PIM Backup Designated Router

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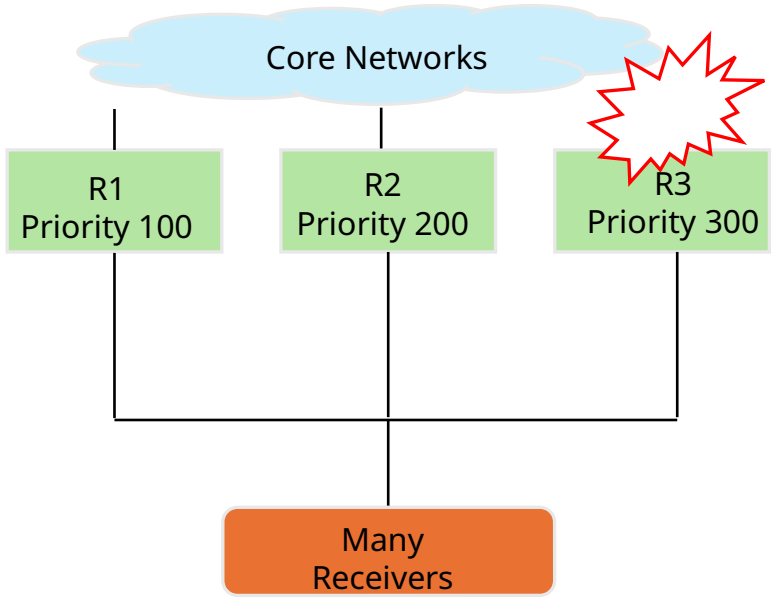
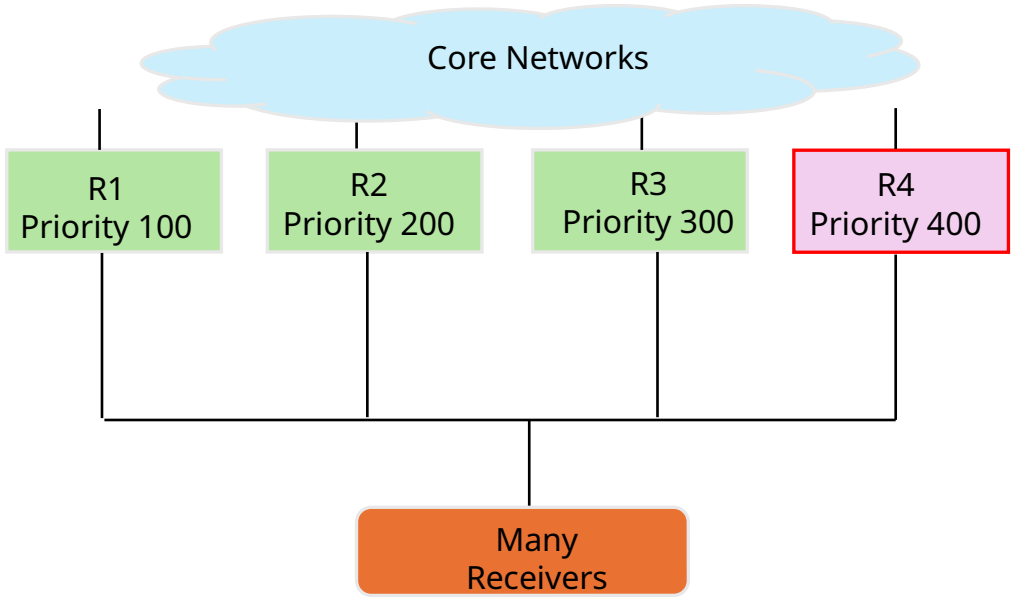
Problem Statement

- PIM DR is crucial for efficient multicast delivery on multi-access LANs.
- Traffic loss occurs during **DR Re-election**:





- RFC 7761 doesn't minimize **transient disruption during DR Re-election.**
- **Key problem**: No make-before-break model in DR re-election.

