Exinda Optimizer and the IP ToS/DiffServ Field

Introduction

The ToS (type of service) or DiffServ (differentiated services) field in the IP header is used to classify IP packets so that routers can make QoS (quality of service) decisions about what path packets should traverse across the network. For example, users may want to guarantee streaming video conferencing utilizes high quality, low-latency (and expensive) links, or, they might want to ensure email uses cheaper (but less reliable) links.

Previously, there were 5 different categories that users could classify their traffic with using the IP ToS field (see RFC 791).

- Normal Service
- Minimize Cost
- Maximize Reliability
- Maximize Throughput
- Minimize Delay

These have since been replaced by a new set of values called DSCP (DiffServ Code Points, see RFC 2474). A DSCP is a 6-bit number; therefore, there are 64 possible DSCP combinations, of which, only a portion have been standardized and are listed below.

DSCP Class (name)	Binary Value	Decimal Value
BE (best effort, default)	000000	0
AF11 (assured forwarding, see RFC 2597)	001010	10
AF12	001100	12
AF13	001110	14
AF21	010010	18
AF22	010100	20
AF23	010110	22
AF31	011010	26
AF32	011100	28
AF33	011110	30
AF41	100010	34
AF42	100100	36
AF43	100110	38
CS1 (class selector)	001000	8
CS2	010000	16
CS3	011000	24
CS4	100000	32
CS5	101000	40
CS6	110000	48
CS7	111000	56
EF (expedited forwarding, see RFC 2598)	101110	46

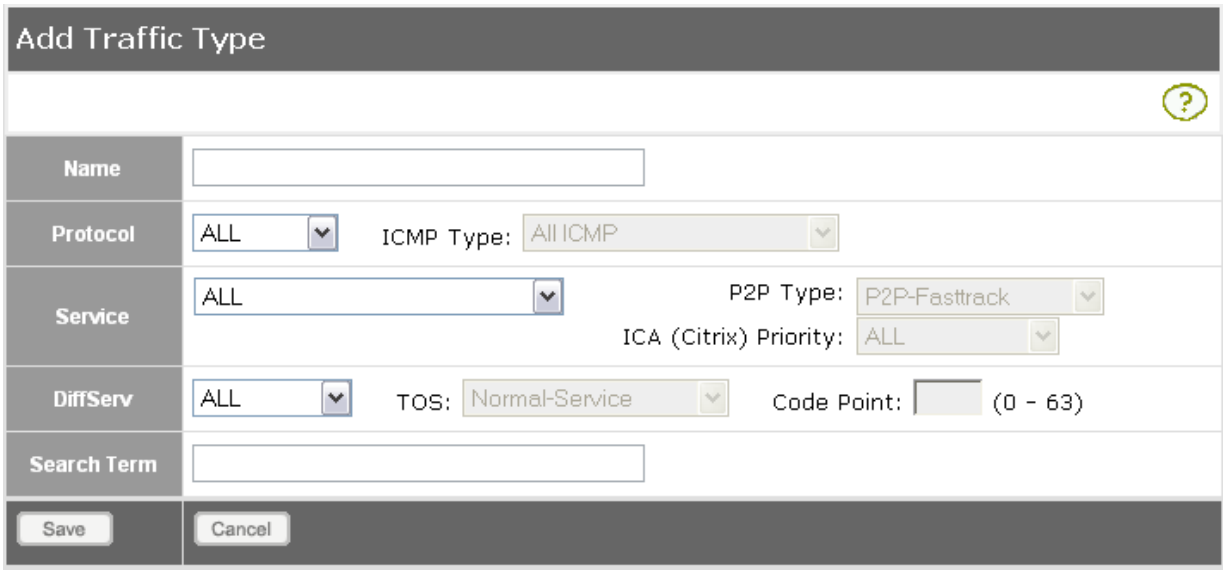
Exinda Optimizer

The Exinda Optimizer range of products can both read and write the ToS/DiffServ field allowing users to:

- **Match** packets with a ToS/DSCP value and apply QoS polices to these packets.
- **Mark** the DiffServ field in the IP header with a ToS/DSCP value based on traffic type (i.e. source/destination host/subnet, source/destination port, application).

