

# What You Make Possible



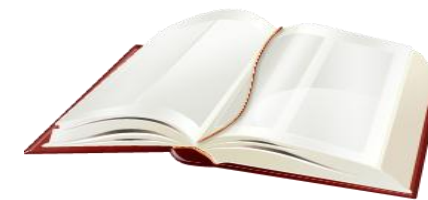
# LISP – A Next Generation Networking Architecture

BRKRST-3045

# LISP - A Next Generation Routing Architecture

## Session Agenda

- LISP Overview
- LISP Operations
- LISP Use Cases
- LISP Status
- LISP Summary
- LISP References



Slides Identified with the Book Icon Are Provided for Your Reference and Will Not Be Part of the Live Presentation

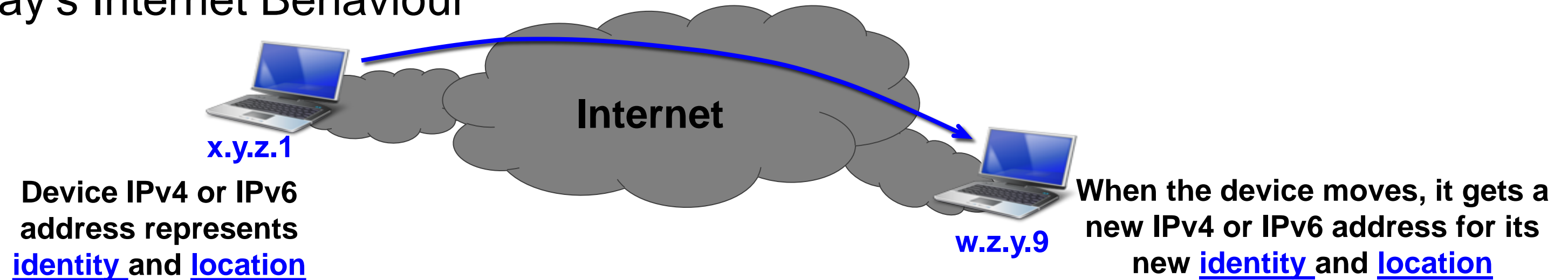
# LISP Overview



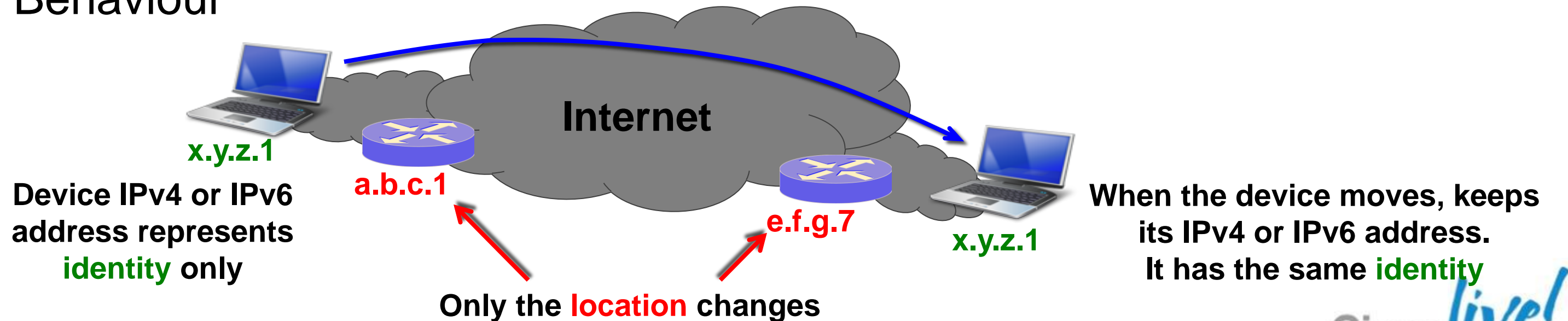
# LISP Overview

## What do we mean by Locator ID separation?

- Today's Internet Behaviour



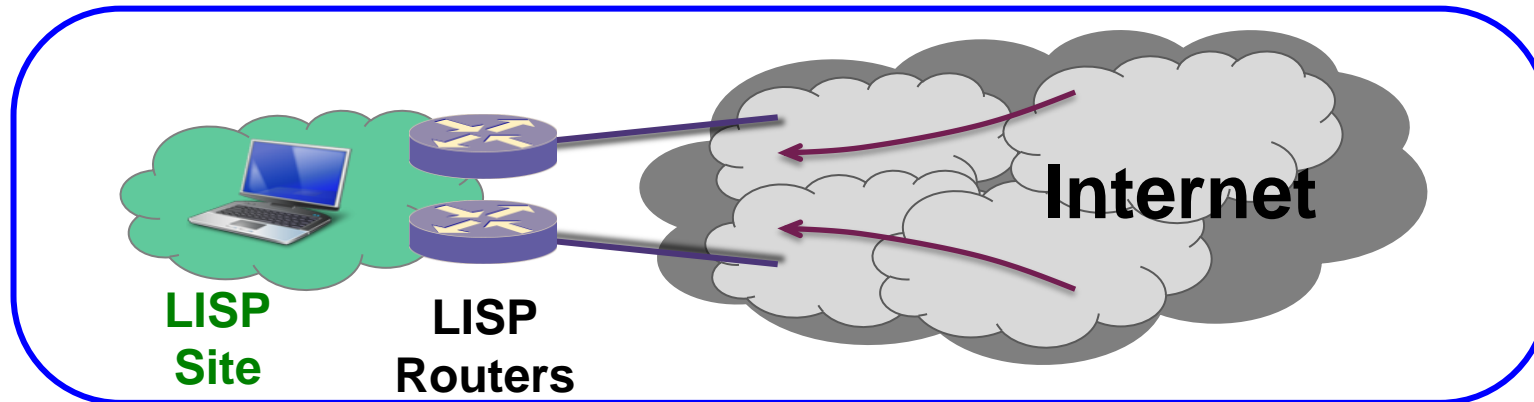
- LISP Behaviour



# LISP Overview

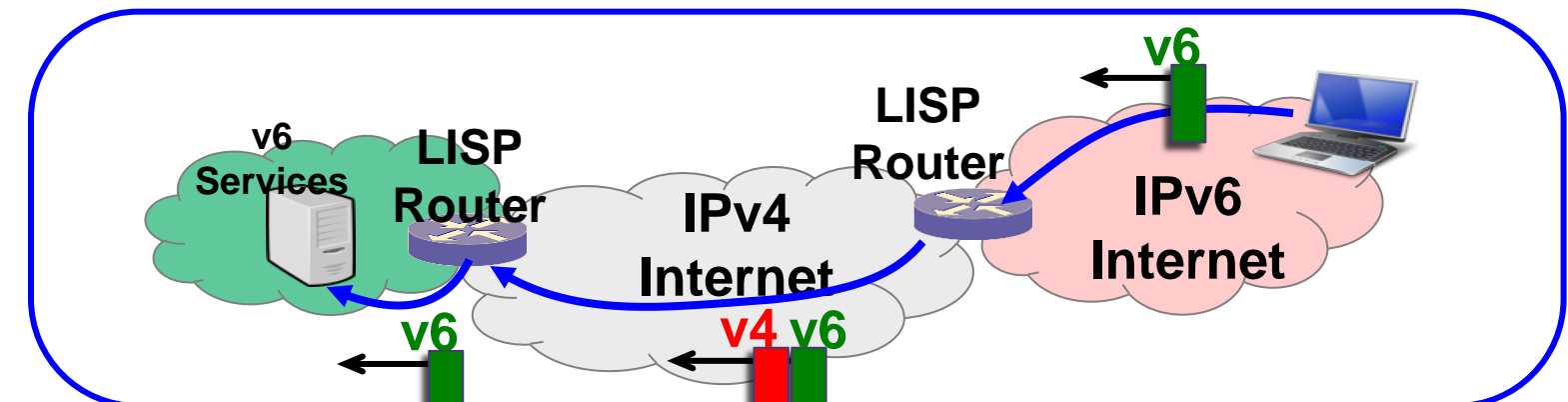
Consolidated Architecture with Multiple Applications

## Efficient Multi-Homing



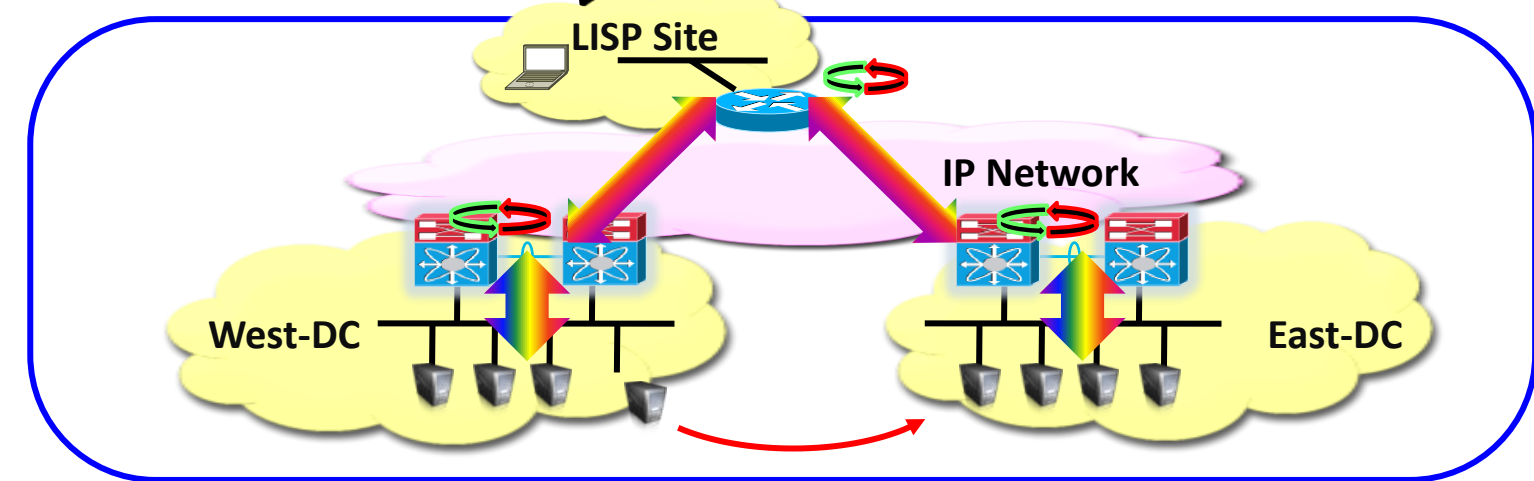
- IP Portability
- Ingress Traffic Engineering without BGP

## IPv6 Transition Support



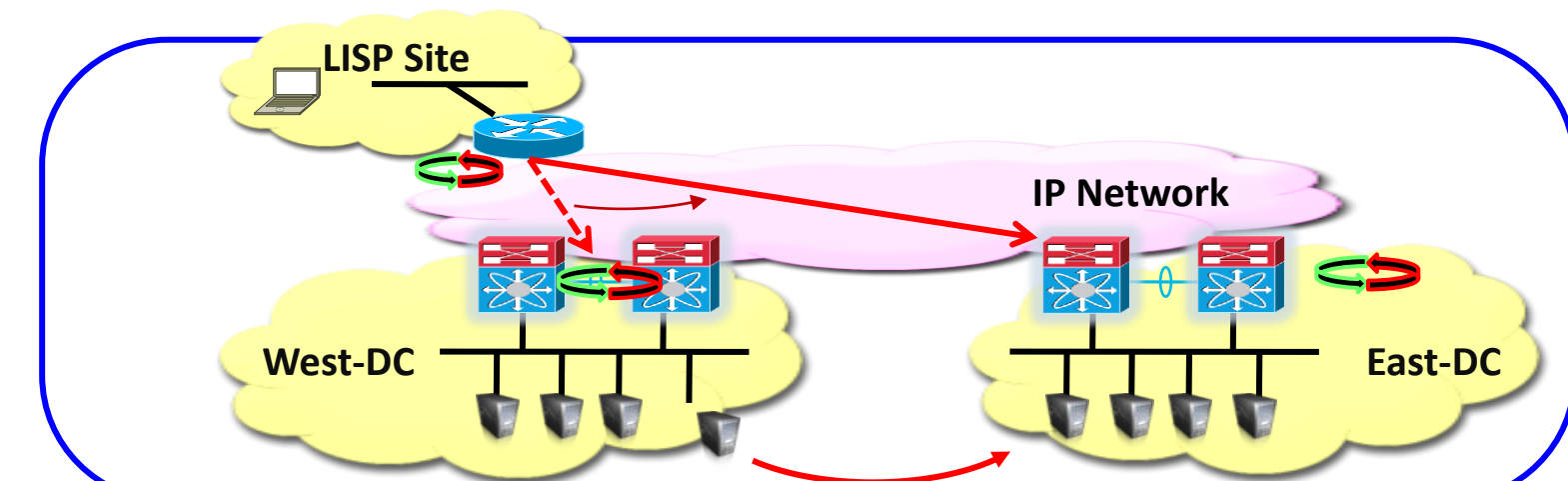
- v6-over-v4, v6-over-v6
- v4-over-v6, v4-over-v4

## Multi-Tenancy and VPNs



- Reduced CapEx/OpEx
- Large scale Segmentation

## Host-Mobility



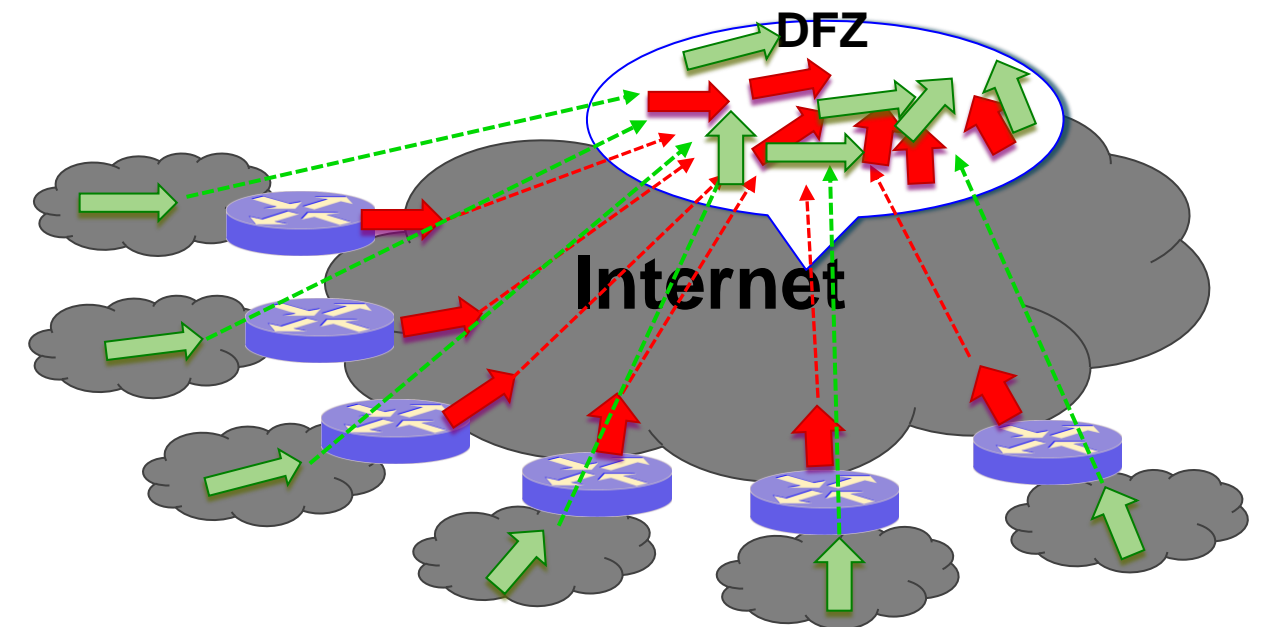
- Cloud / Layer 3 VM moves
- Segmentation

# LISP Overview

Original goal: resolve route scaling problems

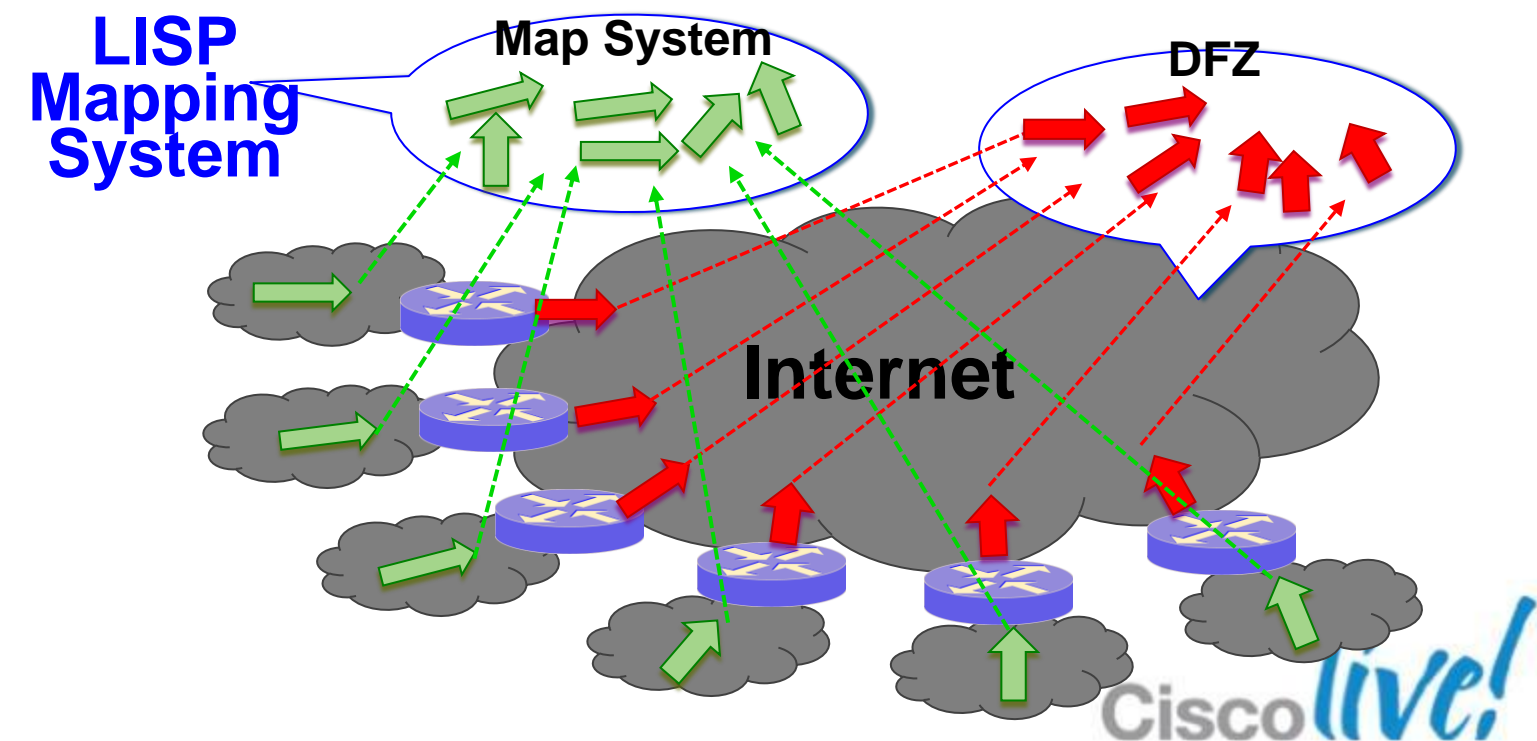
## ■ Today's Internet Behaviour

- The "Default Free Zone" (DFZ) contains all types of routes:
  - Edge (site) routes
  - Core (Provider) route
  - More specifics of both types for TE purposes
- In this model, everything goes in the DFZ



## ■ LISP Behaviour

- Locator/ID "split" architecture treats "core" and "site" prefixes differently
- In this model, prefixes describing core topology (**locators**) go in the DFZ; prefixes describing end sites (**EIDs**) go in the LISP mapping system



# LISP Operations

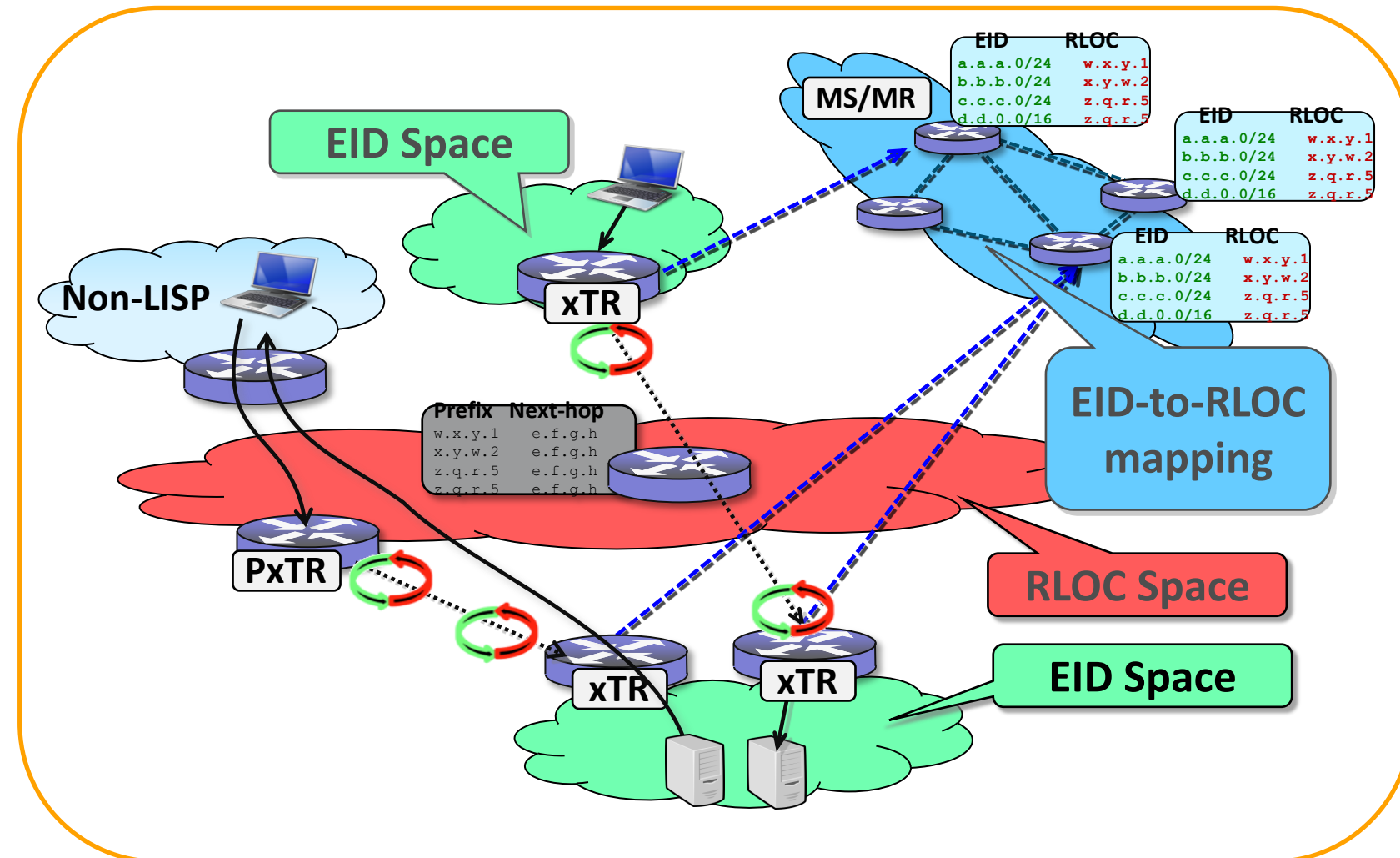




# LISP Operations

## Main attributes of LISP

- **EID (Endpoint Identifier)** is the IP address of a host – just as it is today
- **RLOC (Routing Locator)** is the IP address of the LISP router for the host
- **EID-to-RLOC mapping** is the distributed architecture that maps **EIDs** to **RLOCs**



- Network-based solution
- No host changes
- Minimal configuration
- No DNS changes
- Address Family agnostic
- Incrementally deployable (support LISP and non-LISP)
- Support for mobility

# LISP Operations

LISP Mapping Resolution – DNS analog...

