System seminar: Towards Self-propagate Mal-packets in Sensor Networks

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Abstract:
With the emergence of new applications and deployments of sensor networks, security threats in sensor networks are drawing more attentions among researchers and developers. However, sensor applications are implemented in embedded computer systems that have some unique features differing from regular computers. In this talk, we will explore these features and their impacts on the software security of sensor applications. We found that although memory-related attack techniques in regular computers present similar threats to sensor networks, sensor hardware and software architecture raise new challenges to both attackers and defenders. We found that mal-codes carried by exploiting packets cannot be executed in sensors having the Harvard architecture. Therefore, we proposed a set of attack approaches to illustrate that a mal-packet, which only carries specially crafted data, can exploit memory-related vulnerabilities and utilize existing application codes in a sensor to propagate itself without disrupting sensor's functionality. We also examined possible propagation pattern of such mal-packets in sensor networks. As our ongoing research, we are exploring several defense technologies that are tuned for sensor architectures.

Bio: Qijun Gu received the Ph.D. degree in Information Sciences and Technology from Pennsylvania State University in 2005, the Master degree and the Bachelor degree from Peking University, China, in 2001 and 1998.
His research interests cover various topics on network, security and telecommunication. He has been working on projects including denial of service in wireless networks, key management in broadcast services, worm propagation and containment, genetic algorithm in network optimization, etc. His current projects include vulnerability in sensor applications, authentication in ad hoc and sensor networks, and security in peer to peer systems. His work is funded by Texas State University Research Enhancement Program.