



NVIDIA Network Qualification (NVQual)

April 2024

Agenda

- **Introduce Network Nvqual**
- **Host/DPU Requirements and Preparation**
- **Thermal Stress Test**
- **PCIE Eye Margin and Traffic Test**
- **Run concurrently multiple CX7 or BF3**
- **Run in Docker Container or VM**
- **Process for PASS Approval Review**
- **Troubleshooting**

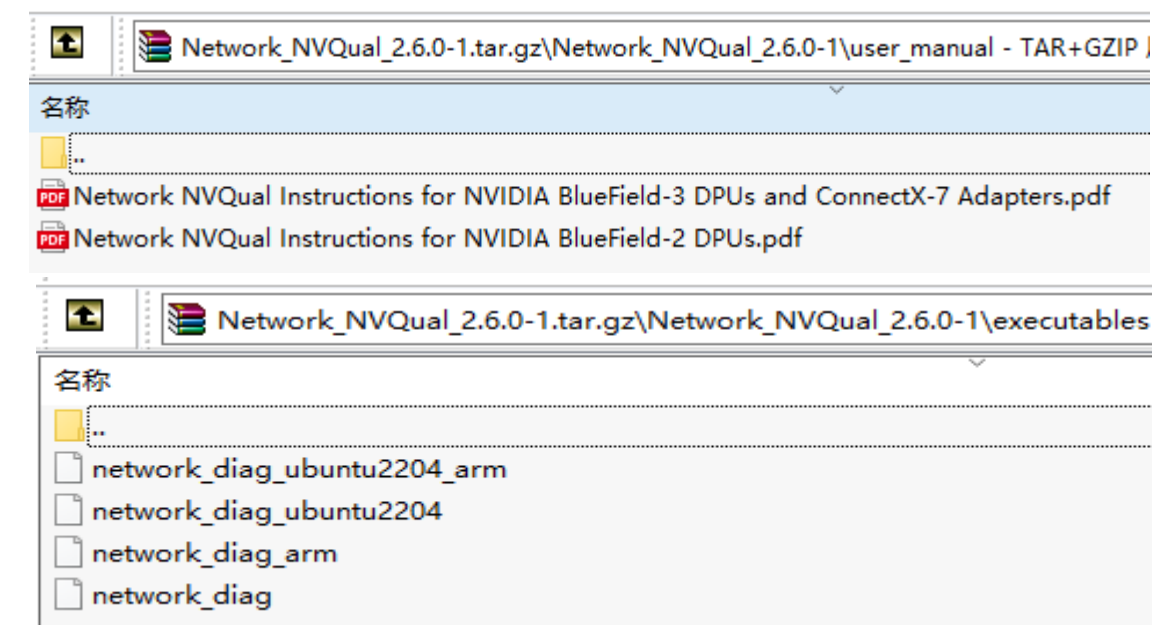
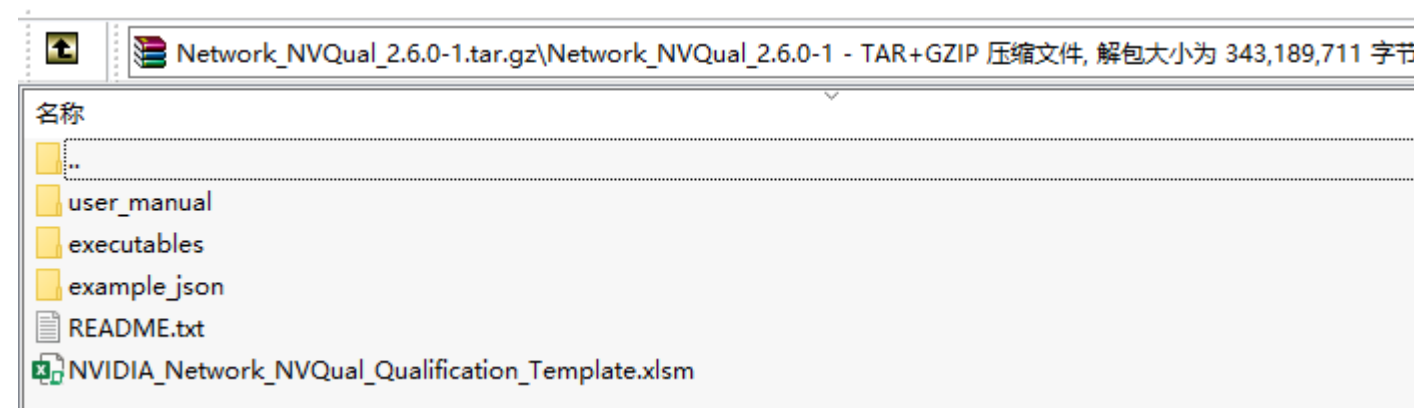


