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# Load balancer

## Description and cases

The SSG can act as a traffic balancer based on IP addresses belonging to an AS defined as `local` in `asnum.dscp`.

In this case, the SSG-LB acts as an L2-bridge in the network, hence the name L2 traffic balancer.

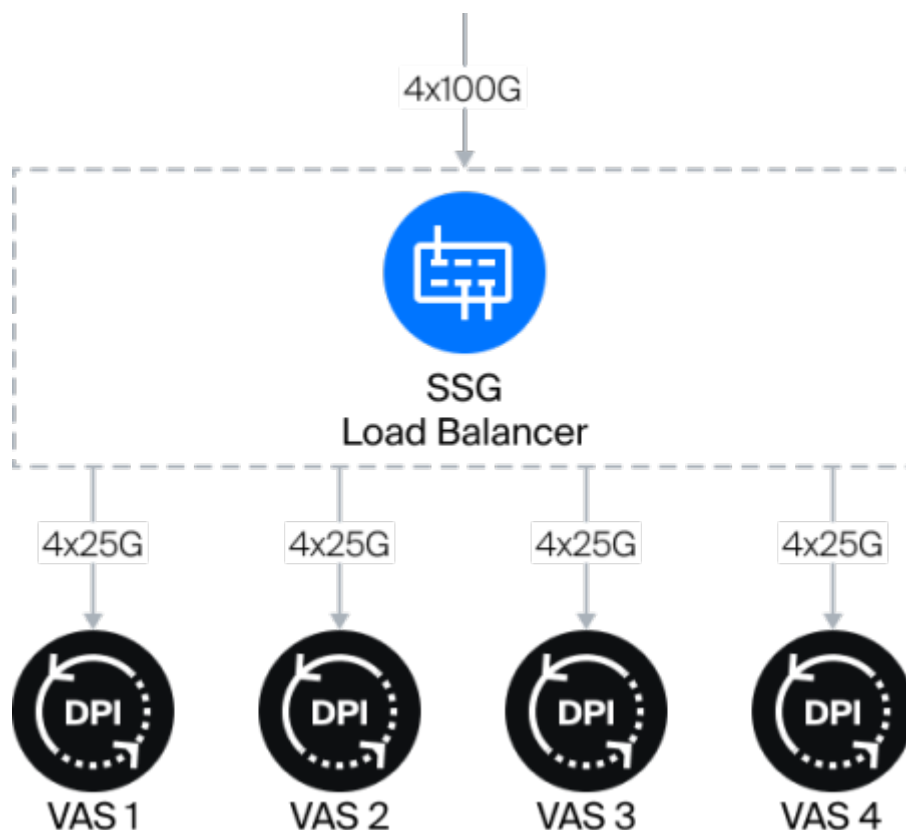


DPI functionality does not work in this mode.

### Case: Balancer on a traffic mirror

Suppose a 400Gbps traffic mirror needs to be evenly distributed among four VAS platforms (Value-Added Services) performing traffic analysis and various detection.

In this case, SSG-LB will evenly distribute traffic with equal port utilization on the pullers and maintain traffic symmetry (traffic from one session will be directed to only one puller).



#### Example configuration `/etc/dpi/fastdpi.conf`:

- Traffic mirroring is fed into 4x100G interfaces.
- Traffic is balanced between four pullers, each puller is connected by 4x25G links.

```
in_dev=05-00.0:05-00.1:05-00.2:05-00.3
out_dev=01-00.0:01-00.1:01-00.2:01-00.3:02-00.0:02-00.1:02-00.2:02-00.3:03-
```

```
0.0:03-00.1:03-00.2:03-00.3:04-00.0:04-00.1:04-00.2:04-00.3
```

```
#FastDPI Control
ctrl_port=29000
ctrl_dev=lo

#Turn on Load Balancing
enable_l2_lb=1

#Balance algorithm
maglev=2

#Hash table
lb_hash_out_dev_type=1
```

## Setting

### Setting up subnets for balancing

Balancing applies only to IP addresses belonging to the AS defined as `local` in `asnum.dscp`.

