A SAVI Solution: Control Packet Snooping

SAVI-CPS-01

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Outline

- SAVI-CPS overview

  details at draft-savi-bi-cps-01
- CNGI-CERNE2 deployment report

Introduction to SAVI-CPS

SAVI-CPS

- CPS (Control Plan/Packet Snooping):
  - Set up IP/port binding (permit entry) at SAVI-switch port based on control packet snooping, to make the host attached to that port can’t spoof its source address
  - Default Dropping at the port that directly attached with the host (When src addr of incoming packet matches a permit entry then forwarding, otherwise dropping)
- Snoop
  - DHCPv6, DHCPv4
  - NDP, ARP

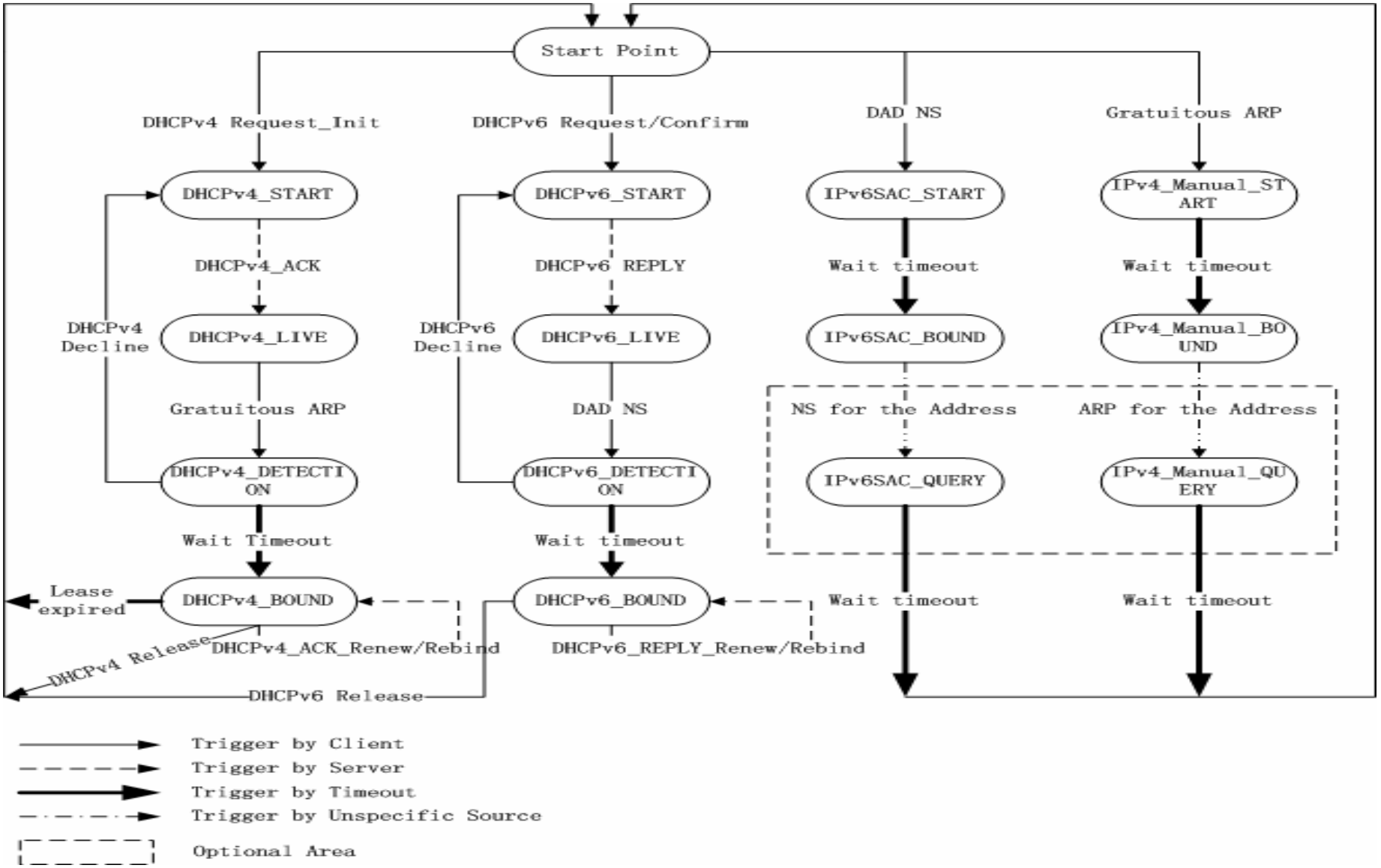
SAVI-CPS

- Work for both IPv6 and IPv4
  - IPv6：DHCPv6, SLAAC
  - IPv4：DHCPv4, Manually configured address
- Benefits
  - Support address assignment standards
  - No new protocol design, such as BDP
  - Initial binding based on only control packets, not data packets (important advice from vendors)
  - No client software
  - Could precisely traceback the source of host /bill by source address within SAVI-area

