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Source Address Dependent Route Information Option for Router  
Advertisements  
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## Abstract

This document defines the Source Address Dependent Route Information option for Router Advertisements, enabling source address dependent routes to be installed in hosts by neighboring routers. It also adds a new flag to the existing Route Information option for backward compatibility purposes.

## Status of This Memo

This Internet-Draft is submitted in full conformance with the provisions of [BCP 78](#) and [BCP 79](#).

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## [1.](#) Introduction

Hosts may have multiple non-link-local addresses, possibly provided by different routers located on one or multiple links. In such situations, hosts must make sure packets with a given source address are sent to the right next-hop router. Failing in selecting the right next-hop router may, at best, induce sub-optimal routing and, at worst, cause the packet to be dropped ([[RFC2827](#)]). Rules 5 and 5.5 from the default address selection algorithm [[RFC6724](#)] make sure that, once the next-hop is chosen, care is taken to pick the right source address. Nevertheless, these rules may fail in some situations, e.g., when the same prefix is advertised on the same link by different routers. Additionally, they don't handle situations where the application picks the source-address before sending the packet.

This document defines the Source Address Dependent Route Information Option for Router Advertisements [[RFC4861](#)], enabling source address dependent routes to be installed in hosts by neighboring routers. It also adds a new flag to the Route Information Option meaning that the option may be ignored by hosts implementing this specification.

## 2. Source Address Dependent Route Information Option

This section defines a new Router Advertisement option called the Source Address Dependent Route Information option. Its use is similar to the Route Information option defined in [\[RFC4191\]](#) but also

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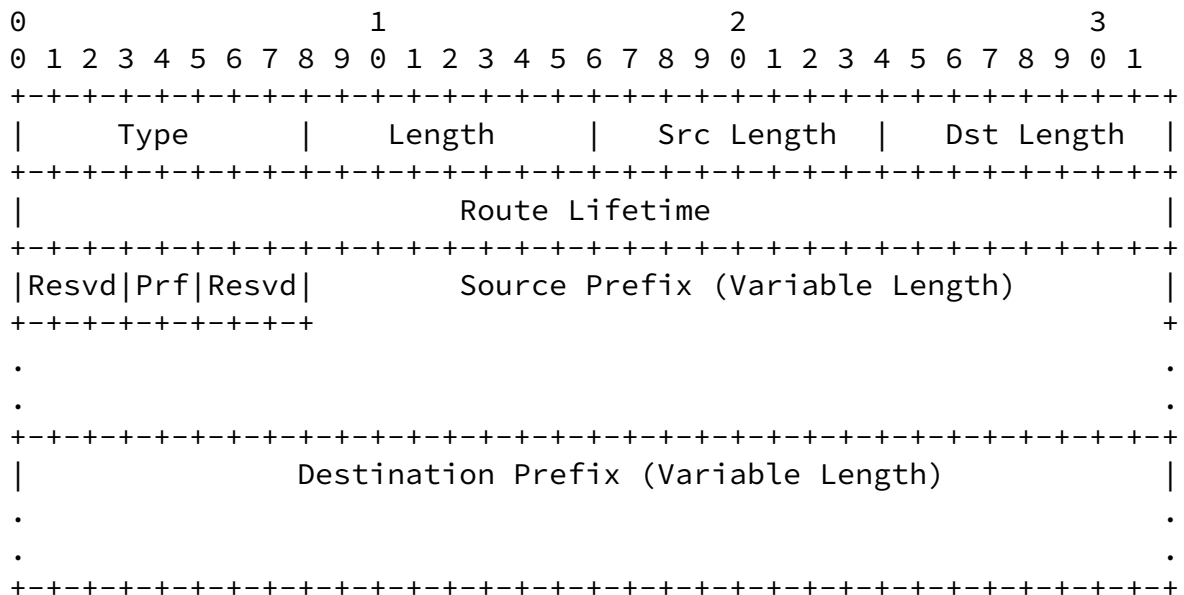
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includes additional source prefix fields, allowing source address dependent routes to be installed on hosts receiving the Router Advertisement.



### Source Address Dependent Route Information Option

Type: To be defined by IANA.

Length: The length of the option (including the Type and Length fields) in units of 8 octets. It ranges from 2 to 6.

