Systems Engineering for Extensible and Interactive Networking and Software Defined Network (SDN)

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Abstract—

Software Defined Networks (SDN) is poised to make a major impact in classical network architecture. SDN to allow flows to be forwarded and processed as per application specification at networking elements. Though it has challenges, the implementation of Open Flow (OF) architecture by all major network vendors and NSF's GENI now paves the way for many innovative active and programmable networked systems to experiment at scale.

This talk will discuss key aspects of this exciting new paradigm. It will also present a formal framework for extensible networked systems building- the *transientware*. This is a formal component engineering framework- which particularly focuses of transparency and interactivity among networked protocol components. Through it- applications or protocol components can systematically subscribe, receive, and in real-time react to selected events. Based on the level of interactivity- this enables several classes of adaptive networked systems to be engineered. As a proof of concept we have designed and implemented several transientware enriched adaptive systems. For example, we have demonstrated elastic video- where TCP friendly adaptive MPEG-2 video transcoder, which can directly interact with the transport layer and adjust its outgoing video rate to satisfy temporal quality constraint of the stream via a dynamic rate adaptive scheme. We have also shown fast mobile handoff cutting through cross-layer mismatch of conventional mobile IP. Interactivity in network protocol elements can greatly benefit advanced applications and middleware.

In this talk we discuss how such intelligent and formal component engineering can be facilitated within Open Flow architecture. This marriage can open up a new horizon- a spectrum of smart solutions can be potentially found to many of the current hard problems in networking.