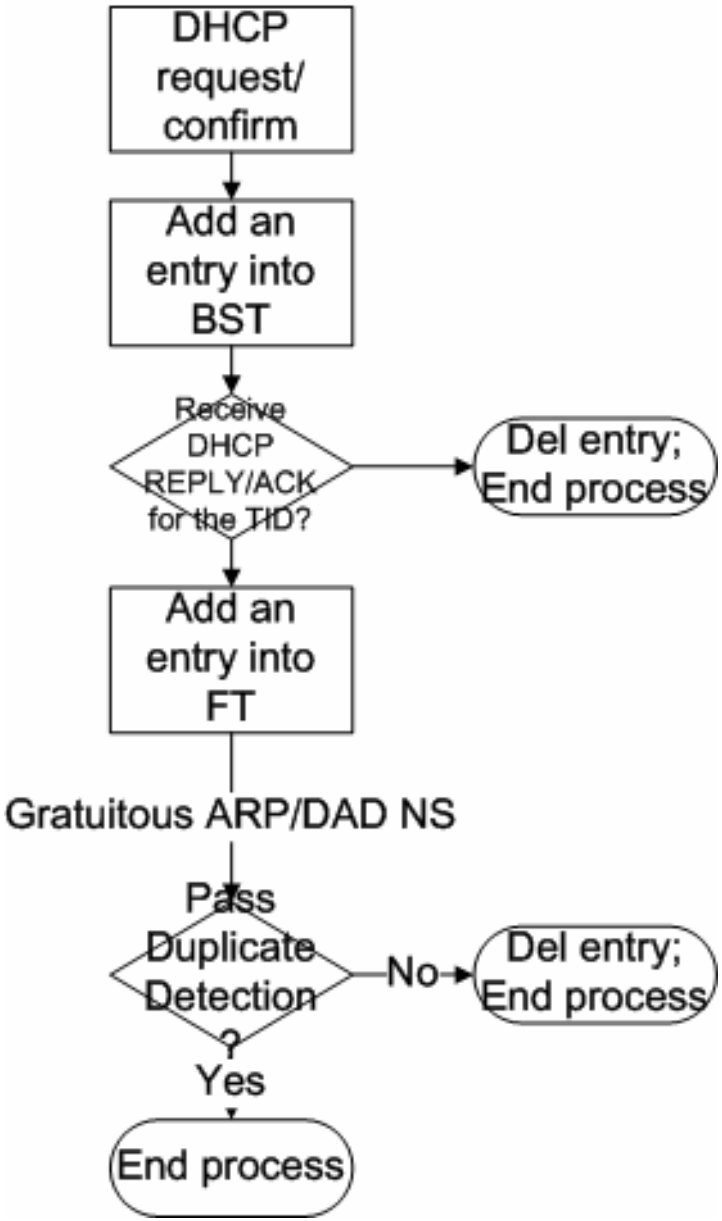
SAVI-CPS

- Port Attributes in SAVI-Switch
  - SAVI-Host: validate src addr based on binding table
  - SAVI-Trunk-Default: verify if src addr conflicts with local binding then forward (SAVI-Legacy switch trunk)
  - SAVI-Trunk-Snooping (an option for SAVI-SAVI trunk)
  - SAVI-DHCP-Trust: validate msg from DHCP server
  - SAVI-RA-Trust: validate RA from router
- Handle cases in DHCPv6 and SLAAC (demo)
  - Multiple addresses at host
  - DHCP-only and DHCP-SLAAC mixed network
  - Host changes port
  - Host changes switch
  - SAVI-Switch changes topology
  - SAVI-switch reboots ….

