

HA PV Gateway in ATCA

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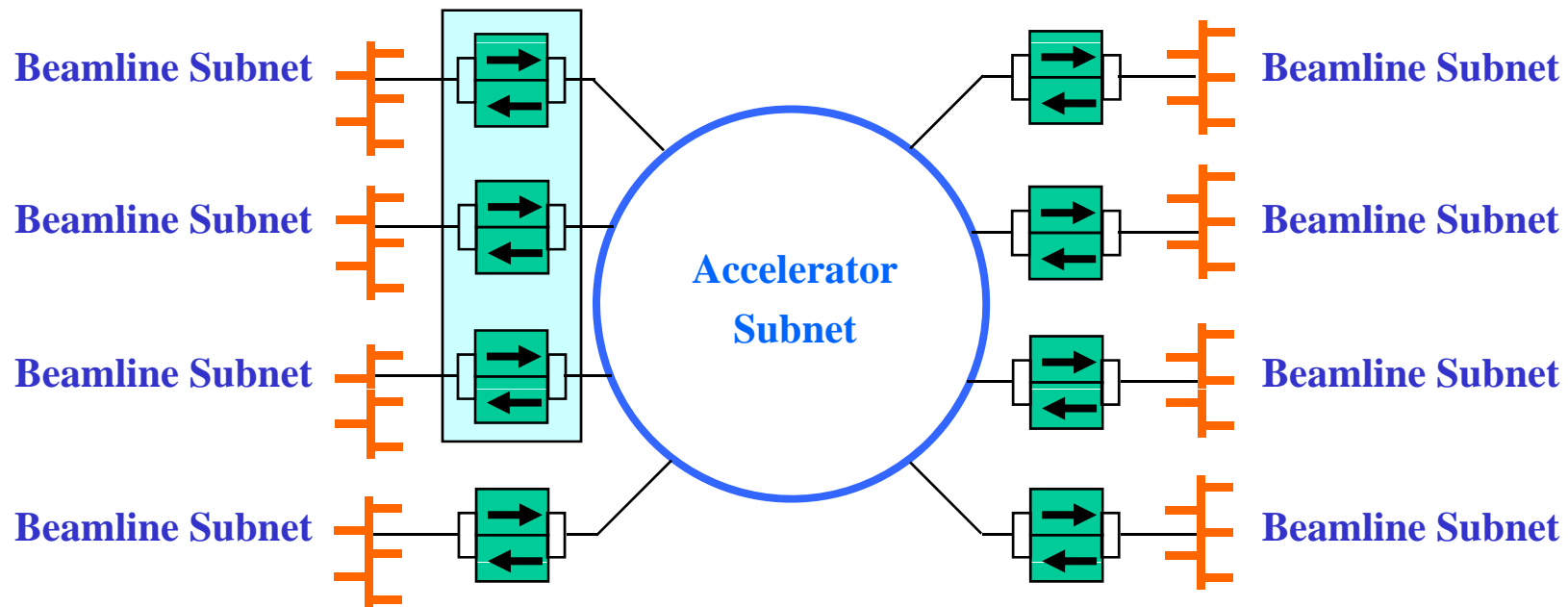


