Multicast Overlay Models & Mechanisms

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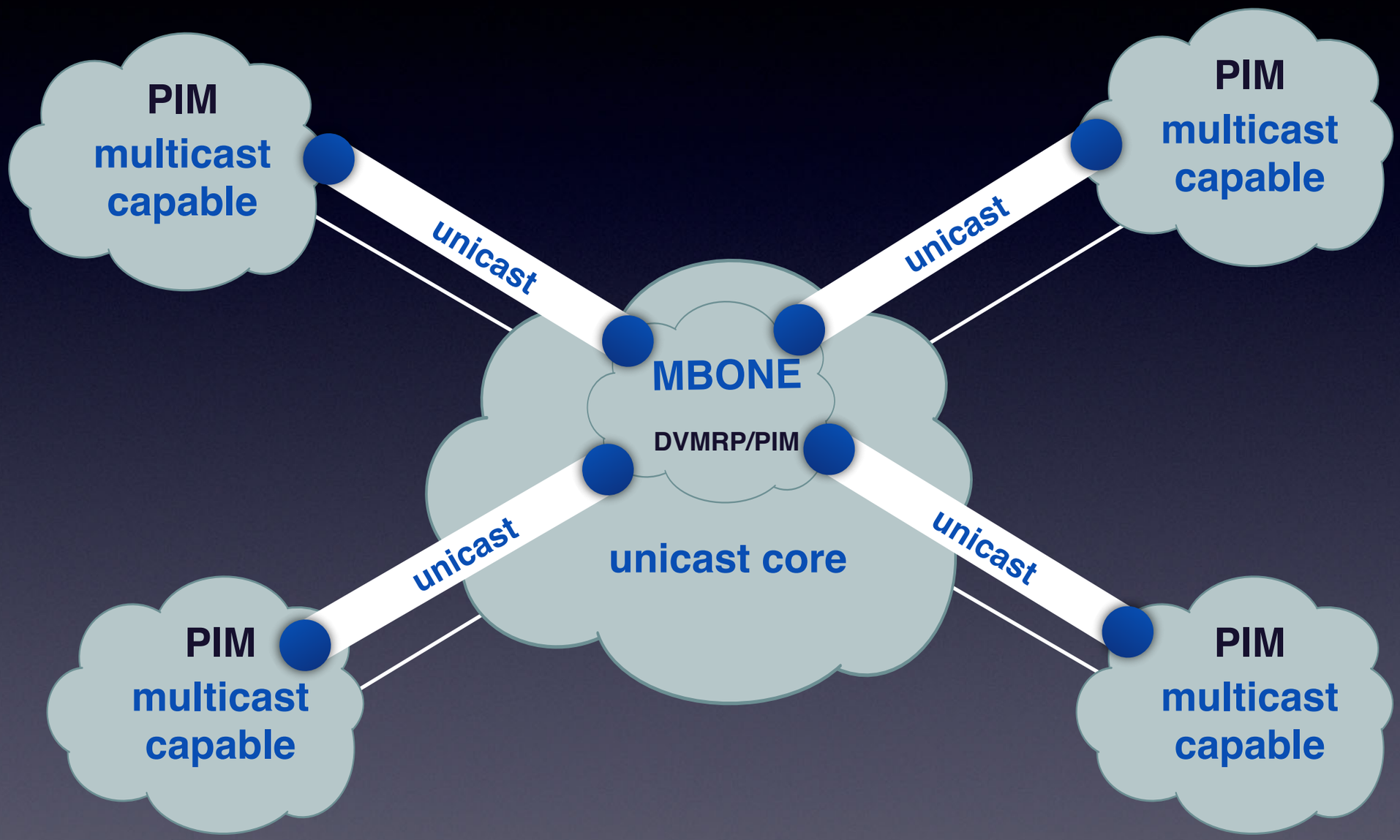
Agenda - Multicast Delivery Models

