BNL Network Status

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BNL

- Supports multiple experiments in various disciplines.
  - Local
    - RHIC; STAR, PHENIX, sPHENIX
    - EIC (future)
    - NSLSII
    - CFN
  - Remote
    - ATLAS, Belle II, etc…

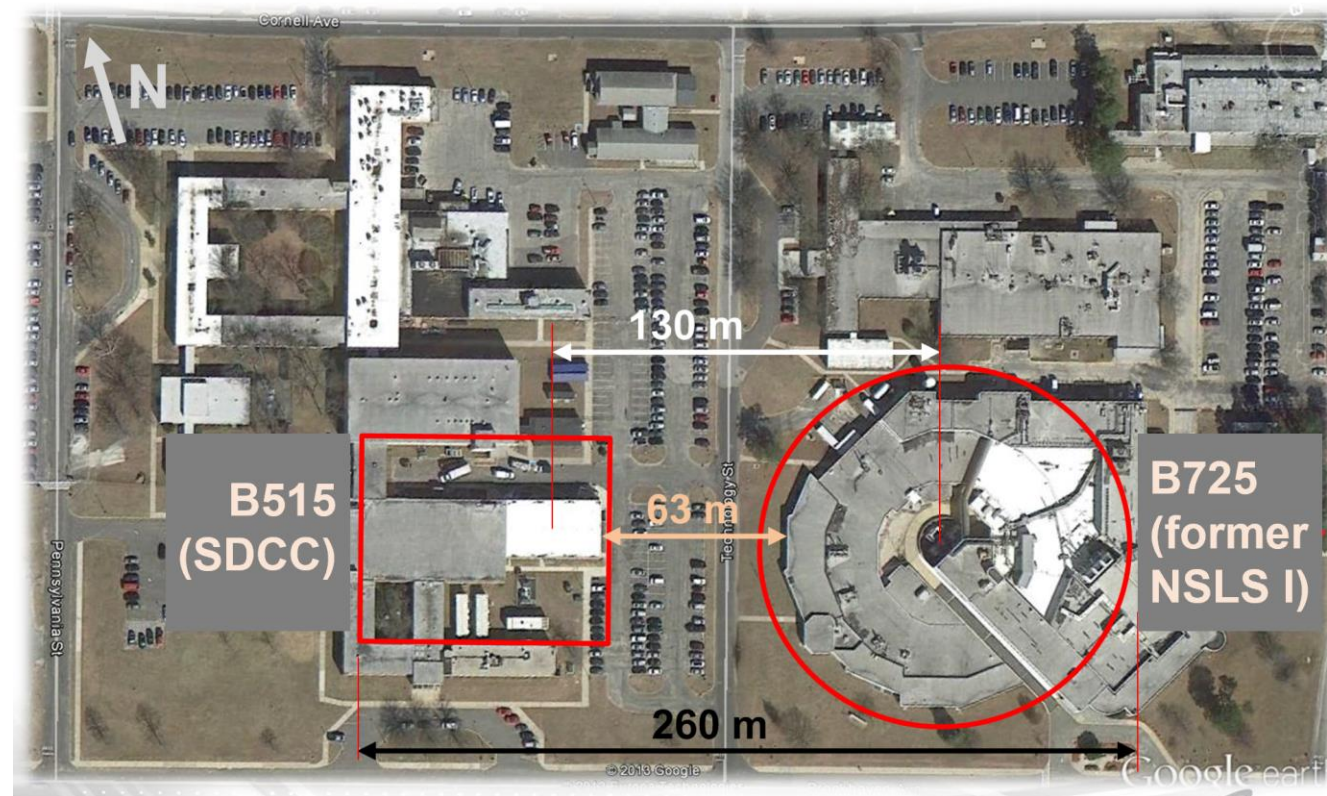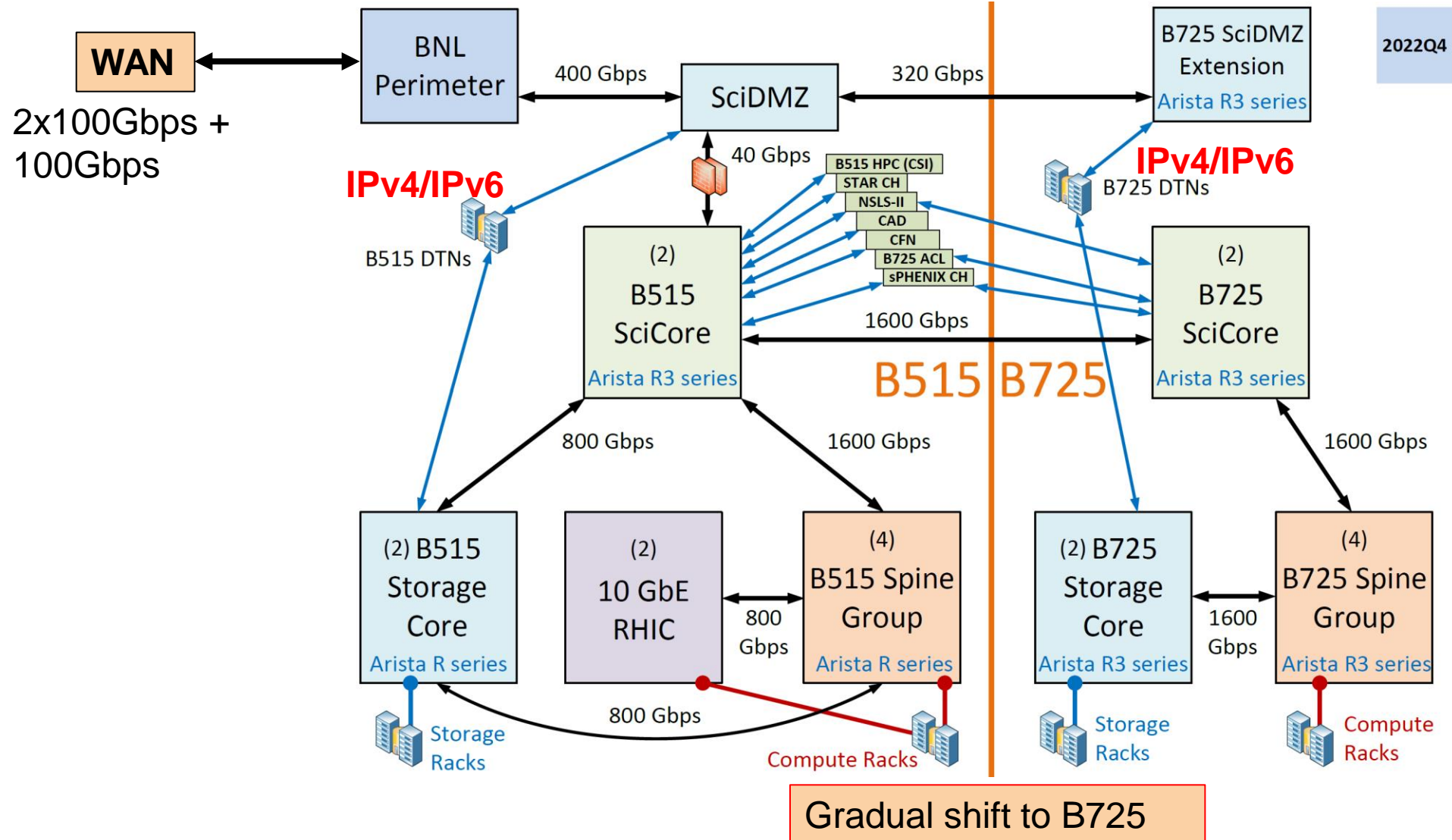# Two physical locations