Introduce Network Nvqual

Network NVQual

Software Package Content

- **network_diag** – executable for Ubuntu 20.04 host OS on x86
- **network_diag_ubuntu2204** – executable specifically for Ubuntu 22.04 host OS on x86
- **network_diag_arm** – executable for Ubuntu 20.04 host OS on Arm aarch64
- **network_diag_ubuntu2204_arm** – executable specifically for Ubuntu 22.04 host OS on Arm aarch64
- **Nvidia_Network_NVQual_Qualification_Template.xlsm** - spreadsheet to capture all the results
- **Network NVQual Instructions for NVIDIA BlueField-2 DPUs** – Instruction manual for BlueField-2 DPU
- **Network NVQual Instructions for NVIDIA BlueField-3 DPUs and ConnectX-7 Adapters** – Instruction manual for BlueField-3 DPU and ConnectX-7 Adapters
- **NVQual_Instructions_for_NVIDIA_BlueField-3_DPUs_Version_2_0** – Instruction manual for BlueField-3 DPU
- **README.txt** – Text file with history information



Host/DPU Requirements and Preparation

Network NVQual

Host/DPU Requirements

- **Host runs Linux OS**

- Supports x86 and aarch64
- Supported OS includes **Ubuntu 20.04** and **Ubuntu 22.04**
- Host prerequisite installations documented in NVQual User Manual (Part of PID tar file)
- Requires installation of **doca-host** packages
- Release 2.5 and newer support **Docker containers**. Provides a wider range of host OS support when running in container mode. See NVQual User Manual for details.

- **DPU runs Ubuntu OS**

- Using **NVIDIA Ubuntu BlueField Boot (BFB) image**
- DPU RJ45 must be connected and DHCP required on that connection, non-container mode requires to **access public internet**.
- Dual-port DPU requires **loopback** network **optical cable** connection from DPU port 0 to port 1
- Single-port DPU requires remote host with separate peer interface

Table 3. OS Support

Distribution	Kernel Version	Architecture
Ubuntu 20.04	5.4.0-26-generic	x86
Ubuntu 22.04	5.15.0-60-generic	x86, aarch64

Network NVQual

Cabling Configuration

- **Dual ports** – DPU Port 0 and Port 1 in loopback
- **Single port** – Connected to external NIC
- **Socket direct DPU** – DPU Port 0 and Port 1 in loopback, Additional PCIE bus

