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RESEARCH INTEREST Failure Resilient Routing, Network System Management, and Peer-to-Peer Systems

EDUCATION University of Minnesota Minneapolis, MN
Ph.D., Computer Science 2000.8-2005.9
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Seoul National University Seoul, Korea
M.Sc. Computer Science 1993.2-1995.2

Seoul National University Seoul, Korea
B.Sc. Computer Science 1989.2-1993.2

AWARDS, GRANTS, AND HONORS Department Research Excellence Fellowship Spring 2005
Sigcomm travel grant for Sigcomm 2003 Aug 2003
Department Academic Excellence Fellowship Fall 2000
Korea Governmental Overseas Full-Scholarship 2000-2003
(Computer Science Area)

ACADEMIC EXPERIENCE University of Minnesota Minneapolis, MN
Research Assistant Fall 2002 - Spring 2005
Supervisor : Prof. Zhi-Li Zhang
Teaching Assistant
CS5211 Computer Networks, CS5107 Computer Graphics,
CS4061 Operating System

WORK EXPERIENCE IBM T.J. Watson Research Center Hawthorne, NY
Advisory Software Engineer 9/19/2005-current
Cable Network Control Data Analysis

IBM T.J. Watson Research Center Hawthorne, NY
Summer Intern 5/31/2005-9/16/2005
Server Consolidation Design and Implementation

WORK EXPERIENCE	IBM T.J. Watson Research Center Summer Intern Distance Map Service Development	Hawthorne, NY 6/1/2004-8/20/2004
	Hyundai Electronics Wireless Local Loop System Development V5.2 protocol implementation DVD Authoring Tool Development GUI implementation on Windows 95 Commercial Website Development Web Database Implementation : Embedded SQL	Seoul, Korea 1997.9-2000.6 1996.7-1997.8 1995.2-1996.7

PUBLICATIONS
JOURNAL

[1] Srihari Nelakuditi, **Sanghwan Lee**, Yinzhe Yu, Zhi-Li Zhang, and Chen-Nee Chuah, "Fast Local Rerouting for Handling Transient Link Failures," to appear in IEEE/ACM Transactions on Networking.

SELECTED
PUBLICATIONS
CONFERENCE
AND
WORKSHOP

[2] **Sanghwan Lee**, Yinzhe Yu, Srihari Nelakuditi, Zhi-Li Zhang, and Chen-Nee Chuah, "Proactive vs. Reactive Approaches to Failure Resilient Routing," In Proceedings of IEEE INFOCOM'04, Hong Kong, March 2004.

[3] **Sanghwan Lee**, Zhi-Li Zhang, and Srihari Nelakuditi, "Exploiting AS Hierarchy for Scalable Route Selection in Multi-Homed Stub Networks," In Proceedings of ACM SIGCOMM/USENIX Internet Measurement Conference (IMC) '04, Taormina, Sicily, Italy, Oct 2004.

[4] Yinzhe Yu, **Sanghwan Lee**, Zhi-Li Zhang, "Leopard: A Locality Aware Peer-To-Peer System With No Hot Spot," In Proceedings of the 4th IFIP Networking Conference (Networking), Waterloo, Canada, May 2005.

[5] Srihari Nelakuditi, **Sanghwan Lee**, Yinzhe Yu, Junling Wang, Zifei Zhong, Guor-Huar Lu, Zhi-Li Zhang, "Blacklist-Aided Forwarding in Static Multihop Wireless Networks," In Proceedings of IEEE SECON'05, Santa Clara, CA, Sep 2005

[6] Srihari Nelakuditi, **Sanghwan Lee**, Yinzhe Yu, and Zhi-Li Zhang, "Failure Insensitive Routing for Ensuring Service Availability," In Proceedings of IWQoS'03, Lecture Notes in Computer Science 2707, Monterey, CA, June 2003.

PUBLICATIONS
POSTERS

[1] **Sanghwan Lee**, Zhi-Li Zhang, Sambit Sahu, Mukund Srinivasan, and Debanjan Saha, "Network Distance Estimation with Virtual Topology," In Posters of SIGCOMM'05, Philadelphia, PA, Aug 2005.

[2] Junling Wang, **Sanghwan Lee**, Srihari Nelakuditi, and Zifei Zhong, "Localized On Demand Link State Routing for Fixed Wireless Networks," In Posters of SIGCOMM'05, Philadelphia, PA, Aug 2005.

[3] Yinzhe Yu, **Sanghwan Lee**, Zhi-Li Zhang, "Leopard: A Locality Aware Peer-To-Peer System With No Hot Spot," In Posters of INFOCOM'05, Miami, Florida, March 2005.

