

CNGI-CERNET2 SAVI Deployment Update

China Education and Research Network (CERNET)

/Tsinghua Univ.

IETF78, Maastricht

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Outline

- SAVI Switches Implementation
- SAVI Switches Testing
- SAVI Deployment in CNGI-CERNET2
- SAVI Management System and MIB Design

Brief Introduction

- CNGI is China Next Generation Internet
- CNGI-CERNET2
 - CERNET: was the 2nd Large ISP in China, 2000+ university campus networks, 20M+ users
 - CERNET2 is the largest IPv6 network
- CNGI-CERNET2 SAVI Deployment Plan
 - 100 universities campus networks nationwide
 - 1 Million users
 - Time frame: 2008-2010
 - SAVI software upgrade at about 20K+ access switches
 - SAVI management system installation in 100 campuses
- China Telecom and China Mobile will also deploy

SAVI Switches Implementation

SAVI Switch Implementation

- Solutions implemented
 - draft-ietf-savi-dhcp-04
 - draft-bi-savi-stateless-01 (from draft-bj-cps, and proposed to be merged with draft-savi-fcfs)
- Vendors
 - ZTE
 - Huawei (New)
 - H3C (3Com)
 - Ruijie
 - Digital China (spun off from Lenovo)
 - Bitway
 - Centac

SAVI-Software upgradable

- Savi-upgradable switches in our deployment
 - 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

Command Line Design

- **Snooping**
 - Enabled **at global view or vlan view**
- Command line: XXX Snooping enable
 - Start snooping and binding
 - Drop the server-end message(DHCP reply, RA) by default, except for packets from anchor with attribute XXX-Trust
- For example, in DHCP-only senario:
 - Dhcp snooping enable
 - NDP snooping link-local enable
- Undo XXX snooping
 - Stop snooping
 - Stop filter server-end message
- SHOULD write memory if snooping is enabled, and enable snooping automatically after reboot.

Command Line Design

- **Verification**

- Enabled at **port view**
- *IP check source IP-address*

Command Line Design

- Port configuration
- Attached to monitored host
 - IP check source IP-address
- Attached to router or DHCP server/relay
 - RA trust or DHCP trust
- Fully trusted port
 - RA trust and DHCP trust
- Default port
 - No configuration

Command Line Design

- **View & Modification**
 - At global view
- **View:** show all the IPv6 bindings
 - *display ipv6 check source binding table*
- **Modification:** add or del bindings manually
 - *ipv6 check source binding table add IP XXX
MAC XXX PORT XXX TYPE XXX [LIFETIME
XXX]*
 - *ipv6 check source binding table del IP XXX
PORT XXX*

Console Example

```
H3C]dis ip check source ipv6
Total entries found: 4
MAC                IP                VLAN Port                Type
001d-09b6-a763    2001::7D1B:A5AE:44DE:FCB1 2    GigabitEthernet1/0/3    ND-SNP
001d-09b6-a763    FE80::B47E:A4DD:166D:89E0 2    GigabitEthernet1/0/3    ND-SNP
001d-09b6-a763    2001::B47E:A4DD:166D:89E0 2    GigabitEthernet1/0/3    ND-SNP
001d-09b6-a763    2001::1004          2    GigabitEthernet1/0/3    DHCPv6-SNP
```

Binding State Table of H3C S5500

Entry:

Source IP | Source MAC | Vlan ID | Type(DHCP or ND)

SAVI Switches Testing

Catalogs of SAVI Testing

- CERNET organized formal testing for SAVI switches
- Test types:
 - Conformance testing
 - Performance testing
 - Test-bed (interoperability) testing
 - Testing in the production network
- Each type has 3 scenarios
 - DHCPv6-only
 - SLAAC-only
 - DHCPv6-SLAAC-mixed
 - In each scenario, the static binding for manual configured address is also tested

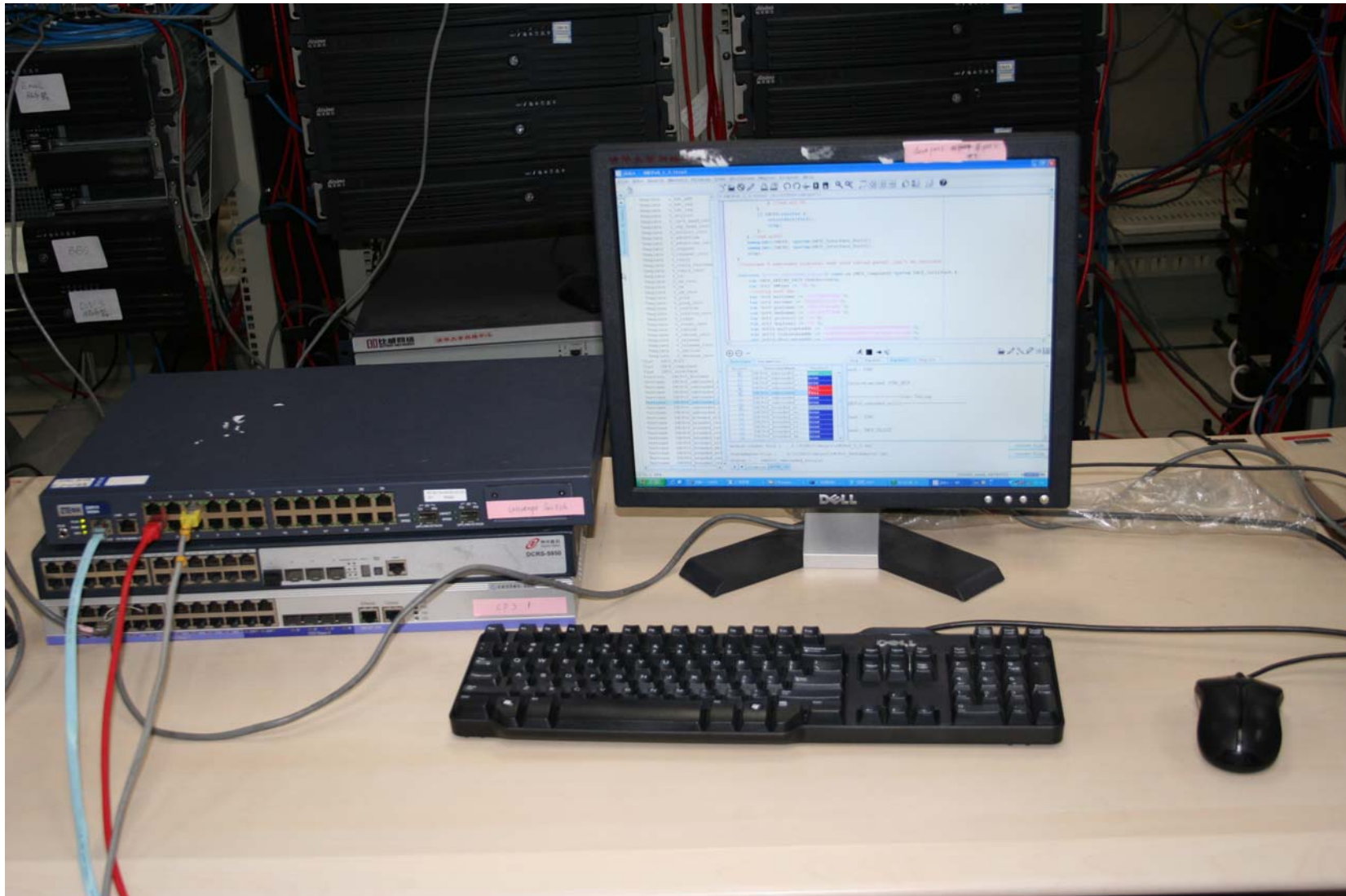
SAVI Switch Testing

- 10 switches models passed this formal testing
 - ZTE: ZXR10-5928 、 ZXR10-3928
 - H3C: S5500, S5100, E126A
 - Ruijie: RG-S5760, RG-S2924, RG-S2628
 - Digital China: DCS-5950, DCS-3950
- Totally 4 testing types x 3 scenarios x 10 models= 120 testing reports generated

