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SDSC's CAIDA Group to Explore the Internet's "Uncharted Territory"

NSF-Funded Award to Evaluate New Internet Architectures

The Center for Applied Internet Data Analysis (CAIDA) at the San Diego Supercomputer Center has been awarded \$1.2 million grant from the National Science Foundation (NSF) to measure and quantify the changing nature of the Internet's topology and what it means for the Internet's future in terms of design, operations, scientific study, and public policy.

The goals of this three-year project are aligned with the NSF's Networking Technology and Systems (NeTS) program and include: advancing our fundamental understanding of how content distribution dynamics affect ISP network management capabilities; developing metrics to quantify the impact of emerging interconnection patterns on the resiliency, efficiency, and market power of modern networks; and revisiting longstanding but now questionable topology modeling assumptions and offering new models that are better empirically grounded.

"From both the scientific and policy perspectives, much of the Internet's evolving ecosystem is largely uncharted territory," said Kimberly Claffy, director of CAIDA, a collaboration started in 1997 among commercial, government, and academic research sectors to promote greater cooperation in the engineering and maintenance of a robust, scalable global Internet infrastructure.

"As the Internet expands to satisfy the demands and expectations of an ever-increasing percentage of the world's population, profound changes are occurring at myriad levels: from interconnection structure and traffic dynamics to creating new economic and political issues that need to be addressed," said Claffy, principal investigator for the new project. "These changes also pose broader challenges for technology investment and future network design so a key goal of this project is to establish a baseline against which to evaluate future Internet architecture designs and implementations."

The project, called 'NeTS: Large: Collaborative Research: Mapping Interconnection in the Internet: Colocation, Connectivity and Congestion', is being done in collaboration with David Clark, a senior research scientist at the [MIT Computer Science and Artificial Intelligence Laboratory \(MIT/CSAIL\)](#), and his research group. CSAIL is the largest research laboratory at MIT and one of the world's leading centers of information technology.

"Measuring the extent and location of congestion will give us improved insights into the causes of poor performance of applications, and as well insights into the business relationships among the providers that make up the Internet," said Clark.

The CAIDA/CSAIL project is being structured into two foundational tasks and a set of research questions that build on those tasks. The first task is to construct a new type of semantically rich Internet map, which will guide the second task: a measurement study of traffic congestion dynamics induced by evolving interconnection and traffic management practices of content delivery networks (CDNs) and ISPs.

"This new map and measurement techniques will frame our inquiry into issues relevant to network operators, researchers, policymakers, and users," said Amogh Dhamdhere, a CAIDA research scientist and co-PI of the project. "These inquiries will inform infrastructure resiliency assessments, improve network modeling integrity, as well as stimulate informed Internet policy debates."

A full description of the proposal can be found at http://www.caida.org/funding/nets-congestion/nets-congestion_proposal.xml. The project is funded under NSF award # 1414177 and scheduled to run through September 2017.

MEDIA CONTACT

Jan Zverina, 858-534-5111, jzverina@sdsc.edu

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