3: Modeling and Control of DC Charging Hub [50min]	<ul style="list-style-type: none"> Integrating Spec II Module with UPER and Site Energy Management System (SEMS) (20 min) Akram Ali (ANL) QandA (5min) SEMS: Modeling, Control Algorithm Development, and Evaluation (20 min) Emin Ucer (NREL) QandA (5min)

1:50PM- 3:00PM	Cross-cutting Discussions and Feedback Gathering: Next Steps and R&D Needs [70min]	Break-out Sessions (45 min) on (i) State-of-the-Art HPC Ecosystem; (ii) Design and Implementation Approach of DC Charging Hub; (iii) Modeling and Control of DC Charging Hub. Summarizing breakout sessions: Session moderators (Each 5min: Total 15 min) Closing Remarks: Lee Slezak (10min)
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Wireless Power Transfer (WPT) Pillar Deep Dive Meeting Agenda

Wednesday, May 03, 2023 | [Meeting Link](#)

Time (EST)	Session	Presentation
11:00AM– 11:20AM	Welcome and Introductions for EVs@Scale Consortium and Wireless Power Transfer Pillar [20min]	<ul style="list-style-type: none"> Welcome and Introductions (10 min) Lee Slezak (DOE)/ Andrew Meintz (NREL) Wireless Power Transfer (WPT) Pillar: Overview (10 min) Lead: Veda Galigekere; ORNL PM: Burak Ozpineci
11:20AM– 12:20PM	Session 1: 200 kW DWPT system development and characterization [60min]	<ul style="list-style-type: none"> 200 kW DWPT system development and validation Veda Galigekere (ORNL) (20 min + 10 min Q&A) Data acquisition setup and characterization of 200 kW DWPT system Richard Carlson (INL) (20 min + 10 min Q&A)
10-min Break		
12:30PM– 1:30PM	Session 2: High frequency power electronics and control system design and development for high power and dynamic wireless charging [60min]	<ul style="list-style-type: none"> High-frequency power electronics and control system design for 200 kW DWPT Gui-Jia Su (ORNL) (20 min + 10 min Q&A) Advanced control techniques for high power and dynamic DWPT (20 min + 10 min Q&A) Veda Galigekere (ORNL) (20 min)
1:30PM– 2:30PM	Session 3: Use case analysis for electrified roadway [60min]	<ul style="list-style-type: none"> Regional analysis on road network impact for light-duty and class 8 tractors (20 min) Andrew Meintz (NREL)
2:30PM– 3:00PM	Cross-cutting Discussions and Feedback Gathering: Next Steps and R&D Needs [30min]	Open discussion and feedback Closing Remarks: Lee Slezak (5min)

Smart Charge Management and Vehicle Grid Integration Flexible charging to Unify the grid and transportation Sectors for EVs at scale (FUSE) Deep Dive Meeting Agenda

Thursday, May 18, 2023 | [Meeting Link](#)

Time (EST)	Session	Presentation
2:00PM–2:10PM	Welcome and Introductions for EVs@Scale Consortium and SCM & VGI Pillar [10min]	<ul style="list-style-type: none"> Welcome and Introductions (10 min) Jason Harper (ANL)
2:10PM–3:25PM	Session 1: FUSE Project Updates [75min]	<ul style="list-style-type: none"> <u>Grid Modeling and SCM Analysis</u>: Updates on utility partnerships, modeling of electric distribution feeders, and new SCM developments and analysis. (20 min) Shibani Ghosh and Mingzhi Zhang. Q&A (5 min) <u>Vehicle Charge Modeling and Broad Regional Analysis</u>: Updates on MD/HD vehicle charging analysis and the broad impacts of vehicle charging and SCM (20 min) Matt Bruchon and Manoj Kumar. Q&A (5 min) <u>Research, Development and Demonstration</u>: Updates regarding OptiQ EVSE, EVrest charge reservation mobile app and charge scheduling research. (20 min) Jason D. Harper. Q&A (5 min)
5-min Break		
3:30PM–4:30PM	Session 2: Panel Discussion Current State of Managed Charging: Progress, Barriers, & Solutions [60min]	<ul style="list-style-type: none"> <u>Garrett Fitzgerald</u>: Senior Director, Electrification, Smart Electric Power Alliance (20 min) <u>Joachim Lohse</u>: Founder and CEO, Ampcontrol.io (20 min) <u>Christie-Anne Edie</u>: Sustainability Program Manager, GSA (20 min)
4:30PM–5:00PM	Interactive Discussion and Panelist Q&A [30min]	<p>Question and Answer – Industry stakeholders, panel members and project members (30 min)</p> <p>Adjourn</p>

