Announcing Prefixes

RFC 8505 ++

Pascal Thubert

IETF 113

Remote

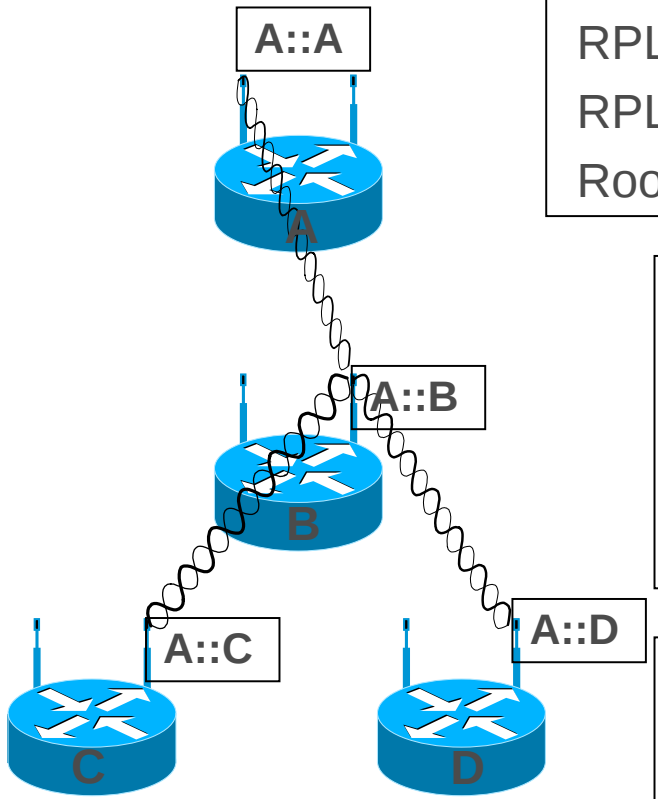
6LoWPAN ND (IPv6 Stateful Address Autoconfiguration)

- RFC 6775 (original 6LoWPAN ND)
  - Defines ARO for registration and DAD operations for stateful AAC
- RFC 8505 (extended 6LoWPAN ND)
  - Extends ARO, updates the registration procedure
  - Allows registering to network services inc. proxy
- RFC 8928 (Address Protection for ND)
  - Secures ownership and enables SAVI
- RFC 8929 (Backbone Router – proxy ND)
  - Defines a proxy ND operation. Updates EDAR to transport ND options such as SLLAO.
- draft-thubert-6lo-unicast-lookup (Unicast Address lookup on backbone)
  - Allows the 6LBR to respond to lookups and saves broadcasts
- draft-ietf-6lo-multicast-registration (Anycast and Multicast Address Registration)
  - Registers anycast and multicast addresses (in addition to unicast per RFC 8505

Redistributing RFC 8505 in routing ?

- **Already done for host routes with the “R” flag**
  - e.g., RFC 9010 into RPL, or even RFC 8929 into IPv6 ND
  - Also draft-thubert-bess-secure-evpn-mac-signaling using BGP, or RIFT
  - Provides a host / router interface that is agnostic to the IGP beyond the router

Multi-link Subnet Routing (non-storing mode)



Parent is default GW, propagates root PIO (L-bit off)
Parent Address in the PIO (with R bit)
RPL Router autoconfigures Address from parent PIO
RPL Router advertises Address via Parent to Root
Root recursively builds a Routing Header back

