



NVIDIA DOCA URL Filter

Reference App

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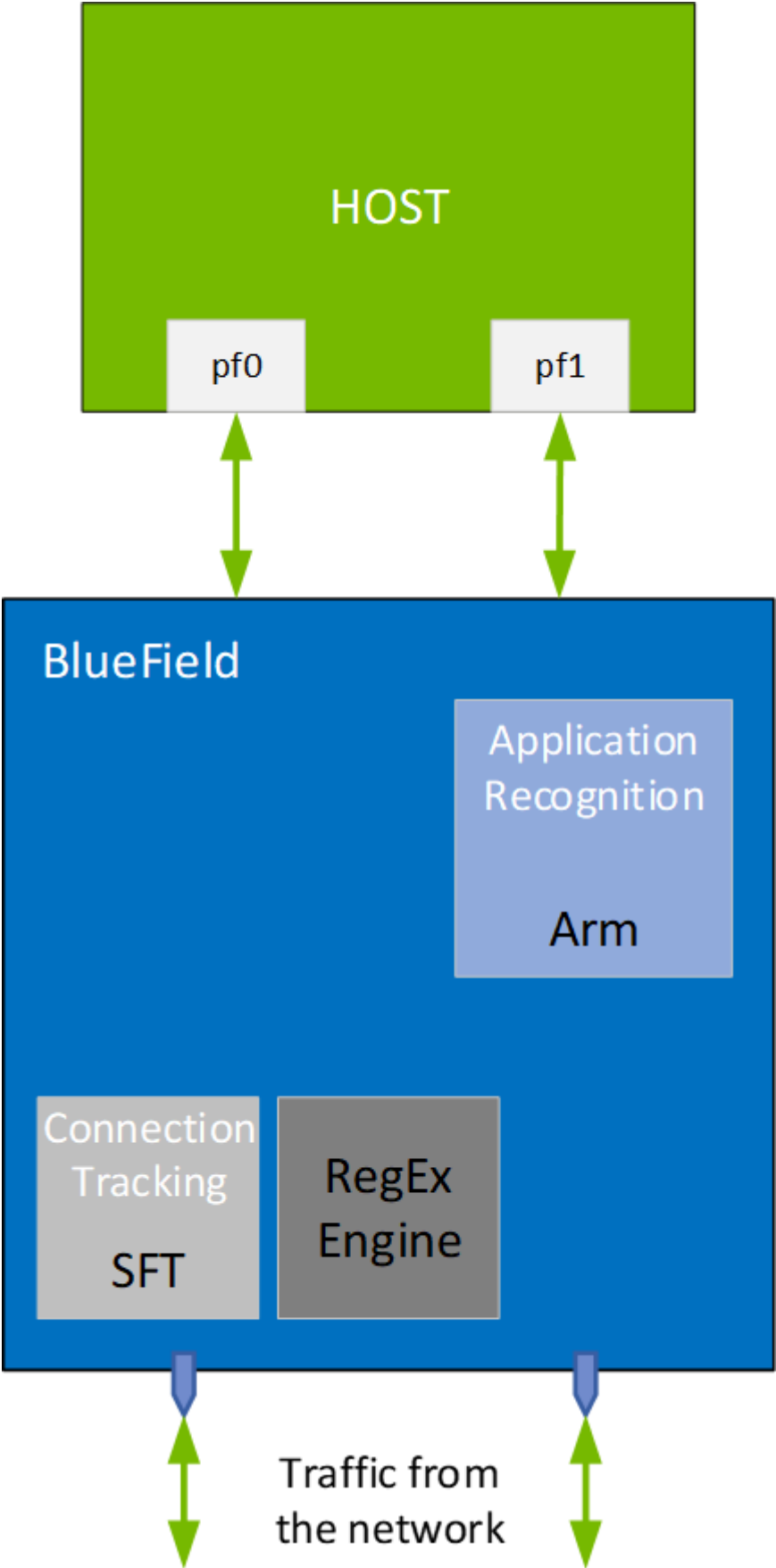
Chapter 1. Introduction

URL filtering limits access by comparing web traffic against a database to prevent user from different threats, malware and accessing harmful sites such as phishing pages.

This kind of content filtering can increase network security and enforce policies on different network resources.

