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IEEE COMMUNICATIONS SOCIETY North Jersey Chapter

Chaos and Its Applicability to Communications Security

by Stamatios Kartalopoulos, COMSOC Distinguished Lecturer and Williams Professor in Telecommuniations Networking of University of Oklahoma

Date: March 24, 2009 (Tuesday)
Time: 6:00 pm (refreshment starts at 5:45 pm)
Place: 202 ECEC, NJIT

About the Speaker

Stamatios V. Kartalopoulos, PhD, is currently the Williams Professor in Telecommunications Networking with the University of Oklahoma. His research emphasis is on optical communication networks (long haul, FSO, and FTTH), optical technology including signal performance sensors, optical metamaterials, as well as chaotic processes, optical network security, including quantum networks and chaotic quantum cryptography. Prior to this, he was with Bell Laboratories where he defined, led and managed research and development teams in the areas of DWDM networks, SONET/SDH and ATM, Cross-connects, Switching, Transmission and Access systems. He has received the President's Award and many awards of Excellence.

Dr Kartalopoulos holds nineteen patents related to communications networks and technology, and has published more than hundred fifty research papers, nine reference textbooks, and chapters to other books.

He has been an IEEE and a Lucent Technologies Distinguished Lecturer and has lectured at international Universities, at NASA and conferences. He has been keynote speaker of major international conferences, has moderated executive forums, and has organized symposia, workshops and sessions at major international communications conferences.

Dr Kartalopoulos is an IEEE Fellow, chair and founder of the IEEE ComSoc Communications & Information Security Technical Committee, series editor of IEEE Press/Wiley, and he has served as editor-in-chief of IEEE Press, chair of ComSoc Emerging Technologies and of SPCE Technical Committees, Area-editor of IEEE Communications Magazine, and VP of IEEE Neural Networks Council.

About the Talk

The number of security breaches and network attacks increases as well as the sophistication of intruders and bad actors. To increase information integrity and network security, very complex processes are employed in cryptographic systems, such as chaos theory and quantum theory.

Chaos is based on the particular behavior of certain non-linear functions, which for a minute change of a parameter they produce a very large and unstable output, known as the chaotic regime. However, this chaos is reproducible, which makes it attractive to secure communications. In addition, we have identified certain peculiarities with chaos functions that the user needs to know of a priori.

In this talk we explain chaos and chaotic processes with simple examples. We also describe two cases for which the chaos functions may exhibit an undesirable state.

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