C:
::/0 via **A::B**
A::B connected
A::C self
A:: ~onlink

D:
::/0 via **A::B**
A::B connected
A::D self
A:: ~onlink

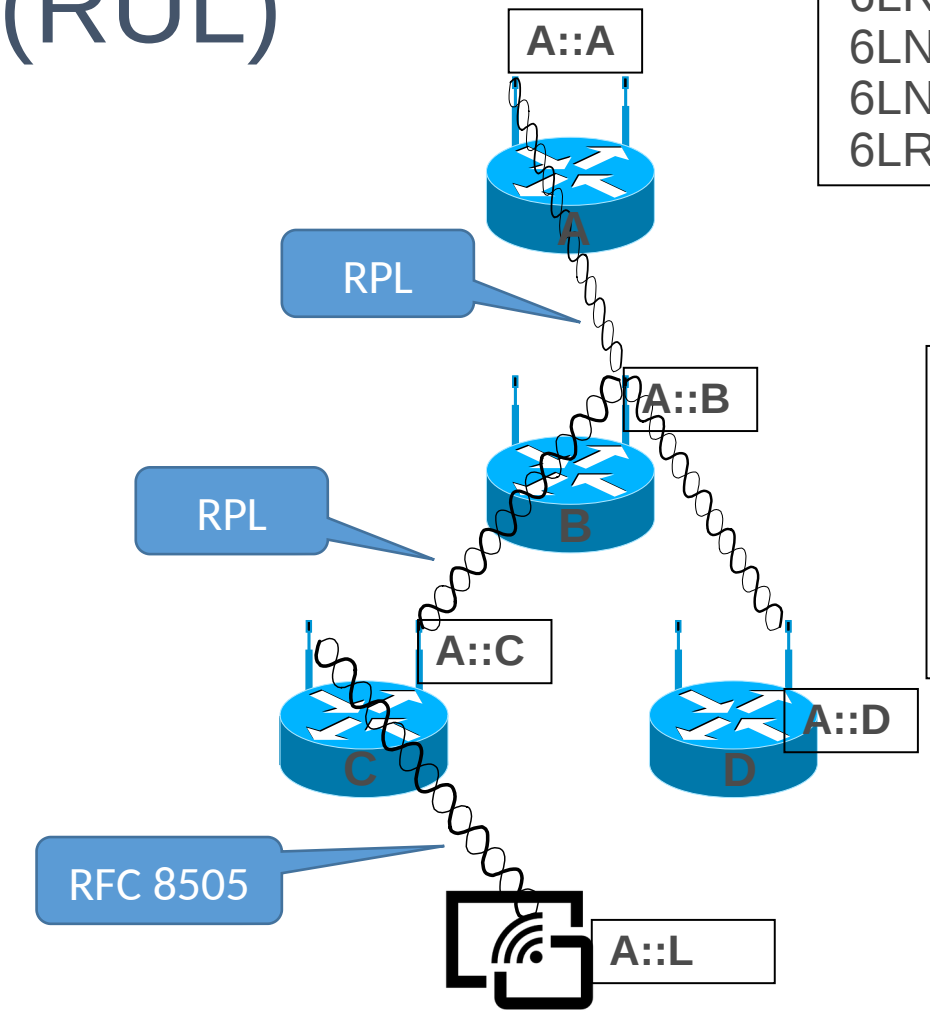
B:
::/0 via **A::A**
A::A connected
A::B self
A:: ~onlink

Target A::C via Transit A::B

A: (root)
A::A self
A::B connected
A::C via **A::B**
A::D via **A::B**
A:: ~onlink

A::C via **A::B** connected

RFC 9010 (RUL)



6LR advertises A:: in RAs
6LN autoconfigures A::L
6LN registers A::L with « R » flag set
6LR injects the address as external host route in RPL

C:
::/0 via A::B
A::B connected
A::C self
A:: ~onlink

Target A::L via
Transit A::C (Ext)

A: (root)
A::A self
A::B connected
A::C via A::B
A::L via A::C
A::D via A::B
A:: ~onlink

