CNGI-CERNET2 SAVI Deployment Update

China Education and Research Network (CERNET)
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Outline

- SAVI Deployment in CNGI-CERNET2
- A New Work: SAVI for WLAN
- SAVI MIB and Management System

SAVI Deployment in CNGI-CERNET2

SAVI switches installation 100 Univ. campus networks (red dots in the map), confirmed SAVI users 900K+ (till to the recent winter vacation)

Scenarios in Deployment

- DHCP-only
  - Only DHCP and link local address are allowed.
  - DHCP and link local address snooping are enabled.
- SLAAC-only
  - Only SLAAC address is allowed.
  - SLAAC snooping is enabled.
- DHCP-SLAAC-Mixed
  - DHCP and SLAAC address are allowed.
  - DHCP snooping and SLAAC snooping are enabled.
- Static addresses (usually for servers) are manually configured in the above scenarios.

SAVI Switch Implementation

- Solutions implemented
  - draft-ietf-savi-dhcp-07
  - draft-bi-savi-stateless-01
  - draft-bi-savi-mix-04 (partially)
- Vendors
  - ZTE、Huawei、H3C (3Com)
  - Ruijie、Digital China (spun off from Lenovo)
  - Bitway、Centac

SAVI-Firmware upgradable

- Savi-upgradable switches in our deployment
  - Switches with at least 2.5 Layer IPv6 capacity
  - SAVI firmware upgrading
  - ZTE: ZXR10 8900,5900,3900A
  - Huawei: S5600, 5300, 3500,3300,2300
  - H3C (3Com): S5500EI, S5500SI, S5120EI、E126A, E152, E328, E352
  - Digital China: DCRS-5950,3950
  - Ruijie: RG-S8600,S5750,S5760,S2900,S2600
  - Bitway: BitStream 7000, 6000, 3000
  - Centec: E600 and E300

A New Work:
SAVI for WLAN

draft-bi-savi-wlan-00

Background

- During deployment, we found that the WLAN environment is very important in campus/enterprise networks, so we need to deploy SAVI for WLAN

The Challenge in WLAN Environment

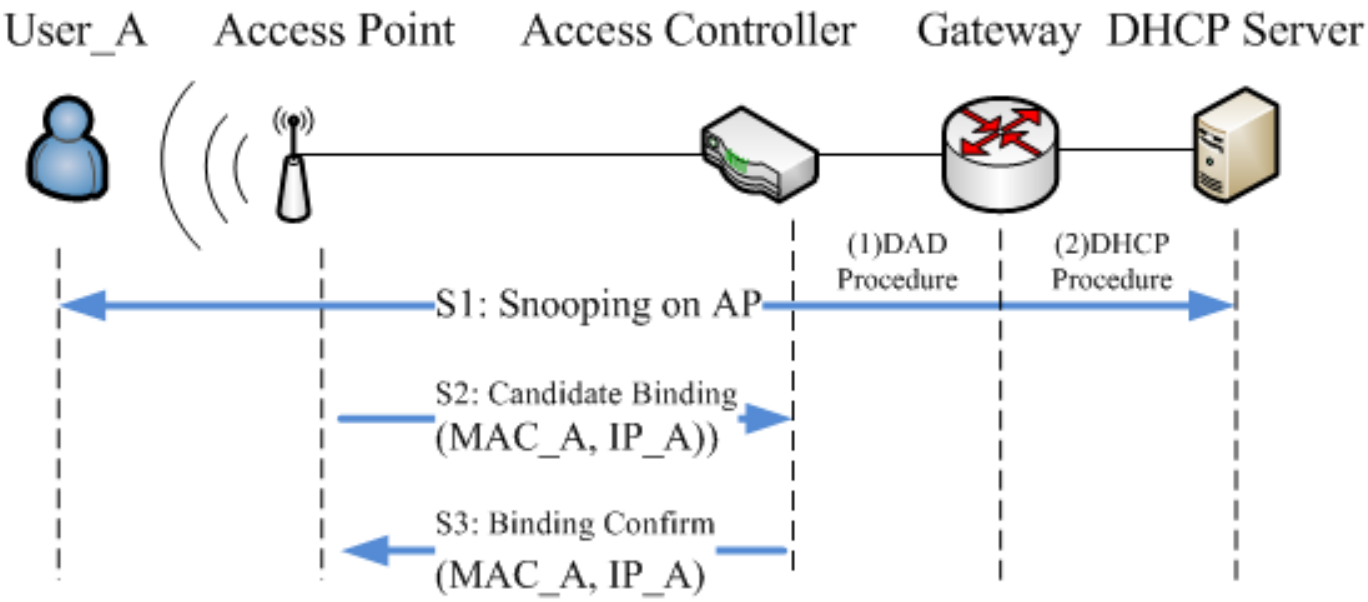
- Trust Binding Anchor
  - In wired environment, the physical port of savi switch can be easily used as the trust binding anchor (binding IP to port)
  - In WLAN, the channel is shared by multiple IP/MACs, thus the binding anchor should be a secure MAC address: a number of security mechanisms on link layer make MAC address a strong enough binding anchor - 802.11i, WAPI, WEP …