Src Length: The number of significant bits in the Source Prefix field.

Dst Length: The number of significant bits in the Destination Prefix field.

Route Lifetime: Time in seconds (relative to the time the packet is sent) that the prefix is valid for route determination. A value





2. The same destination prefix.
3. The next-hop router address equal to the source address of the received Router Advertisement.
4. The outgoing interface equal to the interface the Router Advertisement is received on.

If no routing entry is found and the Route Lifetime is not null, insert a routing entry with the given source prefix, destination prefix, route preference, having as next-hop the source address of the received Router Advertisement, on the interface receiving the packet. If the Route Lifetime is not infinity, set the routing entry timer to the Route Lifetime value.

If a routing entry is found and the Route Lifetime is not null, cancel the associated timer. If the Route Lifetime is not infinity, set it to the Route Lifetime value. Finally, update the entry preference with the Route Preference value.

If a routing entry is found and the Route Lifetime is null, remove the routing entry.

If both destination and source prefixes specified by the option are `::/0`, the router preference and route lifetime present in the option

override the default router lifetime and default router preference present in the header of the Router Advertisement.

#### [4.2.](#) Receiving Route Information option

When receiving a Route Information option, a host **MUST** behave as follows:

If the I bit is set, ignore the option.

Otherwise, act as when receiving a Source Address Dependent Route Information option with source prefix length set to zero.

### [5.](#) Router Behavior

Routers MAY send one or multiple Source Address Dependent Route Information options in their Router Advertisements.

Routers MUST NOT send multiple Route Information options with the same Prefix (no matter what the Ignore flag value is) or multiple Source Address Dependent Route Information options with the same Source and Destination Prefixes. Additionally, routers MUST NOT send a Route Information option with the Ignore bit not set and a Source Address Dependent Route Information with the source length equal to zero if the Prefix from the Route Information option is equal to the Destination Prefix from the Source Address Dependent Route Information option.

The Ignore bit is used to configure hosts implementing this specification differently from other types of hosts (A, B or C). Different combinations will result in different behaviors. For instance:

When injecting a source address dependent route is desired, a Source Address Dependent Route Information option is sent in every RA. Depending on the context, a Route Information with the same prefix and the Ignore bit set MAY be sent as well in order to inject non source address dependent route into type C hosts. Obviously, Source Address Dependent Route Information options can be used to inject non-source dependent routes as well. This technique and the use of the Ignore bit allow type C hosts and hosts implementing this specification to be configured with independent routes.

When injecting a non source address dependent route is desired, the router MAY either use a Route Information option with the Ignore flag not set, in which case type C hosts as well as hosts implementing this specification will be configured, or use a

Source Address Dependent Route Information option with a source prefix `::/0`, in which case type C hosts will not be configured.

When a Source Address Dependent Route Information option is removed from the set of advertised options, the router SHOULD send multiple unsolicited Router Advertisements with the Route Lifetime set to zero.

## 6. Security Considerations

This document allows routers to configure neighboring hosts with source address dependent routing entries. Based on [[RFC4191](#)], attackers can inject default routes to type A and B hosts as well as destination address dependent routes to type C hosts. The Source Address Dependent Route Information option adds the ability for attackers to inject even more specific routes, making attacks slightly harder to detect.

## 7. IANA Considerations

IANA is kindly asked to reserve a Router Advertisement option type to be used by the Source Address Dependent Route Information option.

## 8. Acknowledgments

The author would appreciate reviews and comments.

## 9. References

### 9.1. Normative References

- [RFC4191] Draves, R. and D. Thaler, "Default Router Preferences and More-Specific Routes", [RFC 4191](#), November 2005.
- [RFC4861] Narten, T., Nordmark, E., Simpson, W., and H. Soliman, "Neighbor Discovery for IP version 6 (IPv6)", [RFC 4861](#), September 2007.

### 9.2. Informative References

- [RFC2827] Ferguson, P. and D. Senie, "Network Ingress Filtering: Defeating Denial of Service Attacks which employ IP Source Address Spoofing", [BCP 38](#), [RFC 2827](#), May 2000.
- [RFC6724] Thaler, D., Draves, R., Matsumoto, A., and T. Chown, "Default Address Selection for Internet Protocol Version 6 (IPv6)", [RFC 6724](#), September 2012.



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