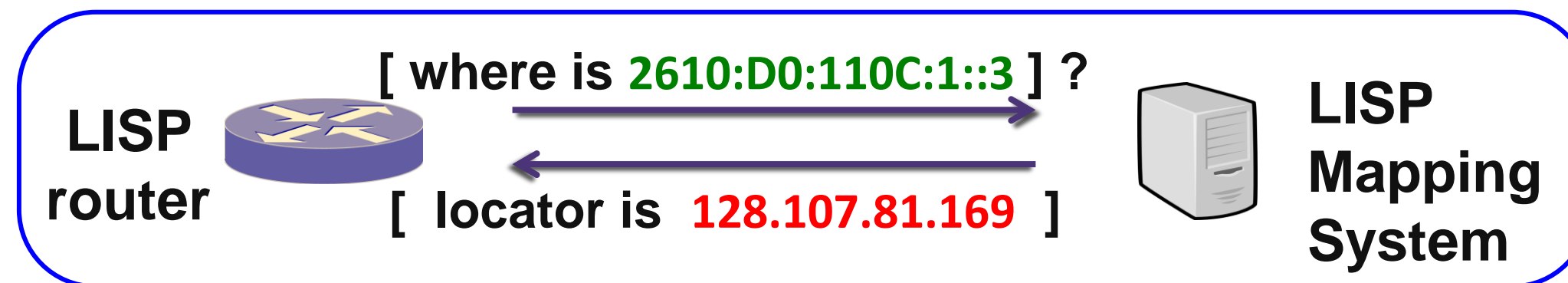
LISP “Level of Indirection” is analogous to a DNS lookup

- DNS resolves IP addresses for URLs



DNS  
Name-to-IP  
URL Resolution

- LISP resolves locators for queried identities



LISP  
Identity-to-locator  
Mapping Resolution

# LISP Operations

## LISP IPv4 EID/IPv4 RLOC Header Example

draft-ietf-lisp-19

IPv4 Outer Header:  
Router supplies RLOCs

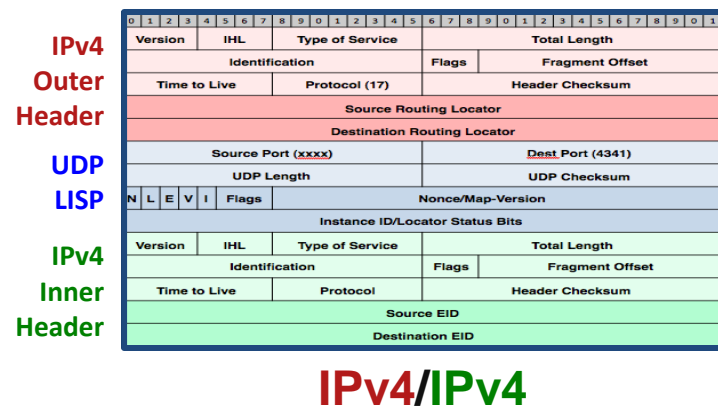
UDP  
LISP  
header

IPv4 Inner Header:  
Host supplies EIDs

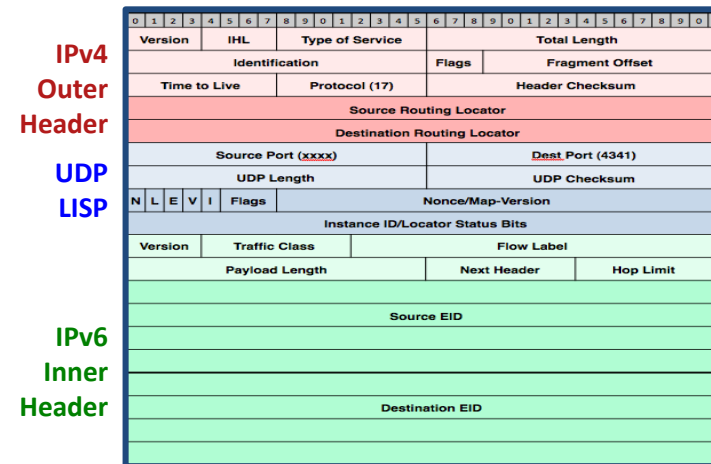
0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	
Version				IHL				Type of Service								Total Length																
Identification										Flags				Fragment Offset																		
Time to Live								Protocol (17)								Header Checksum																
Source Routing Locator																																
Destination Routing Locator																																
Source Port (xxxx)																Dest Port (4341)																
UDP Length																UDP Checksum																
N	L	E	V	I	Flags				Nonce/Map-Version																							
Instance ID/Locator Status Bits																																
Version				IHL				Type of Service								Total Length																
Identification										Flags				Fragment Offset																		
Time to Live								Protocol								Header Checksum																
Source EID																																
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# LISP Operations

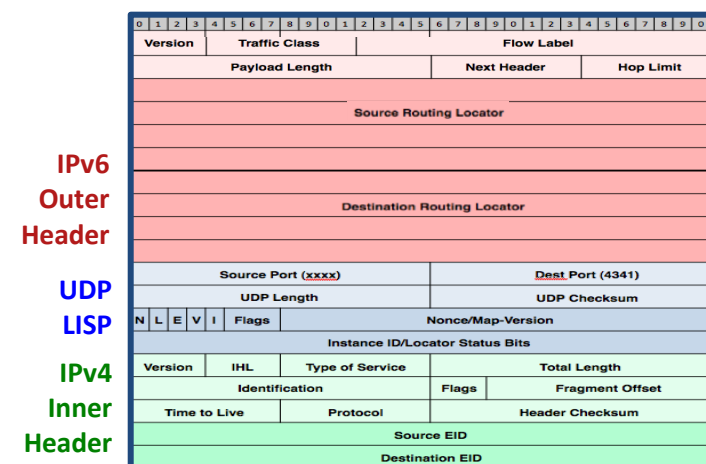
## LISP Encapsulation Combinations – IPv4 and IPv6 Supported...



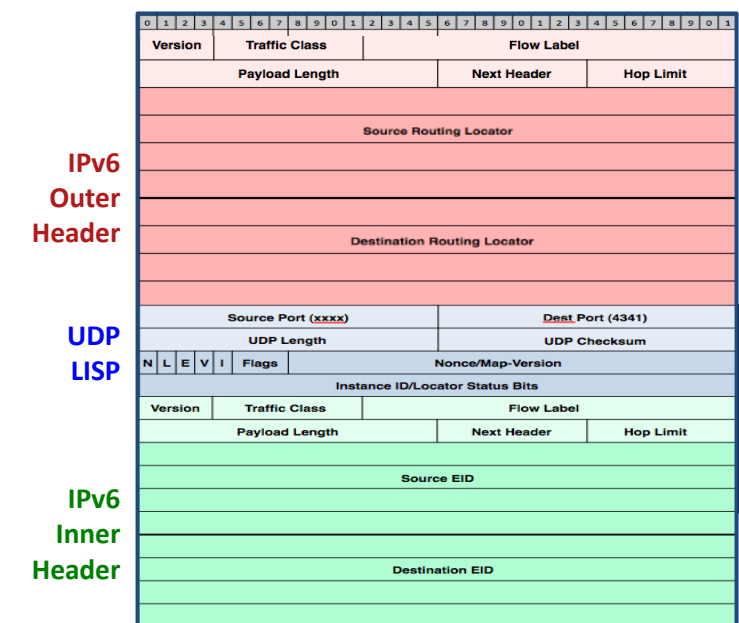
IPv4/IPv4



IPv4/IPv6



IPv6/IPv4



IPv6/IPv6

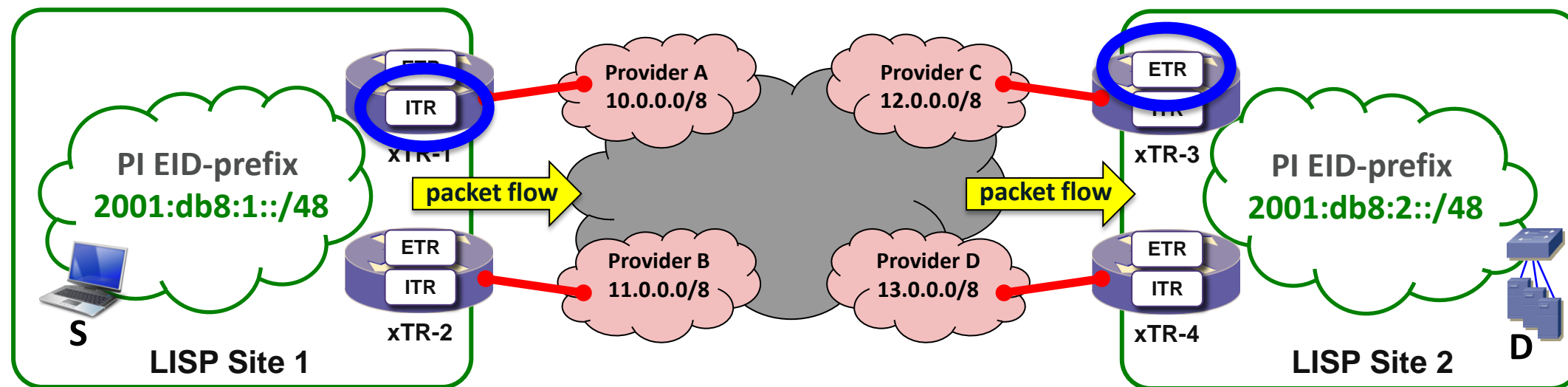
Q: Doesn't encapsulation cause MTU issues?

A: It can... But preparation limits issues...

- Encapsulation overhead is 36B IPv4 and 56B IPv6
- LISP supports “stateful” (PMTUD) and “stateless” (fragmentation) options
- Tunnel/MTU issues are well known (GRE, IPsec, etc.) and are usually operationally tractable

# LISP Operations

LISP Data Plane :: Ingress/Egress Tunnel Router (xTR)...



## ITR – Ingress Tunnel Router

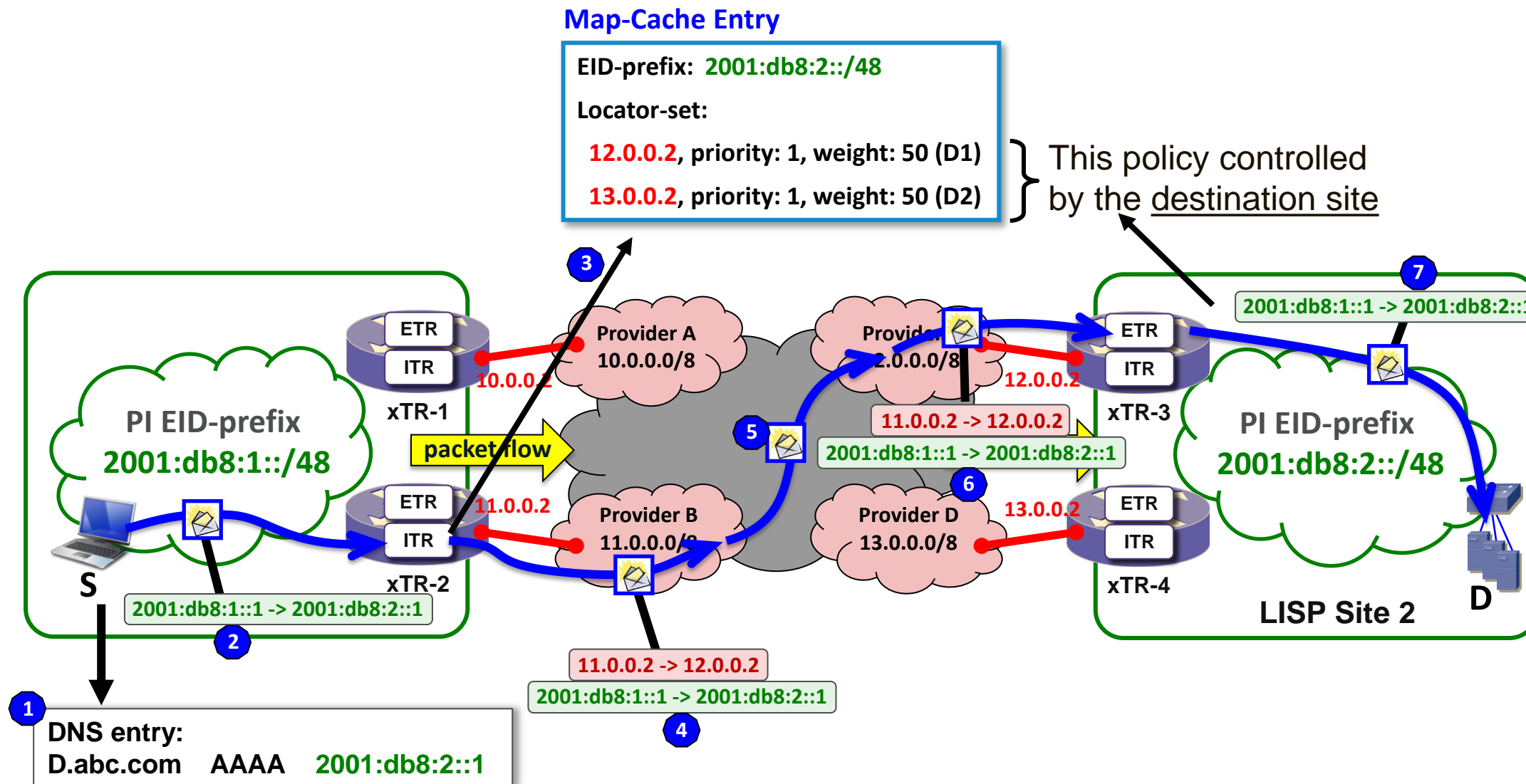
- Receives packets from site-facing interfaces
- Encap to remote LISP sites, or native-fwd to non-LISP sites

## ETR – Egress Tunnel Router

- Receives packets from core-facing interfaces
- De-cap and deliver packets to local **EIDs** at site

# LISP Operations

## LISP Data Plane :: Unicast Packet Flow...



### Notes:

- The destination site controls its ingress policy (active/active in this case)
- 5-tuple hash per-flow selects RLOC for encapsulation

# LISP Operations

## LISP Control Plane :: Introduction

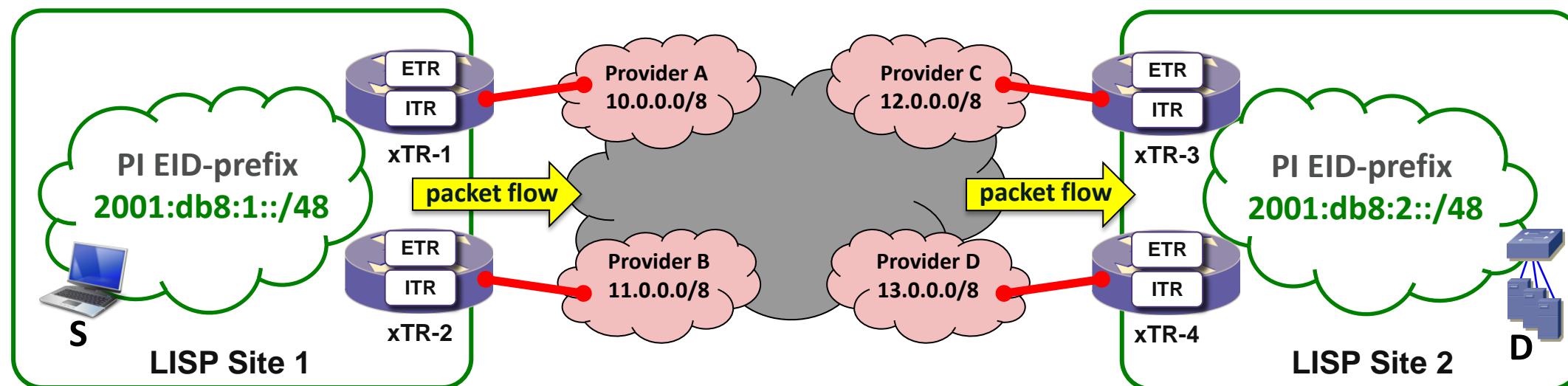
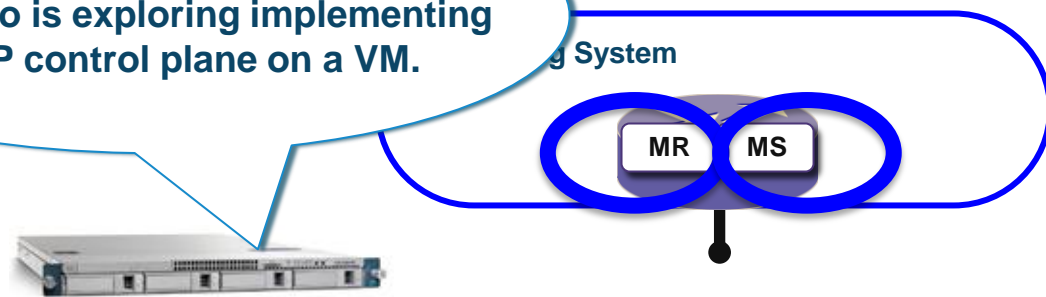
- LISP Control Plane Provides On-Demand Mappings
  - Control Plane is Out-of-Band
  - Map-Resolver and Map-Server (similar to DNS Resolver and DNS Server)
  - LISP Control Plane Messages for EID-to-RLOC resolution
  - Distributed databases and map-caches hold mappings

# LISP Operations

## LISP Control Plane :: Map-Server/Map-Resolver (MS/MR)...

**NOTE:**

An MR/MS need not be deployed as a router. Cisco is exploring implementing the LISP control plane on a VM.



