IPv4/IPv6 Multicast: Problem Statement and Use Cases

`draft-jaclee-behave-v4v6-mcast-ps`

M. Boucadair

C. Jacquenet

Y. Lee

J. Qin

Q. Sun

T. Tsou

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Background

- Multicast Extensions to DS-Lite is a *softwire* WG item
  - *softwire* WG encouraged a companion document to describe issues raised by migration period for multicast services

- -00 of draft-jaclee was posted on March 2011
  - Section 2 illustrates requirements and issues
  - Section 3 describes possible use cases, yielding prioritization as per operators'environments
  - Section 4 documents the multicast transition overview
  - Section 5 elaborates on what is expected from the IETF

Scope

- Intra-domain multicast-enabled networking environments

- No source/receiver heuristic, *i.e.*, receivers do not send multicast traffic to the network

- Primarily focused on live TV broadcasting services

  - But requirements and design overview apply to multicast-based services in general

Operator-Driven Requirements

- Transition mechanisms must be transparent to receivers
- Re-use existing protocols and mechanisms, covering both ASM and SSM designs
- Need for a standardized address format, *e.g.*, to convey IPv4 multicast contents into an IPv6 multicast infrastructure down to the IPv4 receiver
- Need for signaling Inter-Working Functions (*e.g.*, IGMP-MLD)
- Content integrity must be preserved
- QoS and QoE must not be degraded
  - In particular, bandwidth usage must be optimized and content must not be multicast twice

Privileged Use Cases

- ## 4-6-4
  - Access network is IPv6 multicast-enabled
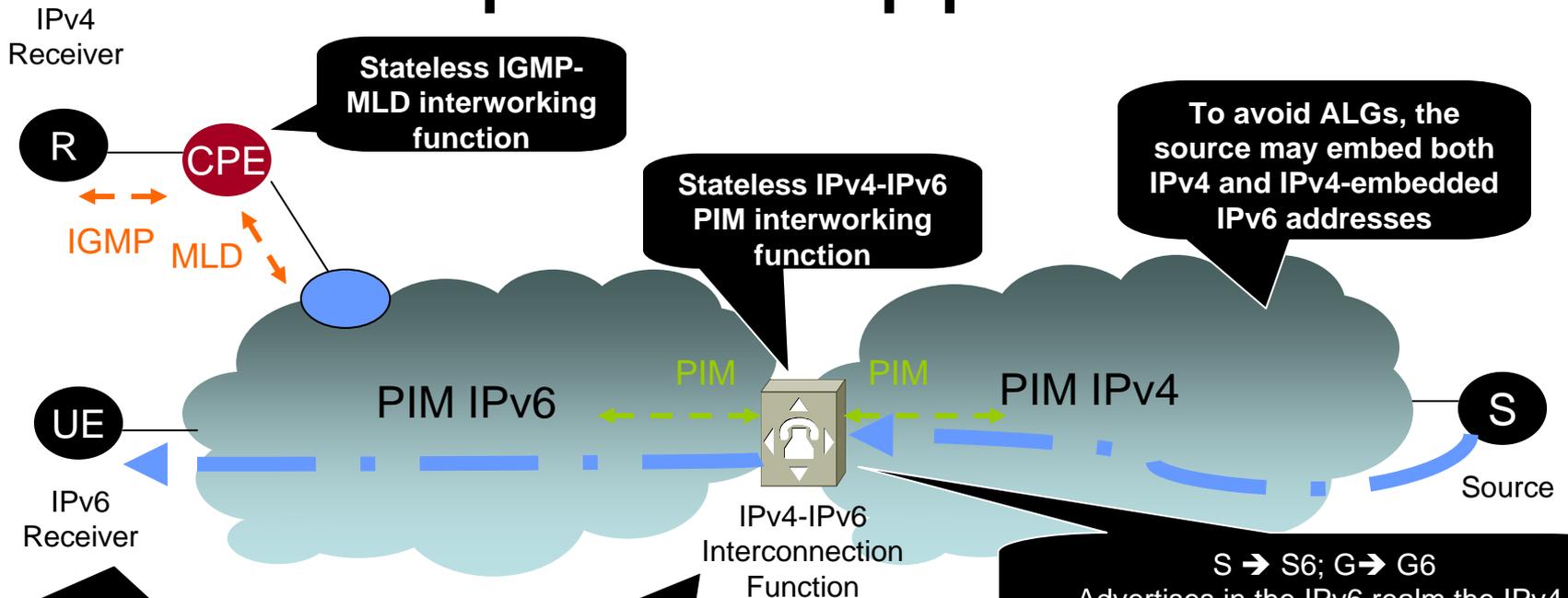 - IPv4 multicast source S is located upstream
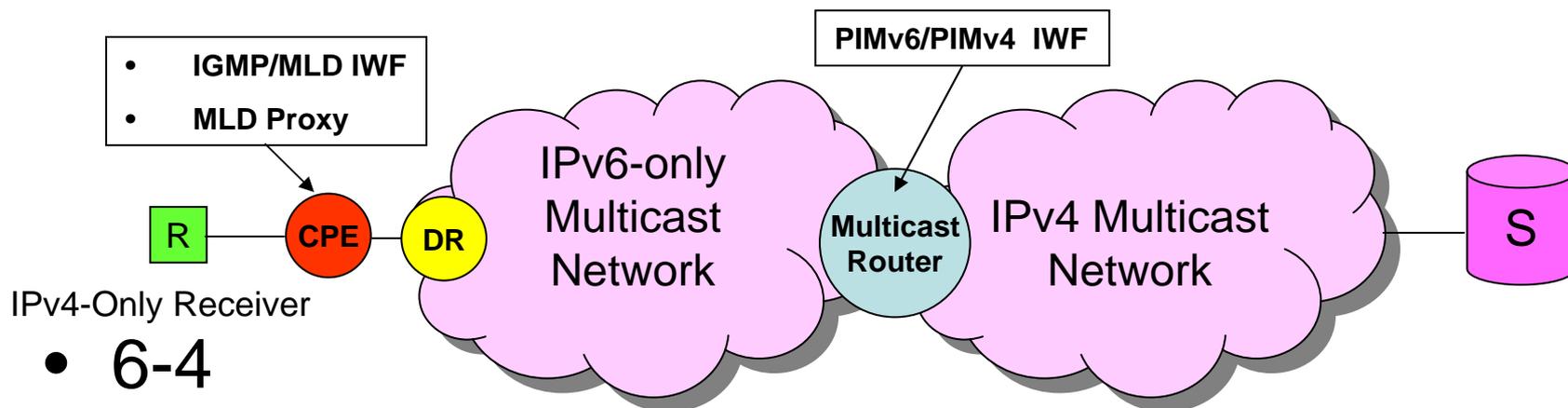
- ## 6-4
  - Typical of mobile environments where terminal is provisioned with an IPv6 prefix only
  - Assumes NAT64 capabilities in the network

