

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

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

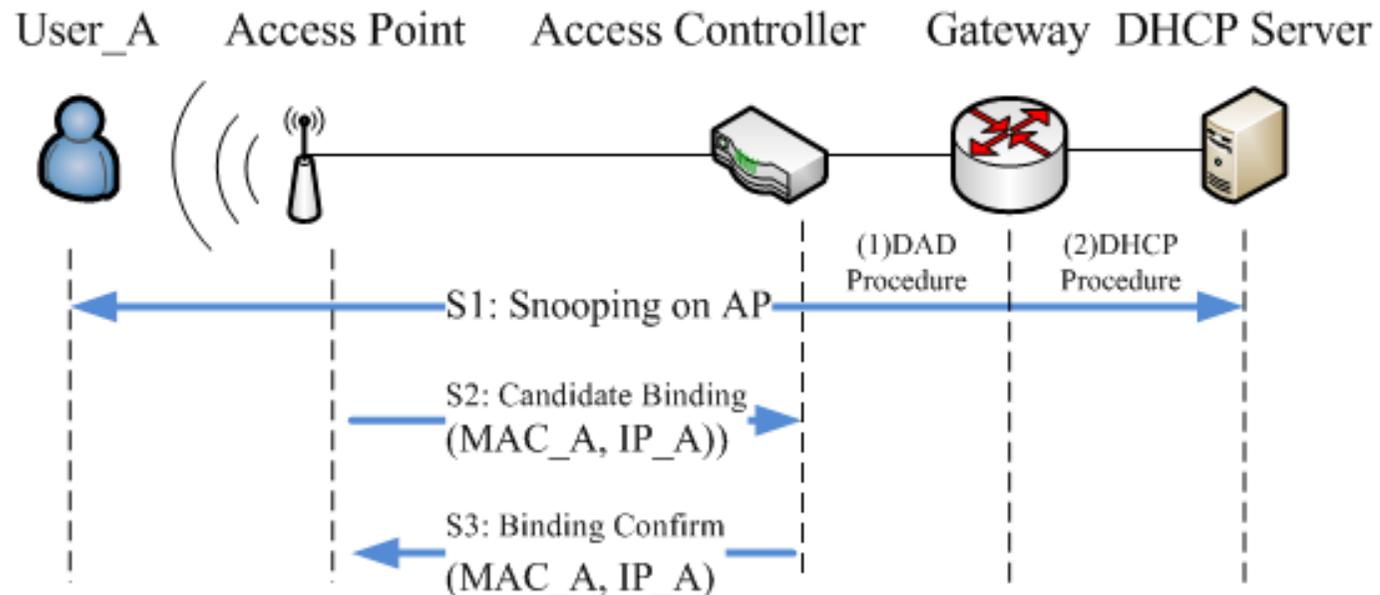
- Trust Binding Anchor
 - In wired environment, the physical port of switch can be easily used as the trust binding anchor (binding IP to port)
 - In WLAN, the channel is shared by multiple IP/MACs, thus the binding anchor should be a secure MAC address: a number of security mechanisms on link layer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

