

Formal specifications of Software-Defined Networks

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As user requirements for computer networks continue to grow, scalability limitations of current network design and implementation become more and more evident. Software-defined networking is an emerging architecture that is dynamic, manageable, cost-effective and adaptable which makes it ideal for the high-bandwidth, dynamic nature of today's applications.

While a lot of progress was made with regards to implementation of SDNs, the formal specification required for their verifications are lagging behind. Common formal specifications used for distributed systems are *Specification and Description Language (SDL)* and *Algebra of Communicating Shared Resources (ACSR)*. SDL is an object-oriented formal language for specification of complex, real-time applications. It is the industry standard with many applications. ACSR is a timed process algebra that supports synchronous timed actions and asynchronous instantaneous events which is useful for modeling systems that are affected not only by execution and synchronization time but also by delays introduced due to scheduling of actions that compete for shared resources.

In my talk I will introduce Software-defined Networking, the principles behind it and how it solves some of the current problems. After that the talk will describe the commonly used tools used for formal specification of SDNs and examples of their use in current attempts at formalizing SDNs. Finally we will look at advantages and disadvantages of these specifications and future options.