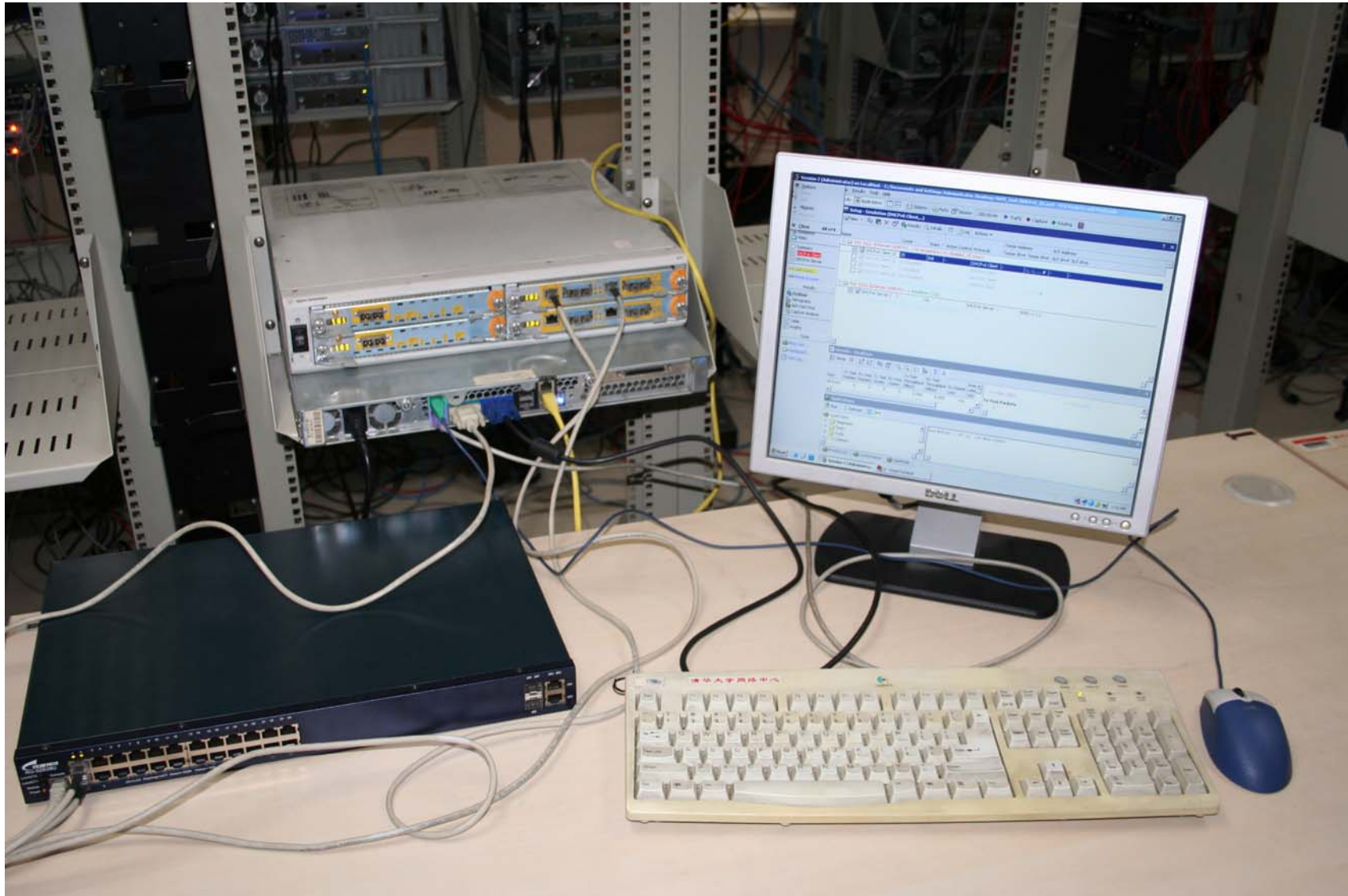
SAVI Switches under Test (form difference vendors)



Conformance Testing (TTCN3 based testing system developed by Tsinghua)

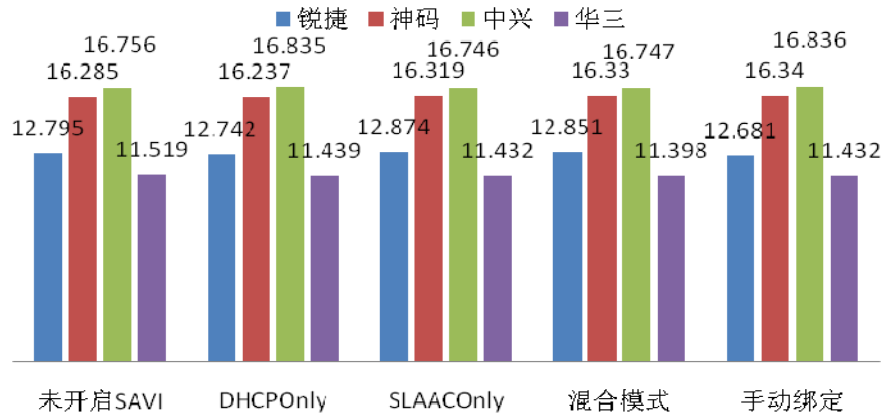


Performance Testing (AGILENT N2X)