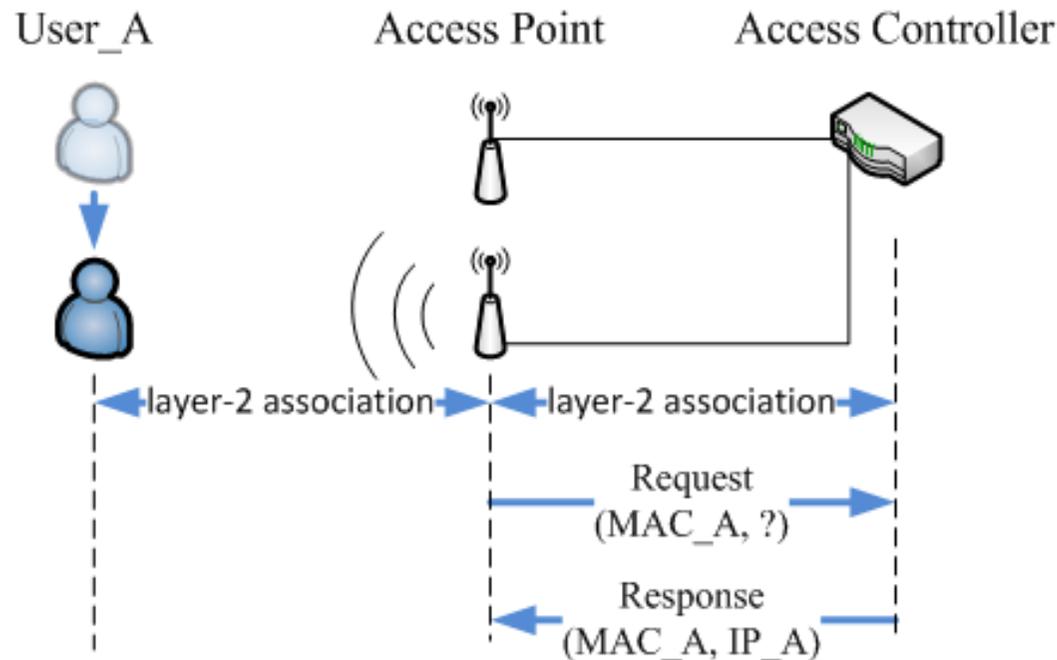
Scenario 1: Filter on FIT AP

- 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)



