Securing Power Grid: A Markov Game Theoretic Approach

Abstract: One class of cyber-attack is advanced persistent threats (APT) where highly skilled attackers can steal user authentication information’s and then in a hidden manner, move laterally in the network, from host to host, until they reach an better target. The extensive use of information and communication technologies in power grid systems make them vulnerable to cyber-attacks. Once the presence of the attacker has been detected in the network, appropriate actions should be taken quickly to prevent the attacker going deeper.

This talk presents a game theoretic approach to optimize the defense against an invader attempting to use a set of known vulnerabilities to reach critical nodes in the network. The network is modeled as a vulnerability multi-graph. The vulnerabilities are exploited by attackers to move laterally from one host to another. A Markov game is built based on a vulnerability multi-graph graph. The solution of the game provides the optimal strategy to disconnect vulnerable services.

Bio: Laurent L. Njilla received his B.S. in Computer Science from the University of Yaoundé 1 in Cameroon, the M.S. in Computer Engineering from the University of Central Florida (UCF) in 2005 and Ph.D. in Electrical Engineering from Florida International University (FIU) in 2015. He joined the Cyber Assurance Branch of the U.S. Air Force Research Laboratory (AFRL), Rome, New York, as a Research Electronics Engineer in 2015. Prior to joining the AFRL, he was a Senior Systems Analyst in the industry sector for more than 10 years. He is responsible for conducting basic research in the areas of hardware design, game theory applied to cyber security and cyber survivability, hardware Security, online social network, cyber threat information sharing, category theory, and blockchain technology. He is the Program Manager for the Cyber Security Center of Excellence (CoE) for the HBCU/MI and the Disruptive Information Technology Program at AFRL/RI. Dr. Njilla’s research has resulted in more than 50 peer-reviewed journal and conference papers and multiple awards including Air Force Notable Achievement Awards, the 2015 FIU World Ahead Graduate award and etc. He is a reviewer of multiple journals and serves on the technical program committees of several international conferences. He is a member of the National Society of Black Engineer (NSBE).