Routing IPv4-Embedded IPv6 Packets

draft-ietf-ospf-ipv4-embedded-ipv6-routing-00

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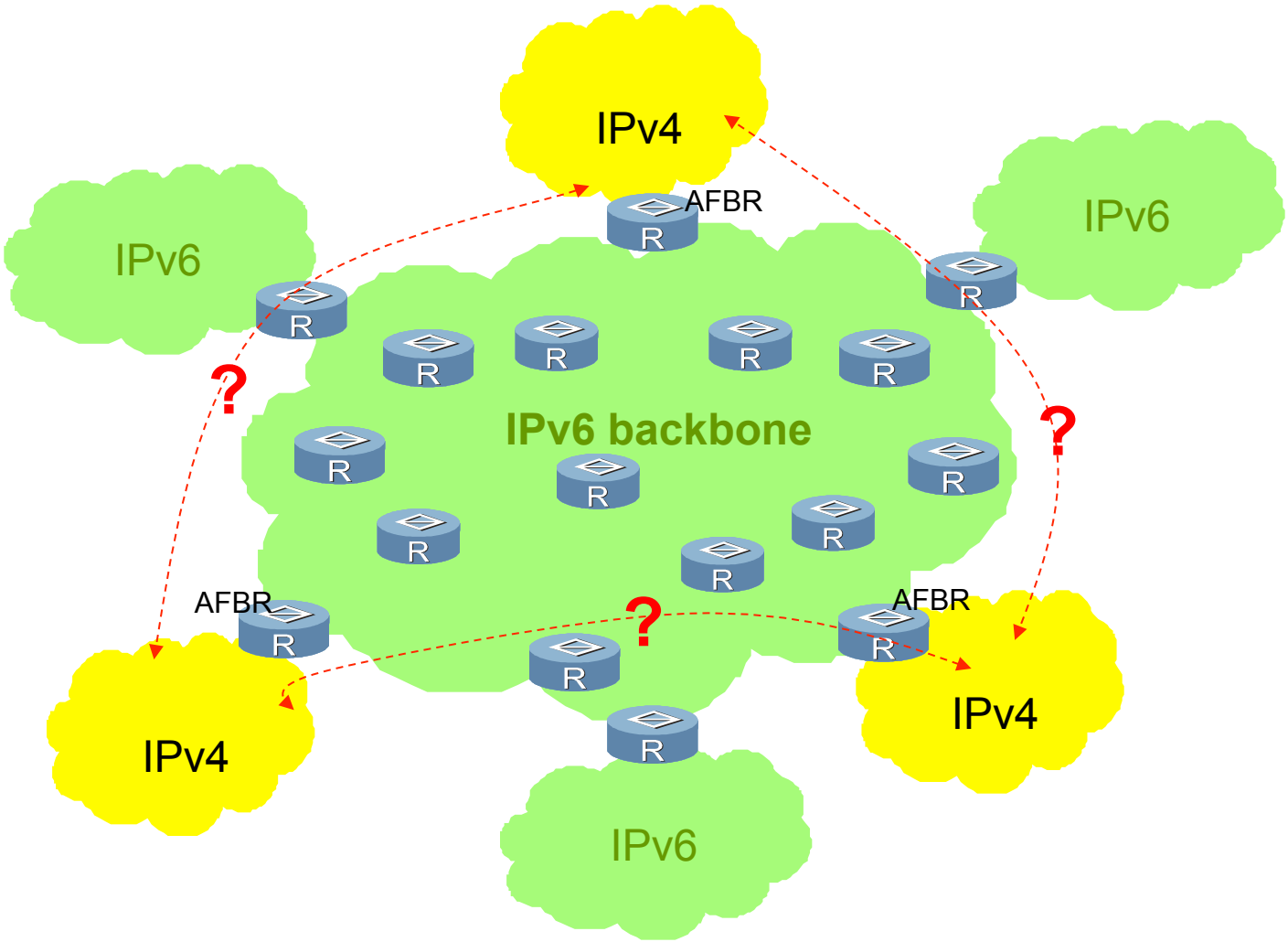
Status Update

