LISP: Intro and Update

RIPE Berlin – May, 2008

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(for Dino, Dave, Darrel, et al)

http://www.vaf.net/prezos/lisp-ripe-short.pdf

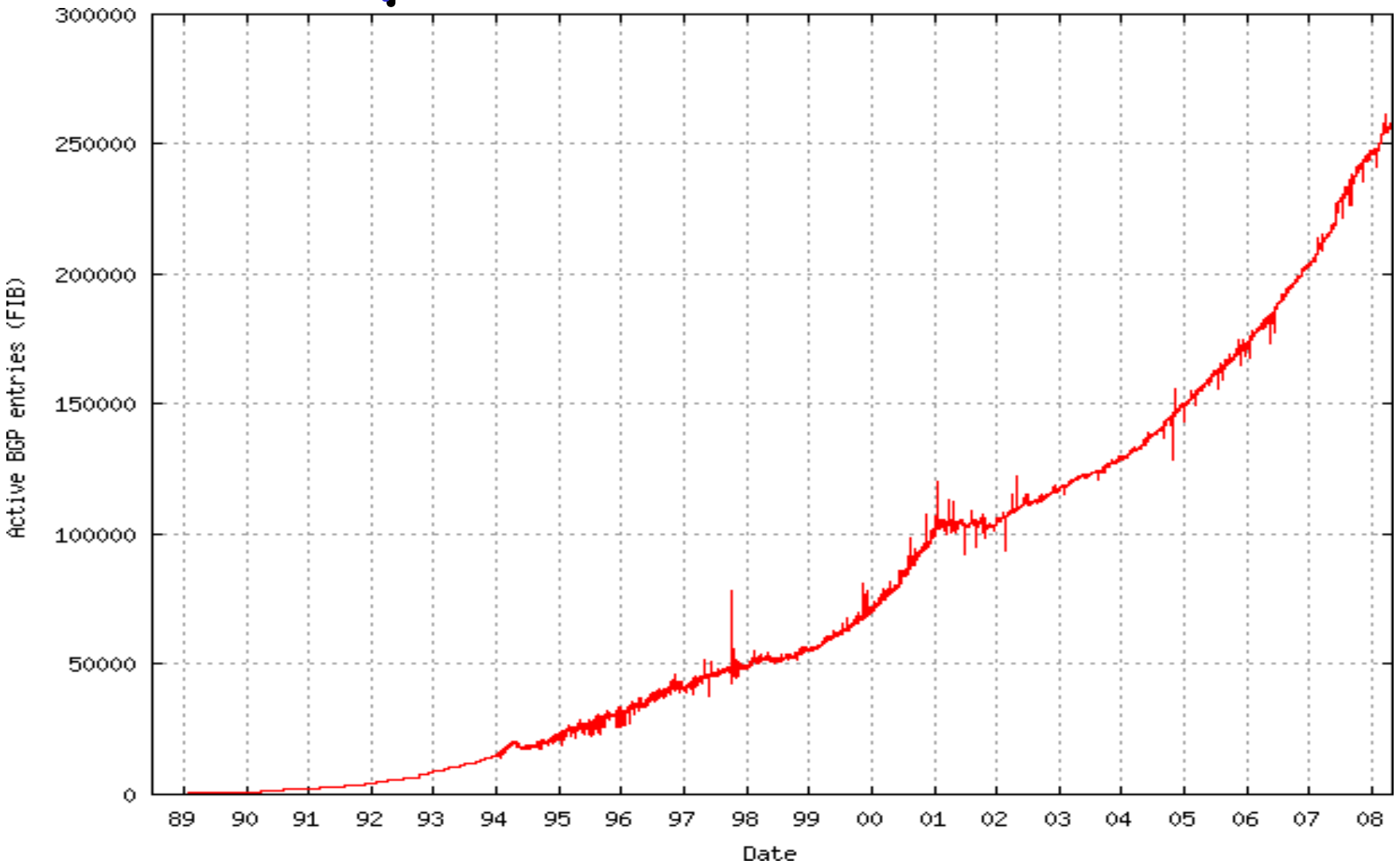
Agenda

- What is LISP?
- What problem is LISP solving?
  - www.vaf.net/prezos/rrg-prague.pdf
- Why Locator/ID Separation?
- Data Plane Operation
- Finding Mappings – LISP+ALT
- Incremental Deployability
- Implementation and Testing status

What is LISP?