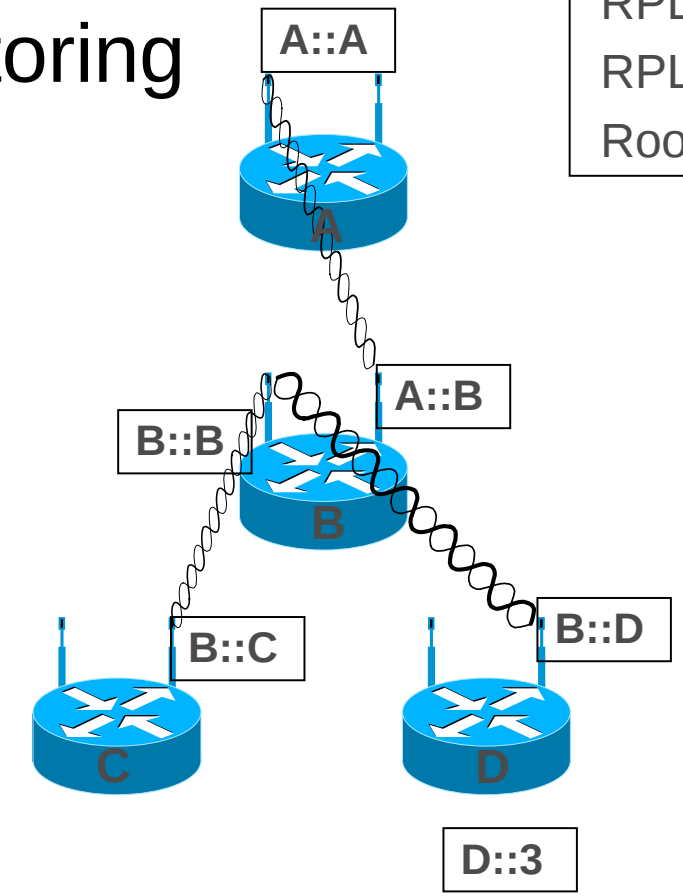
A::L via A::C via A::B connected

But… prefixes?

- **Hosts may own prefixes**
  - Network in Node / recursive networking
  - Kubernetes / Private IPv4 realms

Owned prefix routing (non-storing mode)

Parent is default GW, advertizes owned PIO (L bit on)
RPL Router autoconfigures Address from parent PIO
RPL Router advertises Prefix via Address to Root
Root recursively builds a Routing Header back



C:
::/0 via B::B
B:: connected
C:: connected

Target C::/ via
Transit B::C

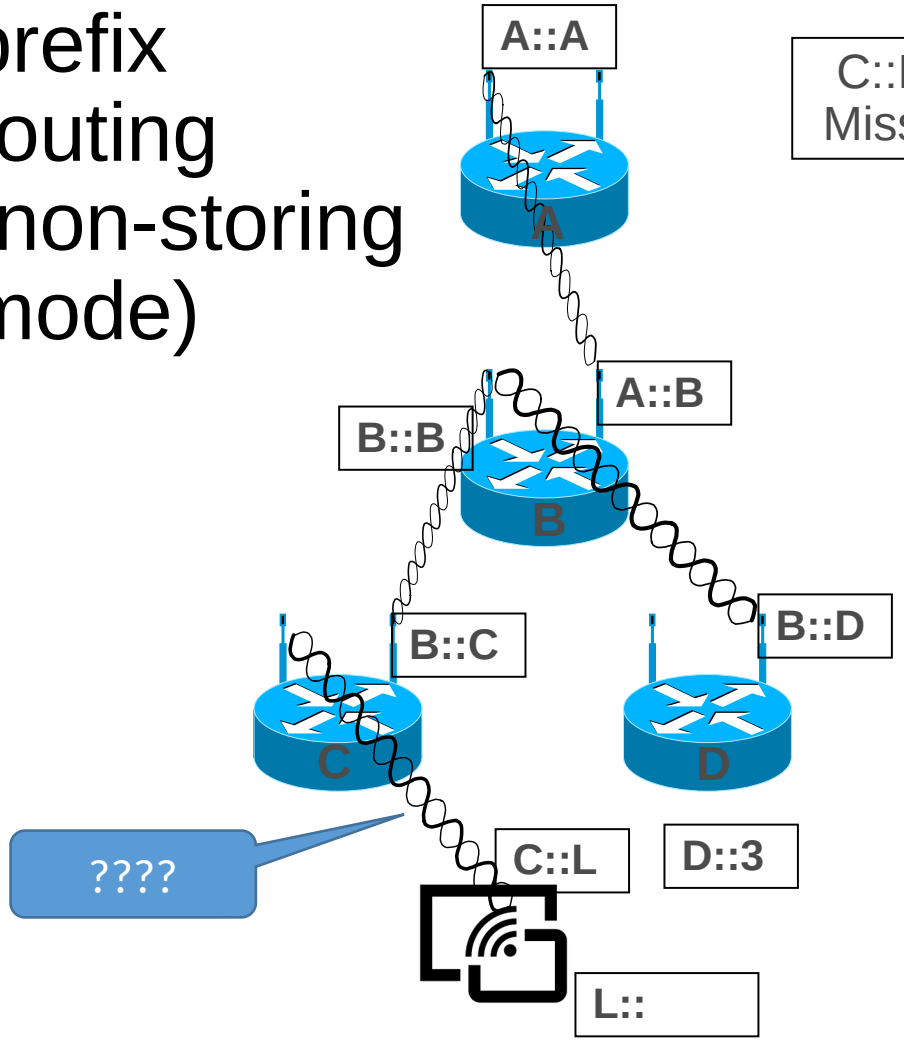
B:
::/0 via A::A
A:: connected
B:: connected