- B515
  - Existing equipment remains until retirement
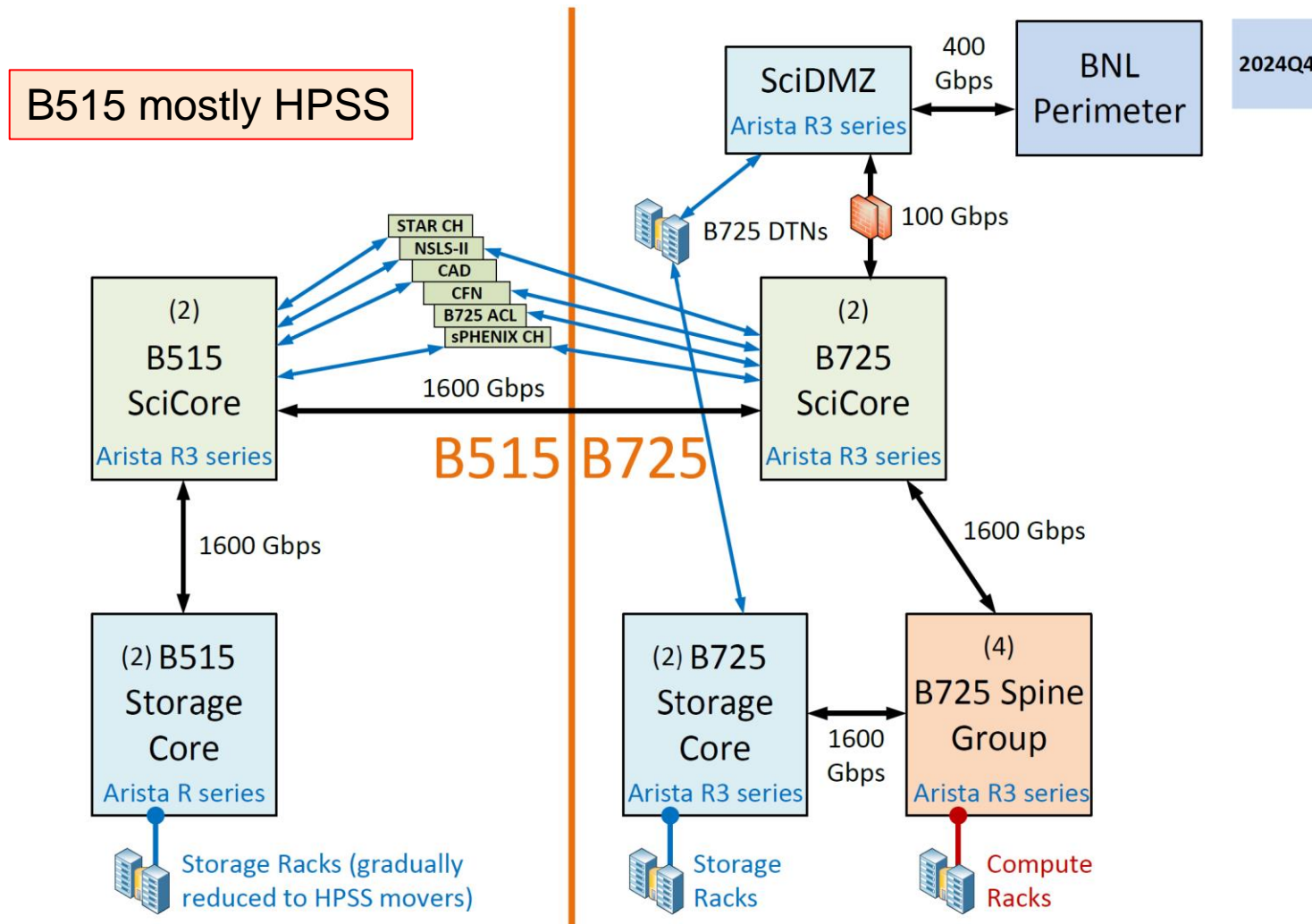
- B725 (former NSLSI)
  - All new equipment are installed