Cyber-Physical Security (CPS) Pillar Deep Dive Meeting Agenda

Wednesday, May 24, 2023 | [Meeting Link](#)

Time (EST)	Session	Presentation
1:00PM– 1:15PM	Welcome and Introductions for EVs@Scale Consortium and Cyber-physical Security Pillar [15min]	<ul style="list-style-type: none"> Welcome and Introductions (10 min) Craig Rodine (SNL)
1:15PM– 1:45PM	Mitigation Solutions Development for Hi-Power EV Charging Barney Carlson (INL) [30min]	With the assumption that remote accessible may be possible for high-power EV charging infrastructure, research at Idaho National Lab (INL) has been conducted to develop solutions to detect, respond, and recovery from manipulation and exploitation of control systems within a high-power charger. This includes internal communications networks, communications with the EV, and smart energy management systems. This Deep Dive presentation will present solutions for mitigating exploitation of CCS cable thermal management systems, power electronics controls, information flow both inside and outside the chargers, and scenarios related to coordinated, simultaneous exploits of numerous high-power DC charging infrastructure. These detection, response, and recovery mitigations will be demonstrated on June 7, 2023 at the EV SALaD demonstration event at INL in collaboration with SNL and PNNL.
1:45PM– 1:55PM	CyberAuto Challenge Support Barney Carlson (INL) [10min]	The CyberAuto Challenge is a weeklong collegiate event focused on training and inspiring the emerging cybersecurity workforce focused on automotive cybersecurity. INL supports the electrified vehicle and charging infrastructure portions of this event. This presentation will provide additional information on the event and collaboration potential for manufacturers of vehicles and charging infrastructure.
10-min Break		
2:00PM– 2:40PM	Zero Trust Thomas Carroll (PNNL) [40min]	<i>Never trust, verify everything</i> – Zero Trust paradigms are gaining in popularity to protect against a range of threats and improve an organization's security posture. At its core, Zero Trust is the means to enforce least privilege access, thereby removing implicit trust based on physical or network location, or based on asset ownership. A Zero Trust approach ensures an organization's attack surface is better understood and managed, and will effectively limit the scope of compromise. In this talk, we describe our research designing, developing and evaluating Zero Trust approaches to bolster EV infrastructure security. The focus is placed on the networking and communications of chargers and ancillary systems that comprise the infrastructure. While Zero Trust does not solve all cybersecurity challenges, it is considered superior to the alternatives.

<p>2:40PM- 2:50PM</p>	<p>eVision Project Update Michael Starke (ORNL) [10min]</p>	<p>In hope of reducing fears on range anxiety, EV charger systems are being deployed in large numbers. Yet, new challenges related to EV charger resiliency have become forefront. The eVision project is focused on developing and demonstrating identification and control techniques that can improve the resilience of EV charging systems. Areas of focus include the physical EV charger and power electronic control, anomaly detection associated with nefarious actors, and station level control responses via coordination of assets. These developed methodologies are being produced and validated in co-simulation, real-time controller hardware-in-the-loop, and hardware testbed platforms. This project represents a collaboration between Oak Ridge National Laboratory, Idaho National Laboratory, and Pacific Northwest National Laboratory.</p>
<p>2:50PM- 3:00PM</p>	<p>EVSE UpstAnD (Upstream Analysis and Design) Project Update Roland Varriale (ANL) [10min]</p>	<p>Previous DOE assessment of EVSEs have focused on the EVSE themselves, in a vacuum, and not the more holistic IT and OT environments they reside within. This project will focus on analyzing "next level up" assets and connections within the EVSE architecture. This includes evaluating deployments of CSMS (public/private/hybrid) as well as scrutinizing remote connection platforms which may provide ingress points to EVSE management networks. This information allows us to more completely understand the risk associated with EVSE integration and may provide insight into securing their deployments.</p>

