     The Label Distribution Protocol (LDP) Implementation Survey Results

Status of This Memo

   This memo provides information for the Internet community. It does
   not specify an Internet standard of any kind. Distribution of this
   memo is unlimited.

Abstract

   Multiprotocol Label Switching (MPLS), described in RFC 3031, is a
   method for forwarding packets that uses short, fixed-length values
   carried by packets, called labels, to determine packet next hops. A
   fundamental concept in MPLS is that two Label Switching Routers
   (LSRs) must agree on the meaning of the labels used to forward
   traffic between and through them. This common understanding is
   achieved by using a set of procedures, called a Label Distribution
   Protocol (as described in RFC 3036) , by which one LSR informs
   another of label bindings it has made. One such protocol, called
   LDP, is used by LSRs to distribute labels to support MPLS forwarding
   along normally routed paths. This document reports on a survey of
   LDP implementations conducted in August 2002 as part of the process
   of advancing LDP from Proposed to Draft Standard.

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1. Introduction

   Multiprotocol Label Switching (MPLS) is a method for forwarding
   packets that uses short fixed-length values carried by packets,
   called labels, to determine packet next hops [RFC3031]. A
   fundamental MPLS concept is that two Label Switching Routers (LSRs)
   must agree on the meaning of the labels used to forward traffic
   between and through them. This common understanding is achieved by
   using a set of procedures by which one LSR informs another of label
   bindings it has made.

   Label Distribution Protocol (LDP) specifies a set of procedures LSRs
   use to distribute labels to support MPLS forwarding along normally
   routed paths. LDP was specified originally by [RFC3036]. The
   current LDP specification is [RFC5036], which obsoletes [RFC3036].
   [RFC3037] describes the applicability of LDP.

   This document reports on a survey of LDP implementations conducted in
   August 2002 as part of the process of advancing LDP from Proposed to
   Draft standard.

   This section highlights some of the survey results. Section 2
   presents the survey results for LDP features, and Appendix A presents
   the survey results in full. Appendix B contains a copy of the survey
   form.

1.1. The LDP Survey Form

   The LDP implementation survey requested the following information
   about LDP implementation:

   - Responding organization. Provisions were made to accommodate
      organizations that wished to respond anonymously.

   - The status, availability, and origin of the LDP implementation.

   - The LDP features implemented and for each whether it was tested
      against an independent implementation. The survey form listed
      each LDP feature defined by [RFC3036] and requested one of the
      following as the status of the feature:

         t: Tested against another independent implementation
         y: Implemented but not tested against independent
            implementation
         n: Not implemented
         x: Not applicable to this type of implementation

In addition, for the 'n' status, the responder could optionally
provide the following additional information:

    s: RFC specification inadequate, unclear, or confusing
    u: Utility of feature unclear
    r: Feature not required for feature set implemented

This document uses the following conventions for reporting survey
results for a feature:

    At By Cn indicates:

    - A responders implemented the feature and tested it against
       another independent implementation (t)
    - B responders implemented the feature but have not tested it
       against an independent implemented (y)
    - C responders did not implement the feature (n)

    (Ds Eu Fr) indicates optional responses:

    - D responders thought the RFC 3036 specification of the feature
       inadequate, unclear, or confusing (s).
    - E responders thought the utility of the feature unclear (u).
    - F responders considered the feature not required for the
       feature set implemented (combines x and r).

1.2. LDP Survey Highlights

   This section presents some highlights from the implementation survey.

    - There were 12 responses to the survey, 2 of which were
       anonymous. At the time of the survey, 10 of the implementation
       were available as products and 2 were in beta test. Eleven of
       the implementations were available for sale; the remaining
       implementation had been done by a company no longer in
       business.

    - Seven implementations were independently written from the RFC
       3036 specification. Four implementations combined purchased or
       free code with code written by the responder.

       One of the implementations was fully purchased code ported to
       the vendor's platform.

    - Every LDP feature in the survey questionnaire was implemented
       by at least 2 respondents.

- Each of the 8 LDP Label Distribution Modes implemented and
  tested:

      8t 2y 2n   DU, Ord Cntl, Lib reten
      7t 1y 4n   DU, Ind Cntl, Lib reten
      7t 1y 4n   DoD Ord Cntl, Cons reten
      6t 1y 5n   DoD, Ind Cntl, Cons reten
      6t 1y 5n   DU, Ord Cntl, Cons reten
      6t 0y 6n   DU, Ind Cntl, Cons reten
      4t 3y 5n   DoD, Ord Cntl, Lib reten
      4t 2y 6n   DoD, Ind Cntl, Lib reten

- Platform and Interface Label Spaces were both widely supported.