Figure 1: Dual-port BlueField-3 DPU / ConnectX-7 Adapter

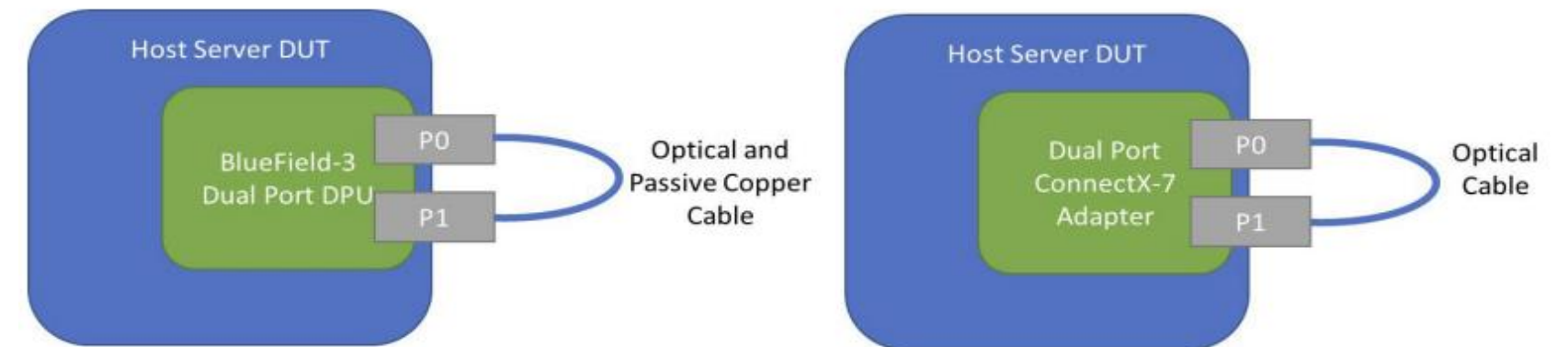


Figure 3: Single-port BlueField-3 DPUs / ConnectX-7 Adapters

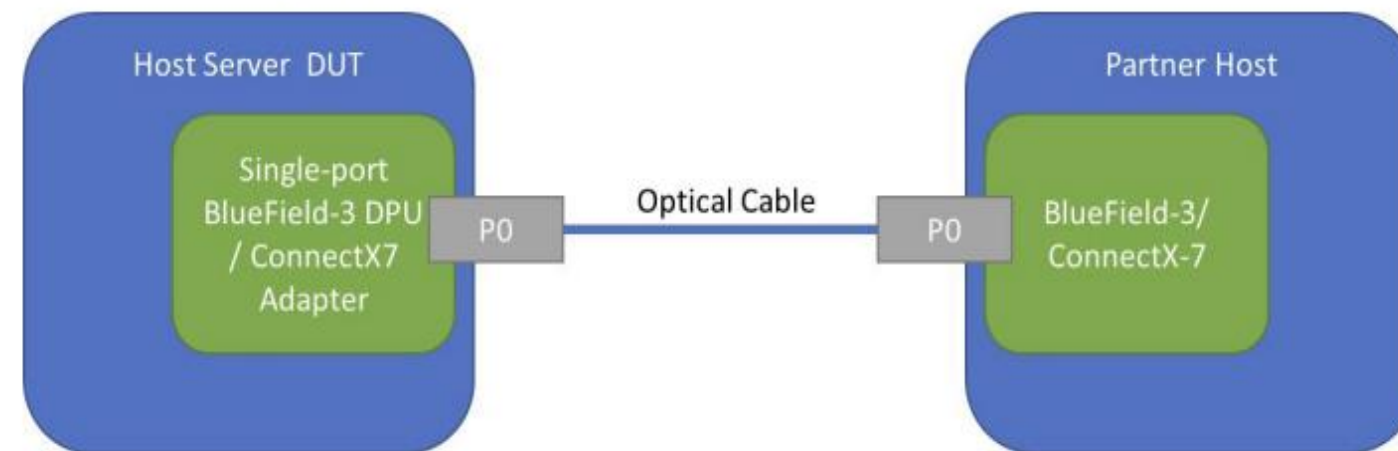
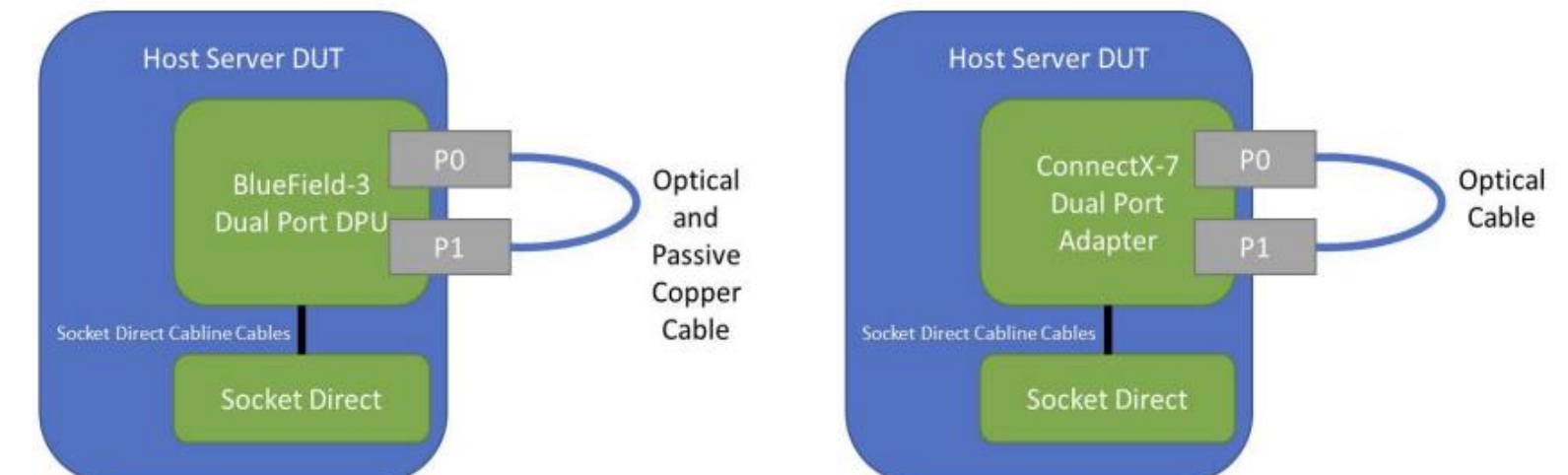


