LISP Mobile-Node

draft-meyer-lisp-mn-05.txt

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RLOC: IRTF MobOpts – Quebec City

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What if . . .

- A mobile device could be server?
- A mobile device did not depend on any carrier?
- A mobile device could roam across different types of radios without dropping sessions?
- Each mobile device keeps the same IP address no matter where goes?

Agenda

- Why Locator/ID Separation
- What is LISP?
- What is LISP-MN?
- Implementation Details
- Futures

Today – No ID/Locator Separation

chambers.cisco.com

(1) Is this John at the location 'cisco'?
(2) Is this John at location 'home'?
(3) Is this John at 'Starbucks'?

If I have a connection to John does it break because he changed locations?

198.133.219.25

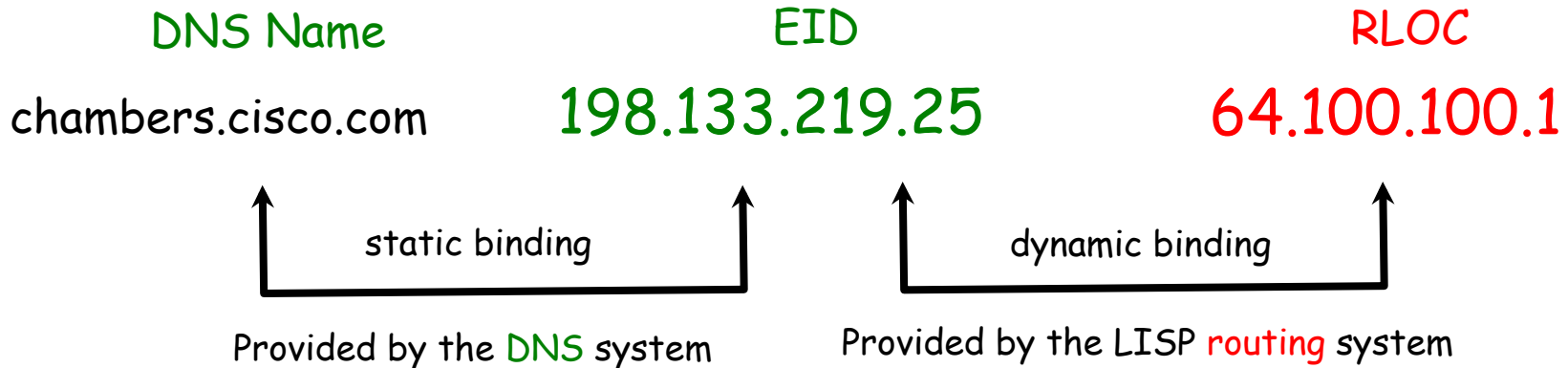Application ID   Network ID   Network Location

Future – With ID/Locator Separation

(1) The service binds to an Application Name (DNS)
(2) The Application Name binds to a Endpoint ID (EID)
(3) The EID binds dynamically to a Routing Locator (RLOC)

(1) Users use DNS names   (the human "who")
(2) Applications use EIDs   (the network "who")
(3) Routing uses RLOCs   (the network "where")