      12t 0y 0n Per platform
       7t 1y 4n Per interface

- LDP Basic and Targeted Sessions were both widely supported.

      12t 0y 0n Basic/Directly Connected
      11t 1y 0n Targeted

- The TCP MD5 Option for LDP session TCP connections was not
  widely implemented.

      3t 1y 8n

2. Survey Results for LDP Features

   This section presents the survey results for LDP features using the
   notational convention described in Section 1.2. It omits the
   optional status responses (s, u, r); complete results may be found in
   Appendix A.

      Feature
         Survey Result

      Interface types
         12t 0y 0n   Packet
         2t 3y 7n   Frame Relay
         6t 2y 4n   ATM
      Label Spaces
         12t 0y 0n   Per platform
         7t 1y 4n   Per interface
      LDP Discovery
         12t 0y 0n   Basic
         11t 1y 0n   Targeted

```
       LDP Sessions
          12t 0y 0n      Directly Connected
          11t 1y 0n      Targeted
       LDP Modes
          7t 1y 4n       DU, Ind Cntl, Lib reten
          8t 2y 2n       DU, Ord Cntl, Lib reten
          6t 0y 6n       DU, Ind Cntl, Cons reten
          6t 1y 5n       DU, Ord Cntl Cons reten
          4t 2y 6n       DoD, Ind Cntl, Lib reten
          4t 3y 5n       DoD, Ord Cntl, Lib reten
          6t 1y 5n       DoD, Ind Cntl, Cons reten
          7t 1y 4n       DoD, Ord Cntl, Cons reten
       Loop Detection
          9t 2y 1n
       TCP MD5 Option
          3t 1y 8n
       LDP TLVs
          7t 4y 0n       U-bit
          7t 4y 0n       F-bit
          12t 0y 0n      FEC TLV
          6t 5y 1n         Wildcard
          12t 0y 0n        Prefix
          10t 0y 2n        Host
          12t 0y 0n      Address List TLV
          10t 1y 1n      Hop Count TLV
          9t 2y 1n       Path Vector TLV
          12t 0y 0n      Generic Label TLV
          6t 2y 4n       ATM Label TLV
          2t 3y 7n       Frame Relay Label TLV
          12t 0y 0n      Status TLV
          9t 3y 0n       Extended Status TLV
          6t 4y 2n       Returned PDU TLV
          6t 4y 2n       Returned Message TLV
          12t 0y 0n      Common Hello Param TLV
          12t 0y 0n        T-bit
          11t 0y 1n        R-bit
          11t 1y 0n        Hold Time
          12t 0y 0n      IPv4 Transport Addr TLV
          7t 2y 3n       Config Sequence Num TLV
          1t 1y 1n       IPv6 Transport Addr TLV
          12t 0y 0n      Common Session Param TLV
          12t 0y 0n        KeepAlive Time
          11t 0y 1n        PVLim
          11t 1y 0n        PDU Max Length
          6t 2y 2n       ATM Session Param TLV
                           M values
          5t 3y 4n           0 No Merge
          3t 3y 6n           1 VP Merge
```

```
      5t 3y 4n              2 VC Merge
      3t 3y 6n              3 VP & VC Merge
      6t 2y 4n           D-bit
      6t 2y 4n           ATM Label Range Component
      2t 3y 7n         FR Session Param TLV
                          M values
      2t 3y 7n              0 No Merge
      2t 3y 7n              1 Merge
      2t 3y 7n           D-bit
      2t 3y 7n           FR Label Range Component
     10t 0y 2n         Label Request Msg ID TLV
      2t 5y 5n         Vendor-Private TLV
      1t 5y 6n         Experimental TLV
   LDP Messages
     12t 0y 0n         Notification Msg
     12t 0y 0n         Hello Msg
     12t 0y 0n         Initialization Msg
     12t 0y 0n         KeepAlive Msg
     12t 0y 0n         Address Msg
     12t 0y 0n         Address Withdraw Msg
     12t 0y 0n         Label Mapping Msg
     10t 0y 2n            Label Request Msg Id TLV
     10t 1y 1n            Hop Count TLV
     10t 1y 1n            Path Vect TLV
      9t 0y 3n         Label Request Msg
      9t 0y 3n            Hop Count TLV
      9t 0y 3n            Path Vect TLV
     12t 0y 0n         Label Withdraw Msg
     12t 0y 0n            Label TLV
     11t 0y 1n         Label Release Msg
     10t 1y 1n            Label TLV
      9t 2y 1n         Label Abort Req Msg
      2t 5y 5n         Vendor-Private Msg
      1t 5y 6n         Experimental Msg
   LDP Status Codes
      9t 3y 0n         Success
      8t 4y 0n         Bad LDP Id
      7t 5y 0n         Bad Ptcl Version
      7t 5y 0n         Bad PDU Length
      7t 5y 0n         Unknown Message Type
      7t 5y 0n         Bad Message Length
      7t 4y 0n         Unknown TLV
      7t 5y 0n         Bad TLV length
      7t 5y 0n         Malformed TLV Value
     11t 1y 0n         Hold Timer Expired
     11t 1y 0n         Shutdown
     10t 1y 1n         Loop Detected
      7t 5y 0n         Unknown FEC
```

```
        11t 1y 0n       No Route
        9t 3y 0n        No Label Resources
        8t 3y 1n        Label Resources Available
                        Session Rejected
        7t 5y 0n          No Hello
        9t 2y 1n          Param Advert Mode
        9t 2y 1n          Param PDUMax Len
        8t 3y 1n          Param Label Range
        7t 5y 0n          Bad KA Time
        11t 1y 0n       KeepAlive Timer Expired
        9t 1y 2n        Label Request Aborted
        6t 5y 1n        Missing Message Params
        7t 5y 0n        Unsupported Addr Family
        7t 5y 0n        Internal Error
```

