Progress of Src/Dst Routing in CERNET2

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CNGI-CERNET2

- 25 PoPs
- >600 Universities
- >4 million users
- Total Bandwidth = 115G
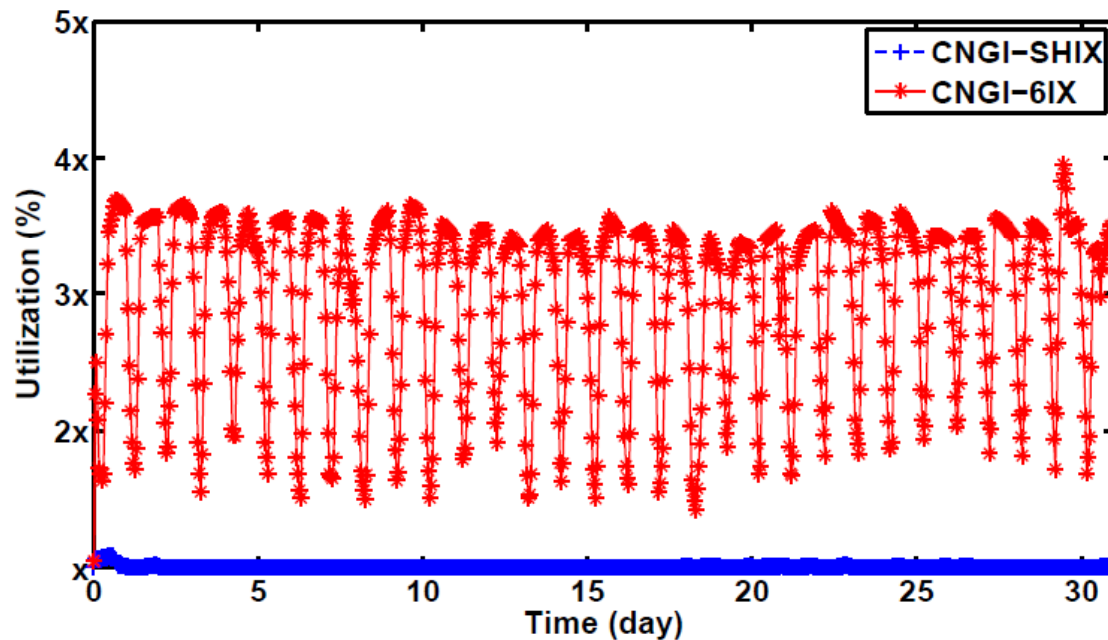- International Egress Bandwidth = 32G

