# IPv6 over Bluetooth(R) Low Energy Mesh Networks

draft-gomez-6lo-blemesh-01

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# Motivation

- High momentum of Bluetooth Low Energy / Bluetooth Smart technology
  - Smartphones, wearables, tablets, notebooks, etc.
- Bluetooth 4.0
  - Star topology network
- Bluetooth 4.1
  - Extended topologies are possible
    - Interest e.g. in the smart home area
- IPv6 over Bluetooth Low Energy
  - RFC 7668
    - Bluetooth 4.1 and IPSP
  - Designed and optimized for a star topology network
  - Would fail to enable IPv6 over a BLE mesh network

# Status

- draft-gomez-6lo-blemesh-00
  - Presented in IETF'94 (Yokohama)
  - Approach
    - Make use of existing Bluetooth specs
      - Bluetooth 4.1 and IPSP
    - Reuse RFC 7668 when possible
  - A few TBDs left

- Rev -01 completes the gaps

# Section 3.3.2. Neighbor Discovery

- Router behavior for 6LRs and 6LBRs as per RFC 6775 (section 6)
  - However, in this spec: routers SHALL NOT use multicast NSs to discover other routers' link layer addresses
- Border router behavior is described in RFC 6775 (section 7)

# Section 3.3.4. Multicast mapping

- BLE link layer does not support multicast
  - Multicast to N neighboring nodes leads to unicasting N times
    - Problem for energy conservation
  - A router MUST keep track of neighboring multicast listeners
    - And MUST NOT forward multicast packets to neighbors that have not registered as listeners for multicast groups the packets are intended to

# Section 5. Security considerations

- RFC 7668 security considerations apply
- Routing protocol needed for BLE mesh network
  - Additional opportunities for threats and attacks
- RFC 7416
  - Systematic overview of threats and attacks on RPL
  - Guidance useful
    - For RPL and, partially, for other protocols
  - Routing protocol for BLE mesh
    - Not specified

# Minor updates

- Replaced ‘draft-ietf-6lo-btle’ with ‘RFC 7668’
- Few typos
- ‘Cleaned’ the references section