DNS Name	EID	RLOC
chambers.cisco.com	198.133.219.25	64.100.100.1

static binding

dynamic binding

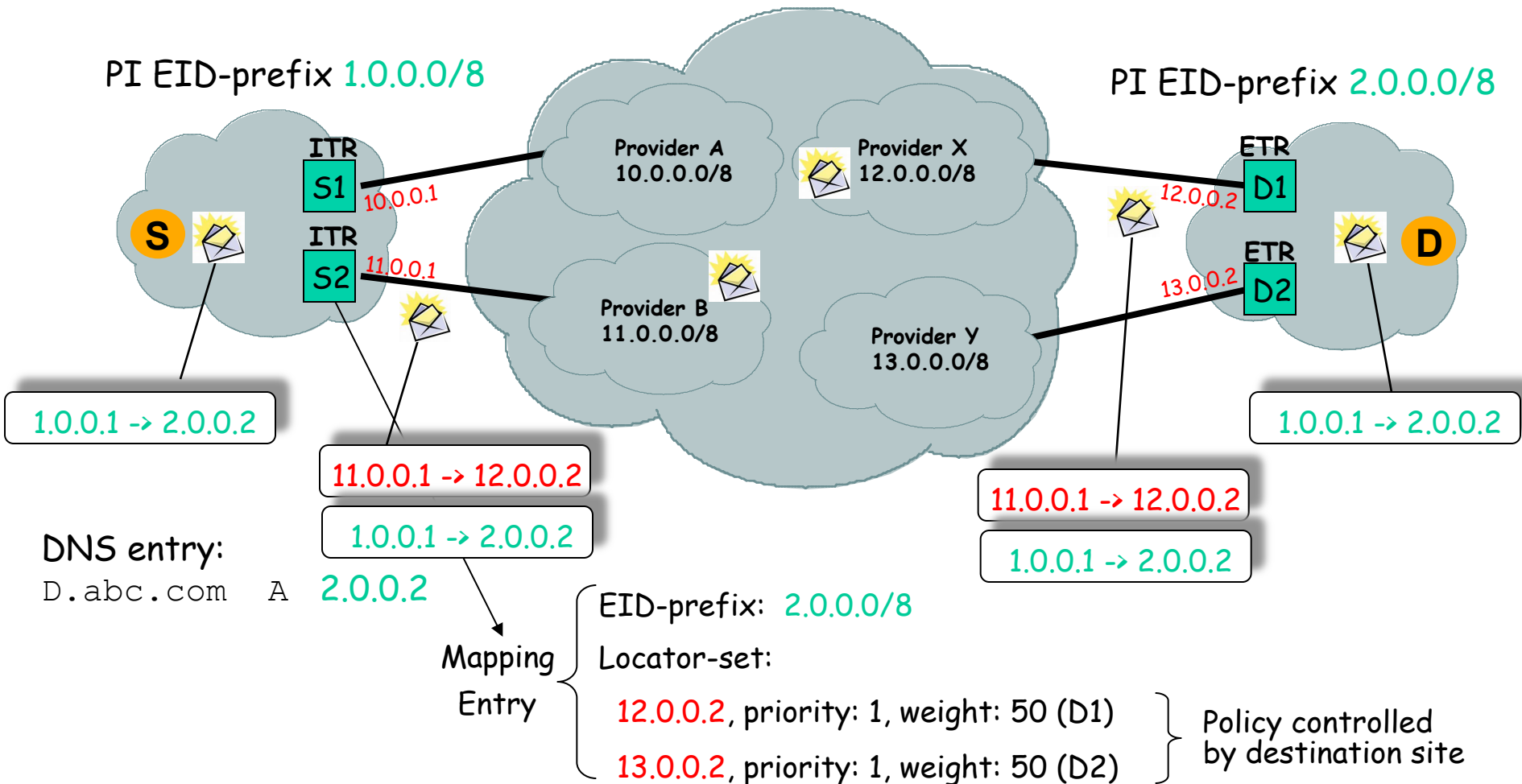Provided by the DNS system

Provided by the LISP routing system

What is LISP?

- A new addressing architecture and protocol suite
  - For separating End-point IDs and Locators
- Network-based solution
- No changes to hosts whatsoever
- No addressing changes to site and core devices
- Very few configuration file changes
- Imperative to be incrementally deployable
- Address family agnostic

What is LISP?