- Locator/ID Separation Protocol
- Ground rules for LISP
  - Network-based solution
  - No changes to hosts whatsoever
  - No new addressing changes to site devices
  - Very few configuration file changes
  - Imperative to be incrementally deployable
  - Address family agnostic

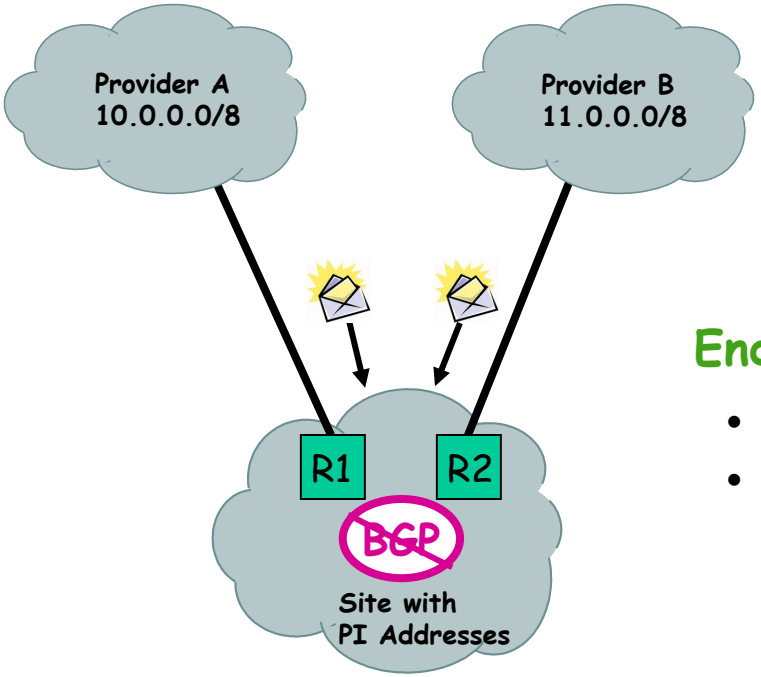
A picture is worth…



What is ID/Loc separation?

- Instead of IP addresses, two numbering spaces:
- Endpoint Identifiers (EIDs): hierarchically assigned to sites along administrative lines (like DNS hostnames)
  - do not change on devices that remain associated with the site; think "PI" but not routable
- Routing Locators (RLOCs): assigned according to network topology, like "PA" address assignments
  - Locators are aggregated/abstracted at topological boundaries to keep routing state scalable
  - When site's connection to network topology changes, so do the locators – aggregation is preserved

What Features do I get?



Lower OpEx for Sites and Providers

- Improve site multi-homing
- Improve provider traffic engineering
- Reduce size of core routing tables

