Experience in Implementing & Deploying a Non-IP Routing Protocol VIRO in GENI

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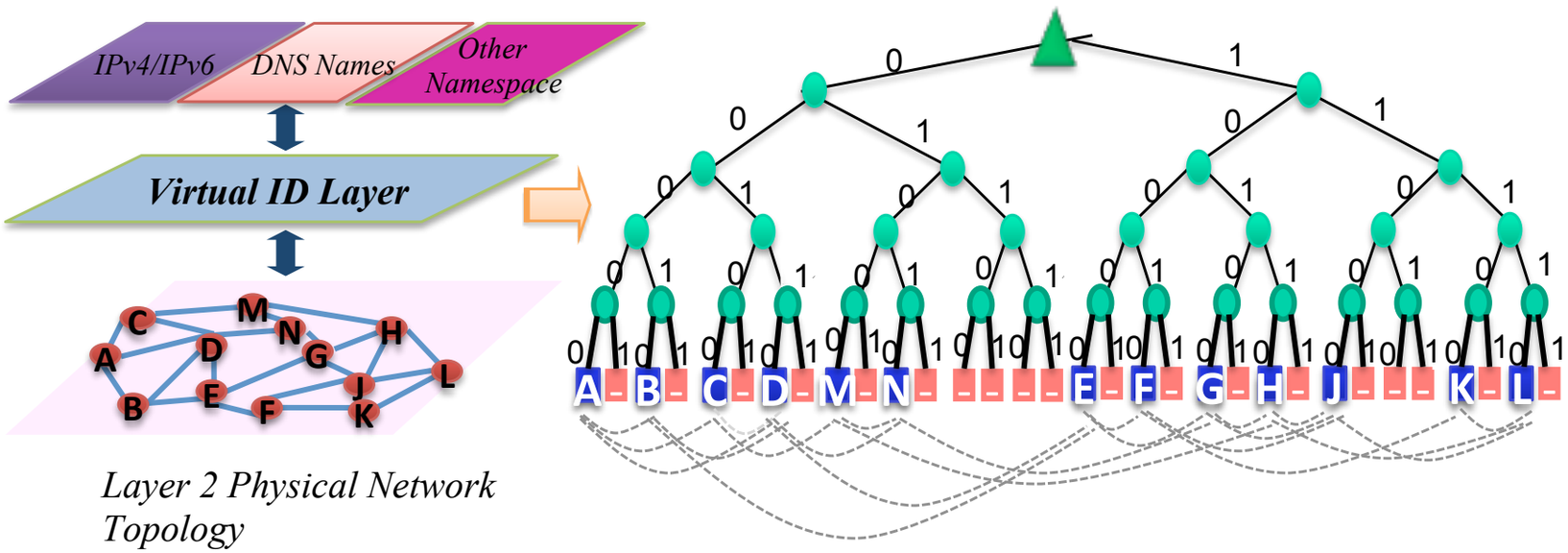
VIRO: Virtual Id ROuting

- A scalable, robust and namespace independent protocols for future networks
  - Addressed challenges faced by traditional L2/L3 techniques.
  - Provided a convergence layer that unifies routing & forwarding.
  - Decoupled routing from addressing, i.e., namespace independent.

