North-Bound Distribution of Link-State and TE Information using BGP

draft-gredler-idr-ls-distribution-00
(was draft-gredler-bgp-te-01)

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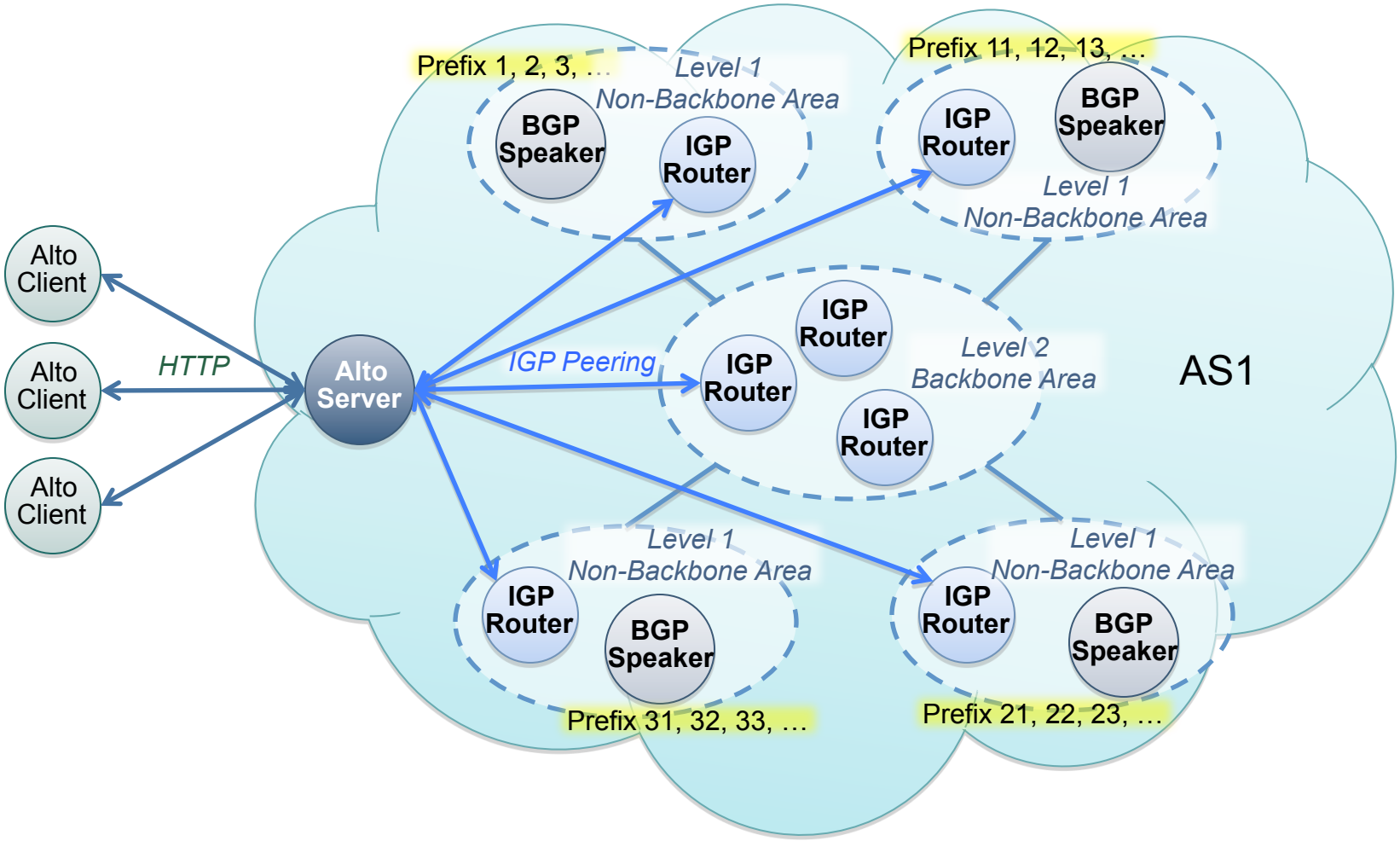
Motivation

