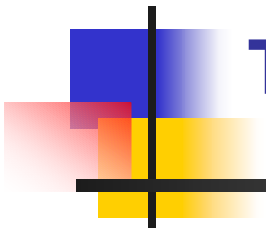
Seminar on Internetworking: Routing - from baseline to state-of-the-art



Topic proposals

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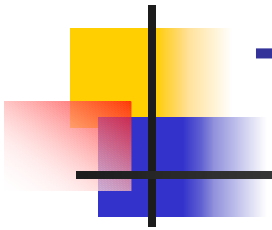


Topics

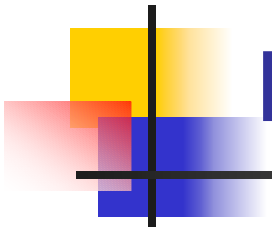
- Routing Security – Solution and challenges
- Trust evaluation based routing in ad hoc networks
- QoS routing for P2P networking

Topic 1: Routing Security – Solution and challenges

- Objectives
  - Understand the necessity of secure routing
  - Study on famous security routing protocols
  - What are the problems solved already and what are open problems/challenges
  - Provide personal opinion on future work
- Candidates
  - Either undergraduates or postgraduates

Suggested research plan

- Motivations: what is routing security? why is it needed? requirements?
- Brief overview of state-of-art
  - History of the routing security (when did the work start? famous work conducted), current status (why is there so little work? how is it different from other security work?, etc.)
  - Internal and external security routing
    - Focus could be on the internal one.
    - Some famous secure routing protocols (SBGP, SOSPF) will be analyzed: basic theory, characteristics and problems (also considered from efficiency and economy points of view).
    - What will be the future development?
- Routing attacks and defenses on them. What has been solved? What has not?
- Provide personal opinion on challenges of secure routing (e.g. in ad hoc networks) and comment existing solutions.



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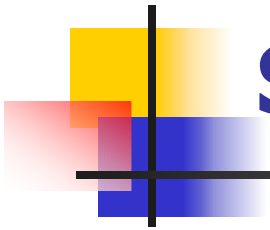
- Paul Syverson, Gene Tsudik, Michael Reed, Carl Landwehr, Towards an Analysis of Onion Routing Security (2000)http://citeseer.nj.nec.com/cache/papers/cs/14515/http:zSzzSzwww.onion-router.netzSzPublicationszSzWDIAU-2000.pdf/syverson00towards.pdf
- **Many papers here about routing security:** http://www.cs.ucsb.edu/~rsg/Routing/papers.html
- Kent, Stephen, et al. "Secure Border Gateway Protocol (S-BGP) -- Real World Performance and Deployment Issues". In Proceedings of the Network and Distributed System Security Symposium (NDSS 2000), San Diego, CA, February 2000.
- "Secure Border Gateway Protocol (Secure BGP),", Stephen Kent, Charles Lynn, Karen Seo, IEEE Journal on Selected Areas in Communication, Vol. 18, No. 4, April 2000. This article describes the basic architecture of the most successful approach to securing BGP. http://www.lasr.cs.ucla.edu/classes/239_1.spring03/papers/JSAC_S-BGP_article.htm
- Nick Feamster, Security for Wide-Area Internet Routing, http://www.acm.org/crossroads/columns/onpatrol/november00.html
- Miscellaneous reference:
  - Routing security slides: http://www.research.att.com/~smb/talks/routesec.pdf
  - IETF routing security requirements and threats: http://www.ietf.org/proceedings/03mar/192.htm

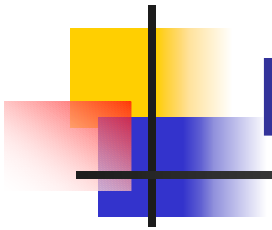
Topic 2: Trust evaluation based routing in ad hoc networks

- Objectives
  - Study a new concept for secure routing in ad hoc networks that actually deal with trust issues and human involvement in ad hoc networks
  - Understand why it is needed
  - Survey the current literature on this work
  - Point out problems in the existing work
- Candidates
  - Preferred: familiar with ad hoc and its routing
  - Postgraduate, undergraduate is also fine



Suggested research plan

- Start at: challenges on secure routing in ad hoc scenario
- Analysis on why trust evaluation can help
- Survey on some existing work
- Comparison and provide your opinion



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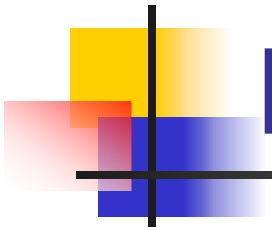
- Vesa Kärpijoki, Signalling and Routing Security in Mobile and Ad-hoc Networks, 17th May, 2000 http://www.hut.fi/~vkarpijo/iwork00/
- Sonja Buchegger, Nodes Bearing Grudges: Towards Routing Security, Fairness, and Robustness in Mobile Ad Hoc Networks. http://www.cs.umd.edu/~waa/class-pubs/sasan.pdf
- MANET routing security slides: http://www.csc.gatech.edu/~gte369k/adhoc_security.pdf
- The work of Baker at Stanford: Mitigating Routing Misbehavior in Mobile Ad Hoc Networks, Mobicom 2000. http://delivery.acm.org/10.1145/350000/345955/p255-marti.pdf?key1=345955&key2=6634714701&coll=GUIDE&dl=GUIDE&CFID=15659998&CFTOKEN=23964888
- The work of Perrig, Hu, and Johnson on secure routing: Ariadne (Mobicom 2002), SEAD (WMCSA 2002), wormhole attacks (Infocom 2003)
  - http://www.cse.cuhk.edu.hk/~xqli/papers/Wireless%20Security/MobiCom/2002/Ariadne_a%20secure%20on-demand%20routing%20protocol%20for%20ad%20hoc%20networks.pdf
  - http://citeseer.nj.nec.com/hu02sead.html
  - http://citeseer.nj.nec.com/hu01packet.html
- Secure Routing Protocol: http://people.cornell.edu/pages/pp59/Docs/mc2r.pdf
- Others
  - The Quest for Security in Mobile Ad Hoc Networks, MobiHOC 2001
  - Small worlds in security systems, ACM New Security Paradigms Workshop 2002.

Topic 3: QoS routing for P2P networking

- Objectives
  - Understand basic knowledge of QoS routing
  - Study the famous solutions of QoS routing in the literature
    - resource reservation protocols(e.g. RSVP), differential services(DiffServ) and MPLS (MultiProtocol Label Switching)
  - Understand P2P system and its basic characteristics
  - Study the necessity/demand of QoS routing for P2P systems
- Candidate:
  - Postgraduate or undergraduate



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- Book:
  - Peer-to-Peer: Harnessing the Power of Disruptive Technologies
- Wen Sun, QoS/Policy/Constraint based routing, http://www.cis.ohio-state.edu/~jain/cis788-99/ftp/qos_routing/index.html
- Shigang Chen, Klara Nahrstedt, An Overview of Quality-of-Service Routing for the Next Generation High-Speed Networks: Problems and Solutions, *IEEE Network Magazine, Special Issue on Transmission and Distribution of Digital Video*, vol. 12, num. 6, pp. 64-79, November-December.
- HUT work: http://www.tct.hut.fi/tutkimus/ironet/qosr.html
- http://www.seas.upenn.edu/~guerin/qos_ospf.html
- RFC: A Framework for QoS-based Routing in the Internet