Network
Internet-Draft
Updates: 7296 (if approved)
Intended status: Standards Track
Expires: January 14, 2021

P. Wouters
S. Prasad
Red Hat

July 13, 2020

Labeled IPsec Traffic Selector support for IKEv2
draft-ietf-ipsecme-labeled-ipsec-03

Abstract

This document defines a new Traffic Selector (TS) Type for Internet Key Exchange version 2 to add support for negotiating Mandatory Access Control (MAC) security labels as a traffic selector of the Security Policy Database (SPD). Security Labels for IPsec are also known as "Labeled IPsec". The new TS type is TS_SECLABEL, which consists of a variable length opaque field specifying the security label. This document updates the IKEv2 TS negotiation specified in RFC 7296 Section 2.9.

Status of This Memo

This Internet-Draft is submitted in full conformance with the provisions of BCP 78 and BCP 79.

Internet-Drafts are working documents of the Internet Engineering Task Force (IETF). Note that other groups may also distribute working documents as Internet-Drafts. The list of current Internet-Drafts is at https://datatracker.ietf.org/drafts/current/.

Internet-Drafts are draft documents valid for a maximum of six months and may be updated, replaced, or obsoleted by other documents at any time. It is inappropriate to use Internet-Drafts as reference material or to cite them other than as "work in progress."

This Internet-Draft will expire on January 14, 2021.

Copyright Notice

Table of Contents

1. Introduction

In computer security, Mandatory Access Control usually refers to systems in which all subjects and objects are assigned a security label. A security label is comprised of a set of security attributes. The security labels along with a system authorization policy determine access. Rules within the system authorization policy determine whether the access will be granted based on the security attributes of the subject and object.

Traditionally, security labels used by Multilevel Systems (MLS) are comprised of a sensitivity level (or classification) field and a compartment (or category) field, as defined in [FIPS188] and [RFC5570]. As MAC systems evolved, other MAC models gained in popularity. For example, SELinux, a Flux Advanced Security Kernel (FLASK) implementation, has security labels represented as colon-separated ASCII strings composed of values for identity, role, and type. The security labels are often referred to as security contexts.

Traffic Selector (TS) payloads specify the selection criteria for packets that will be forwarded over the newly set up IPsec SA as enforced by the Security Policy Database (SPD, see [RFC4301]). This

document updates the Traffic Selector negotiation specified in Section 2.9 of [RFC7296].

This document specifies a new Traffic Selector Type TS_SECLABEL for IKEv2 that can be used to negotiate security labels as additional selectors for the Security Policy Database (SPD) to further restrict the type of traffic allowed to be sent and received over the IPsec SA.

1.1. Requirements Language

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in BCP 14 [RFC2119] [RFC8174] when, and only when, they appear in all captials, as shown here.

1.2. Traffic Selector clarification

The negotiation of Traffic Selectors is specified in Section 2.9 of [RFC7296] where it defines two TS Types (TS_IPV4_ADDR_RANGE and TS_IPV6_ADDR_RANGE). The Traffic Selector payload format is specified in Section 3.13 of [RFC7296]. However, the term Traffic Selector is used to denote the traffic selector payloads and individual traffic selectors of that payload. Sometimes the exact meaning can only be learned from context or if the item is written in plural ("Traffic Selectors" or "TSs"). This section clarifies these terms as follows:

A Traffic Selector (no acronym) is one selector for traffic of a specific Traffic Selector Type (TS_TYPE). For example a Traffic Selector of TS_TYPE TS_IPV4_ADDR_RANGE for UDP traffic in the IP network 198.51.100.0/24 covering all ports, is denoted as (17, 0, 198.51.100.0-198.51.100.255)

A Traffic Selector payload (TS) is a set of one or more Traffic Selectors of the same or different TS_TYPEs, but MUST include at least one TS_TYPE of TS_IPV4_ADDR_RANGE or TS_IPV6_ADDR_RANGE. For example, the above Traffic Selector by itself in a TS payload is denotated as TS((17, 0, 198.51.100.0-198.51.100.255))

1.3. Traffic Selector update

The negotiation of Traffic Selectors is specified in Section 2.9 of [RFC7296] and states that the TSi/TSr payloads MUST contain at least one Traffic Selector type. This document updates the text to mean that the TSi/TSr payloads MUST contain at least one Traffic Selector of type TS_IPV4_ADDR_RANGE or TS_IPV6_ADDR_RANGE, as other Traffic

Selector types can be defined that are complimentary to these Traffic Selector Types and cannot be selected on their own without TS_IPV4_ADDR_RANGE or TS_IPV6_ADDR_RANGE. The below defined TS_SECLABEL Traffic Selector Type is an example of this.