# Gaps completed…

**Ready for WG adoption?**

# Extra slides

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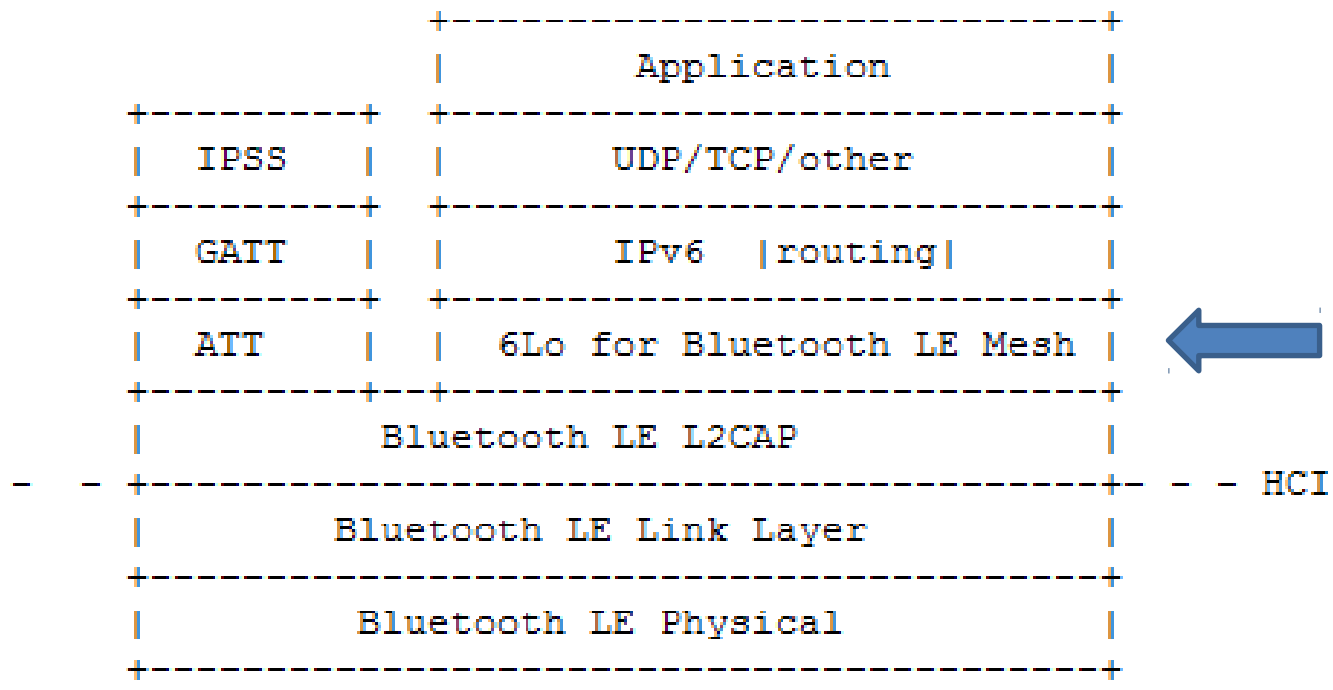
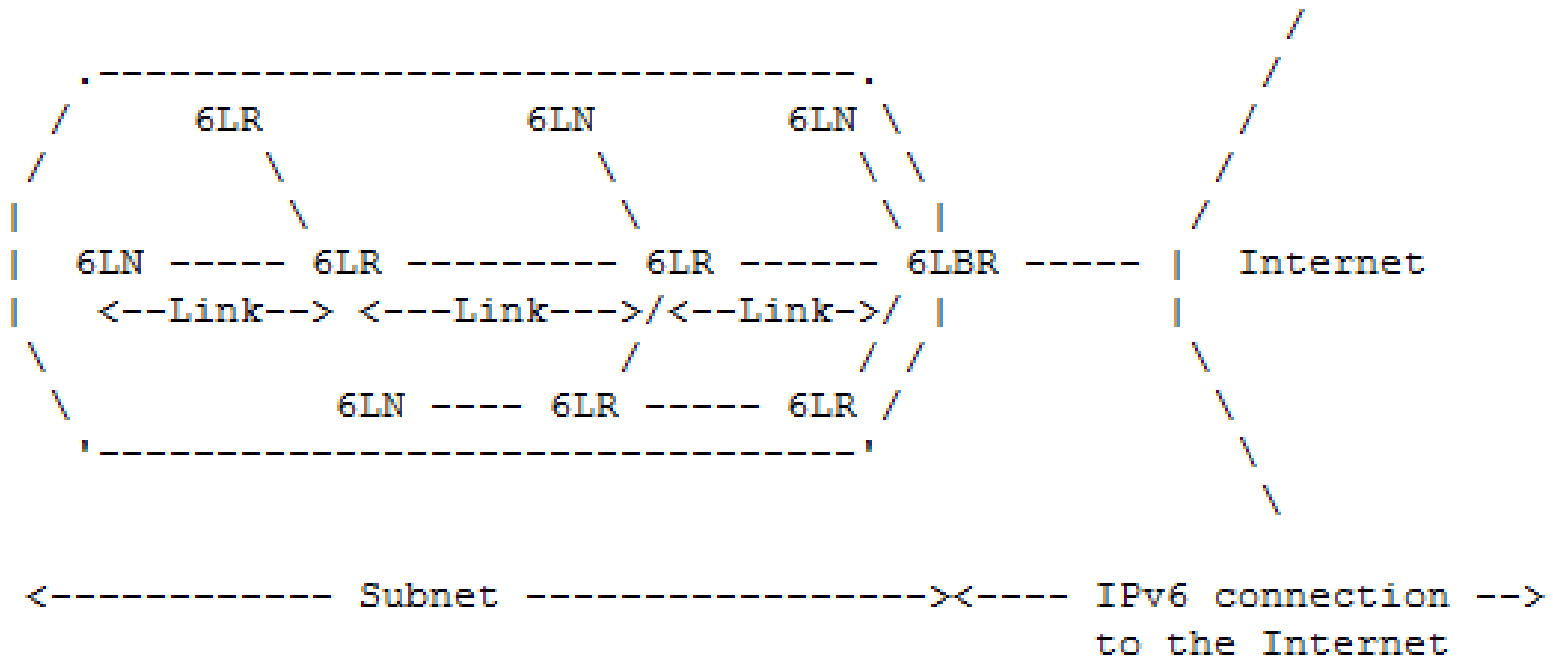
# Protocol stack and assumptions