The Challenge in WLAN Environment

- The network structure and SAVI device are different: Three Scenarios
  - Centralized WLAN (AC+FIT AP) : Filter on AP
  - Centralized WLAN (AC+FIT AP) : Filter on AC
  - Autonomous WLAN (FAT AP) : Filter on AP
- Mobility is the common case
  - It require the binding migration mechanism to adapt host moving

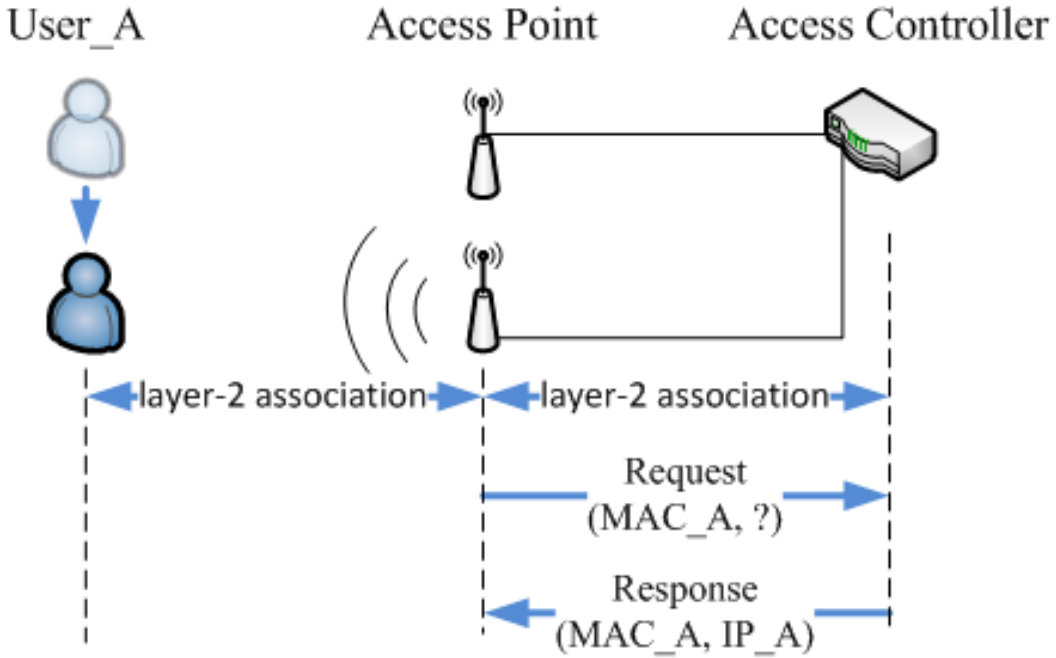
Scenario 1: Filter on FIT AP

- Snooping address assignment procedure (DHCP or DAD) on AP (same as wired network)
- AP notifies AC the new candidate binding through Tunnels (CAPWAP is typical)
- AC confirms to AP the binding is valid or not (AC maintains all live IP/MAC bindings globally)