Figure 2: Dual-port BlueField-3 DPU / ConnectX-7 Adapter with Socket Direct



Network NVQual

Tests Introduce

Category	Description
Thermal Stress Test	<ul style="list-style-type: none">- Multiple hardware engines and Arm cores are engaged to generate high power usage on the DPU- Test runs for 40 minutes- Total of 3 iterations are required- Pass / Fail based on temperature monitoring and thermal throttling results
PCIe Eye Margin Test	<ul style="list-style-type: none">- Verifies PCIe Interface has sufficient margin by measuring the PCIe Eye Figure of Merit (FOM)- Multiple iterations are run to ensure accurate FOM- FOM must fall within defined criteria
PCIe Interface Traffic Test	<ul style="list-style-type: none">- Long duration PCIe RDMA test to verify healthy PCIe interface- Test runs for 70 minutes- Total of 3 iterations are required- Pass / Fail based on no errors are seen within test period and bandwidth meets expectation

Table 1. BlueField-3 DPU Network NVQual Qualification Tests

Category	Qualification Task	Qualification Tool(s)
Thermal	Thermal Qualification	network_diag with DMA engine, CPU max_pwr stressor, SSD fio and ib_write_bw traffic.
PCIe Interface	PCIe Interface Qualification	PCIe Data Eye Margin
Network	Ethernet/InfiniBand Qualification	ib_write_bw traffic

Table 2. ConnectX-7 Adapter Network NVQual Qualification Tests

Category	Qualification Task	Qualification Tool(s)
Thermal/Network	Thermal and Ethernet/Infiniband Qualification	ib_write_bw traffic
PCIe Interface	PCIe Interface Qualification	PCIe Data Eye Margin

Update DPU bfb

Download and reset

Down bfb and update to DPU:

```
wget https://content.mellanox.com/BlueField/BFBs/Ubuntu22.04/DOCA_2.6.0_BSP_4.6.0_Ubuntu_22.04-5.24-01.prod.bfb
```

Watch if updating is done :

```
echo -e "device=/dev/mmcblk0\nWITH_NIC_FW_UPDATE=yes" > bf.cfg
bfb-install--bfb <BlueField-3 DPU Ubuntu bfb> --config bf.cfg --rshim rshim0
```

After bfb update done, run on DPU:

```
mlxconfig -d 03:00.0 reset; mlxconfig -d 03:00.1 reset
```

After Power cycle

- 1) make sue FW config INTERNAL_CPU_MODEL o is configured as MBEDDED_CPU_MODE
- 2) ssh can login into DPU through oob_net0 with root user

BlueField Runtime and Driver Downloads

Download the BlueField DPU and SuperNIC runtime image and drivers below.

BlueField SW Bundle

DOCA-Host

BlueField Software Bundle Download Center

CURRENT VERSIONS

ARCHIVE VERSIONS

START OVER

Version (Current)	Product	Download/Documentation
2.6.0	BlueField SW Bundle (BFB)	Image: Ubuntu 22.04 DOCA Runtime for BlueField
2.5.1-LTS 1.5.3-LTS	DOCA Local Repo Packages for BlueField DPU BlueField-3 BMC firmware BlueField-3 BMC-eROT (Glacier) firmware BlueField-2 BMC firmware BlueField-2 BMC-eROT (CEC) firmware	Description: BlueField SW bundle supporting BlueField-3 & BlueField-2, including DOCA 2.6.0, DPU-OS Ubnuntu 22.04, ATF & UEFI 4.6.0-13035, NIC-FW BF2 24.40.1000, BF3 32.40.1000. Note: BMC and eROT firmware are provided separately. Release Date: 06-Feb-24 SHA256: 2feff270dd0cdf5a9c69195f693fb92ca742b4c77f25831e4a2a6df094d9c580 Size: 1.3GB Documentation: BSP Documentation DOCA Documentation