- Network whereby link layer connections have been established between neighbors
  - IPSP for discovery and conn establishment



# Subnet model

- Multilink subnet
  - Route over routing
  - Routing protocol: out of the scope of this spec



# Link model

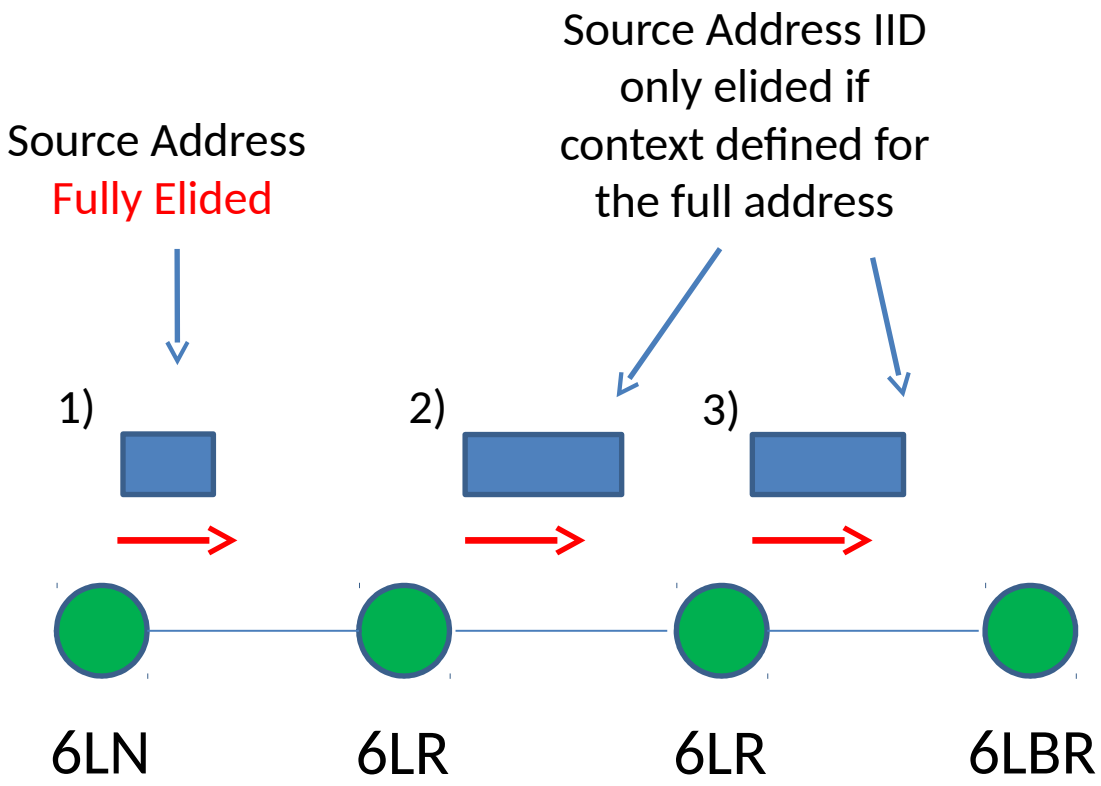
- Address autoconfiguration
  - Now, also 6LRs
  - As per RFC 7668
- Neighbor discovery
  - Now, also 6LRs
  - RFC 6775 functionality for route-over networks
  - Prefix and context distribution
  - Duplicate Address Detection

# Header compression (I/III)

- Based on RFC 6282 format
- 6CO included in RAs
  - Matching each address prefix advertised via PIO
- RFC 7668
  - Exploits star topology plus ARO
  - In a BLE mesh, only a subset of the optimizations are possible
    - Link-local interactions
      - Link-local address can be fully elided if based on Bluetooth device addr.
    - Non-link-local transmissions from 6LN
    - Non-link-local transmissions from a 6LN neighbor to a 6LN

# Header Compression (II/III)

- Non-link-local transmissions from a 6LN



# Header Compression (III/III)

- Non-link-local transmissions from a 6LN neighbor to a 6LN