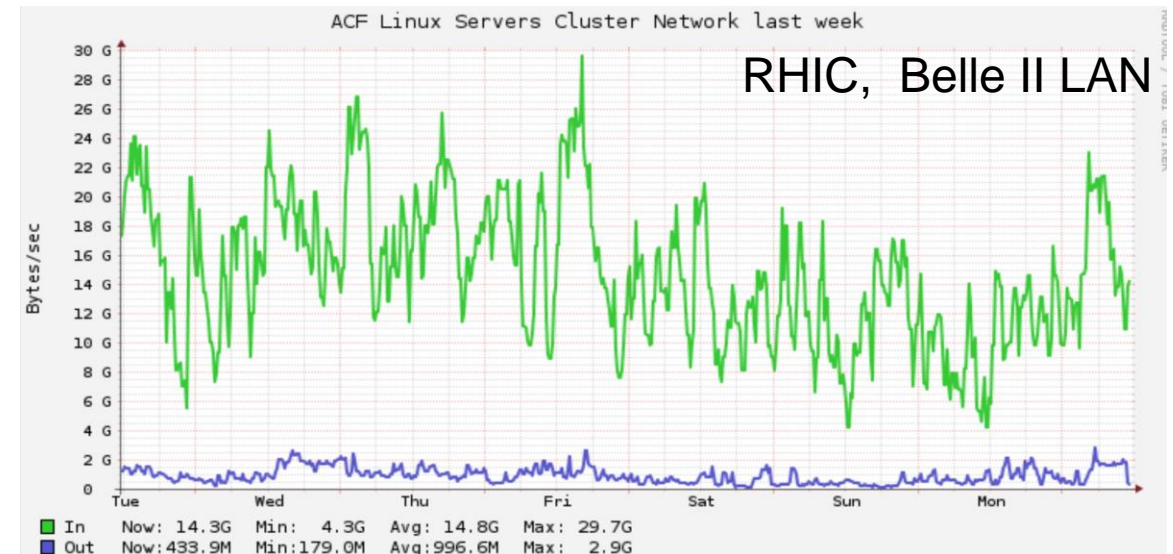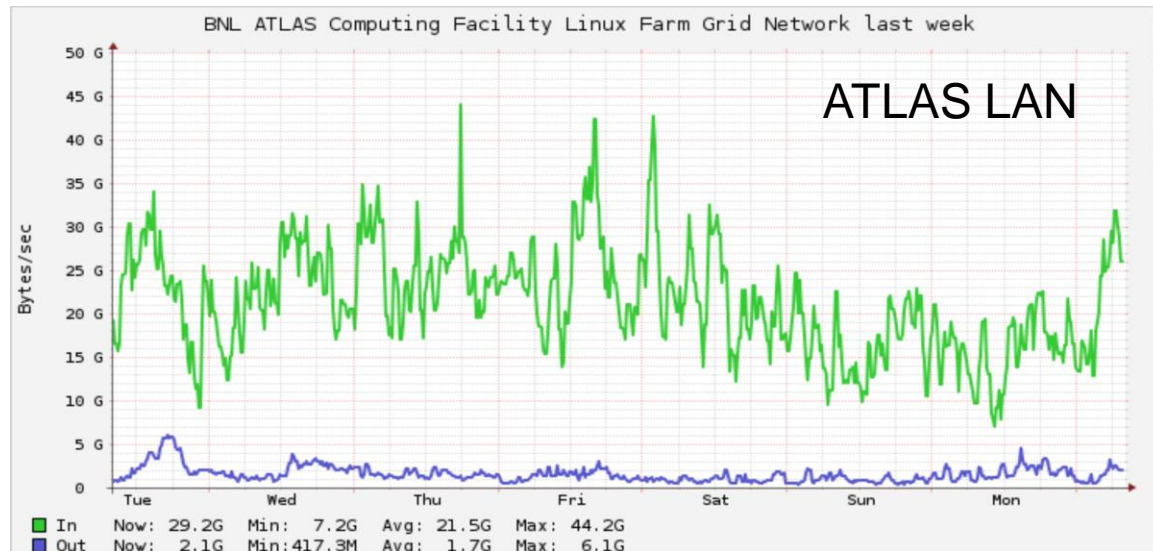
B515 & B725 Data Centers

