

PRAGMA 31  
PRAGMA Experimental Network  
Testbed (ENT)

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# ENT Goals

- Build a breakable international SDN testbed for use by PRAGMA researchers
  - By no means a production system
  - Complete freedom to access and configure network resources
- Provide access to SDN hardware/software to PRAGMA researchers
- Offer networking support for PRAGMA multi-cloud and user-defined trust envelopes

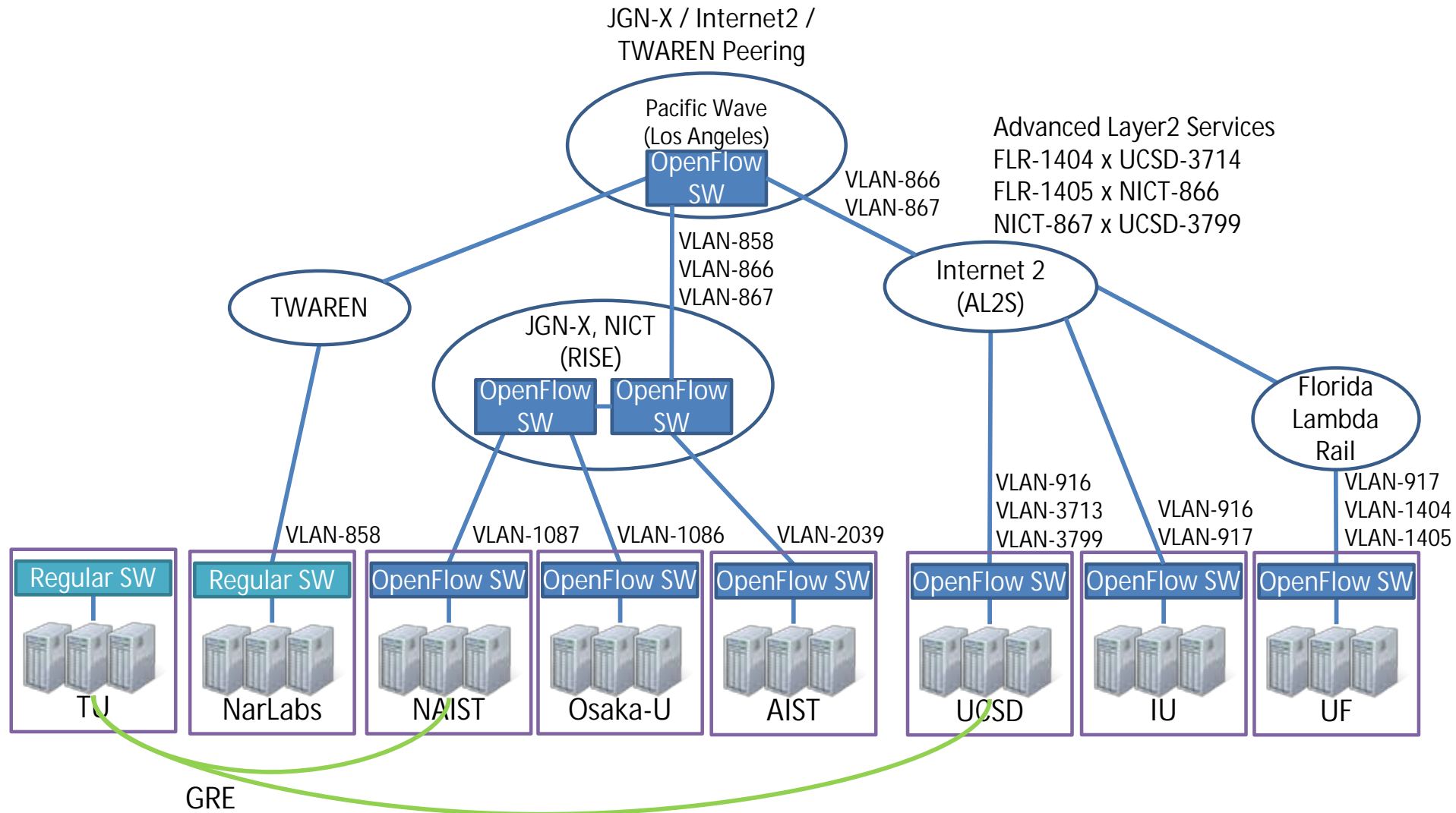
# ENT Progress

- PRAGMA 25 – Start of the project
- PRAGMA 26
  - Preliminary international links configuration
  - Preliminary tests using GRE tunnels
- PRAGMA 27
  - International links connecting Japan (NAIST, AIST, Osaka U) and US (UF and UCSD) established
  - Experiments with multi-path controllers
- PRAGMA 28
  - Connection to Taiwan (NCHC) established
  - Network slicing with AutoVFlow
- PRAGMA 29
  - IU nodes joined via GRE
  - perfSONAR monitor deployed
- PRAGMA 30
  - IU nodes connected via VLAN (Internet2)
  - Extending ENT through IPOP