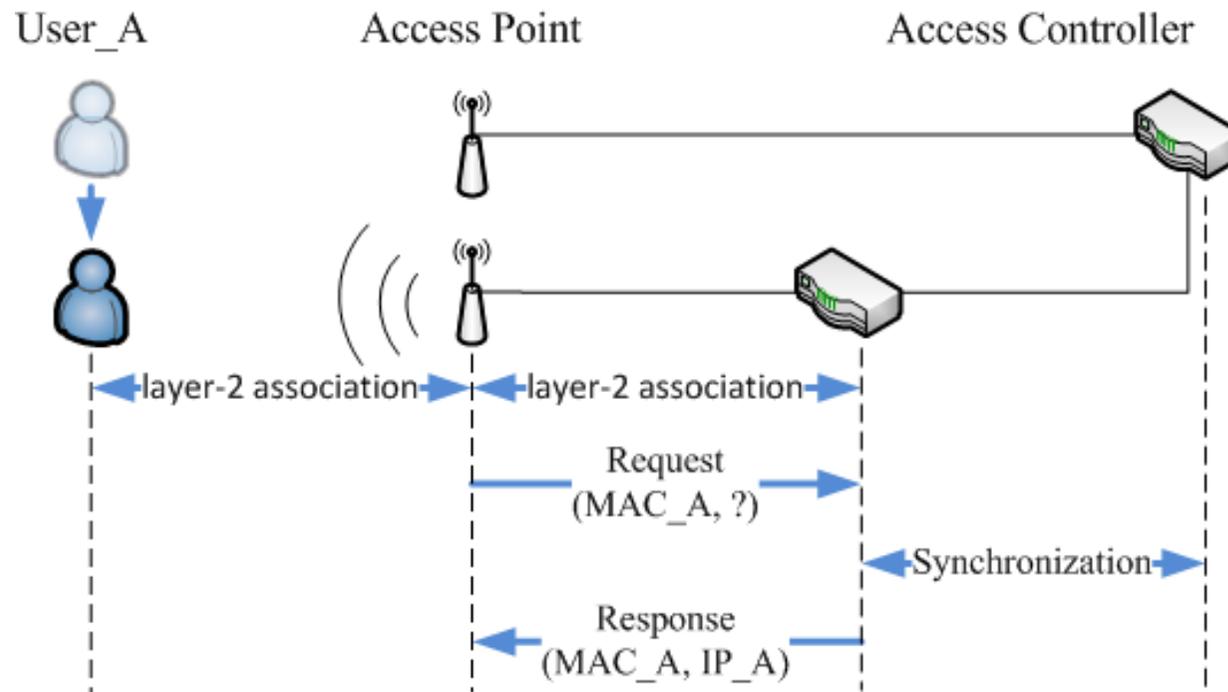
Host move from one AP to another AP

- 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



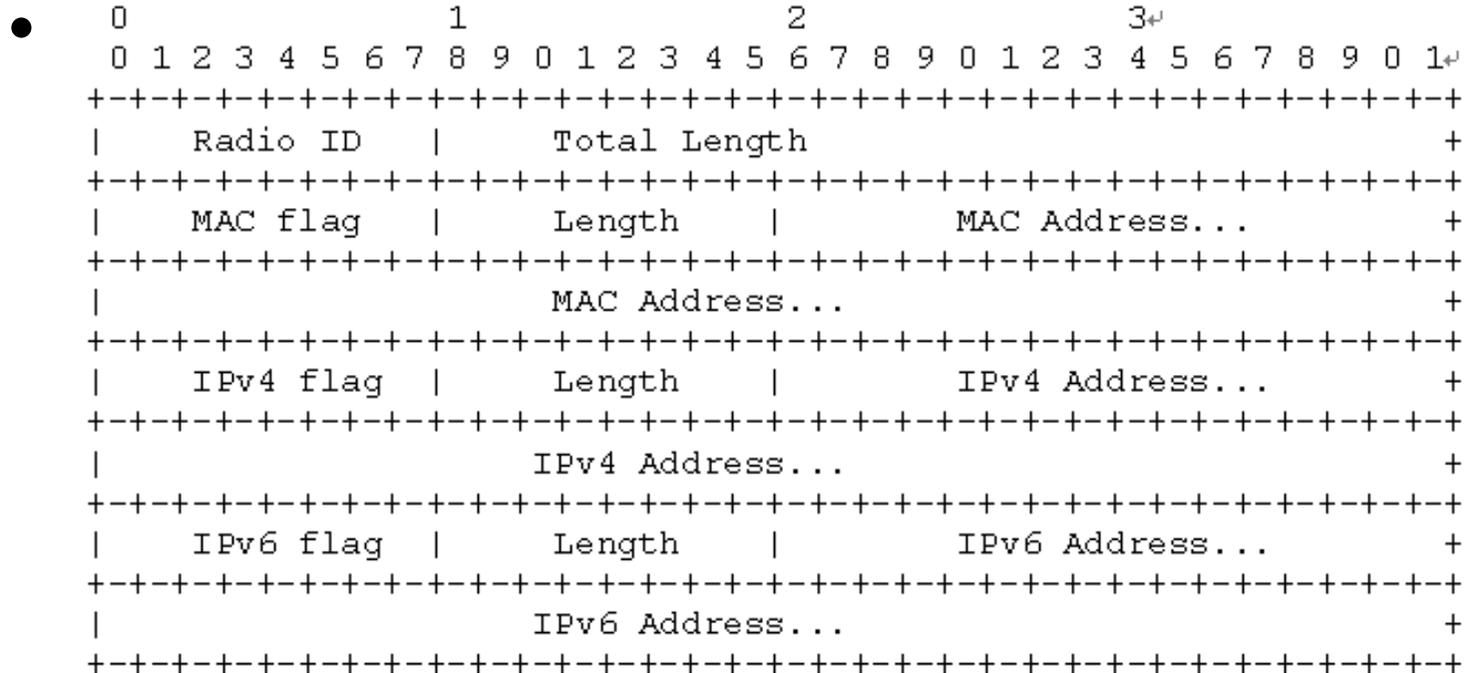
Host move from one AC to another AC

- 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