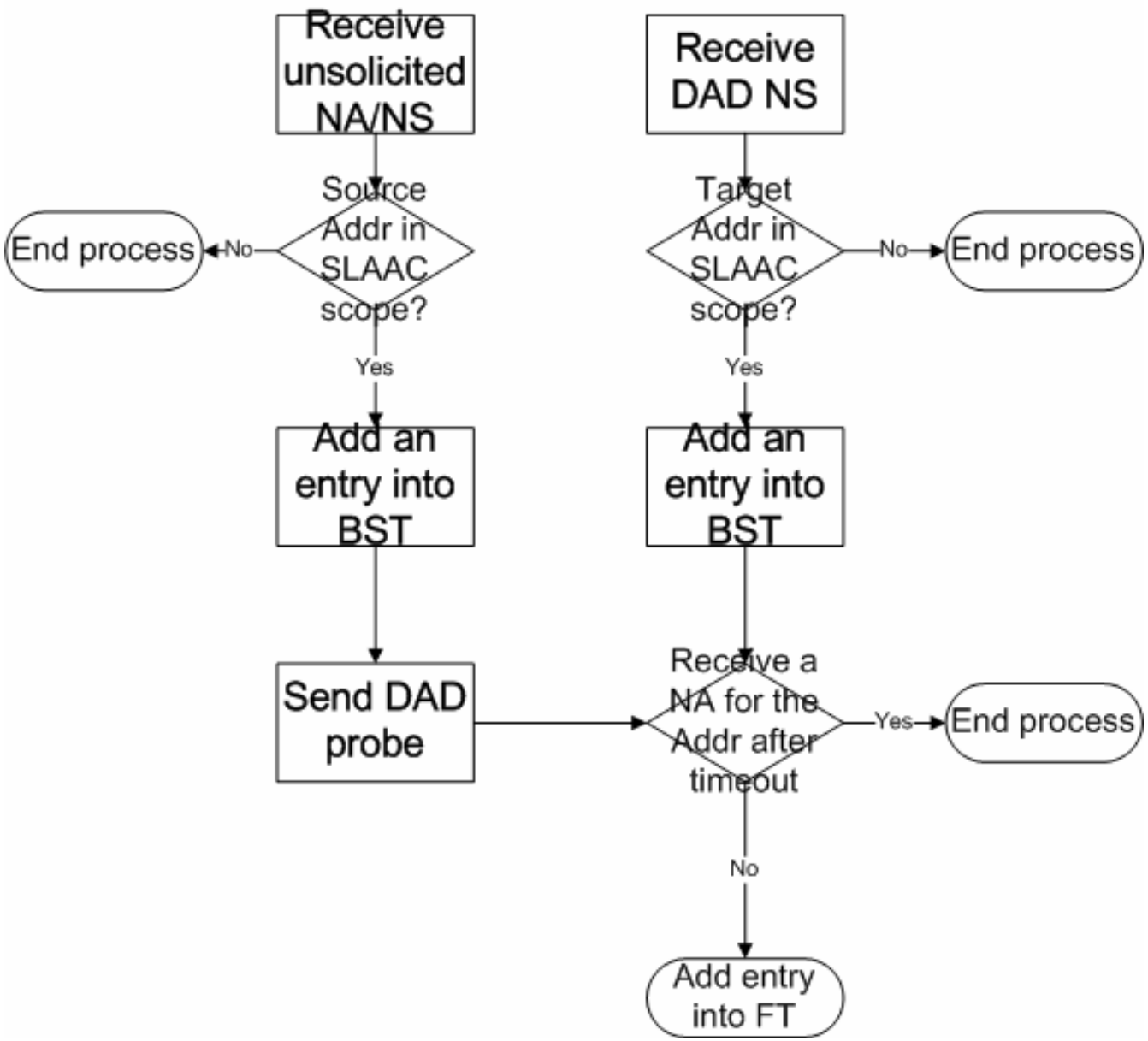
SAVI-CPS State Transition Diagram



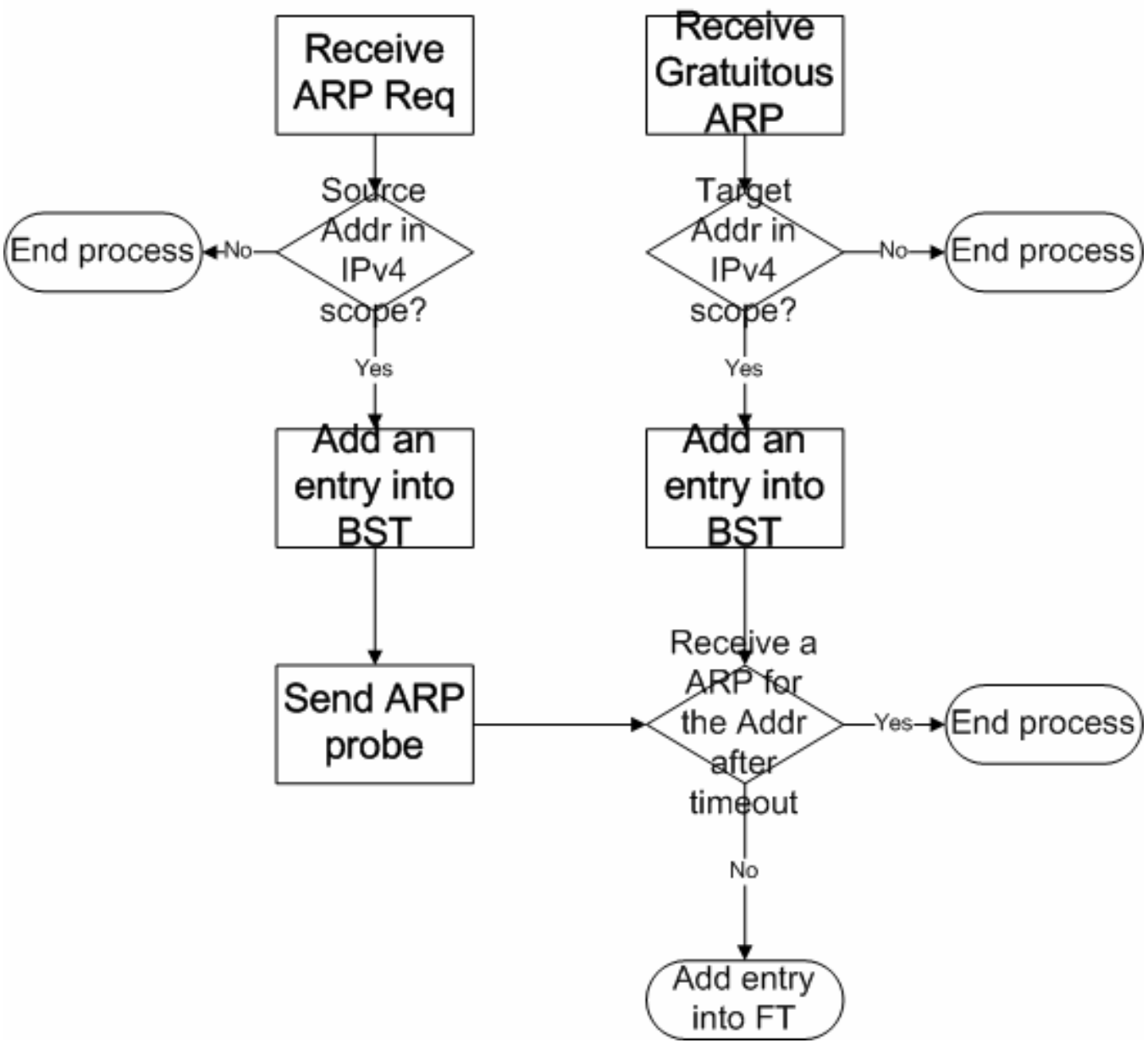
DHCPv4/v6 snooping



ND snooping


Receive unsolicited NA/NS
Source Addr in SLAAC scope?
No
End process
Yes
Add an entry into BST
Send DAD probe
Receive DAD NS
Target Addr in SLAAC scope?
No
End process
Yes
Add an entry into BST
Receive a NA for the Addr after timeout
Yes
End process
No
Add entry into FT

IPv4 binding



CNGI-CERNE2 deployment

Goals

- CNGI-CERNET2
  - CERNET: was the 2nd Large ISP, 2000+ university campus networks, 20M+ users
  - CERNET2 is the largest IPv6 network launched in 2004
- CNGI-CERNET2 SAVI Deployment
  - 100 universities campus networks nationwide
  - 1 Million users
- Time frame: 2008-2010

