

**IPv6 RA Options for Multiple Interface Next Hop Routes**  
**draft-sarikaya-mif-6man-ra-route-02**

Abstract

This draft defines new Router Advertisement options for configuring next hop routes on the mobile or fixed nodes. Using these options, an operator can easily configure nodes with multiple interfaces (or otherwise multi-homed) to enable them to select the routes to a destination. Each option is defined together with definitions of host and router behaviors.

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## **1. Introduction**

IPv6 Neighbor Discovery and IPv6 Stateless Address Autoconfiguration protocols can be used to configure fixed and mobile nodes with various parameters related to addressing and routing [[RFC4861](#)], [[RFC4862](#)], [[RFC4191](#)]. DNS Recursive Server Addresses and Domain Name Search Lists are additional parameters that can be configured using router advertisements [[RFC6106](#)].

Router Advertisements can also be used to configure fixed and mobile nodes in multi-homed scenarios with route information and next hop address. Different scenarios exist such as the node is simultaneously connected to multiple access network of e.g. WiFi and 3G. The node may also be connected to more than one gateway. Such connectivity may be realized by means of dedicated physical or logical links that may also be shared with other users nodes such as in residential access networks.

## **2. Terminology**

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [[RFC2119](#)].



### **3. Default Route Configuration**

A host, usually a mobile host interested in obtaining routing information usually sends a Router Solicitation (RS) message on the link. The router, when configured to do so, provides the route information using zero, one or more Next Hop Address and Route Information options in the router advertisement (RA) messages sent in response.

The route options are extensible, as well as convey detailed information for routes.

RS and RA exchange is for next hop address and route information determination and not for determining the link-layer address of the router. Subsequent Neighbor Solicitation and Neighbor Advertisement exchange can be used to determine link-layer address of the router.

It should be noted that the proposed options in this document will need a central site-wide configuration mechanism. The required values can not automatically be derived from routing tables.

Next hop address and related route information may be provided by some other means such as directly by the next hop routers. In this document we assume that next hop routers are not able to provide this information. One solution would be to develop an inter-router protocol to instigate the next hop routers to provide this information. However, such a solution has been singled out due to the complexities involved.

### **4. Host Configuration**

Router advertisement options defined in this document are used by Type C hosts.

As defined in [[RFC4191](#)] Type C host uses a Routing Table instead of a Default Router List.

### **5. Router Configuration**

The router MAY send one or more Next Hop Address options that specify the IPv6 next hop addresses. Each Next Hop Address option may be associated with zero, one or more Route Prefix options that represent the IPv6 destination prefixes reachable via the given next hop. Router includes Route Prefix option in message to indicate that given prefix is available directly on-link.



Router MAY send a single Next Hop Address without any Route Prefix options. When router sends Next Hop Address option that is associated with Router Prefix option, the router MUST use Next Hop and Route Prefix option defined in [Section 8](#). The Route Prefix MAY contain ::/0, i.e. with Prefix Length set to zero to indicate available default route.

6. Route Prefix option

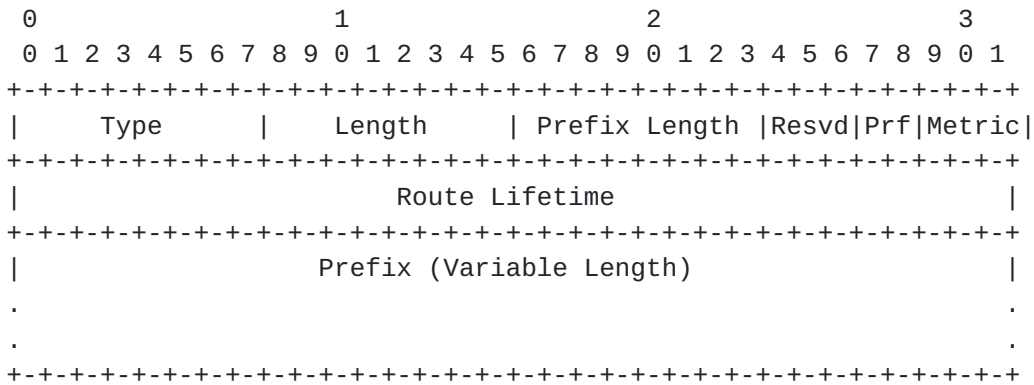


Figure 1: Route Prefix option

Fields:

Type: TBD.