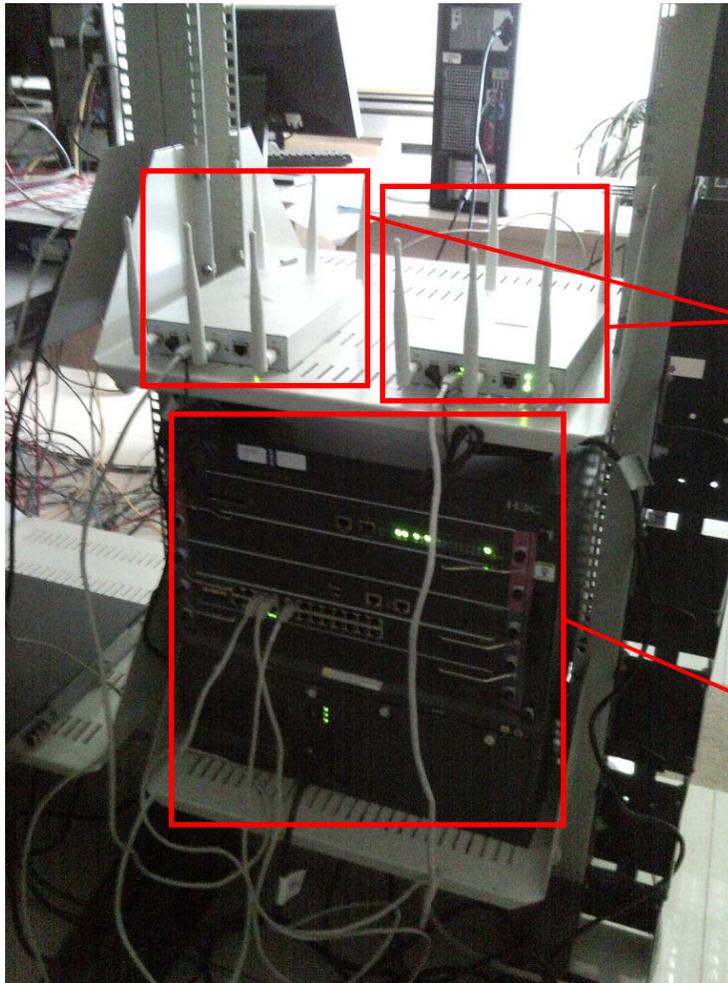
Scenario 2: Filter on AC

- 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

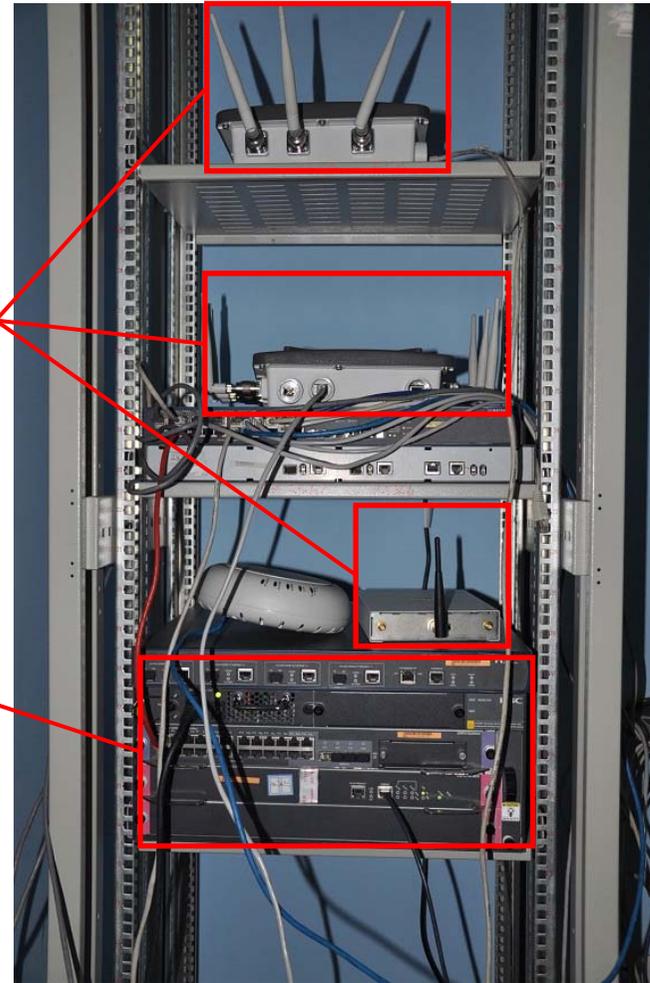
- FAT AP maintains binding table
- Mobility between different FAT APs triggers binding migration

