A History of Multicast Routing
that brings us to today's
State of Affairs in Multicast Overlays

LISP Working Group - Yokohama IETF
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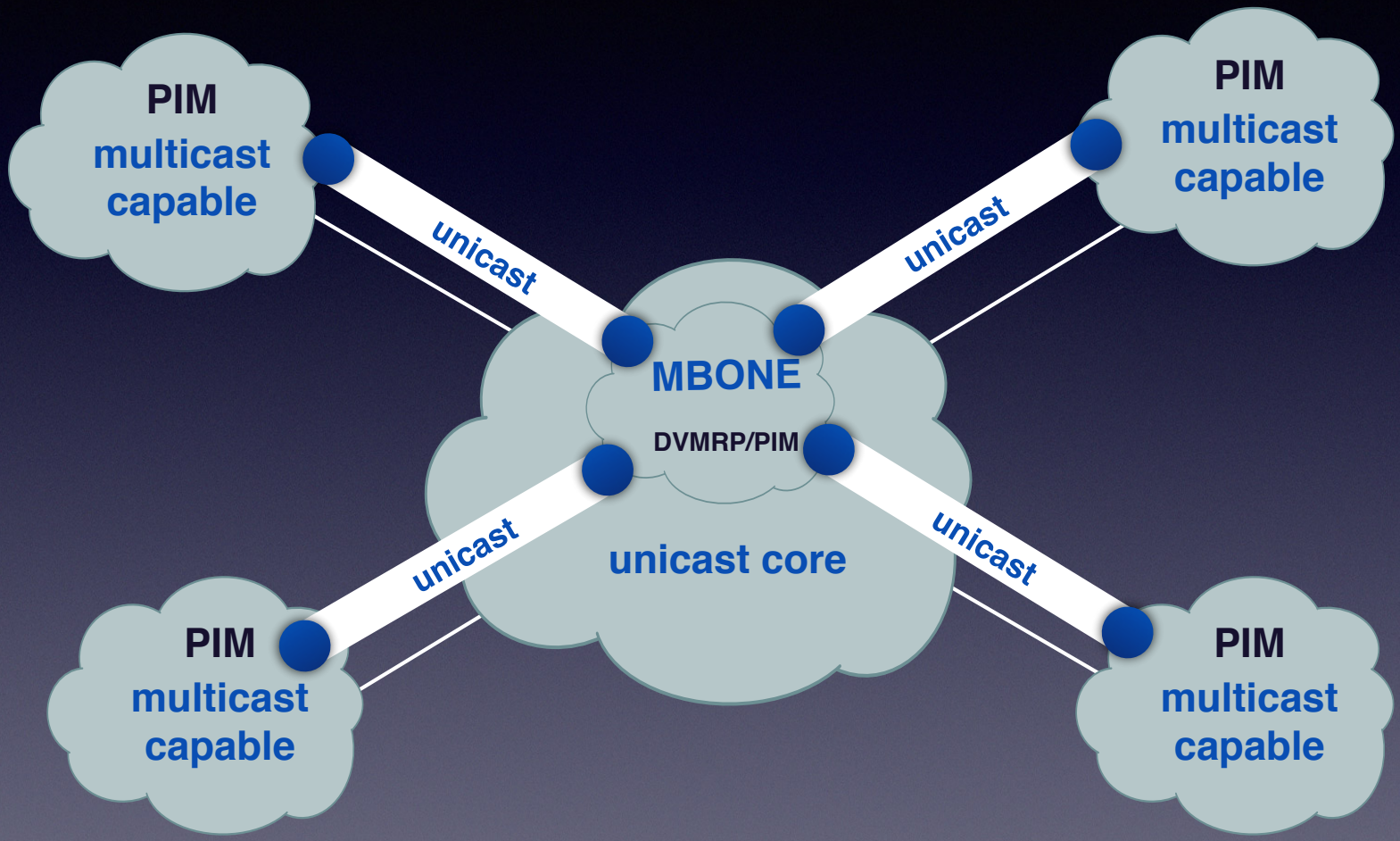
Dino Farinacci
farinacci@gmail.com

