```
**********************************************************
   18841 Sun Mar  1 02:15:16 2020
new/usr/src/man/man1m/flowadm.1m
4508 flowadm not working as documented, or documentation incorrect
4538 flowadm man page does not list lport and rport as output fields for show-fl
7210 flowadm does not have show-usage command described in the manual page
**********************************************************
```

```
'\" te
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.TH FLOWADM 1M "February 26, 2020"
.TH FLOWADM 1M "April 9, 2016"
.SH NAME
flowadm \- administer bandwidth resource control and priority for protocols,
services, containers, and virtual machines
.SH SYNOPSIS
.LP
.nf
\fBflowadm show-flow\fR [\fB-pP\fR] [\fB-S\fR] [\fB-s\fR [\fB-i\fR \fIinterval\f
     [\fB-o\fR \fIfield\fR[,...]] [\fIflow\fR]
.fi

.LP
.nf
\fBflowadm add-flow\fR [\fB-t\fR] [\fB-R\fR \fIroot-dir\fR] \fB-l\fR \fIlink\fR
     [\fB-p\fR \fIprop\fR=\fIvalue\fR[,...]] \fIflow\fR
     \fB-p\fR \fIprop\fR=\fIvalue\fR[,...] \fIflow\fR
\fBflowadm remove-flow\fR [\fB-t\fR] [\fB-R\fR \fIroot-dir\fR] {\fB-l\fR \fIlink
\fBflowadm show-flow\fR [\fB-p\fR] [\fB-l\fR \fIlink\fR] [\fB-o\fR \fIfield\fR[,
.fi

.LP
.nf
\fBflowadm set-flowprop\fR [\fB-t\fR] [\fB-R\fR \fIroot-dir\fR] \fB-p\fR \fIprop
\fBflowadm reset-flowprop\fR [\fB-t\fR] [\fB-R\fR \fIroot-dir\fR] [\fB-p\fR \fIp
\fBflowadm show-flowprop\fR [\fB-cP\fR] [\fB-l\fR \fIlink\fR] [\fB-o\fR \fIfield
     [\fB-p\fR \fIprop\fR[,...]] [\fIflow\fR]
.fi

.LP
.nf
\fBflowadm show-usage\fR [\fB-a\fR] [\fB-d\fR | {\fB-p\fR \fIplotfile\fR \fB-F\f
     [\fB-e\fR \fItime\fR] \fB-f\fR \fIfilename\fR [\fIflow\fR]
.fi

.SH DESCRIPTION
.LP
The \fBflowadm\fR command is used to create, modify, remove, and show
networking bandwidth and associated resources for a type of traffic on a
particular link.
.sp
.LP
The \fBflowadm\fR command allows users to manage networking bandwidth resources
for a transport, service, or a subnet. The service is specified as a
combination of transport and local port. The subnet is specified by its IP
address and subnet mask. The command can be used on any type of data link,
including physical links, virtual NICs, and link aggregations.
.sp
.LP
A flow is defined as a set of attributes based on Layer 3 and Layer 4 headers,
which can be used to identify a protocol, service, or a virtual machine. When a
flow is identified based on flow attributes, separate kernel resources
including layer 2, 3, and 4 queues, their processing threads, and other
```



```
resources are uniquely created for it, such that other traffic has minimal or
zero impact on it.
.sp
.LP
Inbound and outbound packet are matched to flows in a very fast and scalable
way, so that limits can be enforced with minimal performance impact.
.sp
.LP
The \fBflowadm\fR command can be used to define a flow without imposing any
The \fBflowadm\fR command can be used to identify a flow without imposing any
bandwidth resource control. This would result in the traffic type getting its
own resources and queues so that it is isolated from rest of the networking
traffic for more observable and deterministic behavior.
.sp
.LP
\fBflowadm\fR is implemented as a set of subcommands with corresponding
options. Options are described in the context of each subcommand.
.SH SUBCOMMANDS
.LP
The following subcommands are supported:
.sp
.ne 2
.na
\fB\fBflowadm add-flow\fR [\fB-t\fR] [\fB-R\fR \fIroot-dir\fR] \fB-l\fR
\fIlink\fR \fB-a\fR \fIattr\fR=\fIvalue\fR[,...] [\fB-p\fR
\fIprop\fR=\fIvalue\fR[,...]] \fIflow\fR\fR
\fB\fBflowadm show-flow\fR [\fB-pP\fR] [\fB-s\fR [\fB-i\fR \fIinterval\fR]]
[\fB-o\fR \fIfield\fR[,...]] [\fB-l\fR \fIlink\fR] [\fIflow\fR]\fR
.ad
.sp .6
.RS 4n
Adds a flow to the system. The flow is identified by its flow attributes and
properties.
