

Brookhaven National Lab Network Site Update

LHC Meeting 4/4/2017

BNL

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BROOKHAVEN
NATIONAL LABORATORY

a passion for discovery



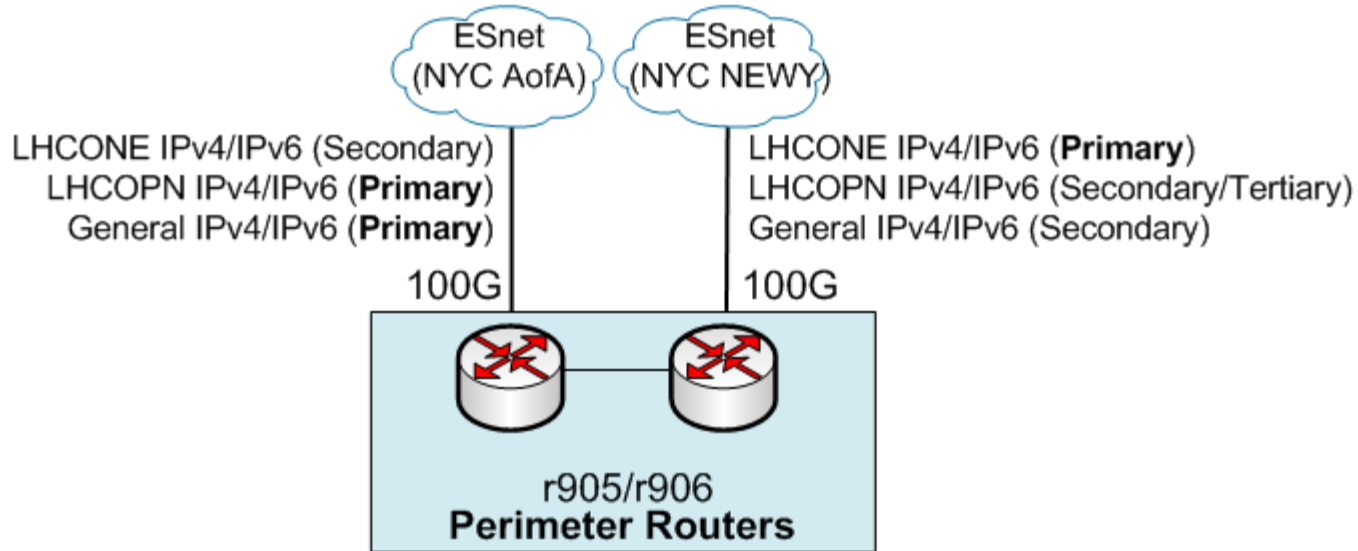
U.S. DEPARTMENT OF
ENERGY

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Welcome to BNL!

- Network Updates
 - BNL WAN Circuit Updates
 - LHCONE/LHCOPN IPv6 Update
 - BNL USATLAS IPv6 Network Readiness

BNL WAN Circuit Updates



■ Network Perimeter

- Two Juniper MX2010s (r905 / r906)
- Each chassis consists of:
 - 2x 100G Line Cards (MPC4E 3D 2CGE+8XGE)
 - 2x 10G Line Cards (MPC 3D 16x 10GE)
- Strictly Layer 3 Routing (OSPF, BGP)

LHCONE/LHCOPN IPv6 Update

- BNL USATLAS IPv6 Connectivity
 - IPv6 connectivity to both LHCONE and LHCOPN
 - Dedicated IPv6 address space for BNL USATLAS
 - 2620:0:210::/48
 - IPv4 and IPv6 Filter Based Forwarding (Policy Based Routing) configured on Network Perimeter to support LHCONE and LHCOPN.