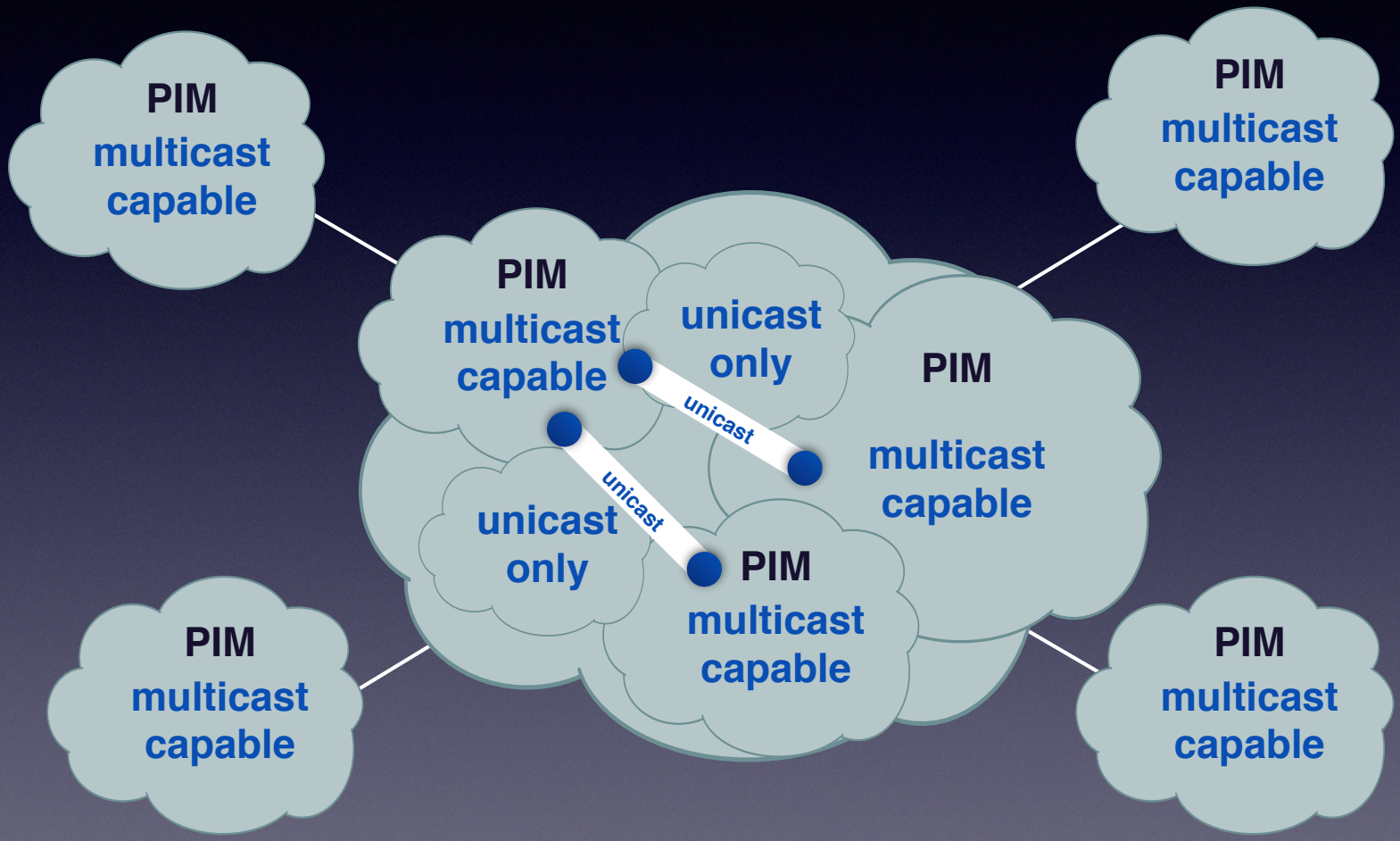
Agenda - Multicast Delivery Models

- Multicast-over-Unicast (MBONE)
- Multicast Native
- Virtualizing Multicast - MVPNs
- Multicast-over-Unicast (AMT)
- Multicast Map-and-Encap Overlays

