



NVIDIA DOCA L2 Reflector

Application Guide

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Chapter 1. Introduction

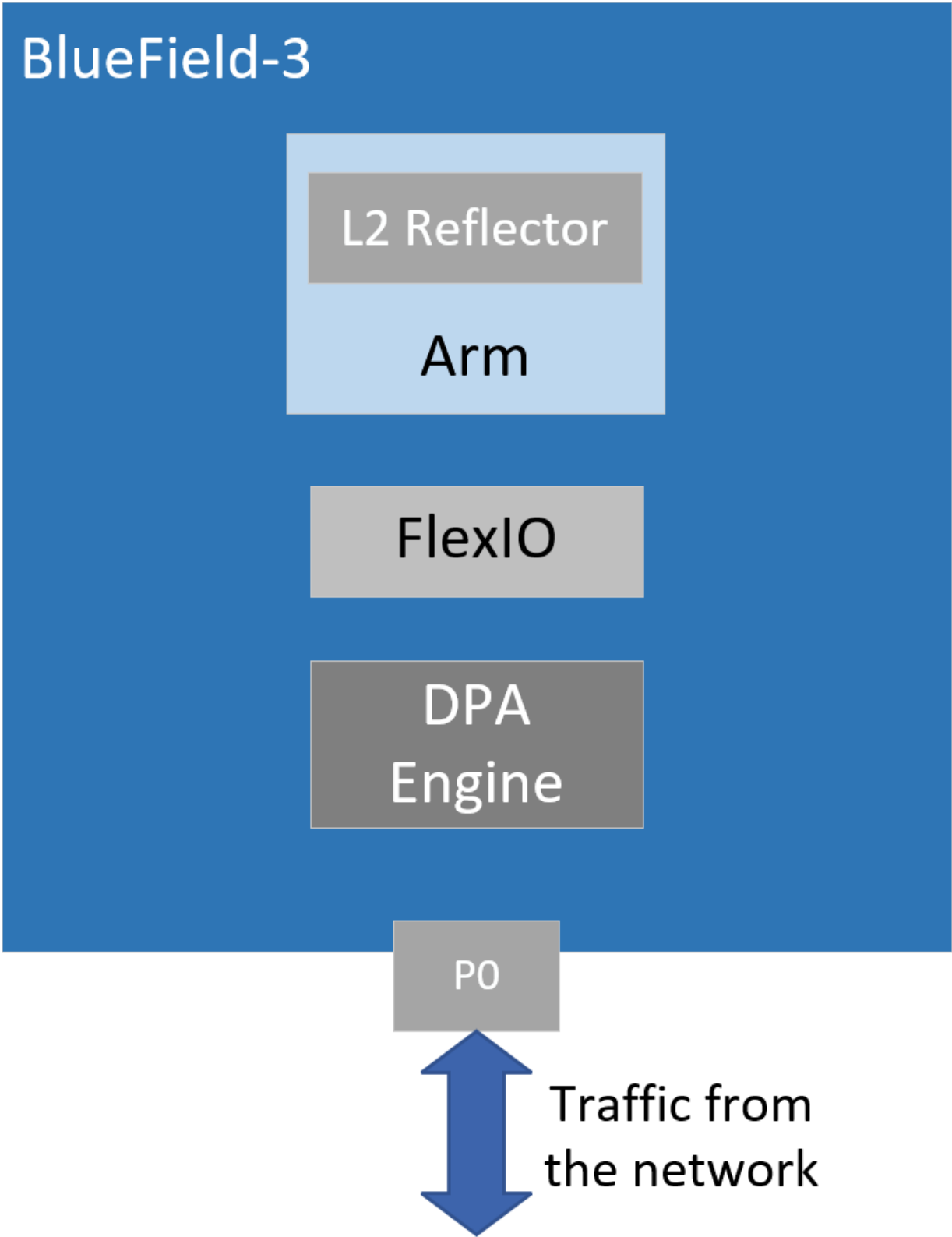
The BlueField-3 DPU supports high-speed DPA. Data path accelerator allows for accelerated packet processing and manipulation.

DOCA Layer-2 (L2) Reflector uses the DPA engine to intercept network traffic and swap the source and destination MAC addresses of each packet.