### MS – Map-Server

- LISP site ETRs register their EID prefixes here; requires configured “lisp site” policy, authentication key
- Receives Map-Requests via Mapping System, forwards them to registered ETRs

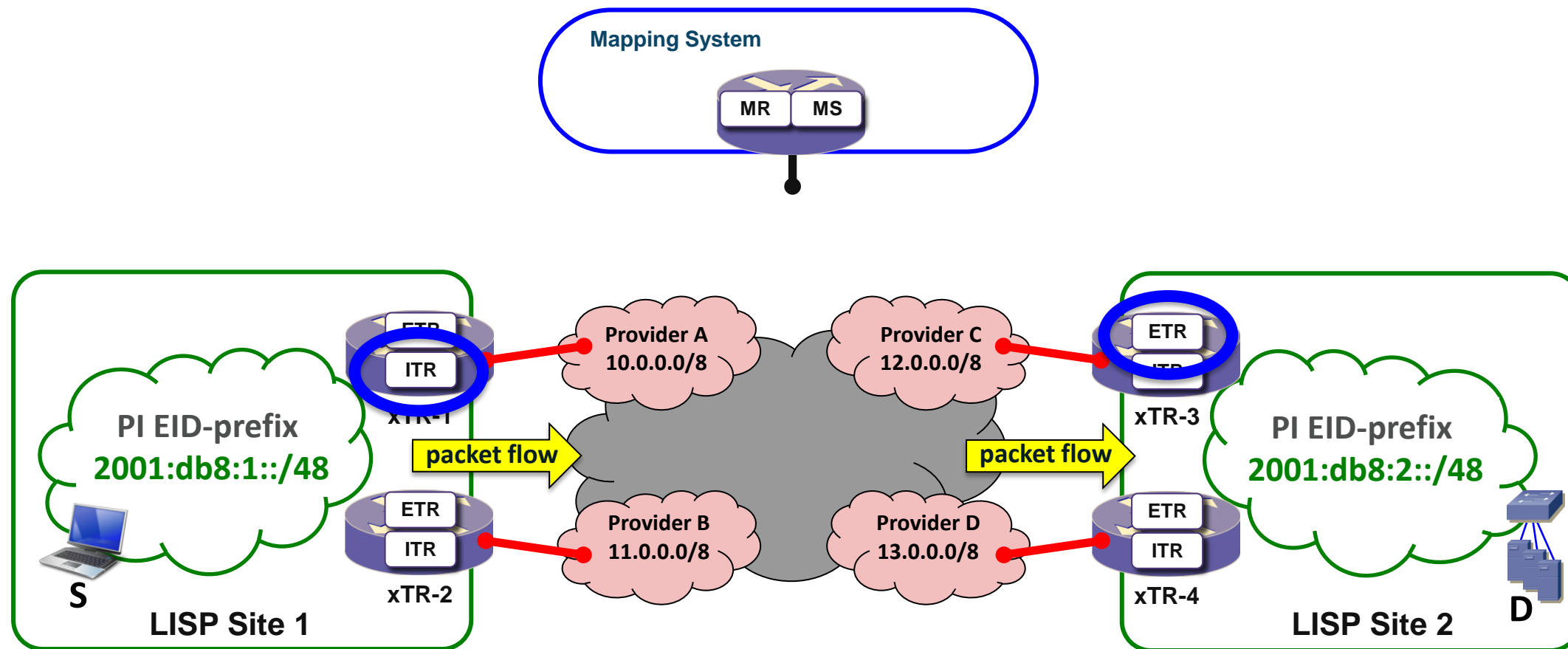
### MR – Map-Resolver

- Receives Map-Request from ITR
- Forwards Map-Request to Mapping System
- Sends Negative Map-Replies in response to Map-Requests for non-LISP sites



# LISP Operations

LISP Control Plane :: Mapping Database (ETR), Map-Cache (ITR)...



## LISP Site Mapping-Database (ETR)

- **EID**-to-**RLOC** mappings in all ETRs for local LISP site
- ETR is “authoritative” for its **EIDs**, sends Map-Replies to ITRs
- ETRs can tailor policy based on Map-Request source

## LISP Map Cache (ITR)

- Only stores mappings for sites ITR currently sending packets to
- Populated by sending/receiving Map-Replies from ETRs
- ITRs must respect Map-Reply policy (TTLs, **RLOC** up/down status, **RLOC** priorities/weights)

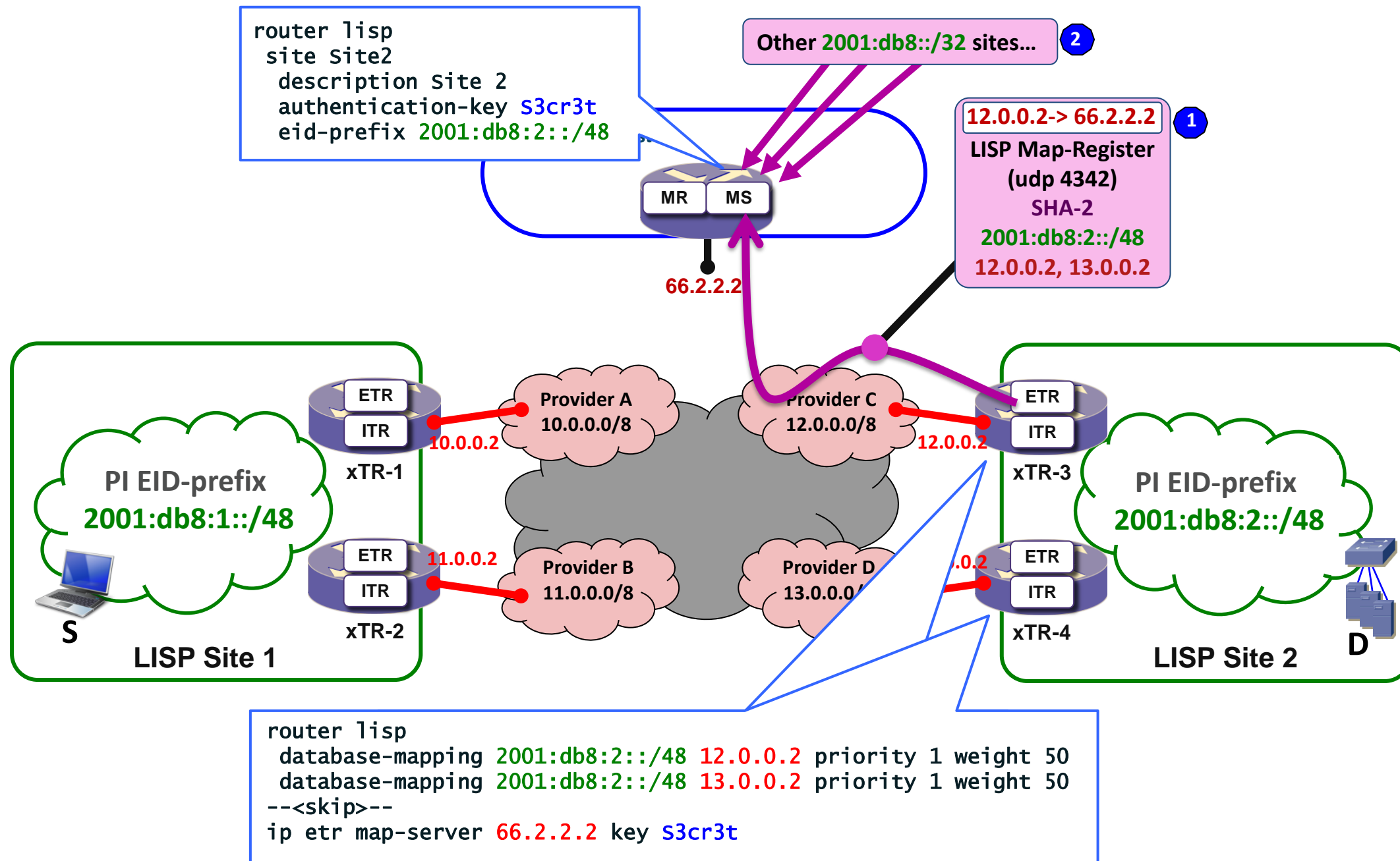
# LISP Operations

## LISP Control Plane :: Control Plane Messages...

- Control Plane Control Plane **EID** Registration
  - **Map-Register message**
    - Sent by ETR to MS to register its associated **EID** prefixes
    - Specifies the **RLOC(s)** to be used by the MS when forwarding Map-Requests to the ETR
- Control Plane “Data-triggered” mapping service
  - **Map-Request message**
    - Sent by an ITR when it needs for **EID/RLOC** mapping, to test an **RLOC** for reachability, or to refresh a mapping before TTL expiration
  - **Map-Reply message**
    - Sent by an ETR in response to a valid map-request to provide the **EID/RLOC** mapping and site ingress policy for the requested **EID**
  - **Map-Notify message**
    - Sent by Map-Server to ETR to acknowledge that its requested EID prefixes were registered successfully

# LISP Operations

## LISP Control Plane :: Map Registration Example...

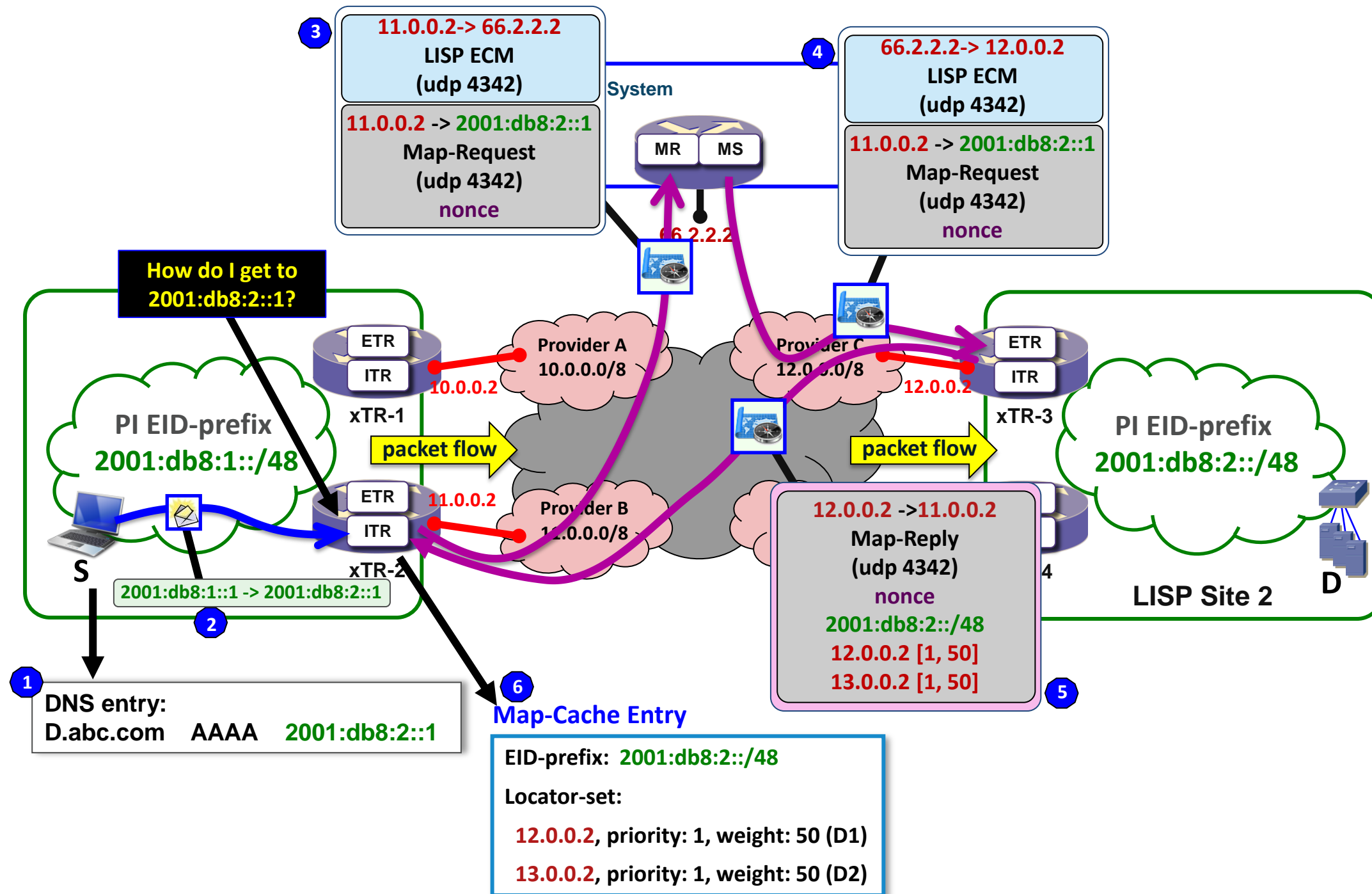


### Notes:

- The ETR registers for EIDs that it is authoritative for
- The MS is configured for the site EIDs, and must have the same authentication key

# LISP Operations

## LISP Control Plane :: Map-Request/Map-Reply Example...

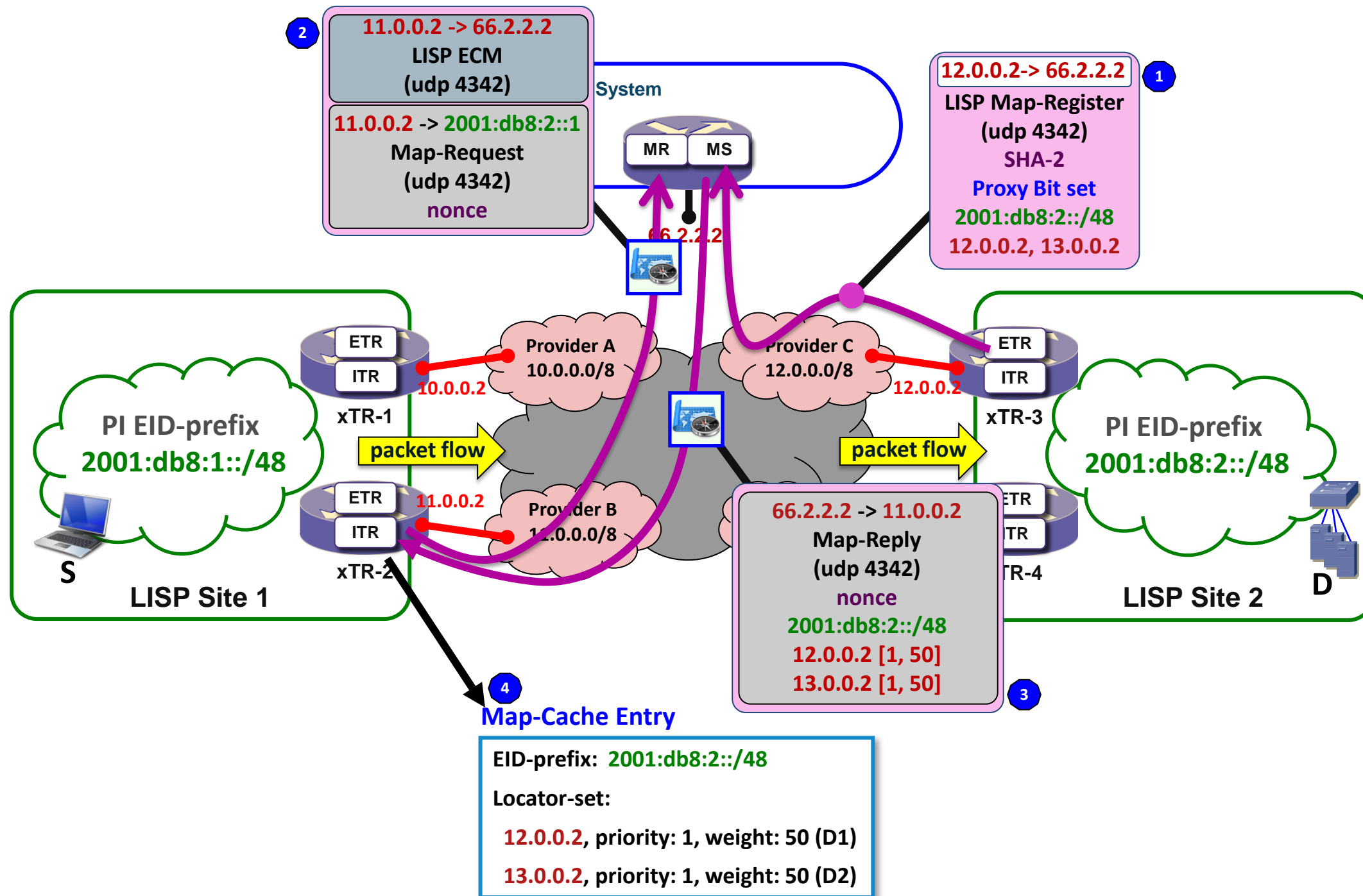


### Notes:

- The IP address in the Map-Request (2001:db8:2::1 in this case) is the host that the ITR is trying to reach.
- The Map-Reply includes the entire prefix (2001:db8:2::/48 in this case) covering the requested host.

# LISP Operations

## LISP Control Plane :: Proxy Map-Reply Example...

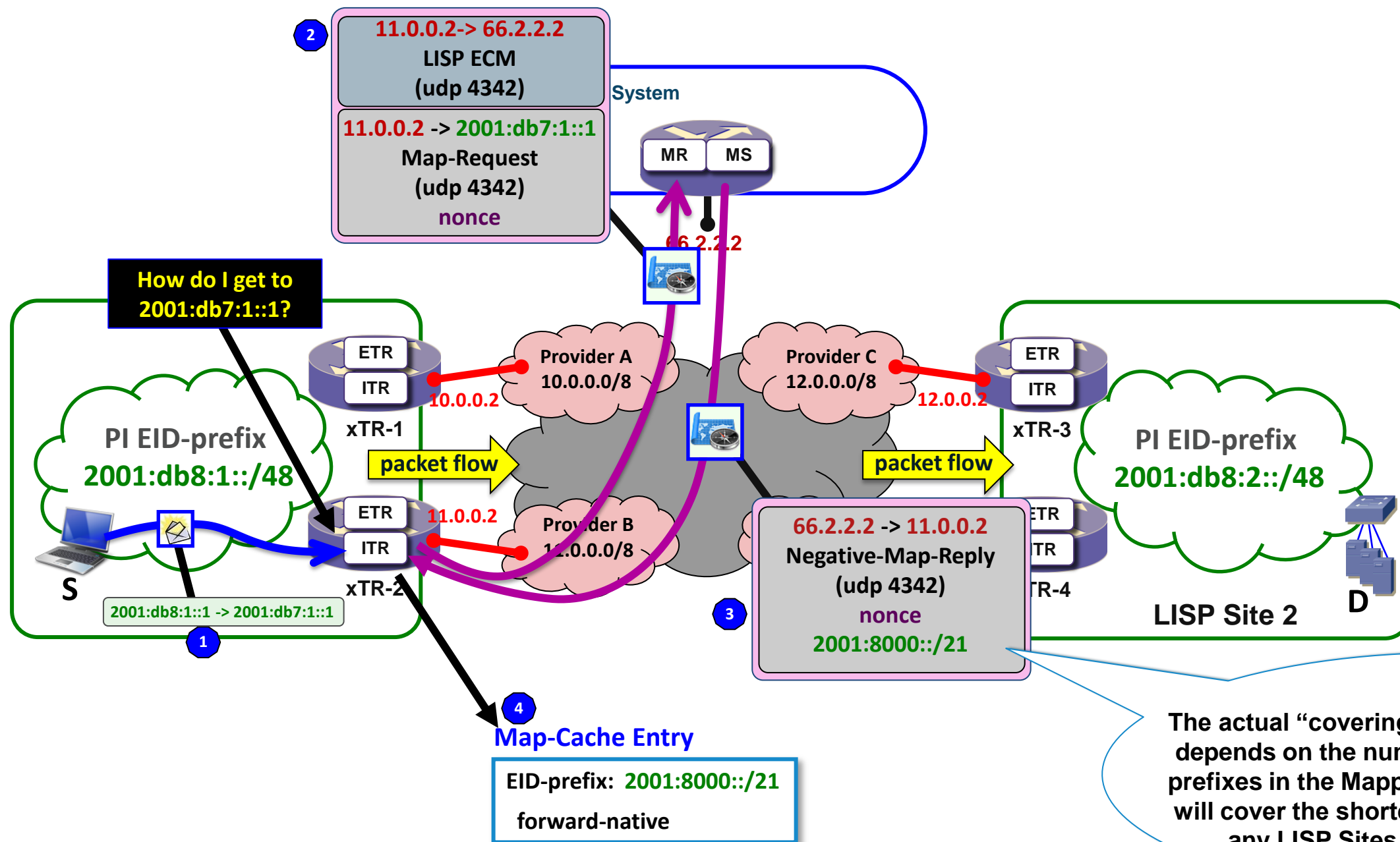


### Notes:

- The ETR can register with the “proxy bit” set.
- The Map-Server creates and sends the Map-Reply on behalf of the ETR in this case.
- This is useful for LISP-MN cases to reduce control plane messaging (and increase battery life).

# LISP Operations

## LISP Control Plane :: Negative Map-Reply Example...



### Notes:

- When an ITR queries for a destination that is not in the Mapping System, the Map-Resolver returns an NMR.

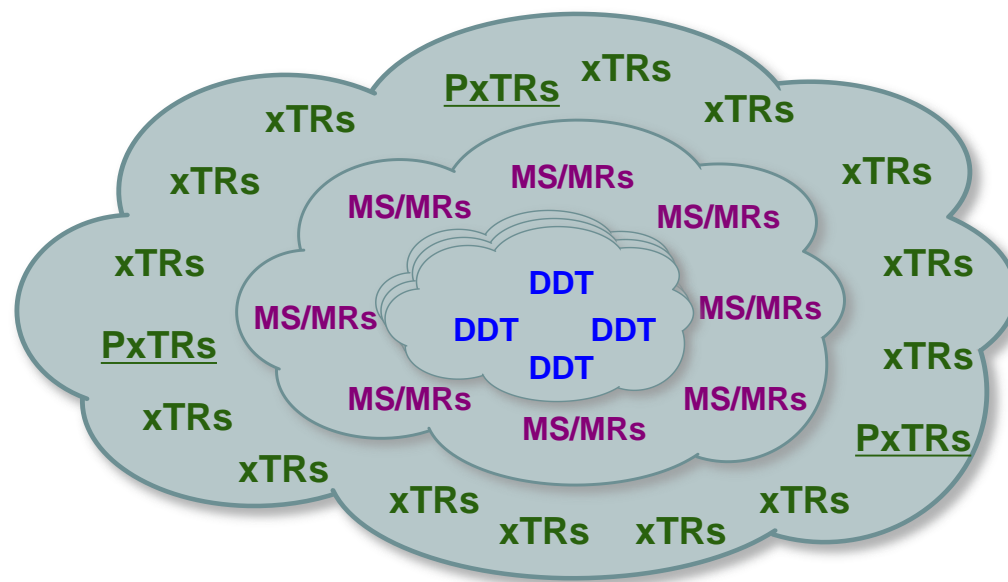
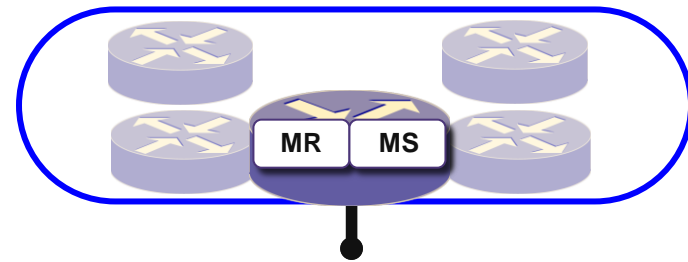
### NOTE:

The actual "covering prefix" returned in an NMR depends on the number and distribution of EID prefixes in the Mapping System. The NMR prefix will cover the shortest prefix that doesn't cover any LISP Sites in the Mapping System

# LISP Operations

## LISP Control Plane :: Mapping System Scaling...

The LISP Beta Network operates this way today...