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

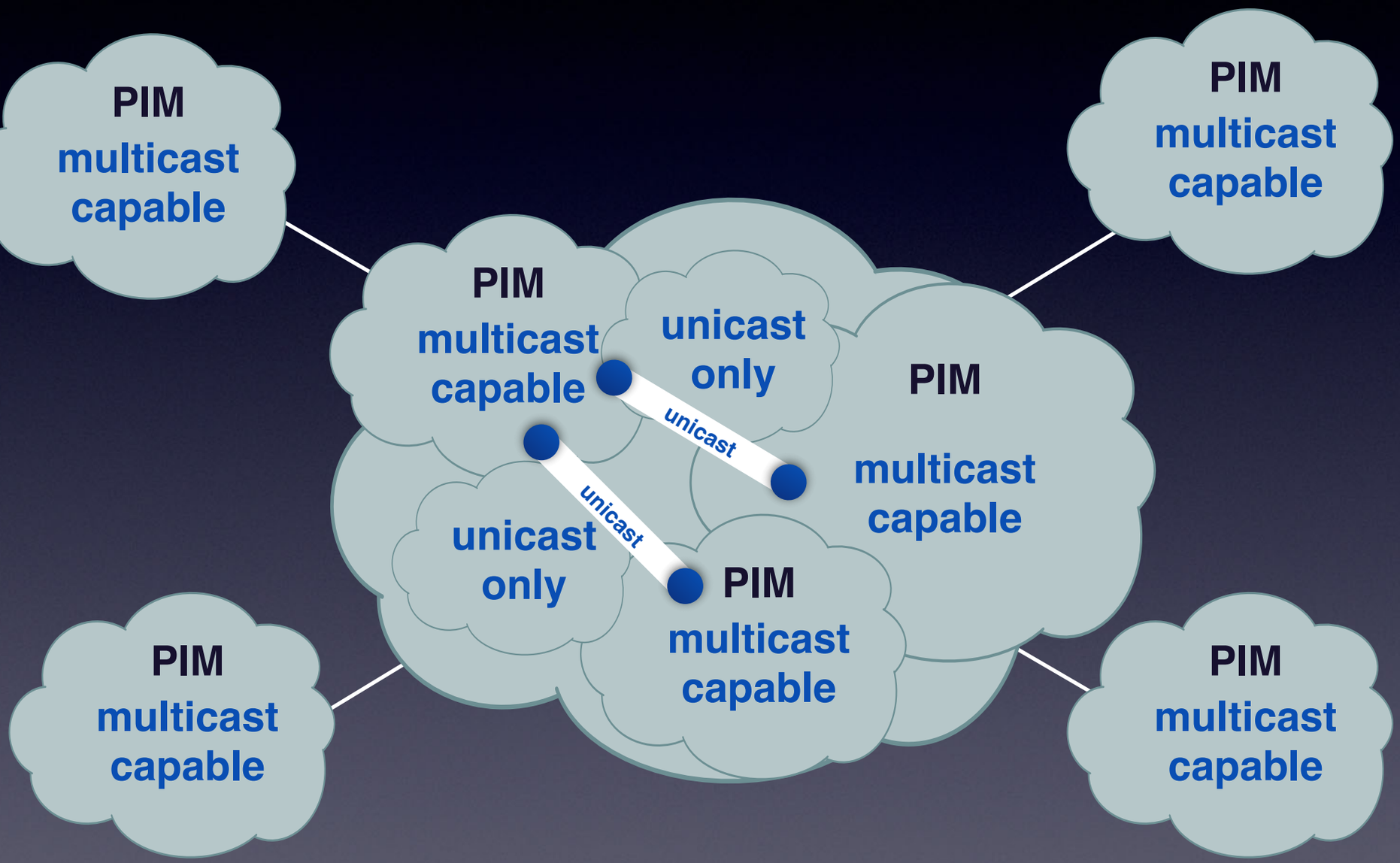
Agenda - Multicast Overlay Signaling Mechanisms

- In-the-Network Signaling
  - RFC 6831 - LISP-Multicast (**PIM**)
  - *draft-farinacci-lisp-mr-signaling* (**LISP**)
- Out-of-the-Network Signaling
  - Mapping Database Based (**PIM** and/or **LISP**)
    - *draft-coras-lisp-re & draft-ietf-lisp-lcaf*
  - Programmable Interface
    - i2rs, OpenFlow, RESTful

