



NVIDIA DOCA File Compression

Application Guide

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Chapter 1. Introduction

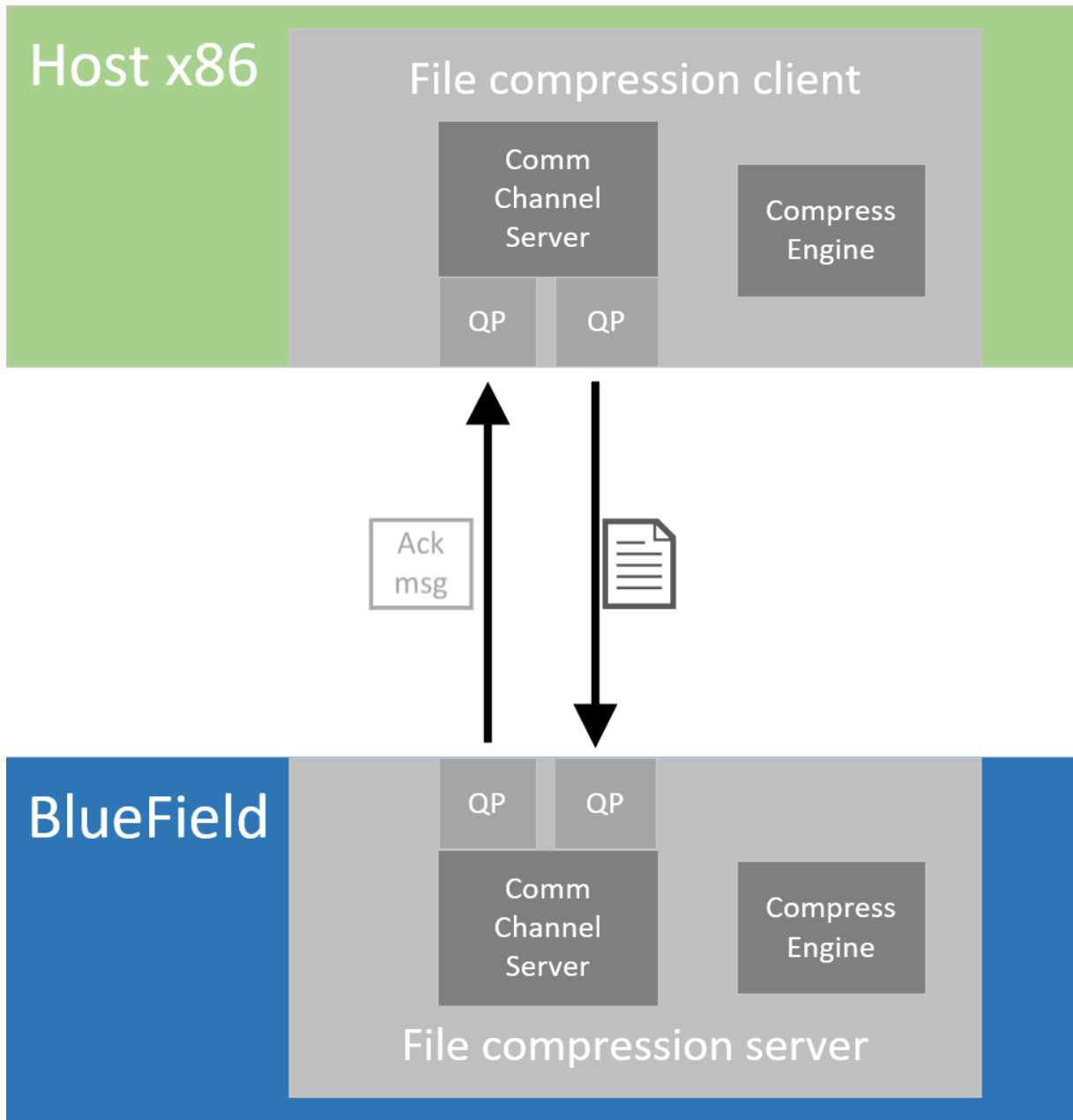
The file compression application exhibits how to use the DOCA Compress API to compress and decompress data using hardware acceleration as well as sending and receiving it using DOCA Comm Channel API.