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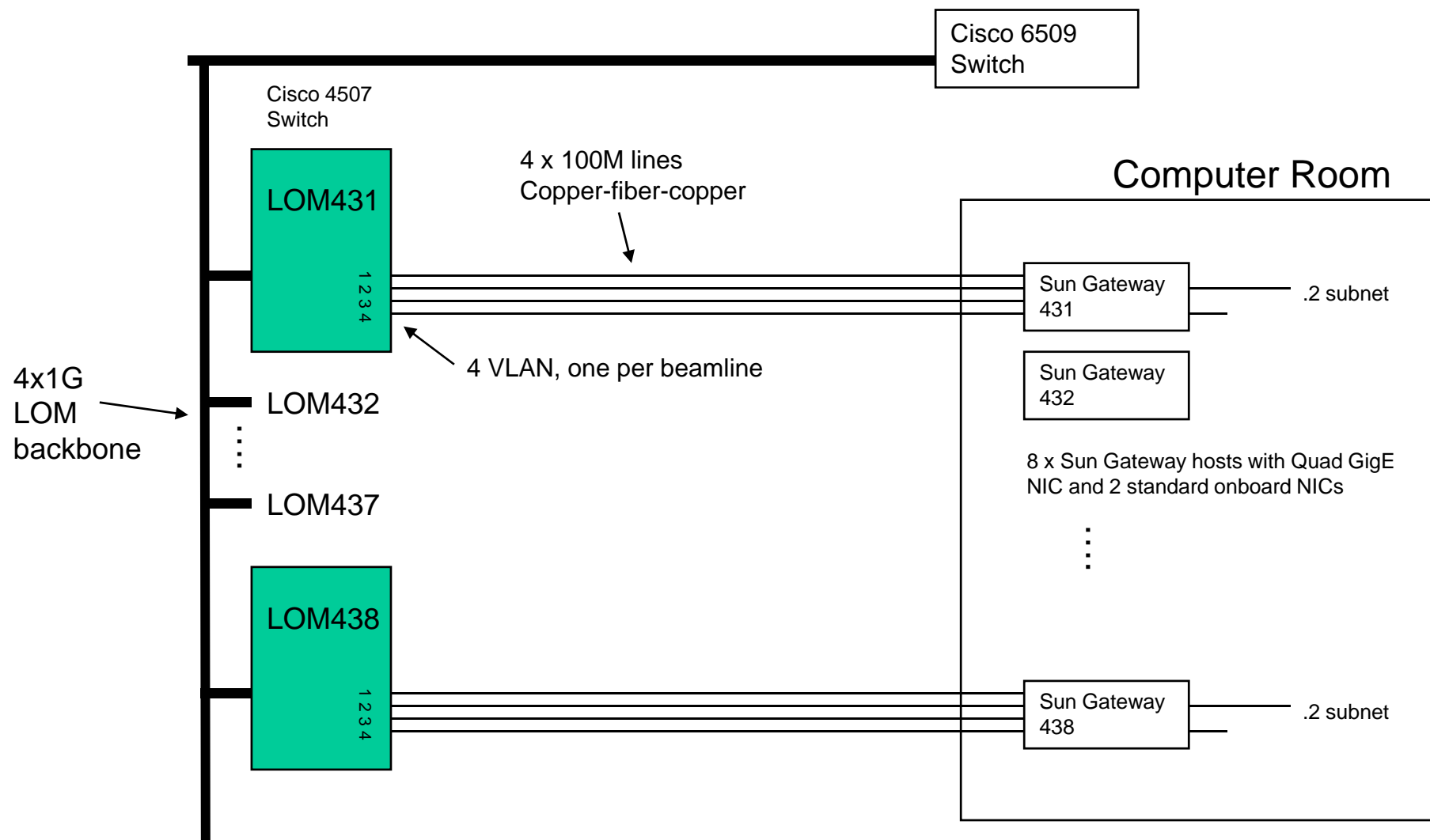


Process Variable Gateways @ APS

- Each sector of experiments (35) has an isolated network (subnet)
- Only certain Process Variables must be accessible to/from the accelerator subnet. Other PV traffic must be blocked.
- A PV Gateway per beamline filters PV requests according to predefined rules (based on naming conventions). “Reverse Gateways” allow the accelerator subnet access to certain beamline PVs.
- To minimize hardware, multiple instances of the PV Gateway (2-5) execute on a single workstation, requiring the workstation to have additional NICs.
- Currently, APS has 42 PV Gateways running on 10 workstations
- Effectively, this provides traffic isolation, filtering, security, and connection management at the application level of the control system. Such capability is essential for large machines.