<https://developer.nvidia.com/networking/doca>

Install DOCA-Host

Download and Install

- Only **ubuntu 20.04** or **22.04** is supported on Host OS for non-container mode.
- New doca-host already included host driver(mlnx_ofed), need uninstall first

<https://developer.nvidia.com/networking/doca>

Installation Instructions:

```
ofed_uninstall.sh  
mft_uninstall.sh
```

```
sudo wget  
https://www.mellanox.com/downloads/DOCA/DOCA_v2.6.0/  
host/doca-host-repo-ubuntu2204_2.6.0-  
0.0.1.2.6.0058.1.24.01.0.3.3.1_amd64.deb  
sudo dpkg -i doca-host-repo-ubuntu2204_2.6.0-  
0.0.1.2.6.0058.1.24.01.0.3.3.1_amd64.deb  
sudo apt-get update  
sudo apt install -y doca-ofed  
  
sudo apt install -y sshpass numactl ipmitool
```

BlueField Runtime and Driver Downloads

Download the BlueField DPU and SuperNIC runtime image and drivers below.

BlueField SW Bundle **DOCA-Host**

DOCA-Host Software Download Center

CURRENT VERSIONS		ARCHIVE VERSIONS		START OVER
Version (Current)	OS distribution	OS distribution Version	Architecture	Download/ Documentation
2.6.0	Ubuntu	Ubuntu 22.04	x86_64	Installation Instructions: To install a new DOCA-Host package, you must first remove the existing package. For details, please refer to section "Upgrading BlueField DPU OS on Host Side" in the BlueField User Manual (https://docs.mellanox.com/category/bluefieldsw). \$ wget https://www.mellanox.com/downloads/DOCA/DOCA_v2.6.0/host/doca-host-repo-ubuntu2204_2.6.0-0.0.1.2.6.0058.1.24.01.0.3.3.1_amd64.deb \$ dpkg -i doca-host-repo-ubuntu2204_2.6.0-0.0.1.2.6.0058.1.24.01.0.3.3.1_amd64.deb \$ apt-get update doca-all profile installation: \$ sudo apt install doca-all doca-networking profile installation: \$ sudo apt install doca-networking doca-ofed profile installation: \$ sudo apt install doca-ofed
2.5.1-LTS	UOS	Ubuntu 20.04	aarch64	
1.5.3-LTS	Sles	Ubuntu 18.04		
	RHEL/CentOS/Rocky			
	Oracle Linux			
	OPENEULER			
	KYLIN			
	Debian			
	CTYUNOS			
	BCLINUX			
	ALINUX			

Thermal Stress Test

Run Thermal Stress Test

Purpose and Requirements

- **Thermal Stress test** 的目的是测试DPU上各个组件在高温下是否有功能问题，涉及组件包括Arm cores, memory interfaces, hardware acceleration engines, PCIe SerDes, and network SerDes
- **DPU 的Thermal Stress测试**可以先单独测试，先评估DPU的基本运行情况，server做适当调整
- 正式测试需要配合server上的其他组件例如GPU的nvqual并行和适当的环境温度测试，目的是测试极限条件下DPU温度散热以及功能能否正常和运行稳定

Table 5. BlueField-3 DPU Thermal Test Requirement Summary

DPU Type	Cable Type	Number of Iteration	Duration (minutes)	Notes
B3220 B3220L B3210L B3210E B3220SH	Optical Cable	At least 2	40	<ul style="list-style-type: none">• No power cycle between runs• Execute GPU/ConnectX thermal test in parallel• Execute in worst case ambient conditions
	Passive Copper Cable	At least 2		
B3140L/H B3240	Optical Cable	At least 3	40	

