

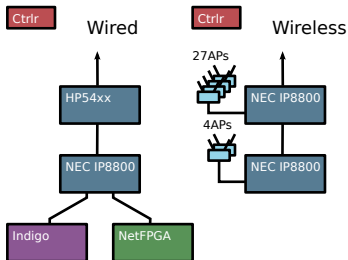
Campus Experiences

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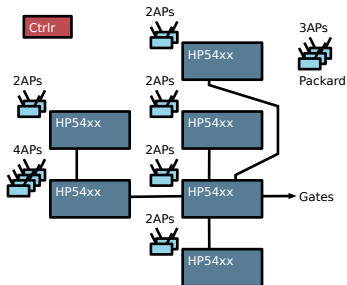
Current Deployments

- Limited active deployment in CS, CIS, and EE buildings
- Wired and Wireless
- Switch limitations

Gates



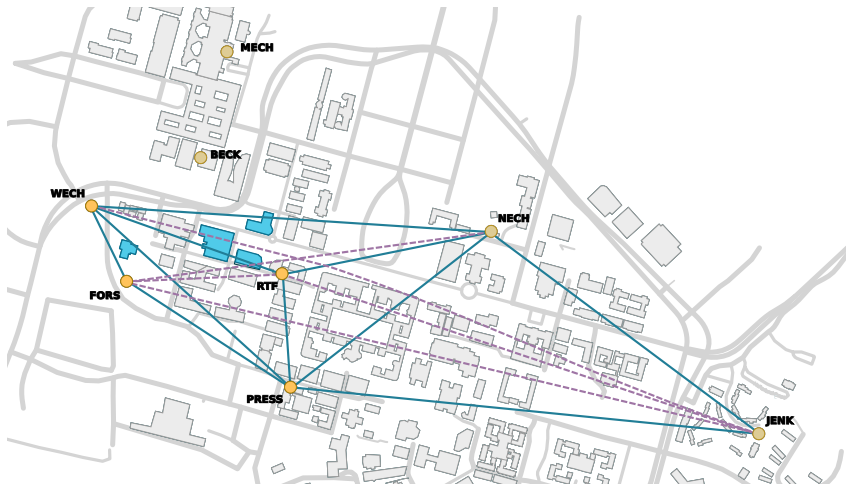
CIS



Current Deployments

- Parallel 40/10Gb campus core network
- Combination of NEC, IBM, and Pronto equipment
- 6 core switches and 4 building entrance switches.
- Partial L1 fiber mesh between core switches, complete with L2 point-to-point across production network.

Planned Deployments



Planned Deployments

- Expanding switch deployments in participating buildings.
- Integrate high performance computing infrastructure.
- Development of an initial number of applications
- Up to 8 core switches.
- Connect SDN infrastructure to GENI, eventually I2 100Gb

- **Lower cost of infrastructure and support**
 - Larger vendor selection
 - Commodity hardware
- **Simplify configuration and management**
 - Decrease the number of appliances in the network
 - Decreased number of management interfaces
 - Opportunity for automation
 - Common policy store for many devices and functions
 - Better view on the state of the network
 - Easier to track devices, users, and applications

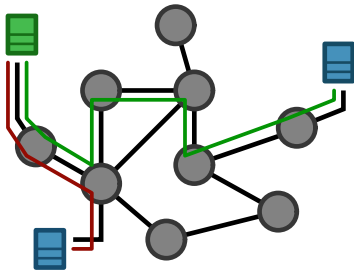
Use Cases - Firewall Application

Current firewall infrastructure consists of 12 pairs of Juniper NS5200 10Gb shared devices covering approximately 300 departments.

- Cost of equipment cost and support.
- Mostly access-list type of policies.
- No application layer filtering.
- Policies and objects per department.
- Needs to be in-line with traffic
- Bottle-neck
- Impacts more than a single user or department.

Use Cases - Load Balancing

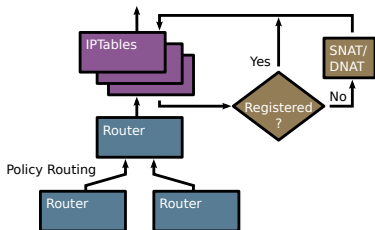
Multiple BigIP pairs in deployed to provide load-balancing services. Mostly used for administrative applications.



- Cost of equipment cost and support.
- Yet another management interface.
- Load-balancing is smart routing
- Standard routed path not necessarily the best path.
- Function exists across the entire network.

Use Cases - Network Access Control

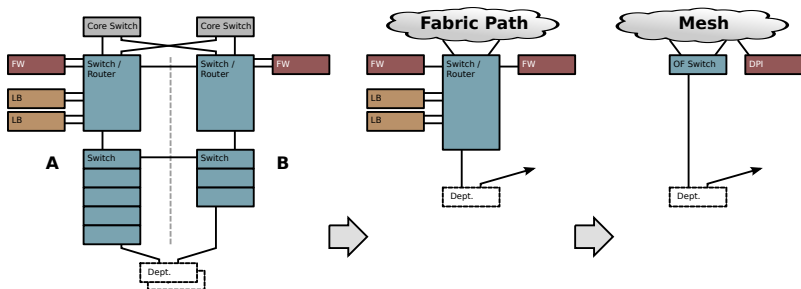
Stanford requires that all devices that access the network be registered in NetDB in order to get a routable DHCP address.



- Security through obscurity
- IP address assigned based on registration status.
- Policy-based routing
- MAC address classification through IPTables

- Push access-control to the edge.
- Apply everywhere in the network.
- Provide more flexible service offering

Topology Evolution



- Migrate appliance functionality into the network.
- Remove obstacles from path.
- Reduce overall infrastructure cost and complexity.

Deployment Strategy/Justification

- Build in parallel
- Minimize impact to current production infrastructure
- Gain experience
- Improve network operations and management of Stanford infrastructure.
- Faster deployment of services.

Implementation

- Limitations in current hardware.
- Most of the budget is already spoken for.
- Still depend on vendors to provide firmware.

Prototyping & Service Testing

- Most experience in the Networking department.
- Some departments don't mind being a guinea pig.
- Pick and choose service and location with low impact.
- No campus-wide implementation needed to get started.

Measuring success

- Metrics collection. (Will require a new infrastructure).
- Reporting
- User Feedback