# ENT Accomplishments & Activities (PRAGMA 31)

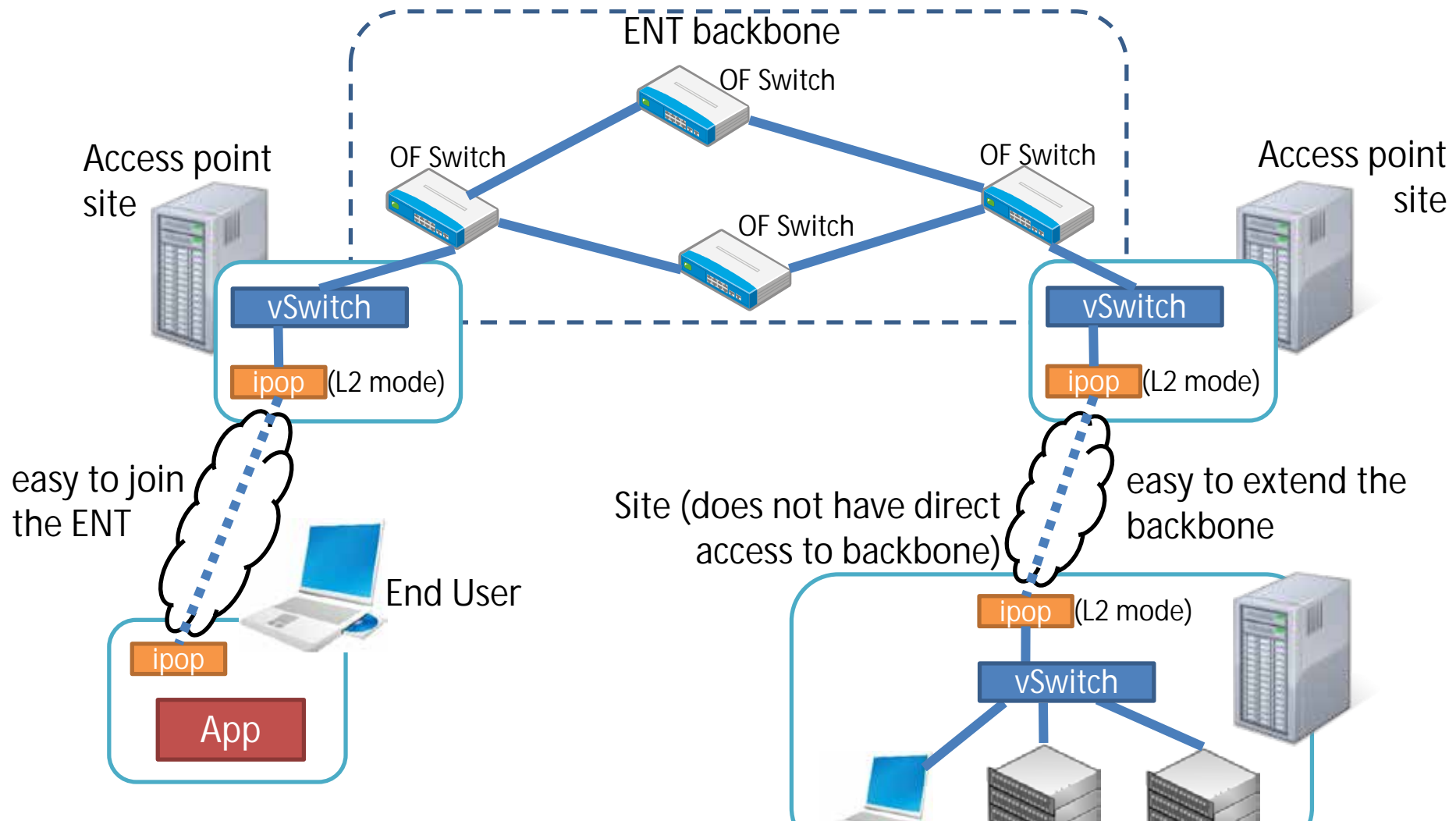
- ENT backbone
  - Connection to Thammasat University with GRE
  - RISE OpenFlow SW at LA joined as a node.
- IPOP access points on ENT
- Monitoring & visualization tool [Demo]
- Integration with Rocks and PRAGMA boot [Student Hackathon]
- Authentication & Secure SDN [Poster]