Run Thermal Stress Test

commands

Type	Command/Example
Reference	<code>./network_diag_ubuntu2204 -d 2400 -ip <oob_net0 IP> -p <DPU PCIe Domain:Bus:Device> -pw <root password of DPU> -si -sp</code>
First running	<code>./network_diag_ubuntu2204 -d 600 -ip 10.7.157.121 -p 0000:8a:00 -pw Admin@123 -si -sp</code>
Specific accelerators	<code>./network_diag_ubuntu2204 -d 600 -ip 10.7.157.121 -p 0000:8a:00 -pw Admin@123 -si -a {ib_traffic,dma,maxpwr_cpu}</code>
Debug	<code>./network_diag_ubuntu2204 -d 600 -ip 10.7.157.121 -p 0000:8a:00 -pw Admin@123 -si -debug</code>
With json (multiple DPU/NICs)	<code>./network_diag_ubuntu2204 -j /home/test/two_dpu_dual_port_thermal.json</code>
Socket Direct	<code>./network_diag_ubuntu2204 -d 2400 -ip <oob_net0 IP> -p <DPU PCIe Domain:Bus:Device> -pw <root passwd of DPU> -sdp <socket direct Domain:Bus:Device> -si -sp</code>

```
two_dpu_dual_port_thermal.json
{
  "general": {
    "duration": 2400,
    "setup_prep": true,
    "system_info": true,
    "not_safe_mode": false,
    "port_ip_subnet": null,
    "disabled_measurements": [],
    "debug": false,
    "ports_config": true
  },
  "players": [
    {
      "bf": {
        "ip": "192.168.21.200",
        "password": "Admin123",
        "pci": "0000:1b:00",
        "sd_pci": null
      },
      "cores": null,
      "accelerators": []
    },
    {
      "bf": {
        "ip": "192.168.21.201",
        "password": "Admin123",
        "pci": "0000:9d:00",
        "sd_pci": null
      },
      "cores": null,
      "accelerators": []
    }
  ]
}
```

json support multiple DPUs

Thermal Test Result Evaluation

Pass / Fail Criteria

- 测试结果会在最后打印，也会记录在log中，测试通过会打印PASS，打印FAIL会带具体的原因，需要针对性的排查和调整重新测试

```
+-----+
10:11:14 Preparation for dma on Player 0..
10:11:15 Preparation for memtest on Player 0..
10:11:47 Preparation for comp_and_decomp on Player 0..
10:11:47 Preparation for ib_traffic on Player 0..
10:11:48 [player 0] [temperature measurement] 50.0°C
10:11:48 Configuring ports on local_host..
10:11:50 Starting dma on Player 0..
10:11:50 Starting memtest on Player 0..
10:11:50 Starting comp_and_decomp on Player 0..
10:11:50 Starting ib_traffic on Player 0..
10:11:50 [player 0] [temperature measurement] 50.0°C
10:11:51 [player 0] [arm frequency measurement] 2749.0MHz
10:11:50 [player 0] [module_temperature_mlx5_0 measurement] 37.0°C
10:11:50 [player 0] [module_temperature_mlx5_1 measurement] 34.0°C
10:12:01 [player 0] [temperature measurement] 58.0°C
10:12:01 [player 0] [arm frequency measurement] 2749.0MHz
10:12:01 [player 0] [module_temperature_mlx5_0 measurement] 37.0°C
10:12:01 [player 0] [module_temperature_mlx5_1 measurement] 35.0°C
10:12:11 [player 0] [temperature measurement] 61.0°C
10:12:11 [player 0] [arm frequency measurement] 2749.0MHz
10:12:12 [player 0] [module_temperature_mlx5_0 measurement] 37.0°C
10:12:12 [player 0] [module_temperature_mlx5_1 measurement] 35.0°C
10:12:21 [player 0] [temperature measurement] 62.0°C
10:12:21 [player 0] [arm frequency measurement] 2749.0MHz
10:12:22 [player 0] [module_temperature_mlx5_0 measurement] 37.0°C
10:12:23 [player 0] [module_temperature_mlx5_1 measurement] 35.0°C
10:12:31 [player 0] [temperature measurement] 56.0°C
10:12:33 [player 0] [module_temperature_mlx5_0 measurement] 37.0°C
10:12:33 [player 0] [module_temperature_mlx5_1 measurement] 35.0°C
10:12:41 [player 0] [temperature measurement] 55.0°C
10:12:43 [player 0] [module_temperature_mlx5_0 measurement] 37.0°C
10:12:44 [player 0] [module_temperature_mlx5_1 measurement] 35.0°C
10:12:51 [player 0] [temperature measurement] 55.0°C
10:12:54 [player 0] [module_temperature_mlx5_0 measurement] 38.0°C
10:12:54 [player 0] [module_temperature_mlx5_1 measurement] 36.0°C
10:13:01 [player 0] [temperature measurement] 55.0°C
10:13:04 [player 0] [module_temperature_mlx5_0 measurement] 38.0°C
10:13:05 [player 0] [module_temperature_mlx5_1 measurement] 36.0°C
10:13:11 [player 0] [temperature measurement] 55.0°C
10:13:15 [player 0] [module_temperature_mlx5_0 measurement] 38.0°C
10:13:15 [player 0] [module_temperature_mlx5_1 measurement] 36.0°C
10:13:21 [player 0] [temperature measurement] 55.0°C
10:13:25 [player 0] [module_temperature_mlx5_0 measurement] 38.0°C
10:13:26 [player 0] [module_temperature_mlx5_1 measurement] 36.0°C
```