Implemented in H3C Equipment and the experiments were conducted



AP

AC

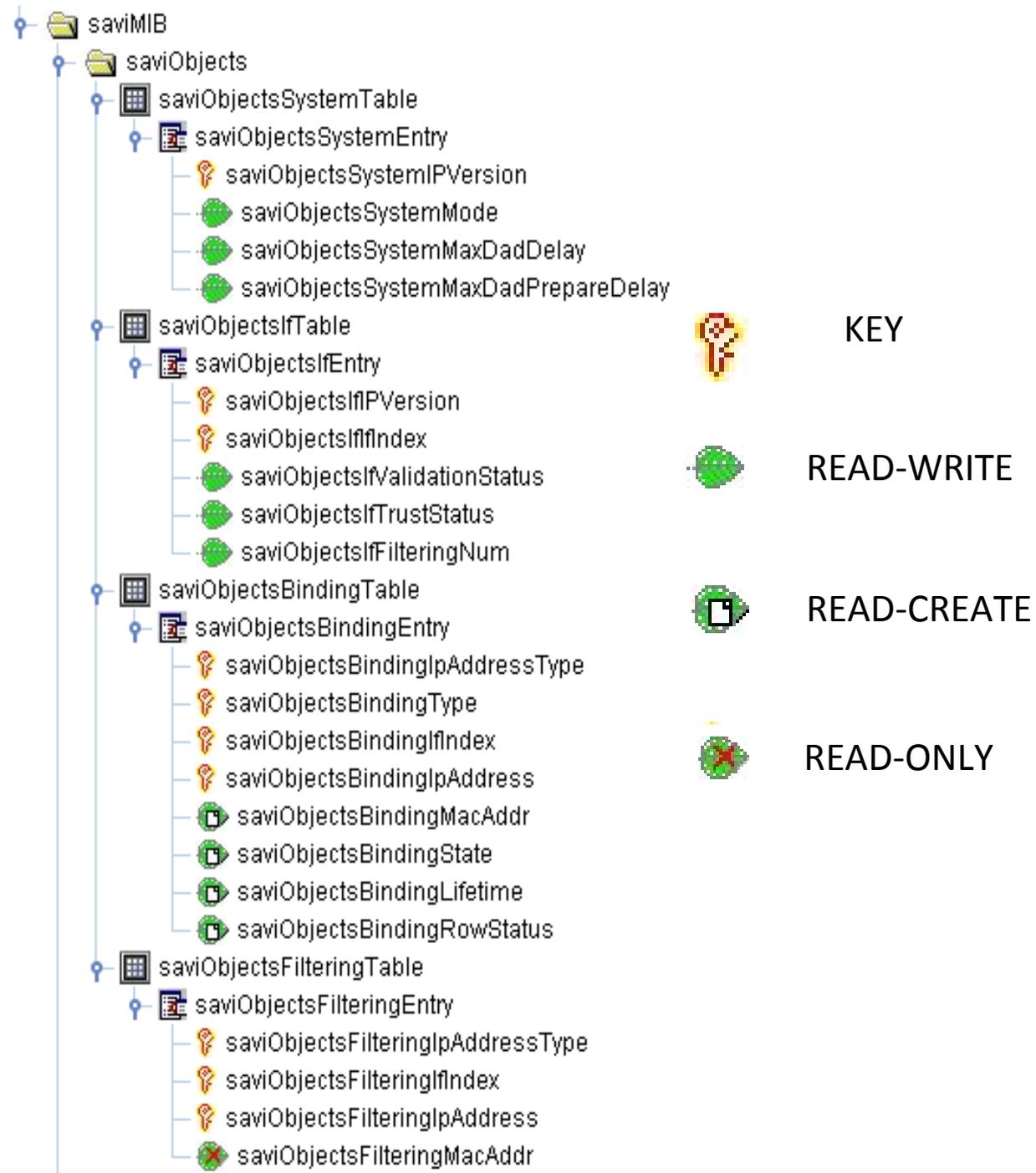


**SAVI MIB and Management
System Design
draft-an-savi-mib-00**

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)