2. TS_SECLABEL Traffic Selector Type

This document defines a new TS Type, TS_SECLABEL that contains a single new opaque Security Label.

2.1. TS_SECLABEL payload format

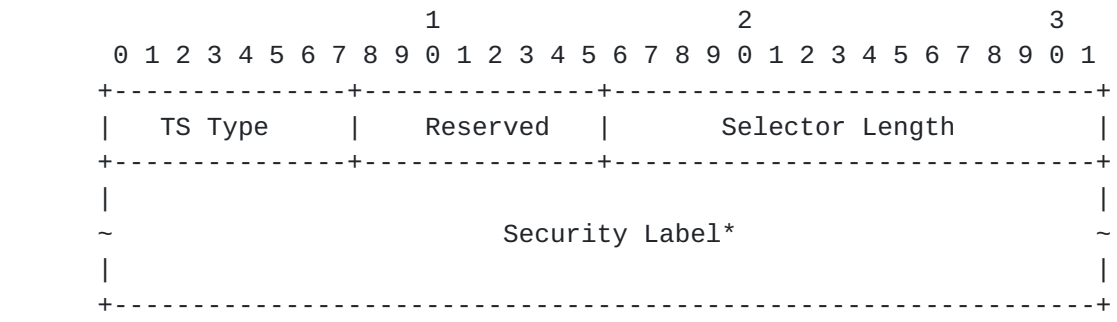

Figure 1: Labeled IPsec Traffic Selector

*Note: All fields other than TS Type and Selector Length depend on the TS Type. The fields shown is for TS Type TS_SECLABEL, the selector this document defines.

- TS Type (one octet) - Set to [TBD] for TS_SECLABEL,
- Selector Length (2 octets, unsigned integer) - Specifies the length of this Traffic Selector substructure including the header.
- Security Label - An opaque byte stream of at least one octet.

2.2. TS_SECLABEL properties

The TS_SECLABEL Traffic Selector Type does not support narrowing or wildcards. It MUST be used as an exact match value.

If the TS_SECLABEL is present in a TSi/TSr, at least one Traffic Selector of type TS_IPV4_ADDR_RANGE or TS_IPV6_ADDR_RANGE MUST also be present in that TSi/TSr.

The Security Label contents are opaque to the IKE implementation. That is, the IKE implementation might not have any knowledge of the

meaning of this selector, other than as a type and opaque value to pass to the SPD.

A zero length Security Label MUST NOT be used. If a received TS payload contains a TS_TYPE of TS_SECLABEL with a zero length Security Label, that specific Traffic Selector MUST be ignored. If no other Traffic Selector of TS_TYPE TS_SECLABEL can be selected, a TS_UNACCEPTABLE Error Notify message MUST be returned. A zero length Security Label MUST NOT be interpreted as a wildcard security label.

If multiple Security Labels are allowed for a given IP protocol, start and end address/port match, multiple TS_SECLABEL can be included in a TS payload.

If the Security Label traffic selector is optional from a configuration point of view, the initiator will have to choose which TS payload to attempt first. If it includes the Security Label and receives a TS_UNAVAILABLE, it can attempt a new Child SA negotiation without that Security Label.

A responder that selected a TS with TS_SECLABEL MUST use the Security Label for all selector operations on the resulting IPsec SA. It MUST NOT select a TS_set with a TS_SECLABEL without using the specified Security Label, even if it deems the Security Label optional, as the initiator TS_set with TS_SECLABEL means the initiator mandates using that Security Label.

3. Traffic Selector negotiation

This document updates the [RFC7296] specification as follows:

Each TS payload (TSi and TSr) MUST contain at least one TS_TYPE of TS_IPV4_ADDR_RANGE or TS_IPV6_ADDR_RANGE.

Each TS payload (TSi or TSr) MAY contain one or more other TS_TYPEs, such as TS_SECLABEL.

A responder MUST create its TS response by selecting one of each TS_TYPE present in the offered TS by the initiator. If it cannot select one of each TS_TYPE, it MUST return a TS_UNAVAILABLE Error Notify payload.

If a specific TS_TYPE (other than TS_IPV4_ADDR_RANGE or TS_IPV6_ADDR_RANGE which are mandatory) is deemed optional, the initiator SHOULD first try to negotiate the Child SA with the TS payload including the optional TS_TYPE. Upon receiving TS_UNAVAILABLE, it SHOULD attempt a new Child SA negotiation using the same TS but without the optional TS_TYPE.