Motivation – Policy Routing

▶ Some universities have higher priority, while others have lower priority

▶ Traffic from foreign academic database should have higher priority

▶ There are thousands of ACL rules

Motivation – Load Balancing
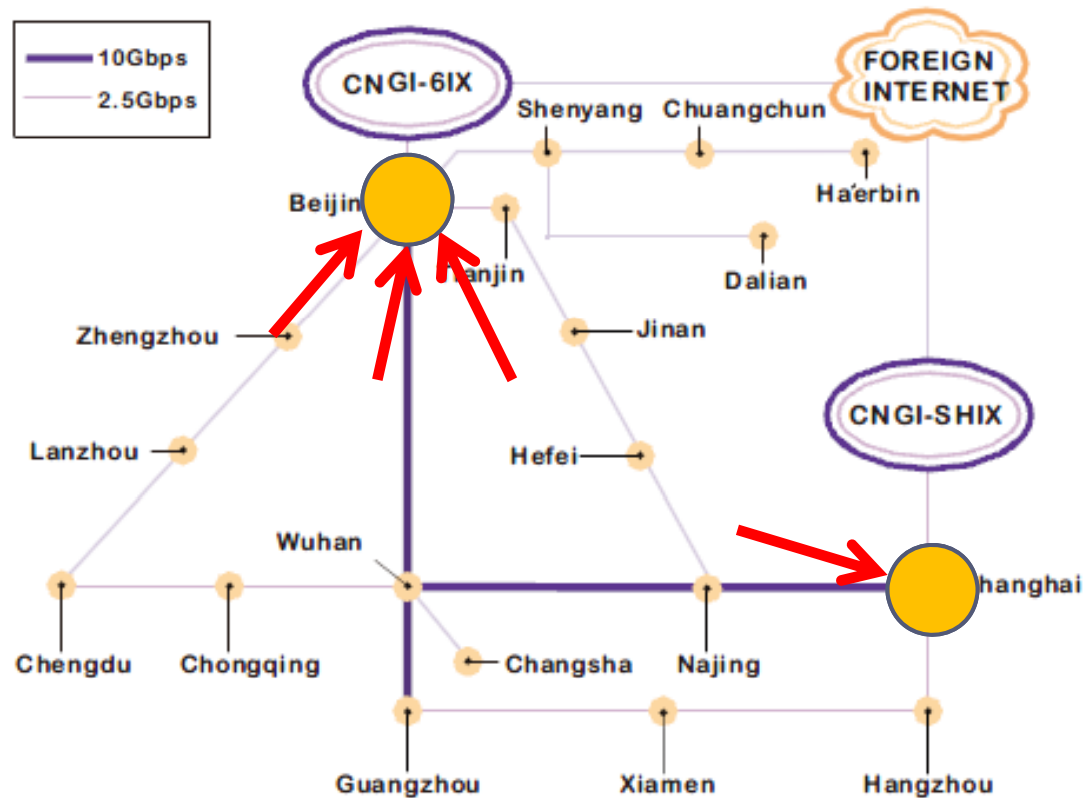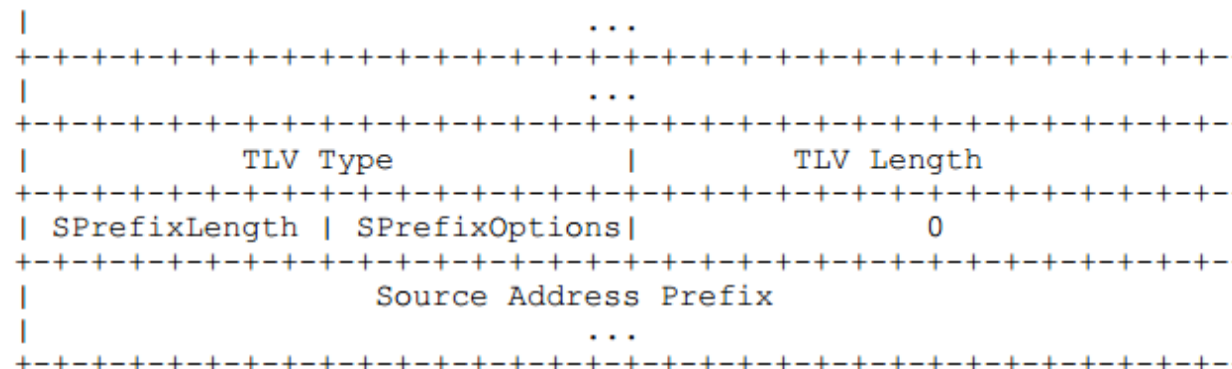
Comparison of Link Utilization

Previous Solutions

▸ **Static routing and PBR**

  ▸ CERNET2 wants a dynamic solution

  ▸ Needs to configure router by router, causes many wrong configurations

▸ **MPLS**

  ▸ High learning curve

  ▸ CERNET2 does not have MPLS operator

CERNET2 is deploying Src/Dst Routing

▸ **Implementing src/dst routing in Bitway routers**

  ▸ Cooperating with ZTE/Huawei

  ▸ Based on OSPFv3

Extended LSA Format

▸ Modify Intra-Area-Prefix-LSA, Inter-Area-Prefix-LSA and AS-External-LSA

  ▸ Defined in [I-D.acee-ospfv3-lsa-extend-02]

    ▸ E-Intra-Area-Prefix-LSA (LSA type: 0xA029)

    ▸ E-Inter-Area-Prefix-LSA (LSA type: 0xA023)

    ▸ E-AS-External-LSA (LSA type: 0xC025)