1. Define an autonomous system with IP addresses that are used by subscribers:

```
vi aslocal.txt
10.0.0.0/8 64511
172.16.0.0/12 64511
192.168.0.0/16 64511
cat aslocal.txt | as2bin /etc/dpi/aslocal.bin
```

1. [Examples for IPv4](#)
2. [Example for IPv6](#)

2. Mark a given autonomous system as local:

```
vi my_as_dscp.txt
64511 local
10415 local
cat my_as_dscp.txt | as2dscp /etc/dpi/asnum.dscp
```

You can use either a custom AS or a public AS as the AS.  
Read more [at the link](#)

3. A reload must be performed to apply the parameters:

```
service fastdpi reload
```

### Setting `/etc/dpi/fastdpi.conf`

1. Define the input and output interfaces in the configuration file.

The input interfaces to which the traffic mirror is fed are specified in the `in_dev` parameter, and the output interfaces are specified in `out_dev`. Interfaces do not form pairs and species constructs are allowed:

```
in_dev=05-00.0:05-00.1:05-00.2:05-00.3:0b-00.0:0b-00.1:0b-00.2:0b-00.3
out_dev=08-00.0:08-00.1:08-00.2:08-00.3
```

Or

```
in_dev=05-00.0
out_dev=out_dev=08-00.0:08-00.1:08-00.2:08-00.3
```

2. Enable balancing mode in the `enable_lb` parameter, where:
  - 0 — deactivate balancing;
  - 1 — activate balancing.
3. Determine by what value to initialize the hash table in the `lb_hash_out_dev_type` parameter, where:
  - 0 — use the internal index of the output interface;
  - 1 — use the interface name from `[in|out]_dev`.
4. Select an engine to handle thread dispatchers in the `dpdk_engine` parameter, where:
  - 0 — read/write **default** engine, one dispatcher for everything;
  - 1 — read/write engine with two dispatcher threads: a dispatcher for each direction;
  - 2 — Read/write engine with RSS support: for each direction, `dpdk_rss` dispatchers are created (default `dpdk_rss=2`), so total number of dispatchers =  $2 * dpdk\_rss$ — to work with `in_dev`, and a separate dispatcher to work with `out_dev`.  
When the parameter value is 2, the `mrx_lb_engine` engine is activated. The principle of operation is the same as in the usual mode `dpdk_engine=2`, only `rss` is enabled on `in_dev`, and only one `rx` queue is created on `out_dev`.

Learn more about the `dpdk_engine` parameter by [clicking here](#).
5. Select a balancing algorithm. The `maglev` algorithm with fixed hash table size is used for traffic balancing, where:
  - 1 — if `src` and `dst` ip are both local, then hash is calculated based on these two addresses;
  - 2 — if only `src` ip local, then hash is calculated based on `src` ip;
  - 3 — if only `dst` ip local, hash is calculated on the basis of `dst` ip;
  - 4 — hash is calculated based on `src` and `dst` ip.

Based on the calculated hash value, the output interface is determined by determining the index of the hash table cell containing the interface index from the array of output interfaces.

## SSG-LB equipment requirements

Max IN traffic Gbps (Mirror on SSG-LB)	Max OUT traffic Gbps (Balanced traffic to the removers)	SSG-LB version	Number of cores of 2.5 GHz or more	RAM GB	Type and <u>minimum</u> number of ports	Packet per second in millions at a base CPU frequency of 2.5GHz or more
up to 100	up to 100	<b>SSG-100-LB</b>	28 Intel 6258R, Intel 5320, 32 AMD 7502P	64 (8x8GB)	2x100G + 14x10/25G	40M pps
up to 200	up to 200	<b>SSG-200-LB</b>	64 AMD 9534	64 (8x8GB)	9x25/40/50/100G	60M pps
up to 300	up to 300	<b>SSG-300-LB</b>	96 AMD 9654	64 (8x8GB)	9x25/40/50/100G	80M pps
up to 400	up to 400	<b>SSG-400-LB</b>	128 AMD 9754	64 (8x8GB)	9x25/40/50/100G	120M pps
up to 800	up to 800	<b>SSG-800-LB</b>	2x128 AMD 9754	128 (16x8GB)	9x25/40/50/100G	240M pps