Project Summary

Overview

Over the past decades, the Internet has undergone a major change from being primarily a research-oriented network for academics to becoming a cyber-physical infrastructure "critical" for modern society in general and the global economy in particular. This transformation of the Internet into a critical infrastructure has occurred largely by happenstance, rather than by design, and under the assumption that the current architecture that has ensured its robustness in the past would be sufficient to provide the robustness now expected from it. We argue that this evolved architecture of today's Internet cannot live up to this new role humanity has assigned it or withstand the types of threats that it now faces.

Any effort to re-architect today's Internet as critical infrastructure requires a new understanding of the architectural principles on which it should be based. It demands a reassessment of the possible scenarios that can challenge the network's basic functioning, as well as the threats that can arise as a result of the network's constant evolution, be it for technological, economic, political, or societal reasons, and that impact its resilience. At the same time, it must explore paths for incremental deployment that embed the necessary incentives for adoption. Given the close interdependence of the Internet and the power grid, both the analysis of potential threats as well as any re-design aimed at the survivability of the former must be informed by the parallel efforts on the latter, and vice versa. The ongoing radical transformation of today's centralized power grid into a highly distributed smart grid, and the concurrent emergence of autonomous or self-driving networks, building on rapid technology advances in programmable data planes and AI/ML, are bound to create severe new risks for potentially catastrophic failures as well as tantalizing new opportunities for potentially revolutionary (individual or joint) redesigns for the Internet and smart grid.

The success of this proposed ambitious effort depends on close collaborations among a broad and interdisciplinary team of scientists, including networking researchers, power/smart grid experts, economists, and social science researchers. The goal of this planned workshop is to bring together an initial group of national and international experts to sketch and start implementing a transformative research agenda for solving one of our community's most challenging yet important tasks: the re-architecting tomorrow's Internet for "survivability", ensuring that the network is able to fulfill its mission even in the presence of large-scale catastrophic events.

Keywords: Internet, Survivability, Workshop.

Intellectual merit

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Broader Impacts

The proposed workshop will drive the creation of a cross-disciplinary research agenda focused on ensuring the survivability of the Internet, even in the face of catastrophic events. It will pave the way to collaborations among a broad and interdisciplinary team of scientists, which we see as critical to addressing this grand challenge, help inform policymakers, and benefit the education and training of the next-generation researchers and practitioners.