Show flow configuration information (the default) or statistics, either for all
flows, all flows on a link, or for the specified \fIflow\fR.
.sp
As part of identifying a particular flow, its bandwidth resource can be limited
and its relative priority to other traffic can be specified. If no bandwidth
limit or priority is specified, the traffic still gets its unique layer 2, 3,
and 4 queues and processing threads, including NIC hardware resources (when
supported), so that the selected traffic can be separated from others and can
flow with minimal impact from other traffic.
.ne 2
.na
\fB\fB-o\fR \fIfield\fR[,...]\fR
.ad
.sp .6
.RS 4n
A case-insensitive, comma-separated list of output fields to display. The field
name must be one of the fields listed below, or a special value \fBall\fR, to
display all fields. For each flow found, the following fields can be displayed:
.sp
.ne 2
.na
\fB\fB-t\fR, \fB--temporary\fR\fR
\fB\fBflow\fR\fR
.ad
.sp .6
.RS 4n
The changes are temporary and will not persist across reboots. Persistence is
the default.
The name of the flow.
.RE

.sp
.ne 2
```

```
 93 .na
 94 \fB\fB-R\fR \fIroot-dir\fR, \fB--root-dir\fR=\fIroot-dir\fR\fR
108 \fB\fBlink\fR\fR
 95 .ad
 96 .sp .6
 97 .RS 4n
 98 Specifies an alternate root directory where \fBflowadm\fR should apply
 99 persistent creation.
112 The name of the link the flow is on.
100 .RE

102 .sp
103 .ne 2
104 .na
105 \fB\fB-l\fR \fIlink\fR, \fB--link\fR=\fIlink\fR\fR
118 \fB\fBipaddr\fR\fR
106 .ad
107 .sp .6
108 .RS 4n
109 Specify the link to which the flow will be added.
122 IP address of the flow. This can be either local or remote depending on how the
123 flow was defined.
110 .RE

112 .sp
113 .ne 2
114 .na
115 \fB\fB-a\fR \fIattr\fR=\fIvalue\fR[,...], \fB--attr\fR=\fIvalue\fR\fR
129 \fB\fBtransport\fR\fR
116 .ad
117 .sp .6
118 .RS 4n
119 A mandatory comma-separated list of attributes to be set to the specified
120 values.
133 The name of the layer for protocol to be used.
121 .RE

123 .sp
124 .ne 2
125 .na
126 \fB\fB-p\fR \fIprop\fR=\fIvalue\fR[,...], \fB--prop\fR=\fIvalue\fR[,...]\fR
139 \fB\fBport\fR\fR
127 .ad
128 .sp .6
129 .RS 4n
130 An optional comma-separated list of properties to be set to the specified
131 values. Flow properties are documented in the "Flow Properties" section, below.
143 Local port of service for flow.
132 .RE

134 .RE

136 .sp
137 .ne 2
138 .na
139 \fB\fBflowadm remove-flow\fR [\fB-t\fR] [\fB-R\fR \fIroot-dir\fR] \fB-l\fR
140 {\fIlink\fR | \fIflow\fR}\fR
149 \fB\fBdsfield\fR\fR
141 .ad
142 .sp .6
143 .RS 4n
144 Remove an existing flow identified by its link or name.
153 Differentiated services value for flow and mask used with \fBDSFIELD\fR value
154 to state the bits of interest in the differentiated services field of the IP
155 header.
156 .RE
```



```
158 .RE

145 .sp
146 .ne 2
147 .na
148 \fB\fB-t\fR, \fB--temporary\fR\fR
163 \fB\fB-p\fR, \fB--parsable\fR\fR
149 .ad
150 .sp .6
151 .RS 4n
152 The changes are temporary and will not persist across reboots. Persistence is
153 the default.
167 Display using a stable machine-parsable format.
154 .RE

156 .sp
157 .ne 2
158 .na
159 \fB\fB-R\fR \fIroot-dir\fR, \fB--root-dir\fR=\fIroot-dir\fR\fR
173 \fB\fB-P\fR, \fB--persistent\fR\fR
160 .ad
161 .sp .6
162 .RS 4n
163 Specifies an alternate root directory where \fBflowadm\fR should apply
164 persistent removal.
177 Display persistent flow property information.
165 .RE

167 .sp
168 .ne 2
169 .na
170 \fB\fB-l\fR \fIlink\fR | \fIflow\fR, \fB--link\fR=\fIlink\fR | \fIflow\fR\fR
183 \fB\fB-S\fR, \fB--continuous\fR\fR
171 .ad
172 .sp .6
173 .RS 4n
174 If a link is specified, remove all flows from that link. If a single flow is
175 specified, remove only that flow.