A: (root)
A:: connected
B:: via A::B
C:: via B::C
D:: via B::D

D:
::/0 via B::B
B:: connected
D:: connected

D::3 via B::D via A::B connected

Owned prefix routing (non-storing mode)



C::L is reachable but L:: is not
Missing equivalent of RFC 8505/9010 for prefixes

C:
::/0 via B::B
B:: connected
C:: connected

Target C::/ via
Transit B::C

A: (root)
A:: connected
B:: via A::B
C:: via B::C
D:: via B::D

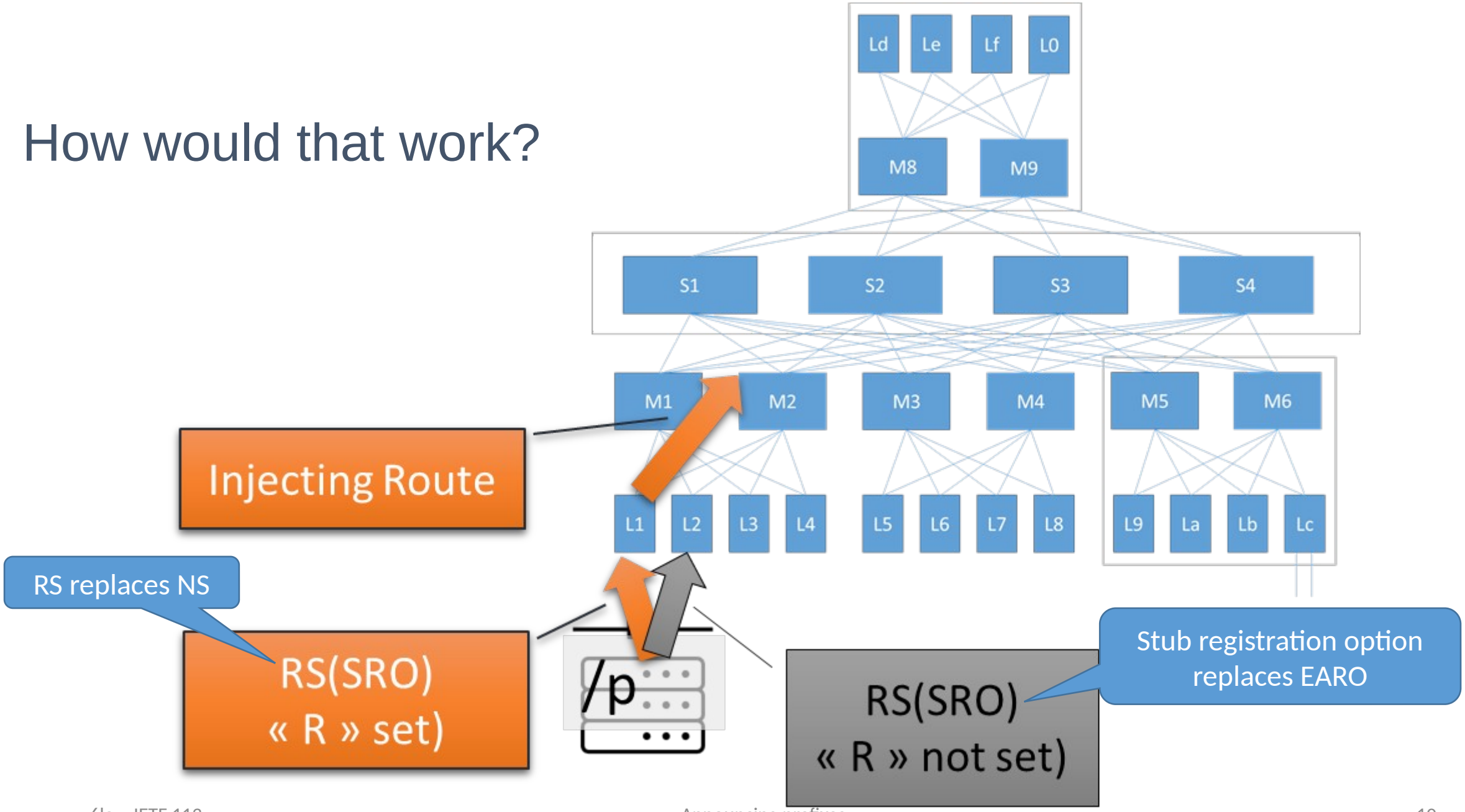
L:: unreachable

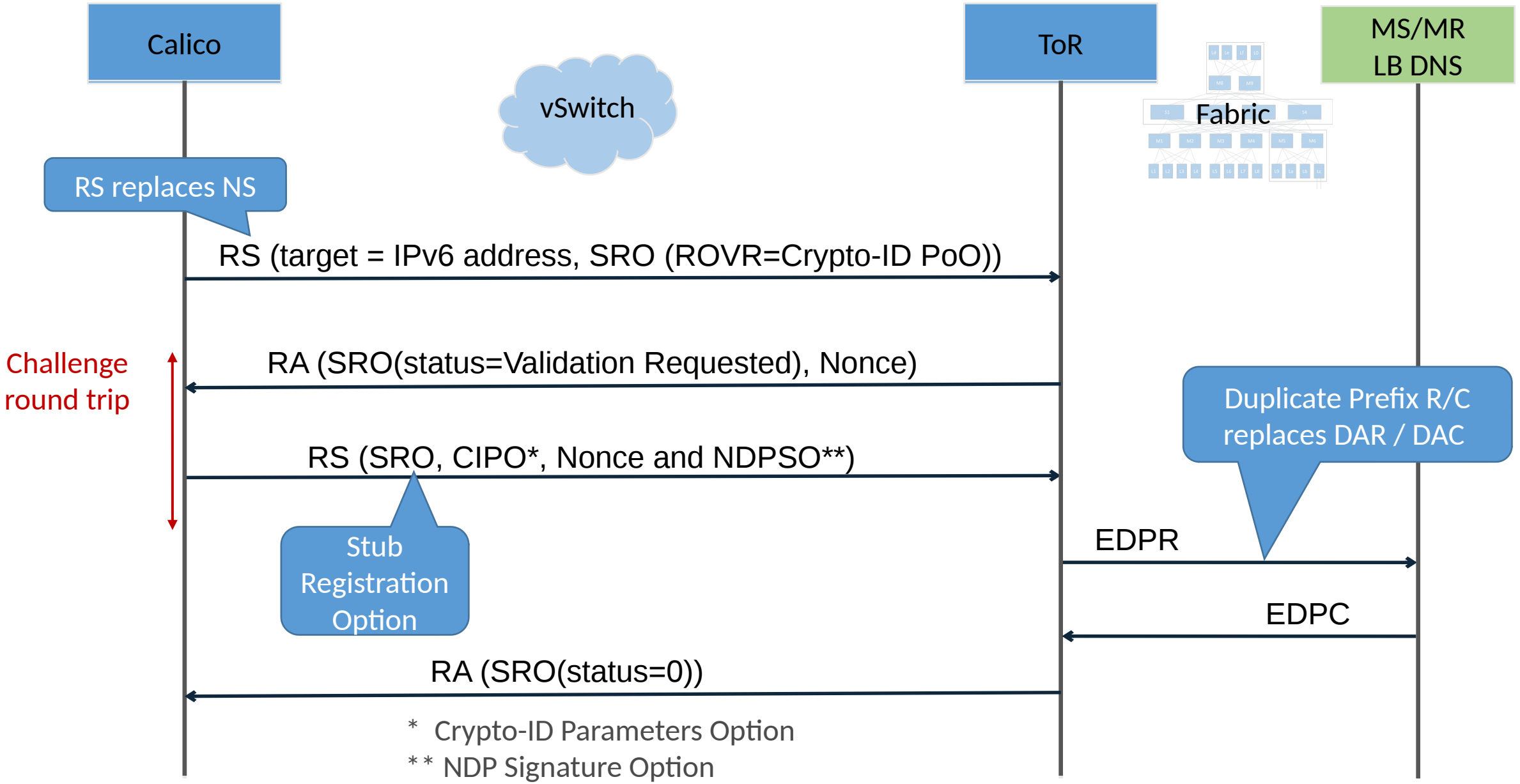