## DDT – Delegated Distributed Tree

- Aggregate **EID-prefixes** along allocation hierarchy
- Advertise **EID-prefixes** in BGP-over-GRE tunnels
- Forward Map-Requests with **EID** destination address over GRE topology

# LISP Operations

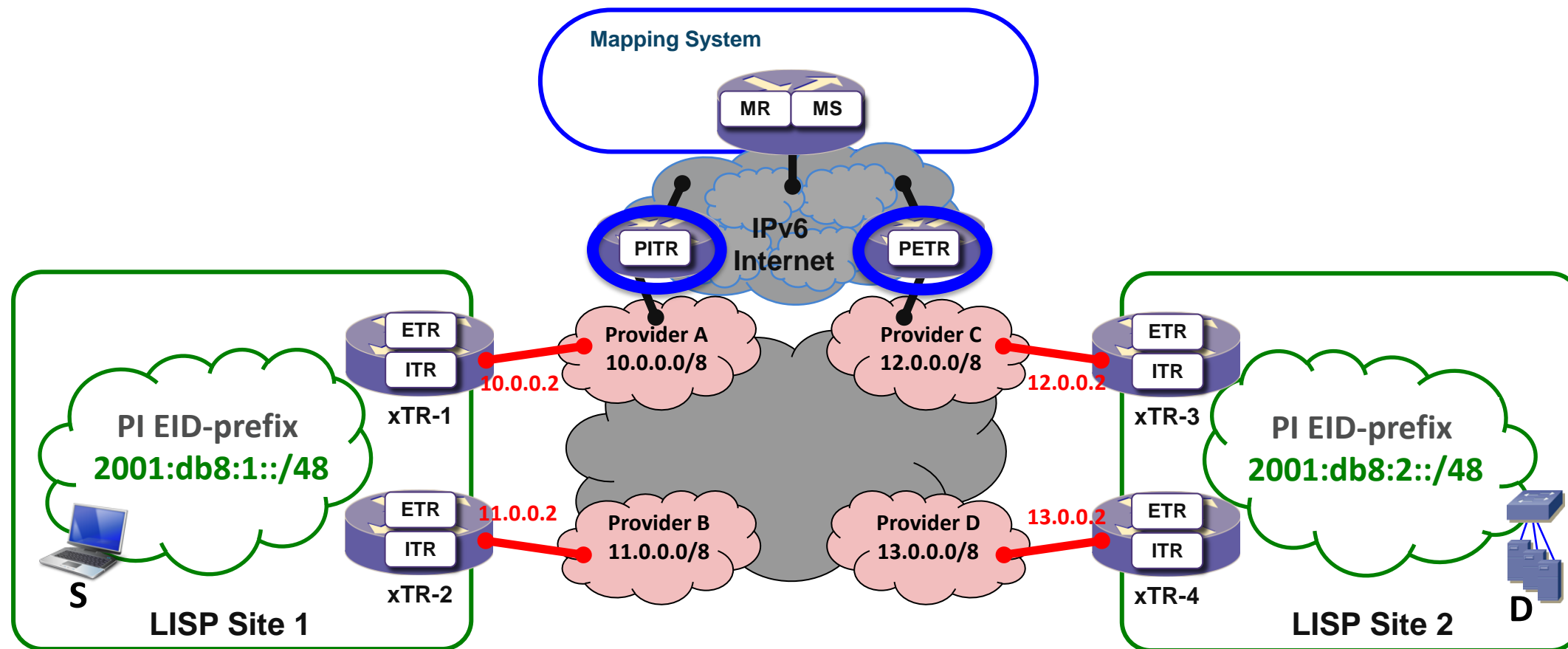
## LISP Interworking :: Day-One Incremental Deployment

- Early recognition
  - LISP will not be widely deployed day-one
  - Up-front recognition of an incremental deployment plan
- Interworking for:
  - **LISP-sites** to **non-LISP sites** (e.g. the rest of the Internet)
  - **non-LISP sites** to **LISP-sites**
- Proxy-ITR/Proxy-ETR are being deployed today
  - Infrastructure LISP network entity
  - Creates a monetised service opportunity for infrastructure players



# LISP Operations

## LISP Internetworking :: Day-One Incremental Deployment



### PITR – Proxy ITR

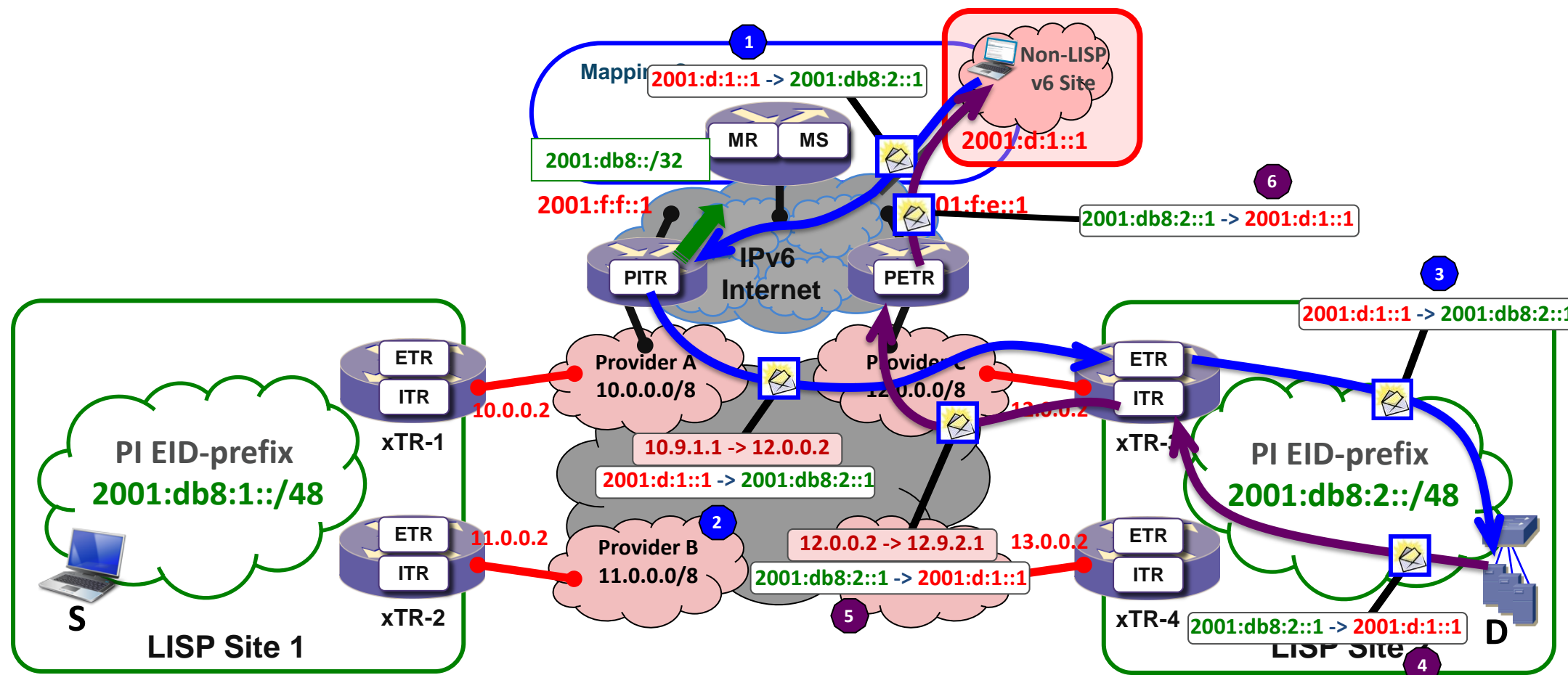
- Receives traffic from **non-LISP** sites; encapsulates traffic to LISP sites
- Advertises coarse-aggregate **EID** prefixes
- LISP sites see ingress TE “day-one”

### PETR – Proxy ETR

- Allows a LISP Site in one AF [IPv4 or IPv6] and the opposite **RLOC** [IPv6 or IPv4] to reach non- that AF [IPv4 or IPv6] (AF-hop-over)
- Allows LISP sites with uRPF restrictions to reach non-LISP sites

# LISP Operations

## LISP Internetworking :: Day-One Incremental Deployment



### Notes:

- PITRs advertise coarse-aggregates (**2001:db8::/32** in this case) to attract non-LISP traffic and encapsulate it to LISP sites.
- PETRs provide LISP to non-LISP AF hop-over (among other services).

# LISP Deployment Examples



# LISP Deployment Overview

## Private and Public LISP Deployment Models...

### Private Model

- “Private” LISP deployment supports the needs of a single Enterprise
- LISP Enterprise deploys:
  - Mapping System, if required
  - Proxy System, if required
  - xTRs

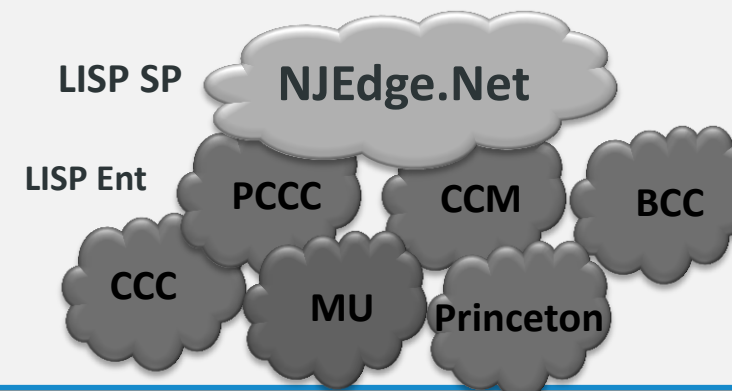
#### Private Enterprise Examples



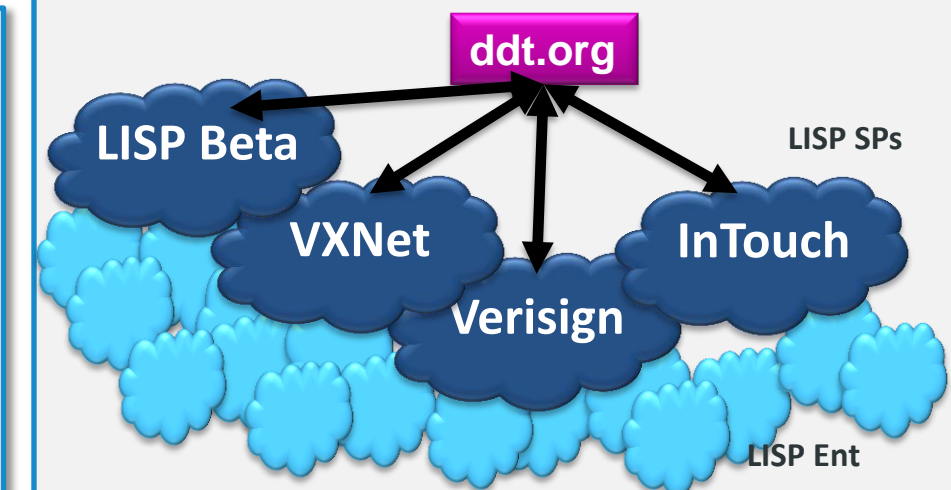
### Public Model

- “Public” LISP deployment supports the needs of multiple Enterprises
- LISP Service Provider deploys “shared” Mapping System and Proxy System
- LISP Enterprises subscribe to LISP SP, and deploy their own xTRs

#### Stand-Alone Example



#### Global Examples



# LISP Deployment Examples

## LISP Deployment Examples...

1. Efficient Multihoming; IPv4 and IPv6
2. Efficient Virtualisation and High-Scale VPNs
3. Data Centre/Host Mobility
4. LISP-Mobile Node



These examples highlight functionality that is integrated in LISP.

All use-case :: multi-homing, v6 transition, virtualisation, and mobility work together!

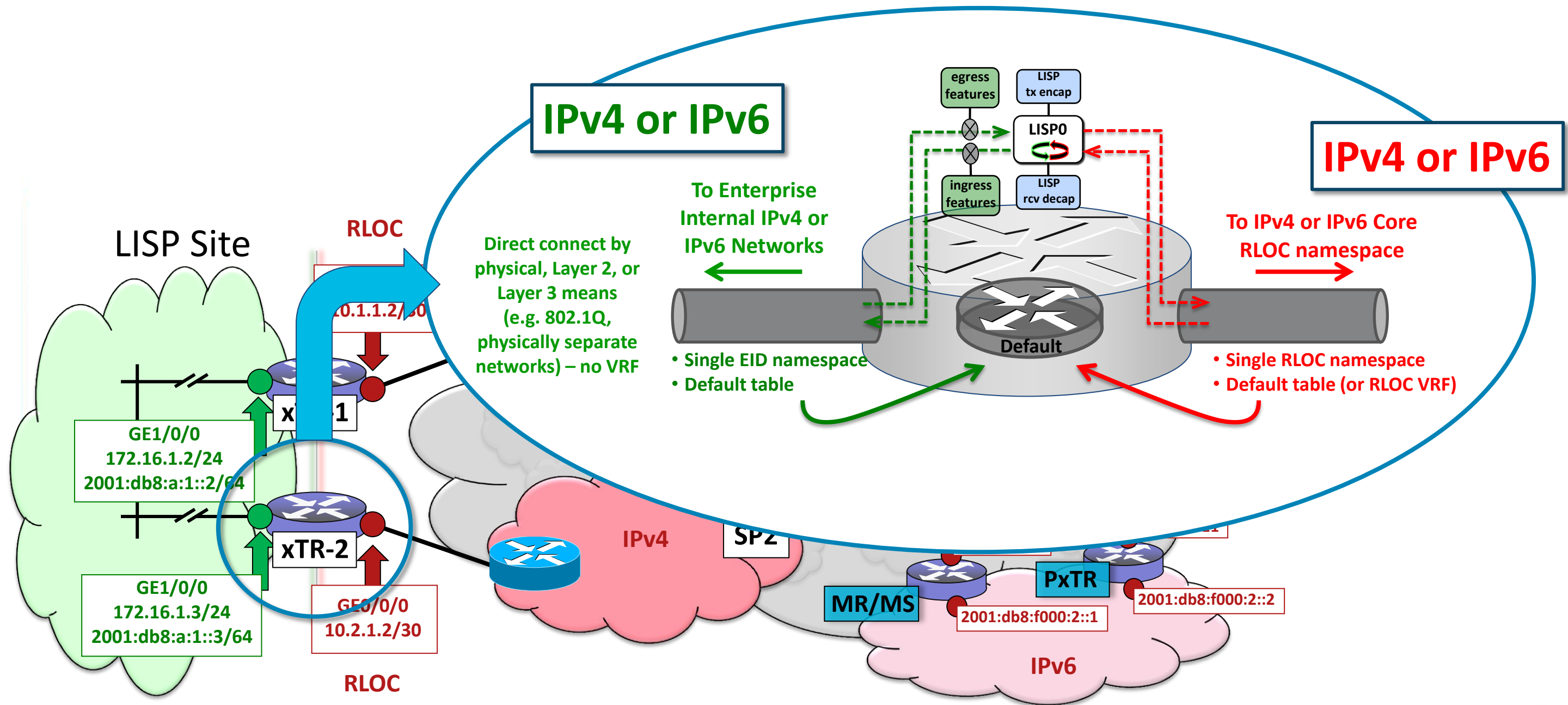
# LISP Deployment Examples

## LISP Deployment Examples...

1. Efficient Multihoming; IPv4 and IPv6
2. Efficient Virtualisation and High-Scale VPNs
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# LISP Multihoming and Multi-AF Support

Inherent support for AF-agnostic Multihoming...



## Target Market:

- State of New Jersey Educational Entities (k-12, universities, colleges)

## LISP Services:

- BGP-free Multihoming
- IPv6 Internet Access
- Host Mobility Disaster-Recovery (adding now...)
- Inter-Departmental VPNs (adding next...)

Customer Site: <http://njedge.net>

Customer Case Study: <http://lisp.cisco.com>

## Members:

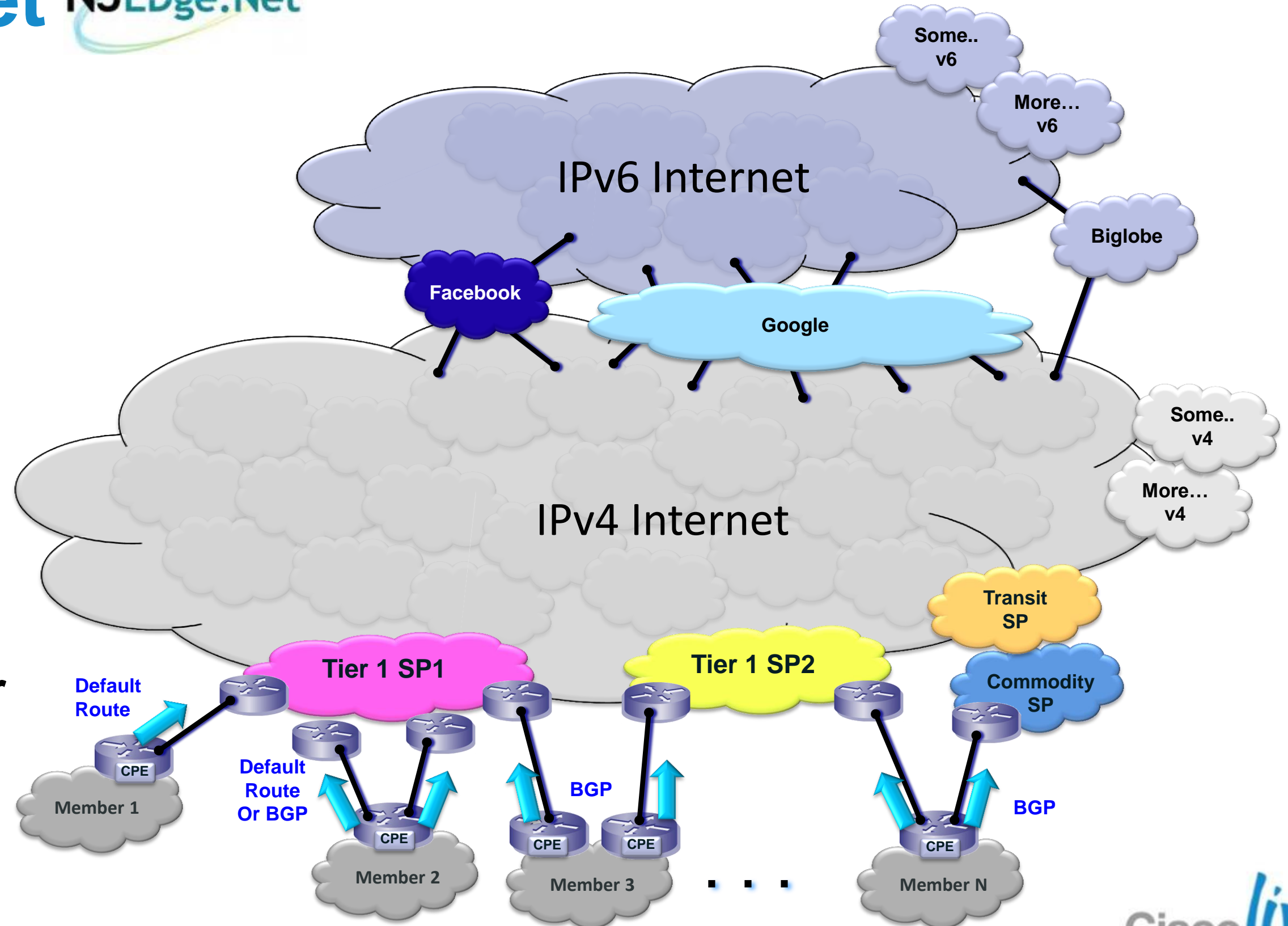
### Current Members...