187 Continuously display network utilization by flow in a manner similar to the way
188 that \fBprstat\fR(1M) displays CPU utilization by process.
176 .RE

178 .RE

180 .sp
181 .ne 2
182 .na
183 \fB\fBflowadm show-flow\fR [\fB-pP\fR] [\fB-s\fR [\fB-i\fR \fIinterval\fR]]
184 [\fB-o\fR \fIfield\fR[,...]] [\fB-l\fR \fIlink\fR] [\fIflow\fR]\fR
194 \fB\fB-s\fR, \fB--statistics\fR\fR
185 .ad
186 .sp .6
187 .RS 4n
188 Show flow configuration information, either for all
189 flows, all flows on a link, or for the specified \fIflow\fR.
198 Displays flow statistics.
199 .RE

190 .sp
191 .ne 2
192 .na
193 \fB\fB-o\fR \fIfield\fR[,...]\fR
204 \fB\fB-i\fR \fIinterval\fR, \fB--interval\fR=\fIinterval\fR\fR
194 .ad
195 .sp .6
```

```
.RS 4n
A case-insensitive, comma-separated list of output fields to display. The field
name must be one of the fields listed below, or a special value \fBall\fR, to
display all fields. For each flow found, the following fields can be displayed:
Used with the \fB-s\fR option to specify an interval, in seconds, at which
statistics should be displayed. If this option is not specified, statistics are
displayed once.
.RE

.sp
.ne 2
.na
\fB\fBflow\fR\fR
\fB\fB-l\fR \fIlink\fR, \fB--link\fR=\fIlink\fR | \fIflow\fR\fR
.ad
.sp .6
.RS 4n
The name of the flow.
Display information for all flows on the named link or information for the
named flow.
.RE

.RE

.sp
.ne 2
.na
\fB\fBlink\fR\fR
\fB\fBflowadm add-flow\fR [\fB-t\fR] [\fB-R\fR \fIroot-dir\fR] \fB-l\fR
\fIlink\fR \fB-a\fR \fIattr\fR=\fIvalue\fR[,...] \fB-p\fR
\fIprop\fR=\fIvalue\fR[,...] \fIflow\fR\fR
.ad
.sp .6
.RS 4n
The name of the link the flow is on.
.RE

Adds a flow to the system. The flow is identified by its flow attributes and
properties.
.sp
As part of identifying a particular flow, its bandwidth resource can be limited
and its relative priority to other traffic can be specified. If no bandwidth
limit or priority is specified, the traffic still gets its unique layer 2, 3,
and 4 queues and processing threads, including NIC hardware resources (when
supported), so that the selected traffic can be separated from others and can
flow with minimal impact from other traffic.
.sp
.ne 2
.na
\fB\fBipaddr\fR\fR
\fB\fB-t\fR, \fB--temporary\fR\fR
.ad
.sp .6
.RS 4n
IP address of the flow. This can be either local or remote depending on how the
flow was defined.
The changes are temporary and will not persist across reboots. Persistence is
the default.
.RE

.sp
.ne 2
.na
\fB\fBproto\fR\fR
\fB\fB-R\fR \fIroot-dir\fR, \fB--root-dir\fR=\fIroot-dir\fR\fR
.ad
```



```
.sp .6
.RS 4n
The name of the layer for protocol to be used.
Specifies an alternate root directory where \fBflowadm\fR should apply
persistent creation.
.RE

.sp
.ne 2
.na
\fB\fBlport\fR\fR
\fB\fB-l\fR \fIlink\fR, \fB--link\fR=\fIlink\fR\fR
.ad
.sp .6
.RS 4n
Local port of service for flow.
Specify the link to which the flow will be added.
.RE

.sp
.ne 2
.na
\fB\fBrport\fR\fR
\fB\fB-a\fR \fIattr\fR=\fIvalue\fR[,...], \fB--attr\fR=\fIvalue\fR\fR
.ad
.sp .6
.RS 4n
Remote port of service for flow.
A comma-separated list of attributes to be set to the specified values.
.RE

.sp
.ne 2
.na
\fB\fBdsfld\fR\fR
\fB\fB-p\fR \fIprop\fR=\fIvalue\fR[,...], \fB--prop\fR=\fIvalue\fR[,...]\fR
.ad
.sp .6
.RS 4n
Differentiated services value for flow and mask used with \fBDSFIELD\fR value
to state the bits of interest in the differentiated services field of the IP
header.
A comma-separated list of properties to be set to the specified values.