3. Security Considerations

   This document is a survey of existing LDP implementations; it does
   not specify any protocol behavior. Thus, security issues introduced
   by the document are not discussed.

4. Informative References

   [RFC3031] Rosen, E., Viswanathan, A., and R. Callon, "Multiprotocol
             Label Switching Architecture", RFC 3031, January 2001.

   [RFC3036] Andersson, L., Doolan, P., Feldman, N., Fredette, A., and
             B. Thomas, "LDP Specification", RFC 3036, January 2001.

   [RFC3037] Thomas, B. and E. Gray, "LDP Applicability", RFC 3037,
             January 2001.

   [RFC5036] Andersson, L., Ed., Minei, I., Ed., and B. Thomas, Ed.,
             "LDP Specification", RFC 5036, October 2007.

Appendix A.   Full LDP Survey Results

LDP Implementation Survey Form (V 1.0)

```
========================================================================
```
A. General Information

Responders:

  Anonymous: 2
  Public: 10

    Agilent Technologies
    Celox Networks, Inc.
    Cisco Systems, Inc.
    Data Connection Ltd.
    NetPlane Systems, Inc
    Redback Networks
    Riverstone Networks
    Trillium, An Intel Company
    Vivace Networks, Inc.
    Wipro Technologies

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B. LDP Implementation Status, Availability, Origin

Status:
      [ ]   Development
      [ ]   Alpha
      [2]   Beta
      [10]   Product
      [ ]   Other (describe):

Availability:
      [ ]   Public and free
      [ ]   Only to selected organizations/companies but free
      [11]   On sale
      [ ]   For internal company use only
      [1]   Other:

Implementation based on: (check all that apply)
      [1]   Purchased code
             (please list source if possible)
      [ ]   Free code
             (please list source if possible)
      [7]   Internal implementation
             (no outside code, just from specs)
      [4]   Internal implementation on top of purchased
             or free code

```
========================================================================
```
C. LDP Feature Survey

For each feature listed, please indicate the status of the
implementation using one of the following:

     't'   tested against another independent implementation
     'y'   implemented but not tested against independent
            implementation
     'n'   not implemented
     'x'   not applicable to this type of implementation

   Optional: For 'n' status, indicate reason for not implementing
              using one of the following:

              's' RFC specification inadequate, unclear, or confusing
              'u' utility of feature unclear
              'r' feature not required for feature set implemented