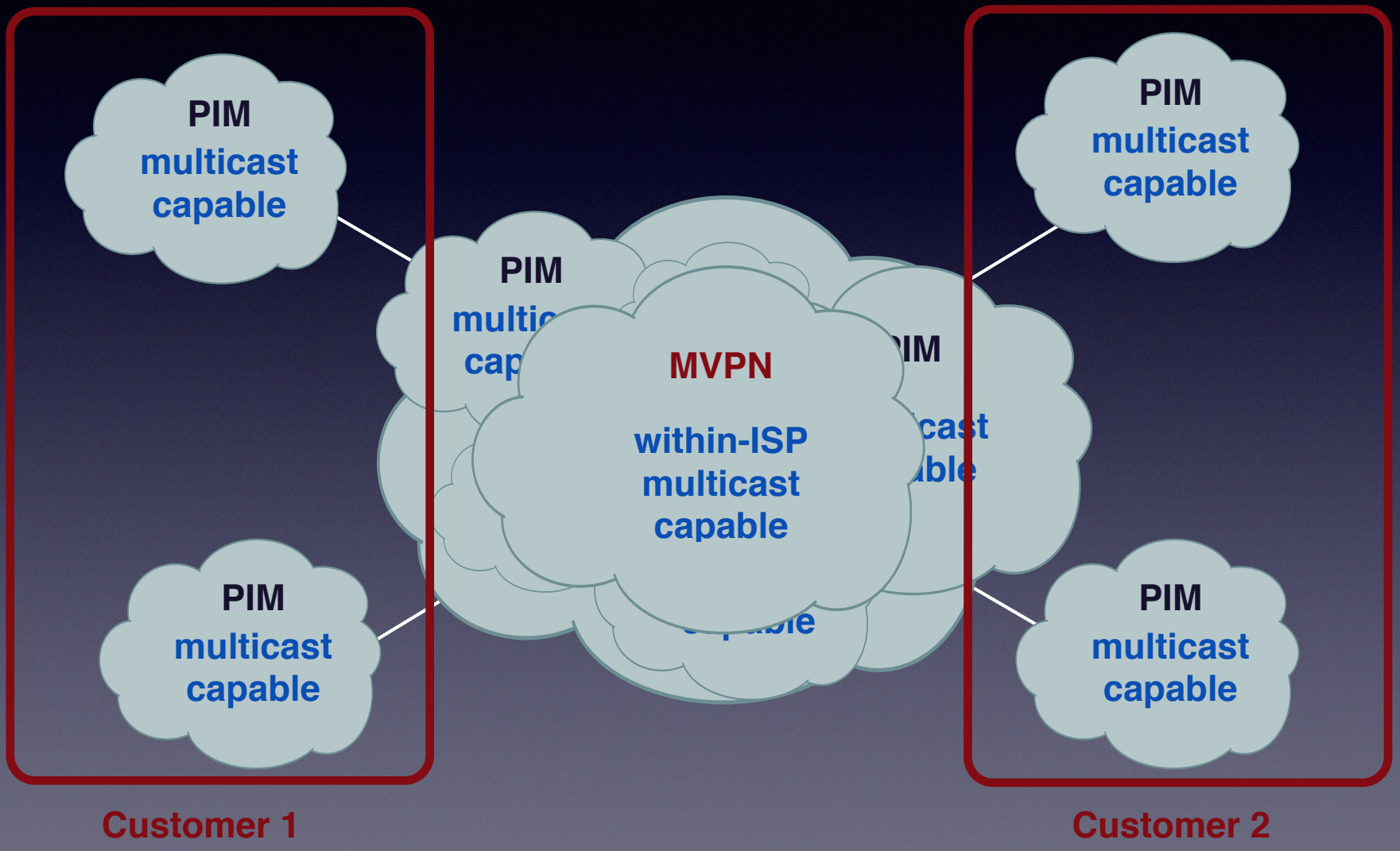
1995


PIM
multicast
capable
PIM
multicast
capable
unicast
unicast
MBONE
DVMRP/PIM
unicast core
unicast
unicast
PIM
multicast
capable
PIM
multicast
capable

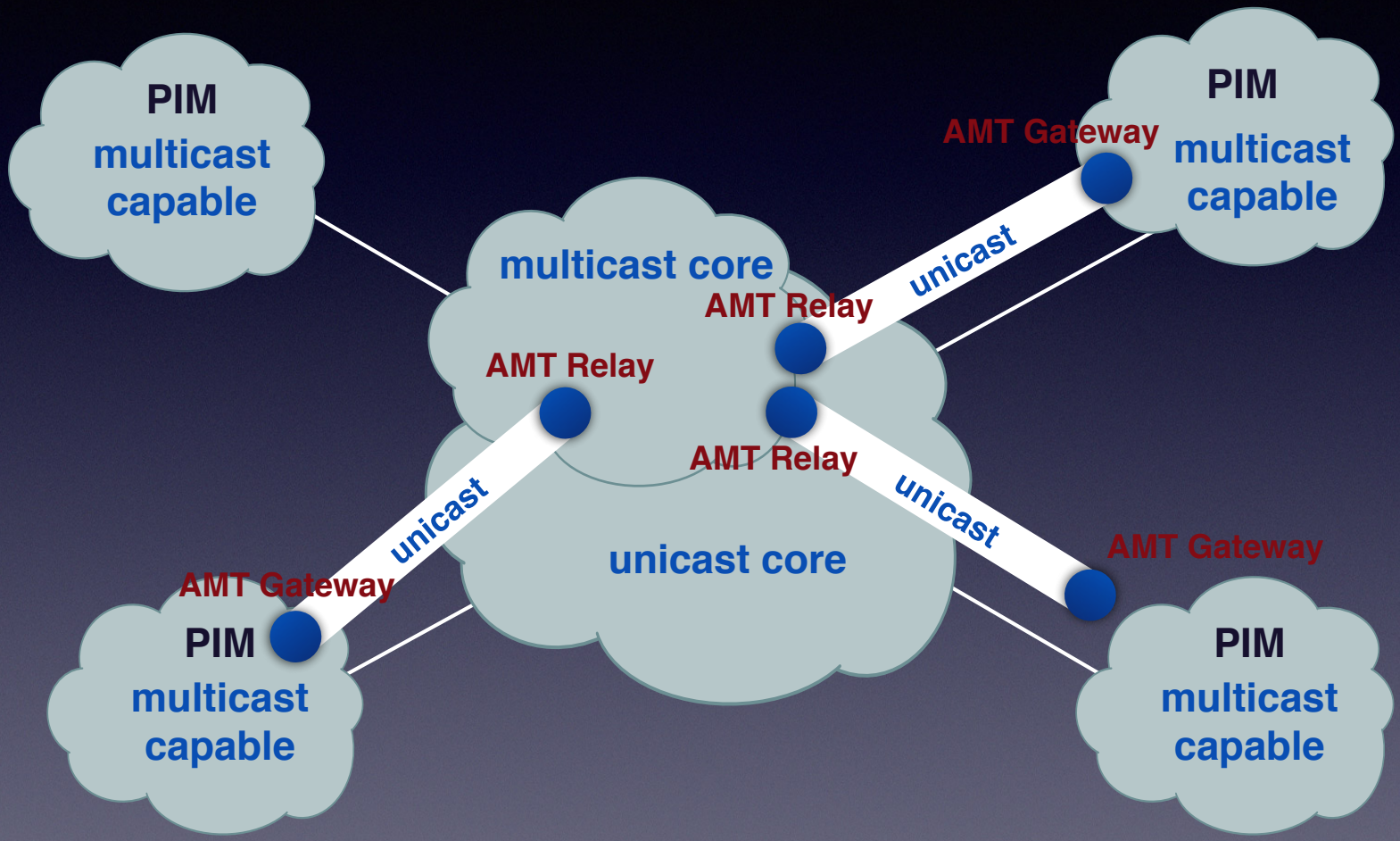
Native Arrived (kind of)