1. Rider University <http://www.rider.edu/> and <http://blackboard.rider.edu>
2. Passaic County Community College <http://www.pccc.edu>
3. Princeton University/IAS <http://www.ias.edu/>
4. Monmouth University <http://www.monmouth.edu/>
5. Raritan Valley Community College <http://www.raritanval.edu/>
6. NJ Division of Homeland Security (Newark)
7. NJ Division of Homeland Security (Hamilton)  
<http://www.njhomelandsecurity.gov/index.html>
8. Burlington County College <http://www.bcc.edu/pages/1.asp>
9. County College of Morris <http://www.ccm.edu/>
10. Cumberland County College <http://www.ccm.edu/>

### In queue (2013)...

1. Ocean County College
2. Bloomfield College
3. New Jersey City University
4. Bergen County College
5. Mercer County College





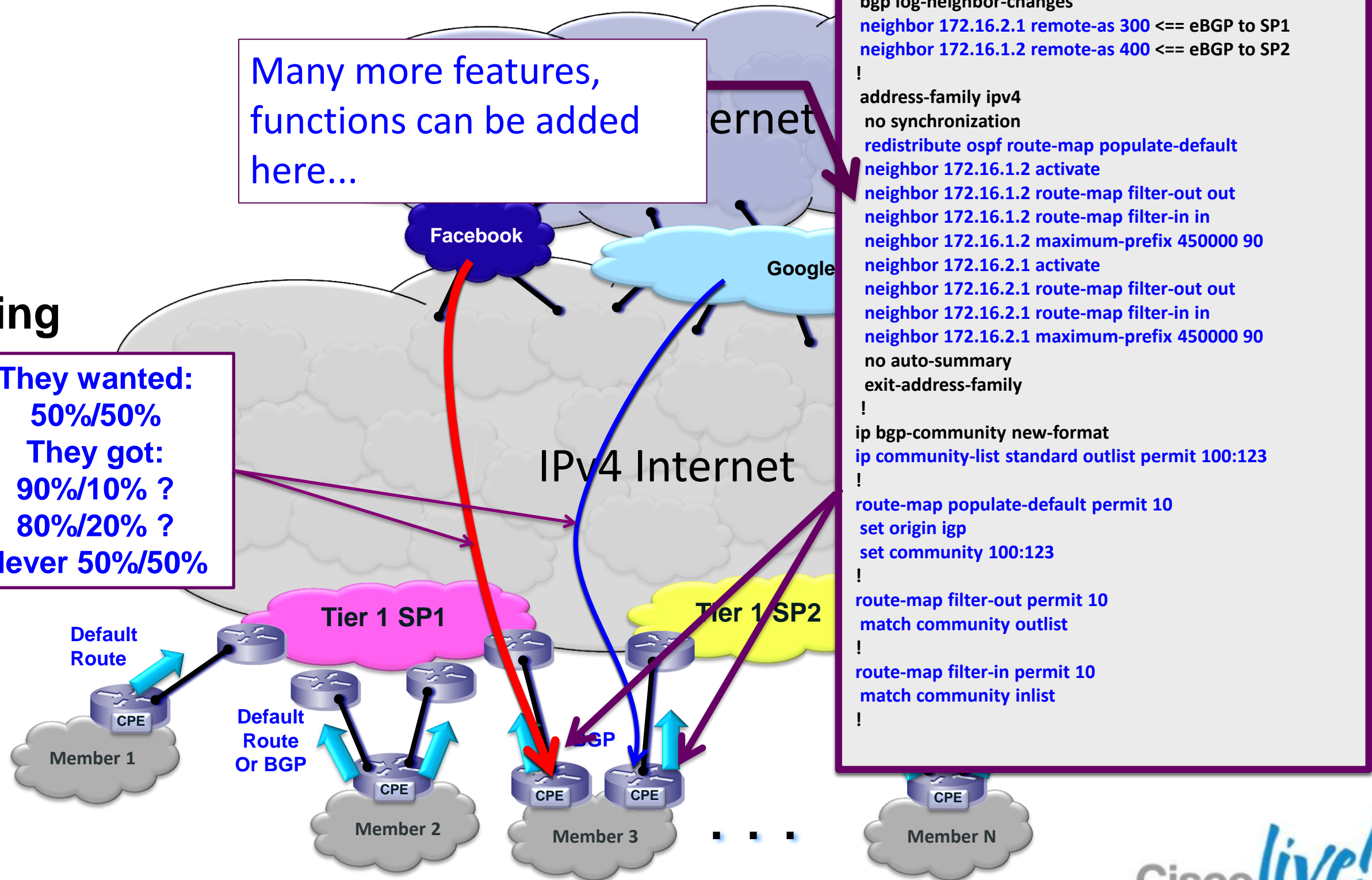
## Constituent Member Topologies...

### Before LISP...

- Configuration complexity...
- Uneven multihoming load shares...

They wanted:  
50%/50%  
They got:  
90%/10% ?  
80%/20% ?  
Never 50%/50%

Many more features,  
functions can be added  
here...



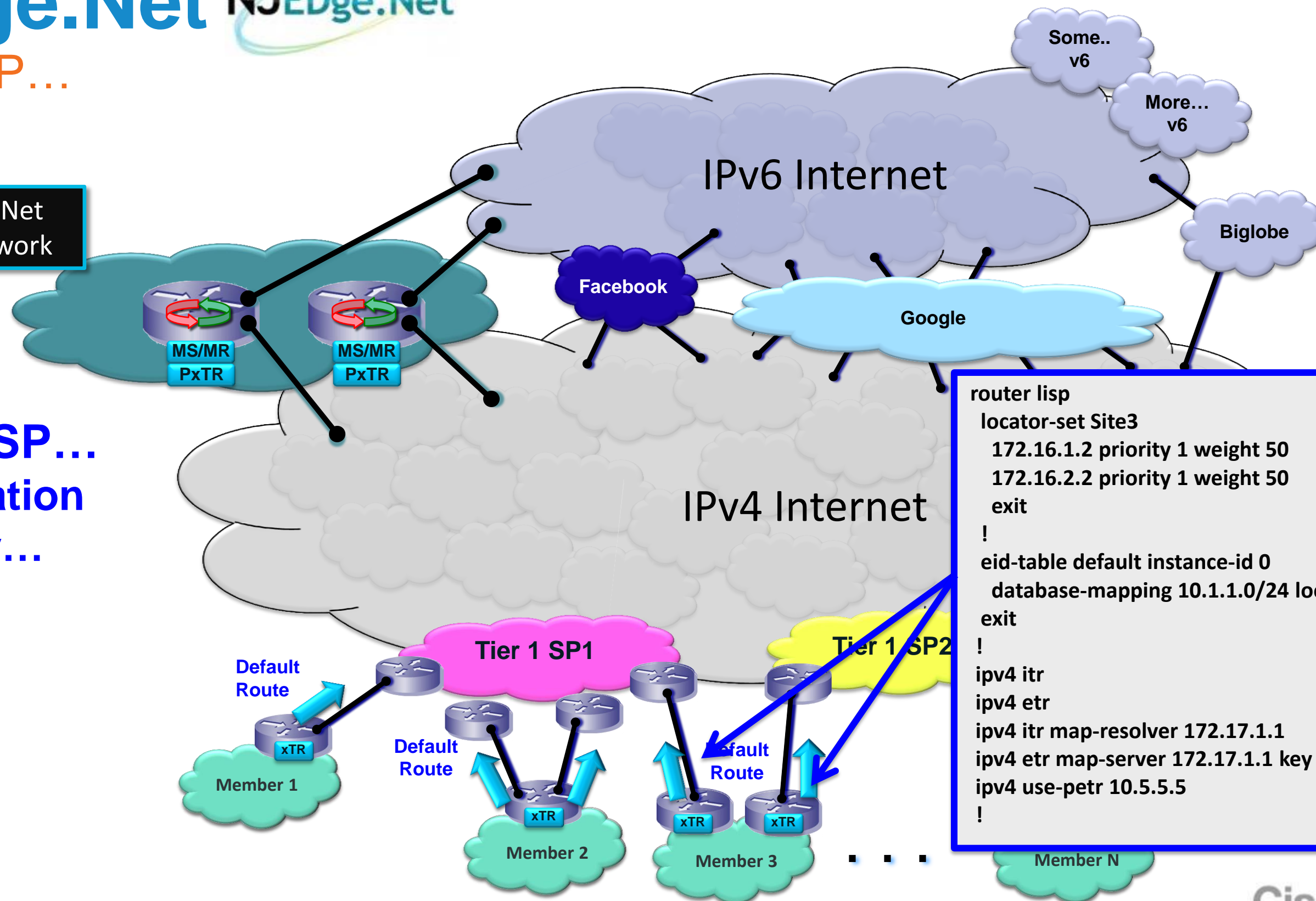
# NJEDge.Net NJEDge.Net

## Adding LISP...

### Deploy LISP...

- Configuration simplicity...

NJEDge.Net  
LISP Network



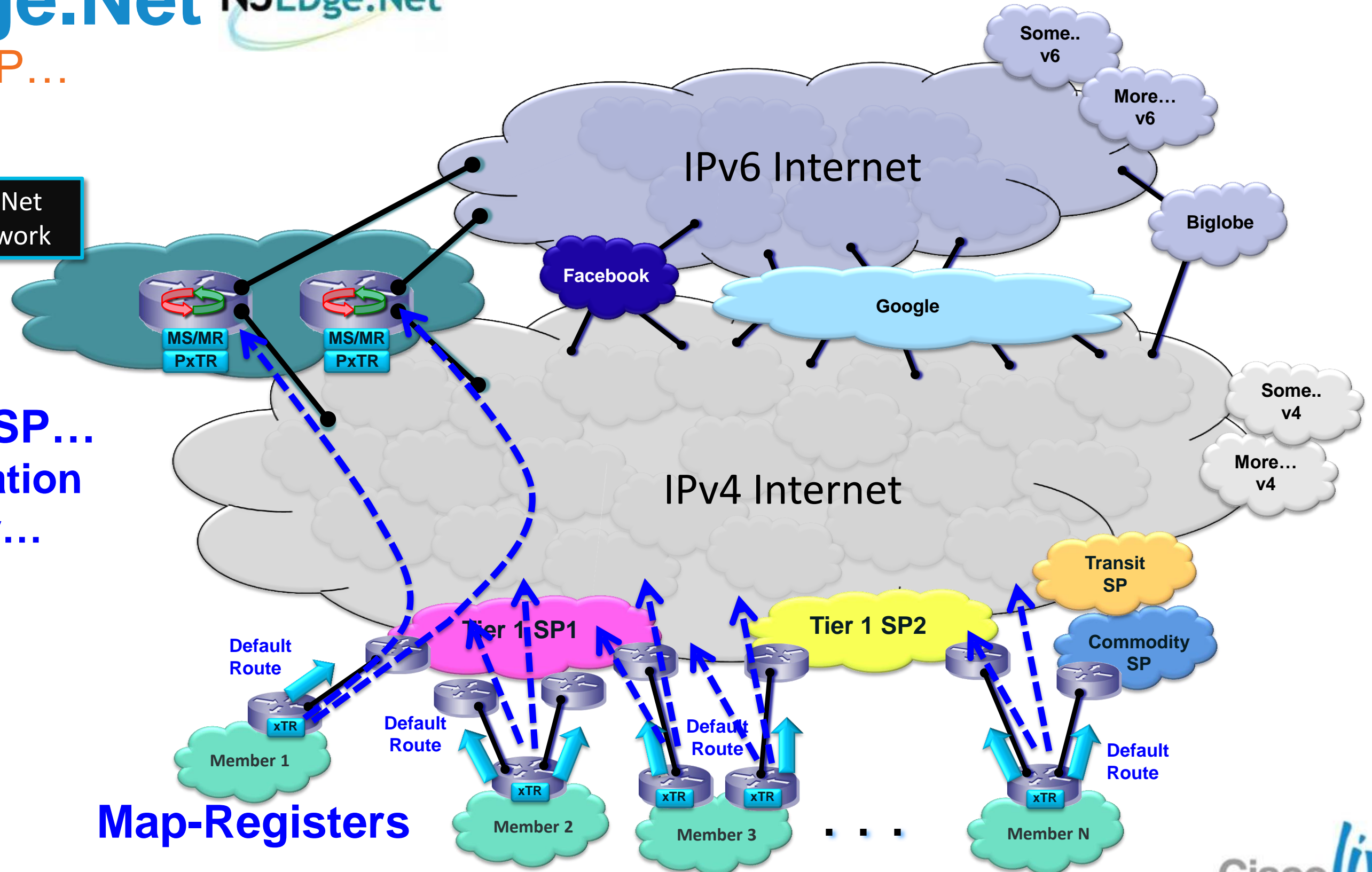
```
router lisp
 locator-set Site3
  172.16.1.2 priority 1 weight 50
  172.16.2.2 priority 1 weight 50
 exit
!
eid-table default instance-id 0
 database-mapping 10.1.1.0/24 locator-set Site3
 exit
!
ipv4 itr
ipv4 etr
ipv4 itr map-resolver 172.17.1.1
ipv4 etr map-server 172.17.1.1 key s3cr3t
ipv4 use-petr 10.5.5.5
!
```



## Adding LISP...

Deploy LISP...  
• Configuration simplicity...

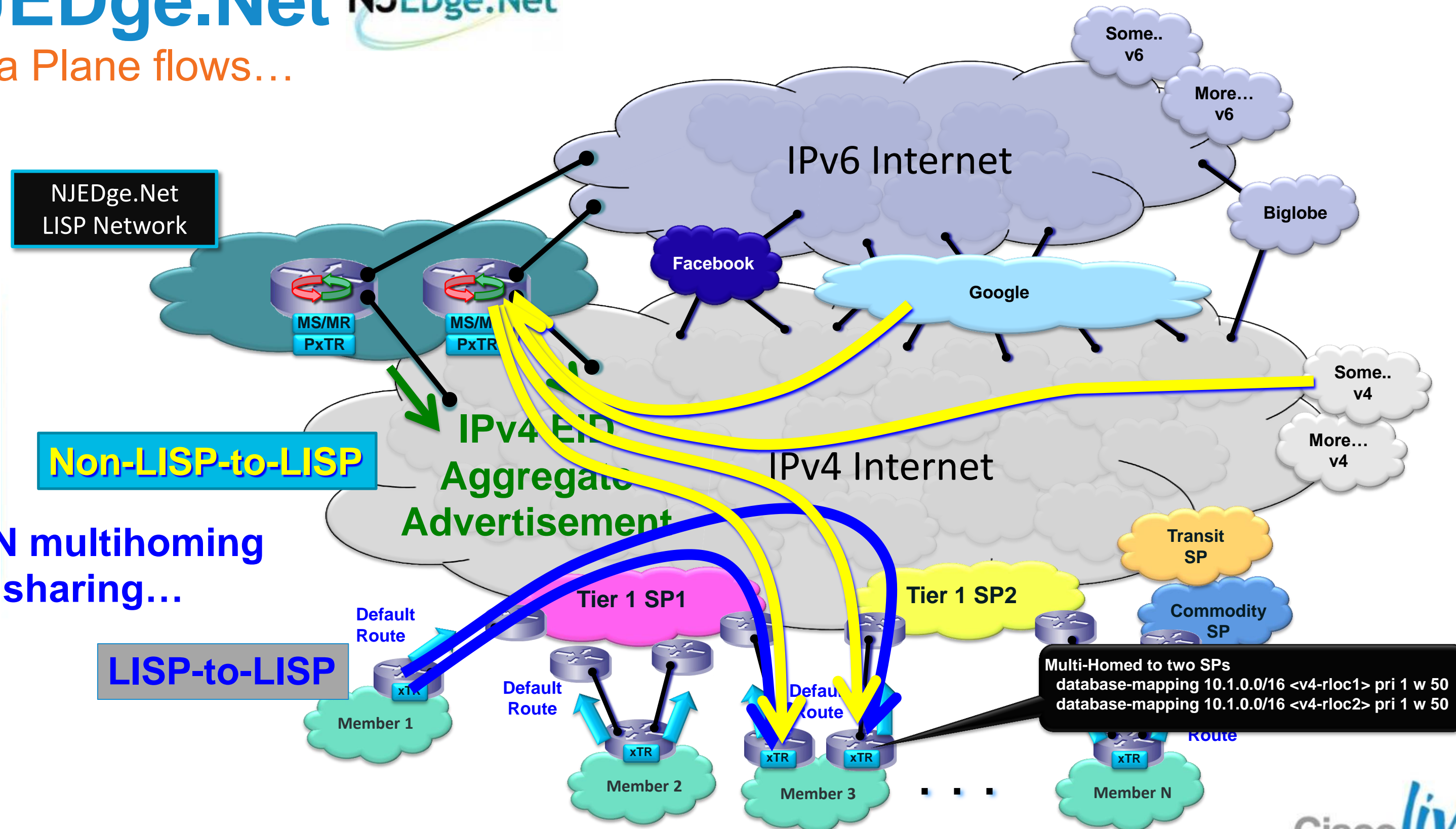
NJEDge.Net LISP Network



Map-Registers

# NJEDge.Net NJEDge.Net

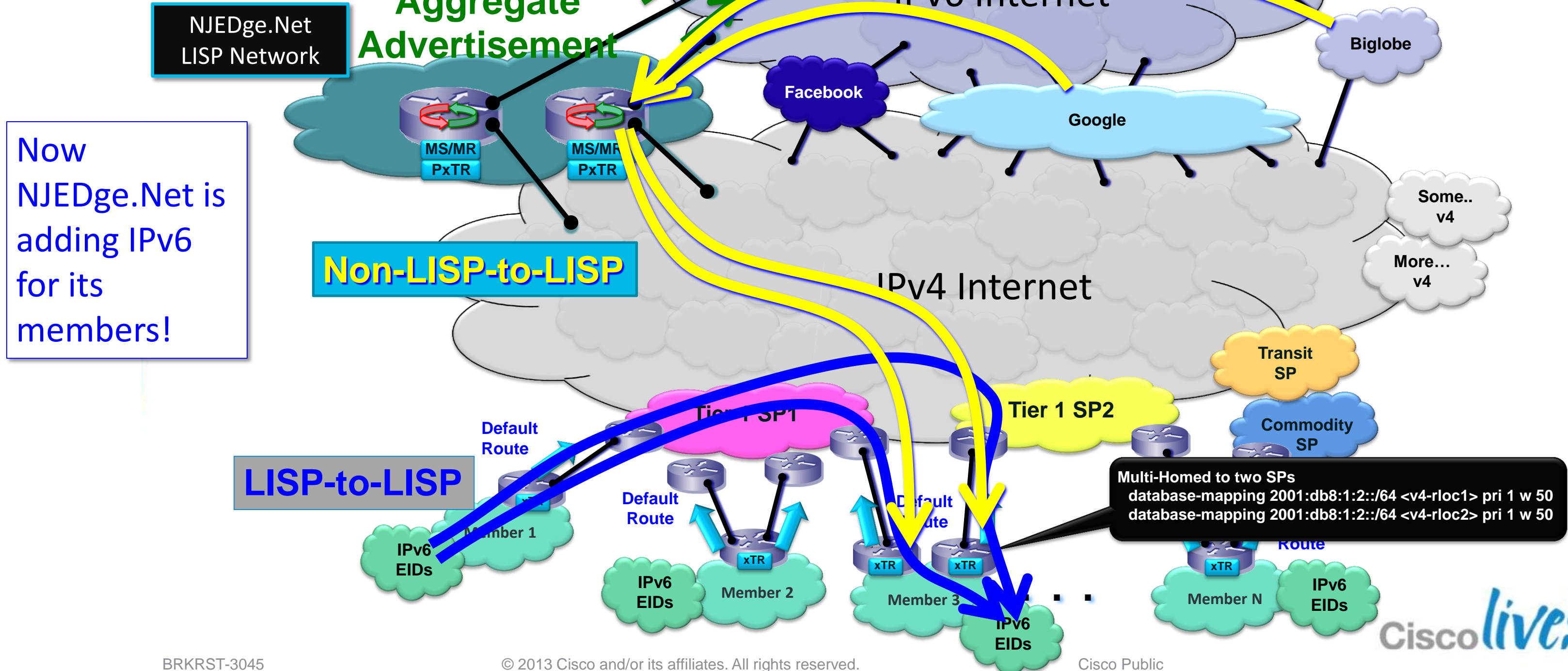
## Data Plane flows...



- EVEN multihoming load sharing...

# NJEDge.Net NJEDge.Net

Adding IPv6...



# LISP Deployment Examples

## LISP Deployment Examples...

1. Efficient Multihoming; IPv4 and IPv6
2. Efficient Virtualisation and High-Scale VPNs
3. Data Centre/Host Mobility
4. LISP-Mobile Node

# LISP Virtualisation

“Shared Model” ...