- LISP is completely open
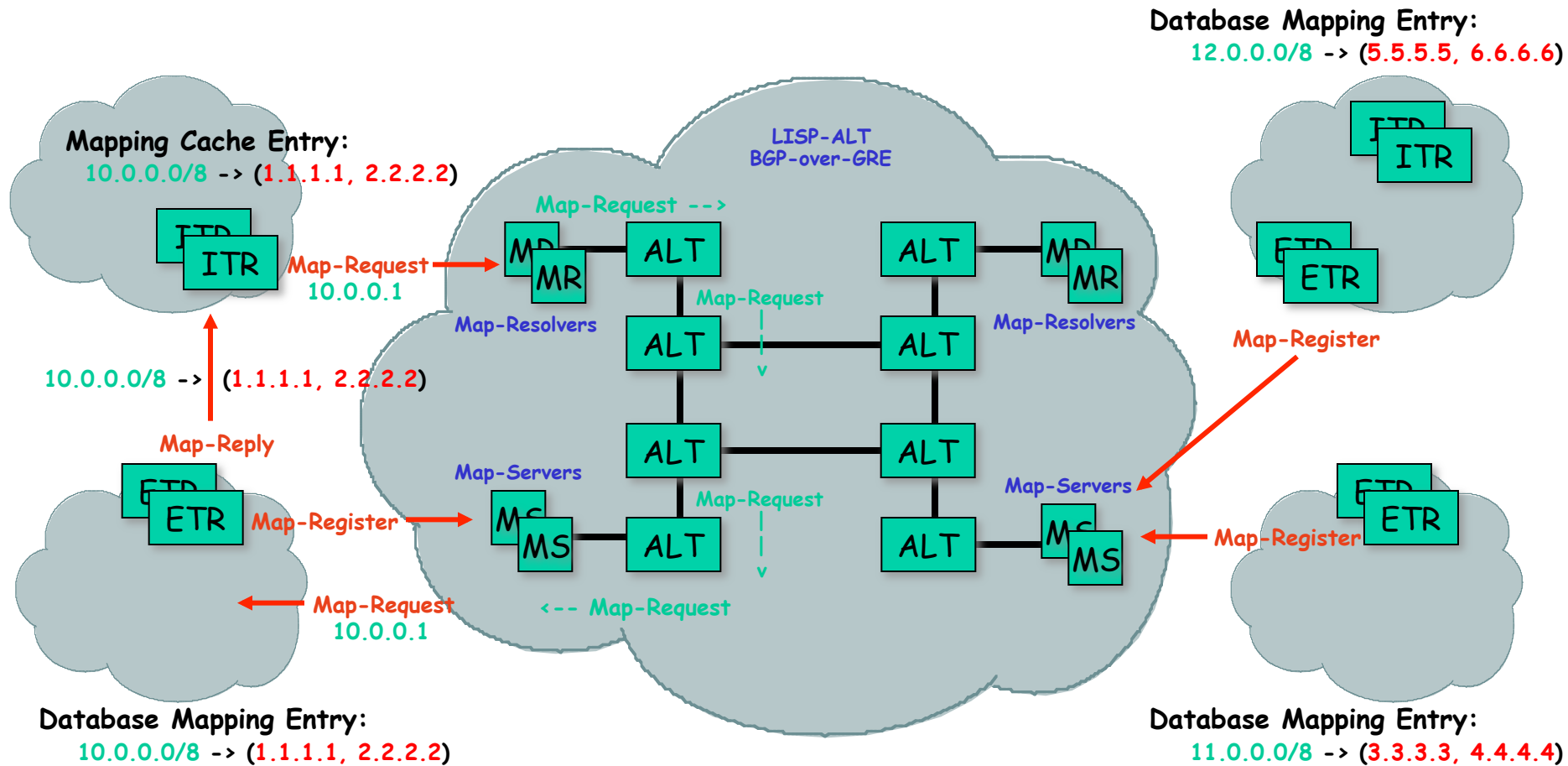 - Started in the IRTF
  - Currently has an IETF working group
  - No known IPR
- 100s of Researchers and Operators Contributed to Design
- Multiple Vendors Interested
- Pilot Network up for nearly 4 years
  - 121 nodes in 25 countries
- Building a LISP-MN Pilot Network
  - Testing server capabilities on Android phones
  - Experimenting new mapping database systems and security mechanisms

