

## TALK ANNOUNCEMENT

**Seminar Series:** The Science of Complex Networks (description below)

**Speaker:** *Ravi Sundaram*, Associate Professor, College of Computer and Information Science, Northeastern University

**Title:** *Net and the City*

**Abstract:** Please see below.

**Date & Time:** Tuesday, January 03, 2005. 1:30-2:30 PM

**Location:** CRC, Building XV, Conference room 2018

**Web:** <http://ndssl.vbi.vt.edu/seminars>

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**Abstract** Today the Internet is considered critical infrastructure. In recent times DDoS attacks have been launched against high profile websites such as Yahoo! and eBay. We address the natural question in today's context:- How vulnerable is the Internet to DDoS attacks at the city-level?

In this talk we describe the findings – structural properties and security implications – from our study that focuses on the Internet within urban regions (city-nets).

The structural properties of city-nets compared to the geographically unrestricted Internet (glob-net) reveal interesting differences. All 11 city-nets studied share a common topological structure: A small subset of routers (waist) carry the bulk of the traffic and within each city the Internet rapidly branches into a large number of hosts (hip). Our findings lead to the formulation and validation of the winner-takes-all hypothesis and the apartment hypothesis to account for the waist/hip structure.

We follow our structural characterization with the investigation of robustness and security implications. We show that city-nets are vulnerable to DDoS attacks. We quantify the vulnerability using a DoSimeter index and show that larger cities are more vulnerable. We counterbalance this pessimal finding by employing the concepts of Vapnik-Chervonenkis-dimension (VC-dimension), epsilon-nets, and confluence coefficient to prove the counter-intuitive result that any large-scale attack can be detected by monitoring only a constant-sized subset of paths in the city.

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**Speaker Bio:** Ravi's research interests are focused on networking from an algorithmic and security standpoint. Earlier as Director of Engineering at Akamai Technologies, Inc. he designed and built Akamai's core infrastructure for directing browsers to servers. His research led to the creation of new services that are in use by companies such as Microsoft, Google and Yahoo! and websites such as [www.whitehouse.gov](http://www.whitehouse.gov). Prior to Akamai he used to be a bond trader at a leading hedge fund. Ravi has a BTech from IIT(Madras) and a PhD from MIT.

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