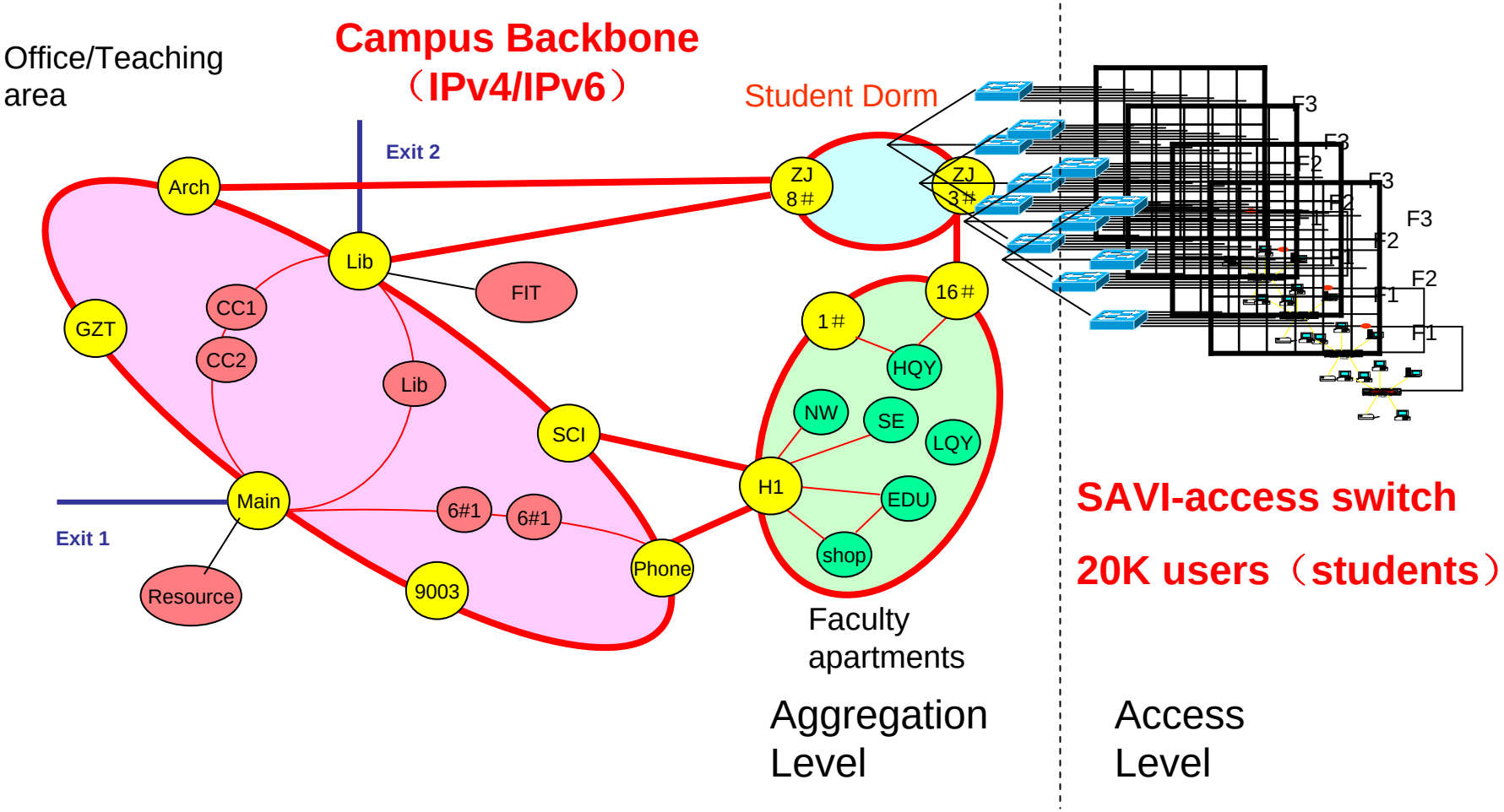
Goals

- Strictly Anti-spoofing at host granularity
  - Accurately traceback a host at the switch port. when attack traffic or unwanted traffic happens in SAVI deployed area, we could traceback the precise host by source address of unwanted traffic, then take actions.
  - Accurately bill the traffic usage to the precise host in SAVI deployed area. It’s important for a operator to bill by usage not by fixed monthly rate.
  - To get precise measurment data
  - All above drive the requirement to SAVI: prevent a host in SAVI deployed area from spoofing used nor unused addresses

SAVI switches installation:100 Univ. campus net (red dot)

Example: Tsinghua Univ. campus network is being deployed (the number of switches, hosts are real）

subnets	switches	port	hosts	users
114	1018	23414	22644	20280



Thank You!
Q & A