Hybrid Type Prefix for IPv4-Embedded IPv6 Addresses

draft-xu-behave-hybrid-type-prefix-00

Xiaohu Xu

(xuxh@huawei.com)

Cameron Byrne

(cameron.byrne@t-mobile.com)

Mohamed Boucadair

(mohamed.boucadair@orange-ftgroup.com)

Gang Chen

(chengang@chinamobile.com)

IETF 77, Anaheim

Problem Statement

- **Redundancy and load-balancing in the IPv6 network to IPv4 Internet scenario.**

  - With WKP (64:FF9B::/96), to achieve hot standby and load-balancing functions, all NAT64 devices of the IPv6 network have to belong to a single redundancy group. State synchronization would become a big challenge if the amounts of state and NAT64 devices for the IPv6 network are much large.

  - With NSP, some extra works (see **draft-wing-behave-dns64-config**) need to be done to avoid traversing the NAT64 when dual-stack hosts are involved.

Problem Statement (con't)

- **NAT64 avoidance in the IPv6 Internet to IPv4 network communications when dual-stack hosts are involved.**
  - NSP MUST be used in this scenario. However, IPv6 addresses synthesized with NSP are hard to be distinguished from native ones.
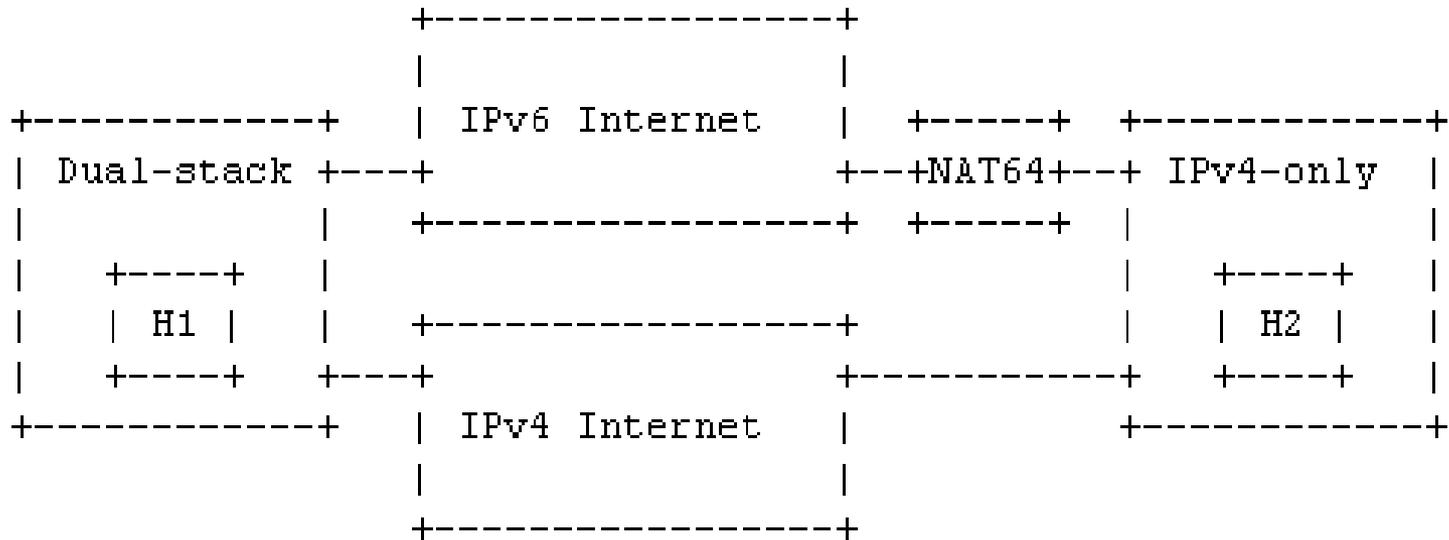
```
                            +----------------+
                            |                |
    +------------+          |  IPv6 Internet |  +-----+  +------------+
    | Dual-stack +---+      |                +--+NAT64+--+ IPv4-only  |
    |            |   |      +----------------+  +-----+  |            |
    |   +----+   |   |                            |      |   +----+   |
    |   | H1 |   |   |      +----------------+    |      |   | H2 |   |
    |   +----+   +---+      |                +----------+  +----+   |
    +------------+          |  IPv4 Internet |             +------------+
                            |                |
                            +----------------+

       Figure 1. Dual-stack Hosts Communicating to IPv4-only Hosts
```

3

Hybrid Type Prefix

- **Hybrid Type Prefix (HTP) integrates the benefits of both WKP and NSP.**
  - Distinguish synthesized IPv6 addresses from native ones easily.
  - Topologically aggregatable in provider networks.