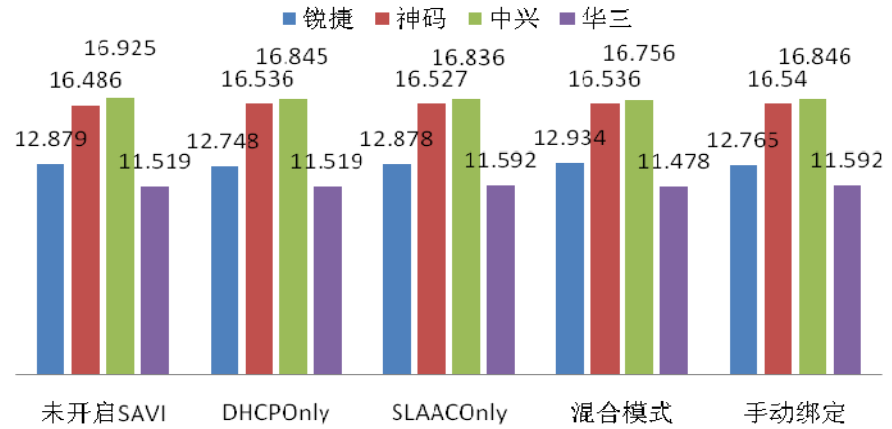


SAVI perf testing result example: delay (micro-second) after binding enabled

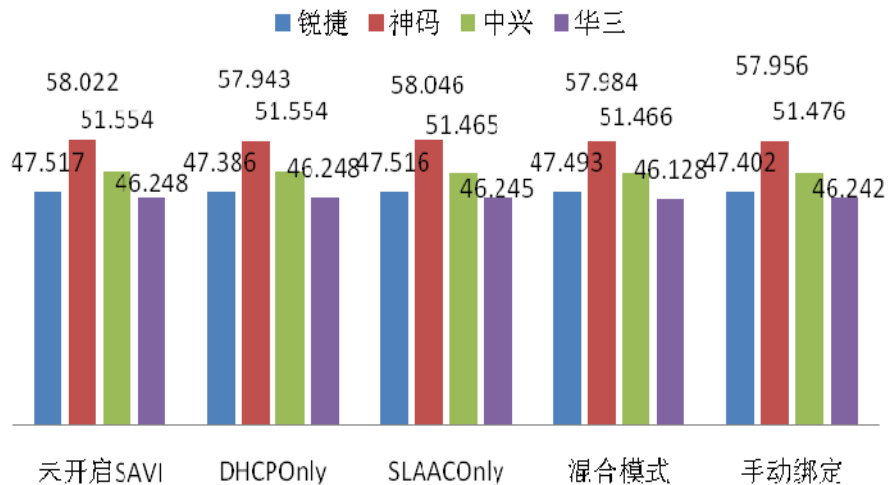
78bytes帧长的报文性能测试结果横向比较



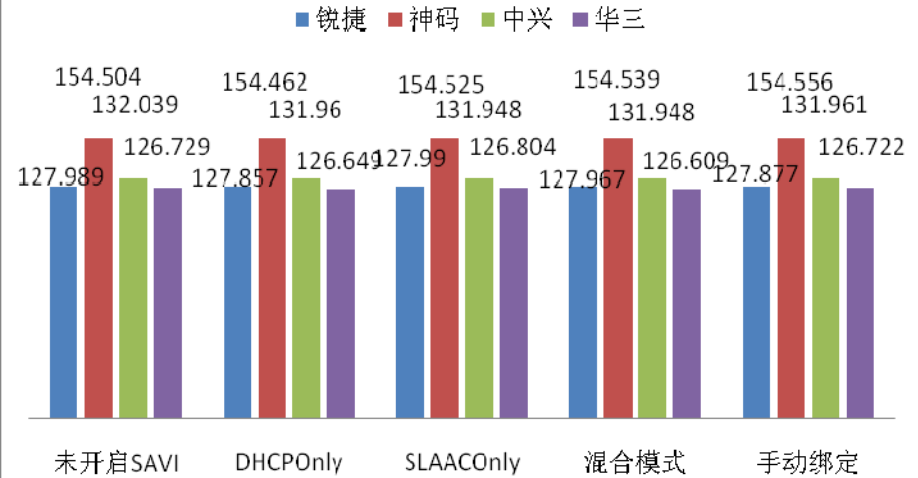
79bytes帧长的性能测试结果横向比较



512bytes帧长的性能测试结果横向比较



1518bytes帧长的性能测试结果横向比较



Binding table size

- size

- C1

	RJ	DC	H3C
DHCPv6-only	244	191	320
SLAAC-only	488	383	640

- C2

	RJ	ZTE	H3C
DHCPv6-only	247	62	230
SLAAC-only	494	125	460

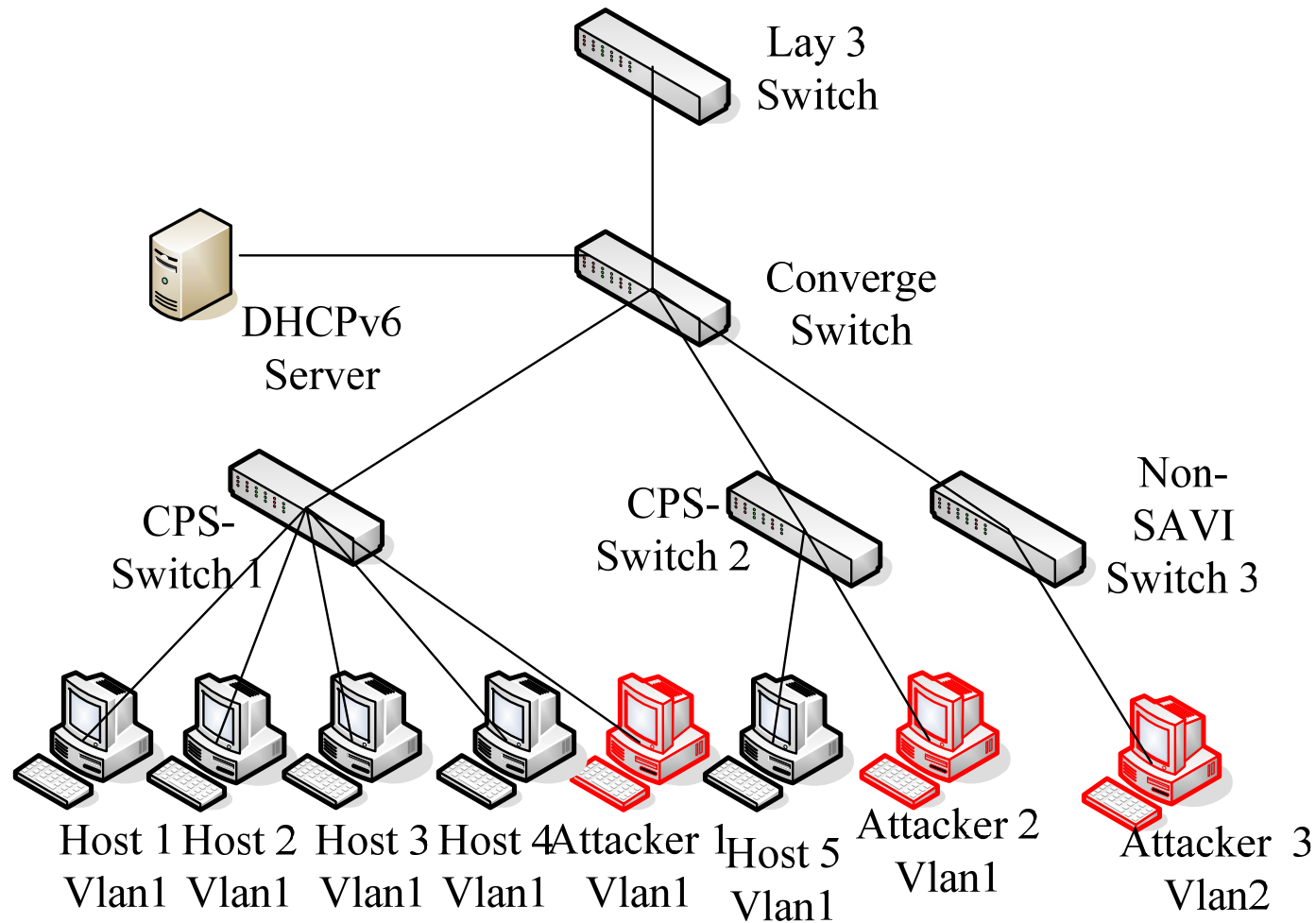
- C3

	RJ	DC	ZTE	H3C
DHCPv6-only	127	200	62	490
SLAAC-only	254	400	125	980

Test-bed (interoperability) testing



Test-bed (interoperability) testing



Interoperability test for host OS

- Windows XP with SP3
- Windows Vista
- Windows 7
- Linux
- MAC OS
- Some dhcpv6 client software, such as dibbler

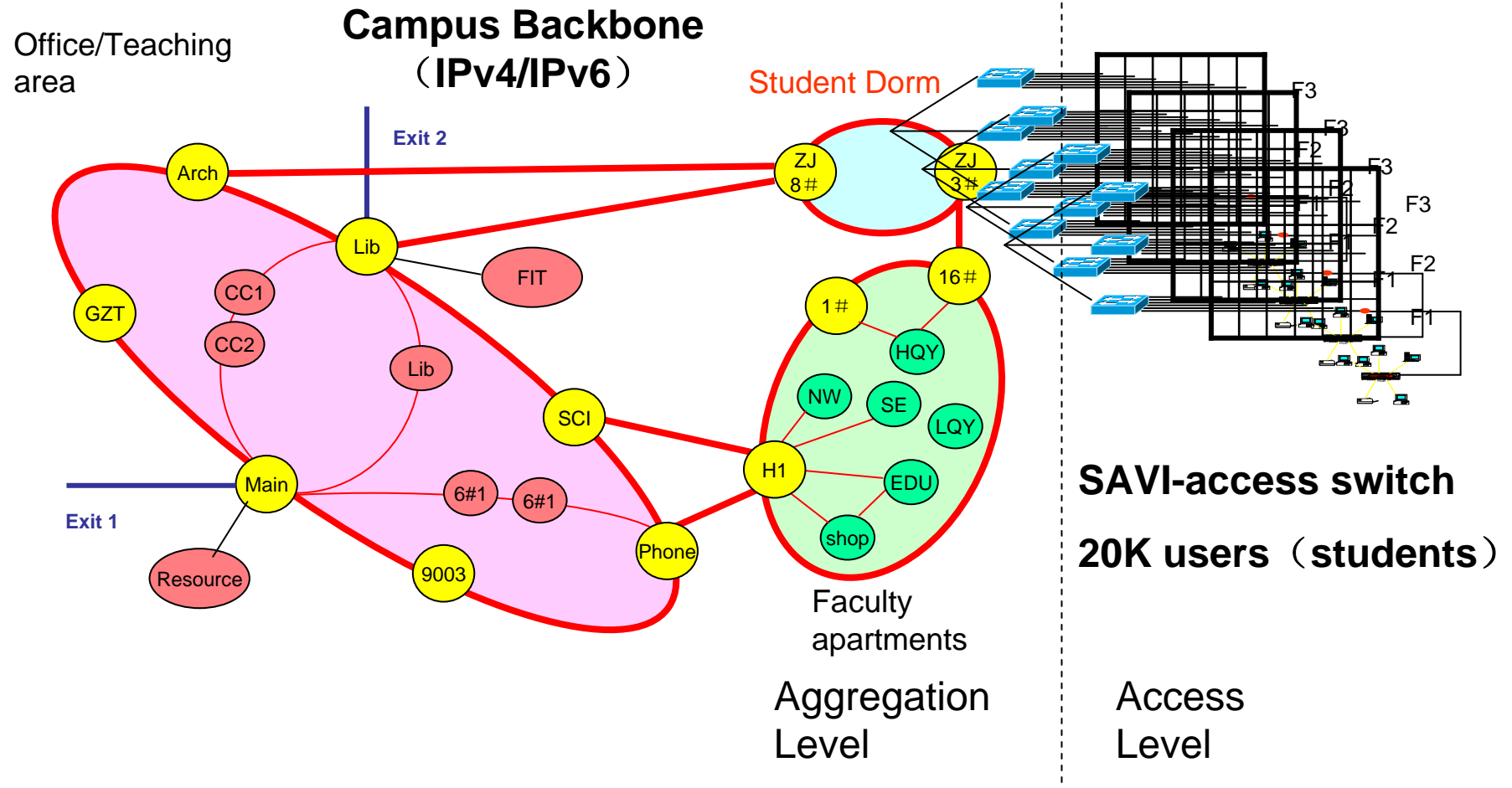
SAVI Deployment in CERNET2

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.