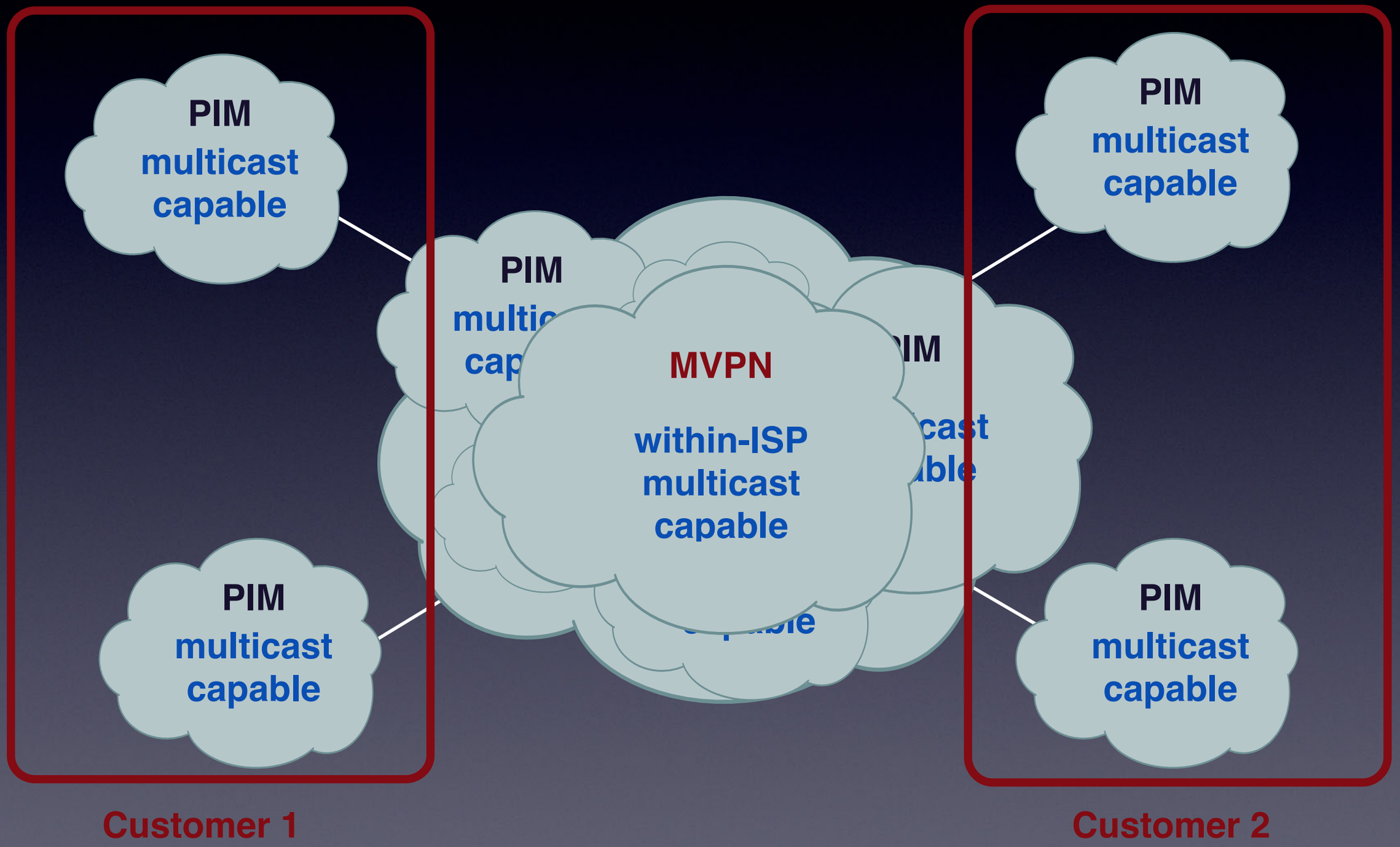
1995


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

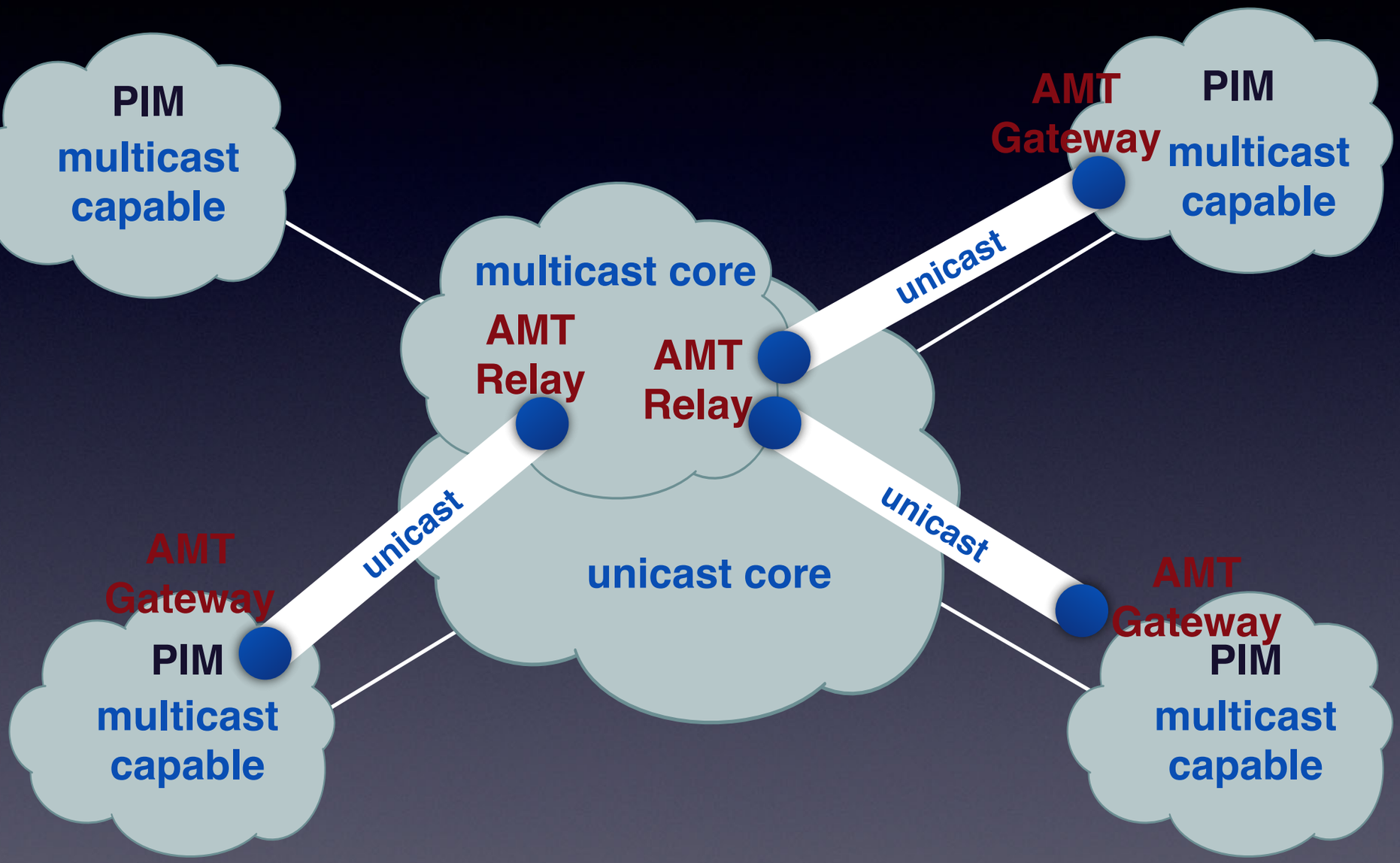
Native Arrived (kind of)