Data-Plane Flow

PI EID-prefix 1.0.0.0/8

PI EID-prefix 2.0.0.0/8

Provider A
10.0.0.0/8

Provider X
12.0.0.0/8

Provider B
11.0.0.0/8

Provider Y
13.0.0.0/8

ITR
S1 10.0.0.1

ITR
S2 11.0.0.1

ETR
D1 12.0.0.2

ETR
D2 13.0.0.2

S

D

1.0.0.1 -> 2.0.0.2

11.0.0.1 -> 12.0.0.2

1.0.0.1 -> 2.0.0.2

11.0.0.1 -> 12.0.0.2

1.0.0.1 -> 2.0.0.2

1.0.0.1 -> 2.0.0.2

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

Mapping Database System

Database Mapping Entry:
  12.0.0.0/8 -> (5.5.5.5, 6.6.6.6)

Mapping Cache Entry:
  10.0.0.0/8 -> (1.1.1.1, 2.2.2.2)

LISP-ALT
BGP-over-GRE

Map-Request -->

ITR

Map-Request
10.0.0.1

MR
MR

ALT

Map-Request
|
v

ALT
MR
MR

ITR

Map-Resolvers

Map-Resolvers

ETR

10.0.0.0/8 -> (1.1.1.1, 2.2.2.2)

ALT

ALT

Map-Register

Map-Reply

ETR

ALT

ALT

Map-Servers

Map-Servers

Map-Register

Map-Register

ETR

MS
MS

ALT

Map-Request
|
v

ALT

MS
MS

Map-Register

ETR

Map-Request
10.0.0.1

<-- Map-Request

Database Mapping Entry:
  10.0.0.0/8 -> (1.1.1.1, 2.2.2.2)

Database Mapping Entry:
  11.0.0.0/8 -> (3.3.3.3, 4.4.4.4)

A Multi-Homed LISP Site

RLOC A

RLOC A'

A

A'

EID-prefix

Relationship between EIDs and RLOCs

Use-Case	EID	RLOC	Description
Standard Site	Static	Static	ETRs staticly configured
VM Mobility	Dynamic	Static	xTRs discover "dynamic-EIDs"
LISP-MN	Static	Dynamic	EID latched to device while radios get DHCPable "dynamic-RLOCs"