LHCONE/LHCOPN IPv6 Update

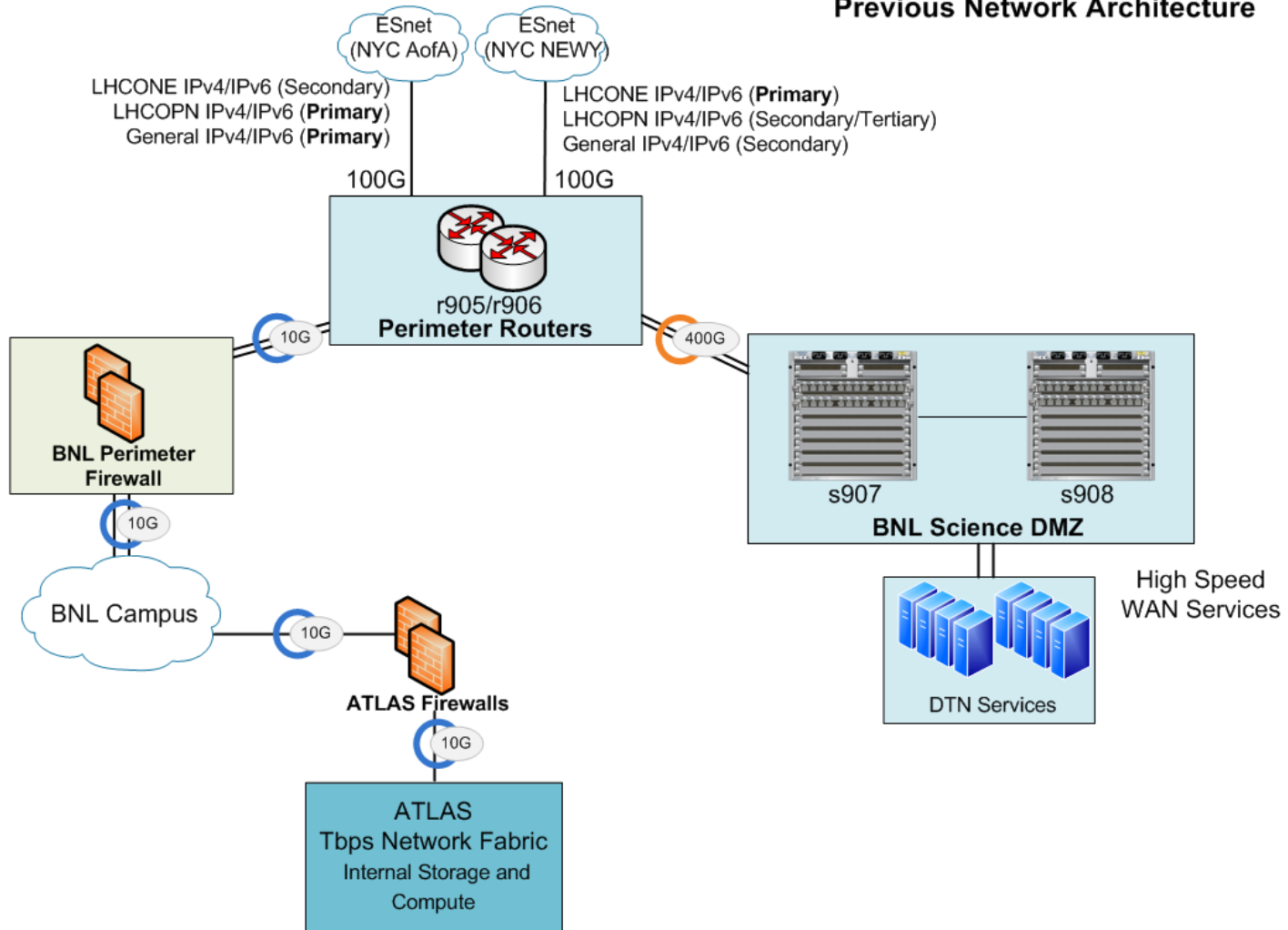
- Supporting LHCONE/LHCOPN Policy Based Routing with Junipers Filter Based Forwarding (FBF).
 - ATLAS subnets utilize the default routing table (inet/inet6) on both perimeter Juniper routers (r905 / r906).
 - Created a VRF for the BNL Campus, which imports all local, OSPF, black hole (Quagga) and default routes.
 - A firewall filter is then applied on all incoming interfaces on the perimeter Juniper routers. This filter states any source traffic that isn't an ATLAS subnet, forward to the campus VRF, else use the default routing table.
 - We went through many design sessions internally to come up with this solution which was the easiest to maintain going forward.