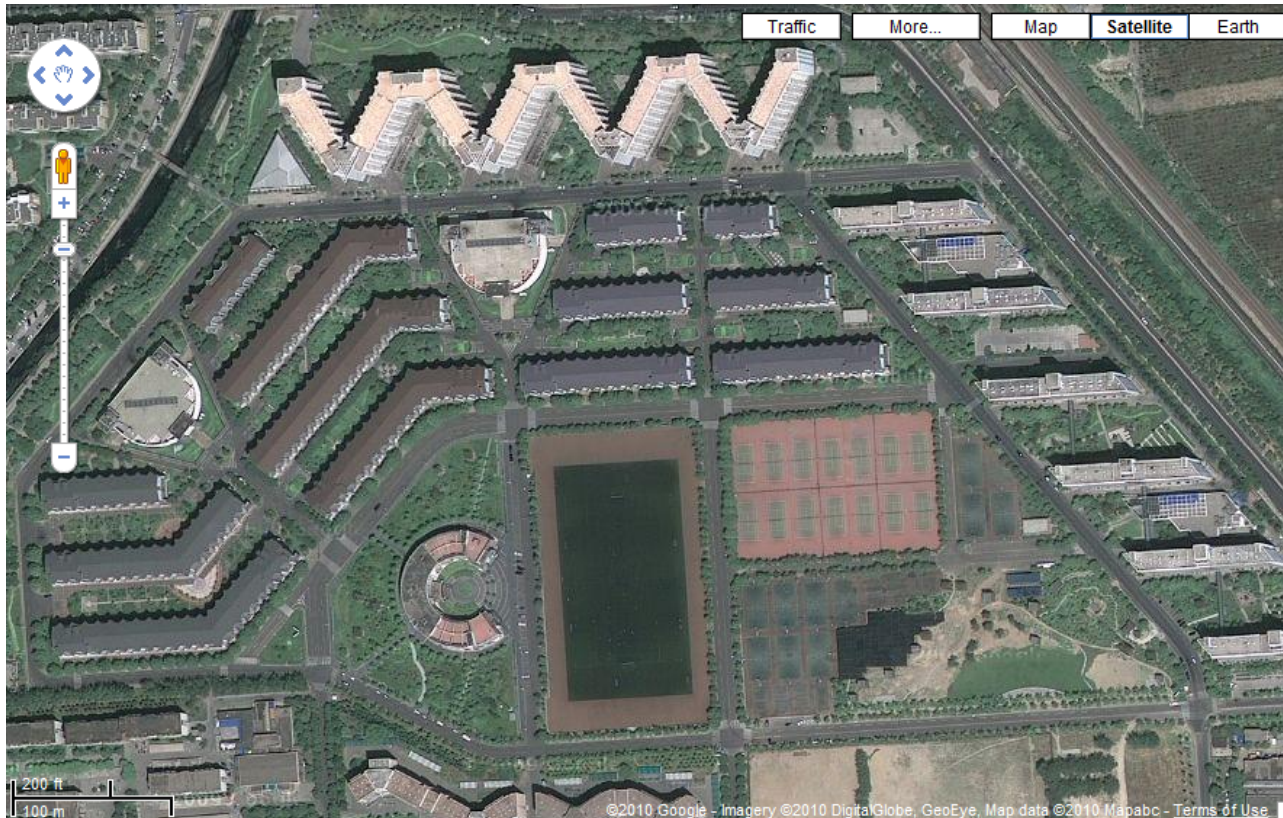
Example: Tsinghua Univ. campus network had deployed (software upgrade at access switch)

subnets	switches	port	hosts	users
114	1018	23414	22644	20280

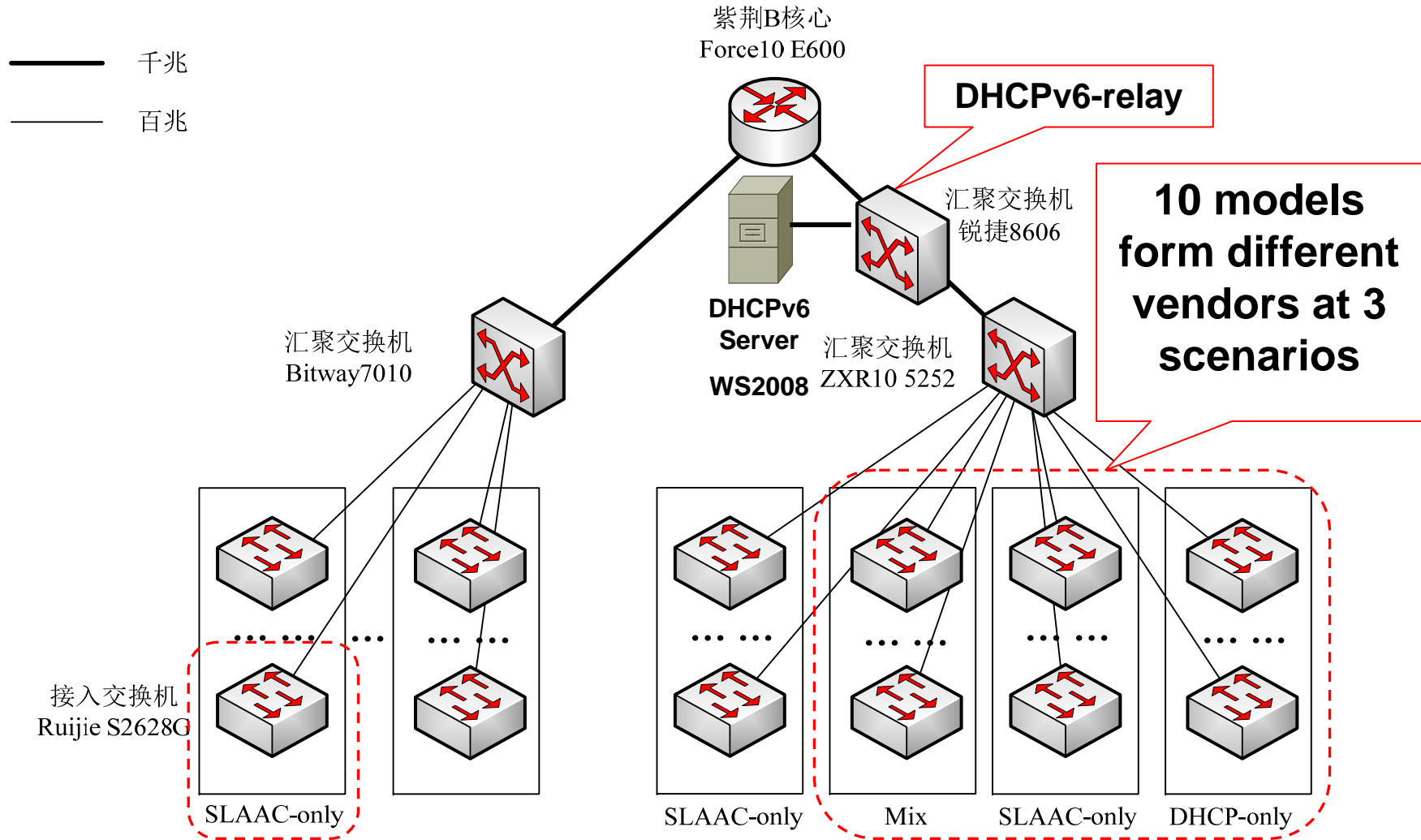


Deployment at Campus Network

- Tsinghua Student Dorms: 20+ buildings, 20K+ students



Deployment in Students Buildings



高机房，共4组，每组10台组成1个子网

低机房，共4组，每组10台组成1个子网

Real Deployment in Student Dorms



H3C: DHCPv6-only

Digital China: DHCP-SLAAC-mixed

```
[ZJ14-L01-F-01]display ip check source ipv6
```

```
Total entries found: 5
```

MAC Address	IP Address	VLAN	Interface	Type
001c-b3ab-6162	FE80::21C:B3FF:FEAB:6162	1	GE1/0/5	ND-SNP
940c-6d74-c244	FE80::960C:6DFF:FE74:C244	1	GE1/0/7	ND-SNP
0022-156c-ba34	FE80::222:15FF:FE6C:BA34	1	GE1/0/9	ND-SNP
0011-2517-fe6b	2402:F000:5:C801:3463:B3D8:E63 C:8FC8	1	GE1/0/14	DHCPv6-SNP
001f-d0a1-45ed	FE80::AD55:DE48:DDC9:2EDB	1	GE1/0/17	ND-SNP

```
ZJ14-L05-F-05#show savi ipv6 check source binding
```

```
Static binding count: 0
```

```
Dynamic binding count: 8
```

```
Binding count: 8
```

MAC	IP	VLAN	Port	Type	State	Expires
90-e6-ba-78-f2-06	2402:f000:5:ca01:d999:3fae:bf36:4178	1	Ethernet1/14	dhcp	BOUND	1012389
90-e6-ba-78-f2-06	fe80::14df:55e9:2639:43ba	1	Ethernet1/14	slaac	BOUND	4374
90-e6-ba-78-f2-06	2402:f000:5:ca01:14df:55e9:2639:43ba	1	Ethernet1/14	slaac	BOUND	14276
90-e6-ba-78-f2-06	2402:f000:5:ca01:2840:a378:d686:fc0b	1	Ethernet1/14	slaac	BOUND	14276
c8-0a-a9-41-b5-a1	2402:f000:5:ca01:639b:f7c8:7999:13c8	1	Ethernet1/21	dhcp	BOUND	1036459
c8-0a-a9-41-b5-a1	fe80::d1d8:1aa5:45b2:b883	1	Ethernet1/21	slaac	BOUND	14058
c8-0a-a9-41-b5-a1	2402:f000:5:ca01:d1d8:1aa5:45b2:b883	1	Ethernet1/21	slaac	BOUND	14058
c8-0a-a9-41-b5-a1	2402:f000:5:ca01:8c12:15a3:553e:f8a5	1	Ethernet1/21	slaac	BOUND	14058