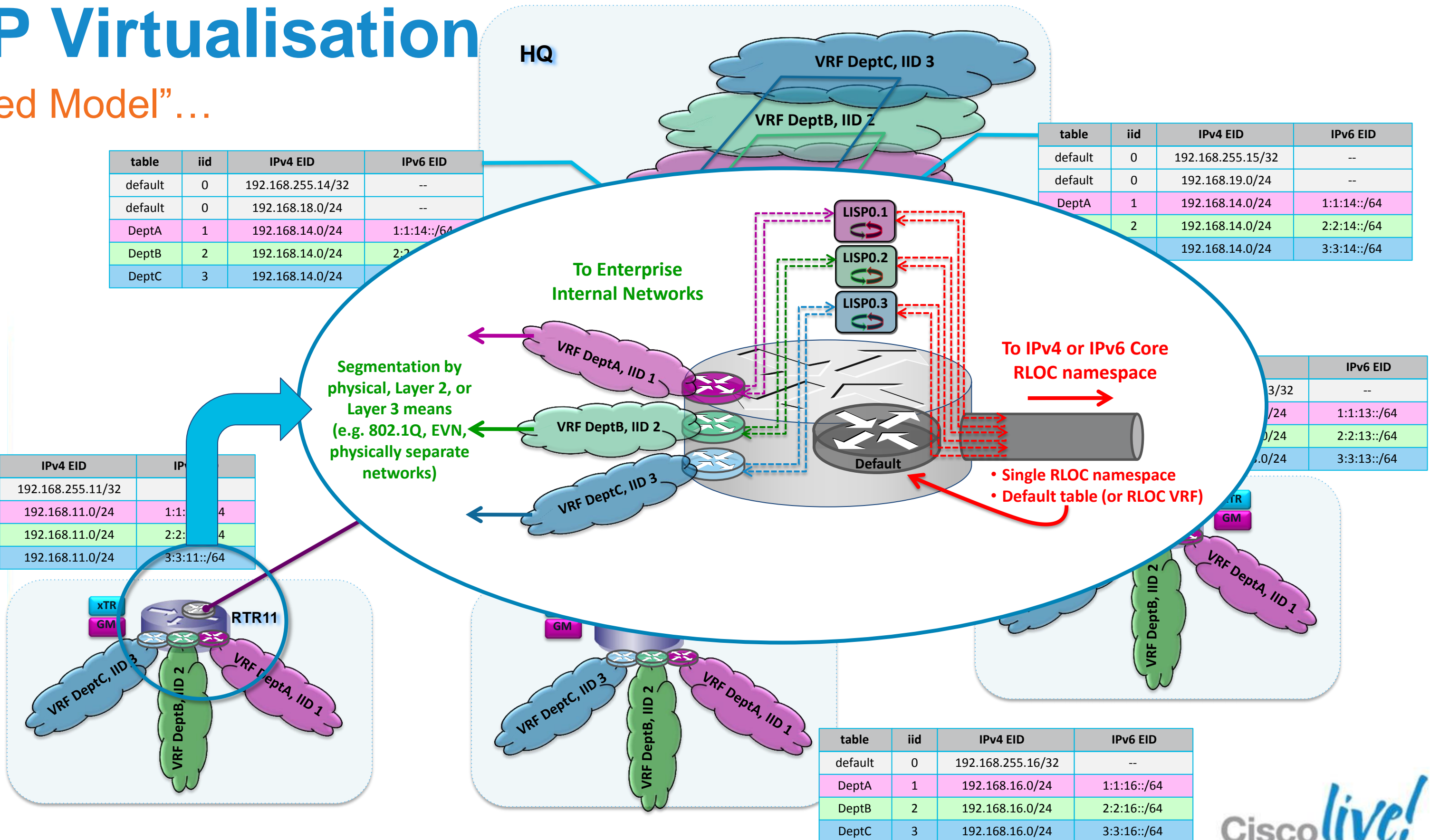
table	iid	IPv4 EID	IPv6 EID
default	0	192.168.255.14/32	--
default	0	192.168.18.0/24	--
DeptA	1	192.168.14.0/24	1:1:14::/64
DeptB	2	192.168.14.0/24	2:2:14::/64
DeptC	3	192.168.14.0/24	3:3:14::/64

table	iid	IPv4 EID	IPv6 EID
default	0	192.168.255.15/32	--
default	0	192.168.19.0/24	--
DeptA	1	192.168.14.0/24	1:1:14::/64
	2	192.168.14.0/24	2:2:14::/64
		192.168.14.0/24	3:3:14::/64

table	iid	IPv4 EID	IPv6 EID
default	0	192.168.255.11/32	--
DeptA	1	192.168.11.0/24	1:1:11::/64
DeptB	2	192.168.11.0/24	2:2:11::/64
DeptC	3	192.168.11.0/24	3:3:11::/64

table	iid	IPv4 EID	IPv6 EID
		192.168.255.11/32	--
		192.168.11.0/24	1:1:13::/64
		192.168.11.0/24	2:2:13::/64
		192.168.11.0/24	3:3:13::/64

table	iid	IPv4 EID	IPv6 EID
default	0	192.168.255.16/32	--
DeptA	1	192.168.16.0/24	1:1:16::/64
DeptB	2	192.168.16.0/24	2:2:16::/64
DeptC	3	192.168.16.0/24	3:3:16::/64



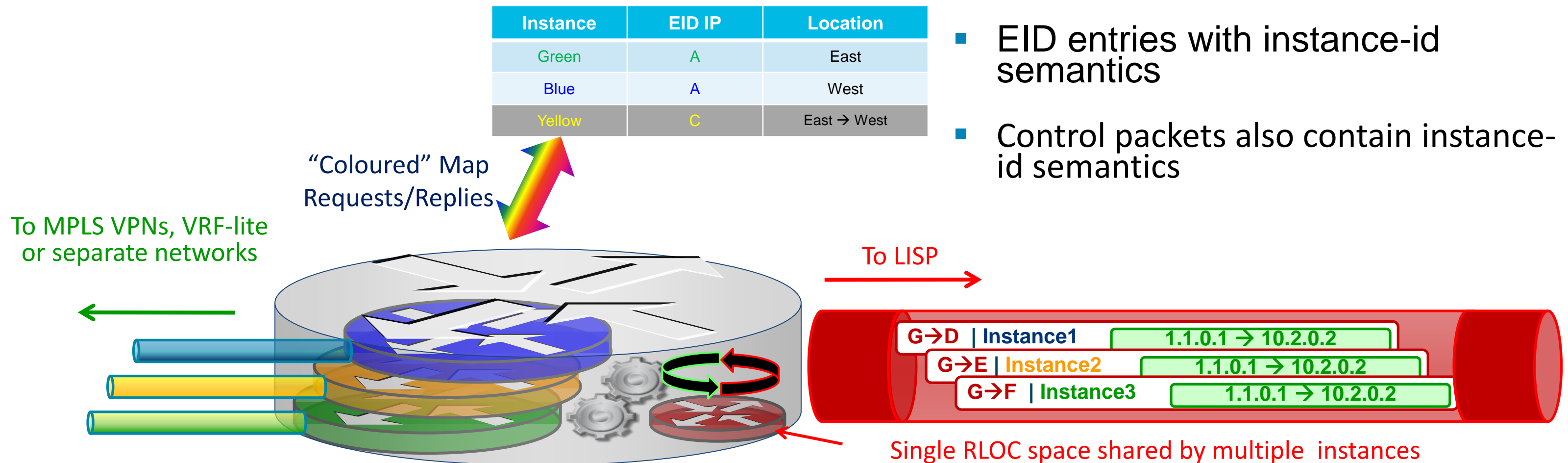


# Network Virtualisation in LISP

## LISP Multi-tenancy

### Virtualised Mapping Service:

- EID entries with instance-id semantics
- Control packets also contain instance-id semantics



### Virtualised Map Cache (xTRs):

- Mappings cached in different VRFs per instance-id
- Interoperable with other VRF features/solutions

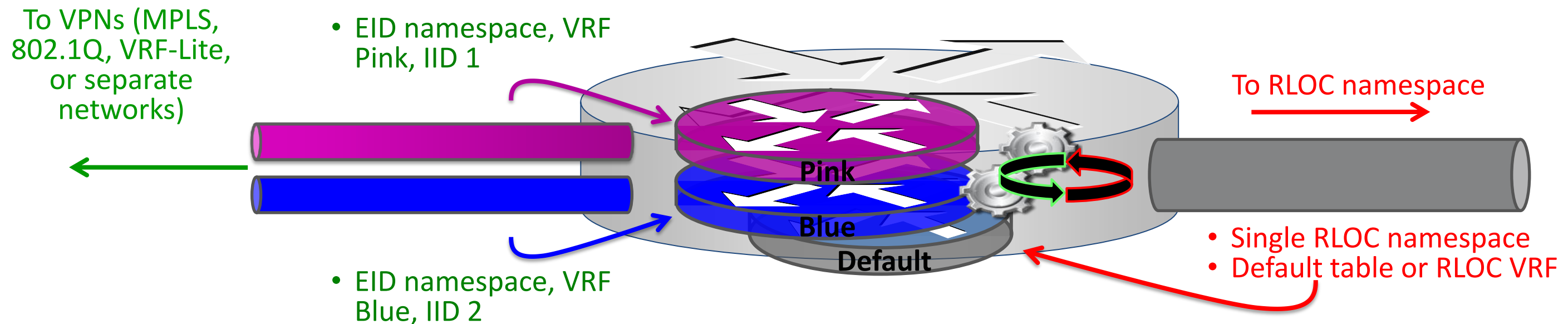
### “Coloured” Traffic:

- Instance-ID tag in LISP data header
- Instance-ID encoded in LISP control packets
- Colouring is transparent to the core

# LISP Use Cases

## LISP Use Case 3 :: Efficient Virtualisation/Multi-Tenancy – Shared Model

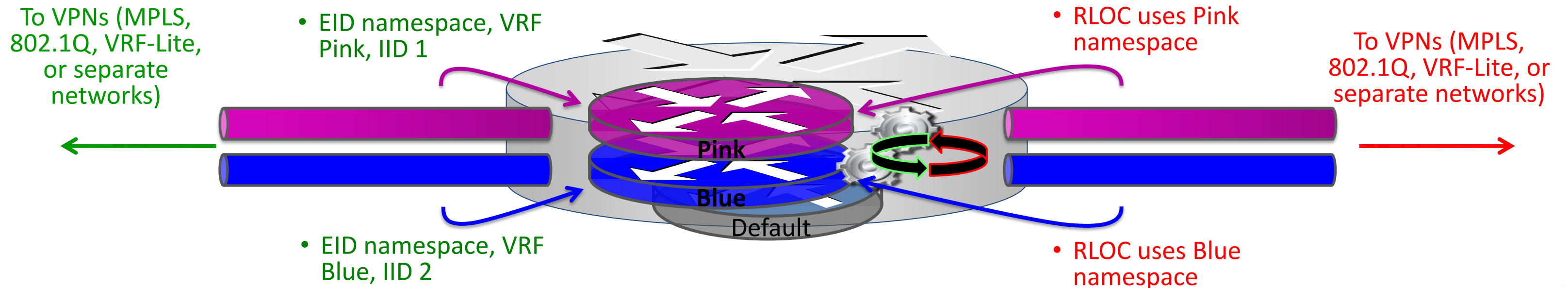
- Shared Model – at the device level
  - Multiple EID-prefixes are allocated privately using VRFs
  - EID lookups are in the VRF associated with an Instance-ID
  - All RLOC lookups are in a single table – default
  - The Mapping System is part of the locator address space and is shared



# LISP Use Cases

## LISP Use Case 3 :: Efficient Virtualisation/Multi-Tenancy – Parallel Model

- Parallel Model – at the device level
  - Multiple EID-prefixes are allocated privately using VRFs
  - EID lookups are in the VRF associated with an Instance-ID
  - RLOC lookups are in the VRF associated with the locator table
  - A Mapping System must be part of each locator address space



### Overview...

#### Target Market:

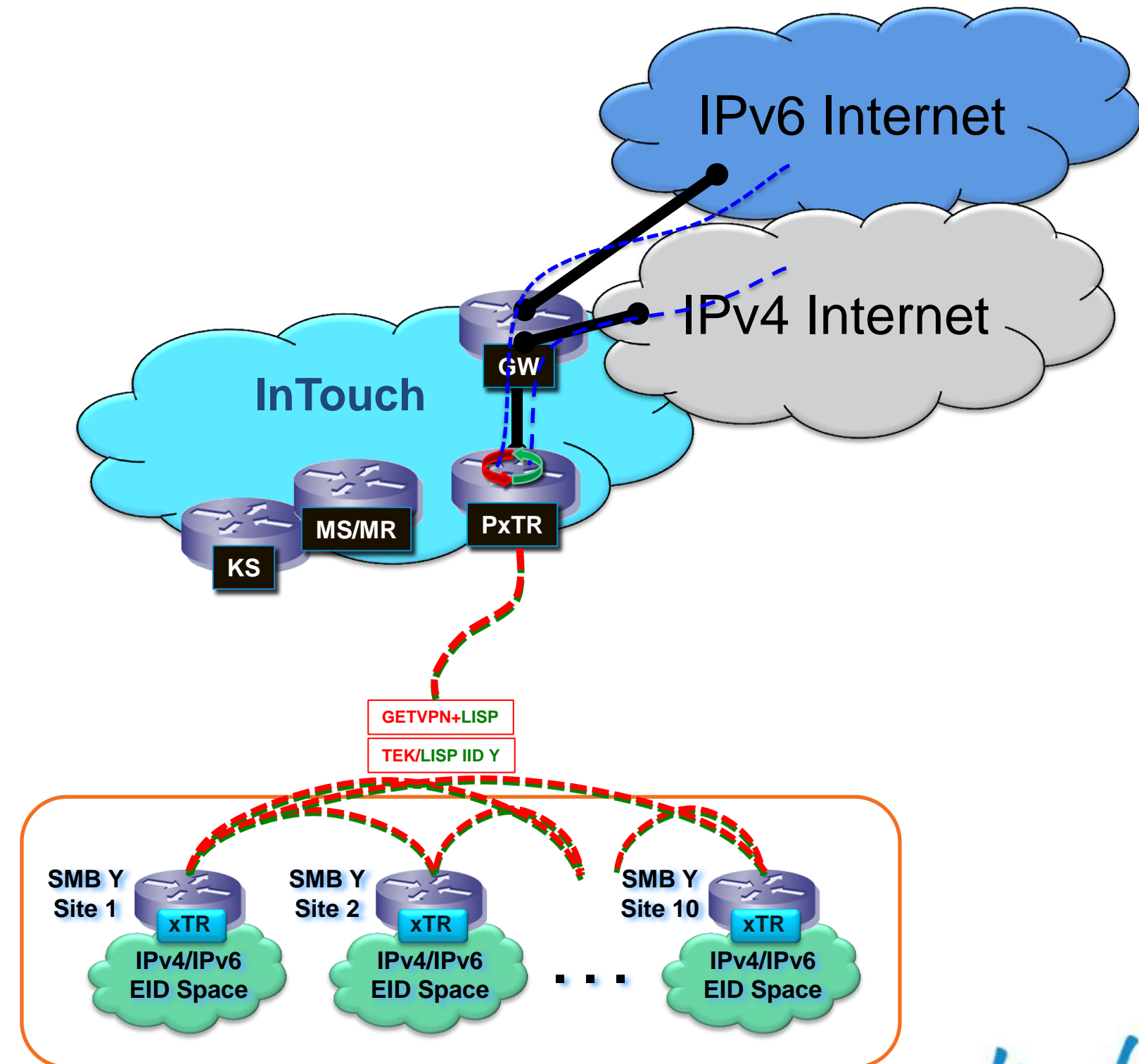
- SMB Enterprises
- Private VPNs (MPLS replacement)

#### LISP Services:

- LISP+GETVPN over the Internet (encrypted)
- LISP Virtualisation
- BGP-Free Multihoming
- IPv4, IPv6

Customer Site: <http://connect.intouch.net>

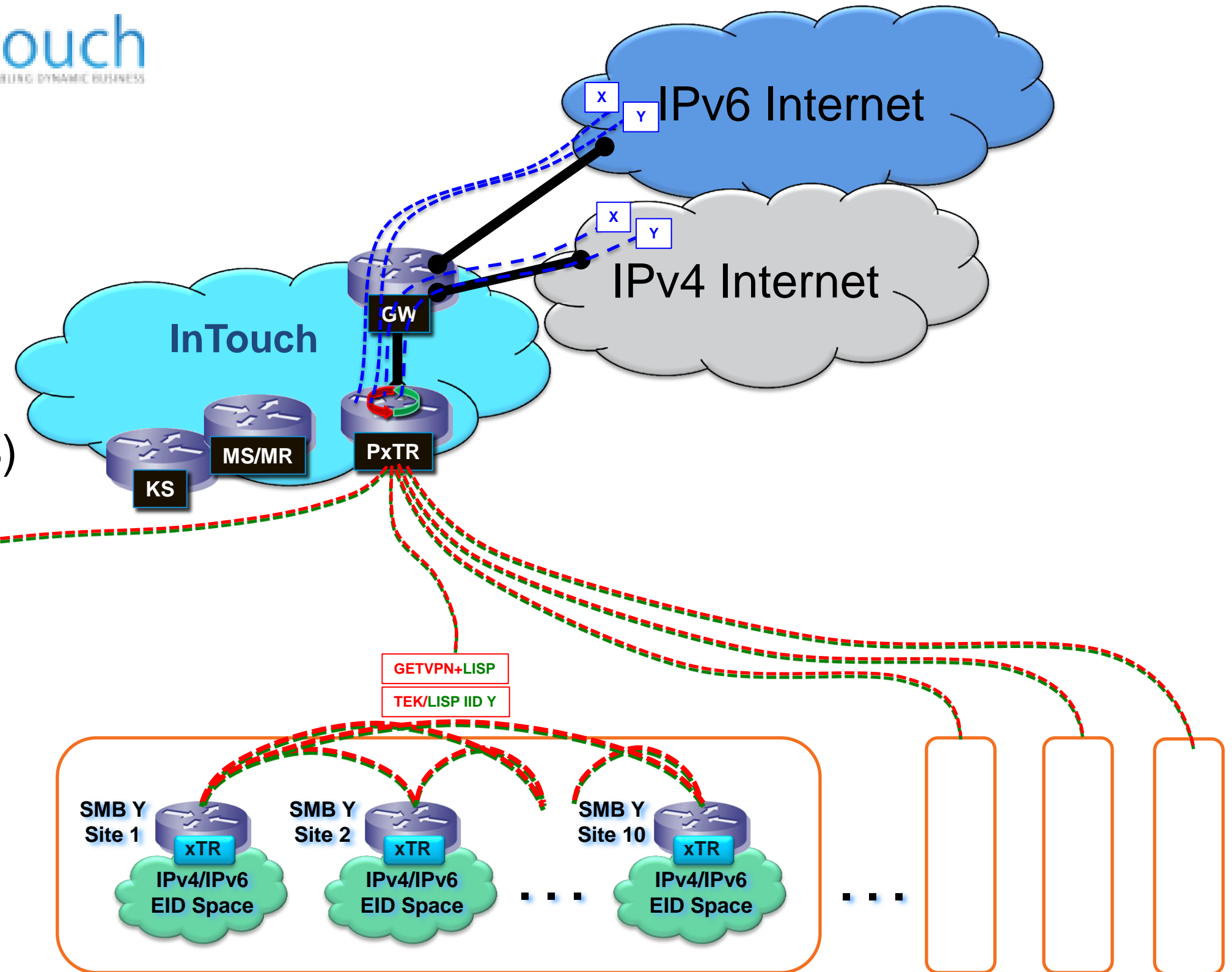
Customer Case Study: <http://lisp.cisco.com>



## LISP Service...

### Benefits:

- Broadband circuits (<\$)
- Multihoming (<\$)
- IPv4 and IPv6
- Private network (w/o MPLS \$)



LISP+GETVPN Config Guide: <http://lisp.cisco.com>

# LISP Deployment Examples

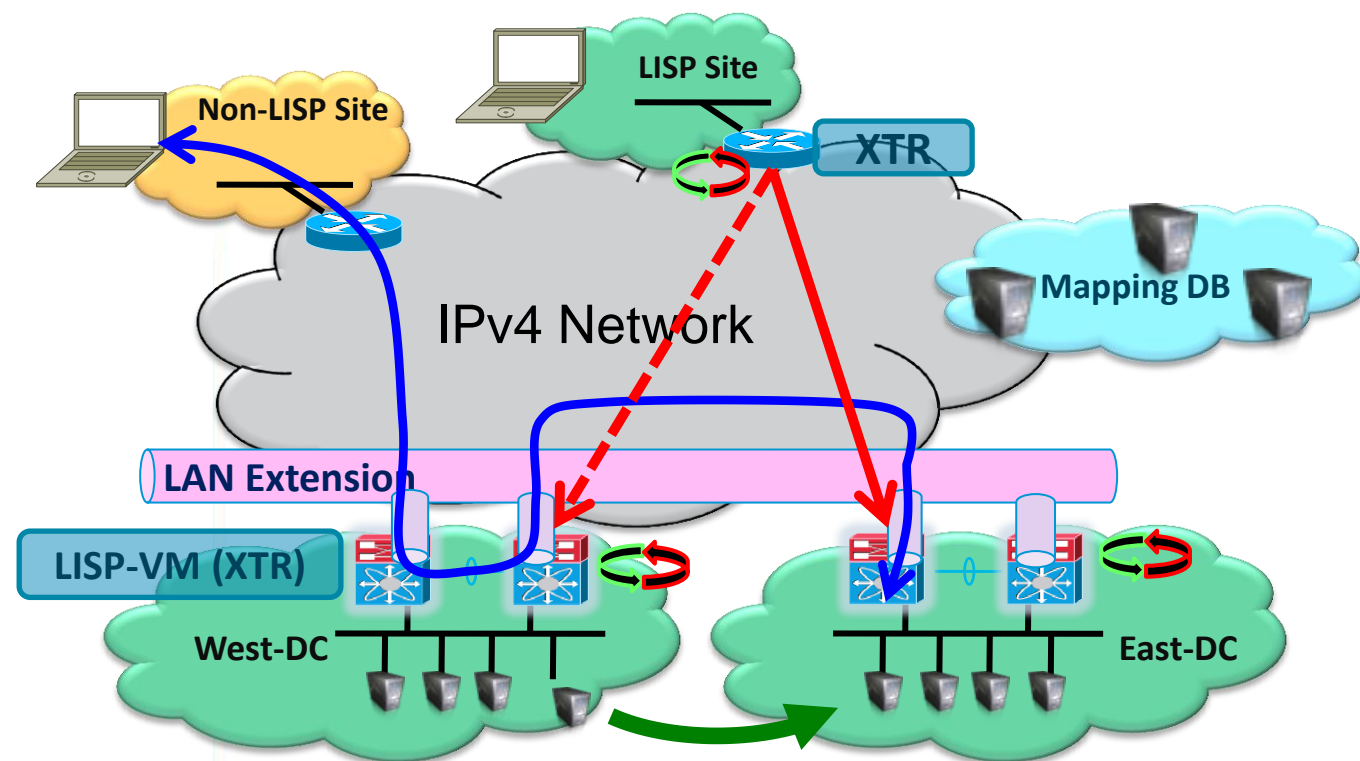
## LISP Deployment Examples...

