Guest Editorial

Selected papers from Trusted Internet Workshop (TIW) 2004

Suresh Subramaniam [a], Krishna Sivalingam [b] and G. Manimaran [c]

[a] *Department of Electrical and Computer Engineering, The George Washington University, Washington, DC 20052, USA*
[b] *Department of Computer Science and Electrical Engineering, University of Maryland, Baltimore County, Baltimore, MD 21250, USA*
[c] *Department of Electrical and Computer Engineering, Iowa State University, Ames, IA 50011, USA*

Security was not an inherent feature of the Internet when it was originally deployed. The tremendous success and growth of the wired Internet has led to a wealth of applications ranging from e-commerce to grid computing. Quality of Service (QoS), reliability, and security are necessities for many of the applications. Furthermore, the growing number of wireless devices capable of connecting to Internet has made QoS, reliability, and security important issues in the wireless world as well.

A considerable amount of research has been done on all aspects highlighted above, and much more remains to be done to secure the next-generation Internet and provide QoS. The term *Trusted Internet* refers to the next generation Internet that is capable of providing QoS, reliability, and security guarantees to the applications and end-users.

We are pleased to present before you this special issue of the *Journal of High Speed Networks (JHSN)* consisting of selected papers from the **Third Annual Trusted Internet Workshop (TIW) 2004** that was held in conjunction with the *International Conference on High-Performance Computing (HiPC)* on December 22, 2004 in Bangalore, INDIA. The goal of the workshop was to provide a forum for researchers and practitioners to present and discuss their work and exchange ideas in the areas of Internet QoS, Internet Reliability, and Internet Security. A similar special issue consisting of selected papers from the 2003 workshop was published last year as JHSN special issue, Vol. 13, no. 4, Dec. 2004.

The workshop received 30 paper submissions. Each submission was reviewed by at least three reviewers, following which nine papers, some of which were regular and the remaining short, were selected for presentation at the workshop. For this special issue, we have selected six of these papers. Each of these six papers is an enhanced version of their workshop counterparts, and have been reviewed again by the special issue co-editors. The papers represent a good sample of the ongoing research in this area, and we hope that these will stimulate further advances in this area.

The paper titled "SCIT-DNS: Critical infrastructure protection through secure DNS server dynamic updates" by Y. Huang, D. Arsenault and A. Sood presents a secure implementation framework for DNS servers. The framework called "Self-Cleaning Intrusion Tolerance" eliminates the risk of keeping the private keys of the DNS server online to sign dynamic updates, and uses hardware redundancy. An implementation of the framework is also presented.

The paper titled "SPEE: A Secure Program Execution Environment tool using code integrity checking" by O. Gelbart, B. Narahari and R. Simha attempts to create a secure program execution environment by complementing the existing code security tools with the addition of program checking and program/user authentication. To this

end, they propose a system called SPEE which provides static verification of code before execution and code block verification at runtime. The SPEE tool is designed to function as part of the operating system kernel and provides a trusted computing system.

In the paper titled "Using routing data for information authentication in sensor networks" by V. Bhuse, A. Gupta, M. Terwilliger, Z. Yang and Z. Kamal, the authors address security in wireless sensor networks. They present a lightweight protocol called Information Authentication in Sensor Networks (IASN), that has the ability to detect a large number of forged packets at low cost. The protocol works by letting the nodes keep track of some routing information and filtering out packets that are not supposed to arrive at the nodes.

The next paper called "AR-TCP: A loss-aware adaptive rate based TCP for ad hoc wireless networks" by B.V. Ramana, B.S. Manoj and C.S.R. Murthy presents a new idea to improve end-to-end throughput in ad hoc wireless networks. A slight enhancement to TCP called AR-TCP is implemented as an adaptive transport controller (ATC) layer that operates below TCP and schedules outgoing TCP data segments according to the available end-to-end data rate. ATC also responds to path breaks by pushing TCP into a FREEZE state to avoid unnecessary retransmissions and timeouts.

The paper titled "A novel architecture for secure group communication in wireless ad-hoc networks with application-level multicast" by R. Mukkamala, M. Moharrum and M. Eltoweissy presents a novel architecture for secure group communication (key generation and distribution, authentication) in wireless ad-hoc networks. The architecture does not assume the existence of network level multicast capabilities and integrates the multicast and group management functions in the application layer.

Finally, the paper called "Key management and delayed verification for ad hoc networks" by M.G. Zapata presents an extension to the Secure AODV routing protocol by removing the need for a certificate authority. It also presents ways to reduce delays in route establishment in cases where routing messages are signed and need to be verified.