# Backbone of PRAGMA-ENT



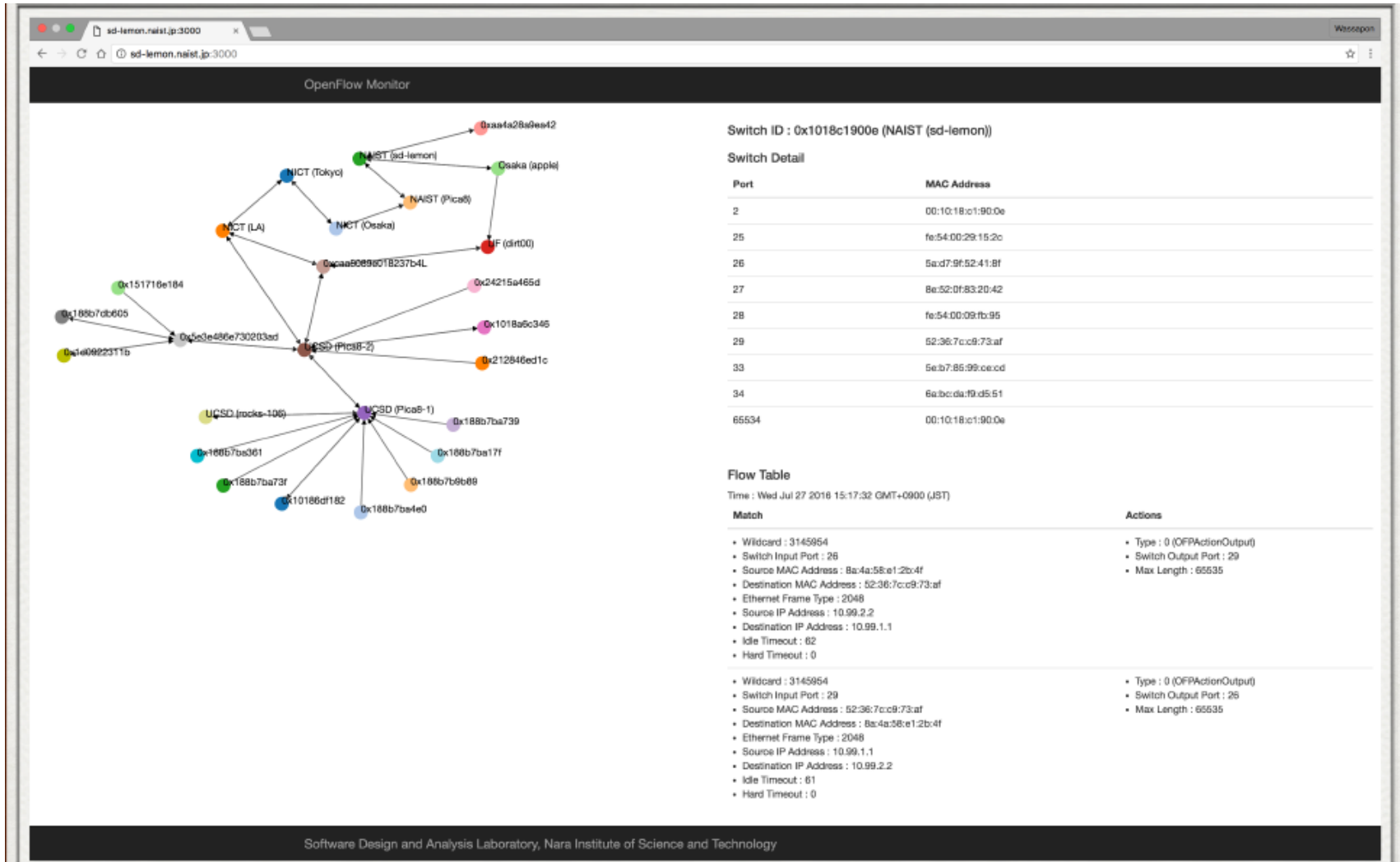
# Extending backbone through IPOP

- IPOP rpm packages is available now
- UF, UCSD and NAIST runs IPOP access points to accept client access.



