

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

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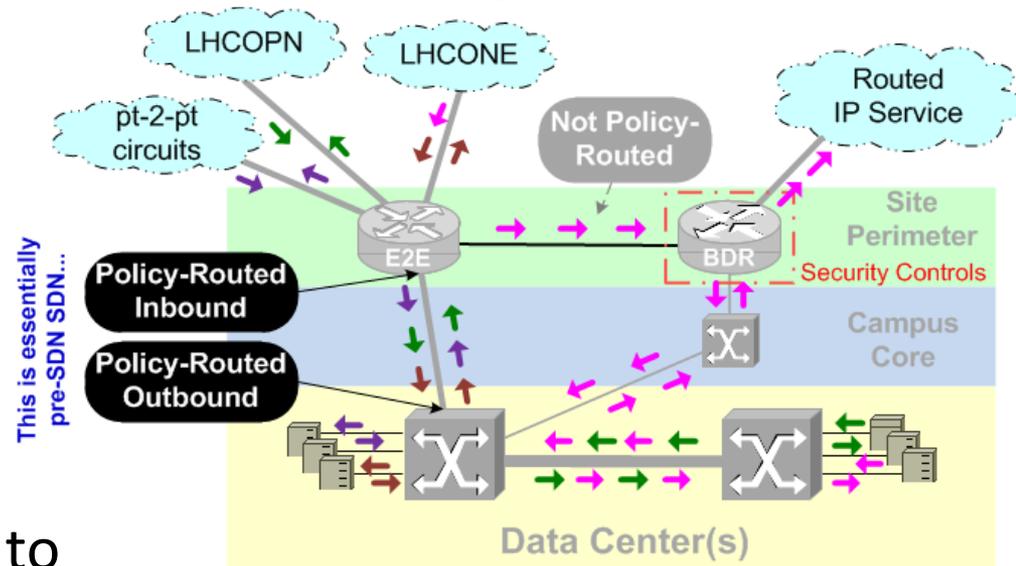
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# FNAL High-Level SDN Interests

- Current focus is on intra-domain SDN scope:
  - Inter-domain “vision” important, but site model comes first
- Potential SDN use cases:
  - 1) Science Data Express Path
    - SDN to separate science data from general network traffic
  - 2) Storage/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

# A General (Intra-domain...) Use Case: Separating Out Science Data Movement

- Objectives:
  - Ensuring adequate network resources for science data
    - Or ensure experiments get what they're paying for...
  - Isolation of high impact science data from general traffic
    - Elephants versus mice...
  - Enabling different security risk profiles
- An SDN example that's not application-driven
  - But could be...
  - Also could be extended to inter-domain service
- Needs to be supported on (common...) site SDN service



# Storage/Archiving Service Use Case

- Lab storage/archiving service for external organizations
  - Currently under evaluation; not a production service
- SDN service would be very attractive feature:
  - To provide predictive (local) network service component
    - Or end-to-end network service component, if feasible
  - Isolation from FNAL science data & general user traffic
  - More favorable security risk assessment
- Storage/archiving service lends itself to SDN service:
  - Customer base well known, modest in scale, relatively static
  - Traffic characteristics also well understood & identifiable

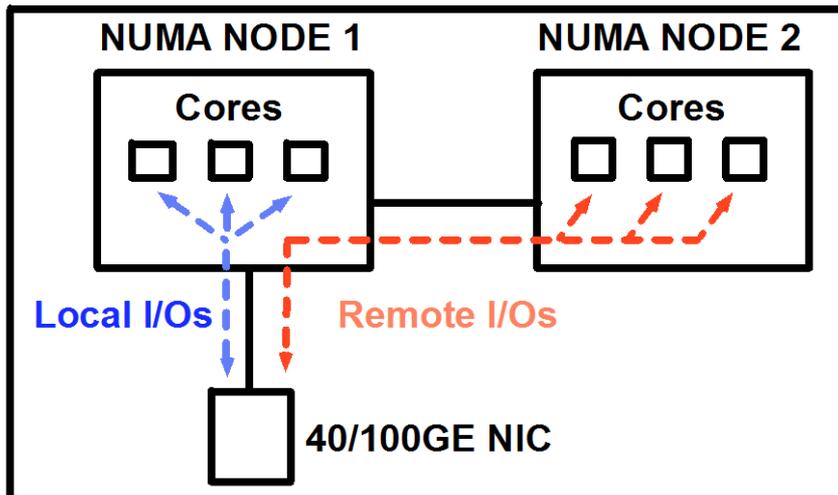
# Storage/Archiving Service Use Case (cont)

- Test case under way with ANL systems:
  - GridFTP
    - Globus DTNs at ANL, with Pfs/Lustre disk
    - dCache DTNs at FNAL, backed with FCS SAN
    - Transferred files post-staged/pre-staged to/from tape
- Case study:
  - Initial transfers <1Gb/s
  - After cursory disk I/O evaluation, “it’s a network problem...”
  - PerfSONAR & iperf testing don’t indicate network problem
  - Dedicated path (w/ OSCARs) circuit established
  - Performance “OK” now, but still not wire rate
- SDN would be a systematic approach to coherently provide & troubleshoot end-to-end service