We hope that you will enjoy this collection of six papers that address various aspects of security and QoS. The Guest Co-Editors would like to thank the authors for considering this journal as a venue for disseminating their research and the reviewers and TIW TPC members for their invaluable help. We also express our deepest gratitude to Dr. Deepindher Sidhu, Editor-in-Chief of this journal for supporting special issues from the TIW workshop series.

Guest Editor Biographies

Suresh Subramaniam has been with the Department of Electrical and Computer Engineering at the George Washington University, Washington, DC since 1997. He is currently an Associate Professor. He received the PhD degree in electrical engineering from the University of Washington, Seattle, in 1997.

His research interests are in the architectural, algorithmic, and performance aspects of communication networks, with particular emphasis on optical and wireless ad hoc networks. He has published over sixty papers in acclaimed conferences and journals, and holds one patent. His research has been supported by DARPA, NSF, NSA, and NIST.

Dr. Subramaniam is a co-editor of the books "Optical WDM Networks – Principles and Practice" (Kluwer, 2000) and "Emerging Optical Network Technologies: Architectures, Protocols, and Performance" (Springer, 2005). He has been on the program committees of several conferences including Infocom, ICC, Globecom, and Broadnets, and served as TPC Co-Chair of the Optical Networking Symposium in Broadnets 2004. He is serving as the General Chair of Broadnets '06, TPC Vice-Chair of the optical symposium at Globecom '06, and Lead TPC Co-Chair of the optical symposium at ICC '07. He currently serves on the editorial boards of Journal of Communications and Networks and IEEE Communications Surveys and Tutorials. He is a co-recipient of the Best Paper Award at the 1997 SPIE Conference on All-Optical Communication Systems.

Krishna M. Sivalingam is an Associate Professor in the Dept. of CSEE at University of Maryland, Baltimore County. Previously, he was with the School of EECS at Washington State University, Pullman from 1997 until 2002; and with the University of North Carolina Greensboro from 1994 until 1997. He has also conducted research

at Lucent Technologies' Bell Labs in Murray Hill, NJ, and at AT&T Labs in Whippany, NJ. He received his PhD and MS degrees in Computer Science from State University of New York at Buffalo in 1994 and 1990 respectively; and his BE degree in Computer Science and Engineering in 1988 from Anna University, Chennai (Madras), India. While at SUNY Buffalo, he was a Presidential Fellow from 1988 to 1991.

His research interests include wireless networks, optical wavelength division multiplexed networks, and performance evaluation. He holds three patents in wireless networks and has published several research articles including more than thirty journal publications. He has published an edited book on wireless sensor networks in 2004 and edited books on optical networks in 2000 and 2004. He is co-recipient of the Best Paper Award at the IEEE International Conference on Networks 2000 held in Singapore. He is a member of the Editorial Board for ACM Wireless Networks Journal, IEEE Transactions on Mobile Computing, Elsevier Optical Switching and Networking Journal, International Journal of Security and Networks, Ad Hoc and Sensor Wireless Networks Journal, and KICS Journal of Computer Networks.

He serves as Steering Committee Co-Chair for the International Conference on Broadband Networks (Broad-Nets) and for International Conference on Security and Privacy for Emerging Areas in Communication Networks (SecureComm). He has served in various leading organizational roles at several International Conferences including IEEE SECON, OptiComm, and IEEE INFOCOM. He is a Senior Member of IEEE and a member of ACM.

G. Manimaran is currently an Associate Professor in the Department of Electrical and Computer Engineering at Iowa State University, where he was an Assistant Professor during January 1999 – June 2005. He received his PhD degree in Computer Science and Engineering from Indian Institute of Technology (IIT), Madras, INDIA, in 1998. His research expertise is in the areas of Trusted Internet encompassing QoS, fault-tolerance, and infrastructure security aspects, and resource management in real-time systems. He is co-author of about 100 research publications, of which two conference/workshop papers received the best paper awards. He is a co-author of the text titled "Resource management in real-time systems and networks", MIT Press, 2001. He has served as guest co-editor for a special issue in each of IEEE Network (Jan/Feb. 2003) and Journal of Systems and Software (2005). He has served as Program co-chair of International Workshop on Parallel and Distributed Real-Time Systems (WPDRTS) 2003 and its General co-chair in 2004. He is a founding co-chair of the Trusted Internet Workshop (TIW) held in conjunction with HiPC. He has given tutorials at leading conferences such as INFOCOM 2004, IEEE ComSoc Tutorials Now (online), and Hot Interconnects 2004 and 2005. He has served as session chair and member of technical program committee in several IEEE conferences. He is member of IEEE, IEEE Computer and Communication Societies, and ACM. His e-mail address is: gmani@iastate.edu