PATENTS

Micheal Haley, Sanghwan Lee, Prashant Pradhan, Sambit Sahu, Debanjan Saha, "Network anomaly delay detection using virtual co-ordinate approach For Internet Applications", filed for US patent, docket number YOR9-2005-0223, 2005.

RESEARCH ACTIVITIES

Multihomed Stub Network Performance Management

The basic purpose of this measurement study is to reveal some correlations among the destination that shares similar paths. We show that the correlation comes from the AS hierarchy. We exploit the findings to reduce the RTTs to the destinations. The idea is to measure the RTT differences to the common ASes and use the difference for all the destinations that share the common ASes.

Distance Map Service for Distributed System

Network distance estimation with a coordinate system has been increasingly gaining popularity in the past several years. In this work, we implemented a prototype of a distance map service and a client called MapViewer to show that the distance map service can be easily implemented and is useful for many applications. The distance map service simply provides the coordinates of hosts. MapViewer uses the coordinate information to solve problems such as server placement and network status monitoring.

Leopard : A Peer to Peer System for Robust Search Service

The features of Leopards are i) object look-up time is proportional to the distance between the requester and the object; ii) in case multiple copies of an object exist, Leopard always locates a near-by copy; and iii) Leopard can effectively handle "flash crowd" traffic with near optimal load balancing.

Failure Insensitive Routing (FIR)

We want to suppress a transient failure updates without routing disruption. Two key ideas are the interface specific forwarding and local rerouting. When a failure occurs, packets are locally rerouted without link state update. In OSPF, packets may be caught in loops if we suppress the failure updates. However, in FIR, by using interface specific forwarding table, packets reach the destination without looping. The suppression of link failures provides higher routing stability.

Blacklist Aided Forwarding (BAF)

For static wireless networks, we propose a novel link-state-based blacklist-aided forwarding (BAF) approach, that takes advantage of the fact that the nodes and therefore their adjacencies are relatively *static*, for scalable packet delivery. Under BAF, each packet carries a blacklist, a minimal set of degraded-quality links encountered along its path, and the next hop is determined based on both its destination and blacklist. BAF provides loop-free delivery of packets to reachable destinations regardless of the number of degraded links in the network.

PUBLICATIONS
MISC

- [1] Zifei Zhong, Ram Keralapura, Srihari Nelakuditi, Yinzhe Yu, Junling Wang, Chen-Nee Chuah, **Sanghwan Lee**, "Avoiding Transient Loops through Interface-Specific Forwarding," In Proceedings of IWQoS'05, Passau, Germany, June 2005
- [2] Zifei Zhong, Srihari Nelakuditi, Yinzhe Yu, **Sanghwan Lee**, Junling Wang, Chen-Nee Chuah, "Failure Inferencing based Fast Rerouting for Handling Transient Link and Node Failures," In Proceedings of IEEE Global Internet, Miami, FL, March 2005
- [3] **Sanghwan Lee**, Zhi-Li Zhang, Sambit Sahu, and Debanjan Saha "On Dimensionality of Coordinate-Based Network Distance Mapping," Technical Report 05-022, Computer Science Department, University of Minnesota, 2005.
- [4] Yinzhe Yu, **Sanghwan Lee**, and Zhi-Li Zhang "Leopard: A Location-Aware Peer-To-Peer System With No Hot Spot," Technical Report 04-031, Computer Science Department, University of Minnesota, 2004.
- [5] **Sanghwan Lee**, Srihari Nelakuditi, and Zhi-Li Zhang, "Impact of AS Hierarchy on Multihoming Performance : A Stub Network Perspective," Technical Report 04-008, Computer Science Department, University of Minnesota, 2004.
- [6] **Sanghwan Lee**, Yinzhe Yu, Srihari Nelakuditi, Zhi-Li Zhang, and Chen-nee Chuah "Proactive vs Reactive Approaches to Failure Resilient Routing," Technical Report 03-031, Computer Science Department, University of Minnesota, 2003.
- [7] Seong Won Shin, **Sang Hwan Lee**, Byeong Ok Kim and Minsoo Suk, "End-to-end Delay Performance of W-CDMA WLL System," Proceedings of the 4th CDMA International Conference (CIC) '99, Vol 2 of 2, pp 434-438, 1999
- [8] Suk I. Yoo, Yong S. Choi and **Sang H. Lee**, "Fault Diagnosis in Air Defense Artilleries using Expert Systems," International Journal on Robotics and Computer-Integrated Manufacturing, Vol.11, No.3, pp.177-186, September 1994.

SERVICES

Reviewers of IWQoS 2004, Networking 2004, ICNP 2004, Infocom 2005, Globecom 2005, NetGames 2005, Infocom 2006, Computer Networks Journal, IWQoS 2004, Networking 2004, ICNP 2004, Infocom 2005, Globecom 2005, NetGames 2005, Infocom 2006, IEEE/ACM Transactions on Networking

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