Rujie: SLAAC-only

```
ZJ-A13-F-1>en
```

```
Password:
```

```
ZJ-A13-F-1#show savi ipv6 check source filtering
```

```
Total entries found: 25
```

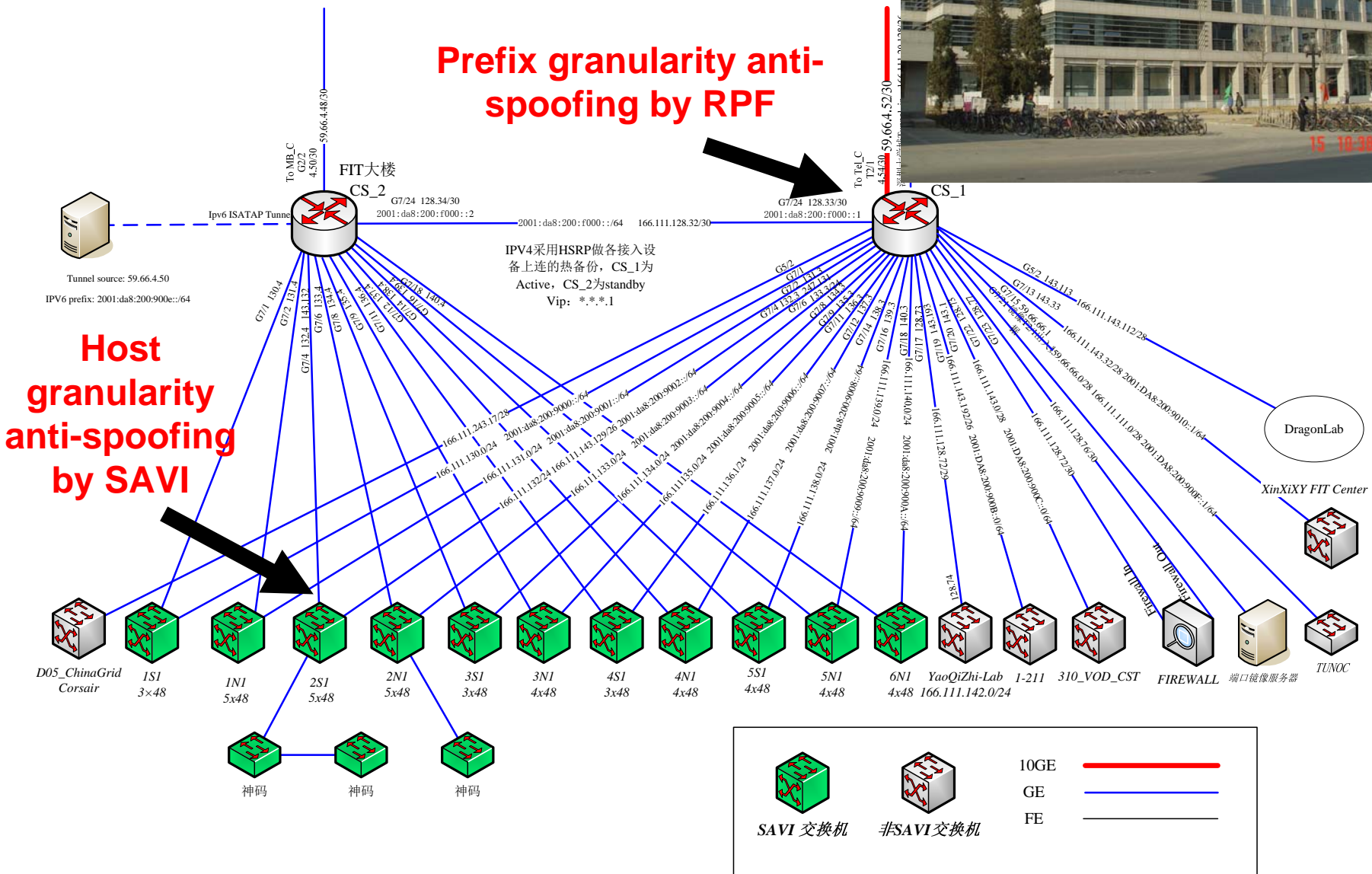
Mac Address	Ipv6 Address	VLAN	Interface	Type
001a.804b.3b39	2402:F000:5:C601:52C:9700:FE47:6298	1	Fa0/2	SLAAC
001a.804b.3b39	2402:F000:5:C601:5515:702:F615:2571	1	Fa0/2	SLAAC
001a.804b.3b39	FE80::5515:702:F615:2571	1	Fa0/2	SLAAC
001d.724b.7bd4	2402:F000:5:C601:583B:BEBE:24E2:DF60	1	Fa0/23	SLAAC
001d.724b.7bd4	2402:F000:5:C601:F86F:AC8A:3D4E:934F	1	Fa0/23	SLAAC
001d.724b.7bd4	FE80::583B:BEBE:24E2:DF60	1	Fa0/23	SLAAC
0021.869f.9f0d	2402:F000:5:C601:702F:91F7:E370:4E5A	1	Fa0/18	SLAAC
0021.869f.9f0d	2402:F000:5:C601:CCE6:BC0C:EC55:2EB0	1	Fa0/18	SLAAC
0023.5a29.8776	2402:F000:5:C601:15FD:296D:A2CA:3677	1	Fa0/4	SLAAC
0023.5a29.8776	2402:F000:5:C601:2C46:65F8:CF78:4E2	1	Fa0/4	SLAAC
0023.5a29.8776	FE80::15FD:296D:A2CA:3677	1	Fa0/4	SLAAC
0023.5a4a.7981	2402:F000:5:C601:2DB9:D2F2:54D0:1290	1	Fa0/12	SLAAC
0023.5a4a.7981	2402:F000:5:C601:38DD:D746:7746:EFE	1	Fa0/12	SLAAC
0023.df96.f8d6	2402:F000:5:C601:2869:D33A:1B7F:7803	1	Fa0/1	SLAAC
0023.df96.f8d6	2402:F000:5:C601:8063:8879:3F58:C8D7	1	Fa0/1	SLAAC
0023.df96.f8d6	FE80::8063:8879:3F58:C8D7	1	Fa0/1	SLAAC
0024.8146.c9e5	2402:F000:5:C601:3174:72E3:BF2F:FEE	1	Fa0/3	SLAAC
0024.8146.c9e5	2402:F000:5:C601:AC55:9656:4BC9:705D	1	Fa0/3	SLAAC
0024.8c3e.1a87	2402:F000:5:C601:1846:8CBC:4BE7:5F3E	1	Fa0/17	SLAAC
0024.8c3e.1a87	2402:F000:5:C601:54A1:F4A8:CD2F:AF59	1	Fa0/17	SLAAC
0024.8c3e.1a87	2402:F000:5:C601:54BB:90A:961:CBE5	1	Fa0/17	SLAAC
0024.8c3e.1a87	2402:F000:5:C601:6C60:43B:CC89:D401	1	Fa0/17	SLAAC
0024.8c3e.1a87	FE80::54A1:F4A8:CD2F:AF59	1	Fa0/17	SLAAC
0026.2df5.1645	2402:F000:5:C601:5947:3D8:91D6:E1D1	1	Fa0/8	SLAAC
0026.2df5.1645	2402:F000:5:C601:95C8:DA64:64C2:CB	1	Fa0/8	SLAAC

```
ZJ-A13-F-1#
```