   Feature   RFC 3036 Section(s)
     Survey Result

   Interface types   2.2.1, 2.5.3,
                                                      2.8.2, 3.4.2
     12t 0y 0n   Packet
     2t 3y 7n(3r 1x)   Frame Relay
     6t 2y 4n(3r)   ATM
   Label Spaces   2.2.1, 2.2.2
     12t 0y 0n   Per platform
     7t 1y 4n(4r)   Per interface
   LDP Discovery   2.4
     12t 0y 0n   Basic   2.4.1
     11t 1y 0n   Targeted   2.4.2
   LDP Sessions   2.2.3
     12t 0y 0n   Directly Connected   --
     11t 1y 0n   Targeted   2.3
   LDP Modes   2.6
     7t 1y 4n(2u 1r)   DU, Ind cntl, Lib reten   2.6
     8t 2y 2n(1r)   DU, Ord cntl, Lib reten   2.6
     6t 0y 6n(2u 2r)   DU, Ind cntl, Cons reten   2.6
     6t 1y 5n(1u 2r)   DU, Ord cntl, Cons reten   2.6
     4t 2y 6n(2u 2r)   DoD, Ind cntl, Lib reten   2.6
     4t 3y 5n(2r)   DoD, Ord cntl, Lib reten   2.6
     6t 1y 5n(2u 2r)   DoD, Ind cntl, Cons reten   2.6
     7t 1y 4n(1u 2r)   DoD, Ord cntl, Cons reten   2.6
   Loop Detection   2.8
     9t 2y 1n
```

```
   TCP MD5 Option                                        2.9
     3t 1y 8n(1u 1r 1x)
   LDP TLVs                                              3.3, 3.4, throughout
     7t 4y 0n(1 noreply)  U-bit                          3.3
     7t 4y 0n(1 noreply)  F-bit                          3.3
                          FEC TLV                        1, 2.1, 3.4.1
     6t 5y 1n(1r)           Wildcard                     3.4.1
     12t 0y 0n              Prefix                       3.4.1
     10t 0y 2n(s1 1u 1r)    Host                         2.1, 3.4.1
     12t 0y 0n            Address List TLV               3.4.3
     10t 1y 1n            Hop Count TLV                  3.4.4
     9t 2y 1n             Path Vector TLV                3.4.5
     12t 0y 0n            Generic Label TLV              3.4.2.1
     6t 2y 4n(2r)         ATM Label TLV                  3.4.2.2
     2t 3y 7n(1u 2r 1x)   Frame Relay Label TLV          3.4.2.3
     12t 0y 0n            Status TLV                     3.4.6
     9t 3y 0n             Extended Status TLV            3.5.1
     6t 4y 2n             Returned PDU TLV               3.5.1
     6t 4y 2n             Returned Message TLV           3.5.1
     12t 0y 0n            Common Hello Param TLV         3.5.2
     12t 0y 0n              T-bit                        3.5.2
     11t 0y 1n              R-bit                        3.5.2
     11t 1y 0n              Hold Time                    3.5.2
     12t 0y 0n            IPv4 Transport Addr TLV        3.5.2
     7t 2y 3n             Config Sequence Num TLV        3.5.2
     1t 1y 1n(1u 4r 1x)   IPv6 Transport Addr TLV        3.5.2
     12t 0y 0n            Common Session Param TLV       3.5.3
     12t 0y 0n              KeepAlive Time               3.5.3
     11t 0y 1n              PVLim                        3.5.3
     11t 1y 0n              PDU Max Length               3.5.3
     6t 2y 2n(1r 1x)      ATM Session Param TLV          3.5.3
                            M values
     5t 3y 4n(1r 1x)        0 No Merge                   3.5.3
     3t 3y 6n(s 1 1r 1x)    1 VP Merge                   3.5.3
     5t 3y 4n(1r 1x)        2 VC Merge                   3.5.3
     3t 3y 6n(s1 1r 1x)     3 VP & VC Merge              3.5.3
     6t 2y 4n(1r 1x)        D-bit                        3.5.3
     6t 2y 4n(1r 1x)        ATM Label Range              3.5.3
                              Component
     2t 3y 7n(1u 1r 2x)   FR Session Param TLV           3.5.3
                            M values
     2t 3y 7n(1u 1r 2x)     0 No Merge                   3.5.3
     2t 3y 7n               1 Merge                      3.5.3
     2t 3y 7n(1u 1r 2x)     D-bit                        3.5.3
     2t 3y 7n(1u 1r 2x)     FR Label Range               3.5.3
                              Component
     10t 0y 2n            Label Request Msg Id TLV       3.5.7
     2t 5y 5n(1u 1r)      Vendor-Private TLV             3.6.1.1
```

