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Programmable Network Research

S&T Campaign: Computational Sciences
Advanced Computing Architecture

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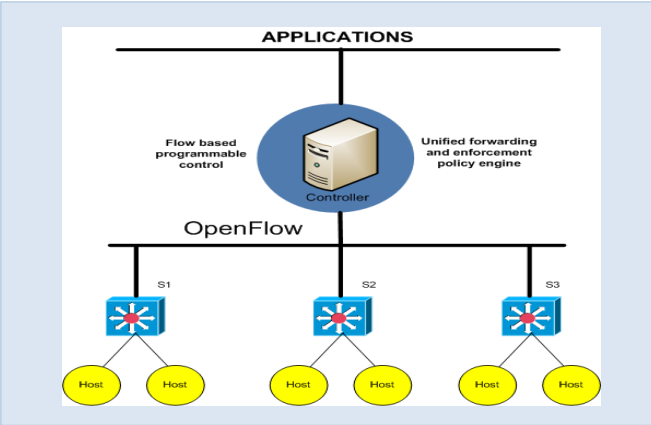
Research Objective

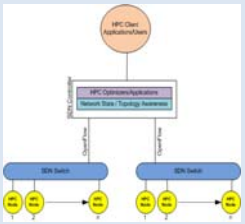
- Development of Programmable network interfaces to create intelligent & adaptable networks with unified control plane
- Modify and Extend OpenFlow to adapt SDN Architectures to Army Network



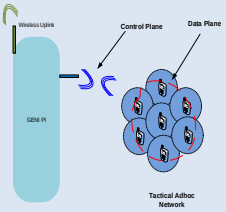
Programmable Network Model

Challenges

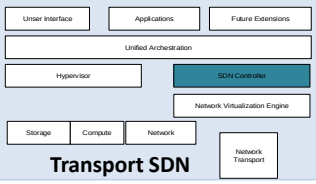
- Implementing programmable network fabrics in existing Army Networks demand significant modification
- Significant modifications to OpenFlow are required to achieve intended functionality
- Integration of MPI with OpenFlow is very challengining



Programmable HPC Network Fabric



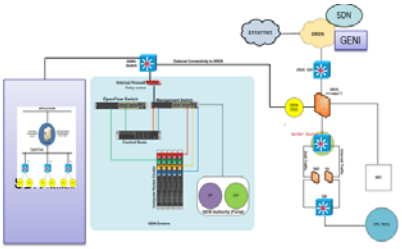
On-Demand Control Plane for Tactical Networks



Transport SDN

ARL Facilities and Capabilities Available to Support Collaborative Research

- Experimental laboratory facilities…
- Specialized modeling/simulation tools and facilities…
- Unique test sites or methods…
- Provide full references of related patents and peer-reviewed journal articles…
- Cite unique ARL expertise…
- Detail significant early findings…



GENI Testbed

SDN Simulation Environments

HPC Systems for Modeling

SDN Lab with Several OpenFlow Compliant Devices

Complementary Expertise/ Facilities/ Capabilities Sought in Collaboration

- Extensive experience in the development of programmable network frameworks
- OpenFlow Programming, experience with Ryu controller
- Control plane programming
- Modeling and Simulation of large scale SDN Networks

Related Work

- "A Unified MAC Layer Model for Heterogeneous Wireless Networks": Saleil Bhat, Venkat Dasari, and Vinod K. Mishra (ARL Technical Report, 2015)
- "Analysis of Cisco ONE OpenFlow Controller Implementation": Curtis Tade, Venkat Dasari, and Vinod K. Mishra ((ARL Technical Report, 2014)
- "Analytical Approach to Polarization Mode Dispersion in Linearly Spun Fiber With Birefringence": Vinod K. Mishra (ARL Technical Report, 2014)
- "GENI Deployment and Research at US Army Research Laboratory", Vinod K. Mishra, Ph.D. and Venkat R. Dasari, Ph.D. (MILCOM Proceedings, 2015)

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