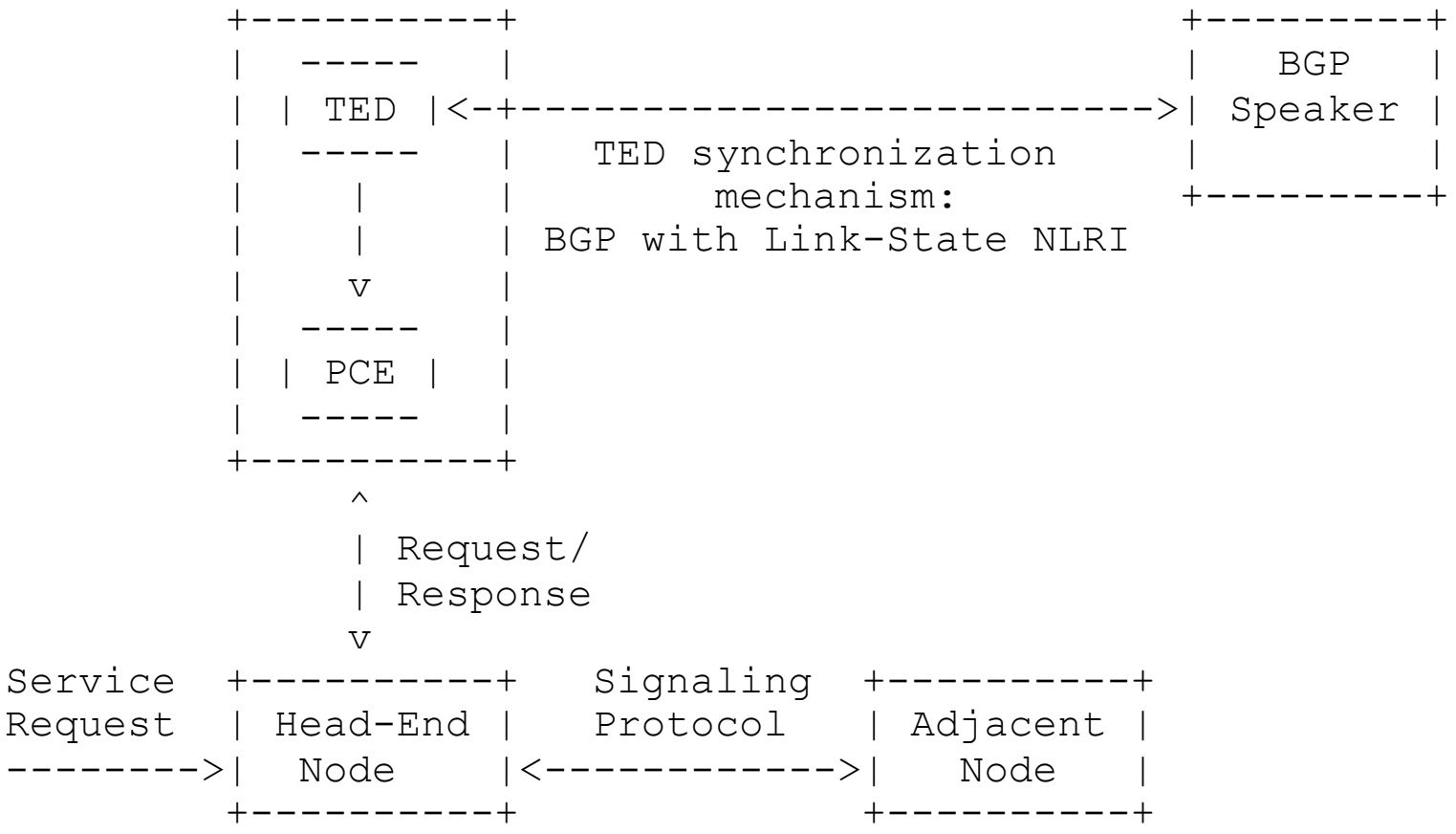
- Look across the "fence"
  - "Fence" being IGP area/level or AS boundary
- Gain visibility for application(s) which need ***complete*** topology data

Use case - Alto Servers: multi-area IGP topology



- ALTO server needs to know all areas topology
- Manually crafting of “IGP peering” topology is tedious and error prone

Use case: Path Computation Element



Note: ***No clash*** with PCE-WG as no TED sync protocol has been ever been specified, although the PCE architecture permits this.