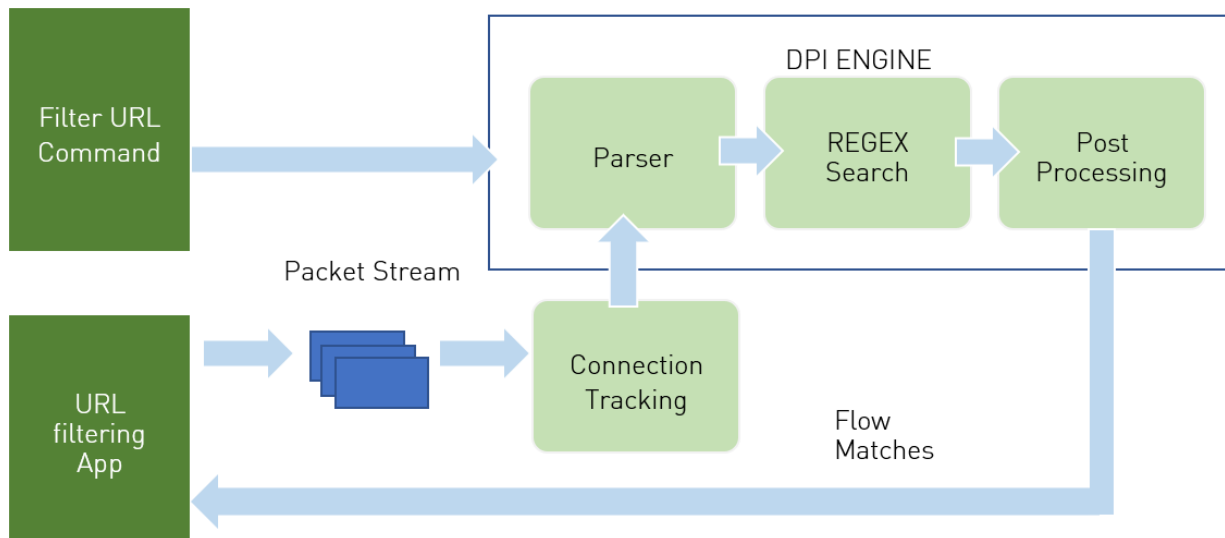
Chapter 2. System Design

URL filtering is designed to run as "bump-on-the-wire" on the BlueField-2 instance, it intercepts traffic coming from the wire and passes it to the physical function (PF) representor connected to the host.



Chapter 3. Application Architecture

URL filtering is designed to run as "bump-on-the-wire" on the BlueField-2 instance, it intercepts traffic coming from the wire and passes it to the physical function (PF) representor connected to the host.



Chapter 4. Configuration Flow

1. DPDK initialization.

```
dpdk_init(&argc, &argv, &nb_queues);
```

2. Stateful flow table (SFT) and port initialization.

```
flow_offload_init(nb_queues);
```

- a). SFT initialization
- b). Mempool allocation
- c). Port initialization

3. DPI initialization.

```
doca_dpi_init(&doca_dpi_config);
```

- a). Configure RegEx engine
- b). Configure DPI queues

4. Configure DPI packet processing.

```
dpi_worker_lcores_run(nb_queues, CLIENT_ID, ar_worker_attr);
```

- a). Configure DPI enqueue packets
- b). Send jobs to RegEx engine
- c). Configure DPI dequeue packets

5. Add URL shell command.

- a). Create database
- b). Filter http
- c). Commit database

6. DPI destroy.

```
doca_dpi_destroy(dpi_ctx);
```

- a). Free DPI resources

Chapter 5. Running Application

- ▶ Prerequisites

Please refer to the [DOCA Installation Guide](#) for details on how to install BlueField related software.

- ▶ BlueField software image 3.6
- ▶ DOCA software package 1.0

- ▶ To build the application

- ▶ Prepare environment variables (DPDK is installed under `/opt/mellanox`)

For Ubuntu:

```
export LD_LIBRARY_PATH=/opt/mellanox/dpdk/lib/aarch64-linux-gnu/
```

For CentOS:

```
export LD_LIBRARY_PATH=/opt/mellanox/dpdk/lib64
```

- ▶ The URL filtering example is installed as part of the `doca-dpi-lib` package. The binary is located under `/opt/mellanox/doca/examples/url_filter/bin/doca_url_filter`. To re-build the application recognition sample, run the command:

```
cd /opt/mellanox/doca/examples/url_filter/src
meson /tmp/build
ninja -C /tmp/build
```

`doca__url_filter` will be created under `build/app`.

- ▶ The URL filter example is based on DPDK libraries. Therefore, the user is required to provide DPDK flags, and allocate huge pages.

```
echo 1024 > /sys/kernel/mm/hugepages/hugepages-2048kB/nr_hugepages
sudo mkdir /mnt/huge
sudo mount -t hugetlbfs nodev /mnt/huge
```

- ▶ To run the application:

```
doca_url_filter [dpdk flags] -- --print_match
```

For example:

```
/opt/mellanox/doca/examples/url_filter/bin/doca_url_filter -a
0000:03:00.0,class=regex:eth,representor=[65535],sft_en=0 -p
```

To print the output when DPI engine finds a match, use `--print_match` or `-p` flag.

For additional information on available flags for DPDK, use `-h` before the `-` separator and for the app, use `-h` after `--`.

If the `print_match` flag is used, a print will be posted to the screen whenever a match is found.

The URL filter is based on user interaction with shell commands. Using the TAB key allows autocompletion while the `quit` command terminates the application. Other available commands are as follows:

- ▶ `create database` – removes and creates a new signature database at `/tmp/signatures.txt` so it can be used in the filter command
- ▶ `filter http *msg* *regex*` – a signature containing the regular expression written is created in the database. When a match is found, a message is printed.
- ▶ `commit database *path*` – compiles and loads the signatures created by the filter command from the file path provided. Default database is `/tmp/signatures.txt`.



Note: To load a signatures file that was created beforehand, simply run `commit database` with the desired path to load the file.

Chapter 6. References

- ▶ `/opt/mellanox/doca/examples/url_filter/src/url_filter.c`

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