Cyber-Physical Security (CPS) Pillar Deep Dive Meeting Agenda

Thursday, May 25, 2023 | [Meeting Link](#)

Time (EST)	Session	Presentation
11:00AM– 11:10AM	Welcome and Introductions for EVs@Scale Consortium and Cyber-physical Security Pillar [10min]	<ul style="list-style-type: none"> Welcome and Introductions (10 min) Craig Rodine (SNL)
11:10AM– 11:25AM	CyberStrike Training for Network Defenders Keira Haskins and Jay Johnson (SNL) [10min]	The CyberStrike platform provides training and experience in the execution, detection, and mitigation of cyber attacks against energy infrastructure. Cyberstrike training involves students in hands-on attack and defense scenarios against real equipment, enabling them to see the actual impact of attacks on physical infrastructure, not just on a screen. Researchers from Sandia and Idaho National Labs are developing a new version of the platform focused on renewable energy resources, including solar and wind generation and electric vehicle charging. The new platform includes attacks against scaled models of a single-axis solar tracker, a wind turbine, and an EV charger. It exposes common vulnerabilities in native protocols such as SunSpec Modbus and the Open Charge Point Protocol, and enables exploits against interfaces such as on-device web and cell-phone applications (e.g., for authorizing and paying for charging) and cloud-based APIs.
11:25AM– 11:45PM	EVSE Security Tools and Solutions Anuj Sanghvi (NREL) [20min]	An increase in digitization and interconnectedness of EV charging and the electrical grid leads to more significant security risks, leaving the stakeholders more vulnerable. Prior research identified several potential issues that exist with securing current EV charging equipment, communications with cloud services and third-party systems, and grid integration. To encourage public-private partnerships, the EVSE Security Solutions wiki on OpenEI provides an open platform to promote awareness of cybersecurity tools and applications toward EVSE. The current site deployment and engagement efforts will be discussed.
11:45AM– 12:30PM	Exploring EV charging PKI: simulation and testing for operational and cyber vulnerabilities Tony Markel (NREL) & Craig Rodine (Sandia), co-PIs, and the project team: Anuj Sanghvi, Nicholas Ryan, Ryan Cryar (NREL) Aya Khalafalla, Craig Rodine (SNL)	The Electric Vehicle charging ecosystem utilizes several protocols for communication between charging stations and vehicles. One family of standards (DIN 70212, ISO 15118) mandates the use of TCP/IP; securing the link with TLS is optional – not currently widespread practice, but it's becoming industry best practice. The most recent standard (ISO 15118-20) requires mTLS v1.3 and defines ANSI 509v3 Certificate Profiles to be supported by an industry-specific PKI.

	<p>Bryan Richardson, Keith Schwalm (DNK Consulting) Md Sahabul Hossain (University of New Mexico)</p> <p>[45min]</p>	<p>Multiple proposals for the design and implementation of such an EV charging PKI are emerging from competing industry initiatives. To assess scalability, vulnerability, efficiency, and other salient PKI characteristics, an R&D team from Sandia National Laboratories and the National Renewable Energy Laboratory are developing a simulation and testing platform to conduct experiments on PKI prototypes. We'll describe how we're using the minimega/Phenix suite of open-source tools to launch and manage virtual machines emulating the PKI and end devices at scale, from thousands to hundreds of thousands of endpoints. Experiments can be scripted and run using the platform's scenario definition and orchestration capability. Initial experiments will demonstrate how a PKI-under-test and end devices respond to loss of control of private keys; Root or Intermediate CA outage or compromise; massive certificate revocation; etc.</p>
<p>12:30PM- 1:00PM</p>	<p>Special event</p> <p>[30min]</p>	<p>We're thrilled to announce that PKI industry luminary Oscar Marcia, CEO of EonTi, will join moderator Craig Rodine (Sandia National Laboratories) for an in-depth discussion of the state of play in EV charging PKI. We'll touch on PKI technology, governance, operations, and the various proposals being made for how PKI can be orchestrated across the ecosystem.</p>