BNL USATLAS IPv6 Network Readiness

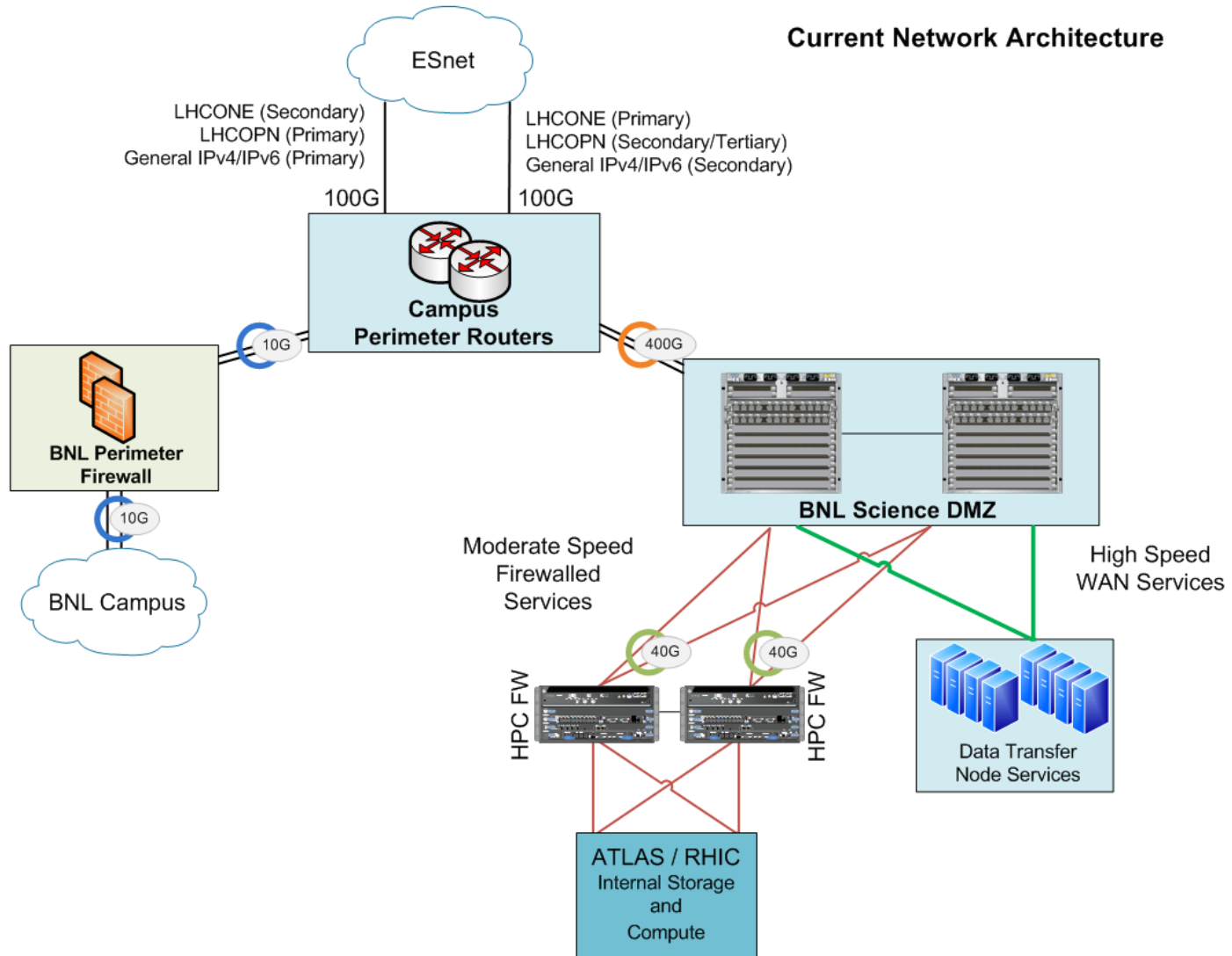
- Worldwide LHC Computing Grid (WLCG) mandate for IPv6 compliance.
 - Central services must be accessible via IPv6 by April 2017
 - Tier 1's will be required to provide dual stack access to storage by April 2017
 - It should be possible for IPv6-only CPU resources by April 2018
- IPv6 connectivity at BNL
 - Currently BNL's campus network doesn't support IPv6 connectivity.
 - Most U.S ATLAS systems at BNL exist within our campus network
 - How do we comply with the WLCG mandate?
 - Lets move BNL USATLAS to our Science DMZ

BNL USATLAS IPv6 Network Readiness

Previous Network Architecture



BNL USATLAS IPv6 Network Readiness



Juniper SRX 5400 Firewalls

- Purchased two Juniper SRX 5400 Firewalls
 - Firewall Performance
 - 65 Gbps of non Express Path capable traffic.
 - 480 Gbps with Express Path.
 - IOC3 Line Card Options
 - 2x100GbE CFP2 and 4x10GbE SFP+
 - 6x40GbE QSFP+ and 24x10GbE SFP+
 - Express Path
 - First packet of a session is sent to SPU.
 - SPU verifies if the traffic is qualified for Express Path
 - If qualified remaining packets are processed by network processor.
 - Our straightforward L3 and L4 requirements are a good fit and perform well on this architecture.

Questions?