Some TS_TYPE's support narrowing, where the responder is allowed to select a subset of the original TS. Narrowing MUST NOT result in an empty selector for that TS_TYPE.

3.1. Example TS negotiation

An initiator could send:

```
TSi = ((17,0,192.0.2.0-192.0.2.255),
       (0,0,198.51.0-198.51.255),
       TS_SECLABEL1, TS_SECLABEL2)

TSr = ((17,0,203.0.113.0-203.0.113.255),
       (0,0,203.0.113.0-203.0.113.255),
       TS_SECLABEL1, TS_SECLABEL2)
```

Figure 2: initiator TS payloads example

The responder could answer with the following example:

```
TSi = ((0,0,198.51.0-198.51.255),
       TS_SECLABEL1)

TSr = (((0,0,203.0.113.0-203.0.113.255),
       TS_SECLABEL1)
```

Figure 3: responder TS payloads example

3.2. Considerations for using multiple TS_TYPEs in a TS

It would be unlikely that the traffic for TSi and TSr would have a different Security Label, but this specification does allow this to be specified. If the initiator does not support this, and wants to prevent the responder from picking different labels for the TSi / TSr payloads, it should attempt a Child SA negotiation with only the first Security Label first, and upon failure retry a new Child SA negotiation with only the second Security Label.

If different IP ranges can only use different specific Security Labels, than these should be negotiated in two different Child SA negotiations. If in the example above, the initiator only allows 192.0.2.0/24 with TS_SECLABEL1, and 198.51.0/24 with TS_SECLABEL2, than it MUST NOT combine these two ranges and security labels into one Child SA negotiation.

Narrowing of Traffic Selectors currenrtly only applies only to TS_IPV4_ADDR_RANGE and TS_IPV6_ADDR_RANGE and not to TS_SECLABEL as the Security Label itself is not interpreted and cannot itself be narrowed. It MUST be matched exactly. Rekey of an IPsec SA MUST only use identical Traffic Selectors, which means the same TS Type and selectors MUST be used. This guarantees that a Security Label once negotiated, remains part of the IPsec SA after a rekey.

4. Security Considerations

It is assumed that the Security Label can be matched by the IKE implementation to its own configured value, even if the IKE implemention itself cannot interpret the Security Label value.

5. IANA Considerations

This document defines two new entries in the IKEv2 Traffic Selector Types registry:

Value	TS Type	Reference
TBD	TS_SECLABEL	[this document]

Figure 4

6. Acknowledgements

A large part of the introduction text was taken verbatim from [draft-jml-ipsec-ikev2-security-label] whose authors are J Latten, D. Quigley and J. Lu.

7. References

7.1. Normative References

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, DOI 10.17487/RFC2119, March 1997, <https://www.rfc-editor.org/info/rfc2119>.

[RFC7296] Kaufman, C., Hoffman, P., Nir, Y., Eronen, P., and T. Kivinen, "Internet Key Exchange Protocol Version 2 (IKEv2)", STD 79, RFC 7296, DOI 10.17487/RFC7296, October 2014, <https://www.rfc-editor.org/info/rfc7296>.

[RFC8174] Leiba, B., "Ambiguity of Uppercase vs Lowercase in RFC 2119 Key Words", BCP 14, RFC 8174, DOI 10.17487/RFC8174, May 2017, <https://www.rfc-editor.org/info/rfc8174>.

7.2. Informative References

[draft-jml-ipsec-ikev2-security-label]
Latten, J., Quigley, D., and J. Lu, "Security Label Extension to IKE", draft-wouters-edns-tcp-keeaplive (work in progress), January 2011.

[FIPS188] NIST, "National Institute of Standards and Technology, "Standard Security Label for Information Transfer"", Federal Information Processing Standard (FIPS) Publication 188, September 1994.

[RFC4301] Kent, S. and K. Seo, "Security Architecture for the Internet Protocol", RFC 4301, DOI 10.17487/RFC4301, December 2005, <https://www.rfc-editor.org/info/rfc4301>.

[RFC5570] StJohns, M., Atkinson, R., and G. Thomas, "Common Architecture Label IPv6 Security Option (CALIPSO)", RFC 5570, DOI 10.17487/RFC5570, July 2009, <https://www.rfc-editor.org/info/rfc5570>.

Authors' Addresses

Paul Wouters
Red Hat

Email: pwouters@redhat.com

Sahana Prasad
Red Hat

Email: sahana@redhat.com