# Extreme Performance Use Case

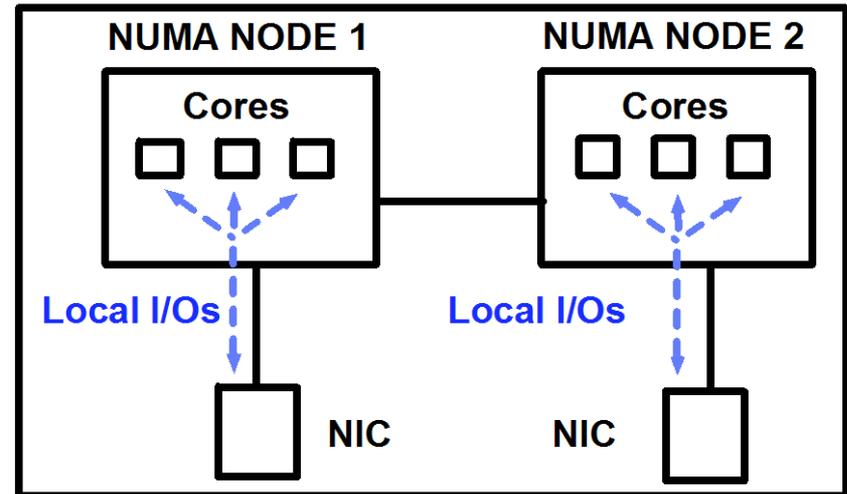
## Which DTN Configuration is better?

DTN configuration 1



a. With one big NIC (40/100 GE NIC)

DTN configuration 2



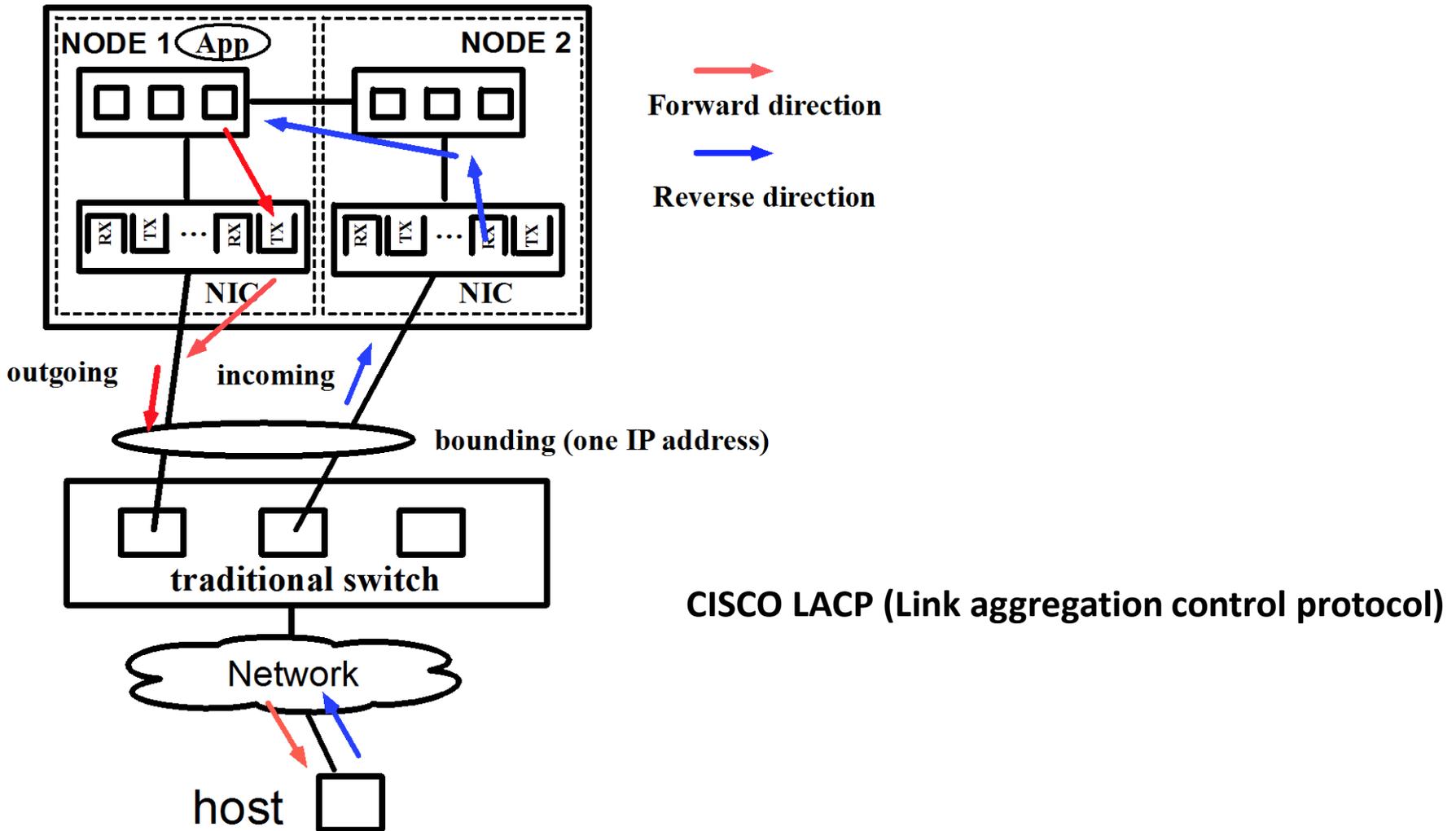
b. With multiple NICs (e.g., 10/40/100GE)

Typically one IP address

How to ensure core affinity on network I/Os?

# A traditional switch cannot ensure core affinity on network I/O

DTN





# Keeping the Big Picture in Mind...