The application's logic includes both a client and a server:

- ▶ Client side – the application opens a file, compresses it, and sends to the server the checksum of the source file alongside the compressed data
- ▶ Server side – the application saves the received file in a buffer, decompresses it, and compares the received checksum with the calculated one

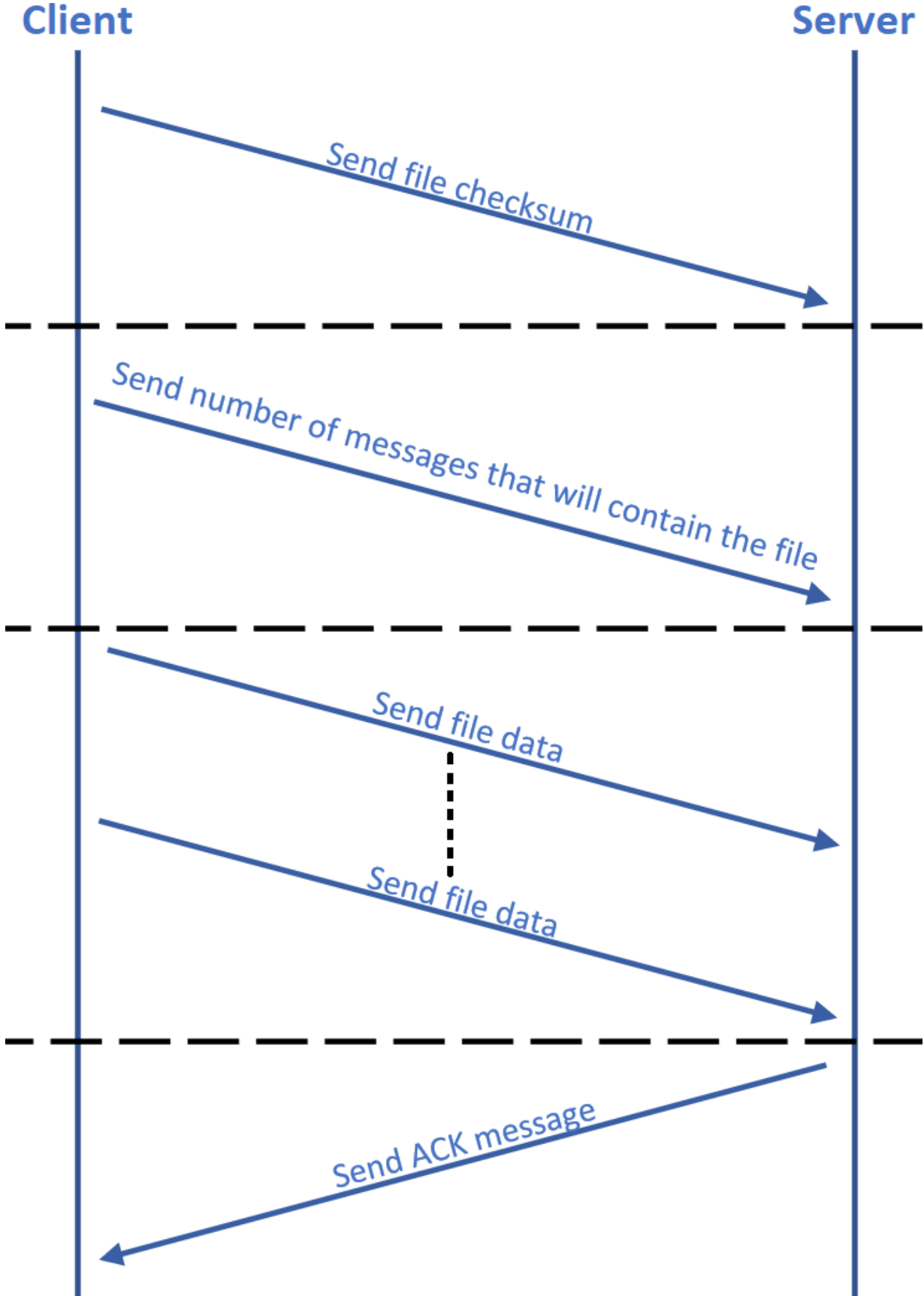
Chapter 2. System Design

The file compression application client runs on the host and the server runs on the DPU.



Chapter 3. Application Architecture

The file compression application runs on top of the DOCA Comm Channel API to send and receive the file from the host and to the DPU.



