

# Intelligent Networking with SDN: Use Case Perspective(s)

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# FNAL High-Level SDN Interests

- Focus is on intra-domain SDN scope:
  - Inter-domain issues important, but site model must come first
- Our current potential SDN use cases:
  - 1) Science Data Express Path
    - SDN to separate science data from general network traffic
  - 2) Support archiving service for external organizations
  - 3) Logical experiment/collaboration data center networks
    - Separate physical infrastructure gets expensive/complex at 100GE
  - 4) Logical large-scale test facility
  - 5) Extreme high performance data movement
- Strong desire to rationalize these to a common site SDN support model

# General SDN Site Use Case: Separating Out Science Data Movement

- Rationale:
  - Ensuring adequate network resources for science data
  - Isolation of high impact science data from general traffic
    - Elephants versus mice...
  - Enabling different security risk profiles
- What we (FNAL) are doing today:
  - PBR = src/dest route-map
  - OpenFlow is functionally src/dest-based forwarding
- Security advantage from src/dest routing

# Separating Science Data Movement (cont)

- LS strategically designed around dynamic network path (circuit) services:
  - But circuit services were/are largely long lived (static)
  - PBR evolved into our preferred tool for separating out high impact science data
- LS-awareness built into Storage Resource Manager (SRM) for data movement:
  - A very basic form of network-awareness in applications
  - It worked, but there was pushback
  - In response, developed flow data-based application-awareness tool in conjunction with LS
    - This is still an R&D area of interest...

# Specific Use Case: Storage Service(s)

- LS strategically designed around dynamic network path (circuit) services:
  - But circuit services were/are largely long lived (static)
  - PBR evolved into our preferred tool for separating out high impact science data
- LS-awareness built into Storage Resource Manager (SRM) for data movement:
  - A very basic form of network-awareness in applications
  - It worked, but there was pushback
  - In response, developed flow data-based application-awareness tool in conjunction with LS
    - This is still an R&D area of interest...

# Custom Use Case: (Extreme) Performance Optimization

- LS strategically designed around dynamic network path (circuit) services:
  - But circuit services were/are largely long lived (static)
  - PBR evolved into our preferred tool for separating out high impact science data
- LS-awareness built into Storage Resource Manager (SRM) for data movement:
  - A very basic form of network-awareness in applications
  - It worked, but there was pushback
  - In response, developed flow data-based application-awareness tool in conjunction with LS
    - This is still an R&D area of interest...

# One Suggestion for Site-Based SDN Development Path

- Develop a generic model for site SDN support that:
  - Incorporate “common” set of anticipated end site use cases
  - Capable of interfacing to transit network SDN-based services
  - Make use of local network abstraction model(s) developed for LambdaStation/TeraPaths/<others>
- Then build upon LambdaStation/TeraPaths platforms, adapted for OpenFlow, to support that generic model
- Create diverse service access paths:
  - 1) User/Operator-driven service (ie., manual...)
  - 2) SDN service awareness in applications
  - 3) SDN-based application-awareness in networks