- **draft-cheng-ospf-ipv4-embedded-ipv6-routing-01 was presented in Beijing meeting**
  - **Proposed as an informational RFC**
  - **One suggestion from Acee was incorporated into 02 text afterwards**
- **Comments were solicited from BEHAVE/SOFTWIRE WG chairs and Joel Halpern with some discussions**
  - **There were no opposition to the draft**
  - **Some clarifications were made during discussions**
  - **03 text was published afterwards**
- **Adopted as OSPF WG document shortly after Prague meeting**
  - **There were some support on the mailing list during the WG poll**
  - **draft-ietf-ospf-ipv4-embedded-ipv6-routing-00**
  - **One e-mail exchange (Nagendra Kumar) on the mailing list recently**

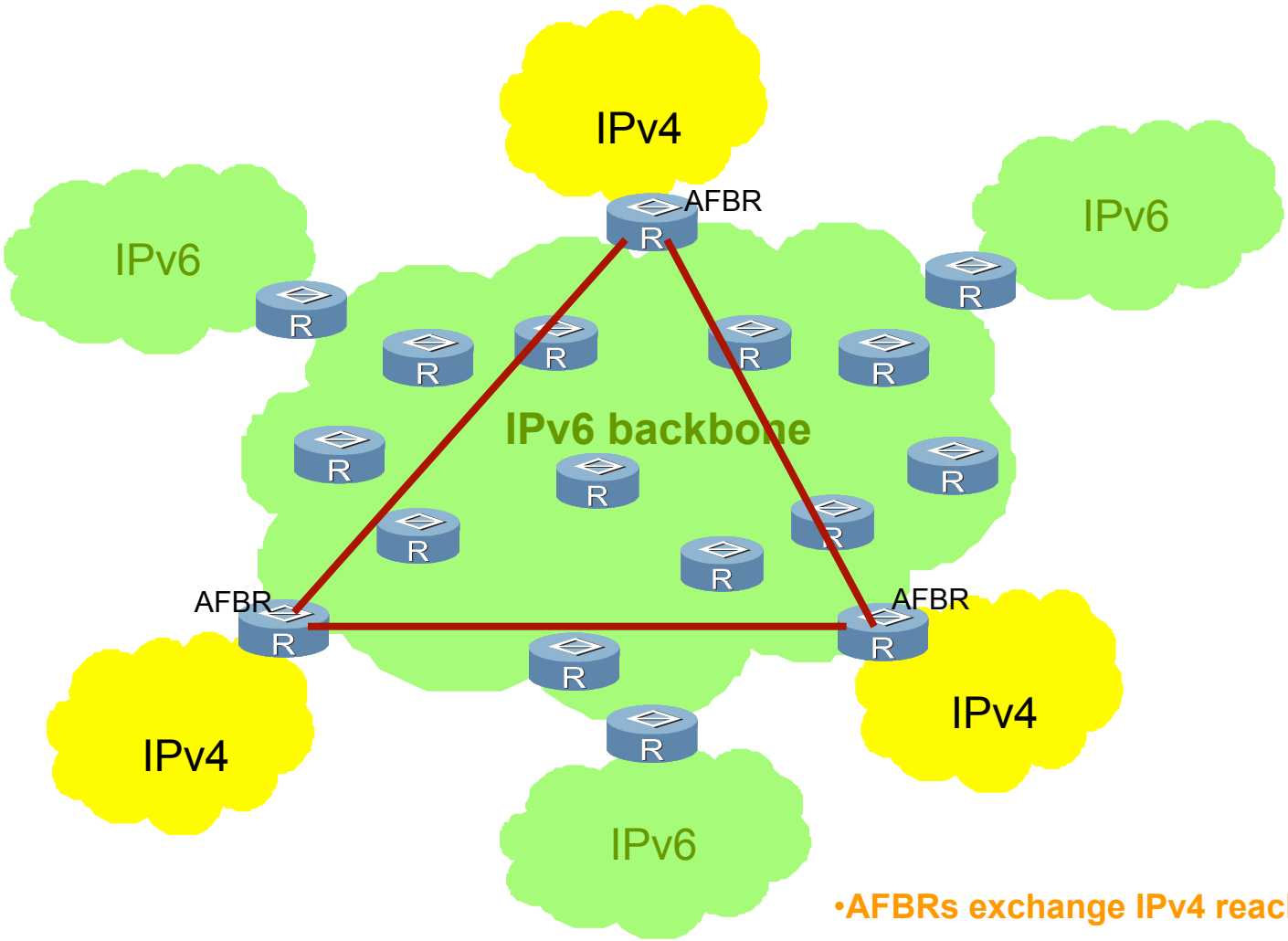
Some Terminologies

- **IPv4-embedded IPv6 address**
  - **Denotes an IPv6 address which contains an embedded 32-bit IPv4 address constructed according to the rules defined in: RFC6052 (IPv6 Addressing of IPv4/IPv6 Translators)**
- **IPv4-embedded IPv6 packets**
  - **IPv6 packets with destination addresses as IPv4-embedded IPv6 addresses**
- **AFXLBR**
  - **Address Family Translation Border Router**
  - **Refers to a border router which is located at the boundary of an IPv6-only network and an IPv4-only network, supports both IPv4 and IPv6 address family, and performs IPv4-IPv6 header translation per RFC6145 (IP/ ICMP Translation Algorithm)**