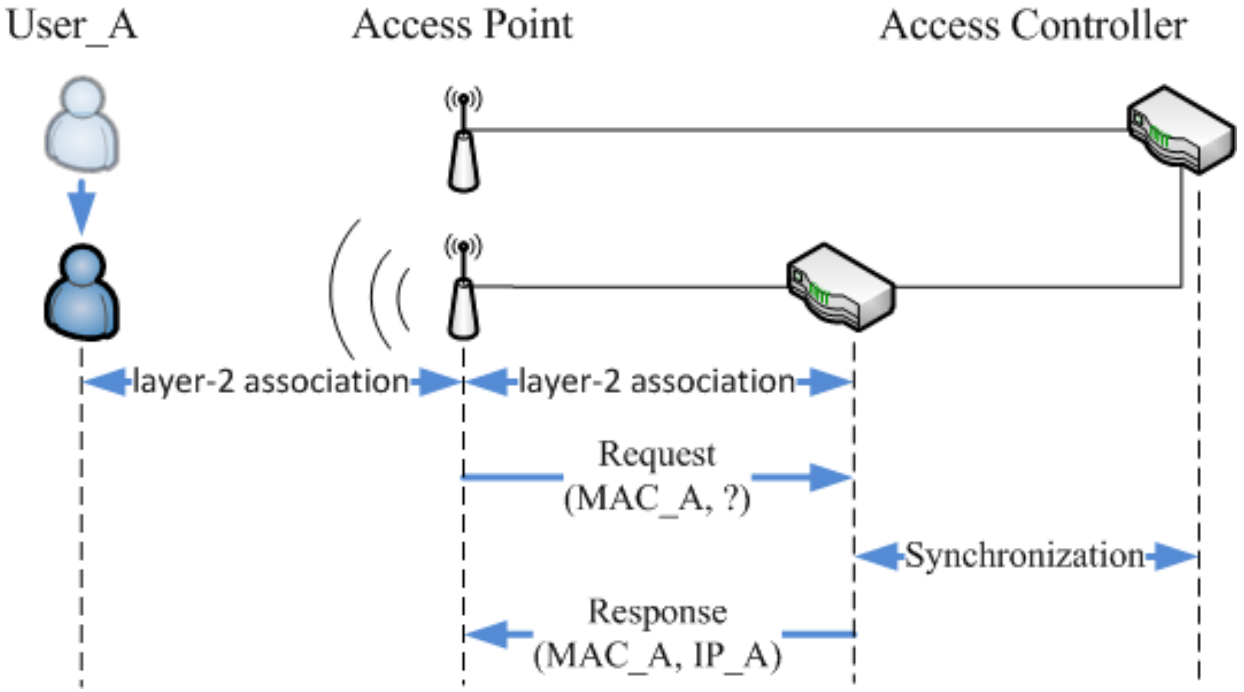
Host move from one AP to another AP

- A host moves from an AP to another AP
  - layer-2 association will happen before IP packet transfer
  - then Home AP delete binding entry, and New AP requests new binding and confirmed by AC



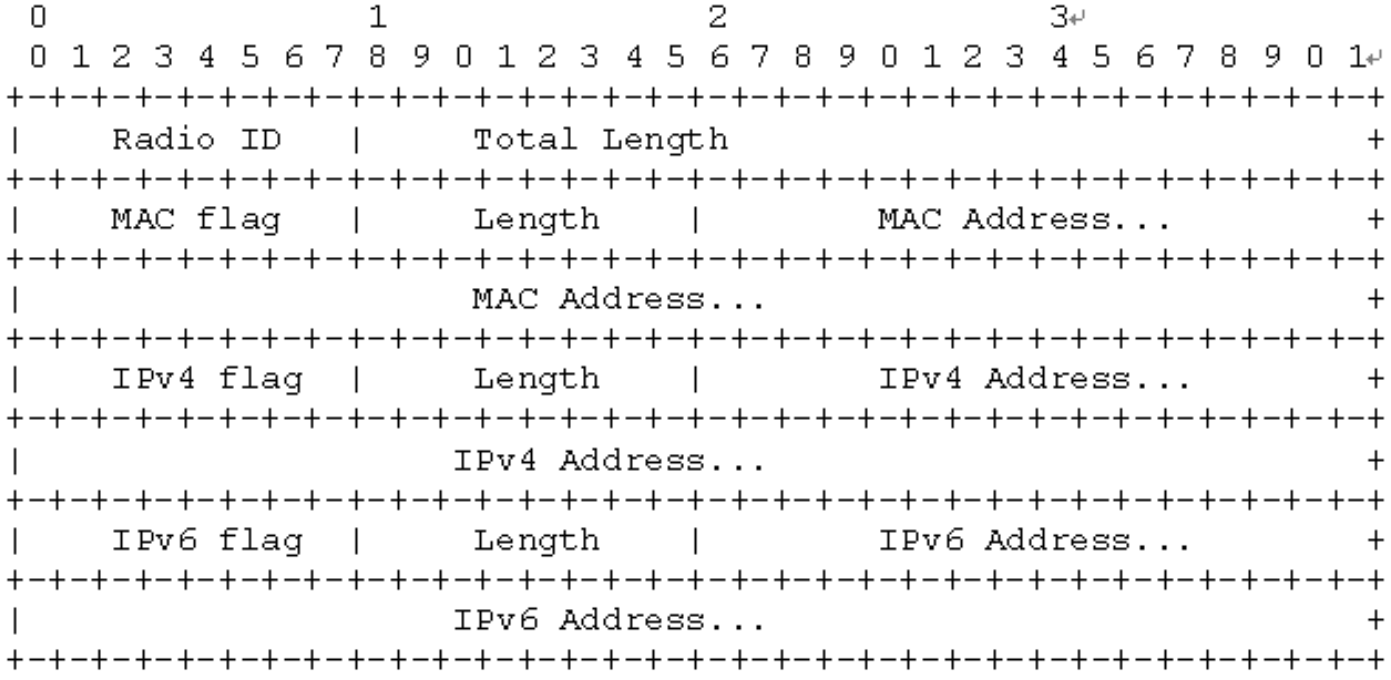
Host move from one AC to another AC

- A host move from across ACs while keeping the same IP address
  - A typical scenario is using IP phone while walking
  - ACs must communicate to sync the binding