Network diagrams now

WAN

2x100Gbps +
100Gbps

BNL Perimeter

400 Gbps

SciDMZ

320 Gbps

B725 SciDMZ Extension
Arista R3 series

2022Q4

40 Gbps

IPv4/IPv6

B515 DTNs

IPv4/IPv6

B725 DTNs

B515 HPC (CSI)
STAR CH
NSLS-II
CAD
CFN
B725 ACL
sPHENIX CH

(2) B515 SciCore
Arista R3 series

1600 Gbps

(2) B725 SciCore
Arista R3 series

B515 | B725

800 Gbps

1600 Gbps

1600 Gbps

(2) B515 Storage Core
Arista R series

(2) 10 GbE RHIC

800 Gbps

(4) B515 Spine Group
Arista R series

(2) B725 Storage Core
Arista R3 series

1600 Gbps

(4) B725 Spine Group
Arista R3 series

800 Gbps

Storage Racks

Compute Racks

Storage Racks

Compute Racks

Gradual shift to B725

4

Network Diagram 2024

Network throughput

TOTAL SITE TRAFFIC — WAN

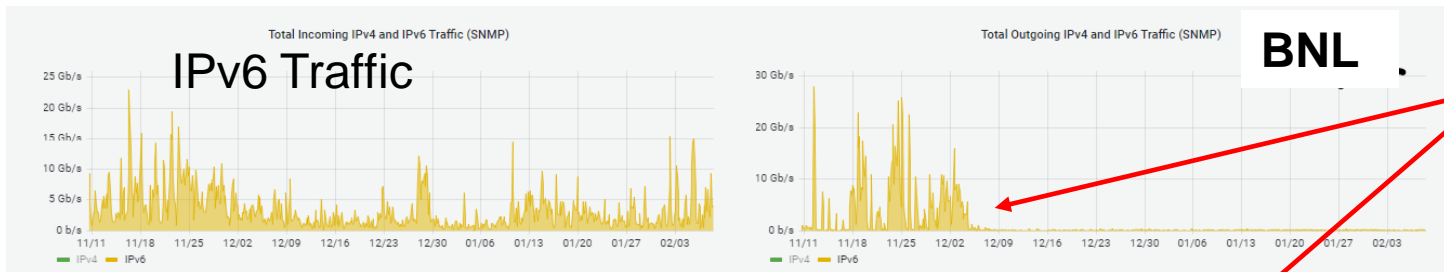RHIC, Belle II LAN

ATLAS LAN

RHIC, Belle II LAN
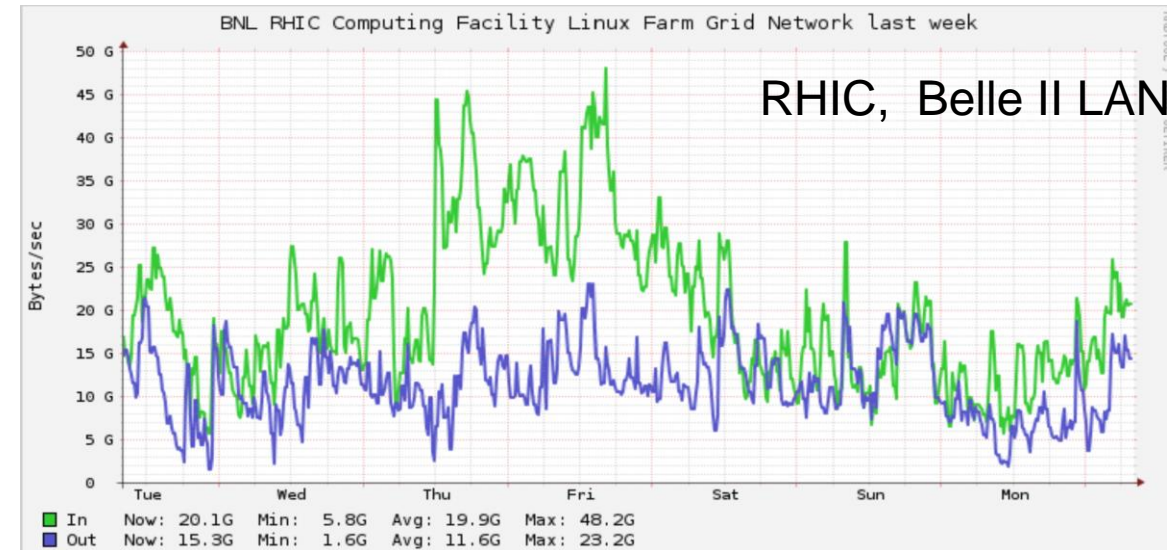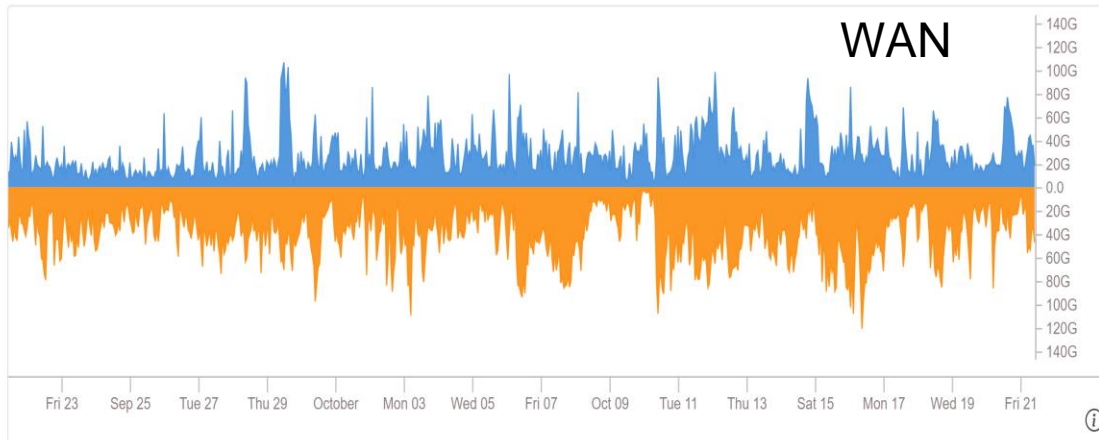
IPv6 at BNL and its disappearance puzzle

- BNL has enabled dual stack 2016.
- It was confirmed to be using IPv6 at that time.