The Problem

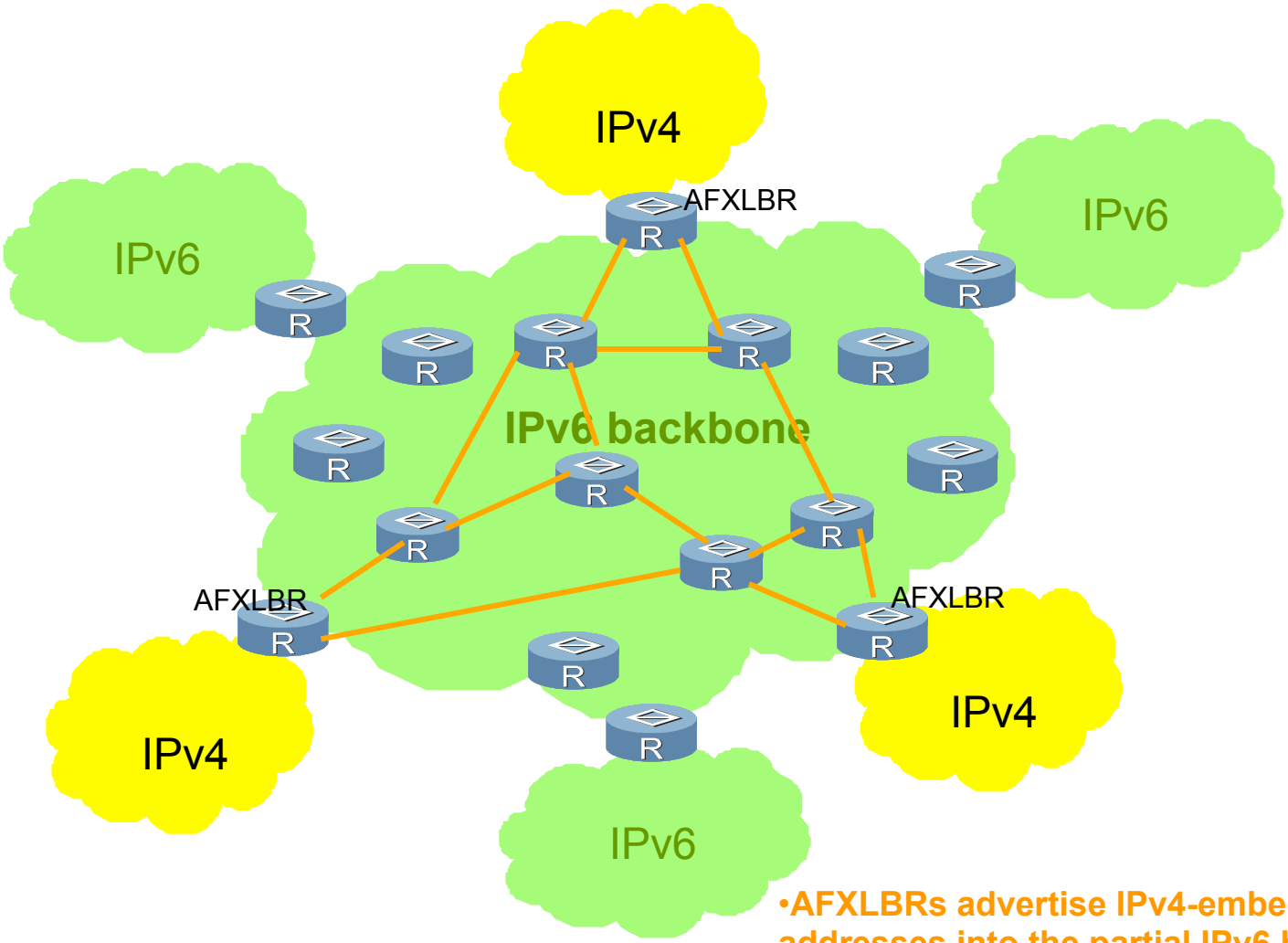


Softwire Mesh (RFC5565) Approach



- AFBRs exchange IPv4 reachability using BGP-MP
- Tunnels established between AFBRs full-mesh
- IPv4 packets transported in tunnels