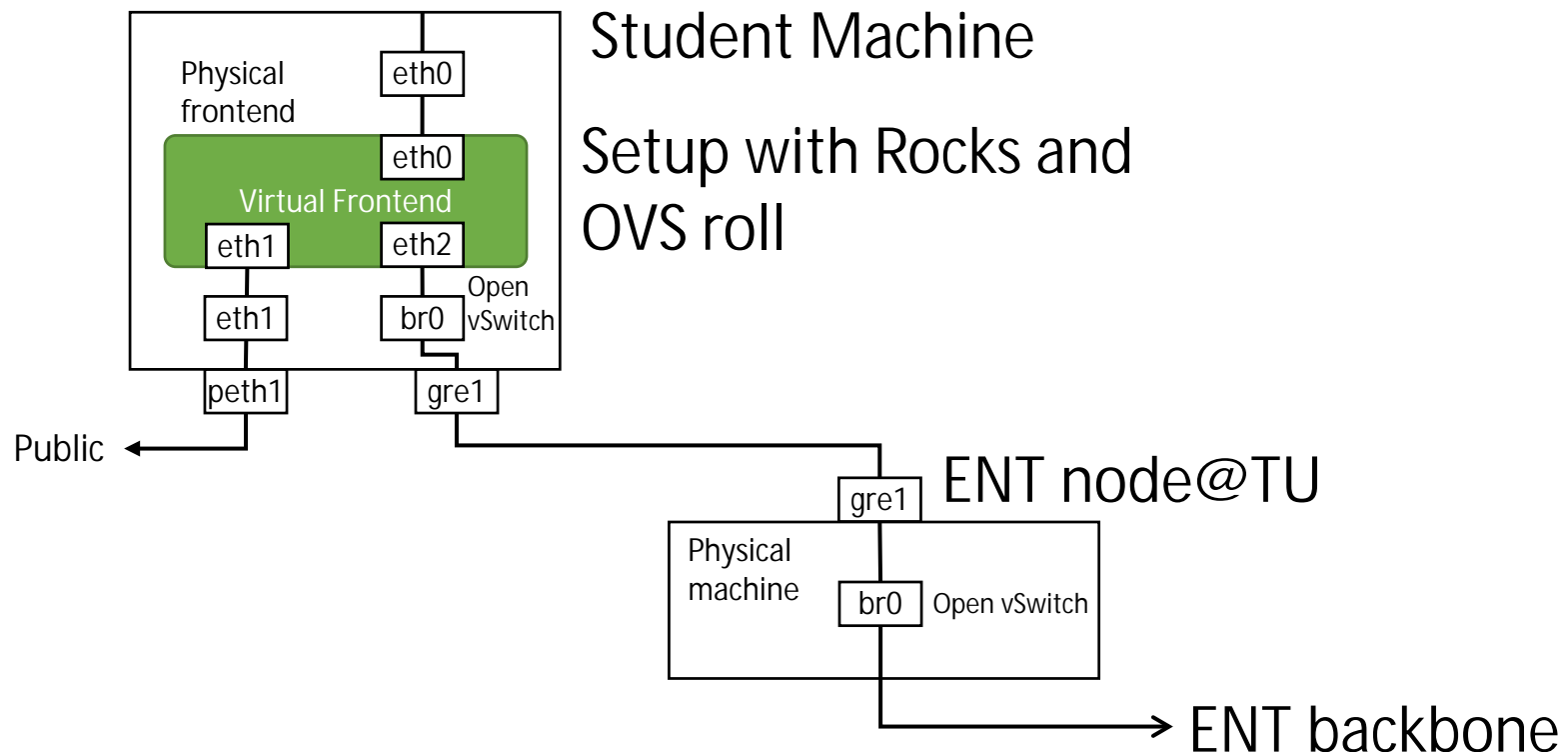
# Monitoring & visualization tool [Demo]

- Boom (a student from Putchong's lab@KU) developed Web-based monitoring & visualization tool for ENT