CAPWAP Extension

- CAPWAP is used to communicate between AP and AC
  - Candidate binding notification & confirmation, binding request & response in mobility
  -



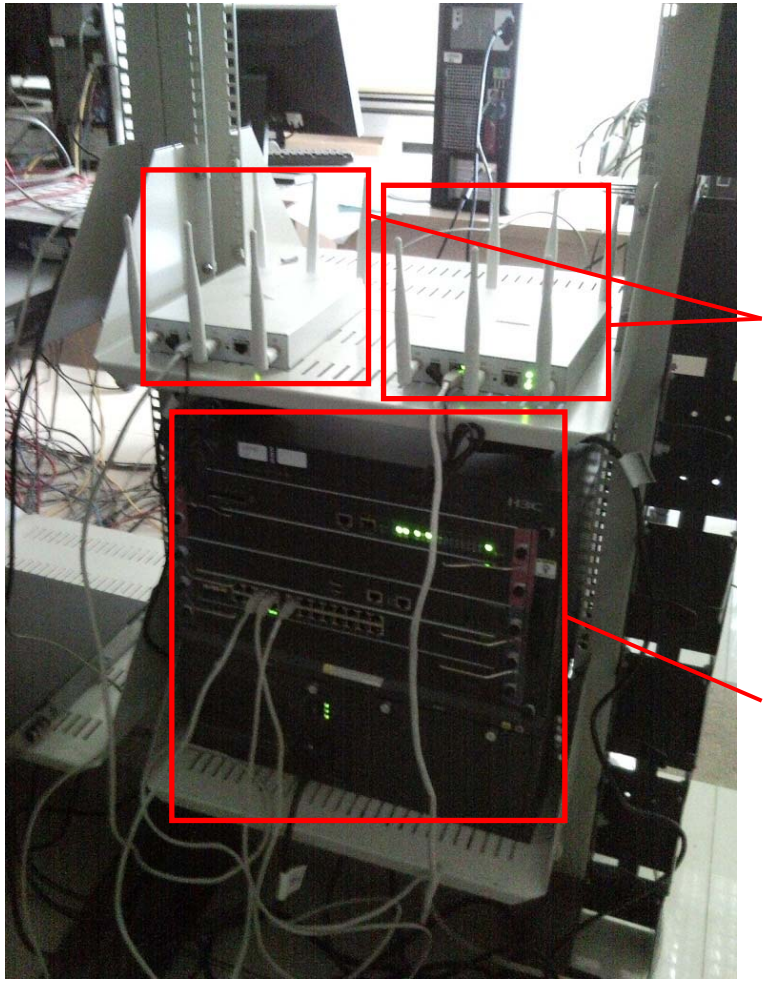
Scenario 2: Filter on AC

- More easy than Scenario 1
- All the packets must go through AC before forwarding.
- AC has a centralized binding table
- Mobility within scope of one AC will not trigger any binding migration
- Mobility between different ACs will trigger binding migration

Scenario 3: Filter on FAT AP

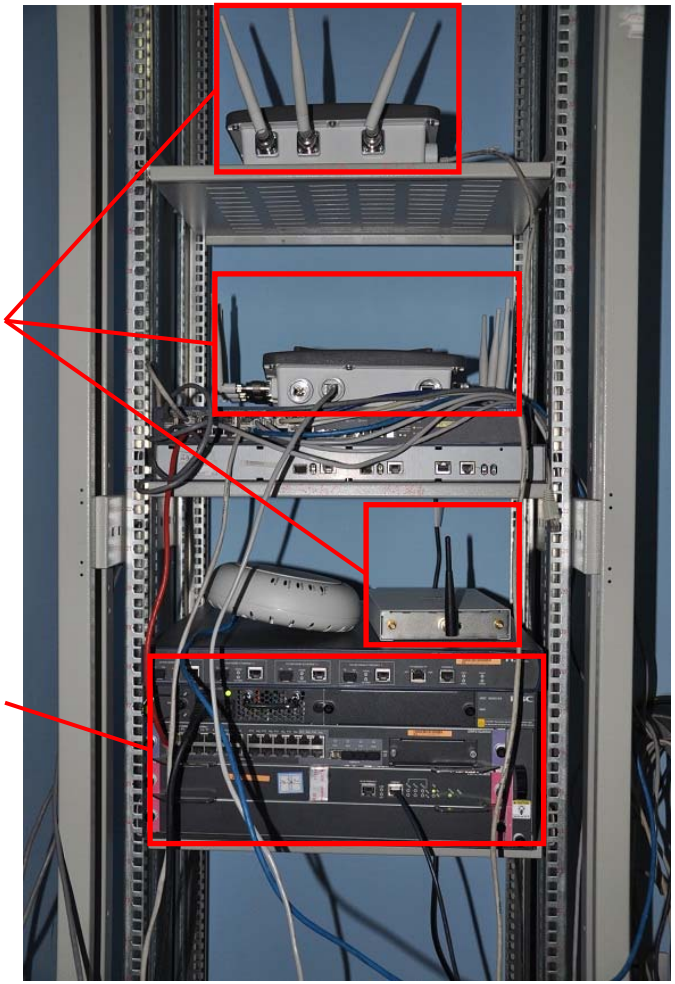
- FAT AP maintains binging table
- Mobility between different FAT APs triggers binding migration