SAVI管理系统

用户 管理 显示 统计 验证

全局视图

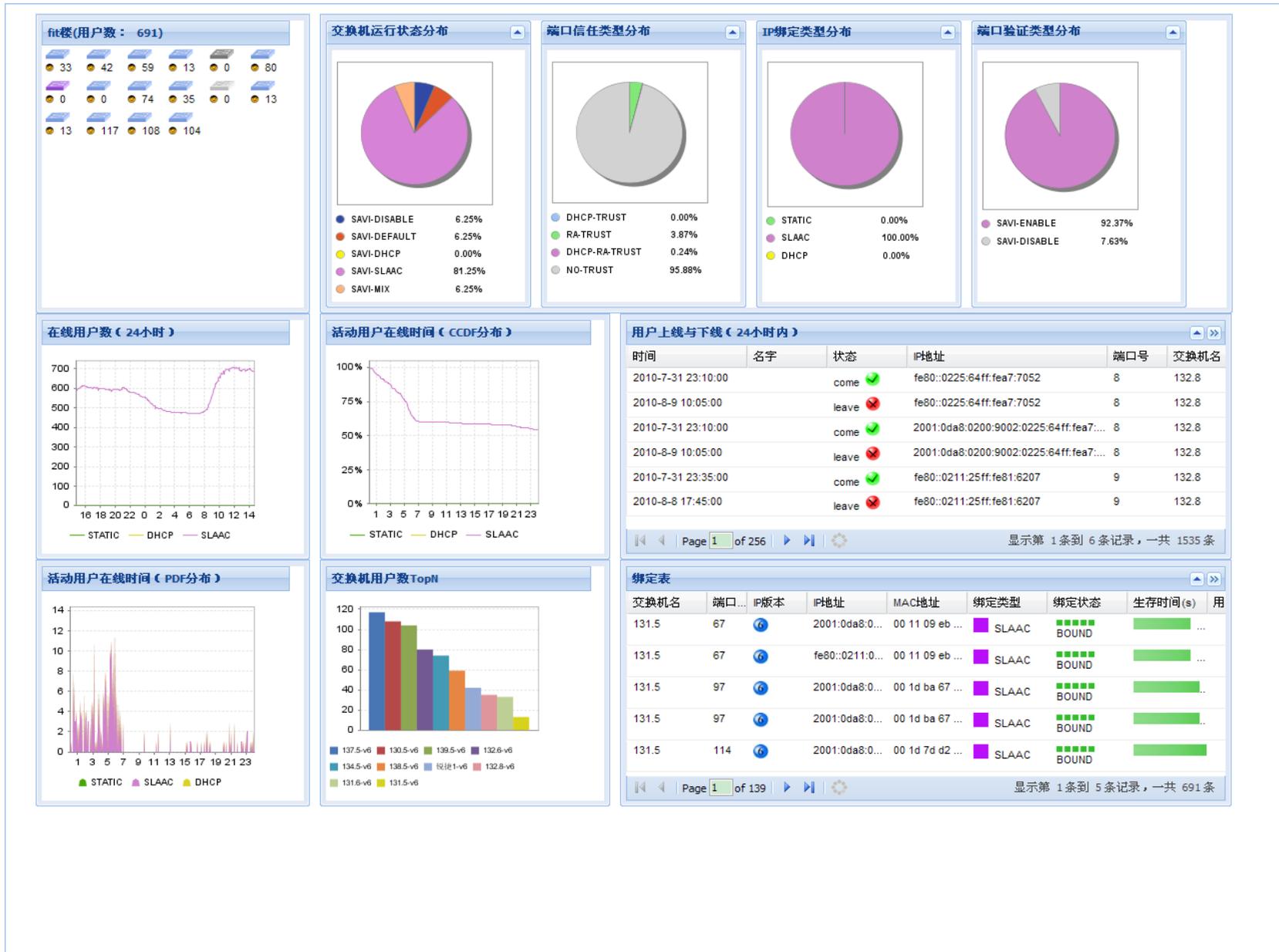
交换机列表 SAVI信息列表

子网名称	交换机数	设备状态 (DISABLE DEFAULT SLAAC DHCP MIX)	用户数
net2	0		0
信楼	19	0 103 22 41 2 43 0 50 10 16 106 57 5 54 82 15 11 0 81	698
测试网段	1	12	12
中兴测试	0		0
神码交换机子网	4	0 38 0 40	78

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显示第 1 条到 5 条记录，一共 5 条

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	机房
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)

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...	26	130.5
2010-8-6 17:55:00		come	2001:0da8:0200:9000:c521:c052:498...	26	130.5
2010-8-8 17:20:00		leave	2001:0da8:0200:9000:c521:c052:498...	26	130.5
2010-8-6 17:55:00		come	2001:0da8:0200:9000:a4a9:70db:906...	26	130.5
2010-8-6 17:55:00		come	2001:0da8:0200:9000:386e:800d:5c8...	26	130.5
2010-8-8 17:15:00		leave	2001:0da8:0200:9000:386e:800d:5c8...	26	130.5