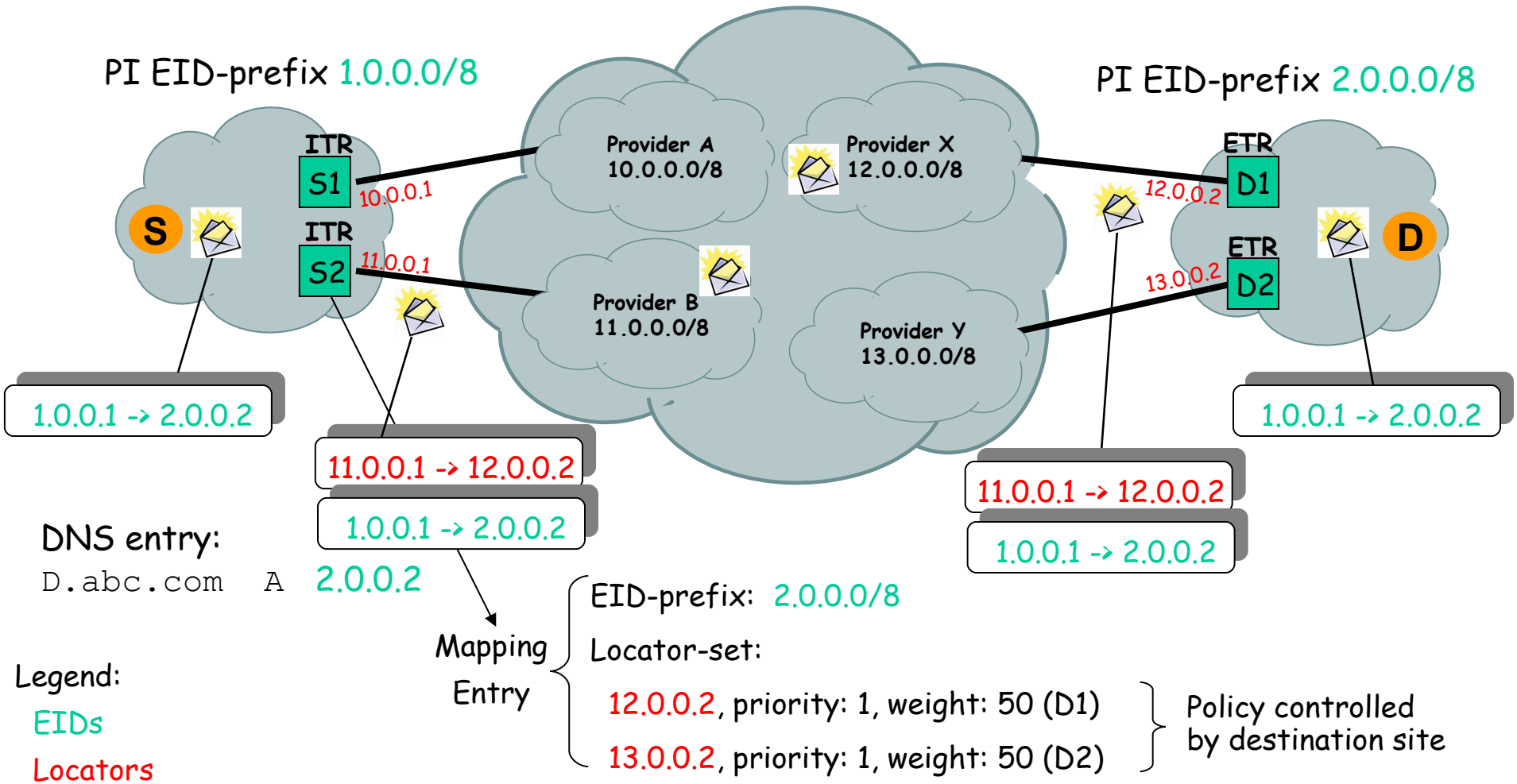
End Site Benefit

- Easier Transition to ipv6
- Change provider without address change

New Network Elements

- Ingress Tunnel Router (ITR)
  - Finds EID to RLOC mapping
  - Encapsulates to Locators at source site
- Egress Tunnel Router (ETR)
  - Owns EID to RLOC mapping
  - Decapsulates at destination site

Packet Forwarding



DNS entry:

`D.abc.com  A  2.0.0.2`

Mapping Entry

EID-prefix: 2.0.0.0/8

Locator-set:

12.0.0.2, priority: 1, weight: 50 (D1)

13.0.0.2, priority: 1, weight: 50 (D2)

Policy controlled by destination site

Legend:

