Telecommunications Seminar Series presents...

A New Approach to Providing Quality of Resilience Classes

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University of Pittsburgh

School of Information Sciences

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There is an increasing need for supporting services with high resilience requirements over future communications networks. For example, public safety emergency calls, networked medical systems and smart power grid communications. From a service provider's perspective, there is a need to support classes of quality of resilience (QoR) in a fashion similar to quality of service classes. The basic concept is to categorize traffic into classes and provide different levels of availability and fault protection for each class. The goal of providing QoR classes is to just meet availability requirements without over-engineering the network. In this talk, we introduce a novel method for providing QoR classes that simplifies the network design and achieves both high resilience and differentiation. Our approach, utilizes the spine concept of embedding a sub-network at the physical layer with comparatively high availability link and node values. This lays a foundation for differentiation between multiple classes of flows. Then, cross layer mapping and spine-aware routing are performed in a way that transfers this differentiation capability to the upper layer network and flows. We provide two joint routing-mapping optimization formulations and evaluate their performance in a multilayer scenario showing the advantages of our approach.

David Tipper is the Director of the Graduate Telecommunications & Networking Program and is a Professor at the School of Information Sciences at the University of Pittsburgh, Pittsburgh, PA. He is a graduate of the University of Arizona (Ph.D. EE, MS SIE) and Virginia Tech (BS EE). His research interests include survivable networks, performance analysis techniques, wireless/wired network design, information assurance, network design and traffic restoration; simulation and queuing theory with emphasis on transient/non-stationary behavior, virtual network design, and network control algorithms. Professor Tipper's research has been supported by grants from various government and corporate sources such as NSF, DARPA, NIST, IBM, ARO, and AT&T.