C::L via B::C via A::B connected

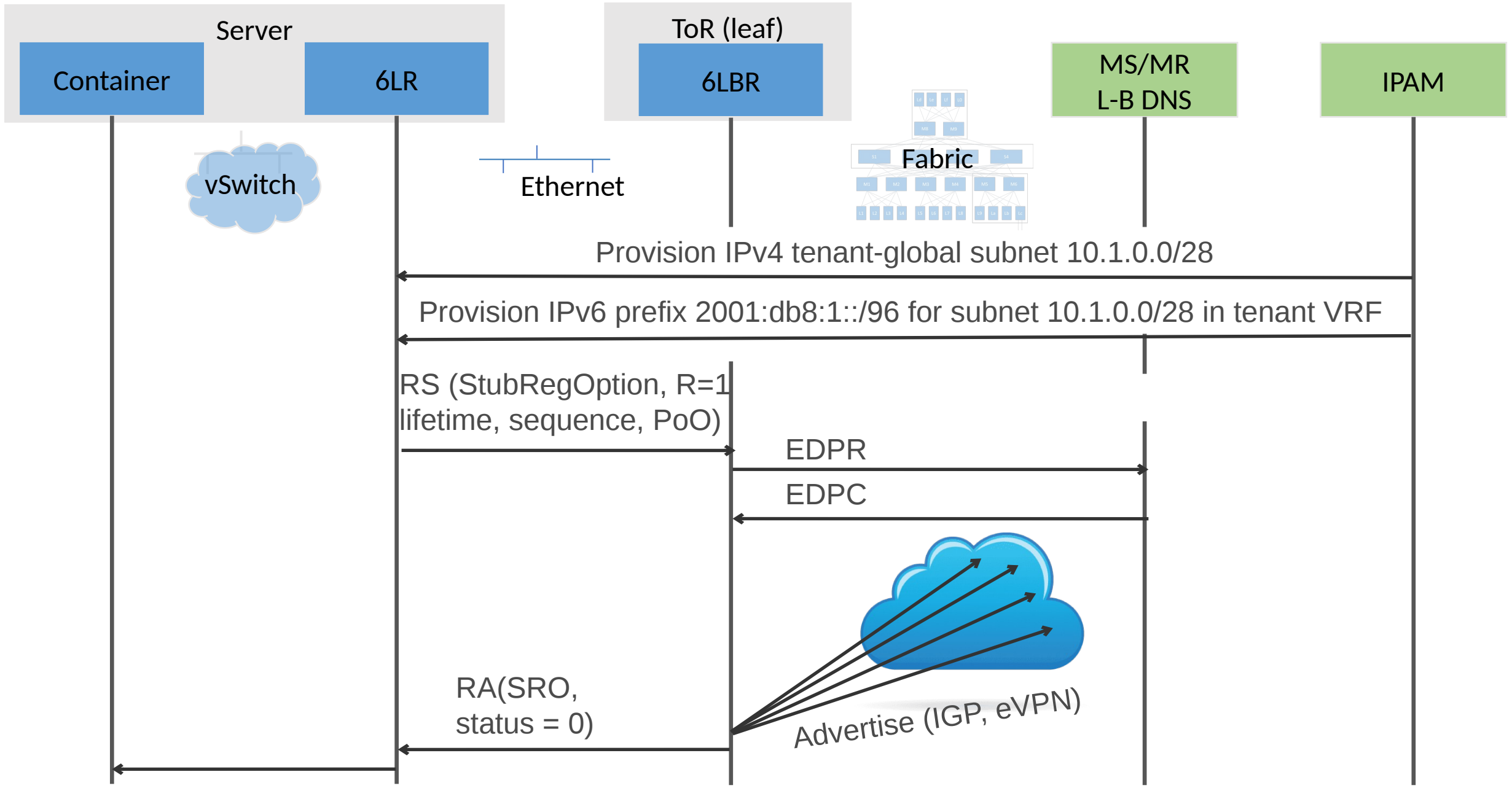
What becomes of DAD?

- **Need to consider prefix aggregation and nesting**
  - Provisioned Mobile Networks should be unique
  - Auto-allocation?

How would that work?




Calico
vSwitch
ToR
Fabric
MS/MR
LB DNS
RS replaces NS
RS (target = IPv6 address, SRO (ROVR=Crypto-ID PoO))
Challenge
round trip
RA (SRO(status=Validation Requested), Nonce)
Duplicate Prefix R/C
replaces DAR / DAC
RS (SRO, CIPO*, Nonce and NDPSO**)
Stub
Registration