EIDs

Locators

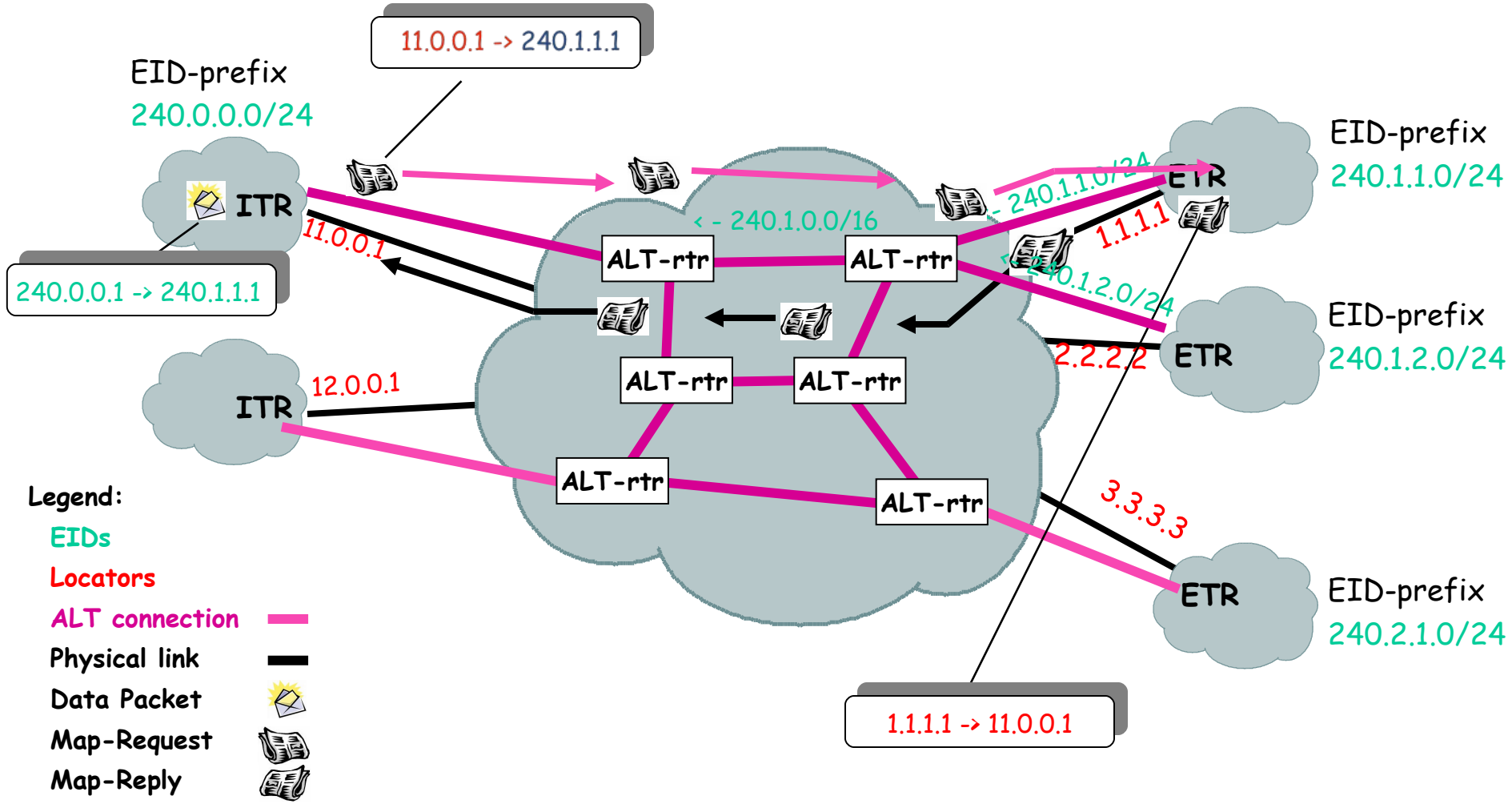
When the ITR has no Mapping

- ITR needs to obtain from ETR
- ITR sends Map Request (or Data Probe)
- ETR returns Map Reply
- But how do the ITR and ETR hook up?

