Distinguished Lecturer Series “Leon the Mathematician” at the Department of Informatics, Aristotle University of Thessaloniki Greece (http://dls.csd.auth.gr)

INVITED LECTURE

Thrasyvoulos Spyropoulos (Assistant Professor, EURECOM, Sophia-Antipolis, France) is going to lecture on

Modeling Epidemic Spreading over Heterogeneous (Contact) Networks

at the **Auditorium of the Central Library** of the Aristotle University of Thessaloniki on **Thursday December 6th, 2012 at 12:00.**

ABSTRACT

Epidemic algorithms have found their way into many areas of computer science, such as databases and distributed systems, and recently for communication in Opportunistic and Delay Tolerant Networks where direct communication can take place between wireless devices (e.g. over WiFi or Bluetooth). Epidemic and gossip-based processes also play an important role in spreading benign (e.g. videos, stories) as well as malicious data (e.g. viruses, worms) over large online social networks (e.g. Facebook, Twitter). To ensure analytical tractability, existing analyses of epidemic spreading predominantly consider homogeneous contact rates between nodes. Nevertheless, numerous studies of real mobility traces, online social network structure and interactions, and other large networks, reveal a different picture: contact rates between different pairs of nodes can vary widely in real networks, and many pairs of nodes never interact. This raises the question: can we derive useful and accurate closed form expressions for the performance of epidemic schemes, under more generic contact assumptions?

In this talk we will start from the basic epidemic scheme and simple heterogeneous contact models and progress our way towards more generic contact scenarios. We model the target networks with an “underlay” binary graph (denoting the notes that ever interact) and we overlay a stochastic contact/interaction process over each existing link. In the case of mobile nodes, the latter might define the times at which two nodes are within transmission range, while in the case of social network nodes, it might define the (random) times at which a user might see or post on the peer’s page. Using this basic model, we show that for some contact classes, highly accurate closed form approximations can be derived based on simple Markov chains, despite heterogeneous inter-contact rates. We will then consider arbitrary contact graphs, and show that, while traditional MC-based models break, (spectral) graph theory provides us with the means to get useful and bounds.

About the Speaker:

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Thrasyvoulos Spyropoulos was born in Athens, Greece, in July 1976. He received his diploma in Electrical and Computer Engineering from the National Technical University of Athens, Greece, in February 2000, and a Ph.D. degree in Electrical Engineering from the University of Southern California (USC), Los Angeles, in 2006. In the past, he has been with the Planete project-team at INRIA, Sophia-Antipolis, and with the Communication and Systems Group at ETH, Zurich. He is currently an Assistant Professor at EURECOM, Sophia-Antipolis, France.

His main research interests are in the areas of Performance Analysis, Mobility Modeling, Routing and MAC protocols for Wireless Networks, and Complex/Social Networks. He has published more than 50 articles in peer-reviewed scientific journals and conference proceedings, while his published work has received more than 3000 citations (h-index 19). He is currently involved in various European, French, and industrial research projects. He is the co-recipient of the IEEE SECON 2008 best paper award, the IEEE WoWMoM 2012 best paper award, and runner-up for the ACM Mobihoc 2011 best paper award. He has served in several Technical Program Conference committees, including ACM Sigmetrics and INFOCOM.