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Layer Two Tunneling Protocol "L2TP"  
IP Differential Services Extension

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Abstract

The L2TP document [[1](#)] defines the base protocol which describes the method of tunneling PPP [[2](#)] data. The L2TP base protocol does not address any Differential Services extensions.

Since the market is reluctant to outsource dial access without any Quality of Service assurances, this draft addresses this problem by

allowing each L2TP Data Session to be assigned an appropriate differential services indicator.

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### **1.0 Introduction**

The L2TP protocol specification does not discuss Quality of Service/Differential Services in any way. The current state of the market has shown that many customers are reluctant to adopt L2TP without any quality of service assurances.

This document will describe how two L2TP peers can negotiate a differential services indicator for a dial-in user. Note that each individual session within a tunnel can have its own Diff Serv Indicator.

The mechanism defined in this document assumes that the Tunnel Initiator determines what the user's appropriate service level is and sends the value in either the ICRQ or OCRQ messages. The Tunnel Terminator can respond to the message by stating what it believes is the user's appropriate service level. The values of the indicator supplied by the Tunnel Terminator will supercede those provided by the Tunnel Initiator if a difference is found. However, the Tunnel Terminator MUST NOT propose a higher differential service level than was proposed by the Tunnel Initiator.

In the case where the Tunnel Terminator does not propose ANY indicator (which is inferred by the absence of the QOS AVPs in either the ICRP or OCRP) the Tunnel Initiator will assume no QOS is assigned to the session.

A tunnel peer which violates the negotiated differential service level is liable to have it's tunnel shutdown.

### **1.1 Conventions**

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The following language conventions are used in the items of specification in this document:

- o MUST, SHALL, or MANDATORY -- This item is an absolute requirement of the specification.
- o SHOULD or RECOMMEND -- This item should generally be followed for all but exceptional circumstances.
- o MAY or OPTIONAL -- This item is truly optional and may be followed or ignored according to the needs of the implementor.

## **2.0 Quality of Service/Differential Services Negotiation**

This section will define the new AVPs which are required for the Quality of Service extension of the L2TP protocol. The AVPs allow designation of a Quality of Service level for a specific data channel.

### **2.1 Differential Services Indicator AVP**

The Differential Services indicator AVP is found in the IPv4 header's DS field. This is the second octet in the header. The actual bit interpretation of the DS field (formerly the IP Precedence and Type of Service bit fields) is left to the appropriate documentation [2][3][4]. This document is concerned with defining a uniform exchange mechanism for the indicator only.

The Differential Services Indicator AVP MAY be present in ICRQ, ICRP, OCRQ and OCRP. This message is used to inform the tunnel peer that a set of differential service indicator value SHOULD be used for all packets related to the data channel associated with the Tunnel and Call Identifiers in the L2TP header [1].

The presence of this AVP in the ICRQ or OCRQ indicates that the tunnel initiator wishes to use a specific differential service indicator value on all data packets. However, the value found in the ICRP or OCRP indicate the value which the Tunnel Terminator is willing to accept. However, the Tunnel Terminator MUST NOT propose a higher differential service level than was proposed by the Tunnel Initiator.

A tunnel peer which violates the negotiated indicator value is liable to have it's tunnel shutdown.

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```

      0              1              2              3
      0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+
|1|1|0|0|          Length          |          43          |
+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+
|          1          | Diff Serv Indicator Value |
+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+

```

This AVP MAY be present in the messages shown above. It is encoded with a Vendor ID of 43 (3Com Corporation) with the attribute set to 1, marked as optional, with the indicator value as data. This AVP SHOULD NOT be hidden and is optional. When present, the L2TP peer is indicating that differential services are to be used on IP packets within the session's data channel.

## 2.2 Error Reporting

In the event that the peer did not accept the Diff Serv Indicator provided, or is unable to support Differential Services a Call-Disconnect-Notify is returned to the peer.

If the indicator provided cannot be used by the peer, the Call-Disconnect-Notify message will include the Diff Serv Indicator AVP as provided in the message that caused the Call-Disconnect-Notify.

## 3.0 References

- [1] W.M. Townsley, A. J. Valencia, A. Rubens, G.S. Pall, G. Zorn, B. Palter, "Layer Two Tunneling Protocol (L2TP)", [draft-ietf-pppext-l2tp-13.txt](#), Work in Progress, January 1999.
- [2] Nichols et al., "Definition of the Differentiated Services Field (DS Field) in the IPv4 and IPv6 Headers", [RFC 2474](#), December 1998.
- [3] Blake et al., "An Architecture for Differentiated Services", [RFC 2475](#), December 1998.
- [4] Bernet, Durham, Reichmeyer, "Requirements of Diff-serv Boundary Routers", [draft-bernet-diffedge-01.txt](#), Work in Progress, November 1998.

## 4.0 Acknowledgements

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comments to an earlier version of this document.

## **5.0 Authors' Addresses**

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