Disappearance Puzzle???
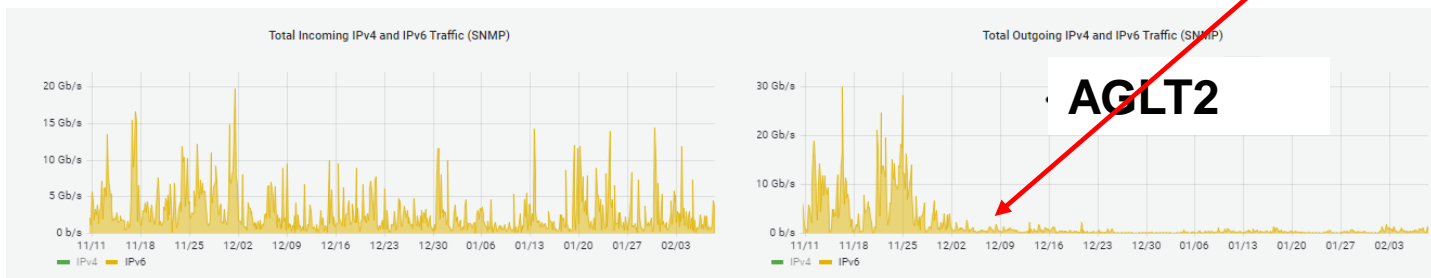2021-2022
Network monitor is showing the large throughput in IPv4.
(Edoardo...)

IPv6 Traffic

BNL

AGLT2

Where did they go?

Solution to the puzzle

Only change
2021 ATLAS went from SRM/GridFTP to WebDAV

RFC3484
Another effect of the default policy table is to prefer communication using IPv6 addresses to communication using IPv4 addresses, if matching source addresses are available.
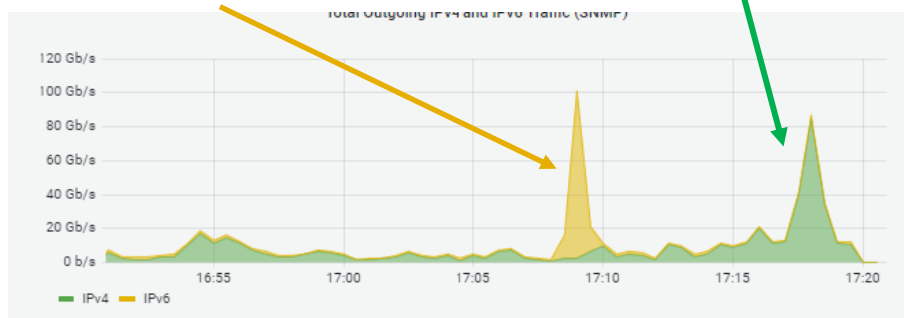
Manual Test

SRM/GridFTP   **WebDAV**

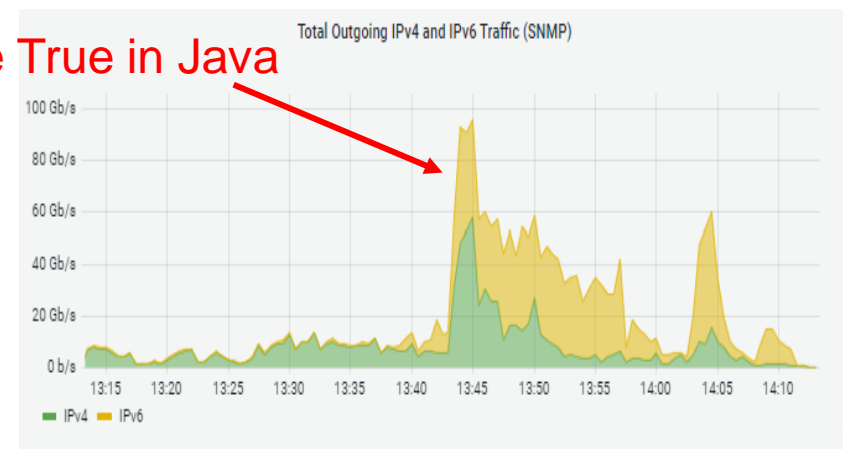**WebDAV doesn't use IPv6!!!**

FTS does not specify IPv6 for WebDAV transfer while it does for SRM/GridFTP because WebDAV does not have such a option. -→ It is using whatever default!

java.net.preferIPv6Addresses (default: **false**)
When dealing with a host which has both IPv4 and IPv6 addresses, and if IPv6 is available on the operating system, the default behavior is to prefer using IPv4 addresses over IPv6 ones.

