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Applicability of LDP Label Advertisement Mode

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Abstract

An LDP speaker negotiates the label advertisement mode with its LDP peer at the time of session establishment. Although different applications sharing the same LDP session may need different modes of label distribution and advertisement, there is only one type of label advertisement mode that is negotiated and used per LDP session. This document clarifies the use and the applicability of session's negotiated label advertisement mode, and categorizes LDP applications into two broad categories of negotiated mode-bound and mode-independent applications. This document proposal and clarification thus updates [[RFC5036](#)] and [[RFC4447](#)].

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1. Introduction

The MPLS architecture [[RFC3031](#)] defines two modes of label advertisement for an LSR:

1. Downstream-on-Demand
2. Unsolicited Downstream

The "Downstream-on-Demand" mode requires an LSR to explicitly request the label binding for FECs from its peer, whereas "Unsolicited Downstream" mode allows an LSR to distribute the label binding for FECs unsolicitedly to LSR peers that have not explicitly requested them. The MPLS architecture [[RFC3031](#)] also specifies that on any given label distribution adjacency, the upstream LSR and the downstream LSR must agree to using a single label advertisement mode.

Label Distribution Protocol (LDP) [[RFC5036](#)] allows label advertisement mode negotiation at the session establishment time ([section 3.5.3](#) [[RFC5036](#)]). To comply with MPLS architecture, LDP specification also dictates that only one label advertisement mode is agreed and used on a given LDP session between two LSRs.

With the advent of new applications, such as L2VPN [[RFC4447](#)], mLDP [[MLDP](#)], ICCP [[ICCP](#)], running on top of LDP, there are situations when an LDP session is shared across more than one application to exchange label bindings for different type of FECs. Although different applications sharing the same LDP session may need different type of label advertisement mode negotiated, there is only one type of label advertisement mode that is negotiated and agreed at the time of establishment of LDP session.

This document clarifies the use and the applicability of session's label advertisement mode for each application using the session. It also categorizes LDP applications into two broad categories of negotiated mode-bound and mode-independent applications. This document proposal and clarification thus updates [[RFC5036](#)] and [[RFC4447](#)].

[2. Conventions used in this document](#)

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 [RFC-2119](#) [[RFC2119](#)].

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The unqualified term "mode" used in document refers to "label advertisement mode".

Please also note that LDP specification [[RFC5036](#)] uses the term "Downstream Unsolicited" to refer to "Unsolicited Downstream", as well as uses the terms "label distribution" and "label advertisement" interchangeably. This document also uses these terms interchangeably.

[3. Label Advertisement Mode Applicability](#)

[3.1. Label Advertisement Mode Negotiation](#)

Label advertisement mode is negotiated between participating LSR peers at the time of session establishment. The label advertisement mode is specified in LDP Initialization message's "Common Session Parameter" TLV by setting A-bit (Label Advertisement Discipline bit) to 1 or 0 for Downstream-on-Demand or Downstream-Unsolicited modes respectively [[RFC5036](#)]. The negotiation of the A-bit is specified in [section 3.5.3 of \[RFC5036\]](#) as follows:

"If one LSR proposes Downstream Unsolicited and the other proposes Downstream on Demand, the rules for resolving this difference is:

- If the session is for a label-controlled ATM link or a label-controlled Frame Relay link, then Downstream on Demand MUST be used.
- Otherwise, Downstream Unsolicited MUST be used."

Once label advertisement mode has been negotiated and agreed, both LSRs must use the same mode for label binding exchange.

[3.2. LDP Applications Categorization](#)

At the time of standardization of LDP base specification [RFC-3036](#), the earlier applications using LDP to exchange their FEC bindings

were:

- . Dynamic Label Switching for IP Prefixes
- . Label-controlled ATM/FR

Since then, several new applications have emerged that use LDP to signal their FEC bindings and/or application data:

- . L2VPN P2P PW ([[RFC4447](#)])

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- . L2VPN P2MP PW ([[P2MP-PW](#)])
- . mLDP ([[MLDP](#)])
- . ICCP ([[ICCP](#)])

We divide these LDP applications into two broad categories from label advertisement mode usage point of view:

1. Session mode-bound Applications (i.e. use the negotiated label advertisement mode)
2. Session mode-independent Applications (i.e. do not care about the negotiated label advertisement mode)

[3.2.1](#). Session mode-bound Applications

The FEC label binding exchange for such LDP applications MUST use the negotiated label advertisement mode.

The early LDP applications "Dynamic Label Switching for IP Prefixes" and "Label-controlled ATM/FR" fall into this category.

[3.2.2](#). Session mode-independent Applications

The FEC label binding, or any other application data, exchange for such LDP applications does not care about, nor tied to the negotiated label advertisement mode of the session; rather, the information exchange is driven by the application need and procedures as described by their respective specifications. For example, [[MLDP](#)] specifies procedures to advertise P2MP FEC label binding in an unsolicited manner, irrespective of the negotiated

label advertisement mode of the session.

The applications, PW (P2P and P2MP), MLDP, and ICCP, fall into this category of LDP application.

[3.2.2.1](#). Upstream Label Assignment

As opposed to downstream assigned label advertisement defined by [\[RFC3031\]](#), [LDP-UPSTREAM] specification defines new mode of label advertisement where label advertisement and distribution occurs for upstream assigned labels.

As stated in earlier [section 3.1](#) of this document, [\[RFC5036\]](#) only allows specifying Downstream-Unsolicited or Downstream-on-Demand mode. This means that any LDP application that requires upstream

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assigned label advertisement also falls under the category of Session mode-independent application.

[3.3](#). Update to [RFC-5036](#)

For clarification reasons, [section 3.5.3 of \[RFC5036\]](#) is updated to add following two statements under the description of "A, Label Advertisement Discipline":

- The negotiated label advertisement discipline only applies to FEC label binding advertisement of "Address Prefix" FECs;
- Any document specifying a new FEC SHOULD state the applicability of the negotiated label advertisement discipline for that FEC.

[3.4](#). Update to [RFC-4447](#)

[RFC4447] specifies LDP extensions and procedures to exchange label bindings for P2P PW FECs. The [section 3 of \[RFC4447\]](#) states:

"LDP MUST be used in its downstream unsolicited mode."

Since PW application falls under session mode-independent application category, the above statement in [\[RFC4447\]](#) should be read to mean as follows:

"LDP MUST exchange PW FEC label bindings in downstream unsolicited

manner, independent of the negotiated label advertisement mode of the LDP session."

[4.](#) Future Work

This document only clarifies the existing behavior for LDP label advertisement mode for different applications without defining any protocol extensions. In future, a new LDP capability [[RFC5561](#)] based mechanism can be defined to signal/negotiate label advertisement mode per FEC/application.

[5.](#) Security Considerations

This document specification only clarifies the applicability of LDP session's label advertisement mode, and hence does not add any LDP security mechanics and considerations to those already defined in LDP specification [[RFC5036](#)].

[6.](#) IANA Considerations

None.

[7.](#) References

[7.1.](#) Normative References

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[8](#). Acknowledgments

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