Proposal Overview

- **Goals:**
  - Prevent traffic loss during re-election.
  - Ensure smooth handoff between DRs.
  - Preserve protocol simplicity and interoperability.
- **Introduce two mechanisms:**
  - **Backup Designated Router (BDR)**
    - Elected alongside DR.
    - To handle scenarios when existing DR fails, BDR takes over instantly.
  - **Delayed DR Election**
    - Allows new routers joining the LAN to delay DR participation.
    - Avoids pre-mature takeover before multicast state is built.

BDR Election Procedure

- **Election follows standard DR logic:**
  - Based on DR Priority and IP Address.
  - Highest = DR, Second Highest = BDR.
- **BDR Role:**
  - Tracks IGMP/MLD membership.
  - Joins multicast tree.
  - Does **not** forward traffic unless DR fails.
- **Upon DR Failure:**
  - BDR assumes DR role immediately.
  - New BDR is elected via same deterministic logic.
- **Key Benefit:** Near-instantaneous recovery, no protocol extensions required.

Delayed DR Election – Why and How?

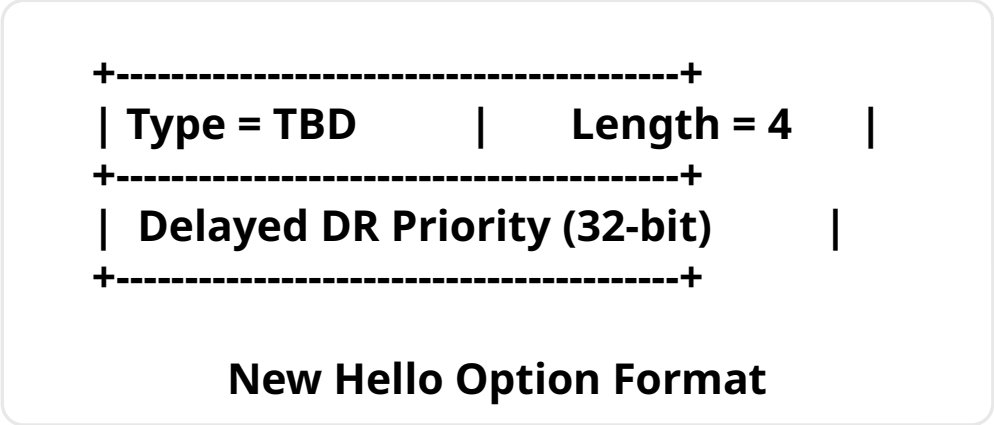
- **The Problem:**
  - New router (e.g., R4) with high priority joins LAN.
  - Standard PIM behavior → immediate DR switch.
  - R3 stops forwarding → R4 hasn’t built multicast state yet → Traffic drop.
- **Our Solution:**
  - Introduce Delayed DR Election via a new Hello Option.
- **Mechanism:**
  - New router advertises DR Priority = 0 (Intent to not participate in DR election yet).
  - Sends true priority in new Hello Option: Delayed_DR_Priority.
  - Waits for timer (default: 2×Hello or IGMP Query Interval) before participating in DR election.

Delayed DR Election – Algorithm Details

Steps for New Router:

1. Sends Hello with:
   - DR Priority = 0
   - Delayed_DR_Priority = Configured Priority
2. Starts Delayed_DR_Election_Timer. While timer runs:
   - Builds multicast tree to RP/source.
   - Prepares to forward traffic (but drops incoming traffic to avoid duplication).
4. If it hears another router with higher Delayed_DR_Priority, it:
   - Prunes tree.
   - Resets timer to match peer's delay.
5. Once timer expires:
   - Starts advertising real DR Priority.
   - Standard DR election occurs.

Hello Option Extension – Delayed DR_Priority



- **Conditionally valid**
  - Only honored if DR Priority = 0.
  - Otherwise ignored.
- **Backwards Compatible**:
  - Non-supporting routers ignore unknown option.
  - Standard DR election unaffected.

Next Steps

The draft is:

- Backward compatible.
- Lightweight.
- Aligned with operator needs.

Next Steps:

- Solicit WG feedback.
- Advance toward WG Last Call.