Implemented in H3C Equipment and the experiments were conducted



AP

AC

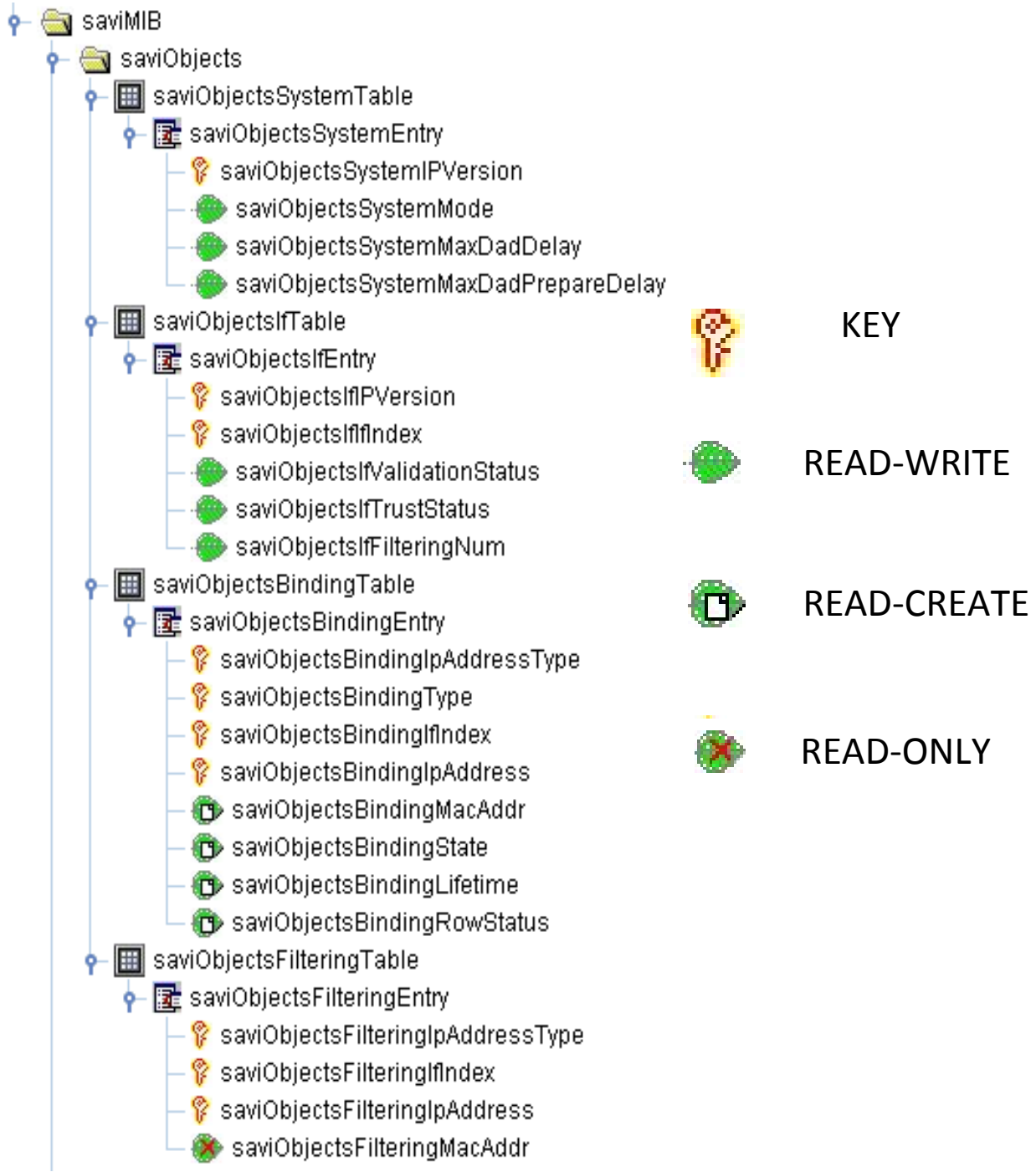


SAVI MIB and Management System Design
draft-an-savi-mib-00

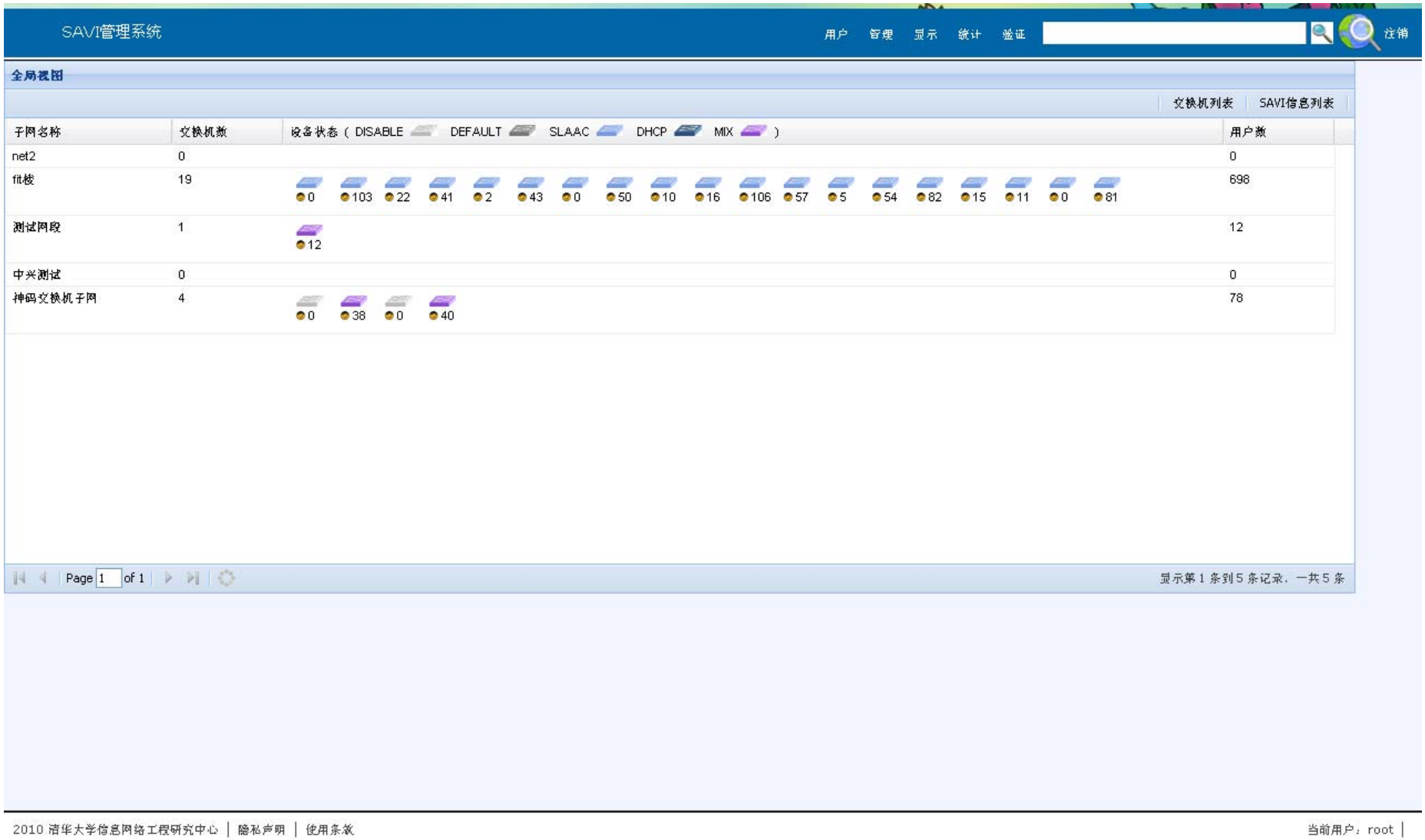
SAVI MIB and Management System

- A SAVI MIB is designed by a strong MIB team in Tsinghua Univ./CERNET
- SAVI MIB has been implemented by multiple vendors deployed in 100 univ. campus networks
  - H3C, ZTE, Ruijie, Digital China,….
- A SAVI management system is designed and installed by Tsinghua Univ.