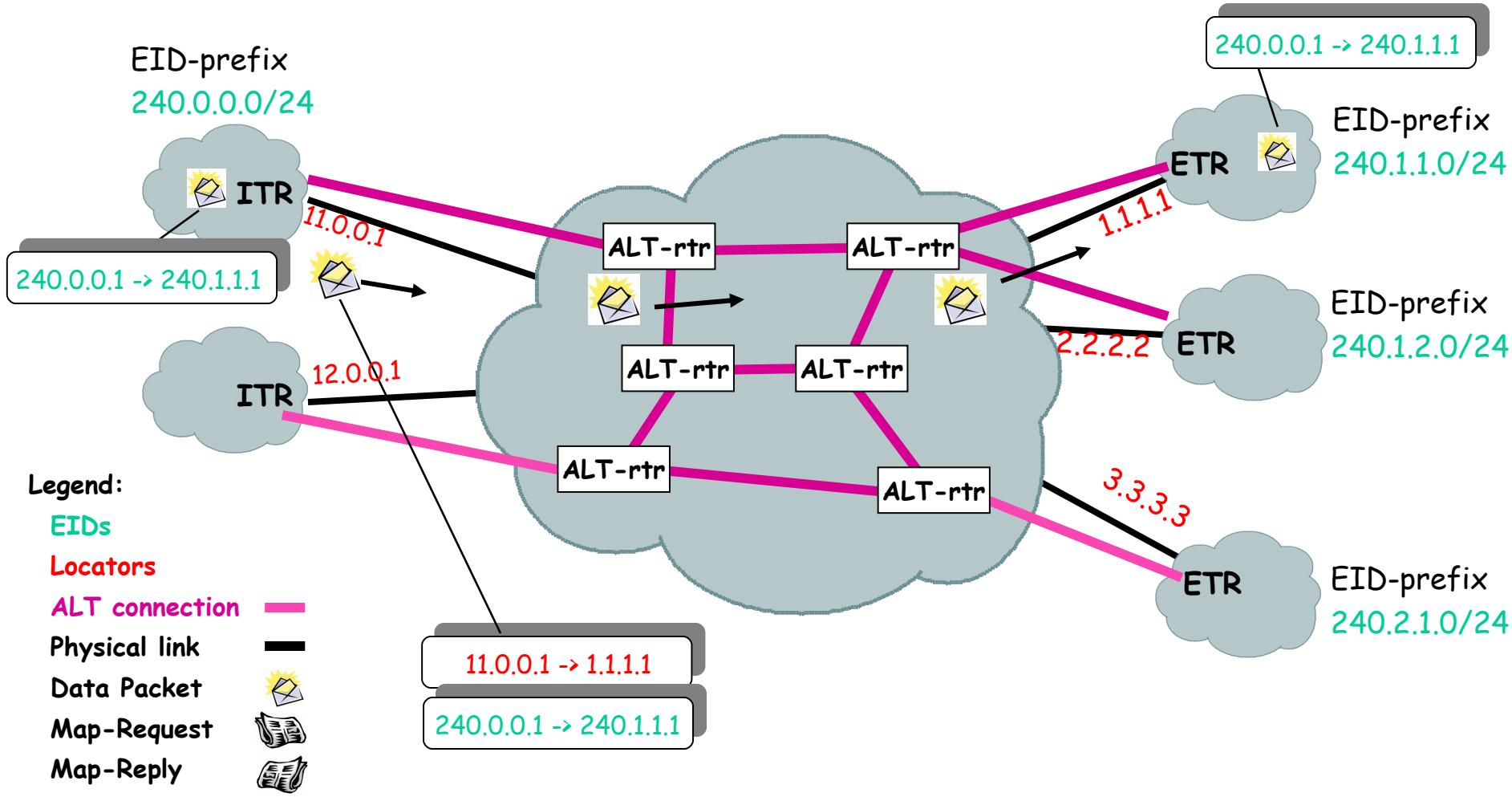
Finding an ETR: LISP+ALT

- Hybrid push/pull approach
  - ALT pushes aggregates, LISP pulls specifics
- Hierarchical EID prefix assignment
- Aggregation of EID prefixes
- GRE-based overlay network
- BGP used to advertise EIDs on overlay
- Option for data-triggered Map-Replies

LISP+ALT in action



LISP+ALT in action



Interworking Deployability

- These combinations must be supported
  - Non-LISP site to non-LISP site
    - Today's Internet
  - LISP site to LISP site
    - Encapsulation over IPv4 makes this work
    - IPv4-over-IPv4 or ipv6-over-IPv4
  - LISP-R site to non-LISP site
    - When LISP site has PI or PA routable addresses
  - LISP-NR site to non-LISP site
    - When LISP site has PI or PA non-routable addresses

Interworking Deployability

- LISP-R site to non-LISP site
  - ITR at LISP site detects non-LISP site when no mapping exists
    - Does not encapsulate packets
  - Return packets to LISP site come back natively since EIDs are routable
  - Same behavior as the non-LISP to non-LISP case
    - LISP site acts as a non-LISP site

Interworking Deployability

- LISP-NR site to a non-LISP site
  - ITR at LISP site detects non-LISP site when no mapping exists
    - Does not encapsulate packets
  - For return packets to LISP site
    - ITR translates to a source routable address so packets symmetrically sent natively
    - PTR advertises NR prefixes close to non-LISP sites so return packets are encapsulated to ETR at LISP site