.RE

.RE

.sp
.ne 2
.na
\fB\fB-p\fR, \fB--parsable\fR\fR
\fB\fBflowadm remove-flow\fR [\fB-t\fR] [\fB-R\fR \fIroot-dir\fR] \fB-l\fR
{\fIlink\fR | \fIflow\fR}\fR
.ad
.sp .6
.RS 4n
Display using a stable machine-parsable format.
Remove an existing flow identified by its link or name.
.sp
.ne 2
.na
\fB\fB-t\fR, \fB--temporary\fR\fR
.ad
.sp .6
.RS 4n
The changes are temporary and will not persist across reboots. Persistence is
```

```
315 the default.
283 .RE

285 .sp
286 .ne 2
287 .na
288 \fB\fB-P\fR, \fB--persistent\fR\fR
321 \fB\fB-R\fR \fIroot-dir\fR, \fB--root-dir\fR=\fIroot-dir\fR\fR
289 .ad
290 .sp .6
291 .RS 4n
292 Display persistent flow property information.
325 Specifies an alternate root directory where \fBflowadm\fR should apply
326 persistent removal.
293 .RE

295 .sp
296 .ne 2
297 .na
298 \fB\fB-l\fR \fIlink\fR, \fB--link\fR=\fIlink\fR | \fIflow\fR\fR
332 \fB\fB-l\fR \fIlink\fR | \fIflow\fR, \fB--link\fR=\fIlink\fR | \fIflow\fR\fR
299 .ad
300 .sp .6
301 .RS 4n
302 Display information for all flows on the named link or information for the
303 named flow.
336 If a link is specified, remove all flows from that link. If a single flow is
337 specified, remove only that flow.
304 .RE

306 .RE

308 .sp
309 .ne 2
310 .na
311 \fB\fBflowadm set-flowprop\fR [\fB-t\fR] [\fB-R\fR \fIroot-dir\fR] \fB-p\fR
312 \fIprop\fR=\fIvalue\fR[,...] \fIflow\fR\fR
313 .ad
314 .sp .6
315 .RS 4n
316 Set values of one or more properties on the flow specified by name. The
317 complete list of properties can be retrieved using the \fBshow-flowprop\fR
351 complete list of properties can be retrieved using the \fBshow-flow\fR
318 subcommand.
319 .sp
320 .ne 2
321 .na
322 \fB\fB-t\fR, \fB--temporary\fR\fR
323 .ad
324 .sp .6
325 .RS 4n
326 The changes are temporary and will not persist across reboots. Persistence is
327 the default.
328 .RE

330 .sp
331 .ne 2
332 .na
333 \fB\fB-R\fR \fIroot-dir\fR, \fB--root-dir\fR=\fIroot-dir\fR\fR
334 .ad
335 .sp .6
336 .RS 4n
337 Specifies an alternate root directory where \fBflowadm\fR should apply
338 persistent setting of properties.
339 .RE
```



```
341 .sp
342 .ne 2
343 .na
344 \fB\fB-p\fR \fIprop\fR=\fIvalue\fR[,...], \fB--prop\fR=\fIvalue\fR[,...]\fR
345 .ad
346 .sp .6
347 .RS 4n
348 A comma-separated list of properties to be set to the specified values.
349 .RE

351 .RE

353 .sp
354 .ne 2
355 .na
356 \fB\fBflowadm reset-flowprop\fR [\fB-t\fR] [\fB-R\fR \fIroot-dir\fR] \fB-p\fR
357 [\fIprop\fR=\fIvalue\fR[,...]] \fIflow\fR\fR
358 .ad
359 .sp .6
360 .RS 4n
361 Resets one or more properties to their default values on the specified flow. If
362 no properties are specified, all properties are reset. See the
363 \fBshow-flowprop\fR subcommand for a description of properties, which includes
364 their default values.
365 .sp
366 .ne 2
367 .na
368 \fB\fB-t\fR, \fB--temporary\fR\fR
369 .ad
370 .sp .6
371 .RS 4n
372 Specifies that the resets are temporary. Temporary resets last until the next
373 reboot.
374 .RE

376 .sp
377 .ne 2
378 .na
379 \fB\fB-R\fR \fIroot-dir\fR, \fB--root-dir\fR=\fIroot-dir\fR\fR
380 .ad
381 .sp .6
382 .RS 4n
383 Specifies an alternate root directory where \fBflowadm\fR should apply
384 persistent setting of properties.