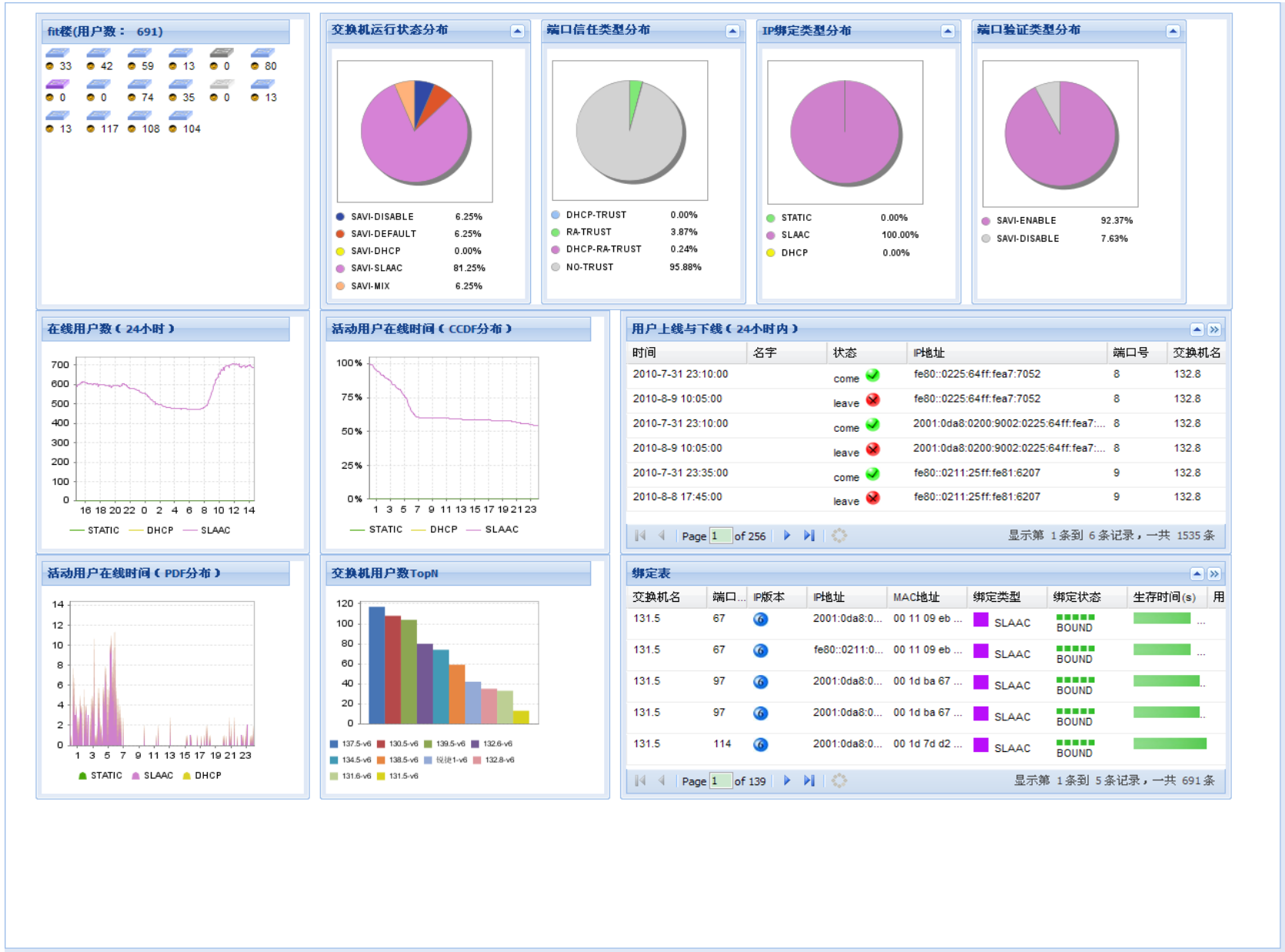
SAVI MIB Tree



Global View (data gathered in Tsinghua FIT building)



