6LoWPAN ND (IPv6 Stateful Address Autoconfiguration)

**RFC 6775** (original 6LoWPAN ND)
Defines ARO for registration and DAD operations for stateful AAC

**RFC 8505** (Issued 11/2018)
The protocol agnostic registration for ULA/GUA for proxy ND and routing services
Analogous to a Wi-Fi association but at Layer 3: a deterministic and query-able state for all addresses

**RFC 8929** (Issued 11/2020)
Federates 6lo meshes over a high-speed backbone
ND proxy analogous to Wi-Fi bridging but at Layer 3

**RFC 8928** (Issued 11/2020)
Protects addresses against theft (Crypto ID in registration)

**draft-ietf-6lo-multicast-registration**
Extends RFC 8505 for multicast and anycast

**draft-thubert-6lo-unicast-lookup**
Provides a 6LBR on the backbone to speed up DAD and lookup
Coexistence with classical ND

**draft-thubert-6lo-prefix-registration**
Extends RFC 8505 for prefixes
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
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
Let it be for prefixes!

- Hosts may own prefixes -> and routers may connect to prefixes
  - Network in Node / recursive networking
  - Kubernetes / Private IPv4 realms
  - Directly connected (no routing)
Owned prefix routing (non-storing mode)

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

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

IGP e.g., RPL

????
Serving SNAC Use Case 1: Shared Link

1) Register P2
2) Route via 6LR2
3) Redirect P2::g
Serving SNAC  Use case 2: Hub and Stubs

1) Register P2

2) Inject P2

3) Route via 6LR2
Provision IPv6 prefix 2001:db8:1::/96 for subnet 10.1.0.0/28 in tenant VRF

Provision IPv4 tenant-global subnet 10.1.0.0/28

RS (StubRegOption, R=1 lifetime, sequence, PoO)

RA (SRO, status = 0)

Also: Cloud/Fabric
What becomes of DAD?

• Need to consider prefix aggregation and nesting
  • Provisioned Mobile Networks should be unique
  • Auto-allocation?
Secured Registration flow

RS or NS?

6LN

Access link

6LR

NS (target = IPv6 address, EARO (ROVR=Crypto-ID PoO))

NA (EARO(status=Validation Requested), Nonce)

NS (EARO, CIPO*, Nonce and NDPSO**) - EARO becomes A stub registration

NA (EARO(status=0))

* Crypto-ID Parameters Option
** NDP Signature Option

Extend or replace DAR / DAC?

EDAR

EDAC

LLN

MS/MR LB DNS

Challenge round trip
Could do’s

• 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 preference to influence load balancing
  • worker capacity (clusters / containers)
  • Access bandwidth /
  • multihoming / preferred interface / anycast

• Tenant ID / VRF ID / RPL instanceID
  • Route tags, RH
Ask

• SNAC interest for common work with 6lo?
• IPv4 using /96?
  • Indicate prefix type e.g., a /96 to embed an IPv4 address
• Proof of ownership (PoO) per RFC 8928