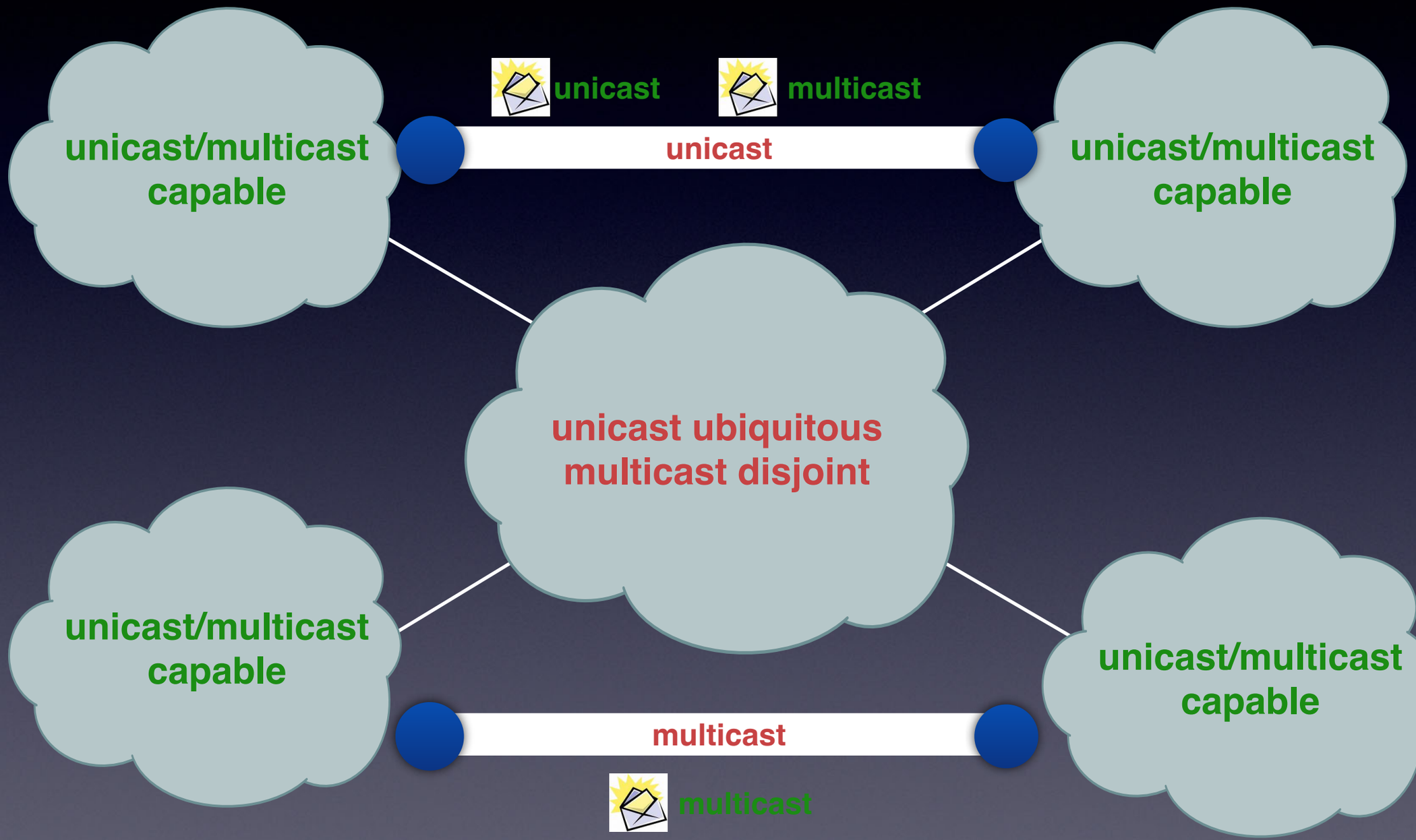
ISP Multicast Service



We Wanted Multicast Anywhere



Now We Have Overlays



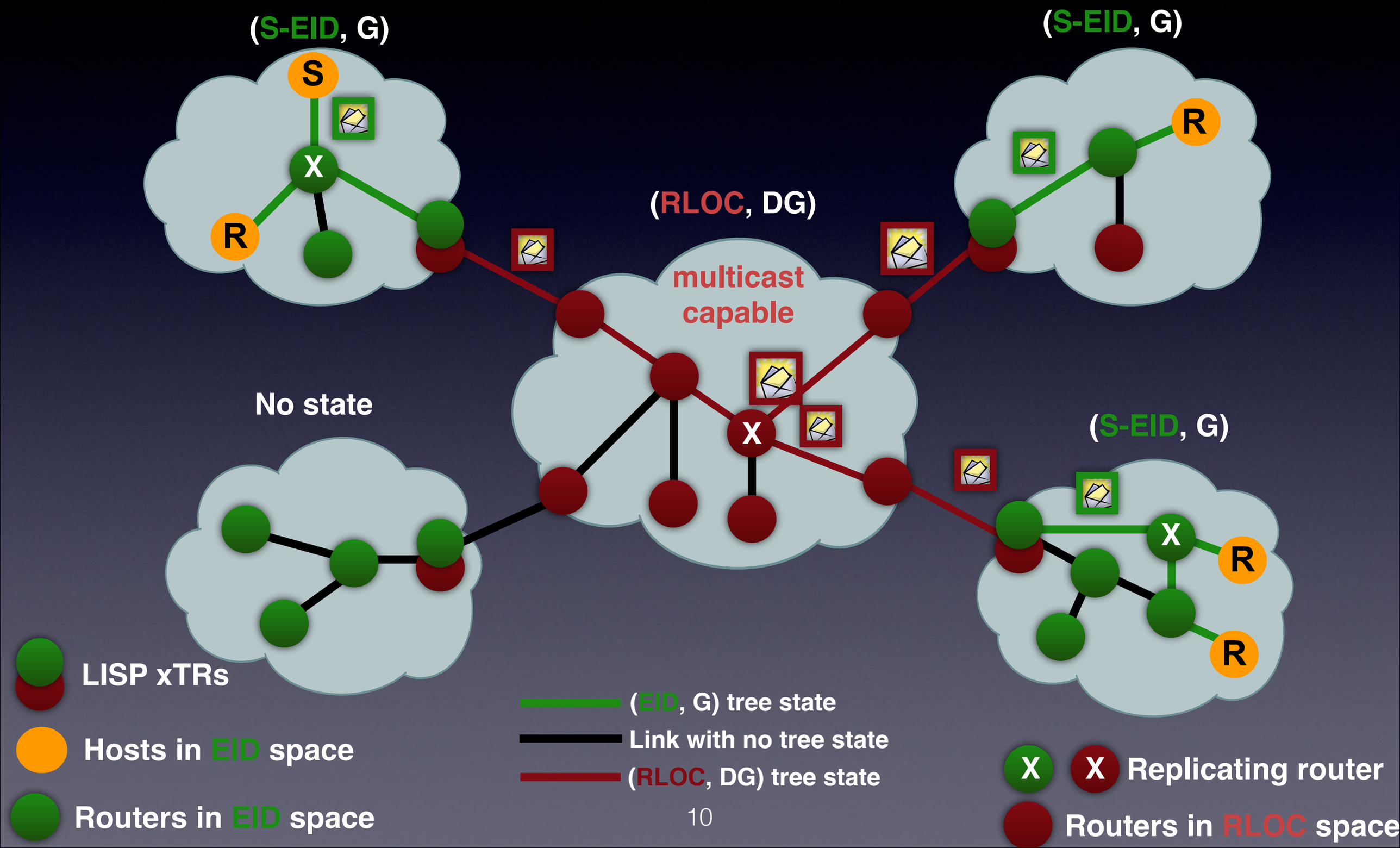
EIDs -> green

RLOCs -> red

LISP-Multicast Today

- RFC 6831 - *draft-ietf-lisp-multicast*