1. Efficient Multihoming; IPv4 and IPv6
2. Efficient Virtualisation and High-Scale VPNs
3. Data Centre/Host Mobility
4. LISP-Mobile Node

# LISP Host Mobility

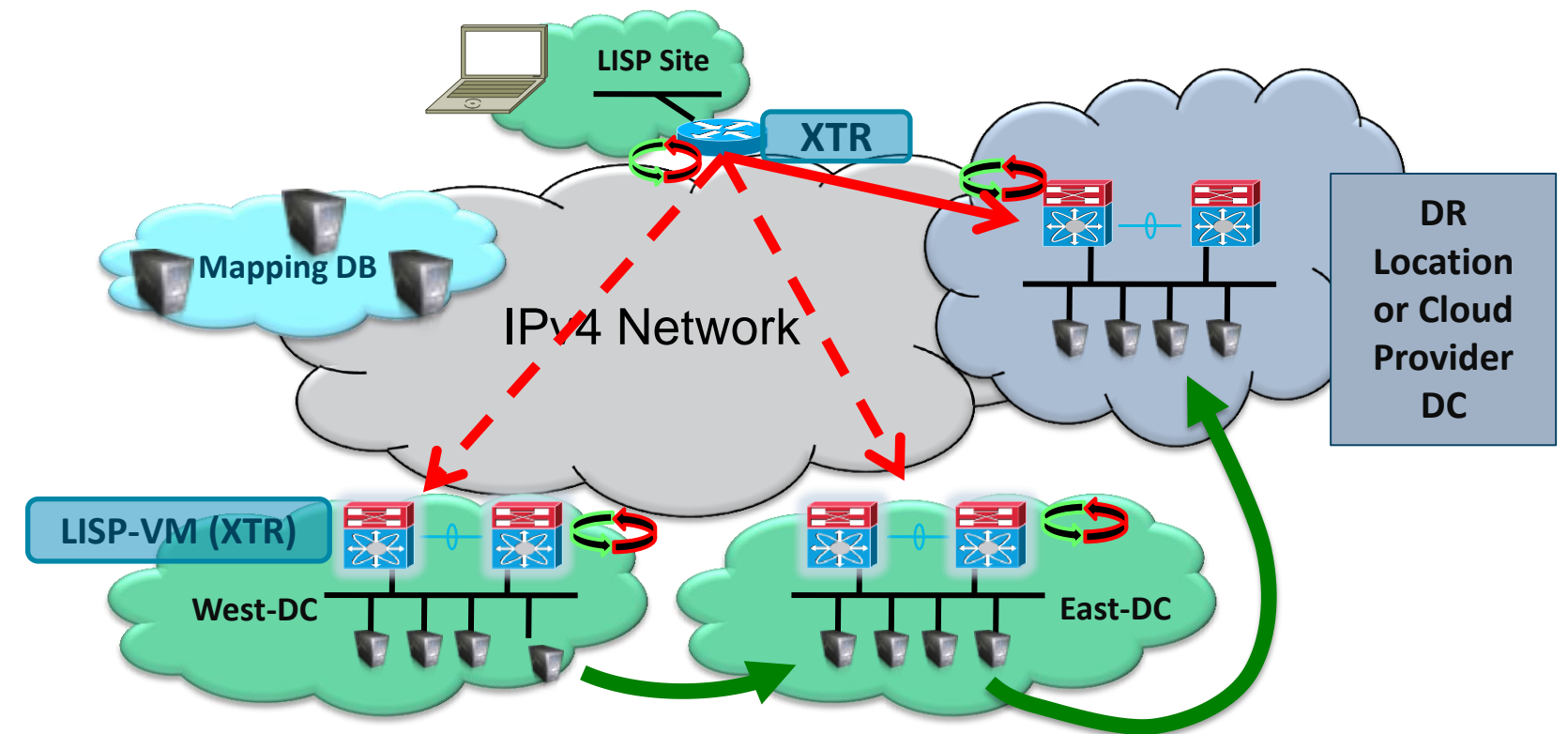
## Host Move Scenarios...

### Moves With LAN Extension



- Routing for Extended Subnets
  - Active-Active Data Centres
  - Distributed Data Centres
- Application Members Distributed
  - Broadcasts across sites

### Moves Without LAN Extension

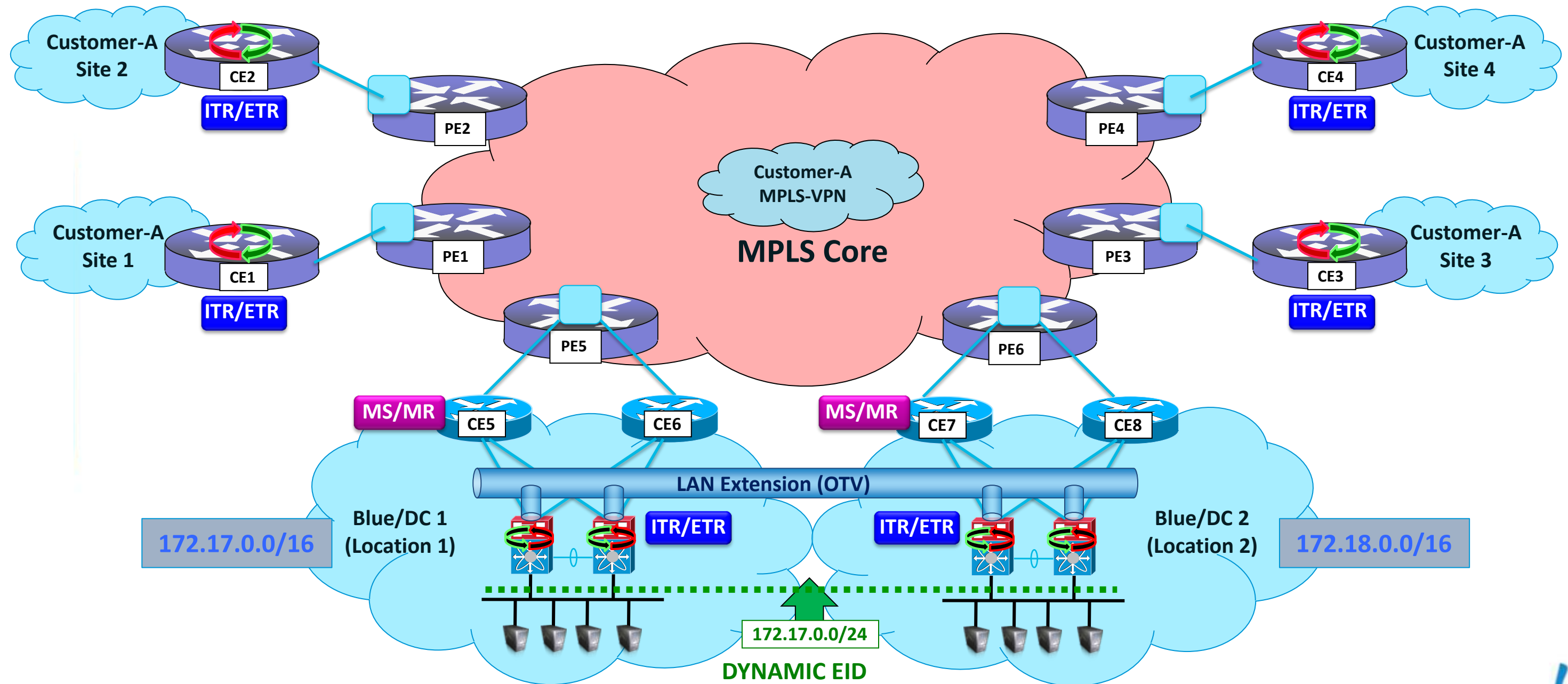


- IP Mobility Across Subnets
  - Disaster Recovery
  - Cloud Bursting
- Application Members In One Location

# LISP Host Mobility

MPLS Core, Extending Subnets – Topology...

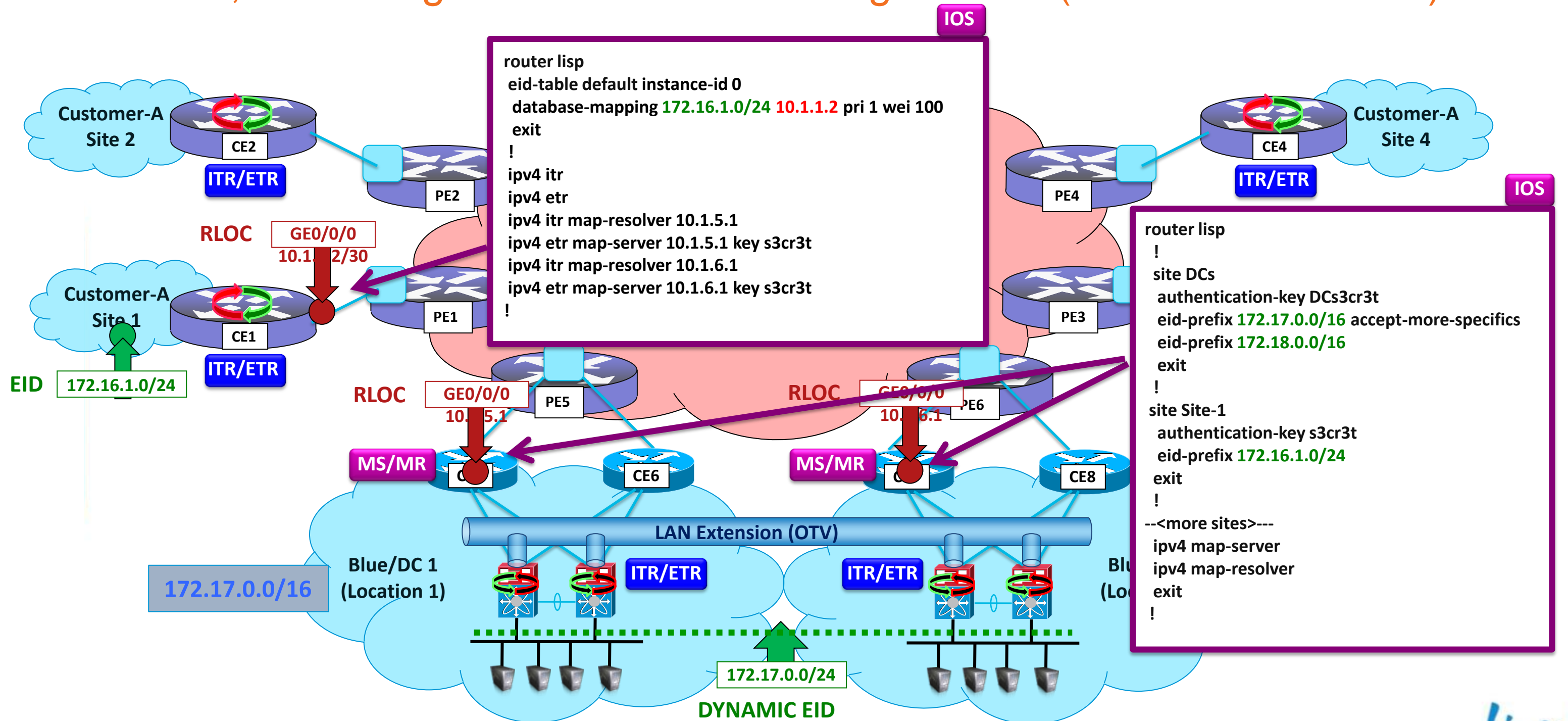
PRODUCTION





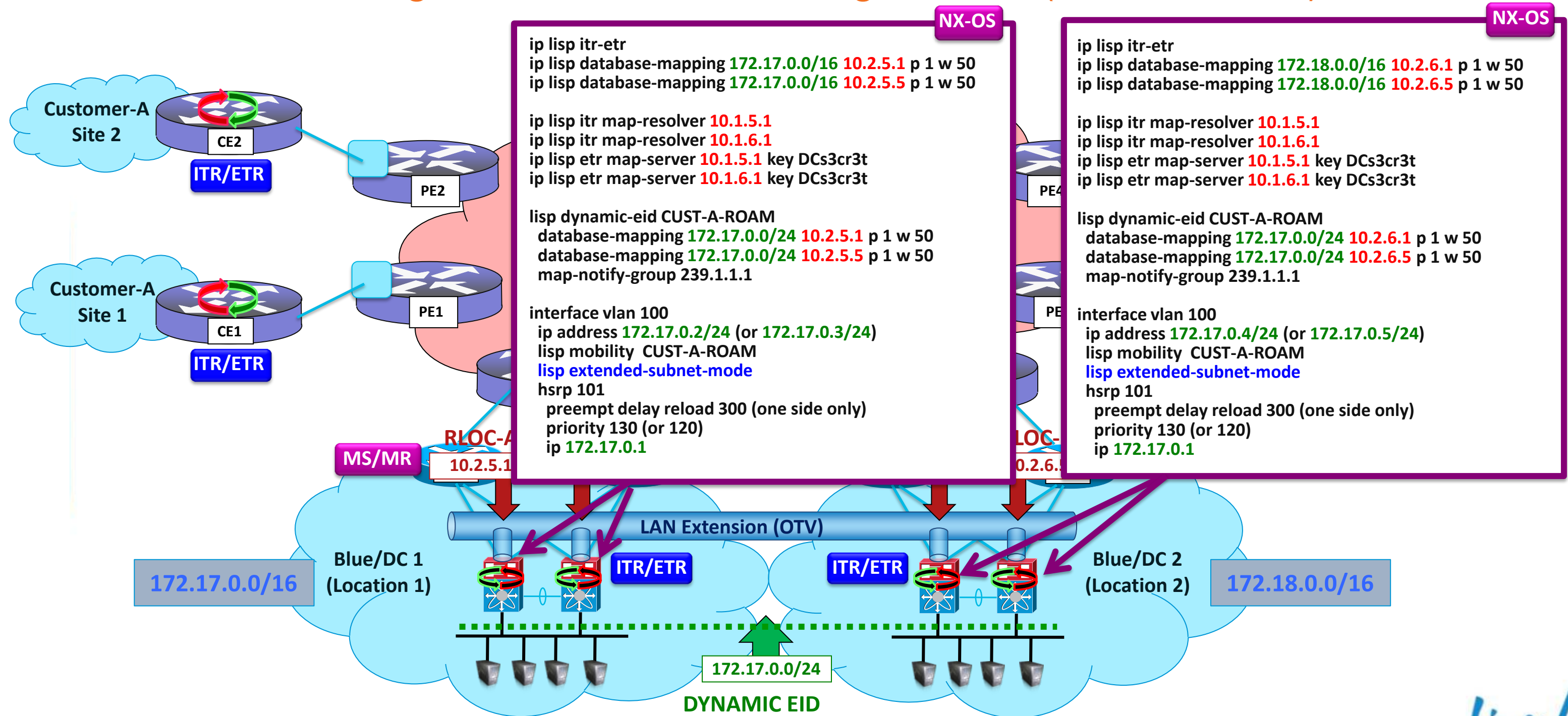
# LISP Host Mobility

## MPLS Core, Extending Subnets – LISP Configurations (Sites and MS/MRs)



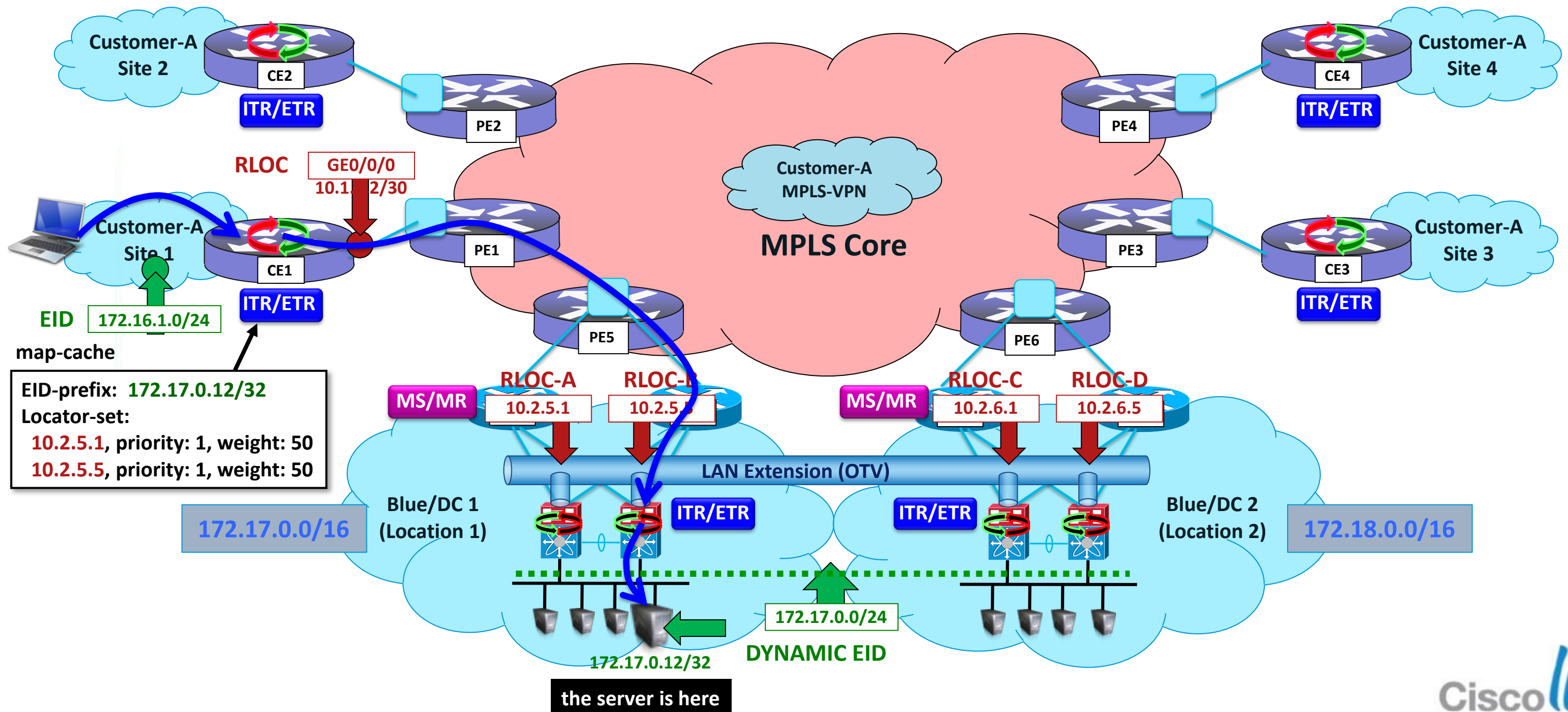
# LISP Host Mobility

## MPLS Core, Extending Subnets – LISP Configurations (Data Centres)



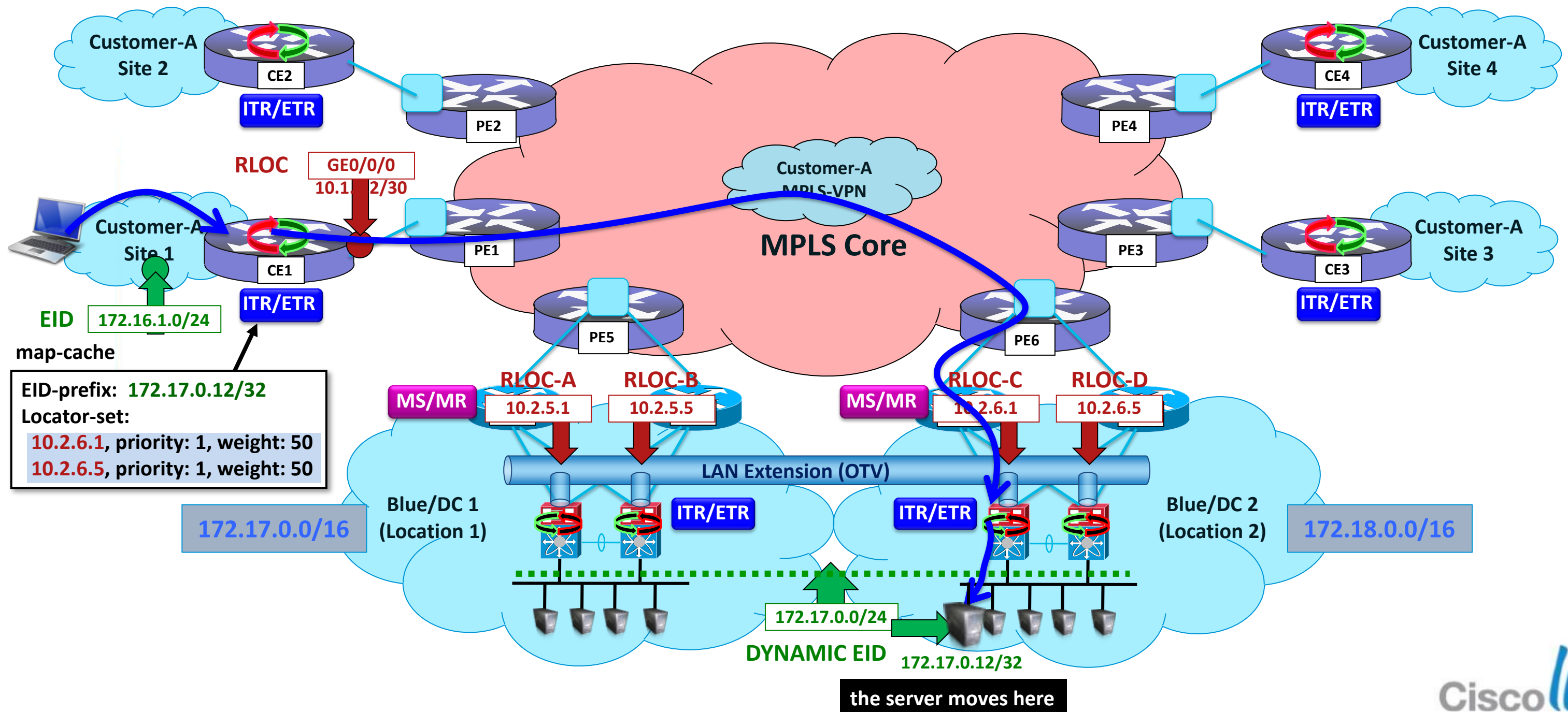
# LISP Host Mobility

MPLS Core, Extending Subnets – Initial State...



# LISP Host Mobility

MPLS Core, Extending Subnets – After moves...



