

# IPv6 over Wireless and Wireless ND (WiND)

**draft-thubert-6man-ipv6-over-wireless**

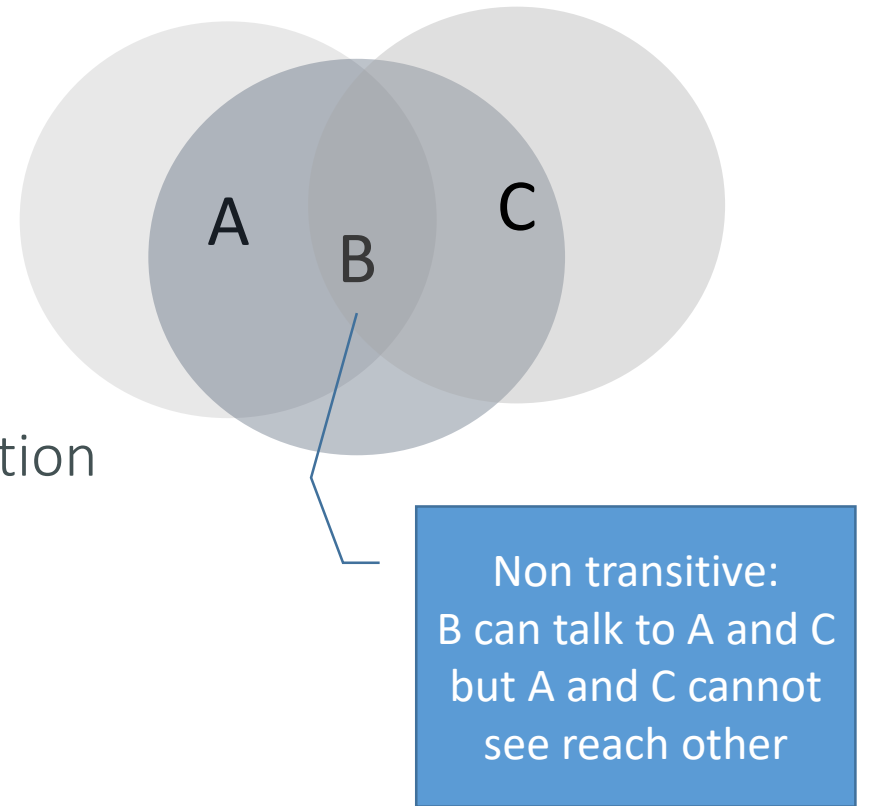
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# Unmet expectations

- IPv6 ND is designed for P2P and Transit Links
  - Wireless is natively non-transitive
  - Requires extensions for NBMA or L2 transit emulation
- L2 transit emulation is not wireless friendly
  - L2R, learning bridges, Wi-Fi Infrastructure Mode
  - Broadcast intensive (no support for multicast)
- Other mismatches
  - Fast Roaming 'r' (ND has no sense of order of events)
  - Intermittent Connectivity (fails all of NUD, DAD and lookup)
  - Fast Initial Link Setup 'ai' (ND is reactive, causes loss of first packets)
  - Increased sensitivity to DoS attacks (Use ND to trigger broadcasts remotely)

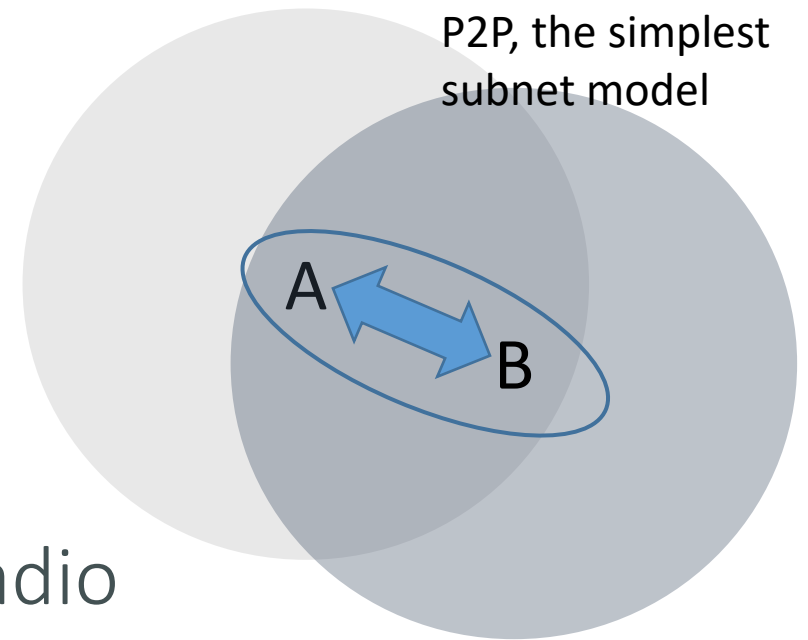


# RFC 8505 registration vs. 802.11 association

- Association allows a proactive setting of the bridging state
  - Allows the APs to eliminate broadcast lookups
  - Compares to reactive learning bridge
- WiND
  - Reproduces the association model at L3
  - Leverages the state for address protection and SAVI
  - Routing inside the subnet replaces bridging
  - Proxy ND at the wire / wireless edge