385 .RE

387 .sp
388 .ne 2
389 .na
390 \fB\fB-p\fR \fIprop\fR=\fIvalue\fR[,...], \fB--prop\fR=\fIvalue\fR[,...]\fR
391 .ad
392 .sp .6
393 .RS 4n
394 A comma-separated list of properties to be reset.
395 .RE

397 .RE

399 .sp
400 .ne 2
401 .na
402 \fB\fBflowadm show-flowprop\fR [\fB-cP\fR] [\fB-l\fR \fIlink\fR] [\fB-p\fR
403 \fIprop\fR[,...]] [\fIflow\fR]\fR
404 .ad
405 .sp .6
406 .RS 4n
```

```
Show the current or persistent values of one or more properties, either for all
flows, flows on a specified link, or for the specified flow.
.sp
By default, current values are shown. If no properties are specified, all
available flow properties are displayed. For each property, the following
fields are displayed:
.sp
.ne 2
.na
\fB\fBFLOW\fR\fR
.ad
.sp .6
.RS 4n
The name of the flow.
.RE

.sp
.ne 2
.na
\fB\fBPROPERTY\fR\fR
.ad
.sp .6
.RS 4n
The name of the property.
.RE

.sp
.ne 2
.na
\fB\fBVALUE\fR\fR
.ad
.sp .6
.RS 4n
The current (or persistent) property value. The value is shown as \fB--\fR
(double hyphen), if it is not set, and \fB?\fR (question mark), if the value is
unknown. Persistent values that are not set or have been reset will be shown as
\fB--\fR and will use the system \fBDEFAULT\fR value (if any).
.RE

.sp
.ne 2
.na
\fB\fBDEFAULT\fR\fR
.ad
.sp .6
.RS 4n
The default value of the property. If the property has no default value,
\fB--\fR (double hyphen), is shown.
.RE

.sp
.ne 2
.na
\fB\fBPOSSIBLE\fR\fR
.ad
.sp .6
.RS 4n
A comma-separated list of the values the property can have. If the values span
a numeric range, the minimum and maximum values might be shown as shorthand. If
the possible values are unknown or unbounded, \fB--\fR (double hyphen), is
shown.
.RE

Flow properties are documented in the "Flow Properties" section, below.
.sp
.ne 2
```



```
.na
\fB\fB-c\fR
.ad
.sp .6
.RS 4n
Display using a stable machine-parsable format.
.RE

.sp
.ne 2
.na
\fB\fB-P\fR, \fB--persistent\fR\fR
.ad
.sp .6
.RS 4n
Display persistent flow property information.
.RE

.sp
.ne 2
.na
\fB\fB-p\fR \fIprop\fR[,...], \fB--prop\fR=\fIprop\fR[,...]\fR
.ad
.sp .6
.RS 4n
A comma-separated list of properties to show.
.RE

.RE

.sp
.ne 2
.na
\fB\fBflowadm show-usage\fR [\fB-a\fR] [\fB-d\fR | {\fB-p\fR \fIplotfile\fR
\fB-F\fR \fIformat\fR}] [\fB-s\fR \fItime\fR] [\fB-e\fR \fItime\fR]
[\fIflow\fR]\fR
.ad
.sp .6
.RS 4n
Show the historical network flow usage from a stored extended accounting file.
Configuration and enabling of network accounting through \fBacctadm\fR(1M) is
required. The default output will be the summary of flow usage for the entire
period of time in which extended accounting was enabled.
.sp
.ne 2
.na
\fB\fB-a\fR\fR
.ad
.sp .6
.RS 4n
Display all historical network usage for the specified period of time during
which extended accounting is enabled. This includes the usage information for
the flows that have already been deleted.
.RE

.sp
.ne 2
.na
\fB\fB-d\fR\fR
.ad
.sp .6
.RS 4n
Display the dates for which there is logging information. The date is in the
format \fIDD\fR/\fIMM\fR/\fIYYYY\fR.
.RE
```

```
.sp
.ne 2
.na
\fB\fB-F\fR \fIformat\fR\fR
.ad
.sp .6
.RS 4n
Specifies the format of \fIplotfile\fR that is specified by the \fB-p\fR
option. As of this release, \fBgnuplot\fR is the only supported format.
.RE

.sp
.ne 2
.na
\fB\fB-p\fR \fIplotfile\fR\fR
.ad
.sp .6
.RS 4n
When specified with \fB-s\fR or \fB-e\fR (or both), outputs flow usage data to
a file of the format specified by the \fB-F\fR option, which is required.
.RE

.sp
.ne 2
.na
\fB\fB-s\fR \fItime\fR, \fB-e\fR \fItime\fR\fR
.ad
.sp .6
.RS 4n
Start and stop times for data display. Time is in the format
\fIYYYY\fR.\fIMM\fR.\fIDD\fR,\fIhh\fR:\fImm\fR:\fIss\fR.
.RE

.sp
.ne 2
.na
\fB\fB-f\fR \fIfilename\fR\fR
.ad
.sp .6
.RS 4n
Read extended accounting records of network flow usage from \fIfilename\fR.