  - 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

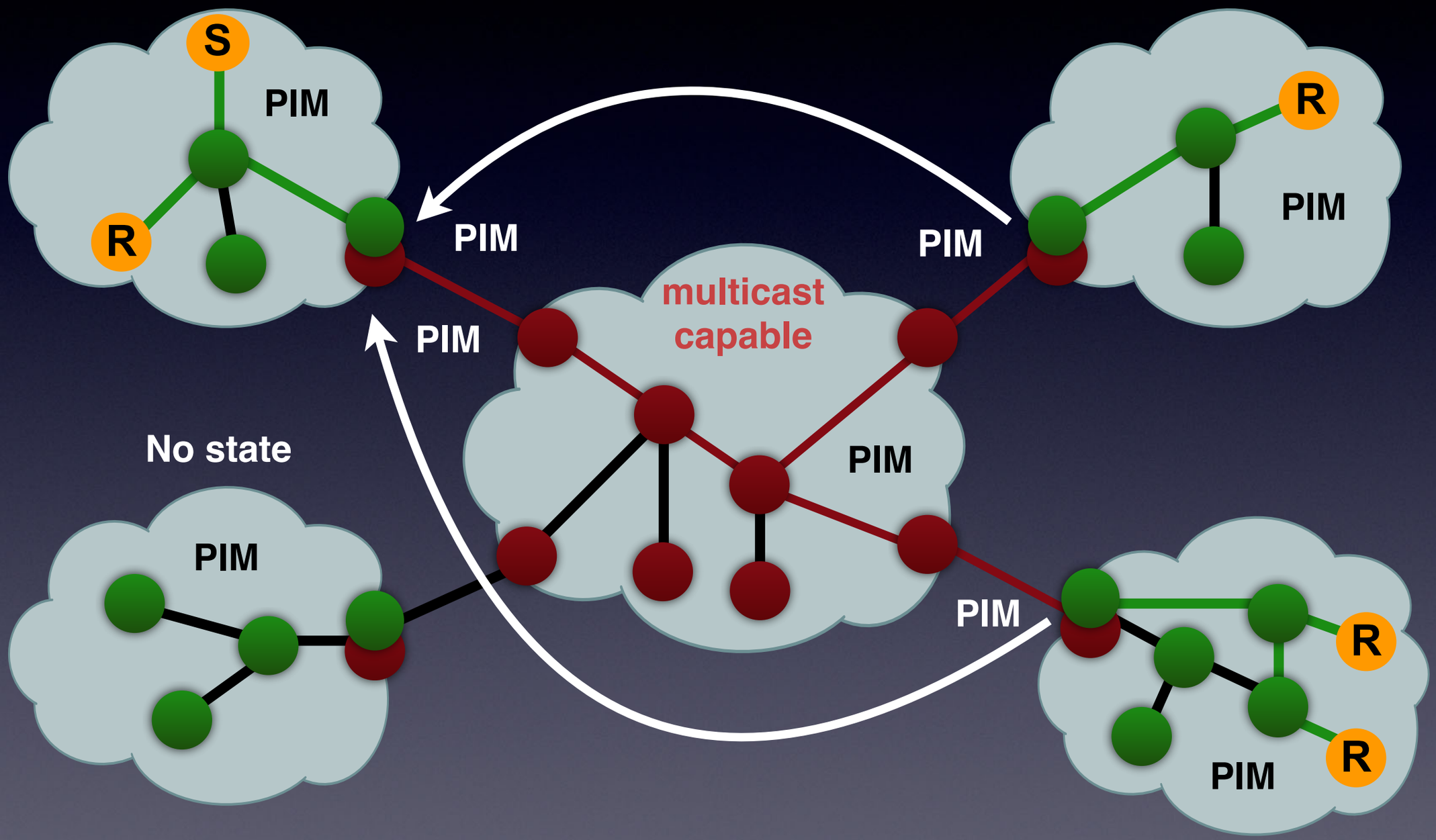


Multicast Overlay Signaling Mechanisms

In-the-Network Signaling

- Use traditional protocol based signaling methods?
  - RFC 6831 - using PIM
  - *draft-farinacci-lisp-mr-signaling* - using LISP