ZTE: SLAAC-only

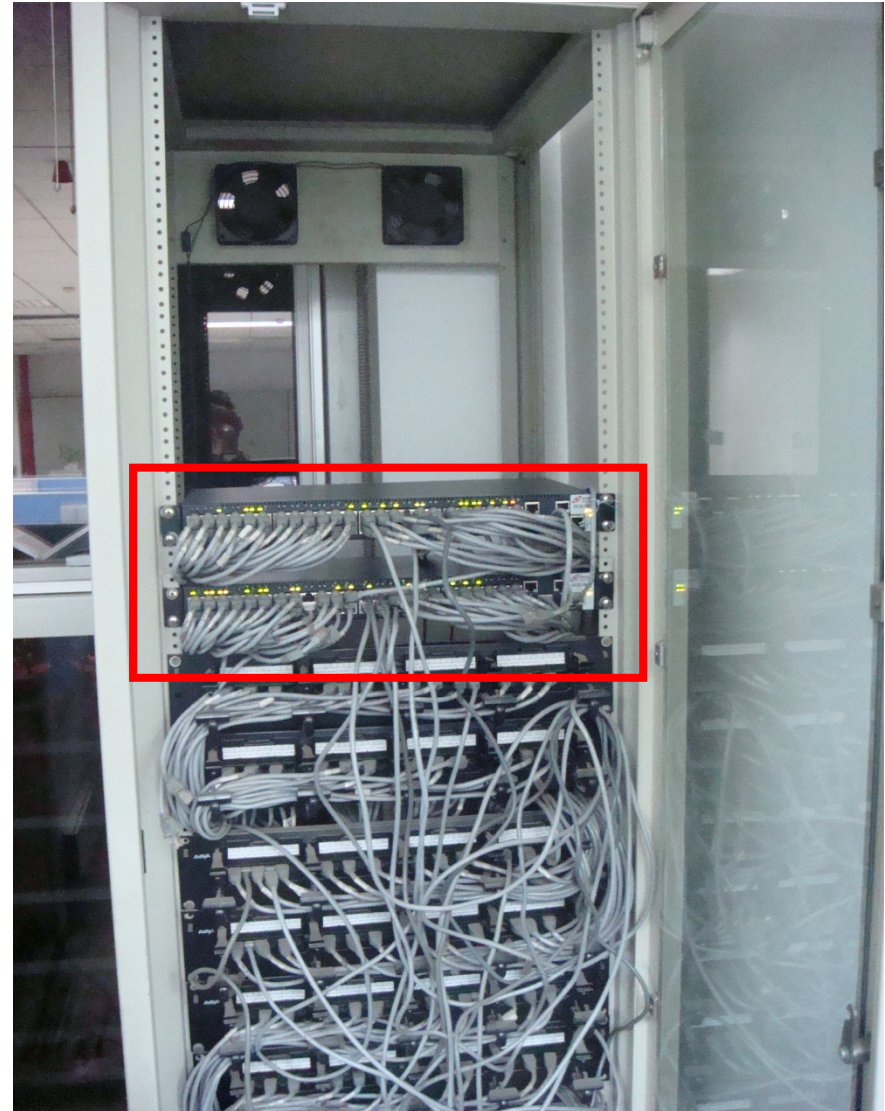
```
ZJ14-L03-F-09#show ipv6 nd snooping bst
IPv6 ND Snooping Bound State Table:
MAC                IPv6                State                Age (s)                Interface
001e-33d9-b0fa     2402:f000:5:c901:e04f:b96 BOUND                2437                    fei_1/6
                   d:10a9:BOUND
001e-33d9-b0fa     2402:f000:5:c901:7196:4e9 BOUND                2437                    fei_1/6
                   6:9fb2:BOUND
000a-e4c7-f926     2402:f000:5:c901:20a:e4ff BOUND                32                      fei_1/7
                   :fec7:fBOUND
000a-e4c7-f926     2402:f000:5:c901:bdc9:6ab BOUND                32                      fei_1/7
                   c:dc9:6BOUND
000a-e4c7-f926     fe80::20a:e4ff:fec7:f926 BOUND                32                      fei_1/7
c80a-a964-fee7     2402:f000:5:c901:b5e9:55d BOUND                4970                   fei_1/12
                   8:b585:BOUND
c80a-a964-fee7     2402:f000:5:c901:7841:954 BOUND                4970                   fei_1/12
                   4:f26e:BOUND
```


Example: SAVI deployment in Tsinghua FIT building



Deployment in Office Building

- FIT Building of Tsinghua Univ
- From Oct 2009- (about 10 months)
- No initial DAD-NS loss observed (link local addr bound)
- Ruijie RG-2652
- Digital China S3950 Switches



Digital China console

3950-52CT-132-7#show ipv6 ndp snooping
NDP Snooping binding is enabled

NDP Snooping binding count **61**, static binding 0

61 addresses bound at a 24-ports switch, multiple addr per host

MAC	IPv6 address	Interface	Vlan ID	State
00-1d-0f-12-44-f9	2002:a66f:cb72:7:316e:d6ac:b96:ea7a	Ethernet0/0/47	1	SAC_BOUND
00-1d-0f-12-44-f9	2001:da8:200:9002:316e:d6ac:b96:ea7a	Ethernet0/0/47	1	SAC_BOUND
00-16-41-a8-b7-2f	2001:da8:200:9002:216:41ff:fea8:b72f	Ethernet0/0/29	1	SAC_BOUND
00-16-41-a8-b7-2f	2001:da8:200:9002:3562:2a49:1012:b475	Ethernet0/0/29	1	SAC_BOUND
00-16-41-a8-b7-2f	fec0::7:216:41ff:fea8:b72f	Ethernet0/0/29	1	SAC_BOUND
00-16-41-a8-b7-2f	<u>2002:a66f:cb72:7:216:41ff:fea8:b72f</u>	Ethernet0/0/29	1	SAC_BOUND
00-16-41-a8-b7-2f	2002:a66f:cb72:7:3562:2a49:1012:b475	Ethernet0/0/29	1	SAC_BOUND
00-12-17-2a-3d-e9	2001:da8:200:9002:212:17ff:fe2a:3de9	Ethernet0/0/31	1	SAC_BOUND
00-12-17-2a-3d-e9	fec0::7:212:17ff:fe2a:3de9	Ethernet0/0/31	1	SAC_BOUND
00-12-17-2a-3d-e9	2002:a66f:cb72:7:212:17ff:fe2a:3de9	Ethernet0/0/31	1	SAC_BOUND
00-12-17-2a-3d-e9	fe80::212:17ff:fe2a:3de9	Ethernet0/0/31	1	SAC_BOUND
00-0d-61-9b-40-e6	fec0::7:20d:61ff:fe9b:40e6	Ethernet0/0/24	1	SAC_BOUND
00-0d-61-9b-40-e6	2002:a66f:cb72:7:20d:61ff:fe9b:40e6	Ethernet0/0/24	1	SAC_BOUND
00-0d-61-9b-40-e6	2002:a66f:cb72:7:f1d2:fd1d:2a62:45a0	Ethernet0/0/24	1	SAC_BOUND
00-0d-61-9b-40-e6	2001:da8:200:9002:20d:61ff:fe9b:40e6	Ethernet0/0/24	1	SAC_BOUND
00-0d-61-9b-40-e6	2001:da8:200:9002:f1d2:fd1d:2a62:45a0	Ethernet0/0/24	1	SAC_BOUND
00-0d-61-9b-40-e6	fe80::20d:61ff:fe9b:40e6	Ethernet0/0/24	1	SAC_BOUND
00-1e-4f-9d-c5-7e	2002:a66f:cb72:7:f458:b6f4:a175:bdcb	Ethernet0/0/5	1	SAC_BOUND
00-1e-4f-9d-c5-7e	2001:da8:200:9002:f458:b6f4:a175:bdcb	Ethernet0/0/5	1	SAC_BOUND
00-1d-0f-12-44-f9	2002:a66f:cb72:7:5cfd:52ce:8dc1:f6c3	Ethernet0/0/47	1	SAC_BOUND
00-1d-0f-12-44-f9	<u>2001:da8:200:9002:5cfd:52ce:8dc1:f6c3</u>	Ethernet0/0/47	1	SAC_BOUND
00-1a-6b-5c-5e-5c	fec0::7:21a:6bff:fe5c:5e5c	Ethernet0/0/33	1	SAC_BOUND
00-1a-6b-5c-5e-5c	2002:a66f:cb72:7:21a:6bff:fe5c:5e5c	Ethernet0/0/33	1	SAC_BOUND
00-1a-6b-5c-5e-5c	2001:da8:200:9002:21a:6bff:fe5c:5e5c	Ethernet0/0/33	1	SAC_BOUND
00-1a-6b-5c-5e-5c	<u>fe80::21a:6bff:fe5c:5e5c</u>	Ethernet0/0/33	1	SAC_BOUND
00-1e-4f-9d-c5-7e	2001:da8:200:9002:1935:bccc:64a:adb4	Ethernet0/0/5	1	SAC_BOUND
00-1e-4f-9d-c5-7e	2002:a66f:cb72:7:1935:bccc:64a:adb4	Ethernet0/0/5	1	SAC_BOUND
00-1d-0f-12-44-f9	2002:a66f:cb72:7:412c:6704:32e9:b4e1	Ethernet0/0/47	1	SAC_BOUND