# Integration with Rocks and PRAGMA boot [Student Hackathon]

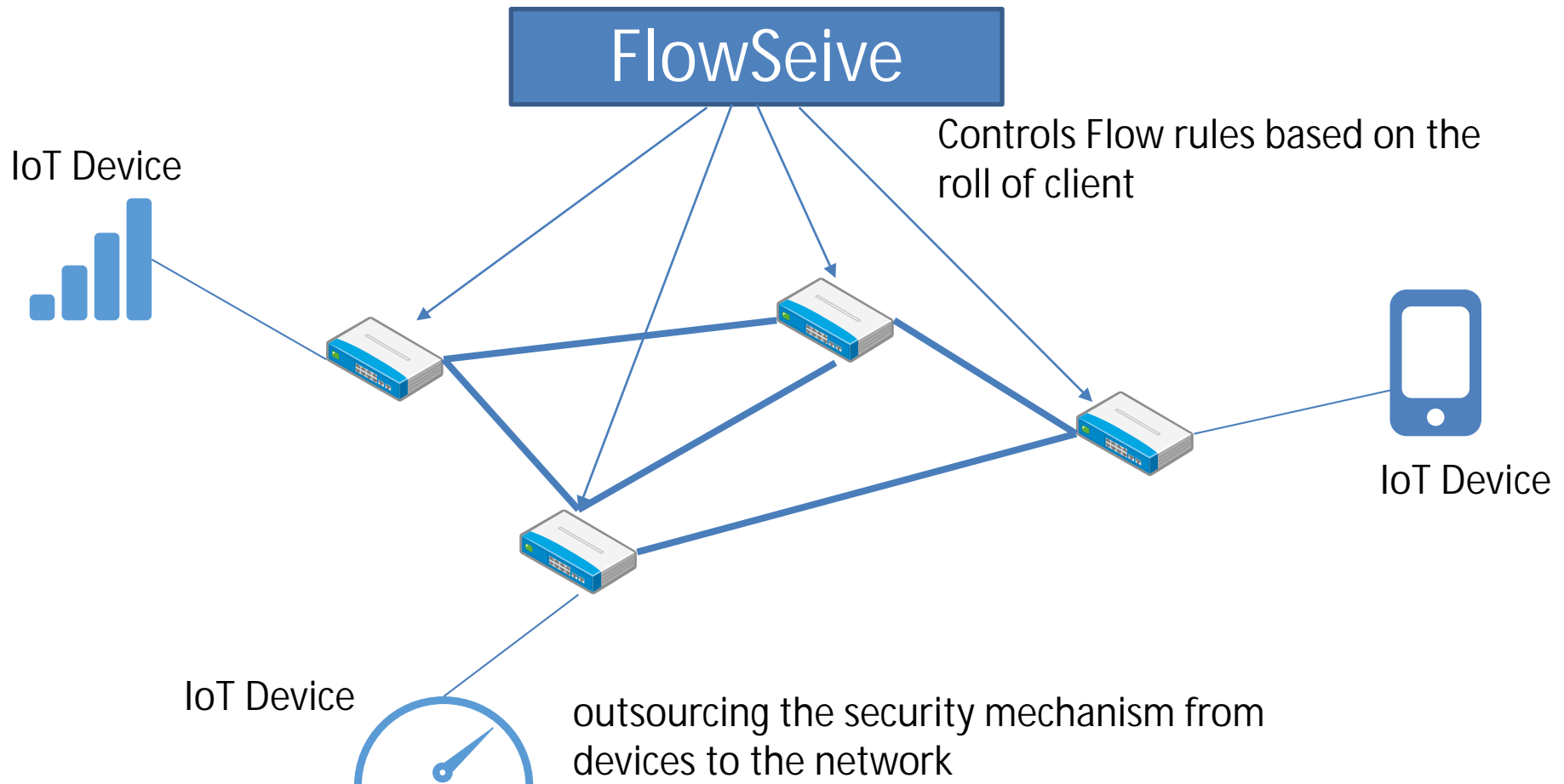
- Students setup Rocks cluster node using OVS roll and deployed a VM cluster attaching ENT interfaces within 24 hours





# Authentication & Secure SDN [Poster]

- Yamada-san (student in Osaka Univ.) developed Roll-based access control mechanism for SDN



# Future Plans

- Network expansion (more sites)
  - Interconnecting RISE (JGN-X) & FSFW (Internet2)
- End user support
  - Visualization
  - Automation and API for AutoVFlow
  - Wiki: [https://github.com/pragmagrid/pragma\\_ent/wiki](https://github.com/pragmagrid/pragma_ent/wiki)
- More applications
  - Disaster management applications
  - Tiled Display Wall
  - Security, Authentication
  - Trust data sharing  
(HathiTrust Digitalized Books Corpus)

# Roadmap of ENT

- Pragma32
  - Reservation or scheduling service
    - VM & Network
  - User friendly UI
    - Visualization
  - Making reservation from Web or API & automation
    - AutoVFlow needs to expose APIs
- Pragma33
  - Expand ENT to at least 10 institutions