2	10 Octets	4 Octets
0064	Network Specific Part	IPv4 Addr

HTP

64::/16 (HTP Block)

2	8 Octets	2	4 Octets
0064	FF9B::	Suffix	IPv4 Addr

WKP

64:FF9B::/80 (WKP Block)

2	8 Octets	2	4 Octets
0064	FF9B::	0000	IPv4 Addr

Strong WKP (a.k.a, the WKP defined in [address-format])

64:FF9B::/96 (Strong WKP)

4
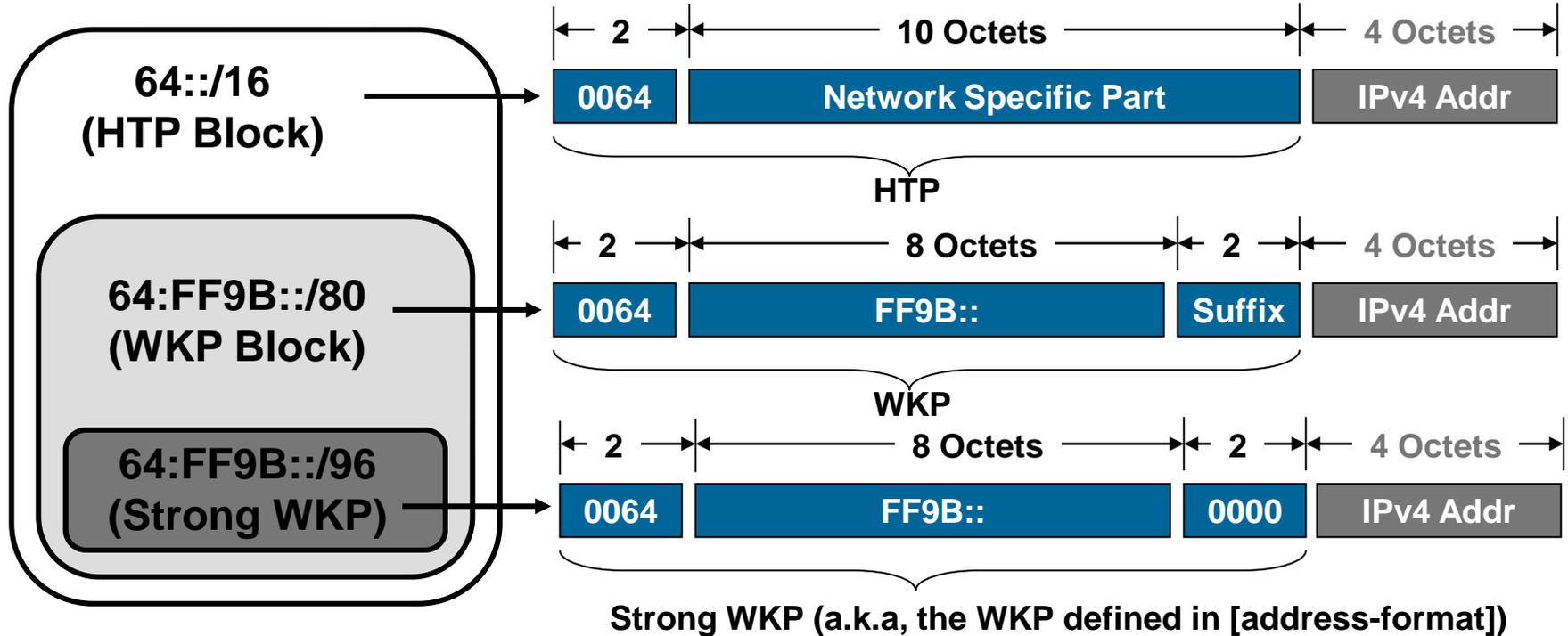
Load-balancing using WKP

← 2 →	← 8 Octets →	← 2 →
0064	FF9B::	Suffix

64:FF9B::/80

Can be used to identify different redundancy groups.