Summary report for 10.7.157.121 [player 0]:

Accelerators	
Accelerator	Information
dma	Duration: 120007495 micro seconds Enqueued jobs: 1539744 Dequeued jobs: 1539744 Throughput: 000.013 MOperations/s Ingress rate: 200.475 Gib/s Egress rate: 200.475 Gib/s PERFORMANCE TEST: PASS
maxpwr_cpu	CPU cores utilization threshold: 90% PERFORMANCE TEST: PASS
ib_traffic	server ip: 10.7.158.206 client ip: 10.7.158.206 server device: mlx5_1 client device: mlx5_0 BW average [Gb/sec]: 321.75 PERFORMANCE TEST: FAIL INFO: average BW 321.75 Gb/sec is lower than minimal required BW on Gen_5.

Measurements					
Run authentication	Min measurement	Max measurement	Avg measurement	Performance Pass/Fail	Fail info
temperature [°C]	50.0	71.0	62.46		
power [W]	29.0	45.0	41.92		
throttling_state [% CPU]	100	100	100.0		
arm_frequency [MHz]	disabled	disabled	disabled		
module_temperature [°C]	disabled	disabled	disabled		

Measurement Counters			
Run authentication	Initial count	Final count	Status
power_throttling	0	0	
thermal_throttling	0	0	PASS

Network NVQual Output

Log and Events

Network NVQual generates folder per test

- located in /tmp/nvqual/nvqual_results_<date_and_time>
- Nvqual_logger.log
 - Detailed logger for Analysis
 - Detailed System information
- Power and Thermal graphs/json files
- Thermal and Power capping event graphs/json file

```
[root@l-csi-g5-1323h nvqual_results_12-03-2024_12_45_52]# tree
.
├── lspci_info.txt
├── nvqual_logger.log
├── player_0
│   ├── dma
│   ├── ib_traffic
│   ├── maxpwr_cpu
│   ├── power
│   ├── power_graph.png
│   ├── power_throttling
│   ├── temperature
│   ├── temperature_graph.png
│   ├── thermal_throttling
│   ├── throttling_state
│   └── throttling_state_graph.png
├── playersInfoJson.json
└── system_info.json
```

Network NVQual

Outputs

BF info

Server-Name	l-csi-bf3-200g-01
IP	10.7.159.111
OS	Ubuntu
OS-Version	22.04
Kernel	5.15.0-1013.15.3.g3fad4a0-bluefield
CPU-Architecture	aarch64
CPU-Vendor	ARM
Python	Python 2.7.18
Python3	3.10.6
Dpdk	22.11.0-1.0.4.591060.1.0.4
Rxp-Compiler	22.10.2
MFT-Version	4.23.0-208
OFED-Version	5.9-1.0.6.0
Doca-Apps	2.0.0074-1
Doca-Apps-Dev	2.0.0074-1
Doca-Grpc	2.0.0074-1
Doca-Grpc-Dev	2.0.0074-1
Doca-Libs	2.0.0074-1
Doca-Libs-Dev	2.0.0074-1
Doca-Prime-Runtime	2.0.0074-1
Doca-Prime-Sdk	2.0.0074-1
Doca-Prime-Tools	2.0.0074-1
Doca-Runtime	2.0.0074-1.5.9.1.0.6.0.bf.4.0.0.12609.1.20230308.prod
Doca-Samples	2.0.0074-1
Doca-Sdk	2.0.0074-1.5.9.1.0.6.0.bf.4.0.0.12609.1.20230308.prod
Doca-Tools	2.0.0074-1.5.9.1.0.6.0.bf.4.0.0.12609.1.20230308.prod
Core-Frequency	MHz
Device-Type	BlueField3
Part-Number	900-9D3B6-00CV-AA0
PCIe	PCIe Gen5.0 x16 with x16 PCIe extension option
Crypto-Mode	Crypto Enabled
DDR	32GB on-board DDR
OOB	None
PSID	MT_0000000884
Fw	32.36.3160
PCI-Device-Name	/dev/mst/mt41692_pciconf0
Base-Mac	946dae519a6c
Operation-Mode	None
mlx-Regex	1.2-ubuntu1
Virtio-Net-Controller	1.5.13-1
Collectx-Clxapi	1.12.4
Libvma	9.8.1-1
Libxlio	2.1.4-1.59106
Dpcp	1.1.38-1.59106
BF-Release	4.0.0
UEFI	4.0.0-275-g5b94d80
OVS	2.17.6-1.59106
Mlnx-Libsnap	1.5.2-3
Mlnx-Snap	None
Spdk	22.05-22
Rxp-Compiler-Dev	22.10.2
Rxp-Bench	22.10.0
BFB	DOCA_2.0.0_BSP_4.0.0_Ubuntu_22.04-1.20230308.prod
Revision	A4
V2	900-9D3B6-00CV-AA0
Serial-Number	MT2306XZ036J
V3	0214c426e7aaed118000946dae519a6c
VA	MLX:MN=MLNX:CSKU=V2:UUID=V3:PCI=V0:MODL=D3B6
Misc-Info	PCIeGen5 x16
VU	MT2306XZ036JMLNXS0D0F0
Checksum-Complement	0xf0
Board-Id	BlueField-3 P-Series DPU 200GbE/NDR200 dual-port QSFP112, PCIe Gen5.0 x16 FHHL, Crypto Enabled, 32GB DDR5, BMC, Tall Bracket