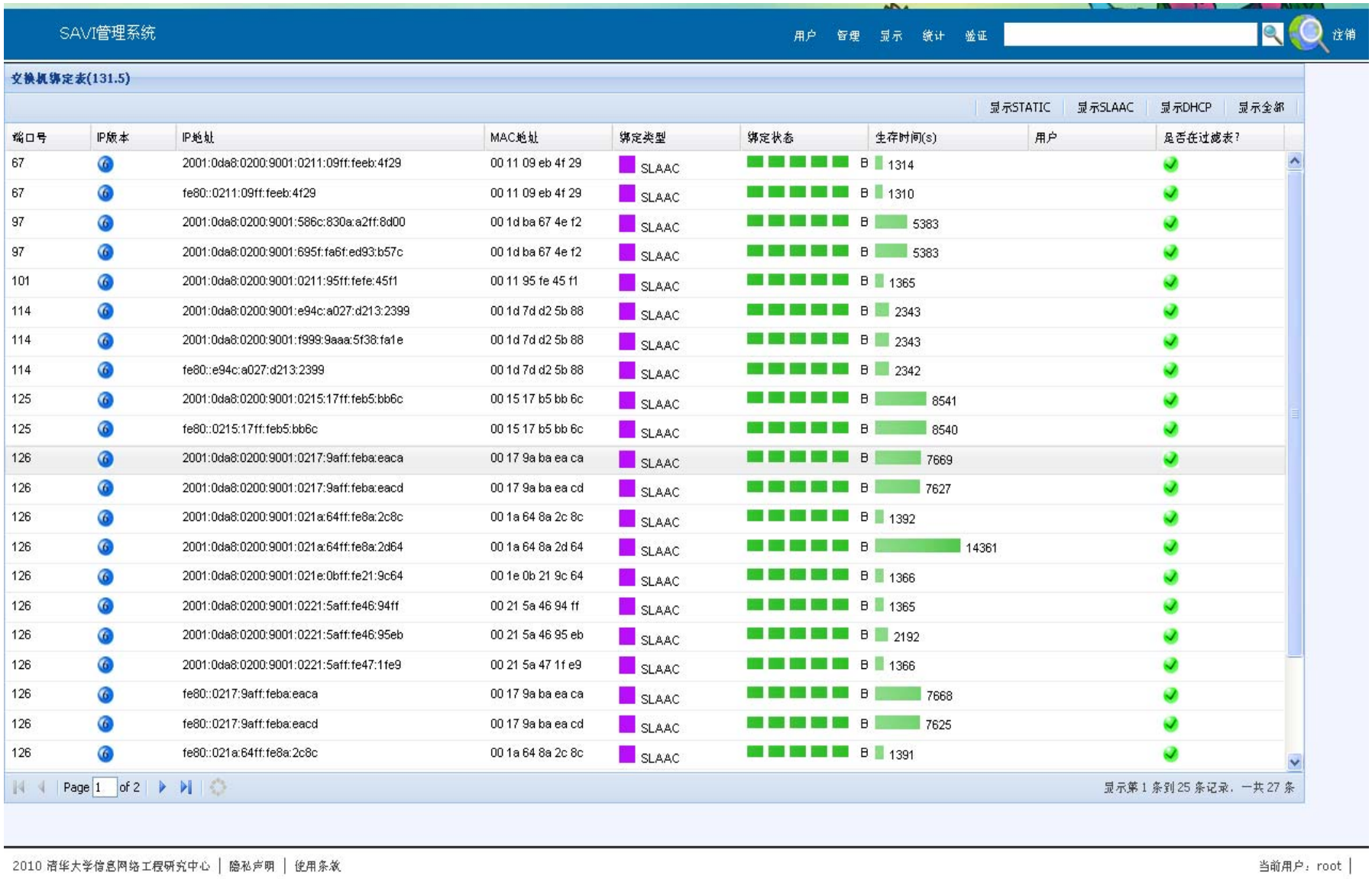
Local Link View



Switch View


基本信息
Name
Value
IPv4地址
166.111.130.5
IPv6地址
IP版本
6
设备名称
130.5
设备型号
锐捷
所属子网
fit楼
描述
运行状态
验证端口数
信任端口数
过滤表项数
绑定表项数
端口面板(在线用户数：108)
在线用户数（24小时）
STATIC
DHCP
SLAAC
活动用户在线时间（CCDF分布）
用户上线与下线（24小时内）
时间
名字
状态
IP地址
端口号
交换机
2010-8-6 17:55:00
come
2001:0da8:0200:9000:dc17:2000:a7b...
2010-8-6 17:55:00
come
2001:0da8:0200:9000:c521:c052:498...
2010-8-8 17:20:00
leave
2001:0da8:0200:9000:c521:c052:498...
2010-8-6 17:55:00
come
2001:0da8:0200:9000:a4a9:70db:906...
2010-8-6 17:55:00
come
2001:0da8:0200:9000:386e:800d:5c8...
2010-8-8 17:15:00
leave
2001:0da8:0200:9000:386e:800d:5c8...
Page 1 of 34
显示第 1 条到 6 条记录，一共 199 条
端口用户数排名
活动用户在线时间排名
绑定表
端口号
IP版本
IP地址
MAC地址
绑定类型
绑定状态
生存时间(s)
用户
SLAAC
BOUND
Page 1 of 22
显示第 1 条到 5 条记录，一共 108 条
完成
Internet
100%

SAVI Binding Table



Thank You!
Q & A