.RE

.sp
.ne 2
.na
\fB\fIflow\fR\fR
.ad
.sp .6
.RS 4n
If specified, display the network flow usage only from the named flow.
Otherwise, display network usage from all flows.
.RE

.RE
```

```
.SS "Flow Attributes"
.LP
The flow operand that identify a flow in a \fBflowadm\fR command is a
comma-separated list of one or more keyword, value pairs from the list below.
.sp
.ne 2
.na
\fB\fBlocal_ip\fR[\fB/\fR\fIprefix_len\fR]\fR
.ad
.sp .6
```



```
.RS 4n
Identifies a network flow by the local IP address. \fIvalue\fR must be a IPv4
address in dotted-decimal notation or an IPv6 address in colon-separated
notation. \fIprefix_len\fR is optional.
.sp
If \fIprefix_len\fR is specified, it describes the netmask for a subnet
address, following the same notation convention of \fBifconfig\fR(1M) and
\fBroute\fR(1M) addresses. If unspecified, the given IP address will be
considered as a host address for which the default prefix length for a IPv4
address is \fB/32\fR and for IPv6 is \fB/128\fR.
.RE

.sp
.ne 2
.na
\fB\fBremote_ip\fR[\fB/\fR\fIprefix_len\fR]\fR
.ad
.sp .6
.RS 4n
Identifies a network flow by the remote IP address. The syntax is the same as
the \fBlocal_ip\fR attribute.
\fIlocal_ip\fR attributes
.RE

.sp
.ne 2
.na
\fB\fBtransport\fR={\fBtcp\fR|\fBudp\fR|\fBsctp\fR|\fBicmp\fR|\fBicmpv6\fR}\fR
.ad
.sp .6
.RS 4n
Identifies a layer 4 protocol to be used. It is typically used in combination
with local_port to identify the service that needs special attention.
.RE

.sp
.ne 2
.na
\fB\fBlocal_port\fR\fR
.ad
.sp .6
.RS 4n
Identifies a service specified by the local port.
.RE

.sp
.ne 2
.na
\fB\fBremote_port\fR\fR
.ad
.sp .6
.RS 4n
Identifies a service specified by the remote port.
.RE

.sp
.ne 2
.na
\fB\fBdsfield\fR[\fB:\fR\fIdsfield_mask\fR]\fR
.ad
.sp .6
.RS 4n
Identifies the 8-bit differentiated services field (as defined in RFC 2474).
.sp
The optional \fIdsfield_mask\fR is used to state the bits of interest in the
differentiated services field when comparing with the \fBdsfield\fR value. A
```

```
\fB0\fR in a bit position indicates that the bit value needs to be ignored and
a \fB1\fR indicates otherwise. The mask can range from \fB0x01\fR to
\fB0xff\fR. If \fIdsfield_mask\fR is not specified, the default mask \fB0xff\fR
is used. Both the \fBdsfield\fR value and mask must be in hexadecimal.
.RE

.sp
.LP
The following six types of combinations of attributes are supported:
The following five types of combinations of attributes are supported:
.sp
.in +2
.nf
local_ip[/\fIprefixlen\fR]=\fIaddress\fR
remote_ip[/\fIprefixlen\fR]=\fIaddress\fR
transport={tcp|udp|sctp|icmp|icmpv6}
transport={tcp|udp|sctp},local_port=\fIport\fR
transport={tcp|udp|sctp},remote_port=\fIport\fR
dsfield=\fIval\fR[:\fIdsfield_mask\fR]
.fi
.in -2
.sp

.sp
.LP
On a given link, the types of combinations above are mutually exclusive. An
attempt to create flows of different types on a given link will fail.
On a given link, the combinations above are mutually exclusive. An attempt to
create flows of different combinations will fail.
.SS "Restrictions"
.LP
There are individual flow restrictions and flow restrictions per zone.
.SS "Individual Flow Restrictions"
.LP
Restrictions on individual flows do not require knowledge of other flows that
have been added to the link.