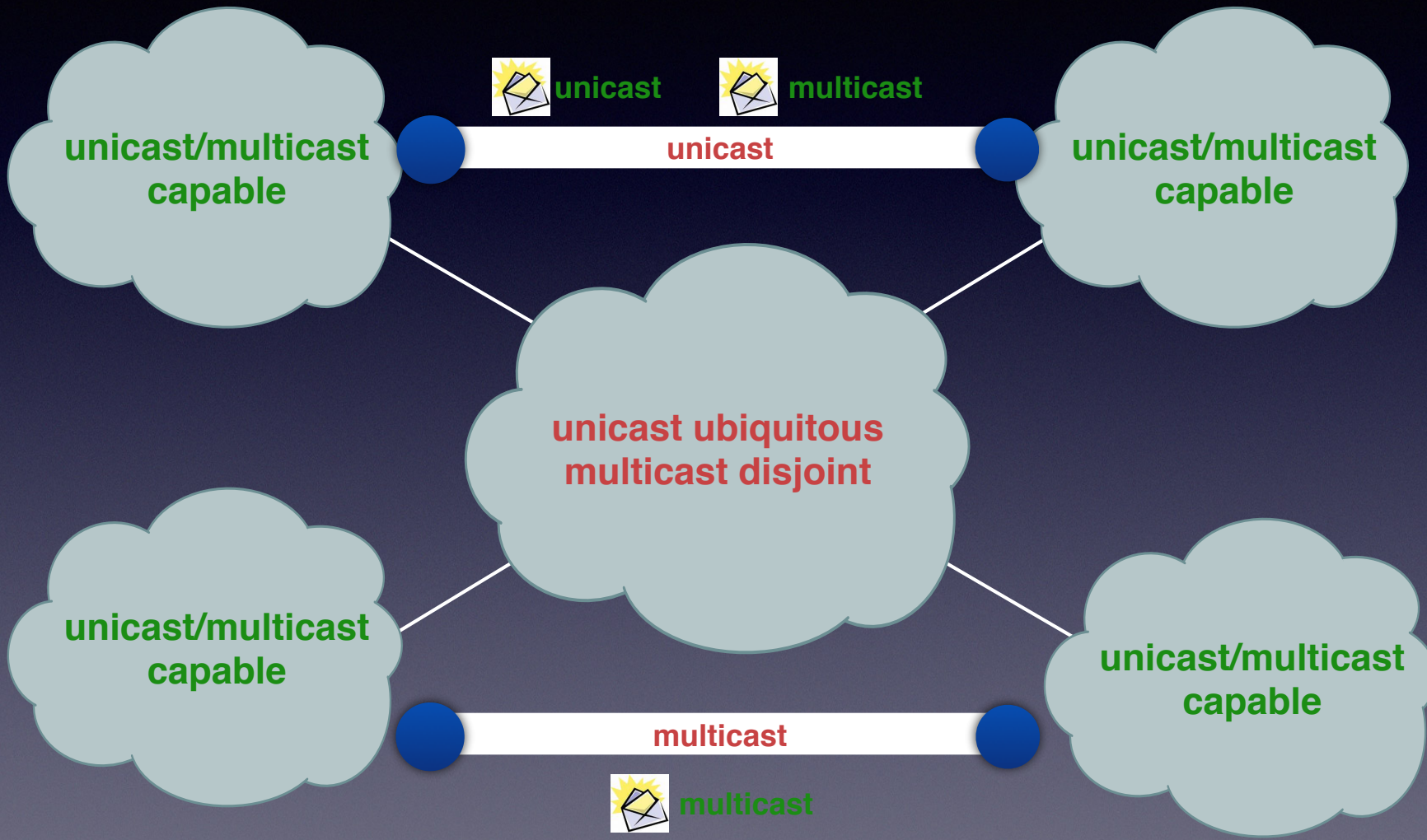
ISP Multicast Service



We Wanted Multicast Anywhere



Now We Have Overlays



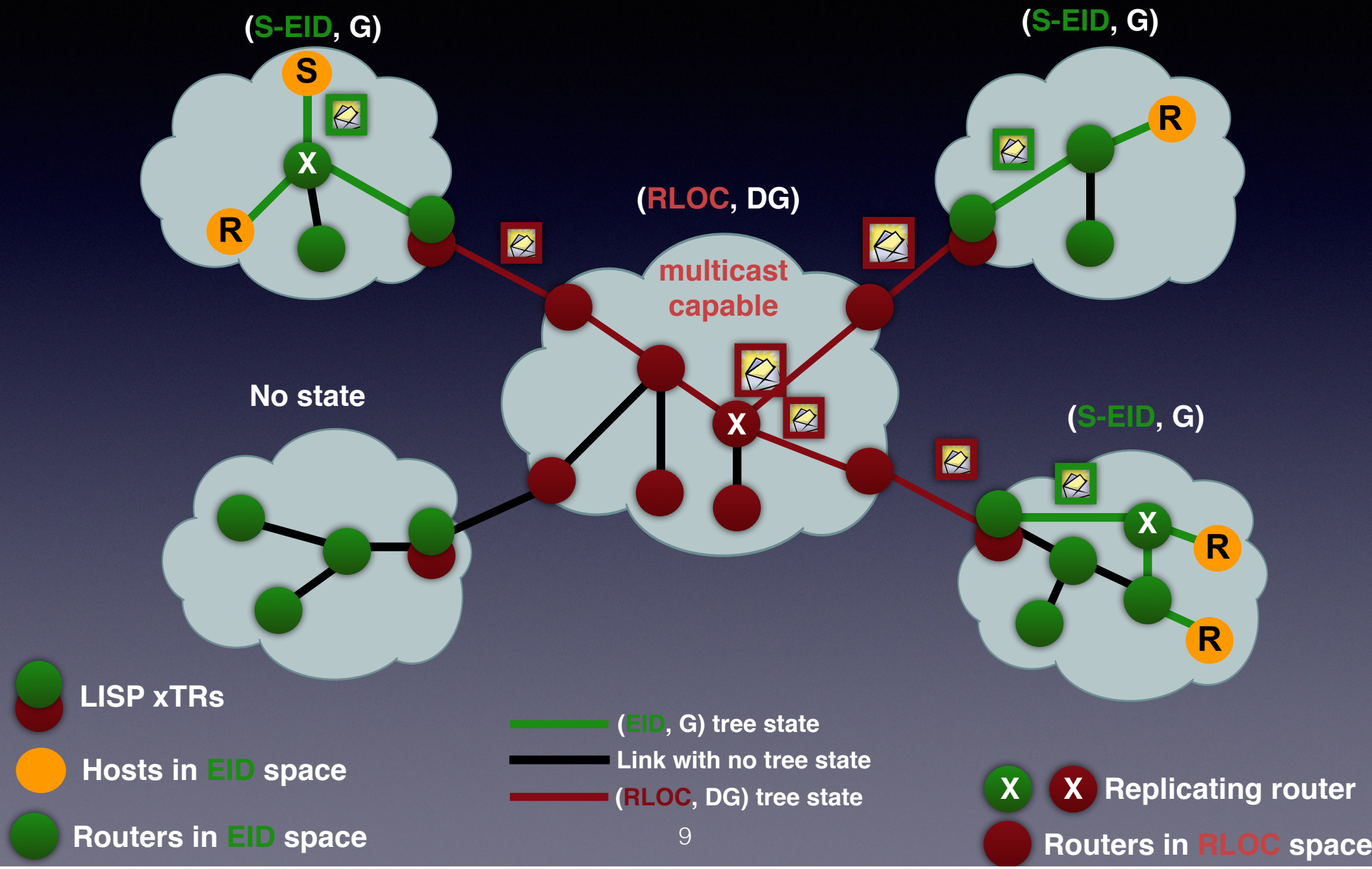
EIDs -> green

RLOCs -> red

LISP-Multicast Today

- RFC 6831 - *"The Locator/ID Separation Protocol (LISP) for Multicast Environments"*
  - Defines how to encap multicast into multicast or unicast
  - Defines use of unicast PIM J/P message exchange between ETRs and ITRs
  - Defines how to work with native PIM at source and receiver multicast sites
  - Enumerates various combinations and recommends how to avoid combinatoric nightmares