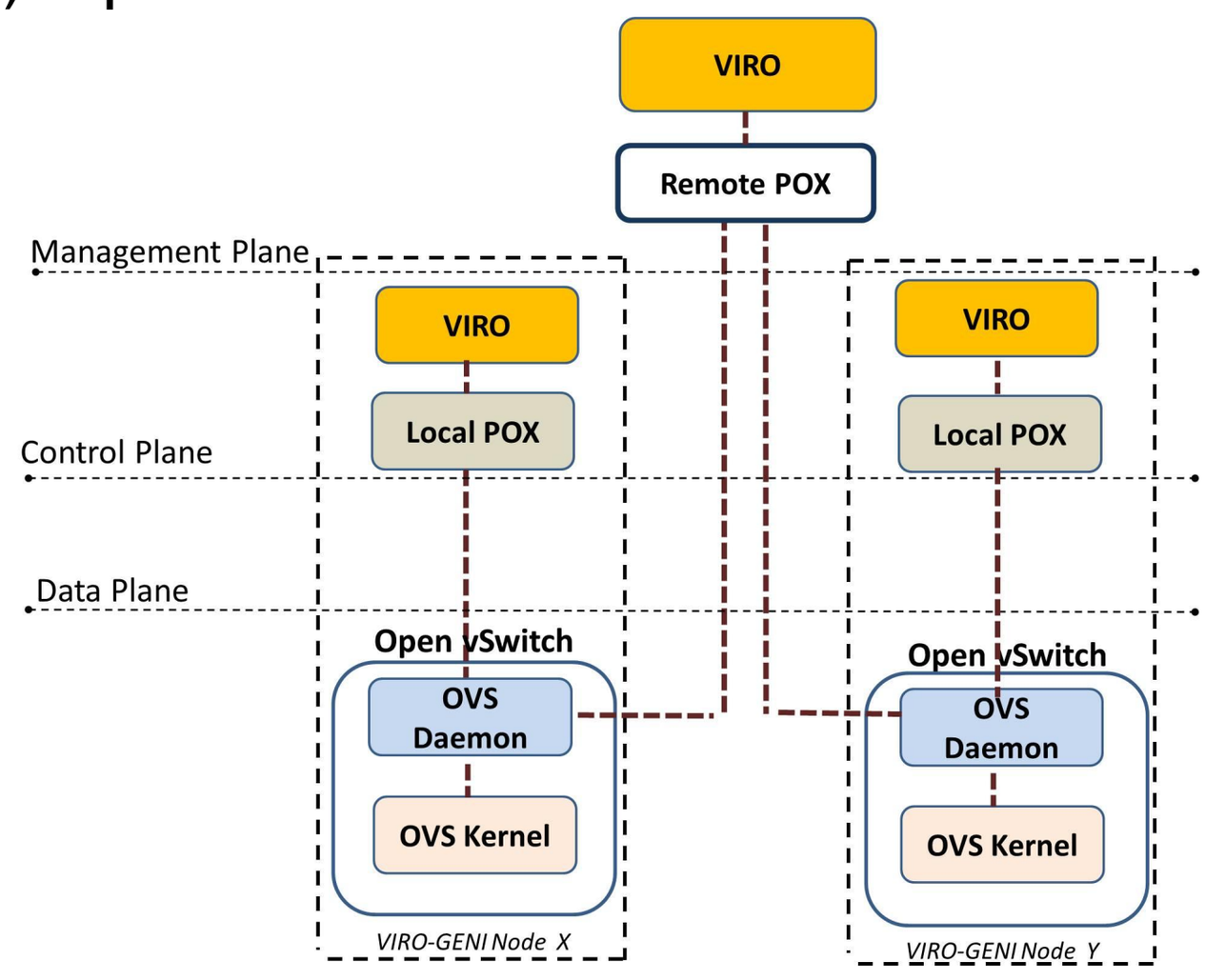
- A topology-aware, structured *virtual identifier* (vid) space



Layer 2 Physical Network Topology

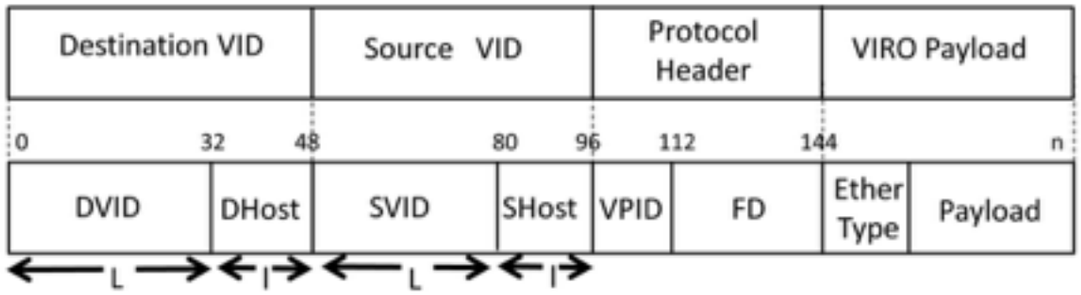
VIRO-GENI

- Remote Controller
- Local Controller
- (Extended) Open vSwitch



Extended Open vSwitch

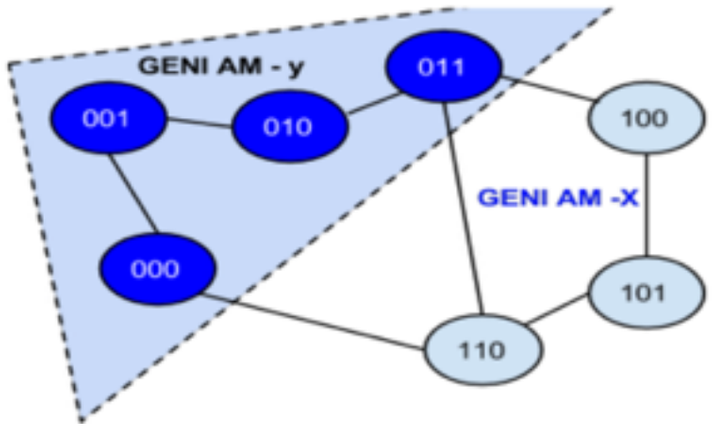
- Current OVS is closely tied to existing TCP/IP/Ethernet.
- In VIRO, we reused some fields and changed packet formats.
- Thus, we have to modify OVS to implement VIRO forwarding.