IPv4 Internet

NAT64 NAT64

NAT64 NAT64

NAT64 NAT64

64:FF9B::02/96

64:FF9B::01/96

64:FF9B::03/96

States for the whole IPv6 network are distributed among different redundancy groups.
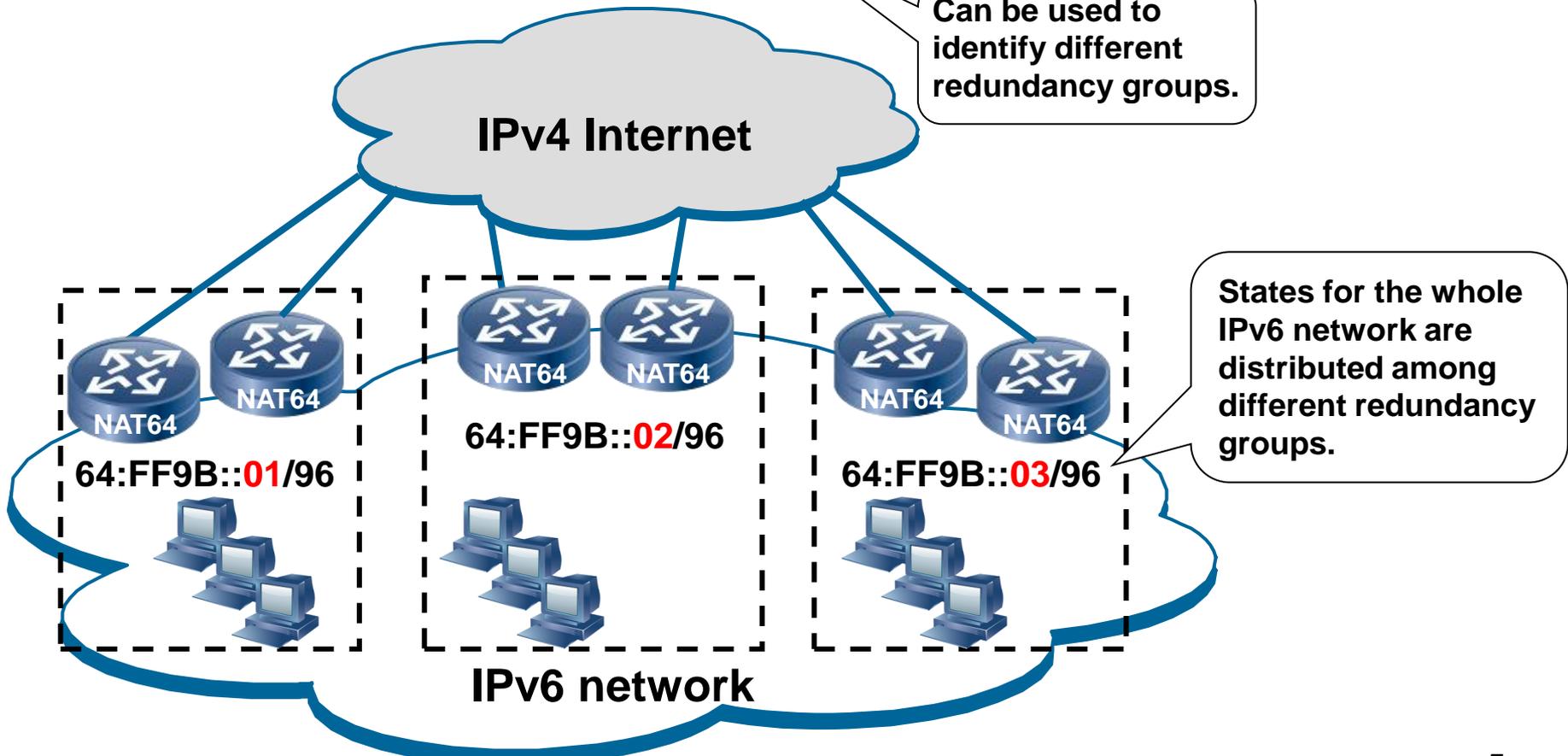
IPv6 network