.sp
.LP
An attribute can be listed only once for each flow. For example, the following
command is not valid:
.sp
.in +2
.nf
# \fBflowadm add-flow -l vnic1 -a local_port=80,local_port=8080 httpflow\fR
.fi
.in -2
.sp

.sp
.LP
\fBtransport\fR and \fBlocal_port\fR:
.sp
.LP
TCP, UDP, or SCTP flows can be specified with a local port. An ICMP or ICMPv6
flow that specifies a port is not allowed. The following commands are valid:
.sp
.in +2
.nf
# \fBflowadm add-flow -l e1000g0 -a transport=udp udpflow\fR
# \fBflowadm add-flow -l e1000g0 -a transport=tcp,local_port=80 \e
udp80flow\fR
.fi
.in -2
.sp

.sp
```



```
.LP
The following commands are not valid:
.sp
.in +2
.nf
# \fBflowadm add-flow -l e1000g0 -a local_port=25 flow25\fR
# \fBflowadm add-flow -l e1000g0 -a transport=icmpv6,local_port=16 \e
flow16\fR
.fi
.in -2
.sp

.SS "Flow Restrictions Per Zone"
.LP
Within a zone, no two flows can have the same name. After adding a flow with
the link specified, the link will not be required for display, modification, or
deletion of the flow.
.SS "Flow Properties"
.LP
The following flow properties are supported. Note that the ability to set a
given property to a given value depends on the driver and hardware.
.sp
.ne 2
.na
\fB\fBmaxbw\fR\fR
.ad
.sp .6
.RS 4n
Sets the full duplex bandwidth for the flow. The bandwidth is specified as an
integer with one of the scale suffixes(\fBK\fR, \fBM\fR, or \fBG\fR for Kbps,
Mbps, and Gbps). If no units are specified, the input value will be read as
Mbps. The default is no bandwidth limit.
.RE

.sp
.ne 2
.na
\fB\fBpriority\fR\fR
.ad
.sp .6
.RS 4n
Sets the relative priority for the flow. The value can be given as one of the
tokens \fBhigh\fR, \fBmedium\fR, or \fBlow\fR. The default is \fBmedium\fR.
.RE

.SH EXAMPLES
.LP
\fBExample 1 \fRCreating a Policy Around a Mission-Critical Port
.sp
.LP
The command below creates a policy around inbound HTTPS traffic on an HTTPS
server so that HTTPS obtains dedicated NIC hardware and kernel TCP/IP
resources. The name specified, \fBhttps-1\fR, can be used later to modify or
delete the policy.

.sp
.in +2
.nf
# \fBflowadm add-flow -l bge0 -a transport=TCP,local_port=443 https-1\fR
# \fBflowadm show-flow -l bge0\fR
FLOW         LINK       IPADDR                PROTO  LPORT   RPORT   DSFLD
https1       bge0       --                    tcp    443     --      --
FLOW         LINK         IP ADDR             PROTO  PORT    DSFLD
https1       bge0         --                  tcp    443     --
.fi
.in -2
```

```
699 .sp

701 .LP
702 \fBExample 2 \fRModifying an Existing Policy to Add Bandwidth Resource Control
703 .sp
704 .LP
705 The following command modifies the \fBhttps-1\fR policy from the preceding
706 example. The command adds bandwidth control and give the policy a high
707 priority.

709 .sp
710 .in +2
711 .nf
712 # \fBflowadm set-flowprop -p maxbw=500M,priority=high https-1\fR
713 # \fBflowadm show-flow https-1\fR
714 FLOW        LINK        IPADDR                PROTO  LPORT   RPORT   DSFLD
715 https-1     bge0        --                    tcp    443     --      --
835 FLOW         LINK         IP ADDR               PROTO  PORT    DSFLD
836 https1       bge0         --                    tcp    443     --

717 # \fBflowadm show-flowprop https-1\fR
718 FLOW         PROPERTY        VALUE          DEFAULT        POSSIBLE
719 https-1      maxbw             500          --             --
720 https-1      priority        high           --             low,medium,high
841 https-1     priority    HIGH       --          LOW,NORMAL,HIGH
721 .fi
722 .in -2
723 .sp

725 .LP
726 \fBExample 3 \fRLimiting the UDP Bandwidth Usage
727 .sp
728 .LP
729 The following command creates a policy for UDP protocol so that it cannot
730 consume more than 100Mbps of available bandwidth. The flow is named
731 \fBlimit-udp-1\fR.

733 .sp
734 .in +2
735 .nf
736 # \fBflowadm add-flow -l bge0 -a transport=UDP -p maxbw=100M, \e
737 priority=low limit-udp-1\fR
738 .fi
739 .in -2
740 .sp

742 .LP
743 \fBExample 4 \fRSetting Policy, Making Use of \fBdsfield\fR Attribute
864 \fBExample 4 \fRShowing Flow Usage
744 .sp
745 .LP
867 Flow usage statistics can be stored using the extended accounting facility,
868 \fBacctadm\fR(1M).

870 .sp
871 .in +2
872 .nf
873 # \fBacctadm -e extended -f /var/log/net.log net\fR

875 # \fBacctadm net\fR
876 Network accounting: active
877 Network accounting file: /var/log/net.log
878 Tracked Network resources: extended
879 Untracked Network resources: none
880 .fi
881 .in -2
```



```
882 .sp

884 .sp
885 .LP
886 The historical data that was saved can be retrieved in summary form using the
887 \fBshow-usage\fR subcommand of \fBflowadm\fR.