  ▸ Appending a src prefix behind them

    ▸ Defined in [I-D.baker-ipv6-ospf-dst-src-routing]

```
|                              . . .                              |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                              . . .                              |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|            TLV Type           |          TLV Length           |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
| SPrefixLength | SPrefixOptions|               0               |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                      Source Address Prefix                     |
|                              . . .                              |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

Extended Routing Table

Data Type	Data Value
u_char	Destination type
struct prefix	Destination prefix
struct prefix	Source prefix
u_int32_t	Flow Label
struct timeval installed	Installed time
struct timeval changed	Changed time
u_char	Flag
struct ospf6_path	Path
struct ospf6_nexthop	Nexthop[]

▸ Each routing entry is as above

  ▸ With additional src prefix (and flow label)

▸ The routing table is an array of entries

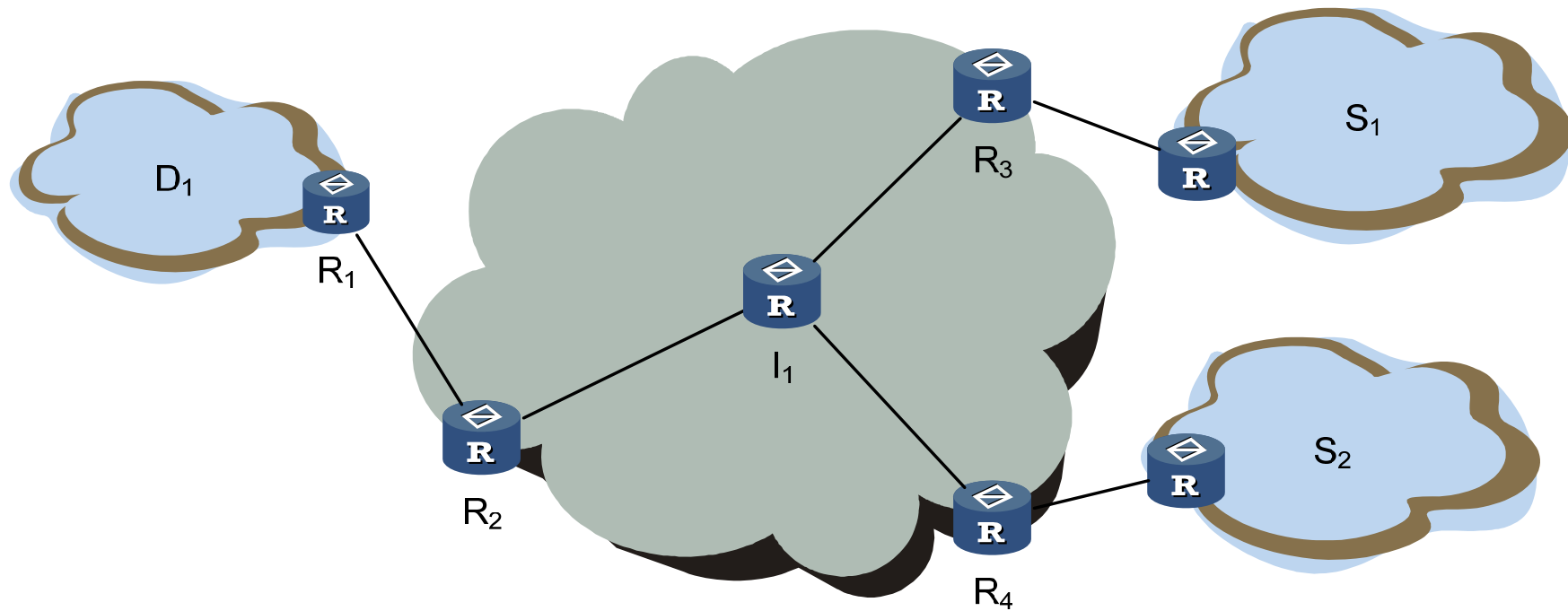 ▸ Can be further structured into radix trie