Set IPv6 Preference True in Java
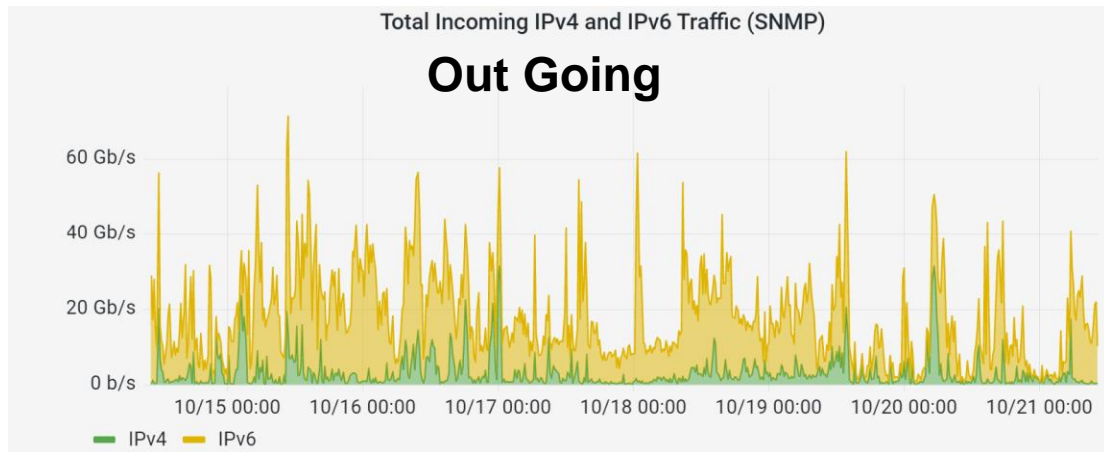
IPv4 vs IPv6 Network throughput

Total Incoming IPv4 and IPv6 Traffic (SNMP)

Out Going

Total Outgoing IPv4 and IPv6 Traffic (SNMP)
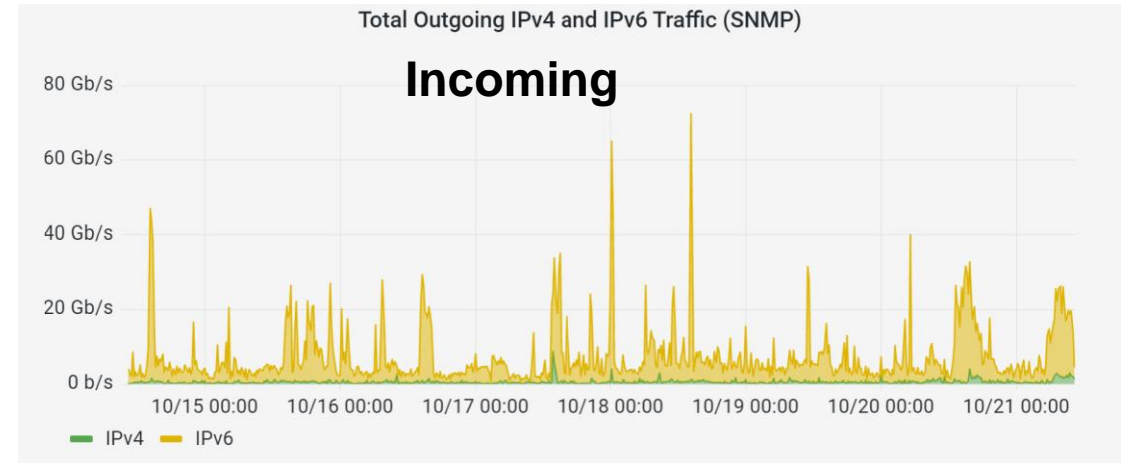
Incoming

- Still some IPv4
- Whether IPv4 or IPv6 transfer is determined by the destination storage.
  - Incoming transfers in the above plot is determined by BNL while that of the outgoing transfers is by remote destinations.
  - <u>More IPv4 traffic in outgoing while not too much in incoming</u> => Some remote destinations are still misconfigured or not supporting IPv6

