



Measurement and Architecture for a Middleboxed Internet

User Guide for mmb 0.1

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Contents

1	mmb.....	3
2	mmb CLI guide.....	4
2.1	add/remove policies	4
2.1.1	<cond>	5
2.1.2	<field>	5
2.1.3	<value>	5
2.1.4	Examples	5
2.2	stateful policies	6

1 mmb

mmb (modular middlebox) is a vpp plugin that performs various middlebox behaviors.

2 mmb CLI guide

mmb <command>

SYNTAX : add|del|list|flush

This parameter determines the command applied on the policy list.

Allowed values:

- add : add a policy to the policy list
- del : remove a policy from the policy list
- list : list the policies in the policy list.
- flush : remove all policies from the policy list

2.1 add/remove policies

mmb add|del <match> [<match> ...] <target> [<target> ...]

- <match>

SYNTAX : [!] <field> [[<cond>] <value>]

This parameter is a constraint that determines the packets on which the policy will operate.

If a <match> is composed of a <field> alone, the constraint is that the packet should contain the field. If it is composed of a <field> and a <value>, the constraint is that the packet should contain the field and it should be set to the specified value. If it is composed of a <field>, a <cond> and a <value>, then the constraint is that the packet should contain the field, and the condition on the value should be true.

The ! operator applied on one constraint performs the logical NOT of the constraint. Multiple constraints can be inputted for the same rule, the resulting constraint is the logical AND of all inputted constraints.

- <target>

SYNTAX : mod [...] | strip [...] | drop

This parameter determines the action(s) to apply on matched packets.

- mod <field> <value> : modify a field on a packet.
- strip [!] <field> : strip options from a packet.

If the ! operator is placed after the strip keyword, the following option will be added to the whitelist (the only authorized options), if not it will be added to the blacklist (the forbidden options).

The special keyword all can be used in a strip target to strip all options from the matched packet.

- drop : drop a packet

2.1.1 <cond>

A condition is applied on a <value> from a <field> to form a constraint. Note that > and < have to be escaped if typed from a bash shell.

Available conditions: ==, !=, <=, >=, <, >.

2.1.2 <field>

Available fields:

- interfaces: in, out
- protocols¹: ip, tcp, udp, icmp
- IPv4 fields: ip-ver, ip-ihl, ip-dscp, ip-ecn, ip-non-ect², ip-ect0², ip-ect1², ip-ce², ip-len, ip-id, ip-flags, ip-res, ip-df, ip-mf, ip-frag-offset, ip-ttl, ip-proto, ip-checksum, ip-saddr³, ip-daddr³.
- ICMPv4 fields: icmp-type, icmp-code, icmp-checksum, icmp-payload.
- User Datagram Protocol (UDP) fields: udp-sport, udp-dport, udp-len, udp-checksum, udp-payload.
- Transmission Control Protocol (TCP) fields: tcp-sport, tcp-dport, tcp-seq-num, tcp-ack-num, tcp-offset, tcp-res, tcp-cwr, tcp-ece, tcp-urg, tcp-ack, tcp-push, tcp-res, tcp-syn, tcp-fin, tcp-flags, tcp-win, tcp-checksum, tcp-urg-ptr, tcp-payload.
- TCP options: tcp-opt-mss, tcp-opt-wscale, tcp-opt-sackp, tcp-opt-sack, tcp-opt-timestamp, tcp-opt-fast-open, tcp-opt-fast-open.
- Custom TCP options: tcp-opt [<kind>]
Replace <kind> with the kind of option in decimal. When employed in a <match> without a <kind>, checks if the packet contains any option.

2.1.3 <value>

The value of a field is in decimal or in hexadecimal if preceeded by x.

2.1.4 Examples

```
vpp# mmb add ip-ecn mod ip-ecn 0
ECN bleaching
```

```
vpp# mmb add ip-proto 17 drop
Block UDP
```

¹applicable only to net-proto or ip-proto fields in a <match>

²not followed by <value>

³ the following <value> can include a subnet mask, the == condition will become subnet matching

```
vpp# mmb add ip-proto != 6 drop
Block every IP protocol but TCP

vpp# mmb add ip-proto != 17 ip-proto != 6 drop
Block every IP protocol but TCP and UDP

vpp# mmb add ip-proto 17 drop
vpp# mmb add ip-proto 6 drop
Block TCP and UDP

vpp# mmb add tcp-dport 80 mod tcp-dport 443
Rewrite TCP port 80 to port 443

vpp# mmb add tcp-opt-mss strip tcp-opt-mss
Strip MSS option

vpp# mmb add tcp-opt-mss > 1500 mod tcp-opt-mss 1460
If MSS is larger than 1500, set it to 1460

vpp# mmb add tcp-opt strip ! tcp-opt-mss
Strip all options but MSS

vpp# mmb add tcp-opt strip tcp-opt-mss strip tcp-opt-wscale
Strip MSS and WScale

vpp# mmb add tcp-opt-timestamp strip all
Strip all options if packet contains timestamp option

vpp# mmb add tcp-opt strip ! tcp-opt-mss strip ! tcp-opt-wscale
Strip all options except mss and wscale if packet contains timestamp option (whitelist)

vpp# mmb add tcp-opt strip tcp-opt-mss strip tcp-opt-wscale
Strip all mss and wscale if packet contains timestamp option (blacklist)

vpp# mmb add tcp-opt ! tcp-opt-mss ! tcp-opt-wscale drop
Drop all TCP packets with options different than MSS or WScale.

vpp# mmb add ! tcp-opt-mss ! tcp-opt-wscale drop
Drop all TCP packets that do not contain MSS nor WScale.

vpp# mmb add tcp-opt 22 drop
Drop all TCP packets that contain option 22
```

2.2 stateful policies