1. Connection is established on both sides by DOCA Comm Channel API.
2. Client compresses the data:
 - ▶ When compress engine is available – submits compress job with DOCA Compress API and sends the result to the server
 - ▶ When compress engine is unavailable – compresses the data in software
3. Client sends the number of messages needed to send the compressed content of the file.
4. Client sends data segments in size of up to 4080 bytes.
5. Server saves the received data in a buffer and submits a decompress job.
6. Server sends an ACK message to the client when all parts of the file are received successfully.
7. Server compares the received checksum to the calculated checksum.
8. Server writes the decompressed data to an output file.

Chapter 4. DOCA Libraries

This application leverages the following DOCA libraries:

- ▶ [DOCA Compress Library](#)
- ▶ [DOCA Comm Channel Library](#)

Chapter 5. Configuration Flow

1. Parse application argument.

- a). Initialize arg parser resources and register DOCA general parameters.

```
doca_argp_init();
```

- b). Register file compression application parameters.

```
register_file_compression_params();
```

- c). Parse the arguments.

```
doca_argp_start();
```

- i. Parse app flags.

2. Set queue-pair attributes.

```
set_endpoint_properties();
```

- a). Set maximum message size of 4080 bytes.

- b). Set maximum messages allowed on queue pair.

3. Create Comm Channel endpoint.

```
doca_comm_channel_ep_create();
```

- a). Create endpoint for client/server.

4. Create compress context.

```
doca_compress_create();
```

- a). Create compress context for submitting compress jobs for client/server.

5. Run client/server main logic.

```
file_compression_client/server();
```

6. Clean up the file compression application.

```
file_compression_cleanup();
```

- a). Free all application resources.

7. Arg parser destroy.

```
doca_argp_destroy();
```

Chapter 6. Running 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 regarding the DOCA applications.

2. The file compression binary is located under `/opt/mellanox/doca/applications/file_compression/bin/doca_file_compression`. To build all the applications together, run:

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

3. To build only the file compression application:

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

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

b). Run the commands in step 2.



Note: `doca_file_compression` is created under `./build/file_compression/src/`.

Application usage:

```
Usage: doca_file_compression [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:

```
-p, --pci-addr       DOCA Comm Channel device PCI address  
-r, --rep-pci-addr  DOCA Comm Channel device representor PCI  
address  
-f, --file           File to send by the client / File to write by  
the server
```

```
-t, --timeout          Application timeout for receiving file
content messages, default is 5 sec
```



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

```
/opt/mellanox/doca/applications/file_compression/bin/doca_file_compression
-h
```

4. CLI example for running the application on BlueField:

```
/opt/mellanox/doca/applications/file_compression/bin/doca_file_compression -p
03:00.0 -r 3b:00.0 -f received.txt
```

5. CLI example for running the application on the host:

```
/opt/mellanox/doca/applications/file_compression/bin/doca_file_compression -p
3b:00.0 -f send.txt
```



Note: Refer to section "Running DOCA Application on Host" in [NVIDIA DOCA Virtual Functions User Guide](#).

6. To run `doca_file_compression` using a JSON file:


```
doca_file_compression --json [json_file]
```




For example:

```
cd /opt/mellanox/doca/applications/file_compression/bin
./file_compression --json ./file_compression_params.json
```

Chapter 7. Arg Parser DOCA Flags

For more information, refer to [NVIDIA DOCA Arg Parser Programming Guide](#).

Flag Type	Short Flag	Long Flag/ JSON Key	Description	JSON Content
General Flags	l	log-level	Set 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	Print a help synopsis	N/A
Program Flags	f	file	For client – path to the file to be sent For server – path to write the file into  Note: This is	<code>"file": "/tmp/data.txt"</code>

Flag Type	Short Flag	Long Flag/ JSON Key	Description	JSON Content
			 mandatory flag.	
	p	pci-addr	Comm Channel DOCA device PCIe address  Note: This is mandatory flag.	<code>"pci-addr": 03:00.1</code>
	r	rep-pci	Comm Channel DOCA device representor PCIe address  Note: This flag is a mandatory only on the DPU.	<code>"rep-pci": b1:00.1</code>

Chapter 8. References

- ▶ `/opt/mellanox/doca/applications/file_compression/src`

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