

Review on Software Defined Networking (SDN) Prototype Operational Network

Introduction

U.S. Federal investments in networking technologies have fostered the development of the Internet that is now a key technology for the functioning and expansion of U.S. and world commerce, transforming the way everyone does business, increasing business opportunities and capabilities, and providing a world-leading commercial sector in networking equipment and services. Recently, U.S. agencies are investing in innovations leading to the next-generation of network/cloud technologies to provide the improved capacity, tools, service, and equipment needed for the future Internet. One of the most promising new technologies, Software-Defined Networking (SDN), has the potential and momentum to provide game changing innovation to the entire Internet eco-system and to continue U.S. preeminence in commercial network technology.

Review Concept

SDN technology is currently being tried out in many domains by many organizations, each domain with its own flavor. Each organization has had to create customized and application-specific software to adapt SDN to their needs. For SDN to extend its impact to Internet-scale there is now a critical need and an opportunity to extend SDN technology, both within a single domain and transparently across multiple domains, much like the Internet today, with the intent to support novel SDN-based capabilities at the application/service layers.

Within this context, OSTP has directed the Federal agencies participating in the Networking and Information Technology Research and Development (NITRD) Subcommittee Large Scale Networking (LSN) Coordinating Group to plan and hold an LSN review with participation by representatives from Federal agencies, the commercial sector, researchers, and other networking and distributed systems research community participants to explore and report on the need for this prototype SDN network including:

- Identify current capabilities and resources that contribute to development and operation of an operational SDN prototype network that interoperates seamlessly with the current public Internet
- Identify research, resource, and collaboration needs in creating such a system
- Identify gaps in operational software tools necessary for running a production multi-domain SDN network
- Identify /opportunities for SDN virtualized networks to interact with “clouds” of computation and storage
- Provide a review report to the NITRD Subcommittee and OSTP on recommendations for needed R&D, resources and collaboration for the prototype system

The LSN agencies are holding an SDN prototype operational networking review December 17-18 at the National Science Foundation with representation from the academic, Federal, and commercial communities. It is being held to identify the requirements processes, and players to, develop, deploy, operate, and manage, in the near term, this prototype network and, over the longer term, to provide the research and development needed to extend SDN capabilities for end-users.

Review Goals

The goals of this review are to bring together key individuals from academia, Federal agencies, and the commercial sector to:

1. Identify the requirements, timing, and responsibilities needed, over the short term, to develop, deploy and operate a prototype multi-domain SDN network with:

- Transparency and interoperation among SDN domains
- Transparency and interoperation with the public Internet
- Acceptable levels of cybersecurity and robustness
- Technology development for Layer 1, 2, and 3 operations
- Interdomain policy issues (control, identity management, information sharing,...)
- Advanced network capabilities demonstration with SDN like quality-of-service, efficient equipment usage, and energy use reductions
- Participation of commercial equipment providers to facilitate technology transfer
- Development of new applications that leverage novel SDN capabilities

2. Identify needed research and development, over the longer term, to increase the capability of SDN networks to support user applications, and to better integrate SDN technologies with the public Internet and emerging cloud technologies

3. Provide a review report documenting recommendations for needed R&D, resources and collaboration to deploy and operate the prototype nationwide SDN network and to identify future SDN research needs