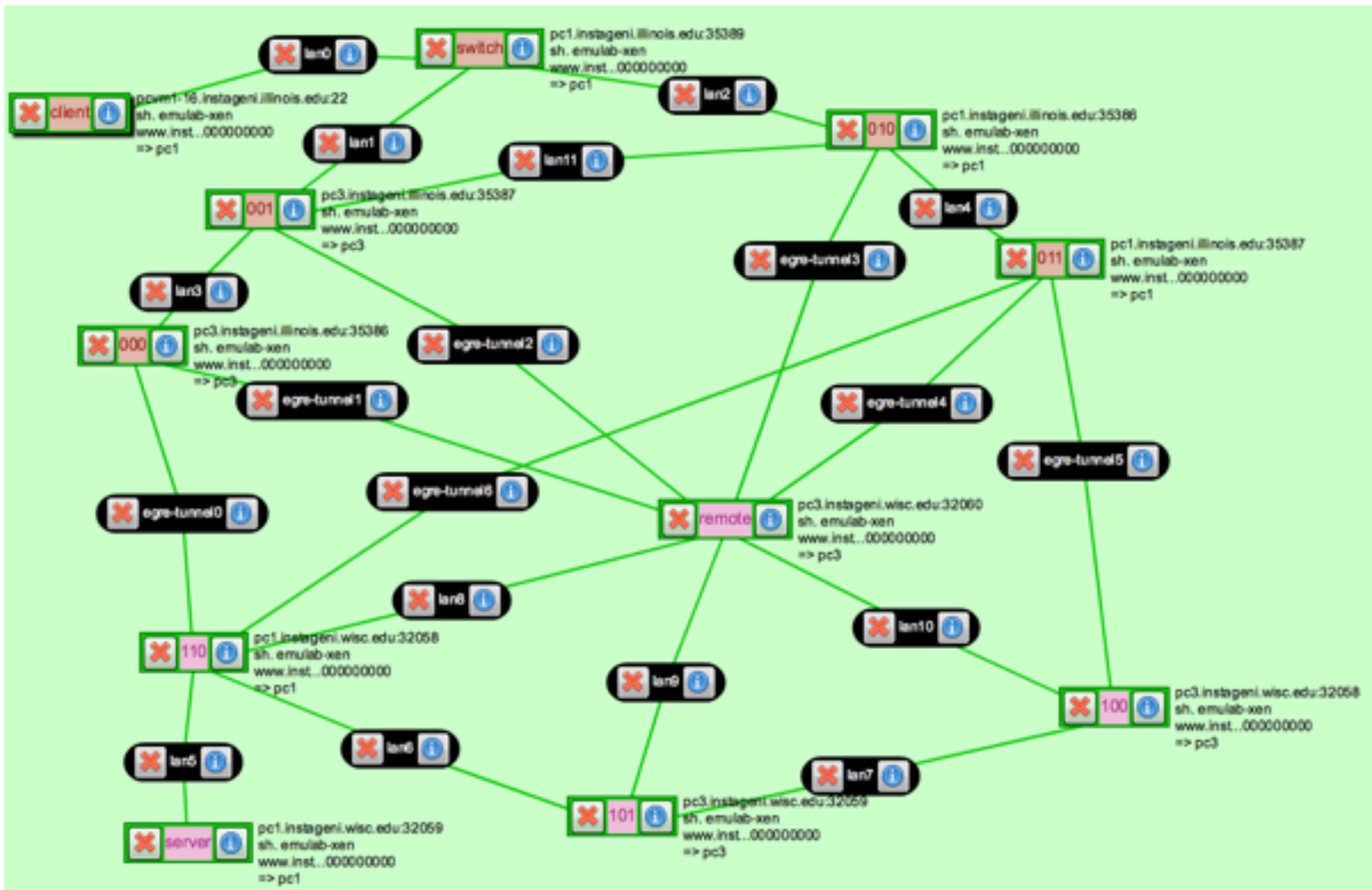


Actions	Descriptions
PUSH_FD	add VPID and FD
POP_FD	remove VPID and FD
SET_VID_SRC_SW	set the first 4 bytes of the SVID
SET_VID_SRC_HOST	set the last 2 bytes of the SHost
SET_VID_DST_SW	set the first 4 bytes of the DVID
SET_VID_DST_HOST	set the last 2 bytes of the DHost
SET_VID_FD_SW	set first 4 bytes of the FD
SET_VID_FD_HOST	set the last 2 bytes of the FD