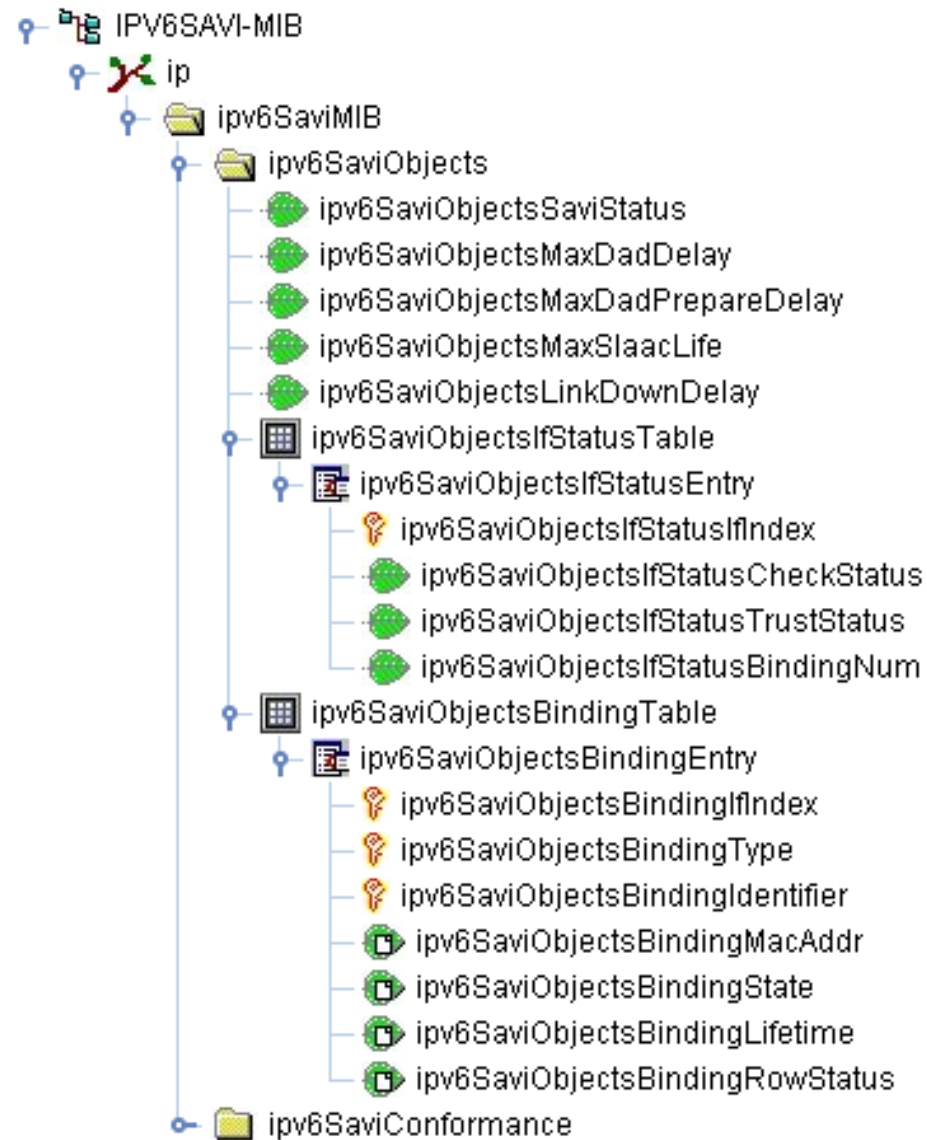
6to4

Global

Link local

SAVI Management System and MIB Design

MIB tree



Function

- Set :
 - SAVI-DHCP or SAVI-SLAAC function
 - Anchor (switch port) type
 - Binding limitation of anchor
- Get:
 - Binding State Table entries
 - Filtering Table entries
 - Statistics

Structure of SAVI-MIB

- Two separate MIB tree
 - IPV4SAVI-MIB for IPv4
 - IPV6SAVI-MIB for IPv6
 - They have Similar Structure
- Following we illustrate IPV6SAVI-MIB

Structure of IPV6SAVI-MIB

- ipv6SaviObjectsStatus
 - SAVI-DHCP/SAVI-SLAAC Status
- ipv6SaviObjectsMaxDadDelay,
ipv6SaviObjectsMaxDadPrepareDelay,
 - constants of SAVI
- ipv6SaviObjectsIfStatusTable
 - Validation type of anchor
 - Trust type of anchor
 - Binding limitation of anchor
- ipv6SaviObjectsBindingTable
 - Binding State Table entries

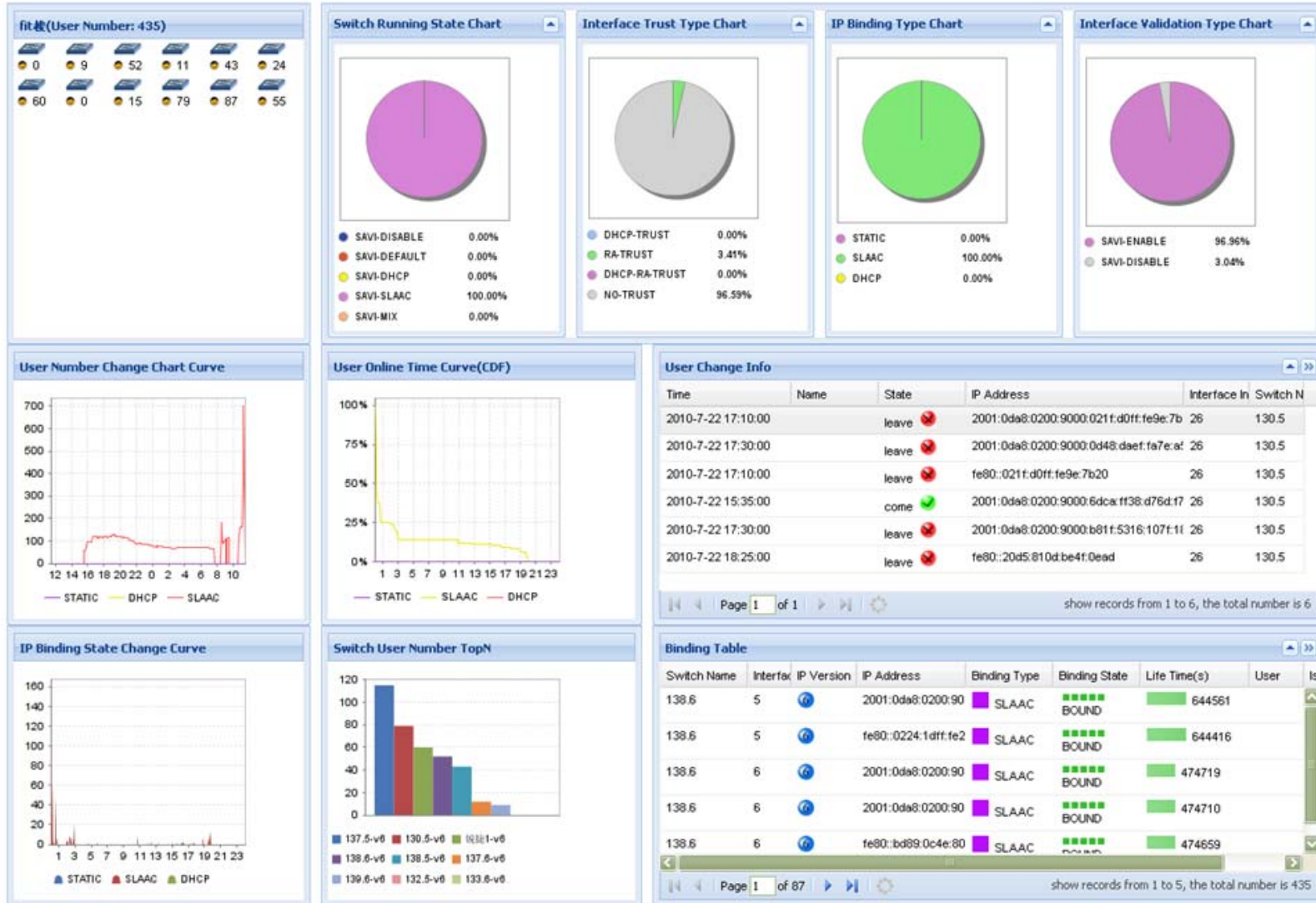
Structure of IPV6SAVI-MIB

- ipv6SaviObjectsIfStatusTable
 - ipv6SaviObjectsIfStatusIfIndex InterfaceIndex,
 - ipv6SaviObjectsIfStatusCheckStatus Integer32,
 - ipv6SaviObjectsIfStatusTrustStatus Integer32,
 - ipv6SaviObjectsIfStatusBindingNum Unsigned32

Structure of IPV6SAVI-MIB

- ipv6SaviObjectsBindingTable
 - ipv6SaviObjectsBindingIfIndex InterfaceIndex,
 - ipv6SaviObjectsBindingType Integer32,
 - ipv6SaviObjectsBindingIdentifier InetAddressIPv6,
 - ipv6SaviObjectsBindingMacAddr MacAddress,
 - ipv6SaviObjectsBindingState Integer32,
 - ipv6SaviObjectsBindingLifetime TimeInterval,
 - ipv6SaviObjectsBindingRowStatus RowStatus

SAVI management system implemented-Subnet view



Switch view (data gathered in Tsinghua FIT building)