Implementation Status

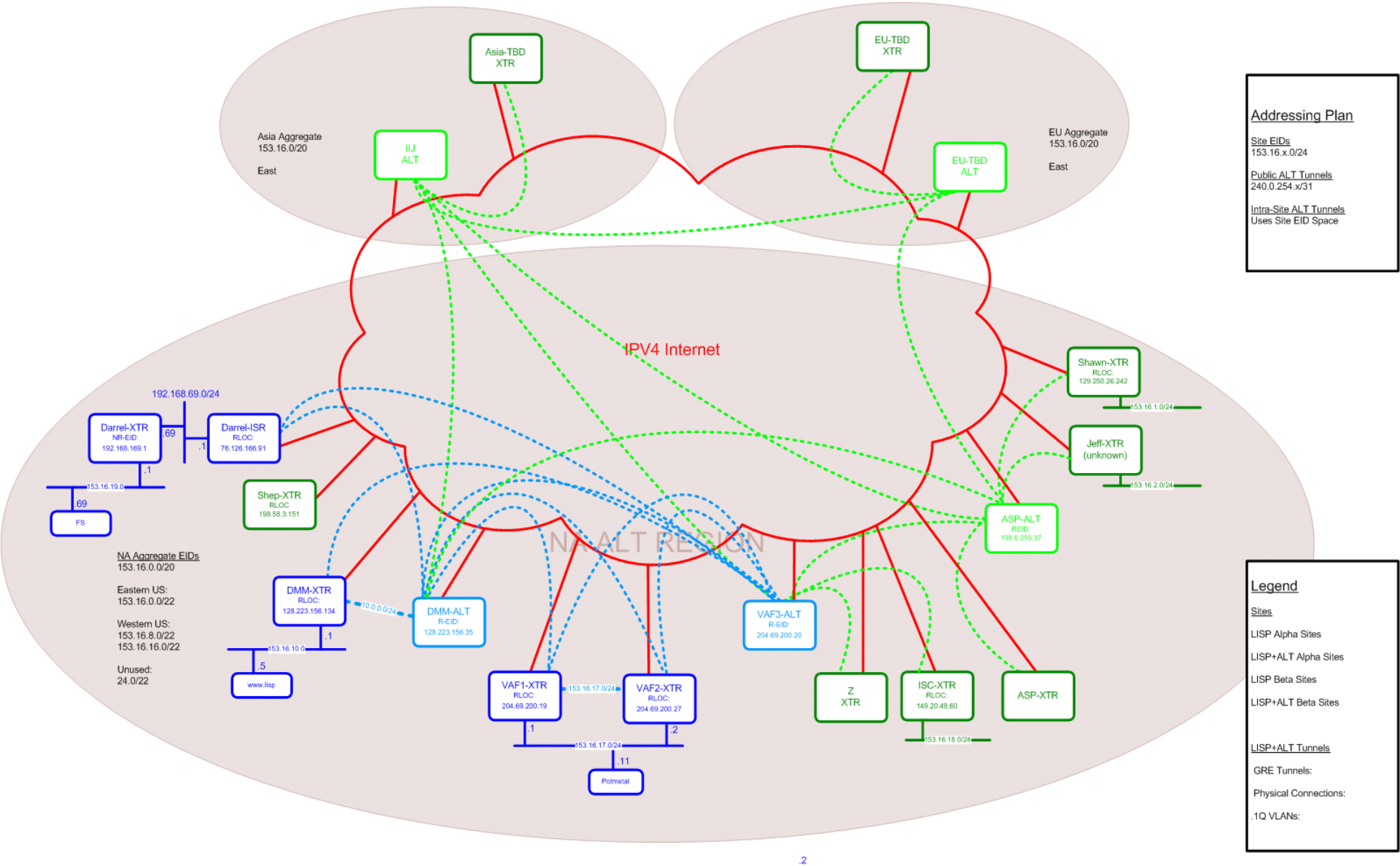
- cisco has a LISP prototype implementation
  - Started the week of IETF Prague (March 2007)
- OS platform is NX-OS (on top of Linux)
- Hardware platform is Titanium
  - 1 RU dual-core off-the-shelf PC with 7 GEs
- Based on `draft-farinacci-lisp-07.txt`
- Software switching only
- Supports both IPv4 and ipv6
- Includes ALT and Interworking

Implementation Status

- IOS 12.4T prototype is in the works
- OpenLISP implementation

  draft-iannone-openlisp-implementation-00.txt
- Would really like to see more

LISP and LISP+ALT Test Topology



Addressing Plan

Site EIDs
153.16.x.0/24

Public ALT Tunnels
240.0.254.x/31

Intra-Site ALT Tunnels
Uses Site EID Space

Legend

Sites

LISP Alpha Sites

LISP+ALT Alpha Sites

LISP Beta Sites

LISP+ALT Beta Sites

LISP+ALT Tunnels

GRE Tunnels:

Physical Connections:

.1Q VLANs:

.2

Wanna play with us?

- Looking for more external test sites
  - Particular need in European region
  - Must be able to dedicate minimum of 1 day a week
- Goals:
  - Test multiple implementations
  - Experience with operational practices
  - Learn about revenue making opportunities
- Contact us: lispers@cisco.com
- See also: lisp-interest@lists.civil-tongue.net

Internet Drafts

draft-farinacci-lisp-07.txt

draft-fuller-lisp-alt-02.txt

draft-lewis-lisp-interworking-00.txt

draft-farinacci-lisp-multicast-00.txt


LISP
RULES