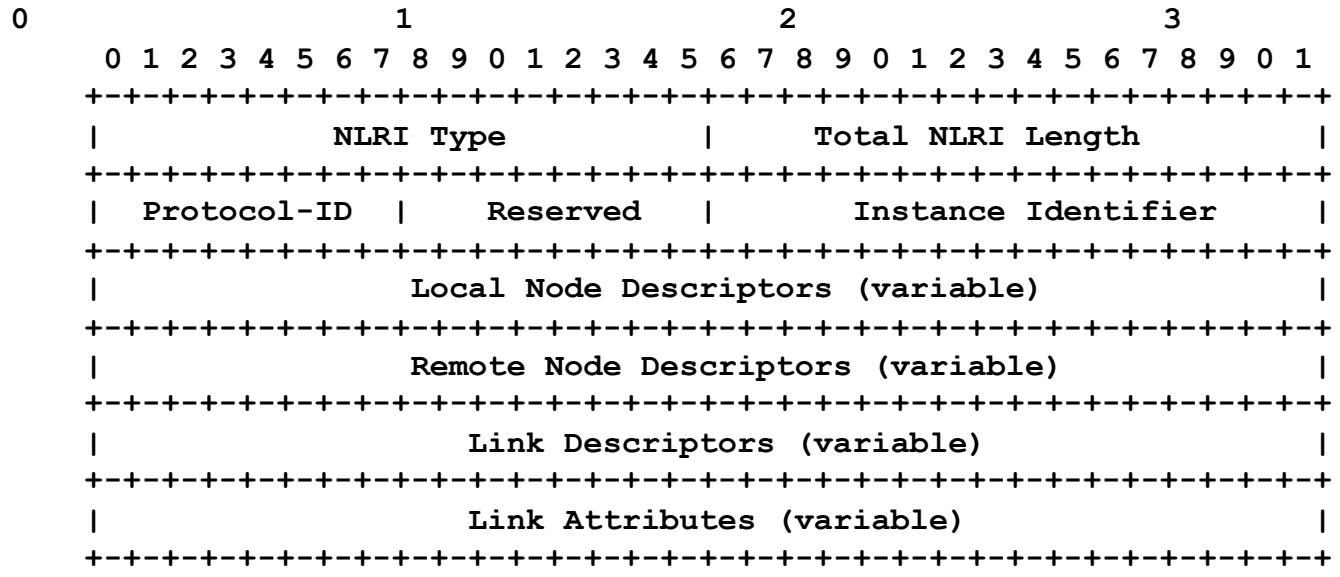
Major Changes since IETF81

- Support for Node attributes (Overload Bits, Capabilities)
- Support for Multiple protocols sharing a link
  - OSPF/ISIS Migration
  - Level 1,2 intra POP links
- Support for Multi- {Topology, Instance} extensions
- Added support for OSPF/IS-IS Area ID