```
   1t 5y 6n(2r)           Experimental TLV            3.6.2
 LDP Messages                                         3.5, throughout
   12t 0y 0n              Notification Msg            3.5.1
   12t 0y 0n              Hello Msg                  3.5.2
   12t 0y 0n              Initialization Msg         3.5.3
   12t 0y 0n              KeepAlive Msg              3.5.4
   12t 0y 0n              Address Msg                3.5.5
   12t 0y 0n              Address Withdraw Msg       3.5.6
   12t 0y 0n              Label Mapping Msg          3.5.7
   10t 0y 2n(1r)            Label Request Msg Id TLV 3.5.7
   10t 1y 1n               Hop Count TLV             3.5.7
   10t 1y 1n               Path Vect TLV              3.5.7
   9t 0y 3n(1x)           Label Request Msg          3.5.8
   9t 0y 3n(1x)             Hop Count TLV            3.5.8
   9t 0y 3n(1x)             Path Vect TLV            3.5.8
   12t 0y 0n              Label Withdraw Msg         3.5.10
   12t 0y 0n               Label TLV                 3.5.10
   11t 0y 1n             Label Release Msg           3.5.11
   10t 1y 1n               Label TLV                 3.5.11
   9t 2y 1n              Label Abort Req Msg         3.5.9
   2t 5y 5n(1u 1r)      Vendor-Private Msg           3.6.1.2
   1t 5y 6n(2r)          Experimental Msg            3.6.2
 LDP Status Codes                                     3.4.6
   9t 3y 0n              Success                     3.4.6, 3.9
   8t 4y 0n              Bad LDP Id                  3.5.1.2.1
   7t 5y 0n              Bad Ptcl Version            3.5.1.2.1
   7t 5y 0n              Bad PDU Length              3.5.1.2.1
   7t 5y 0n              Unknown Message Type        3.5.1.2.1
   7t 5y 0n              Bad Message Length          3.5.1.2.1
   7t 4y 0n(1 noreply)   Unknown TLV                 3.5.1.2.2
   7t 5y 0n              Bad TLV Length              3.5.1.2.2
   7t 5y 0n              Malformed TLV Value         3.5.1.2.2
   11t 1y 0n             Hold Timer Expired          3.5.1.2.3
   11t 1y 0n             Shutdown                    3.5.1.2.4
   10t 1y 1n             Loop Detected               3.4.5.1.2, 3.5.8.1
   7t 5y 0n              Unknown FEC                 3.4.1.1
   11t 1y 0n             No Route                    3.5.8.1
   9t 3y 0n              No Label Resources          3.5.8.1
   8t 3y 1n              Label Resources Available   3.5.8.1
                        Session Rejected            2.5.3, 3.5.3
   7t 5y 0n               No Hello                   2.5.3, 3.5.3
   9t 2y 1n               Param Advert Mode          2.5.3, 3.5.3
   9t 2y 1n               Param PDU Max Len          2.5.3, 3.5.3
   8t 3y 1n               Param Label Range          2.5.3, 3.5.3
   7t 5y 0n               Bad KA Time                3.5.1.2.5, 3.5.3
   11t 1y 0n             KeepAlive Timer Expired     2.5.6, 3.5.1.2.3
   9t 1y 2n              Label Request Aborted       3.5.9.1
   6t 5y 1n              Missing Message Params      3.5.1.2.1
```

```
   7t 5y 0n                   Unsupported Addr Family   3.4.1.1, 3.5.5.1
   7t 5y 0n                   Internal Error            3.5.1.2.7
```

Appendix B. LDP Implementation Survey Form

LDP Implementation Survey Form (V 1.0)

The purpose of this form is to gather information about implementations
of LDP as defined by RFC 3036. The information is being requested as
part of the process of advancing LDP from Proposed to Draft Standard.

The form is patterned after the implementation report form used for
HTTP/1.1; see:

http://www.ietf.org/IESG/Implementations/http1.1-implementations.txt

==
A. General Information

Please provide the following information.

Organization:

Organization url(s):

Product title(s):

Brief description(s):

Contact for LDP information
   Name:
   Title:
   E-mail:
   Organization/department:
   Postal address:
   Phone:
   Fax:
```

==
B. LDP Implementation Status, Availability, Origin

Please check [x] the boxes that apply.

