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BORDER GATEWAY PROTOCOL NETWORK LAYER REACHABILITY INFORMATION NON-KEY DATA EXCHANGE

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ABSTRACT

Techniques are described herein for encoding non-key data along with each Network Layer Reachability Information (NLRI) packed in a Border Gateway Protocol (BGP) Update message. This may be useful to increase the NLRI packing efficiency of the Update message when the NLRIs have unique path information associated therewith, or when only a subset of NLRIs have some path information associated therewith. A number of use cases may be employed to take advantage of this mechanism.

DETAILED DESCRIPTION

Border Gateway Protocol (BGP) Network Layer Reachability Information (NLRI) formats for different address families are, for the most part, fixed and not extensible to add new prefix-specific information. When an NLRI has some unique path information that is not shared with other NLRIs which is represented as an attribute, it must be packed and advertised in its own unique Update message. This can result in a large number of Update messages when there are a large number of NLRIs. This represents a significant scaling challenge for BGP update generation.

Accordingly, described herein is a mechanism that allows BGP speakers to advertise an Update message packed with multiple NLRIs (or prefixes), each of which may be associated with unique path information along with other shared attributes. This mechanism enables a method of extended NLRI encoding. Two peers may exchange Update messages in the extended NLRI format based on negotiation of an "NLRI Non-Key (NNK)" Capability during session establishment. This Capability may be deployed per address family.

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When the NNK Capability has been exchanged for a particular address family, the NNK data is prepended before each and every NLRI formatted in the Update message. This only applies for reachable prefixes and not for unreachable/withdrawn prefixes.

Figures 1 and 2 below depict the high level encoding.

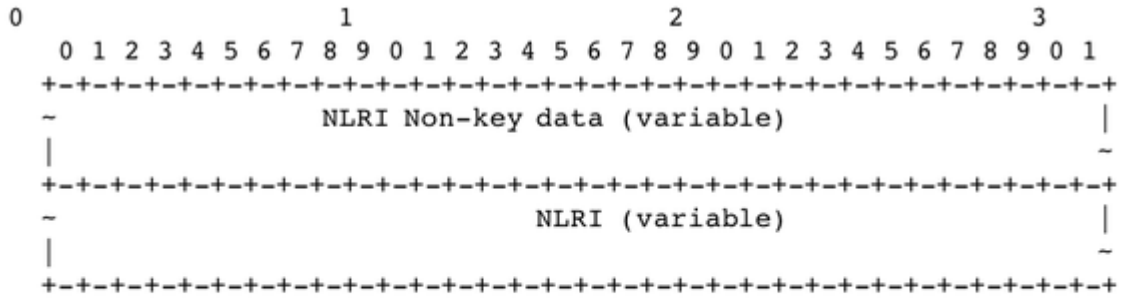

Figure 1: "NLRI Encoding extended with Non-key Data"

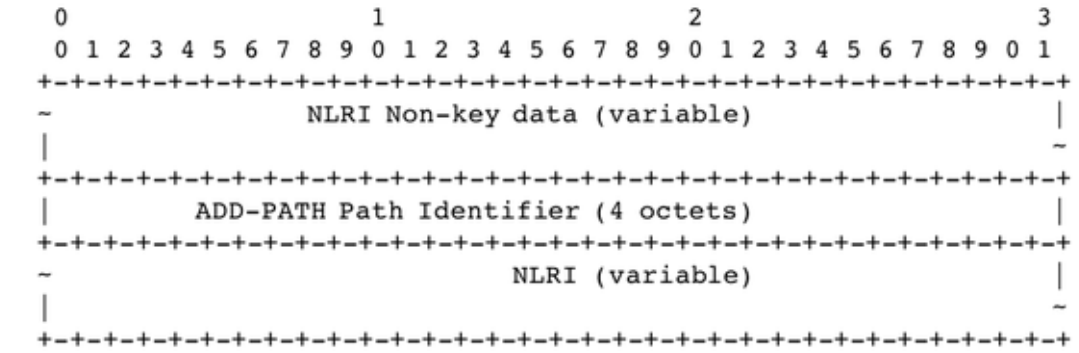

Figure 2:
"NLRI Encoding extended with ADD-PATH Path-Identifier and Non-key Data"

The NNK data itself, when present, is formatted as a set of Type-Length-Value (TLV) blocks. Each TLV includes a particular type of prefix-specific non-key path information.

Figure 3 below illustrates the detailed encoding.