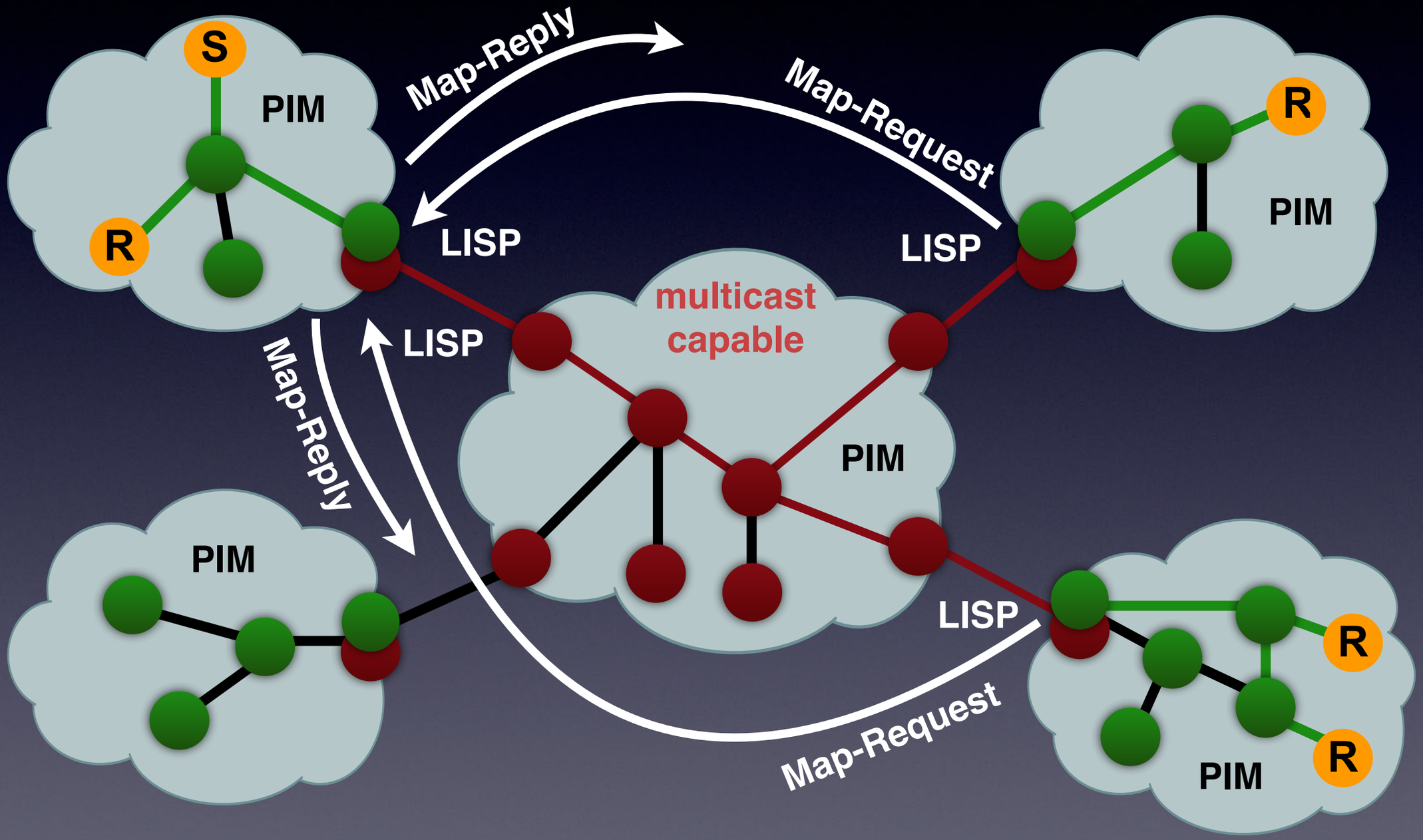
PIM Control-Plane Everywhere



LISP-Multicast Tomorrow

- 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 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

LISP as Control-Plane



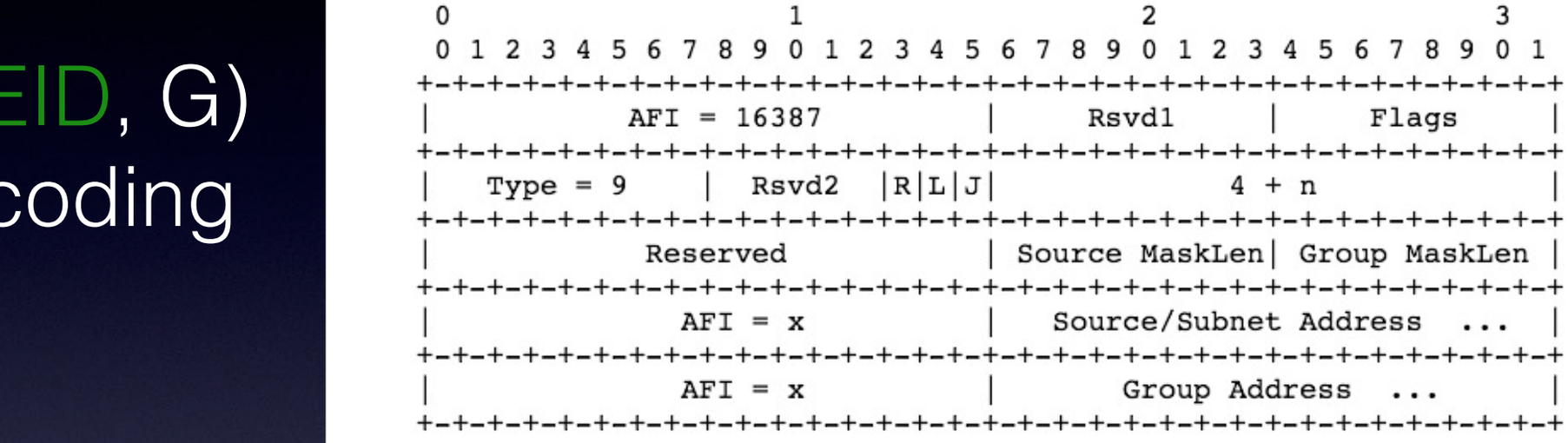
Out-of-the-Network Signaling

- Use the Mapping Database
  - Replication list of ETRs or DGs are stored per (S-prefix, G-prefix) EID entry
  - See LISP Replication Engineering (LISP-RE) design
- 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