Transcoding TE Link Info into BGP NLRI

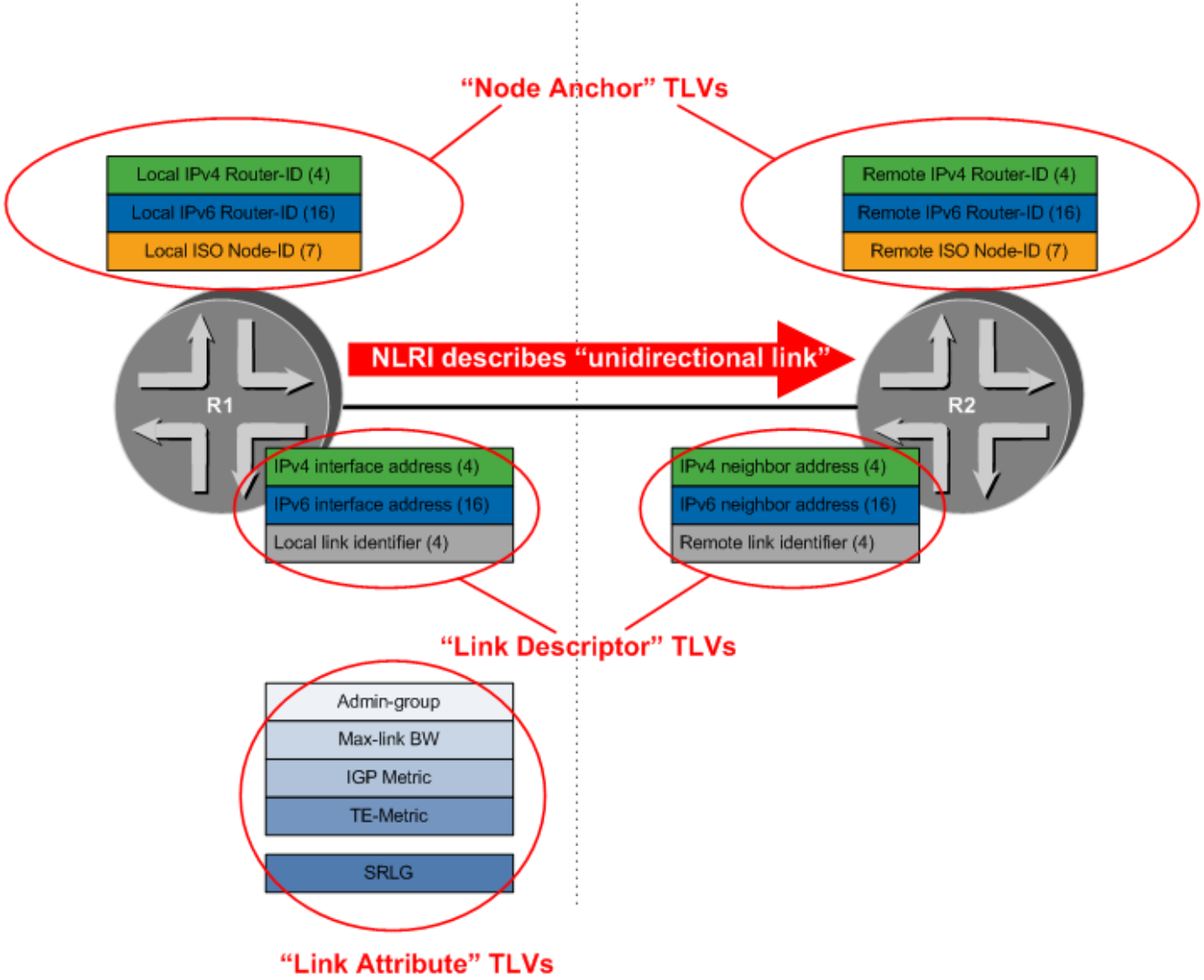
- Carried in
  - MP_REACH_NLRI
  - MP_UNREACH_NLRI
- Two NLRI types
  - Node
  - Link
    - Each NLRI describes a single link anchored by at least a pair of router-IDs
    - Link may be anchored by more than one pair of Router-IDs
- Negotiated between BGP speakers using BGP-MP Capability

Transcoding TE Link Info into BGP NLRI TED (SAFI 1)