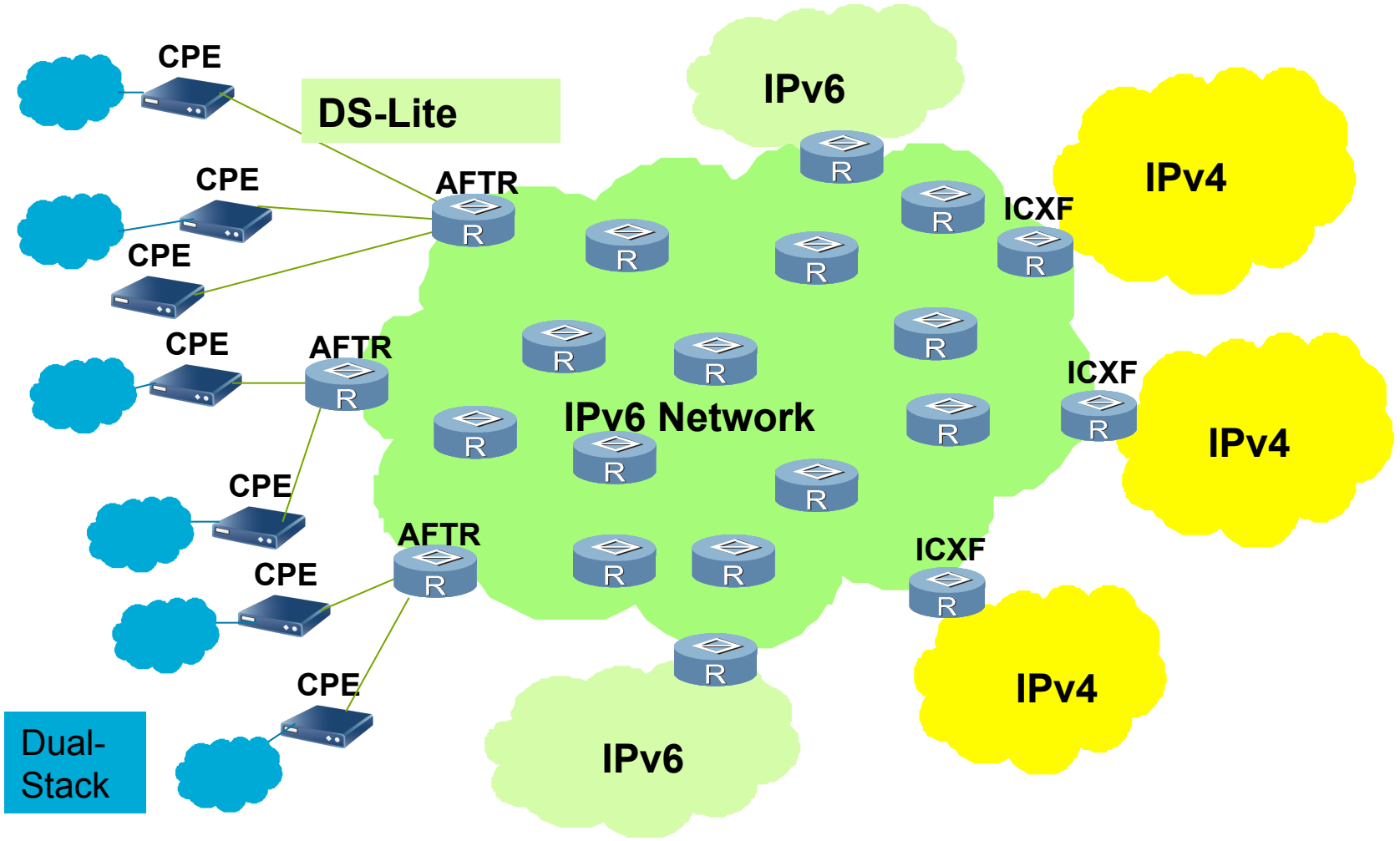
OSPFv3 MT/MI Approach



- **AFXLBRs advertise IPv4-embedded IPv6 addresses into the partial IPv6 backbone**
- **A separate routing table for routing IPv4-embedded IPv6 packets.**

Scenarios where OSPFv3 approach useful

- **Running BGP not feasible sometimes**
- **Tunnel based forwarding not feasible**



One use case: [draft-boucadair-softwire-dslite-v6only-01]

Mechanisms for separate routing table

- **Use OSPFv3 multi-instance mechanism**
  - **Reference: RFC5838**
  - **Instantiate a separate instance for IPv4-embedded unicast IPv6 routing**

- **Use OSPFv3 multi-topology mechanism**
  - **Reference: http://tools.ietf.org/html/draft-ietf-ospf-mt-ospfv3-03.txt**
  - **Configure interfaces for IPv4-embedded unicast IPv6 routing**

Advertising IPv4-Embedded IPv6 Routes

- **IPv4-embedded IPv6 addresses would be advertised by AFXLBR into IPv6 network as AS External LSA per OSPFv3 (RFC5340)**
  - **A single OSPFv3 AS External LSA carries one IPv4-embedded IPv6 address or prefix**
  - **The metric**
    - **By default, it is type-1 metric**
    - **May also be set to type-2 metric (by provisioning at AFXLBR)**
  - **No forwarding address**
    - **Let AFXLBR performs IPv4 routes look-up**

Forwarding IPv4-Embedded IPv6 Packets

- **At AFXLBR**
  - **Packet header translation**
    - **According to RFC 6145 (IP/ICMP Translation Algorithm)**
  - **Address translation**
    - **According to RFC6052 (IPv6 Addressing of IPv4/IPv6 Translators)**
  - **IPv6 prefix**
    - **Well known IPv6 prefix 64::FF9B::/96, or**
    - **ISP-specific IPv6 prefix**
- **At other IPv6 routers**
  - **Arriving packets with IPv4-embedded IPv6 addresses are forwarded along on IPv4-embedded IPv6 topology.**
- **MTU handling**
  - **Recommendation – AFXLTR to run PMTU (RFC1981)**

Next Step …

- **Authors would like to solicit comments with discussion on mailing list at this time**
- **Will update the draft accordingly later**