Chapter 2. System Design

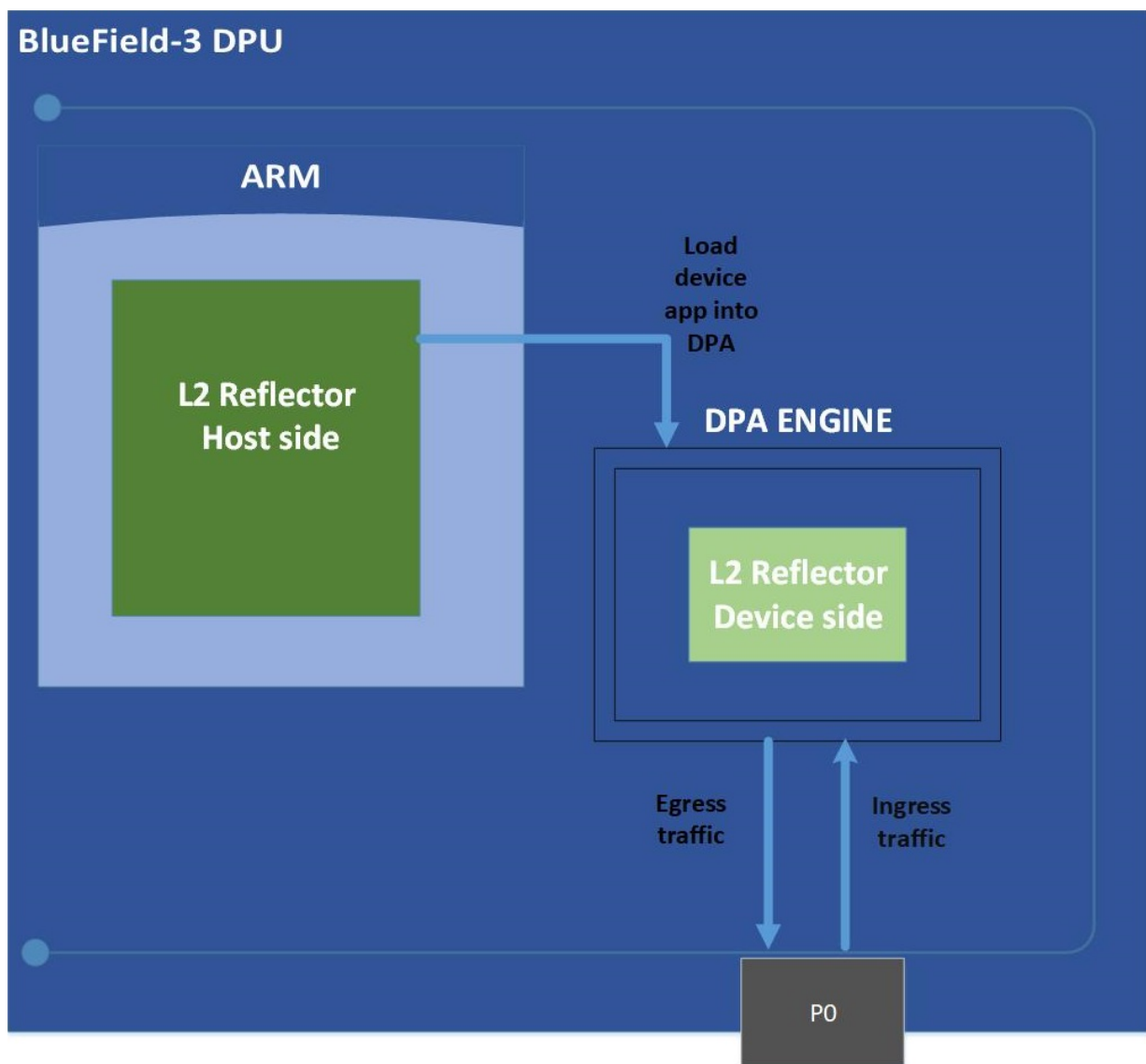
The application accepts traffic from specific port given as an argument and leverage the DPA capabilities for accelerated processing.

The following figure shows a view of the high-level components of the application:



Chapter 3. Application Architecture

DOCA L2 Reflector runs on top of FlexIO SDK to configure the DPA engine.



The FlexIO application consist of two parts:

- ▶ Host side – responsible for allocating resources and loading them to the DPA
- ▶ Device side – core processing logic of the application which swaps the MACs on the DPA

For more information, please refer to the [NVIDIA DOCA FlexIO SDK Programming Guide](#).