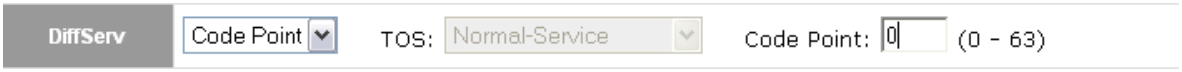
Matching Packets

When defining a traffic type in the Exinda Optimizer, there is a DiffServ section that allows users to match only those packets with a specified ToS/DSCP value.



Users can choose to match packets based on the old ToS standard by selecting the desired ToS value from the drop-down list.

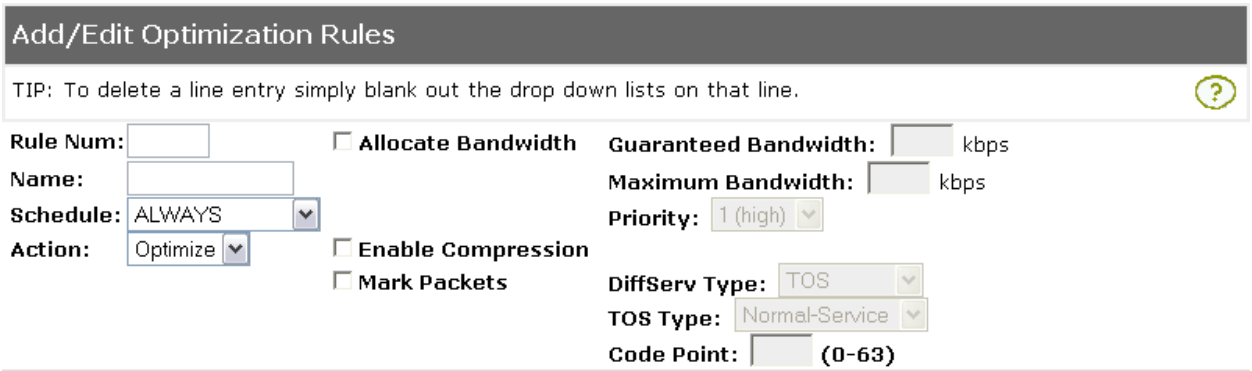
Packets can be matched using a DSCP value by entering the decimal value into the Code Point field.



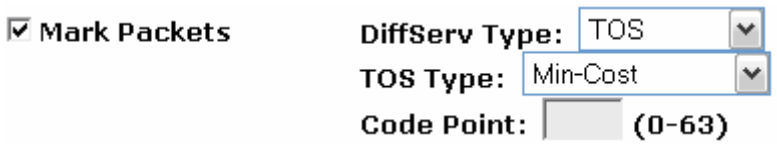
After a traffic type has been created, it can then be used in the Optimizer section and policies can then be applied to that traffic.

Marking Packets

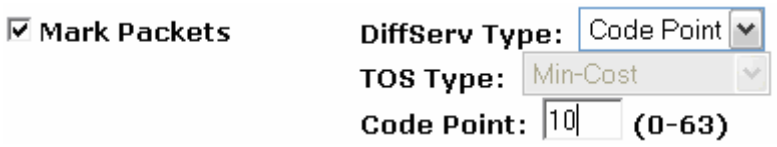
Users may want to mark certain packets with a ToS/DSCP value so that external routers can treat the traffic appropriately. The Optimizer section allows users to configure such actions.



Packets can be marked using the old ToS standard. Simply check the 'Mark Packets' box and select the desired ToS value from the drop-down list.



Packets can also be marked with a DSCP value. Enter the desired decimal DSCP value into the text box.



Any traffic that matches the corresponding optimizer rules will then be marked with the specified value and should be treated appropriately by routing equipment down the line.

ISPs may provide users with a table similar to the one below (example only). Each class has different guaranteed service and pricing levels. This information should be used in conjunction with Exinda Optimizer to implement and ensure quality of service.

Traffic Priority Class	IETF DiffServ Traffic Priority Class	DSCP Setting
Real Time (Gold)	Expedited Forwarding	EF
Mission Critical (Silver High)	Assured Forwarding	AF31
Business Critical (Silver Low)	Assured Forwarding	AF32/33
General Business (Bronze)	Best Effort	BE

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Recommended Reading

- “Configuring Policies and Filter Rules in the Exinda Optimizer”
- “Configuring Circuits and Virtual Circuits in the Exinda Optimizer”