# Link and Link Local

- A radio Interface connects to a physical radio broadcast domain
  - An IPv6 bidirectional Link is created where radio broadcast domain overlap enough that A sees B and B see A.
  - LLAs need to be unique for a communicating pair for a lifetime.
  - The IPv6 Link is usually reflexive though often asymmetrical
  - The IPv6 Link is usually not transitive unless special measures taken
  - As a node moves, it meets other nodes and IPv6 Links are formed
- => No way to do DAD once and for all on a radio interface

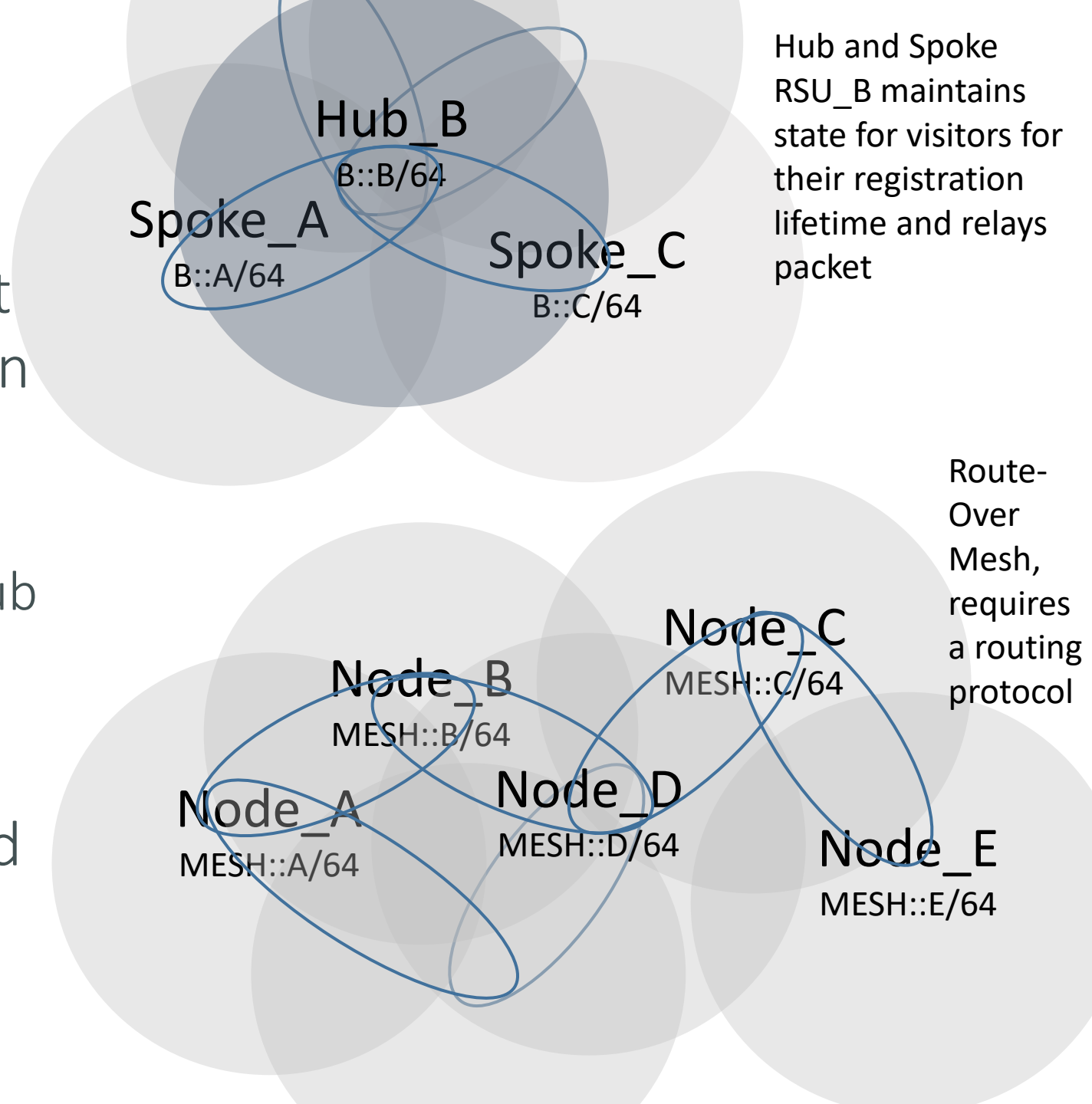


# NBMA SubNet models

A subnet may overlap - or not with a radio broadcast domain

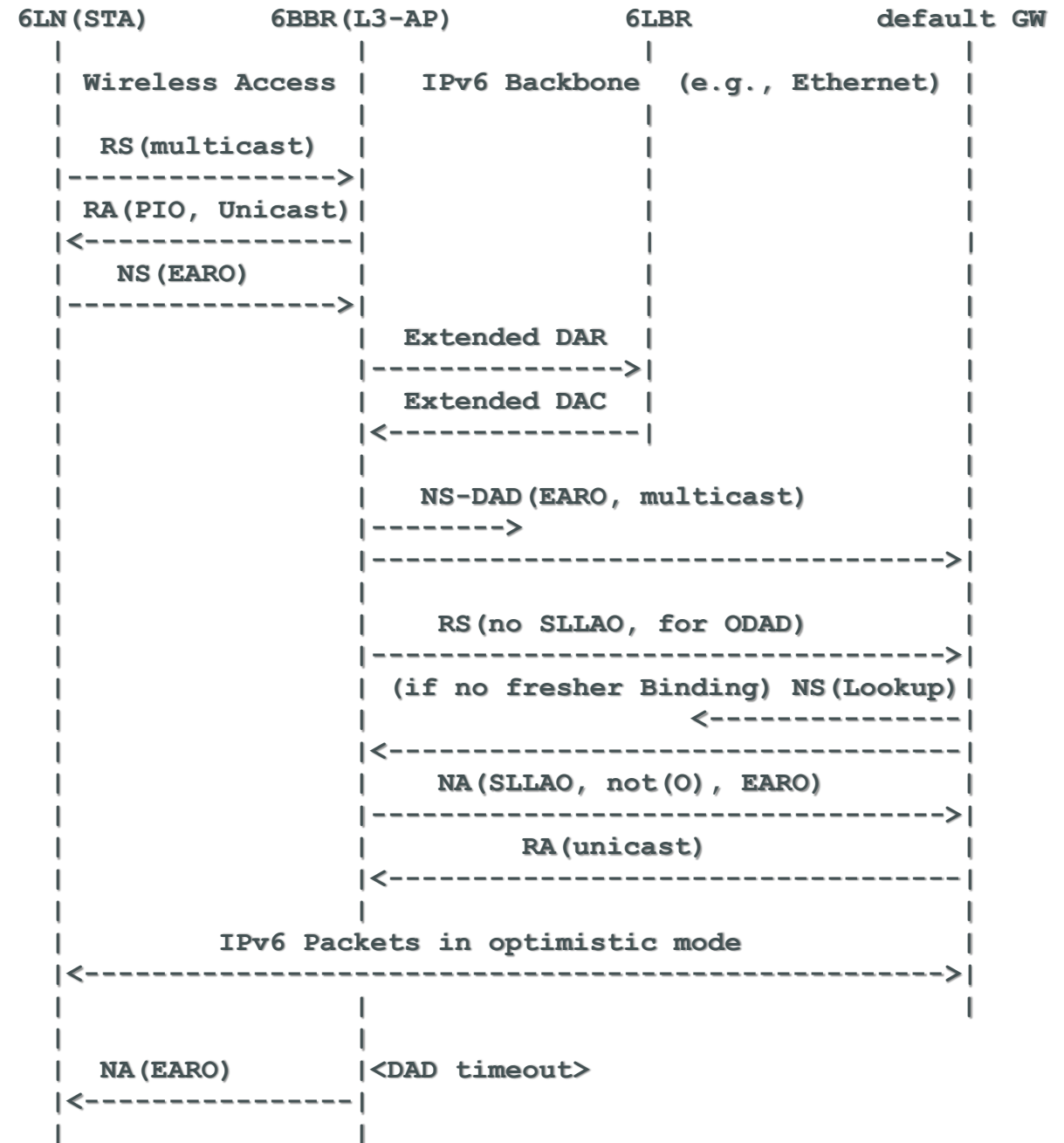
- A P2P subnet is smaller
- Hub and Spoke matches the radio bcast domain of the Hub
- A route-over mesh is larger

A central registrar for the subnet for DAD, collapsed and reachable over multihop on the Hub if H&S.