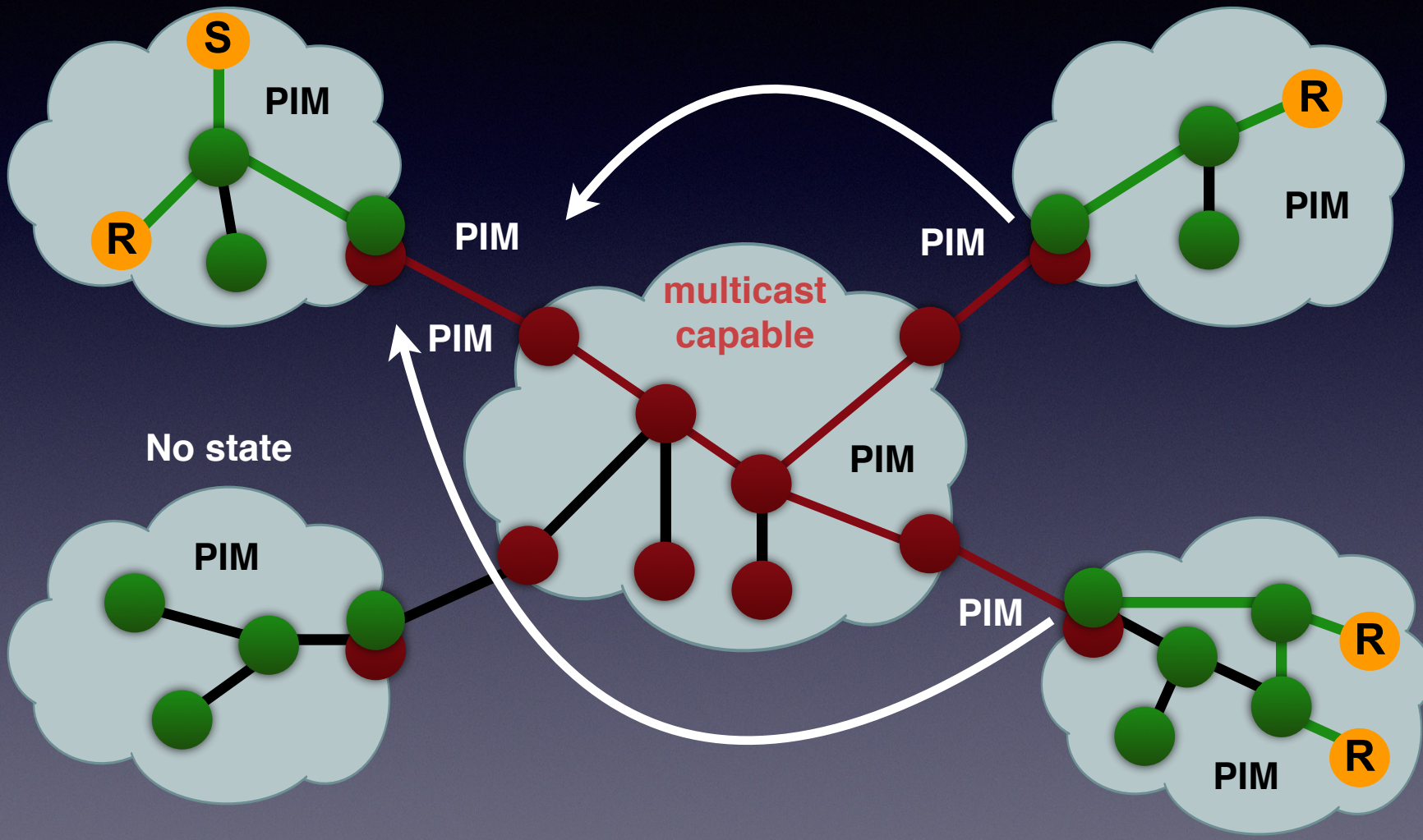
Core Supports Native Multicast



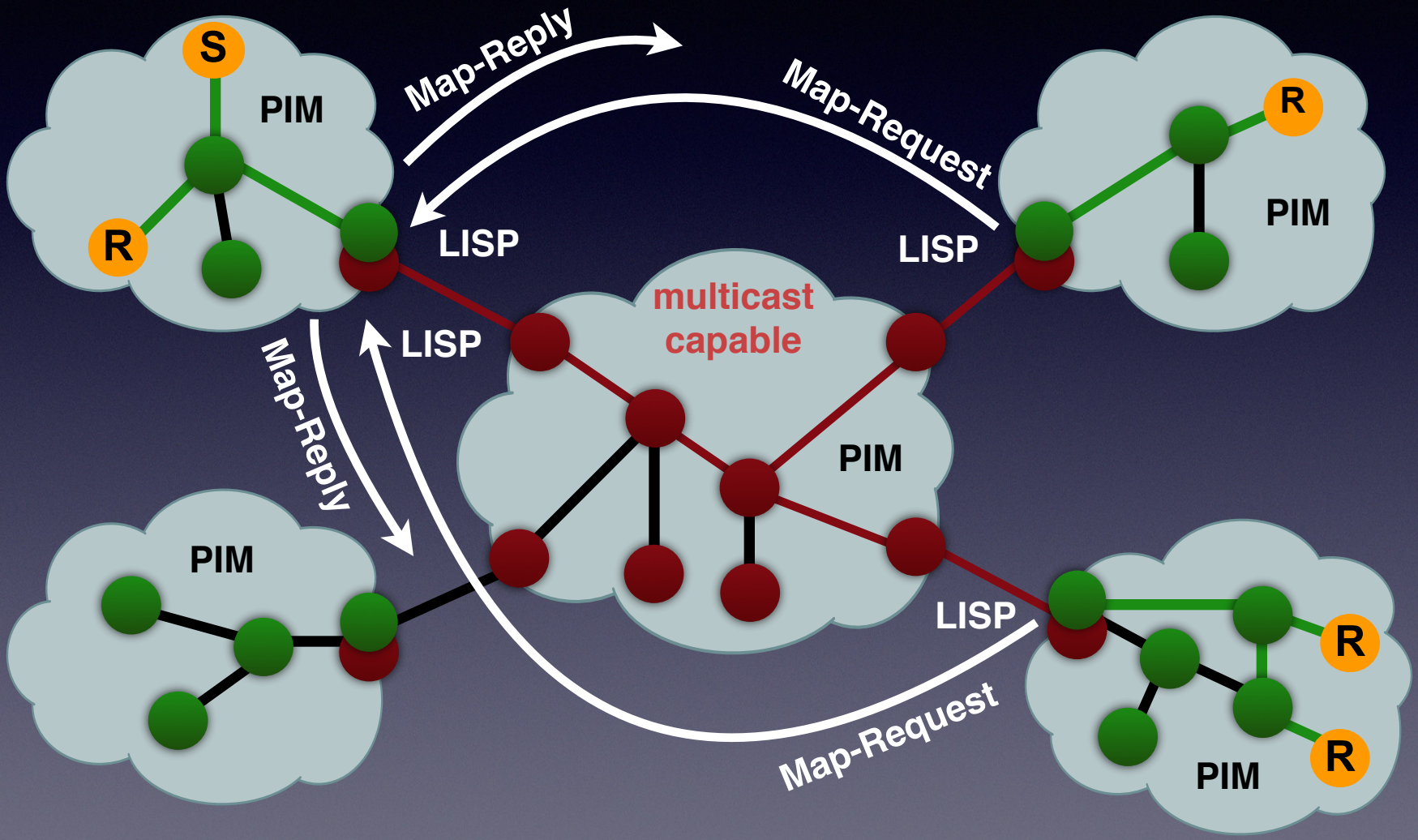
Multicast Overlay Signaling Mechanisms

- **In-the-Network Signaling** - Mechanisms of Today
  - RFC 6831 - LISP-Multicast (**PIM** for signaling)
  - *draft-farinacci-lisp-mr-signaling* (**LISP** for signaling)
- **Out-of-the-Network Signaling** - Next-Gen Mechanisms
  - Mapping Database Based
    - *draft-farinacci-lisp-signal-free-multicast*
    - *draft-coras-lisp-re & draft-ietf-lisp-lcaf*
  - Programmable Interfaces
    - i2rs, OpenFlow, RESTful

PIM Control-Plane Everywhere



LISP as Control-Plane



Next-Gen LISP-Multicast

- Eliminate the need for PIM over-the-top
  - Less protocols mean lower OpEx and less complexity
- Use the existing mapping system for ETRs to find the ITRs of source multicast sites
- At the same time allow for encap of multicast into unicast
  - To allow multicast service over partner unicast-only network