Interface Status

SAVI Management System						
User Management Showing Statistic Verification <input type="text"/>						
Interface of Switch(130.5)						
Index	IP Version	Validation Status	ifTrustStatus	Max Filtering-Num		Binding Table
26	IPv6	Enable	NO-TRUST	4294967295		>>
27	IPv6	Enable	NO-TRUST	4294967295		>>
28	IPv6	Enable	NO-TRUST	4294967295		>>
29	IPv6	Enable	NO-TRUST	4294967295		>>
30	IPv6	Enable	NO-TRUST	4294967295		>>
31	IPv6	Enable	NO-TRUST	4294967295		>>
32	IPv6	Enable	NO-TRUST	4294967295		>>
33	IPv6	Enable	NO-TRUST	4294967295		>>
34	IPv6	Enable	NO-TRUST	4294967295		>>
35	IPv6	Enable	NO-TRUST	4294967295		>>
36	IPv6	Enable	NO-TRUST	4294967295		>>
37	IPv6	Enable	NO-TRUST	4294967295		>>
38	IPv6	Enable	NO-TRUST	4294967295		>>
39	IPv6	Enable	NO-TRUST	4294967295		>>
40	IPv6	Enable	NO-TRUST	4294967295		>>
41	IPv6	Enable	NO-TRUST	4294967295		>>
42	IPv6	Enable	NO-TRUST	4294967295		>>
43	IPv6	Enable	NO-TRUST	4294967295		>>
44	IPv6	Enable	NO-TRUST	4294967295		>>
45	IPv6	Enable	NO-TRUST	4294967295		>>
46	IPv6	Enable	NO-TRUST	4294967295		>>
47	IPv6	Enable	NO-TRUST	4294967295		>>
48	IPv6	Disable	NO-TRUST	6666		>>
49	IPv6	Disable	RA-TRUST	4294967295		>>
50	IPv6	Disable	RA-TRUST	4294967295		>>

Binding and Filtering table of a switch

SAVI Management System User Management Showing Statistic Verification

show.showRealTimeSwitchBindingTableInfo.bindingTableForSwitch(139.5) Show STATIC Show SLAAC Show DHCP Show All

Interface Index	IP Version	IP Address	Binding Type	Binding State	Life Time(s)	User	Is In Filtering Table?
25	IPv6	2001:0da8:0200:9009:020a:e4ff:fea0:3aa6	SLAAC	████████	B 11736.94		✓
25	IPv6	2001:0da8:0200:9009:0215:58ff:fe9b:157b	SLAAC	████████	B 11806.45		✓
25	IPv6	2001:0da8:0200:9009:51a6:a2ad:a9c5:bb59	SLAAC	████████	B 7059.69		✓
25	IPv6	2001:0da8:0200:9009:8dc5:fea3:7fd4:9d48	SLAAC	████████	B 7059.57		✓
25	IPv6	2001:0da8:0200:9009:918a:06b9:1596:de63	SLAAC	████████	B 9193.36		✓
25	IPv6	2001:0da8:0200:9009:a5ff:450d:a173:a6fc	SLAAC	████████	B 11806.3		✓
25	IPv6	2001:0da8:0200:9009:c90c:c219:3b91:f725	SLAAC	████████	B 9193.24		✓
25	IPv6	2001:0da8:0200:9009:fc77:0e05:bf34:6d90	SLAAC	████████	B 11736.79		✓
25	IPv6	fe80::020a:e4ff:fea0:3aa6	SLAAC	████████	B 11527.99		✓
25	IPv6	fe80::8dc5:fea3:7fd4:9d48	SLAAC	████████	B 7059.04		✓
25	IPv6	fe80::c90c:c219:3b91:f725	SLAAC	████████	B 9193.1		✓
26	IPv6	2001:0da8:0200:9009:021f:3cff:fe93:a0e1	SLAAC	████████	B 8149.51		✓
26	IPv6	2001:0da8:0200:9009:1d8f:5ef0:bb73:1e34	SLAAC	████████	B 8111.52		✓
26	IPv6	2001:0da8:0200:9009:28f0:92b0:b96f:ffb9	SLAAC	████████	B 11166.61		✓
26	IPv6	2001:0da8:0200:9009:6915:6e80:ded7:50f7	SLAAC	████████	B 8149.39		✓
26	IPv6	2001:0da8:0200:9009:74b7:08cf:ea64:535f	SLAAC	████████	B 774.73		✓
26	IPv6	2001:0da8:0200:9009:9c81:ba6c:b1c1:4951	SLAAC	████████	B 7793.35		✓
26	IPv6	2001:0da8:0200:9009:9ca0:68c5:11bb:0e41	SLAAC	████████	B 774.72		✓
26	IPv6	2001:0da8:0200:9009:ca3a:35ff:fe57:994d	SLAAC	████████	B 12132.64		✓
26	IPv6	2001:0da8:0200:9009:e142:df2c:2dc2:5f39	SLAAC	████████	B 7793.34		✓
26	IPv6	fe80::021f:3cff:fe93:a0e1	SLAAC	████████	B 8148.87		✓
26	IPv6	fe80::1d90:2929:0785:5c33	SLAAC	████████	B 9921.11		✓
26	IPv6	fe80::74b7:08cf:ea64:535f	SLAAC	████████	B 774.69		✓
26	IPv6	fe80::ca3a:35ff:fe57:994d	SLAAC	████████	B 12130.95		✓
26	IPv6	fe80::e142:df2c:2dc2:5f39	SLAAC	████████	B 7792.82		✓

Page 1 of 4 show records from 1 to 25, the total number is 87

Log of User come and leave

User Change Info					
Time	Name	State	IP Address	Interface Index	Switch Name
2010-7-22 18:00:00		leave	2001:0da8:0200:9001:7951:d03a:ec23:b47d	36	131.6
2010-7-22 19:30:00		leave	2001:0da8:0200:9001:a8a6:ddc2:0d54:2001	36	131.6
2010-7-22 22:55:00		leave	2001:0da8:0200:9001:5808:a213:c7f7:e91a	36	131.6
2010-7-22 17:50:00		leave	2001:0da8:0200:9001:d8a8:32ee:1f51:eac7	36	131.6
2010-7-22 21:20:00		leave	2001:0da8:0200:9001:69f4:178a:4eee:3139	36	131.6
2010-7-22 21:20:00		leave	fe80::69f4:178a:4eee:3139	36	131.6
2010-7-22 22:55:00		leave	fe80::5808:a213:c7f7:e91a	36	131.6
2010-7-22 17:35:00		leave	2001:0da8:0200:9001:3cd0:2e88:0996:8ab0	82	131.6
2010-7-22 17:35:00		leave	2001:0da8:0200:9001:c4af:a4a5:d373:8272	82	131.6
2010-7-22 17:35:00		leave	fe80::c4af:a4a5:d373:8272	82	131.6
2010-7-22 17:10:00		leave	2001:0da8:0200:9001:ed5b:b630:b90c:e99f	6	131.6
2010-7-22 15:55:00		come	2001:0da8:0200:9001:1871:1820:f63d:3f8d	6	131.6
2010-7-22 15:55:00		come	2001:0da8:0200:9001:0226:9eff:fe70:9ca9	6	131.6
2010-7-22 17:10:00		leave	fe80::41b9:1733:f928:11ec	6	131.6
2010-7-22 19:45:00		leave	fe80::0227:18ff:fe00:033a	6	131.6
2010-7-22 15:55:00		come	fe80::0226:9eff:fe70:9ca9	6	131.6
2010-7-22 17:10:00		leave	2001:0da8:0200:9001:41b9:1733:f928:11ec	6	131.6
2010-7-22 19:45:00		leave	2001:0da8:0200:9001:0227:18ff:fe00:033a	6	131.6
2010-7-22 15:55:00		come	2001:0da8:0200:9001:021d:60ff:fe1e:ad26	34	131.6
2010-7-22 15:55:00		come	fe80::021d:60ff:fe1e:ad26	34	131.6
2010-7-22 21:20:00		leave	2001:0da8:0200:9001:b166:14c1:1425:c2c9	36	131.6
2010-7-22 21:25:00		leave	2001:0da8:0200:9001:e073:c6ce:70b8:96a6	6	131.6
2010-7-22 21:25:00		leave	fe80::41b9:1733:f928:11ec	6	131.6
2010-7-22 21:25:00		leave	2001:0da8:0200:9001:41b9:1733:f928:11ec	6	131.6
2010-7-23 10:45:00		leave	fe80::0d0d:2df6:c3e7:fd6f	36	131.6

Thank You!
Q & A

Conclusions

- SAVI drafts have been implemented by multiple vendors and being largely deployed in CERNET2
 - draft-ietf-savi-dhcp-04
 - draft-bi-savi-stateless-01
- SAVI switches in CNGI-CERNET2 have been fully tested
- SAVI management system and MIB have been designed
- A light-weight savi-slaac is necessary for low end access switch for large scale deployment
 - Currently, no major problem found
 - For details: draft-bi-savi-stateless-01