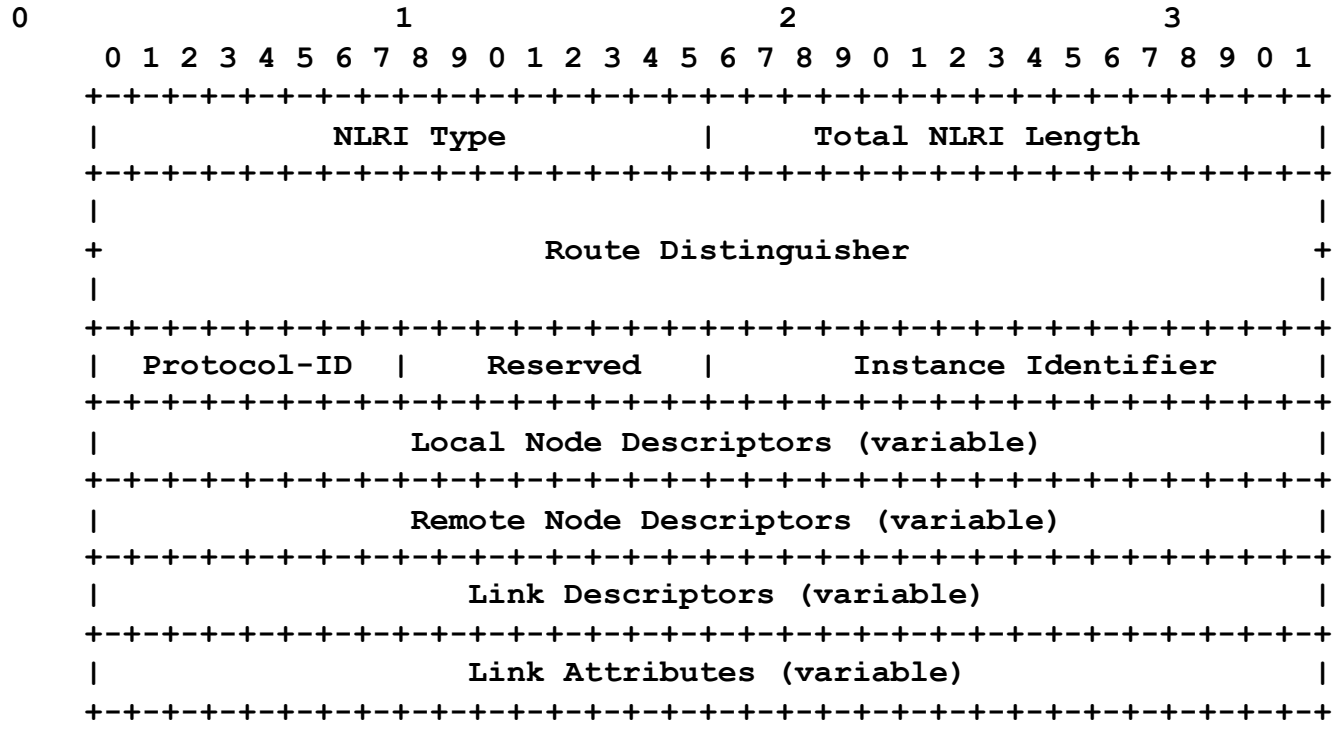


Node Anchor TLVs: describes which Protocols Router-IDs will "anchor" the link
Link Descriptor TLVs: uniquely identify a link between a pair of anchor Routers.
Link Attribute TLVs: describe the link properties

TED NLRI TLV Types



Transcoding TE Link Info into BGP NLRI TED (SAFI 128)



Route Distinguisher:
Node Anchor TLVs: describes which Protocols Router-IDs will "anchor" the link
Link Descriptor TLVs: uniquely identify a link between a pair of anchor Routers.
Link Attribute TLVs: describe the link properties

Node Anchors

Type	Description	Length
256	Local Autonomous System	4
257	Local IPv4 Router-ID	4
258	Local IPv6 Router-ID	16
259	Local ISO Node-ID	7
260	Remote Autonomous System	4
261	Remote IPv4 Router-ID	4
262	Remote IPv6 Router-ID	16
263	Remote ISO Node-ID	7

- **Local IPv4 Router ID:** opaque value (can be an IPv4 address or an 32 Bit router ID)
- **Remote IPv4 Router ID**: opaque value (can be an IPv4 address or 32 Bit router ID)
- **Local IPv6 Router ID**: opaque value (can be an IPv6 address or 128 Bit router ID)
- **Remote IPv6 Router ID**: opaque value (can be an IPv6 address or 128 Bit router ID)
- **Local ISO Node ID**: ISO node-ID (6 octets ISO system-ID plus PSN octet)
- **Remote ISO Node ID**: ISO node-ID (6 octets ISO system-ID plus PSN octet)
- **Local/Remote AS**: used to ***disambiguate*** Router-IDs allocated from private IP address spaces

Link Descriptors

Type	Description	Defined in:
4	Link Local/Remote Identifiers	[RFC5307], Section 1.1
6	IPv4 interface address	[RFC5305], Section 3.2
8	IPv4 neighbor address	[RFC5305], Section 3.3
12	IPv6 interface address	[RFC6119], Section 4.2
13	IPv6 neighbor address	[RFC6119], Section 4.3

- Encoding of 'Link Descriptor' TLVs i(Type Codepoints, Lengths, Values) same as Extended IS reachability TLV sub-TLVs (defined in RFC5305, RFC5307 & RFC6119)
- Link Descriptor TLVs can carry data sourced either by IS-IS or OSPF.