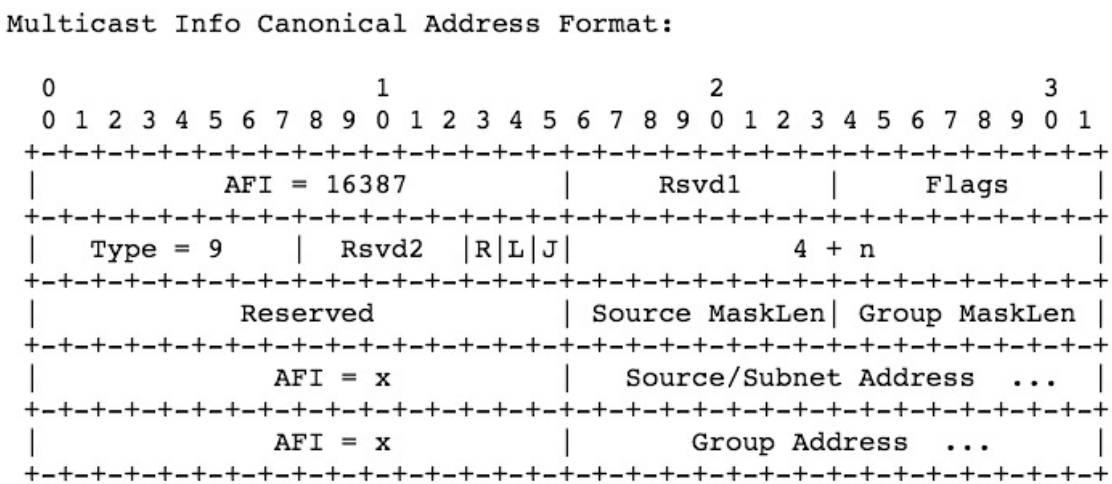
Out-of-the-Network Signaling

- Use the Mapping Database
  - Replication list of ETRs or DGs are stored per (S-prefix, G-prefix) EID entry
- Use a Programmable Interface
  - Have network controller monitor ETRs for joined state
  - Then network controller programs ITRs with replication state
  - Network controllers can program RTRs inside of network to optimize distribution trees

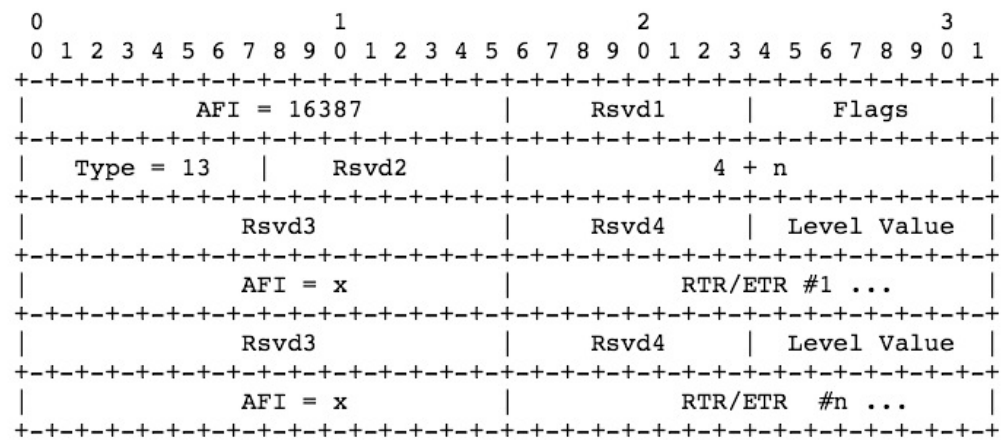
Using the Mapping Database

(S-EID, G) encoding

Multicast Info Canonical Address Format:

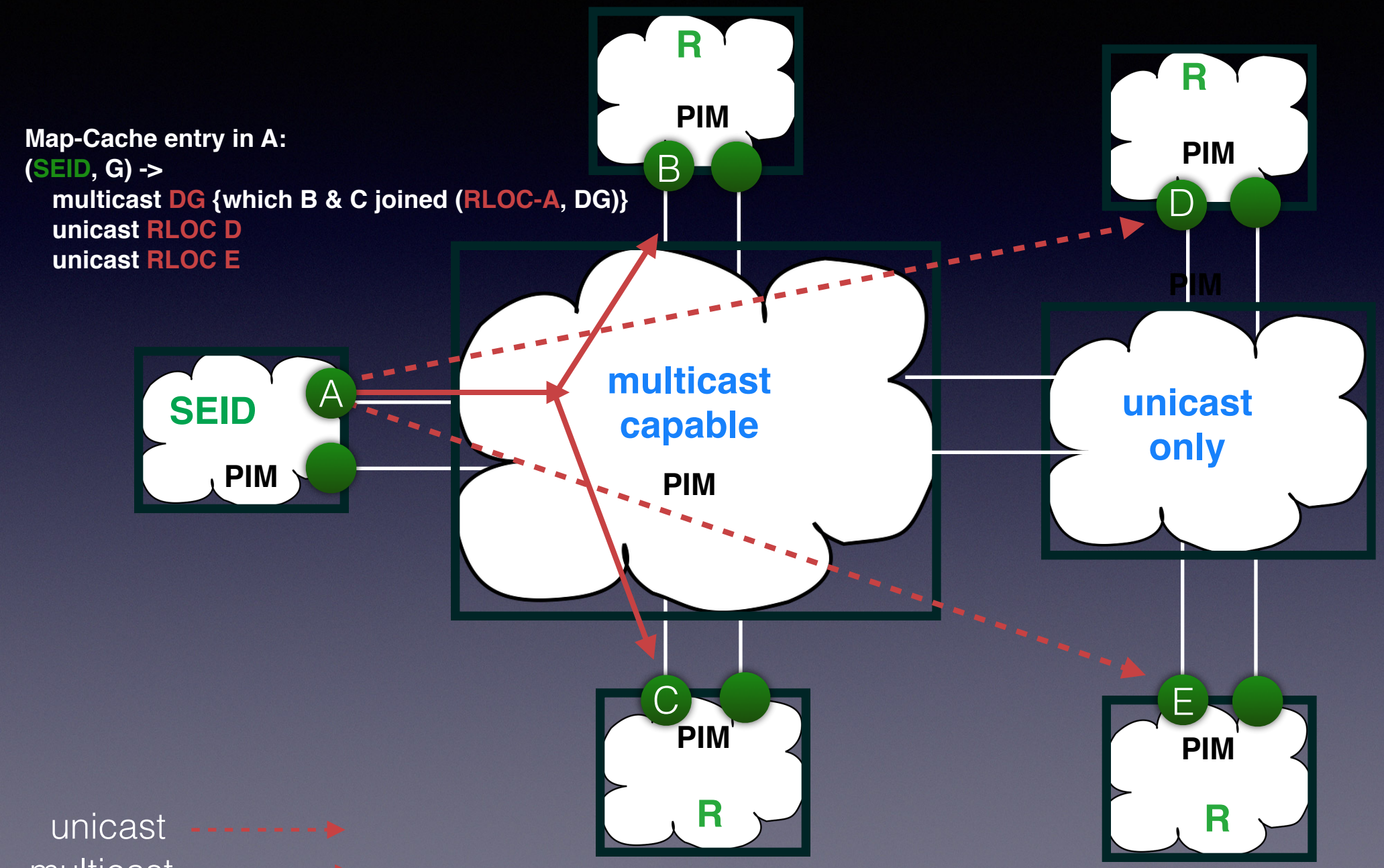


Replication List Entry Address Format:

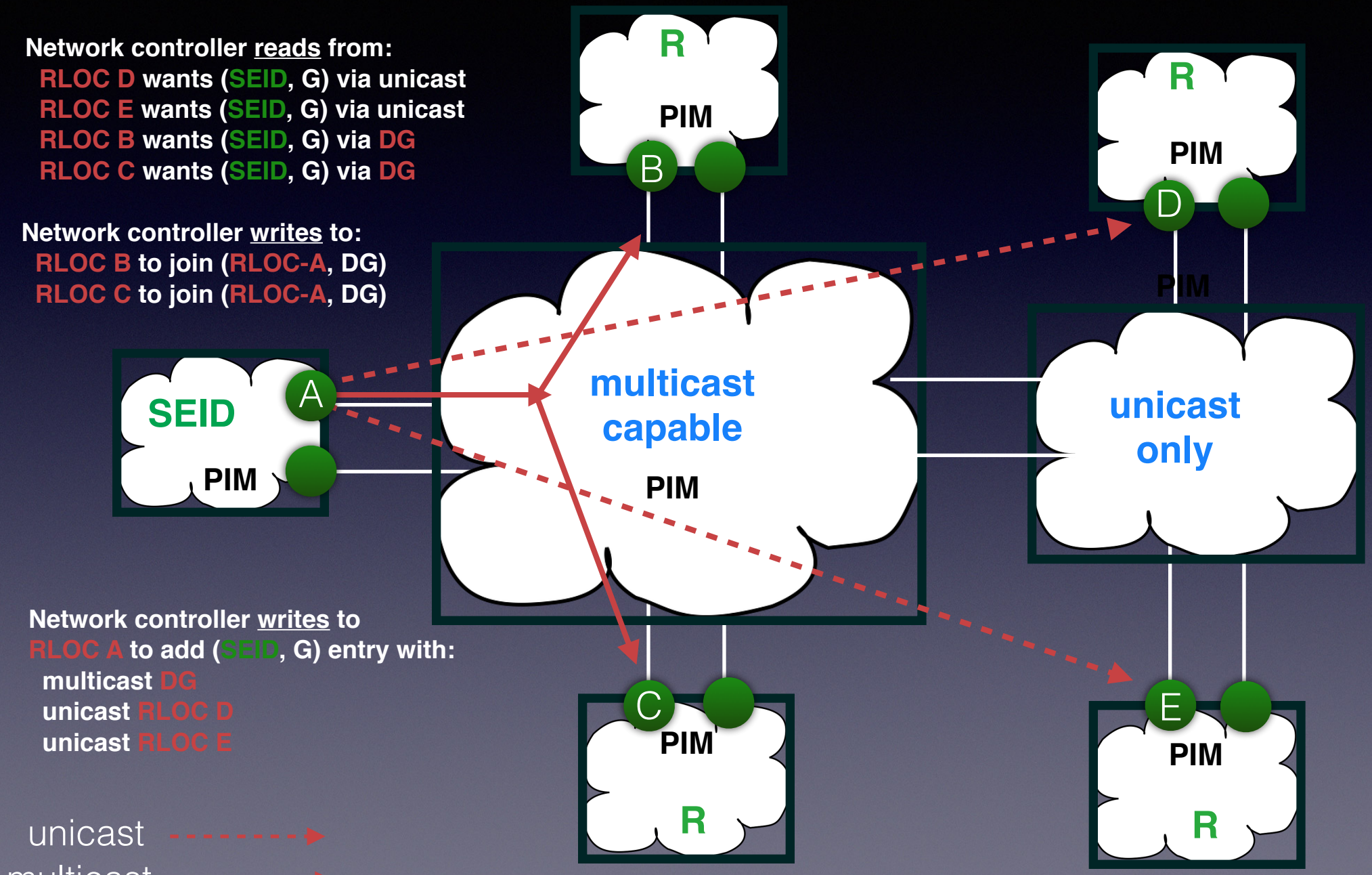


RLOC or DG encoding

Mapping Database Based Example



Programmable Interface Example



Recommendations

- RFC 6830 is necessary for *underlay-only* multicast to transition to *overlay-underlay* multicast - **keep it active**
- We let *draft-farinacci-lisp-mr-signaling* *expire* to reduce the number of signaling approaches - **kill it**
- Make *draft-farinacci-lisp-signal-free-multicast* working group draft - **keep it active**
  - Focus future multicast efforts on mapping database based designs for access-control, policy, and replication-engineering (RE)