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Communication between Software CEs with shared addresses
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Abstract

In some Software mechanisms, multiple Customer Edge (CE) devices can share the same IPv4 address by using different port sets. This document describes a problem of the IPv4 communication between Software CEs with the same IPv4 address.

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[1.](#) Introduction

IPv4 devices use IPv4 addresses to recognize their local addresses. In many implementations (e.g. Linux), when an IPv4 device is forwarding or directly sending a packet, if the IPv4 destination address of the packet is one of the local addresses of the device, the device will never send the packet out. The device is usually pre-configured with local routing records to route all packets destined to local addresses into local loopback interface.

Softwire mechanisms, such as MAP-E [[I-D.ietf-softwire-map](#)] and Lightweight 4over6 [[I-D.ietf-softwire-lw4over6](#)], make use of address + port set based IPv4 address sharing. Multiple Softwire CE devices (e.g. MAP CE and lwB4) are configured with the same IPv4 address, each with a different port set.

When a CE attempts to send IPv4 packets to another CE and both CEs are configured with the same IPv4 address but different port sets, the IPv4 packets may be consumed by the first CE. This problem causes the CEs with the same IPv4 address failed to send IPv4 packets to each other. This document describes this problem and requires port set enabled devices to use IPv4 address + port set to recognize their local addresses.

[2.](#) Requirements Language

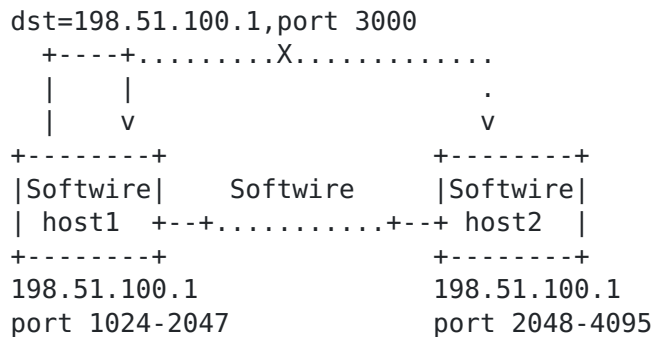
The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [[RFC2119](#)].

[3.](#) Problem Statement

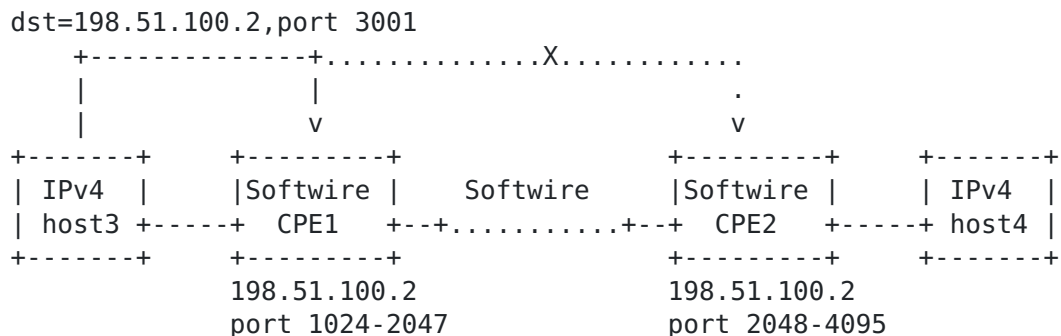
When an IPv4 device sends a packet, if the destination address of the packet is one of the local IPv4 addresses of the device, the packet is consumed by the device itself and will not be sent out of the

device. When the device is upgraded to support port set, it is configured with port-restricted IPv4 address(es). The same IPv4 address may be allocated to multiple devices. If the device still use IPv4 address to recognize its local address, it is unable for the device to send IPv4 packets to any other devices that are configured with the same IPv4 address and a different port set.

Figure 1 shows an example scenario of the problem. In Figure 1(a), two hosts work as Softwire CEs. They are provisioned with the same IPv4 address 198.51.100.1, each with a different port set. When host1 sends a packet to host2 with the destination address 198.51.100.1 and destination port 3000, its forwarding engine recognizes that 198.51.100.1 is its local address, so the packet is forwarded into its loopback interface. In Figure 1(b), two CPEs work as Softwire CEs and each connects to an IPv4 host. When host3 sends a packet to host4 with the destination address 198.51.100.2 and destination port 3001, the packet is forwarded to CPE1. After received the packet, CPE1 recognizes that the destination address 198.51.100.2 is its local address, so the packet is consumed by CPE1 and never forwarded to CPE2/host4.



(a) Host as CE



(b) CPE as CE

Figure 1: An Example of the Problem

4. CE Behavior

A Software CE, that supports port set based IPv4 address sharing, MUST use IPv4 address + port set to recognize its local address. When forwarding an IPv4 packet, if the destination address of the packet is the CE's IPv4 address but the destination port of the packet does not belong to the port set of the CE, the CE MUST NOT send the packet into its local loopback interface. The packet should be sent to CE's tunnel virtual interface or WAN interface, as per the forwarding policy of the corresponding Software mechanism.

5. Security Considerations

TBD

6. IANA Considerations

This document does not include an IANA request.

7. References

7.1. Normative References

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", [BCP 14](#), [RFC 2119](#), March 1997.

7.2. Informative References

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Cui, Y., Qiong, Q., Boucadair, M., Tsou, T., Lee, Y., and I. Farrer, "Lightweight 4over6: An Extension to the DS-Lite Architecture", [draft-ietf-software-lw4over6-06](#) (work in progress), February 2014.

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Troan, O., Dec, W., Li, X., Bao, C., Matsushima, S., Murakami, T., and T. Taylor, "Mapping of Address and Port with Encapsulation (MAP)", [draft-ietf-software-map-10](#) (work in progress), January 2014.

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