Status:
      [ ]   Development
      [ ]   Alpha
      [ ]   Beta
      [ ]   Product
      [ ]   Other (describe):

Availability
      [ ]   Public and free
      [ ]   Only to selected organizations/companies but free
      [ ]   On sale.
      [ ]   For internal company use only
      [ ]   Other:

Implementation based on: (check all that apply)
      [ ]   Purchased code
            (please list source if possible)
      [ ]   Free code
            (please list source if possible)
      [ ]   Internal implementation
            (no outside code, just from specs)
      [ ]   Internal implementation on top of purchased
            or free code
            List portions from external source:
            List portions developed internally:

```
=======================================================================
C. LDP Feature Survey

For each feature listed, please indicate the status of the
implementation using one of the following:

    't'   tested against another independent implementation
    'y'   implemented but not tested against independent implementation
    'n'   not implemented
    '-'   not applicable to this type of implementation

  Optional: For 'n' status, indicate reason for not implementing using
            one of the following:

            's'  RFC specification inadequate, unclear, or confusing
            'u'  utility of feature unclear
            'r'  feature not required for feature set implemented
```

Feature	RFC 3036 Section(s)	Status (one of t, y, n, -; if n, optionally one of s, u, r)
Interface types	2.2.1, 2.5.3, 2.8.2, 3.4.2	
Packet		
Frame Relay		
ATM		
Label Spaces	2.2.1, 2.2.2	
Per platform		
Per interface		
LDP Discovery	2.4	
Basic	2.4.1	
Targeted	2.4.2	

LDP Sessions	2.2.3	
Directly Connected	--	
Targeted	2.3	
LDP Modes	2.6	
DU, Ind cntl, Lib retention	2.6	
DU, Ord cntl, Lib retention	2.6	
DU, Ind cntl, Cons retention	2.6	
DU, Ord cntl, Cons retention	2.6	
DoD, Ind cntl, Lib retention	2.6	
DoD, Ord cntl, Lib retention	2.6	
DoD, Ind cntl, Cons retention	2.6	
DoD, Ord cntl, Cons retention	2.6	
Loop Detection	2.8	
TCP MD5 Option	2.9	
LDP TLVs	3.3, 3.4, throughout	
U-bit	3.3	
F-bit	3.3	
FEC	1., 2.1, 3.4.1	

Wildcard	3.4.1	
Prefix	2.1, 3.4.1	
Host	2.1, 3.4.1	
Address List	3.4.3	
Hop Count	3.4.4	
Path Vector	3.4.5	
Generic Label	3.4.2.1	
ATM Label	3.4.2.2	
Frame Relay Label	3.4.2.3	
Status	3.4.6	
Extended Status	3.5.1	
Returned PDU	3.5.1	
Returned Message	3.5.1	
Common Hello Parameters	3.5.2	
T-bit	3.5.2	
R-bit	3.5.2	
Hold Time	3.5.2	
IPv4 Transport Address	3.5.2	
Configuration Sequence Number	3.5.2	
IPv6 Transport Address	3.5.2	
Common Session Parameters	3.5.3	

KeepAlive Time	3.5.3	
PVLim	3.5.3	
Max PDU Length	3.5.3	
ATM Session Parameters	3.5.3	
M values 0 No Merge	3.5.3	
1 VP Merge	3.5.3	
2 VC Merge	3.5.3	
3 VP & VC Merge	3.5.3	
D-bit	3.5.3	
ATM Label Range Component	3.5.3	
Frame Relay Session Parameters	3.5.3	
M values 0 No Merge	3.5.3	
1 Merge	3.5.3	
D-bit	3.5.3	
Frame Relay Label Range Component	3.5.3	
Label Request Message Id	3.5.7	
Vendor-Private	3.6.1.1	
Experimental	3.6.2	

```
=================+===============================+=======================
LDP Messages     | 3.5, throughout
-----------------+-------------------------------+-----------------------
  Notification   | 3.5.1                         |
-----------------+-------------------------------+-----------------------
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Author's Addresses

    Bob Thomas
    Cisco Systems, Inc.
    1414 Massachusetts Ave.
    Boxborough MA 01719

    EMail: rhthomas@cisco.com

    Loa Andersson
    Acreo AB
    Isafjordsgatan 22
    Kista, Sweden

    EMail: loa.andersson@acreo.se
           loa@pi.se

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