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The ARPA-E *ENLITENED* Program – Enabling Transformative Datacenter and HPC Networks with Integrated Photonics

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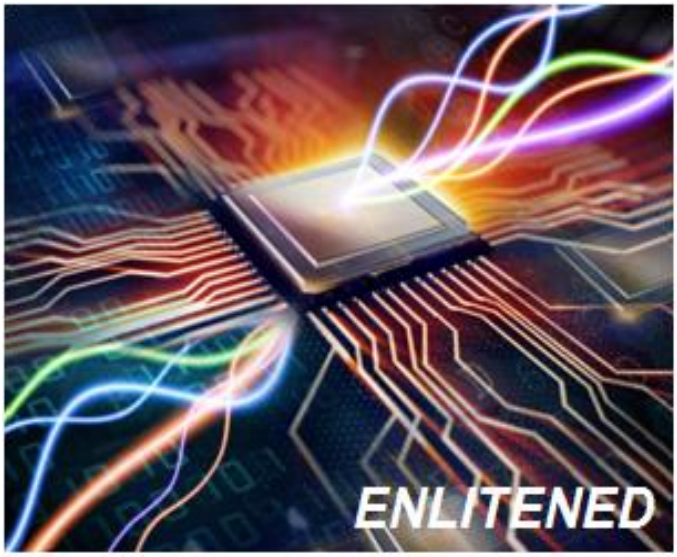
Abstract – The U.S. Advanced Research Projects Agency – Energy (*ARPA-E*) launched the *EN*ergy-efficient *L*ight-wave *I*ntegrated *T*echnology *E*nabling *N*etworks that *E*nhance *D*ata-processing *(ENLITENED)* Program* in 2017 with the goal of exploiting integrated photonic communications technology to overcome the interconnect bottlenecks in future generations of data centers and high performance computing systems. It is anticipated that the more energy-efficient, higher bandwidth, and lower latency interconnection networks enabled by integrated photonics will provide significant overall energy efficiency gains due to higher and more optimized utilization of computing resources.

The *ENLITENED* portfolio comprises a diverse set of projects that are configured to exploit specific integrated photonic technology platforms in a manner that informs novel network architectures. Technology platforms being developed include Silicon photonics-based and VCSEL-based notions for signaling, and a variety of network routing approaches that utilize photonic switching and photonically-enhanced electronic switching concepts. New network architectures being explored include packet switching, circuited switching, and hybrid concepts.



This presentation reviews the motivation, goals, and progress of the *ENLITENED* Program. The challenges, technical approaches, and accomplishments in specific projects are highlighted, along with the evaluation methods that are being developed. The plans for the late-2019 transition into Phase II of *ENLITENED* – which will be focused on demonstrations that show a path to transformative performance at the system level and commercial viability – will be reviewed.

Bio – Dr. Haney serves as a Program Director at the Advanced Research Projects Agency-Energy (ARPA-E). He is on assignment from the University of Delaware, where he is a Professor of Electrical and Computer Engineering. Previous positions include Program Manager at the Defense Advanced Research Projects Agency (DARPA) and co-founder of Applied Photonics, Inc. He received his Ph.D. in Electrical Engineering from the California Institute of Technology, M.S. in Electrical Engineering from the University of Illinois at Urbana, and B.S. in Physics from University of Massachusetts, Amherst. Dr. Haney is a Fellow of The Optical Society of America.

*see: https://arpa-e.energy.gov/?q=arpa-e-programs/enlitened