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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
26	IPv6	2001:0da8:0... 00 1f d0 9e 7...		SLAAC	BOUND		
26	IPv6	2001:0da8:0... 00 02 3f 02 6...		SLAAC	BOUND	656...	
26	IPv6	2001:0da8:0... 00 1a 4d 94 ...		SLAAC	BOUND	319327	
26	IPv6	2001:0da8:0... 00 1a 4d 94 ...		SLAAC	BOUND	319312	
26	IPv6	2001:0da8:0... 00 25 64 a6 f...		SLAAC	BOUND	195768	

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SAVI Binding Table

SAVI管理系统									用户	管理	显示	统计	验证	注销	
交换机绑定表(131.5)									显示STATIC	显示SLAAC	显示DHCP	显示全部			
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	是否在过滤表?							
67	6	2001:0da8:0200:9001:0211:09ff:feeb:4129	00 11 09 eb 4f 29	SLAAC		B 1314		✓							
67	6	fe80::0211:09ff:feeb:4129	00 11 09 eb 4f 29	SLAAC		B 1310		✓							
97	6	2001:0da8:0200:9001:586c:830a:a2ff:8d00	00 1d ba 67 4e f2	SLAAC		B 5383		✓							
97	6	2001:0da8:0200:9001:695f:fa6f:ed93:b57c	00 1d ba 67 4e f2	SLAAC		B 5383		✓							
101	6	2001:0da8:0200:9001:0211:95ff:fefe:45f1	00 11 95 fe 45 f1	SLAAC		B 1365		✓							
114	6	2001:0da8:0200:9001:e94c:a027:d213:2399	00 1d 7d d2 5b 88	SLAAC		B 2343		✓							
114	6	2001:0da8:0200:9001:f999:9aaa:5f38:fa1e	00 1d 7d d2 5b 88	SLAAC		B 2343		✓							
114	6	fe80::e94c:a027:d213:2399	00 1d 7d d2 5b 88	SLAAC		B 2342		✓							
125	6	2001:0da8:0200:9001:0215:17ff:feb5:bb6c	00 15 17 b5 bb 6c	SLAAC		B 8541		✓							
125	6	fe80::0215:17ff:feb5:bb6c	00 15 17 b5 bb 6c	SLAAC		B 8540		✓							
126	6	2001:0da8:0200:9001:0217:9aff:feba:eaca	00 17 9a ba ea ca	SLAAC		B 7669		✓							
126	6	2001:0da8:0200:9001:0217:9aff:feba:eacd	00 17 9a ba ea cd	SLAAC		B 7627		✓							
126	6	2001:0da8:0200:9001:021a:64ff:fe8a:2c8c	00 1a 64 8a 2c 8c	SLAAC		B 1392		✓							
126	6	2001:0da8:0200:9001:021a:64ff:fe8a:2d64	00 1a 64 8a 2d 64	SLAAC		B 14361		✓							
126	6	2001:0da8:0200:9001:021e:0bff:fe21:9c64	00 1e 0b 21 9c 64	SLAAC		B 1366		✓							
126	6	2001:0da8:0200:9001:0221:5aff:fe46:94ff	00 21 5a 46 94 ff	SLAAC		B 1365		✓							
126	6	2001:0da8:0200:9001:0221:5aff:fe46:95eb	00 21 5a 46 95 eb	SLAAC		B 2192		✓							
126	6	2001:0da8:0200:9001:0221:5aff:fe47:1fe9	00 21 5a 47 1f e9	SLAAC		B 1366		✓							
126	6	fe80::0217:9aff:feba:eaca	00 17 9a ba ea ca	SLAAC		B 7668		✓							
126	6	fe80::0217:9aff:feba:eacd	00 17 9a ba ea cd	SLAAC		B 7625		✓							
126	6	fe80::021a:64ff:fe8a:2c8c	00 1a 64 8a 2c 8c	SLAAC		B 1391		✓							

Thank You!
Q & A