IPv4/IPv6 Multicast: Problem Statement and Use Cases
draft-jaclee-behave-v4v6-mcast-ps

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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

  ![Diagram](image.png)

• **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

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

Stateless IPv4-IPv6 header translation of multicast flows

Two MPREFIX64s can be used: Encap and translation

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

IPv4 Receiver

IPv6 Receiver

Source

S \rightarrow S_6; G \rightarrow G_6

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