Node Anchor + Link descriptor form the key in the DB/RIB

Node Attributes

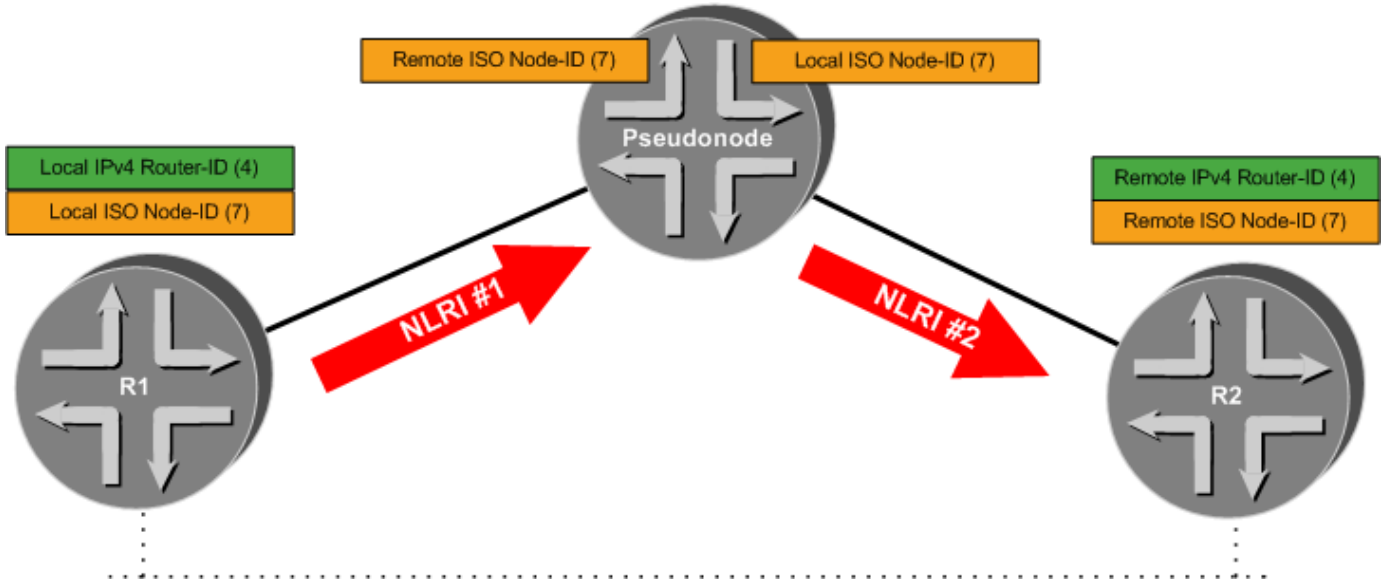
Type	Description	Length
229	Multi Topology	2
65515	Node Flag Bits	1
65516	OSPF Specific Node Properties	variable
65517	IS-IS Specific Node Properties	variable
65518	Node Area ID	variable

Most important is Node Flags Bits TLV (Overload etc.)

Next steps

- Feedback ?
- Accept as a WG item ?

Router-ID Anchoring Example ISO Pseudonode



- Broadcast LAN between a pair of routers:
  - “Real" (=non pseudonode) routers have both an IPv4 Router-ID and IS-IS Node-IDs
  - The pseudonode does not have an IPv4 Router-ID.
- Two unidirectional links being generated:
- NRLI #1for (R1, Pseudonode) encodes:
  - local IPv4 router-ID, local ISO node-ID and remote ISO node-id
- NLRI #2 for (Pseudonode, R2) encodes:
  - local ISO node-ID, remote IPv4 router-ID and remote ISO node-id.