# LISP Status



# LISP Status

## LISP Standardisation Effort Status...

IETF LISP WG: <http://tools.ietf.org/wg/lisp/>

Draft	Next Steps/Target
<b>LISP base protocol</b> (draft-ietf-lisp-24)	RFC Ed Queue...
<b>LISP+ALT</b> (draft-ietf-lisp-alt-10)	RFC Ed Queue...
<b>LISP Map Server</b> (draft-ietf-lisp-ms-16)	RFC Ed Queue...
<b>LISP Interworking</b> (draft-ietf-lisp-interworking-06)	RFC Ed Queue...
<b>LISP Map Versioning</b> (draft-ietf-lisp-map-versioning-09)	RFC Ed Queue...
<b>LISP Multicast</b> (draft-ietf-lisp-multicast-14)	RFC Ed Queue...
<b>LISP Internet Groper</b> (draft-ietf-lisp-lig-06)	RFC Ed Queue...
<b>LISP MIB</b> (draft-ietf-lisp-mib-07)	AD Evaluation...
<b>LISP Canonical Address Format</b> (draft-ietf-lisp-lcaf-00)	Active Working Group Document...
<b>LISP Deployment</b> (draft-ietf-lisp-deployment-05)	Active Working Group Document...
<b>LISP SEC</b> (draft-ietf-lisp-sec-04)	Active Working Group Document...
<b>LISP DDT</b> (draft-fuller-lisp-ddt-00)	Active Working Group Document...
<b>LISP Mobile Node</b> (draft-meyer-lisp-mn-06)	Proposed for WG adoption (3 prototypes available)

# LISP Status

## LISP Deployments - International LISP Beta Network...

- LISP Community Operated:
  - More than 5 Years operational...
  - More than ~300 Sites, 33 countries...
- Interoperable LISP implementations:

- Cisco

IOS (ISR, ISRG2, 7200) and IOS-XE (ASR1K)

Cisco IOS-XR (CRS3, ASR9K (beta))

Cisco NX-OS (N7K, C200)

- Open Source

FreeBSD: OpenLISP

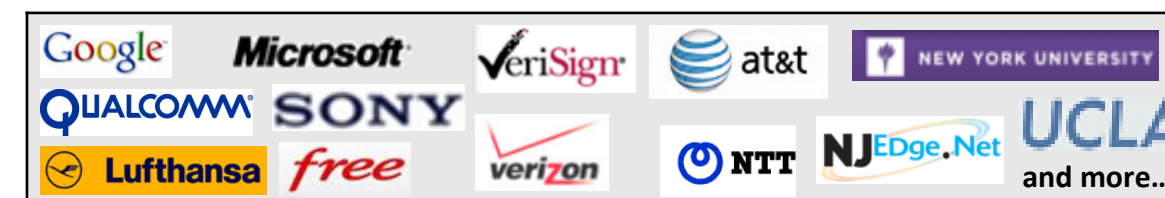
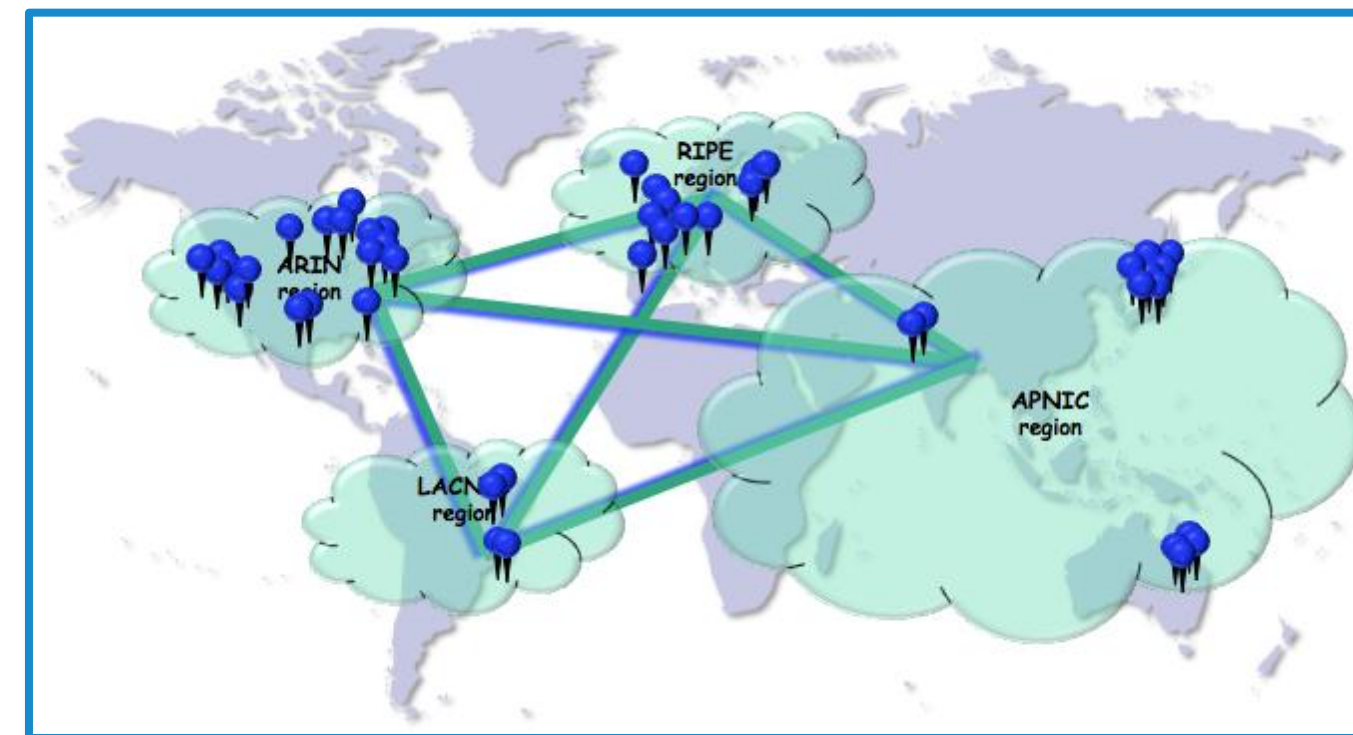
Linux: Aless, LISPmob, OpenWrt

Linux: LISPmob

Android (Gingerbread)

- Furukawa Network Solution Corporation FITElnet-G21

Plus a few others... ;-)



Cisco live!

# LISP Status

## LISP Software – Available Releases...



### ■ Cisco Releases

**Cisco LISP Releases: <http://lisp.cisco.com>**

- NX-OS since December 2009... Nexus 7000, UCS C200
- IOS since December 2009... ISR, ISRG2, 7200
- IOS-XE since March 2010... ASR1K
- IOS-XR since March 2012... CRS3
- Coming soon... ASR9K (4/2013), Catalyst 6500 (5/2013), and others

### ■ Other Releases

**Other LISP Releases: <http://www.lisp4.net>**

- Furukawa Network Solutions Corp
- FreeBSD :: Open LISP
- Linux :: Aless, LISPmob, OpenWrt (coming soon...)
- Android :: Gingerbread (coming soon...)
- Other vendors... Check the site!

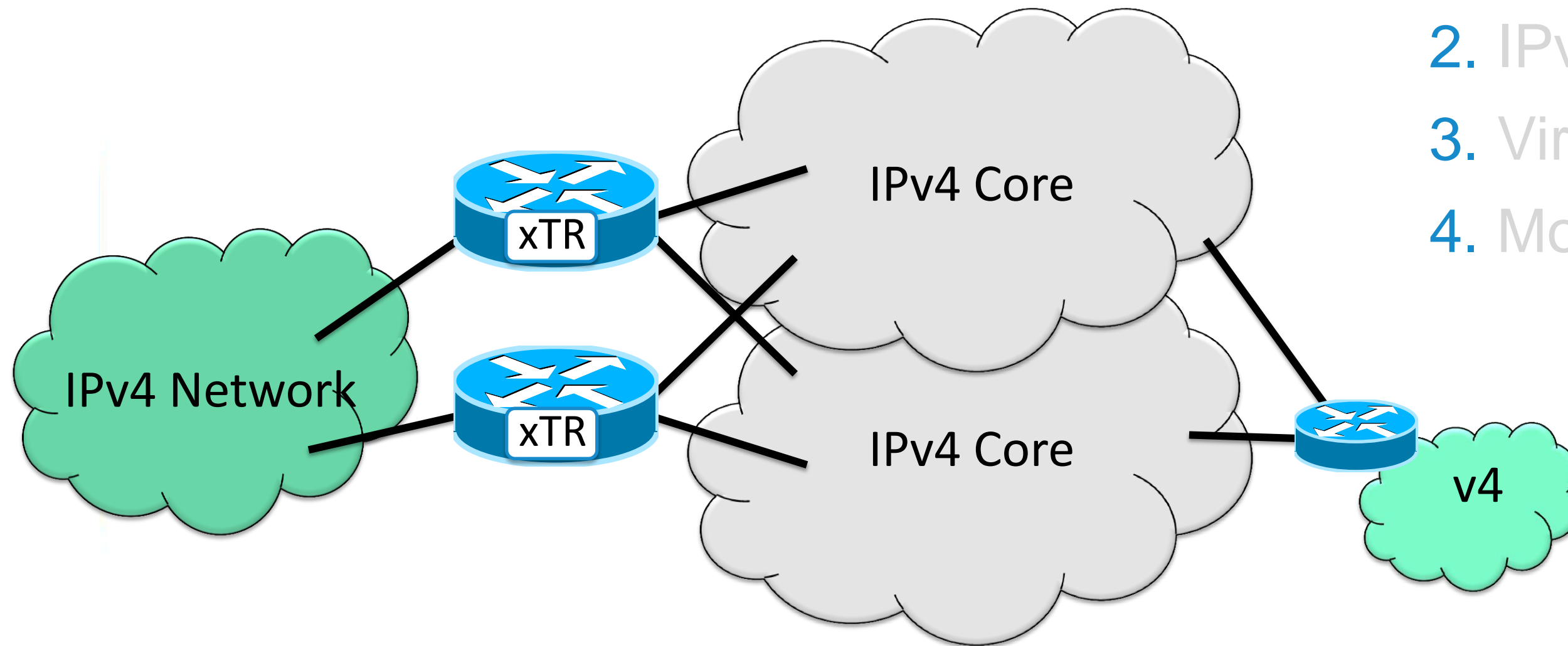


# LISP Summary



# LISP Efficient Multihoming

Part of the LISP Solution Space...

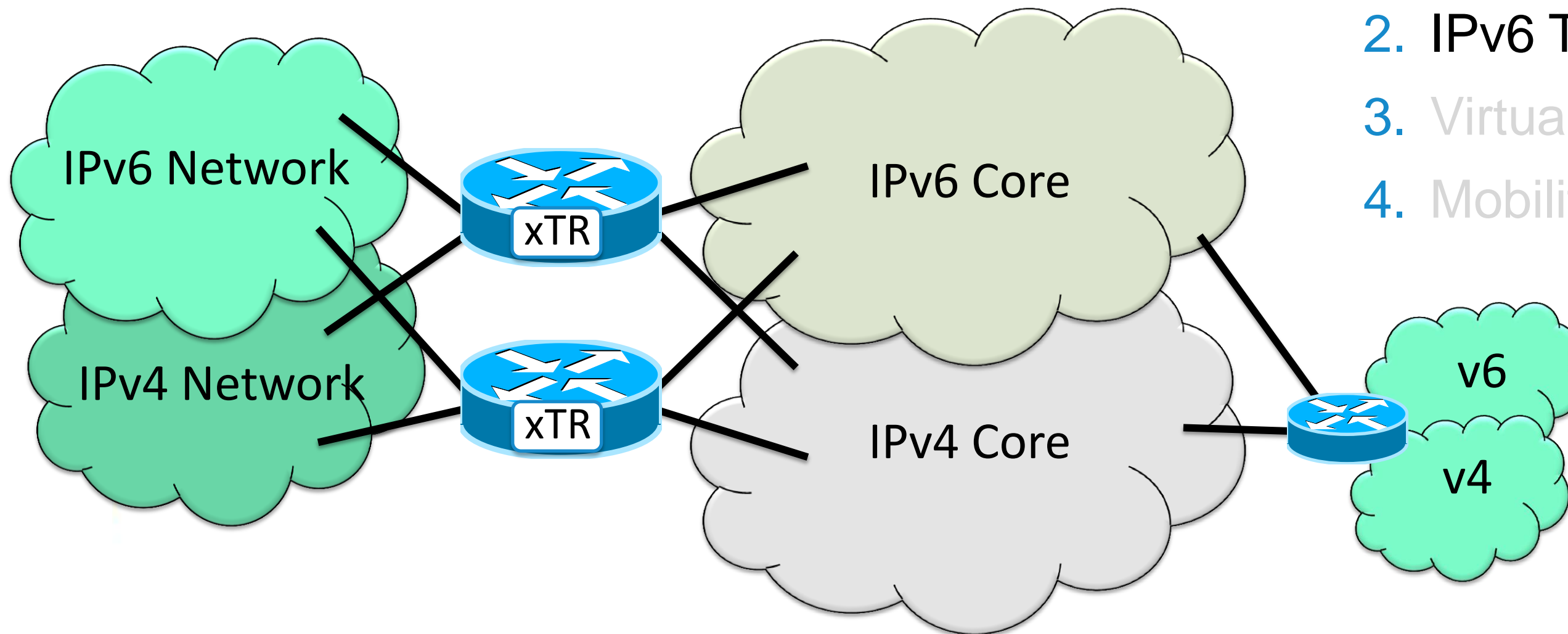


1. Multihoming
2. IPv6 Transition
3. Virtualisation/VPN
4. Mobility

LISP is an Architecture...

# LISP IPv6 Transition Support

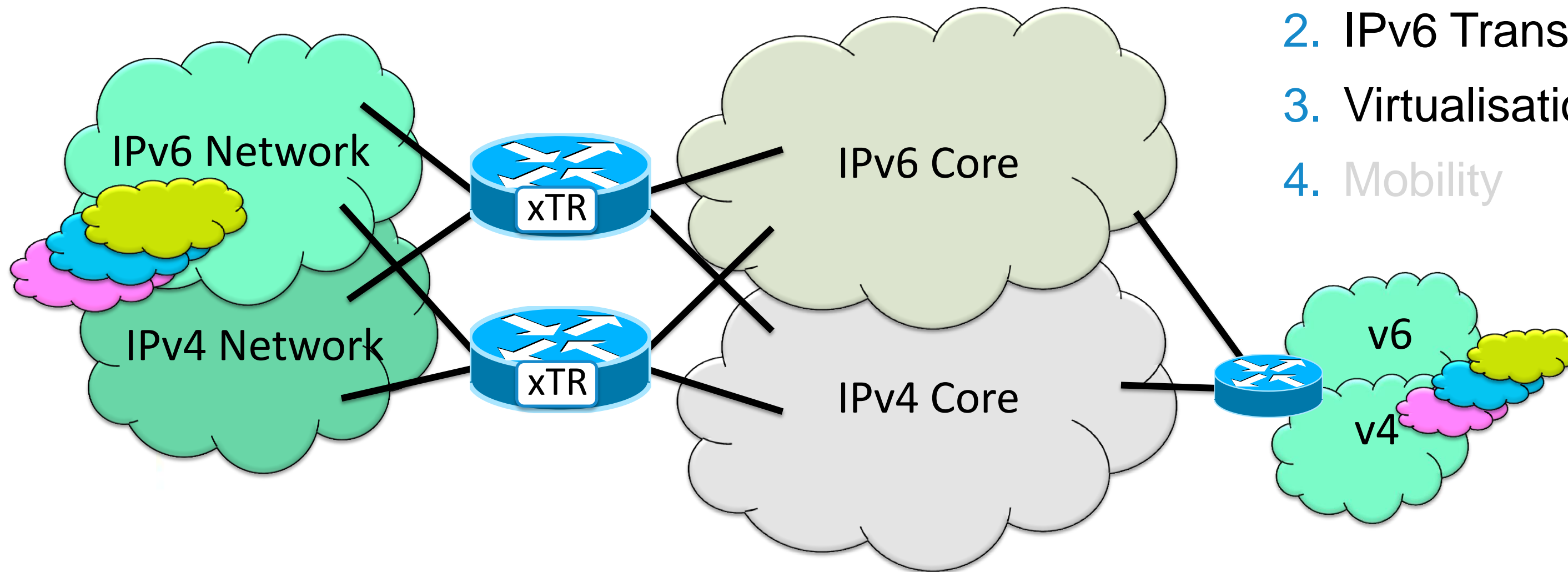
Part of the LISP Solution Space...



1. Multihoming
2. IPv6 Transition
3. Virtualisation/VPN
4. Mobility

LISP is an Architecture...

# LISP Virtualisation/VPN Support

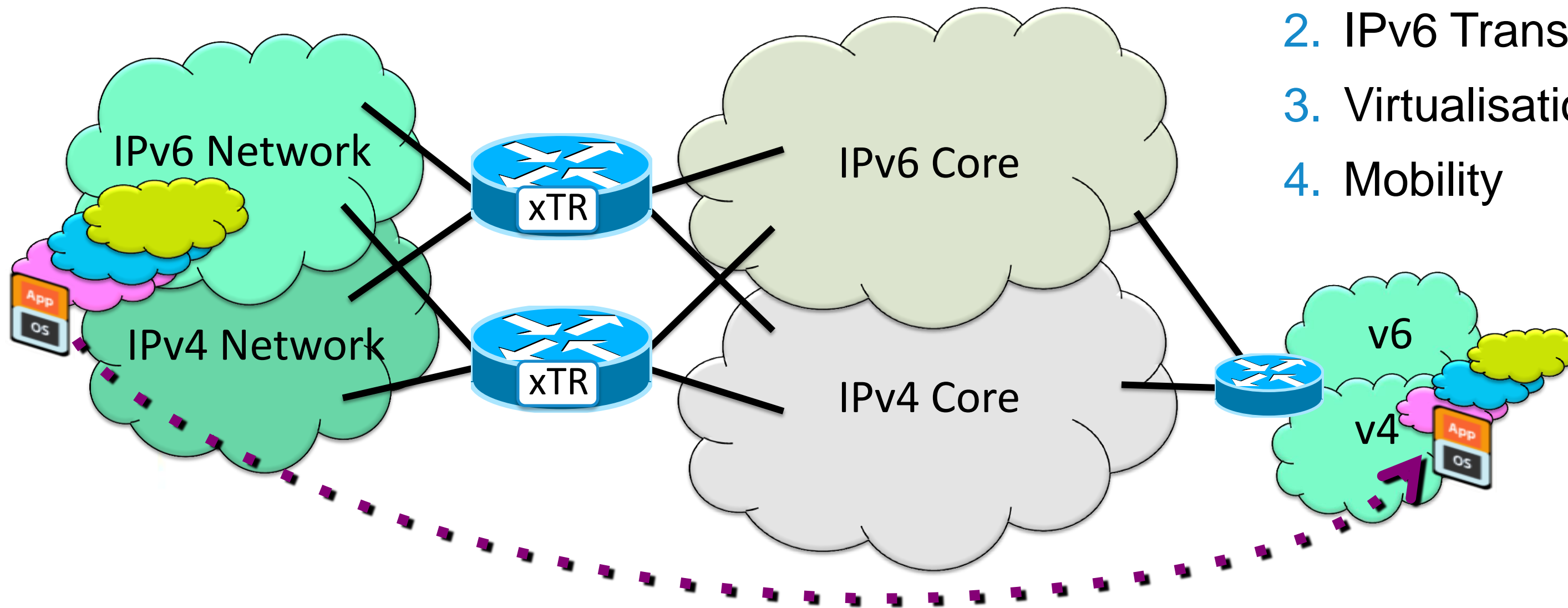


1. Multihoming
2. IPv6 Transition
3. Virtualisation/VPN
4. Mobility

LISP is an Architecture...

# LISP Host Mobility Support

Part of the LISP Solution Space...



1. Multihoming
2. IPv6 Transition
3. Virtualisation/VPN
4. Mobility

LISP is an Architecture...

# LISP Summary

## LISP – A Routing Architecture; Not a Feature



- Enables **IP Number Portability**
  - With session survivability
  - Never change host IP addresses; No renumbering costs
  - No DNS “name == EID” binding change
- Uses **pull** vs. **push** routing
  - OSPF and BGP are **push** models; routing stored in the forwarding plane
  - LISP is a **pull** model; Analogous to DNS; massively scalable
- An **over-the-top** technology
  - Address Family agnostic
  - Incrementally deployable
  - No changes in end systems
- Creates a **Level of Indirection**
  - Separates End-Host and Site addresses
- Deployment **simplicity**
  - No host changes
  - Minimal CPE changes
  - Some new core infrastructure components
- Enables other **interesting features**
  - Simplified multi-homing with Ingress traffic Engineering – without the need for BGP
  - End-host mobility without renumbering
  - Address Family agnostic support
- An **Open Standard**
  - No Cisco Intellectual Property Rights

# LISP References



# LISP References

## LISP Information and Mailing Lists...



### ■ LISP Information

- Cisco LISP Site ..... <http://lisp.cisco.com> (IPv4 and IPv6)
- Cisco LISP Marketing Site ..... <http://www.cisco.com/go/lisp/>
- LISP Beta Network Site ..... <http://www.lisp4.net> or <http://www.lisp6.net>
- LISP DDT Root ..... <http://www.ddt-root.org>
- IETF LISP Working Group ..... <http://tools.ietf.org/wg/lisp/>

### ■ LISP Mailing Lists

- Cisco LISP Questions ..... [lisp-support@cisco.com](mailto:lisp-support@cisco.com)
- IETF LISP Working Group ..... [lisp@ietf.org](mailto:lisp@ietf.org)
- LISP Interest (public) ..... [lisp-interest@puck.nether.net](mailto:lisp-interest@puck.nether.net)
- LISPmob Questions ..... [users@lispmob.org](mailto:users@lispmob.org)





# Q & A



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