Chapter 4. DOCA Libraries and Drivers

This application leverages the following DOCA driver:

- ▶ [FlexIO SDK Library](#)

Chapter 5. Configuration Flow

This section lists the application's configuration flow which includes different FlexIO functions and wrappers.

1. Parse application argument.
 - a). Initialize arg parser resources and register DOCA general parameters.

```
doca_argp_init();
```

- b). Register the application's parameters.

```
register_l2_reflector_params();
```

- c). Parse the arguments.

```
doca_argp_start();
```

2. Setup the InfiniBand device.

```
l2_reflector_setup_ibv_device();
```

3. Setup the DPA device.

```
l2_reflector_setup_device();
```

4. Allocate the device's resources.

```
l2_reflector_allocate_device_resources();
```

5. Run initialization function on the device:

```
flexio_process_call();
```

6. Create the steering rule.

```
l2_reflector_create_steering_rule();
```

7. Start the event handler on the device.

```
flexio_event_handler_run();
```

8. Main loop.

```
while (!force_quit)
    sleep(10);
```

9. Cleanup the resources.

```
l2_reflector_destroy();
```

Chapter 6. Dependencies

NVIDIA BlueField-3 DPU is required.

Chapter 7. Running the Application

1. Refer to the following documents:

- ▶ [NVIDIA DOCA Installation Guide for Linux](#) for details on how to install BlueField-related software.
- ▶ [NVIDIA DOCA Troubleshooting Guide](#) for any issue you may encounter with the installation, compilation, or execution of DOCA applications.
- ▶ [NVIDIA DOCA Applications Overview](#) for additional compilation instructions and development tips of DOCA applications.

2. The L2 Reflector binary is located under `/opt/mellanox/doca/applications/l2_reflector/bin/l2_reflector`. To build all the applications together, run:


```
cd /opt/mellanox/doca/applications/  
meson build  
ninja -C build
```

3. To build only the allreduce application:

a). Edit the following flags in `/opt/mellanox/doca/applications/meson_option.txt`:

- ▶ Set `enable_all_applications` to `false`
- ▶ Set `enable_l2_reflector` to `true`

b). Run the commands in step 2.

 **Note:** `l2_reflector` will be created under `./build/l2_reflector/src/host/`.

Application usage:


```
Usage: l2_reflector [DOCA Flags] [Program Flags]
```

DOCA Flags:

```
-h, --help           Print a help synopsis  
-v, --version        Print program version information  
-l, --log-level      Set the log level for the program  
<CRITICAL=20, ERROR=30, WARNING=40, INFO=50, DEBUG=60>
```

Program Flags:

```
-d, --device <device name>   Device name
```

 **Note:** For additional information on the application, use `-h`:

```
/opt/mellanox/doca/applications/l2_reflector/bin/l2_reflector -h
```

4. CLI example for running the application on BlueField/host:

```
/opt/mellanox/doca/applications/l2_reflector/bin/l2_reflector -d mlx5_0
```

5. To run `l2_reflector` using a JSON file:

```
<application name> --json [json_file]
```

For example:

```
cd /opt/mellanox/doca/applications/l2_reflector/bin  
./l2_reflector --json ./l2_reflector_params.json
```

Chapter 8. Arg Parser DOCA Flags

Refer to [NVIDIA DOCA Arg Parser User Guide](#) for more information.

Flag Type	Short Flag	Long Flag/JSON Key	Description	JSON Content
General Flags	l	log-level	Sets the log level for the application: <ul style="list-style-type: none">▶ CRITICAL=20▶ ERROR=30▶ WARNING=40▶ INFO=50▶ DEBUG=60	<code>"log-level": 60</code>
	v	version	Print program version information	N/A
	h	help	Prints a help synopsis	N/A
Program Flags	d	device	Device name	<code>"device": mlx5_0</code>

Chapter 9. References

- ▶ `/opt/mellanox/doca/applications/l2_reflector/src/common/l2_reflector_common.h`
- ▶ `/opt/mellanox/doca/applications/l2_reflector/src/device/l2_reflector_device.c`
- ▶ `/opt/mellanox/doca/applications/l2_reflector/src/host/l2_reflector_core.c`
- ▶ `/opt/mellanox/doca/applications/l2_reflector/src/host/l2_reflector_core.h`
- ▶ `/opt/mellanox/doca/applications/l2_reflector/src/host/l2_reflector.c`
- ▶ `/opt/mellanox/doca/applications/l2_reflector/bin/l2_reflector_params.json`

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