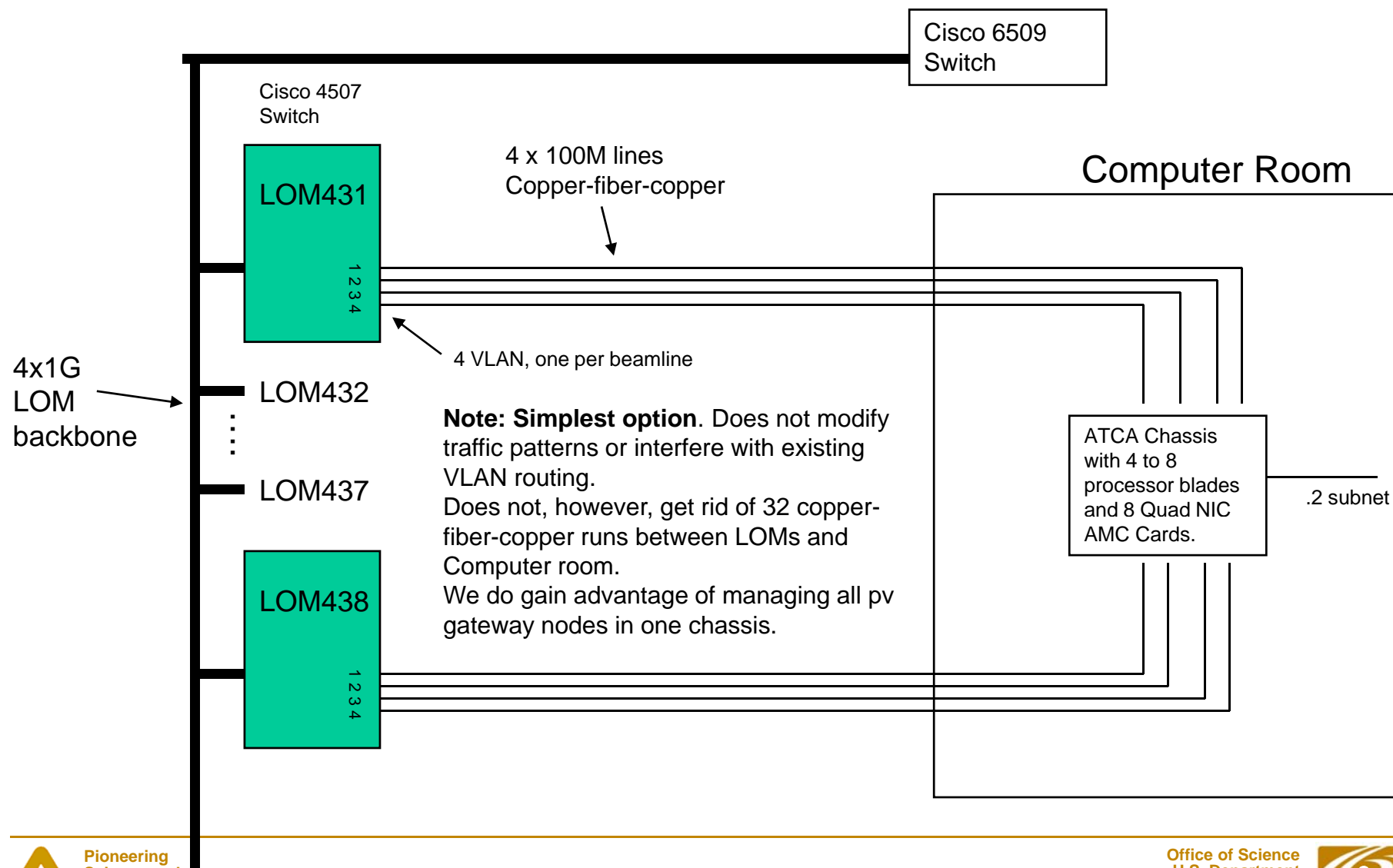


EPICS PV Gateway Network Architecture – Now

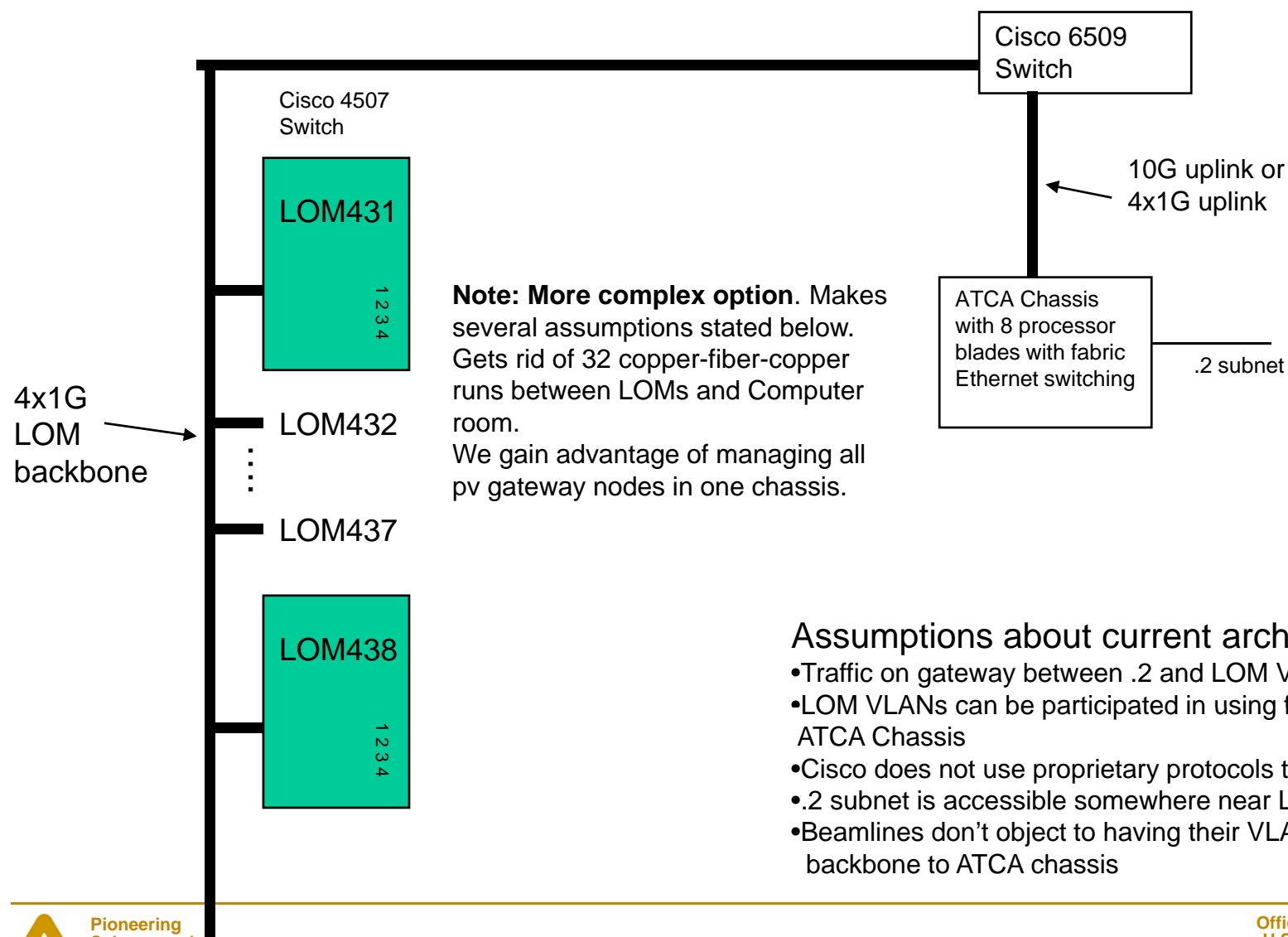


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Modified Architecture – Option #1



Modified Architecture – Option #2



Why is this a good ILC R&D Project?

- It is a real need with real requirements.
- It is entirely a “network traffic” challenge which aligns nicely with telecom-centric ATCA
- Can be done with commercial equipment ... no custom hardware design
- We will learn *a lot* about
 - ATCA hardware and software tools
 - Routing of network traffic
 - Process monitoring, migration, and failover
 - Cost vs. performance of ATCA-based applications
 - Is it really “High Availability”?
 - How applications must be enhanced to take advantage of HA hardware/software
- The R&D effort will directly benefit APS and the APS Upgrade:
 - Understanding the benefits and costs of HA
 - May possibly provide a high performance, highly reliable solution for numerous gateways
 - Approach could be applied to other applications (loggers, RDBs, etc)

Work Package

- **Purpose**

- The ILC controls network will require controls traffic gateways in order to manage connections to the expected (large) number of control points. Controls gateways serve several purposes, but the most fundamental is to manage the issue of many control system clients trying to make connections to potentially every control point. Gateways are critical points of a control system, and very much a telecommunications-like application. We propose to explore the features of AdvancedTCA, both hardware and software, by taking an existing control system gateway, porting it to ATCA, and demonstrating the benefits gained from applying the technology from telecommunications.

- **Goals**

- Demonstrate an existing process variable gateway, modified to provide telecom-grade management and availability, including failover to redundant hardware.
- Gain an understanding of the cost in time and materials to enhance a common controls function with high availability features from the telecom field.

Work Package

- **Deliverables**

- Modified codebase for candidate gateway (EPICS Process Variable Gateway or other) using SAF-compliant AIS implementation.
- Reference architecture for deploying gateway software on ATCA shelf
- Operational demonstration of functions, including behavior when various faults are induced. Perhaps operational deployment at APS.
- Evaluation document of cost-benefit of effort

- **Effort**

- 1 FTE for 1 year (or, more likely, 2 half FTE with complementary skills)

- **Materials**

- 1 ATCA Chassis (with shelf management) with dual star base and fabric backplane
- 2 CPU blades with base and fabric ethernet
- 2 Switch blades with base and fabric switching
- External conventional server to as management and traffic simulation node