889 .LP
890 \fBExample 5 \fRSetting Policy, Making Use of \fBdsfield\fR Attribute
891 .sp
892 .LP
746 The following command sets a policy for EF PHB (DSCP value of 101110 from RFC
747 2598) with a bandwidth of 500 Mbps and a high priority. The \fBdsfield\fR value
748 for this flow will be \fB0x2e\fR (101110) with the \fBdsfield_mask\fR being
749 \fB0xfc\fR (because we want to ignore the 2 least significant bits).

751 .sp
752 .in +2
753 .nf
754 # \fBflowadm add-flow -l bge0 -a dsfield=0x2e:0xfc \e
755 -p maxbw=500M,priority=high efphb-flow\fR
756 .fi
757 .in -2
758 .sp

907 .sp
908 .LP
909 Display summary information:

911 .sp
912 .in +2
913 .nf
914 # \fBflowadm show-usage -f /var/log/net.log\fR
915 FLOW      DURATION  IPACKETS RBYTES      OPACKETS OBYTES     BANDWIDTH
916 flowtcp   100       1031     546908      0        0          43.76 Kbps
917 flowudp   0         0        0           0        0           0.00 Mbps
918 .fi
919 .in -2
920 .sp

922 .sp
923 .LP
924 Display dates for which logging information is available:

926 .sp
927 .in +2
928 .nf
929 # \fBflowadm show-usage -d -f /var/log/net.log\fR
930 02/19/2008
931 .fi
932 .in -2
933 .sp

935 .sp
936 .LP
937 Display logging information for \fBflowtcp\fR starting at 02/19/2008, 10:38:46
938 and ending at 02/19/2008, 10:40:06:

940 .sp
941 .in +2
942 .nf
943 # \fBflowadm show-usage -s 02/19/2008,10:39:06 -e 02/19/2008,10:40:06 \e
944 -f /var/log/net.log flowtcp\fR
945 FLOW      TIME       IPACKETS RBYTES      OPACKETS OBYTES     BANDWIDTH
946 flowtcp   10:39:06   1        1546         4       6539       3.23 Kbps
947 flowtcp   10:39:26   2        3586         5       9922       5.40 Kbps
```

```
948 flowtcp   10:39:46   1        240          1       216       182.40 bps
949 flowtcp   10:40:06   0        0            0       0           0.00 bps
950 .fi
951 .in -2
952 .sp

954 .sp
955 .LP
956 Output the same information as above as a plotfile:

958 .sp
959 .in +2
960 .nf
961 # \fBflowadm show-usage -s 02/19/2008,10:39:06 -e 02/19/2008,10:40:06 \e
962 -p /home/plot/myplot -F gnuplot -f /var/log/net.log flowtcp\fR
963 # \fBTime tcp-flow\fR
964 10:39:06 3.23
965 10:39:26 5.40
966 10:39:46 0.18
967 10:40:06 0.00
968 .fi
969 .in -2
970 .sp

760 .SH EXIT STATUS
761 .ne 2
762 .na
763 \fB\fB0\fR\fR
764 .ad
765 .sp .6
766 .RS 4n
767 All actions were performed successfully.
768 .RE

770 .sp
771 .ne 2
772 .na
773 \fB\fB>0\fR\fR
774 .ad
775 .sp .6
776 .RS 4n
777 An error occurred.
778 .RE

780 .SH ATTRIBUTES
993 .LP
781 See \fBattributes\fR(5) for descriptions of the following attributes:
782 .sp

784 .sp
785 .TS
786 box;
787 c | c
788 l | l .
789 ATTRIBUTE TYPE  ATTRIBUTE VALUE
790 _
791 Interface Stability     Committed
792 .TE

794 .SH SEE ALSO
795 \fBbladm\fR(1M), \fBflowstat\fR(1M), \fBifconfig\fR(1M),
796 \fBroute\fR(1M), \fBattributes\fR(5)

798 .SH NOTES
799 The display of statistics by the \fBshow-flow\fR subcommand, and the
800 \fBshow-usage\fR subcommand, have been removed. This functionality can
```



```
 801 now be accessed using the \fBflowstat\fR(1M) utility.
1008 .LP
1009 \fBacctadm\fR(1M), \fBdladm\fR(1M), \fBifconfig\fR(1M), \fBprstat\fR(1M),
1010 \fBroute\fR(1M), \fBattributes\fR(5), \fBdlpi\fR(7P)
```