Toward IPv6 Only testing
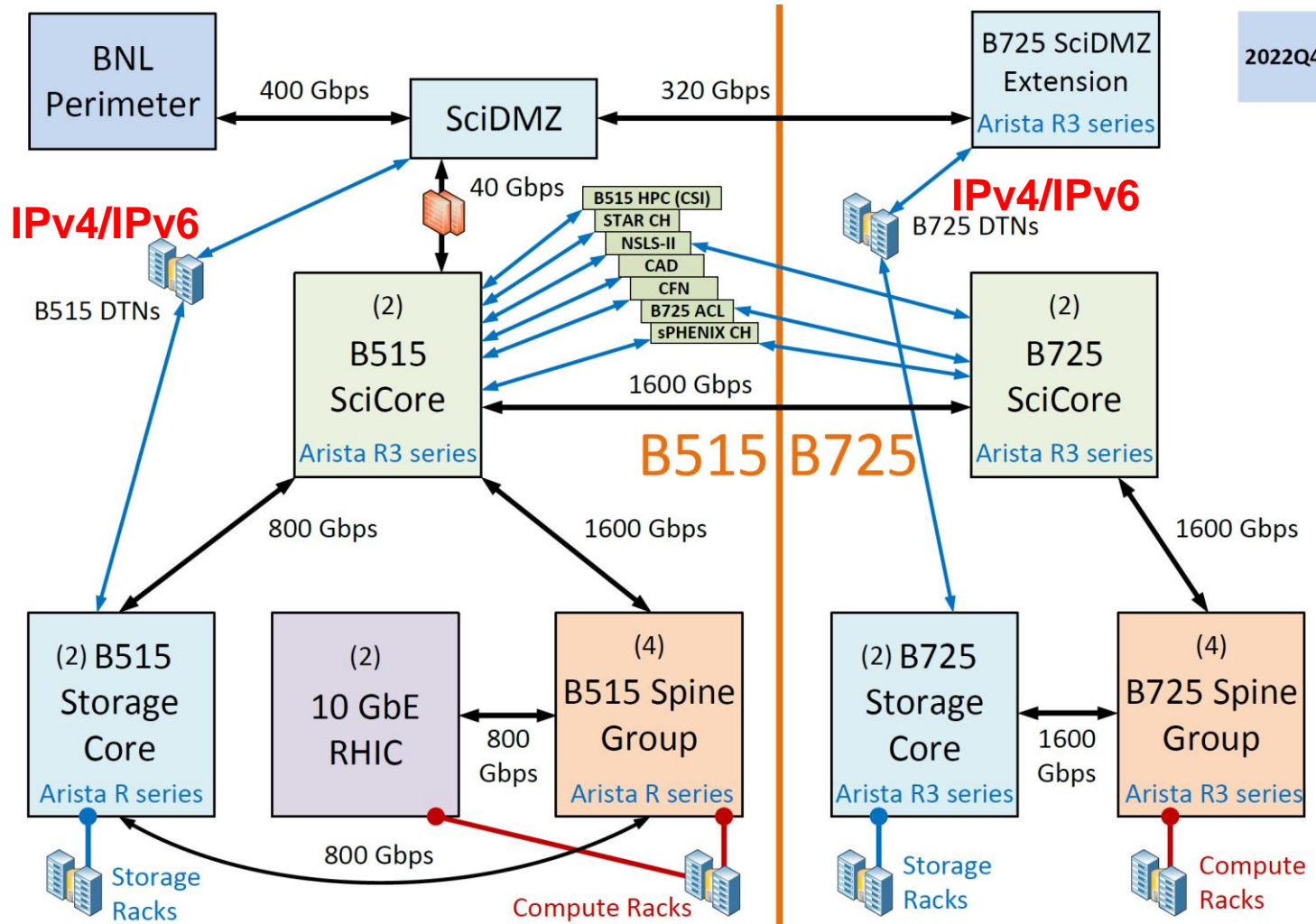
- Dual stack
  - DTNs
  - Storages
- IPv4
  - Worker nodes
  - CVMFS
  - All management services
    - Ssh gateway
    - Configuration and Build management system

Started the process of setting up IPv6 only setup

Conclusions

- BNL network supports all existing experiments well while migrating data center without impact.

- BNL has a plan to support any additional requirements for the future need by the experiments.

- BNL can identify and resolve network issues seen by the experiments.

- BNL has started the process of setting up IPv6 only testing.

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