Option
EDPR
EDPC
RA (SRO(status=0))
* Crypto-ID Parameters Option
** NDP Signature Option


Server
Container
6LR
ToR (leaf)
6LBR
MS/MR
L-B DNS
IPAM
vSwitch
Ethernet
Fabric
Provision IPv4 tenant-global subnet 10.1.0.0/28
Provision IPv6 prefix 2001:db8:1::/96 for subnet 10.1.0.0/28 in tenant VRF
RS (StubRegOption, R=1
lifetime, sequence, PoO)
EDPR
EDPC
RA(SRO,
status = 0)
Advertise (IGP, eVPN)

Sorry, getting gory…

- Adding stub prefix advertisement vs. host today
  - Indicate prefix type e.g., a /96 to embed an IPv4 address
  - Proof of ownership (PoO) per RFC 8928
- Adding policy / ACLs
  - Signal partial micro-segmentation (offload), who can talk to me
- Adding metrics to influence load balancing
  - worker capacity (clusters / containers)
  - Access bandwidth /
  - multihoming / preferred interface / anycast
- Tenant ID / VRF ID / RPL instanceID
  - Route tags, RH

Go? No-Go?

Ask

- Should we go for it
  - Indicate prefix type e.g., a /96 to embed an IPv4 address
  - Proof of ownership (PoO) per RFC 8928