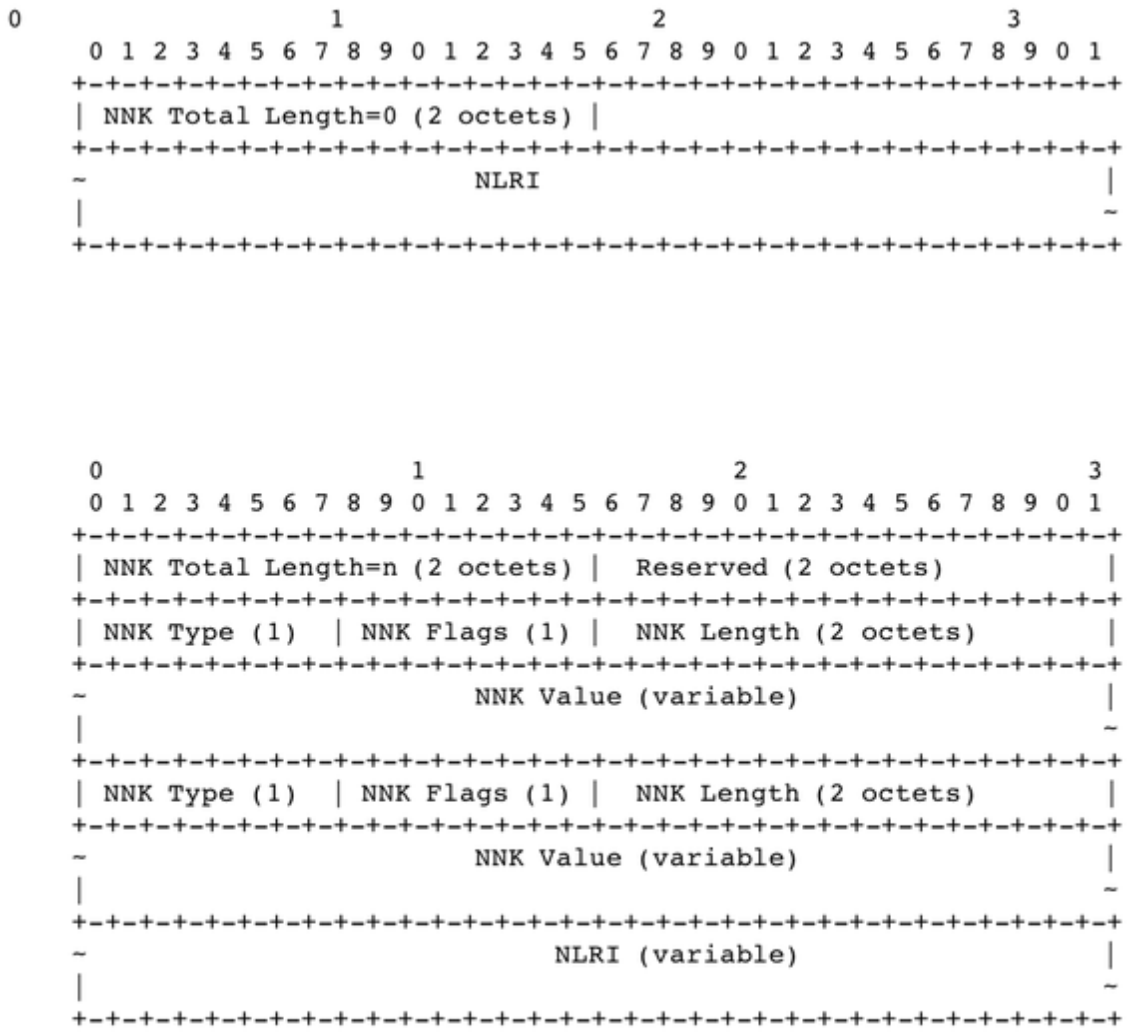

Figure 3: "NLRI Non-key Data Format"

Examples of encoding prefix-specific data (existing or to-be-defined) include: Multiprotocol Label Switching Segment Routing (SR-MPLS) label index values; encrypted attributes (e.g., Autonomous Systems (AS) path, route-target extended communities, etc.); secure tunneling information; non-key data of new route types added to existing address families (e.g., Ethernet Virtual Private Network (EVPN), Mobile Virtual Private Network (MVPN), etc.); and path tracking information (e.g., router identifier, Autonomous System Number (ASN), etc.).

In summary, techniques are described herein for encoding non-key data along with each NLRI packed in a BGP Update message. This may be useful to increase the NLRI packing efficiency of the Update message when the NLRIs have unique path information associated therewith, or when only a subset of NLRIs have some path information associated therewith. A number of use cases may be employed to take advantage of this mechanism.