Length: The length of the option (including the Type and Length fields) in units of 8 octets.

Other fields are as in [\[RFC4191\]](#) except:

Metric Route Metric. 3-bit signed integer. The Route Metric indicates whether to prefer the next hop associated with this prefix over others, when multiple identical prefixes (for different next hops) have been received.

7. Next Hop Address option

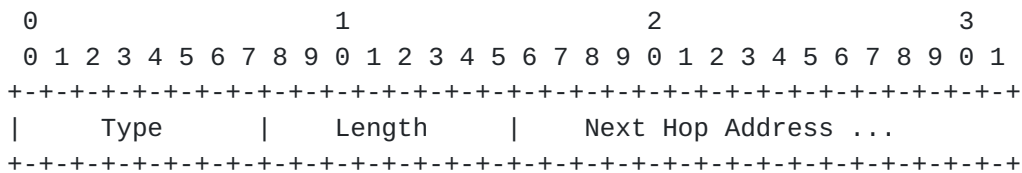


Figure 2: Next Hop Address option





Fields:

Type: TBD.

Length: The length of the option (including the type and length fields) in units of 8 octets. It's value is 3.

Next Hop Address: An IPv6 address that specifies IPv6 address of the next hop. It is 16 octets in length.

8. Next Hop Address with Route Prefix option

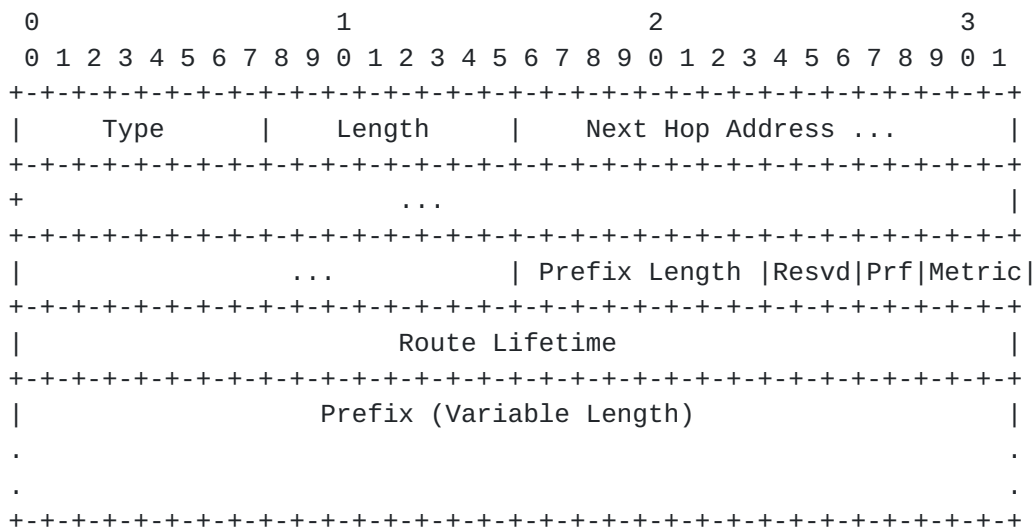


Figure 3: Next Hop Address with Route Prefix option

Fields:

Type: TBD.

Length: The length of the option (including the type and length fields) in units of 8 octets. For example, the length for a prefix of length 16 is 5.

Other fields are as in [Section 6](#) and [Section 7](#).

9. Security Considerations

Neighbor Discovery is subject to attacks that cause IP packets to flow to unexpected places. Because of this, neighbor discovery messages MUST be secured, possibly using Secure Neighbor Discovery (SEND) protocol [[RFC3971](#)].



**10. IANA Considerations**

Authors of this document request IANA to assign three new RA options:

Option Name	Type
Route Prefix	
Next Hop Address	
Next Hop Address and Route Prefix	

Table 1:

**11. Acknowledgements**

Brian Carpenter provided comments that have led to improvements in the document. We are also grateful to Zhen Cao for his comments.



## **12. References**

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