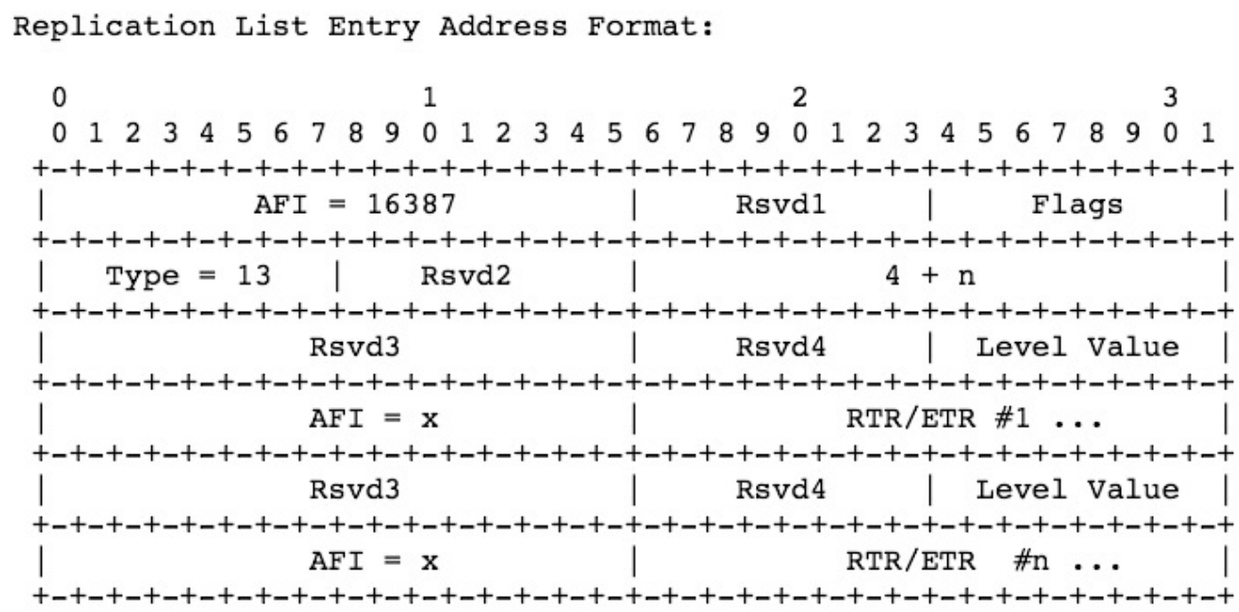
Using the Mapping Database

(S-EID, G) encoding

Multicast Info Canonical Address Format:



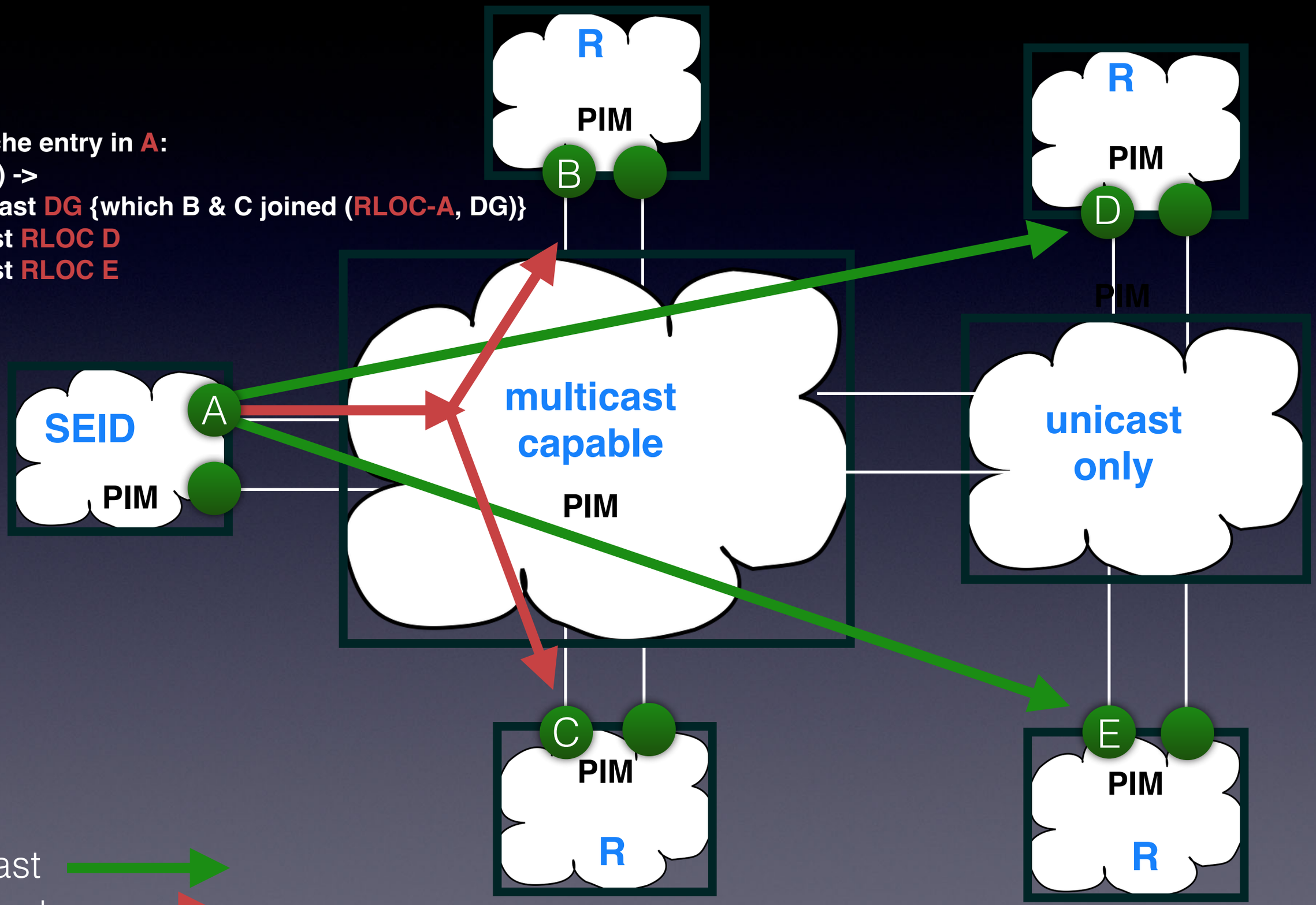
Replication List Entry Address Format:



RLOC or DG encoding

Mapping Database Example

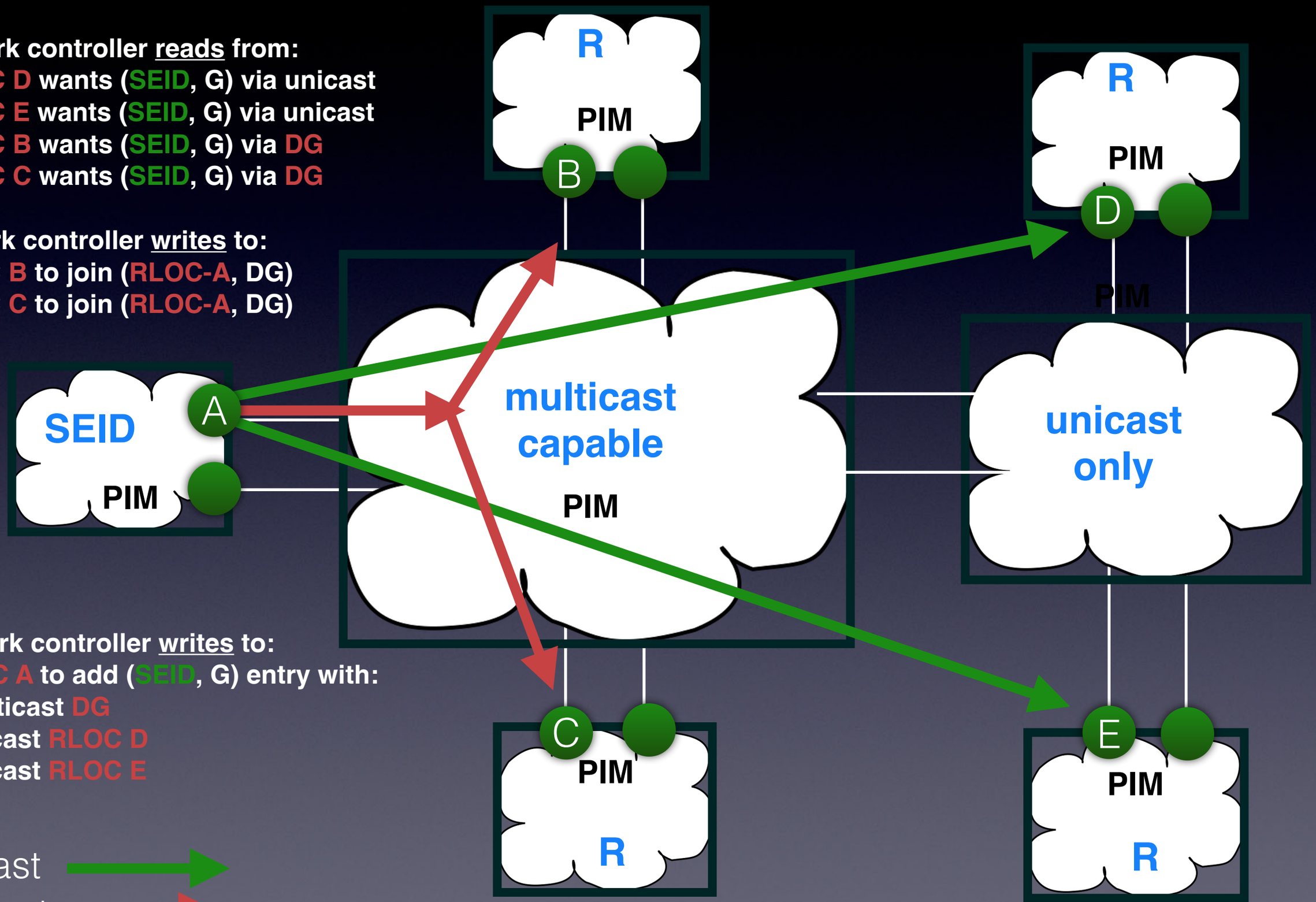
Map-Cache entry in A:
(SEID, G) ->
multicast DG {which B & C joined (RLOC-A, DG)}
unicast RLOC D
unicast RLOC E



Programmability Example

Network controller reads from:
- **RLOC D wants (SEID, G) via unicast**
- **RLOC E wants (SEID, G) via unicast**
- **RLOC B wants (SEID, G) via DG**
- **RLOC C wants (SEID, G) via DG**

Network controller writes to:
- **RLOC B to join (RLOC-A, DG)**
- **RLOC C to join (RLOC-A, DG)**



Network controller writes to:
- **RLOC A to add (SEID, G) entry with:**
  - **multicast DG**
  - **unicast RLOC D**
  - **unicast RLOC E**

unicast
multicast

Advanced Topic - Future

- If unicast replication becomes popular ...

  ... need to manage head-end replication overhead

- Will need in-the-network replicators (like AMT Relays)

- See *draft-coras-lisp-re-02*

Q&A

Multicast can turn any simple problem into a hard one

:-)