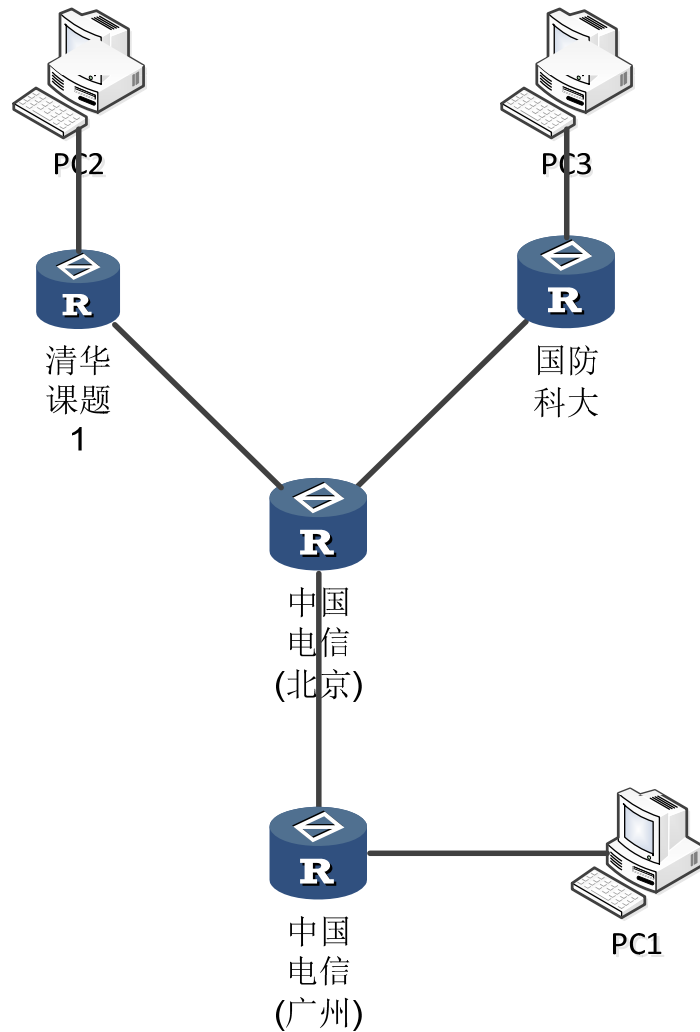# Testing Scenario - Multi-homing
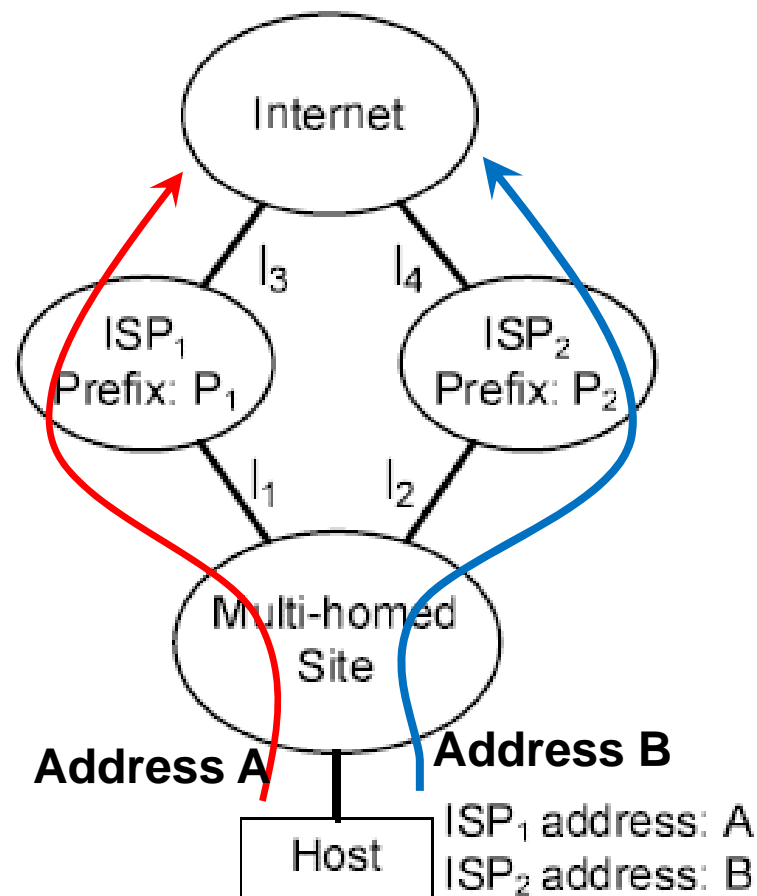
CNGI Multi-homing Test Case
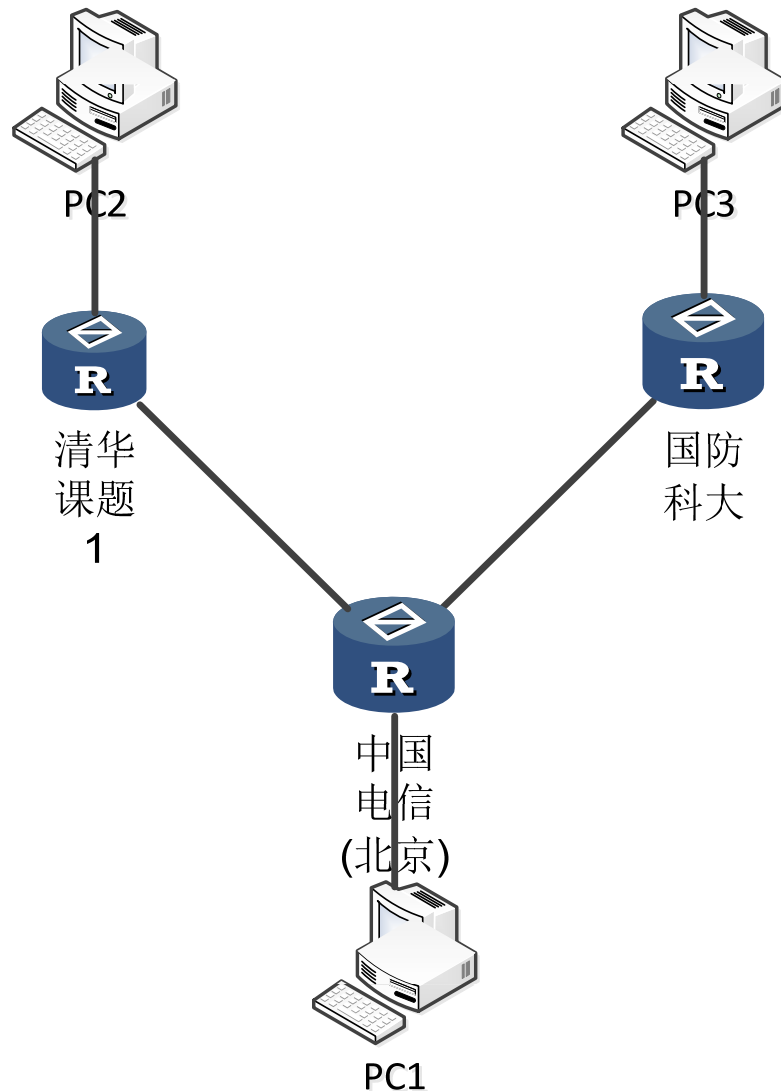
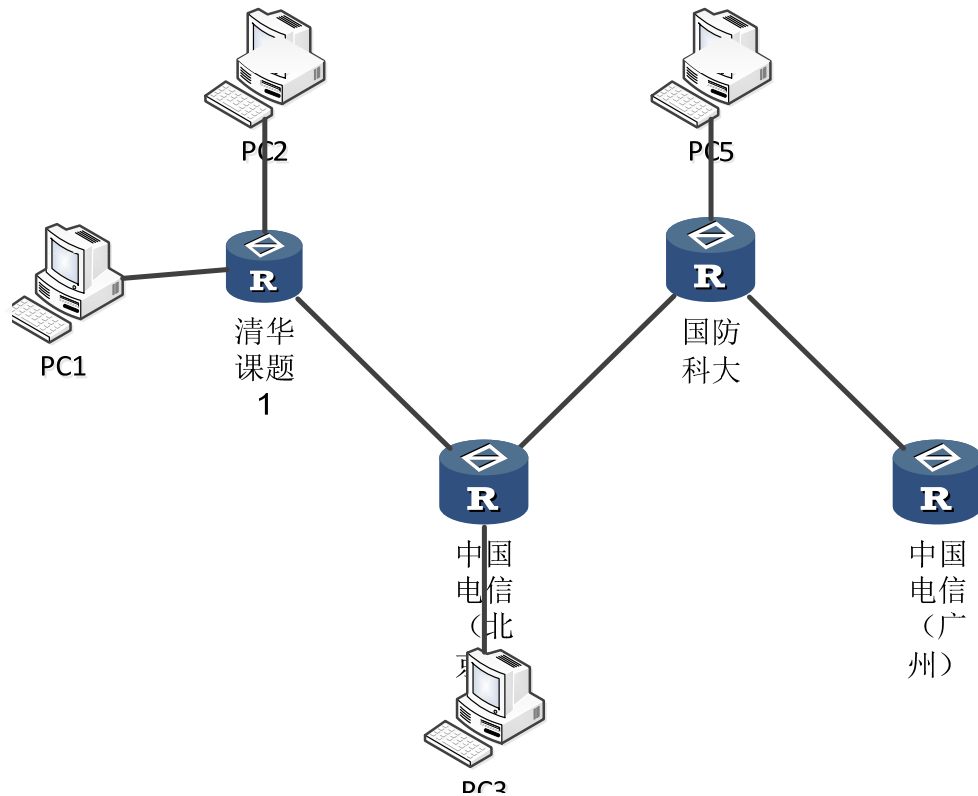Using two CERNET2 routers and one China Telecom router

Testing Scenario - Security

▸ S2 is a malicious sender

CNGI Security Test Case

▸ Using two CERNET2 routers and two China Telecom routers

Testing Scenario - Load Balancing

- PC2, PC3, PC5 are the senders, PC1, PC4 are the receivers

Using two CERNET2 routers and two China Telecom routers

Thank You!!!