Multicast Transition Overview

- Source discovery
  - To avoid ALGs, the source may advertise both IPv4 multicast group address *and* corresponding IPv4-embedded IPv6 multicast group address
    - See draft-boucadair-mmusic-altc and draft-ietf-mboned-64-multicast-address-format
- Multicast tree computation
  - Delivery of IPv4 multicast contents to receivers connected to an IPv6-only infrastructure assumes extension of the original IPv4 multicast tree in the IPv6 multicast domain
  - Multicast router located at the border of the IPx multicast domains (*e.g.*, mAFTR) behaves as the IPv6 source/RP to multicast IPv4 traffic by means of IPv4-embedded IPv6 prefixes
- The need for Inter-Working Functions
  - To relay signaling flows across IPx multicast domains
    - IGMP ⇔ MLD, IGMP ⇔ PIMv6, MLD ⇔ PIMv4
  - To forward multicast traffic across IPx multicast domains
    - Based upon encapsulation or translation (as per RFC 6145)
  - Stateless functions are recommended

Proposed Approach

IPv4 Receiver

R — CPE

IGMP   MLD

Stateless IGMP-MLD interworking function

Stateless IPv4-IPv6 PIM interworking function

To avoid ALGs, the source may embed both IPv4 and IPv4-embedded IPv6 addresses

PIM IPv6

PIM   PIM

PIM IPv4

UE

IPv6 Receiver

S

Source

IPv4-IPv6 Interconnection Function

Stateless (local) synthesis of IPv6 address when IPv4 multicast address are embedded in application payload (e.g., SDP)

Stateless IPv4-IPv6 header translation of multicast flows

Two MPREFIX64s can be used: Encap and translation

S ➜ S6; G➜ G6
Advertises in the IPv6 realm the IPv4-converted IPv6 address of S

For SPT mode in ASM, requests will be received by this function

For SSM, requests will be received by this function

No coordination is required between IPv4-IPv6 PIM interworking function, IGMP-MLD interworking function, IPv4-IPv6 Interconnection Function and any ALG in the path

Minimal operational constraints on the multicast address management: IPv6 multicast addresses can be constructed using what has been deployed for IPv4 delivery mode

What the IETF Should Consider

- **Specification of Inter-Working Functions**
  - Along with corresponding MIB
- **Specification of the IPv4-embedded IPv6 multicast address format (underway)**
- **Elaboration of privileged use cases**
  - 4-6-4, 6-4, 6-4-6-4 (as per China Telecom environment)
- **Publication of applicability statement documents**
  - To reflect operational experience and share best practices

Pending Question and Next Steps

- What's the purpose of draft-eubanks?
  - *mboned* interim meeting and exchanges failed to answer so far
- Comments on draft-jaclee are most welcome
  - Publication of -04 is underway
- *mboned* to consider draft-jaclee adoption as a WG item

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