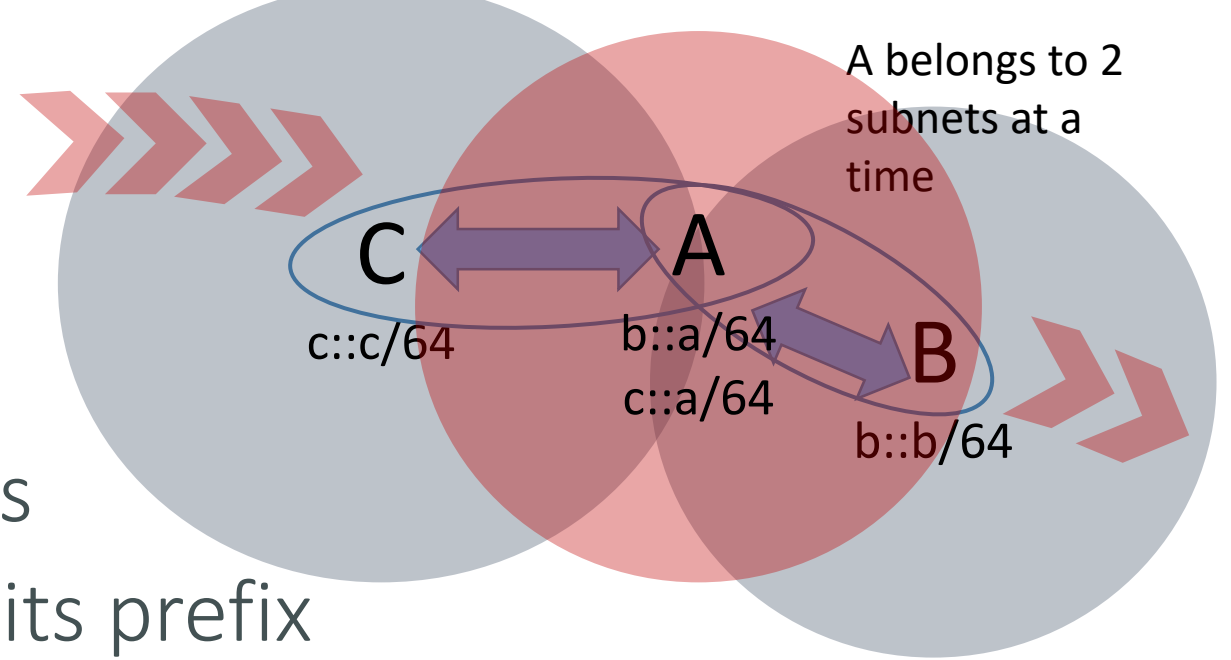
# General Design

- Registration for guaranteed service
  - Even with intermittent connectivity
  - DAD protection on behalf for lifetime
  - Extensible for lookup
- Routing vs. Bridging Proxy
  - Bridging advertises the SLLA of the 6LN
  - Routing hides the 6LN and routes
  - Routing keeps L2 stable
- Model
  - Link is broadcast domain
  - Subnet <> Link
    - => Not on-link and routing



## Other Things to Adjust

- Matching source IP to router
  - E.g., 1 car attached to 2 RSUs
  - Each RSU enforcing SAVI for its prefix
  - Providing reachability back to a CoA based on its prefix
- Aggressive DNA (Detecting Network attachment)
  - Rapid discovery (advertisement interval option in RA)
  - Permanently assess reachability of DRL and prune rapidly
  - May reuse a GUA if come back within reg. lifetime



# 6lo standard work



A proactive setting of proxy/routing state to avoid multicast due to reactive Duplicate address detection and lookup in IPv6 ND

- [RFC 8505](#) (Issued 11/2018)
  - The registration mechanism for proxy and routing services
  - Analogous to a Wi-Fi association but at Layer 3
- [draft-ietf-6lo-backbone-router](#) (WGLC complete 1/25)
  - Federates 6lo meshes over a high-speed backbone
  - ND proxy analogous to Wi-Fi bridging but at Layer 3
- [draft-ietf-6lo-ap-nd](#) (WGLC complete 3/26)
  - Protects addresses against theft (Crypto ID in registration)
- [draft-thubert-6lo-unicast-lookup](#)
  - Provides a 6LBR on the backbone to speed up DAD and lookup
- [draft-thubert-6man-ipv6-over-wireless](#) (new draft)
  - IPv6 ND vs. WiND applicability to wireless networks

A blue starburst shape with a white border, containing the text 'NEW DRAFT' in white capital letters.

NEW  
DRAFT



# Status

- Triggered by IPWAVE IPv6-over-OCB, need a baseline for wireless
- Inherit from 10 years of work at 6lo, millions of nodes deployed
- draft-thubert-6man-ipv6-over-wireless-03 out
- Discusses radio broadcast domain, native and emulated
- Introduces WiND, compares to ND on native MAC (no emulation)
- Discusses applicability / use cases
- Next rev on host and routers behavior, e.g., matching router.

## Questions to the group

- Archiving value -> should we publish ?
- Transfer WiND to 6MAN for maintenance and extensions?
- Generalize RFC 8505 (and WiND suite) over non-6lo Link ?