LISP Hand-Set Mobility

3G/4G Network

WiFi Network

64.0.0.1

65.0.0.1

dino.cisco.com

dynamic RLOCs

EID: 2610:00d0:xxxx::1/128

static EID
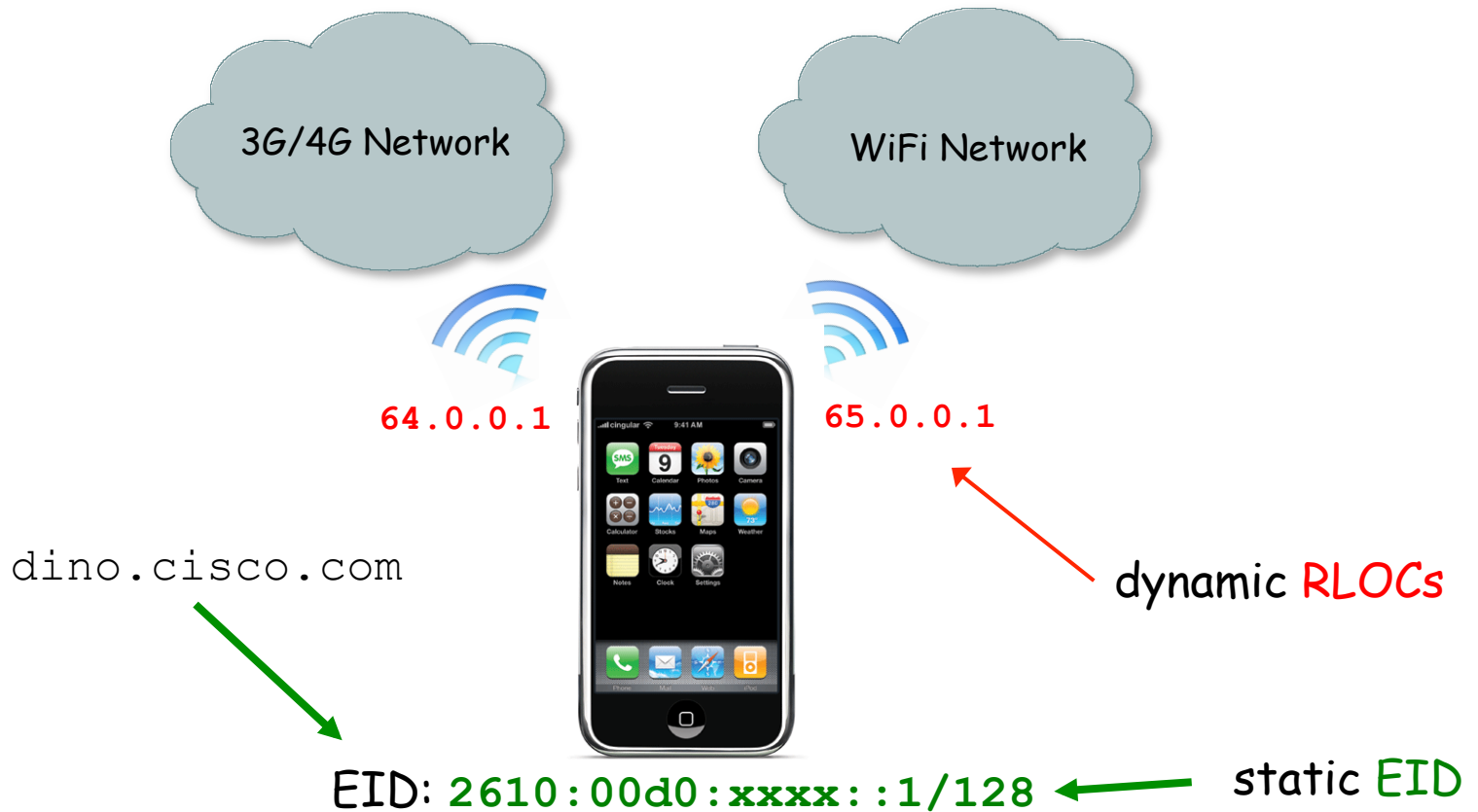
This phone is a LISP site!

LISP Mobile-Node Mobility

EID-prefix: **2610:00d0:xxxx::1/128**

Map-Server: **64.1.1.1**

64.0.0.1 **wifi**

65.0.0.1 **3G**

**(1) 2 MNs can roam and stay connected
(2) MNs can be servers
(3) MNs roam without changing DNS entries
(4) MNs can use multiple interfaces
(5) MNs can control ingress packet policy
(6) Faster hand-offs
(7) Low battery use by MS proxy-replying
(8) And most importantly, packets have stretch of 1 so latency is best for delay sensitive applications**

LISP-MN can scale to 1 billion hand-sets!

Implementation Details

- Android and Linux LISP-MN available
  - Supports IPv4 or IPv6 EIDs
- Design Goals
  - Minimize direct kernel changes
  - Architect for robustness
  - Minimize network stack complexity
  - Code for flexibility

Futures

- Faster Handoffs
- Add LISP-SEC to LISP-MN
- Use Geo Coordinates for RLOC selection
- More multi-homing capabilities
- LISP-MN roaming in and out of LISP sites
- LISP-MN with NAT-Traversal
- Augment pilot network for LISP-MN
  - Experiment with concurrent end-point roaming
  - Experiment with new mapping database systems

LISP is here now!

- With real implementation experience!
- With real deployment experience!
- With real customer engagement!
- Has been that way for several years
- http://www.lisp{4,6}.net
- http://lisp.cisco.com
- lisp@ietf.org
- lisp-support@cisco.com