Experiment Topology

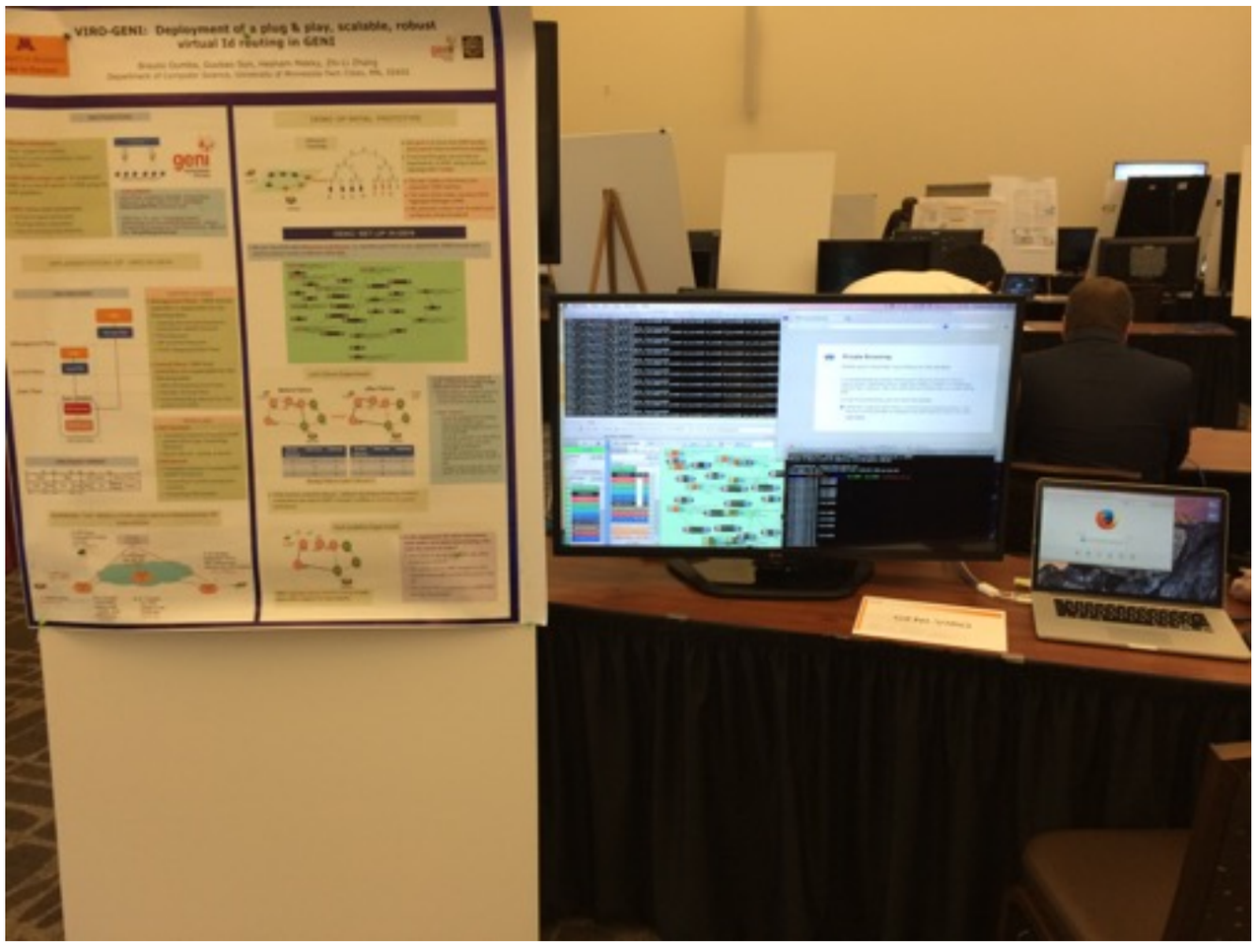
- Two aggregates (illinois-ig and wisc-ig) are used.
- EGRE tunnels are used.
- We tested VIRO by conducting host mobility test and link failure recovery test.





Current Status

- A prototype of VIRO is deployed and being deployed in GENI.
- A demo was shown at GEC20.
- Tools used:
  - Flack
  - EGRE Tunnel
  - Omni



Problems We Encountered

- Flack doesn’t always work as expected.
  - Sometimes links cannot be added to the topology.
  - Flack is no longer maintained, while Jack is in development.
- Rspec files generated by Flack cannot be re-used by Flack in our experiment.
  - We believe it is a problem related to inter-aggregate links.
  - Have to build the topology from scratch every time.
  - The rspec doesn’t work even if we use “Add Resource”.
- Stitching’s implementation may be problematic for VIRO.
  - Omni 2.6 made it much easier before GEC20.
  - If multiple stitching links are in a single rspec file, it is difficult to reserve.
  - The forwarding of stitching links seems to be based on MAC address, which will be a problem for our VIRO.

What Do We Hope?

- More stable GUI tools
- Better support for sharing slices
- More stable stitching
- Update reservation (instead of starting over)

END

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- The paper & demo will be at CNERT Workshop, Oct 24.

- Thanks to GENI Project Office and GENI Community!