HTP Allocation for IPv6 Internet to IPv4 Network Scenario

2	10 Octets
0064	Network Specific Part

64::/16 (exclude 64:FF9B::/80)

IPv6 Tier-1 ISP #x

(64::/24)

IPv6 Tier-2 ISP#m

(64:0001::/32)

IPv6 Tier-2 ISP#n

(64:0002::/32)

64:0001::01/96

64:0001::02/96

64:0002::01/96

64:0002::02/96

NAT64

IPv4 network
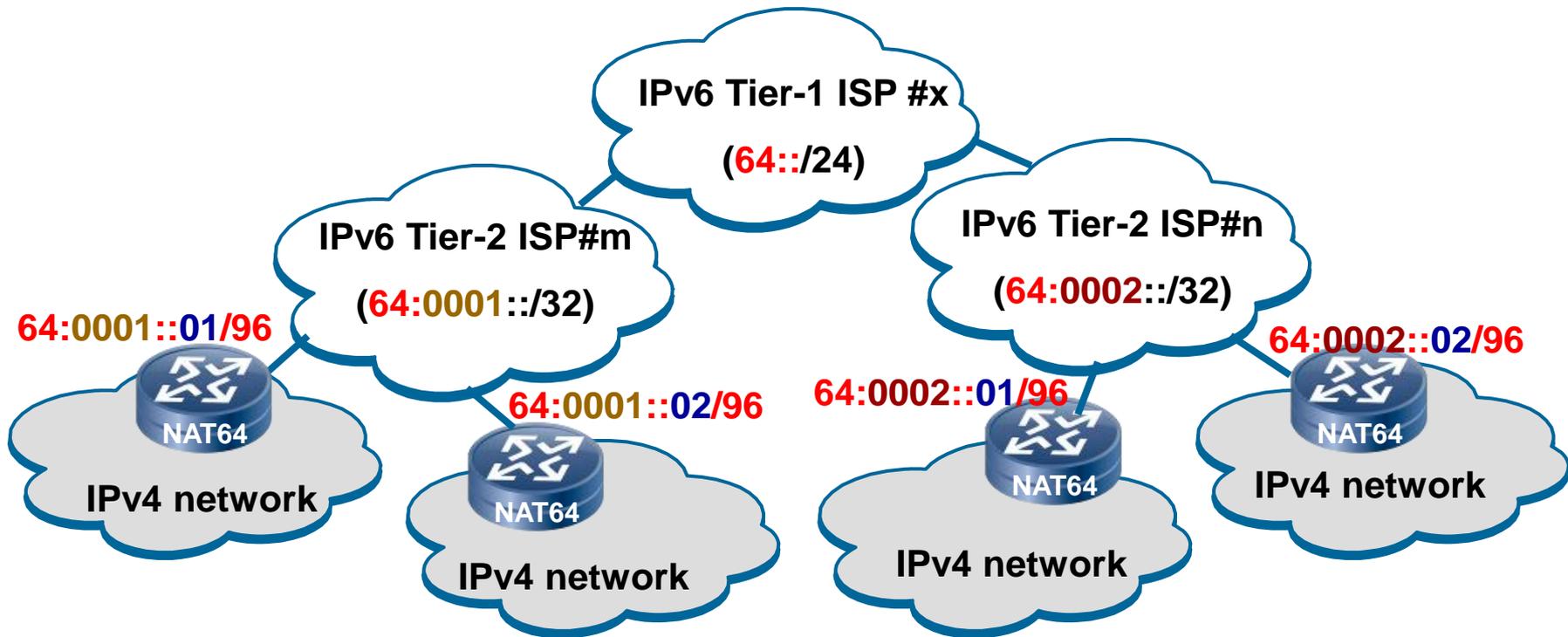
- **HTPs are allocated in the same hierarchy as that for NSPs.**

Next-Step

- **Comments?**

- **Adopt it as a new charter item?**