Network NVQual

Outputs

Host info	
Server-Name	l-csi-hw09d
IP	10.7.158.112
OS	Ubuntu
OS-Version	22.04
Kernel	5.15.0-60-generic
CPU-Architecture	x86_64
CPU-Vendor	GenuineIntel
Python	3.10.6
Python3	3.10.6
Dpdk	22.11.0-1.0.3
Rxp-Compiler	22.10.2
Mft-Version	4.23.0-204
Ofed-Version	internal-5.9
Doca-Apps	2.0.0057-1
Doca-Apps-Dev	None
Doca-Grpc	2.0.0072-1
Doca-Grpc-Dev	None
Doca-Libs	2.0.0057-1
Doca-Libs-Dev	None
Doca-Prime-Runtime	2.0.0072-1
Doca-Prime-Sdk	None
Doca-Prime-Tools	2.0.0072-1
Doca-Runtime	2.0.0-0.1.2-230228-153012-daily
Doca-Samples	None
Doca-Sdk	None
Doca-Tools	2.0.0-0.1.2-230228-153012-daily
Mst-Device	/dev/mst/mt41692_pciconf0
Doca-Host-Repo	2.0.0-0.1.2-230228-153012-daily.2.0.0072.1.5.9.1.0.4.0
Manufacturer	Dell Inc.
Product-Name	PowerEdge R750
Version	Not Specified
Serial-Number	DM7NXP3
Uuid	4c4c4544-004d-3710-804e-c4c04f585033
Wake-Up-Type	Power Switch
Sku-Number	NotProvided
Model-Name	PowerEdge R750
Family	PowerEdge

Port 1 info	
State	Active
Physical-State	LinkUp
Speed	200G
Width	4x
Fec	Standard_RS-FEC - (544,514)
Loopback-Mode	No Loopback
Auto-Negotiation	ON
Identifier	QSFP28
Compliance	50GBASE-SR, 100GBASE-SR2, or 200GBASE-SR4
Cable-Technology	850 nm VCSEL
Cable-Type	Optical Module (separated)
OUI	Mellanox
Vendor-Name	Mellanox
Vendor-Part-Number	MMA1T00-VS
Vendor-Serial-Number	MT1915FT03017
Rev	A7
Wavelength	850
Transfer-Distance	50
Attenuation	N/A
FW-Version	37.51.302
Digital-Diagnostic-Monitoring	Yes
Power-Class	5.0 W max
CDR-Rx	ON,ON,ON,ON
CDR-Tx	ON,ON,ON,ON
Los-Alarm	N/A
Rx-Power-Current	0,0,0,0 [-14..6]
Tx-Power-Current	0,0,0,0 [-12..6]
IB-Cable-Width	1x,2x,4x
Cable-Breakout	Channels implemented [1,2,3,4]/Far end is unspecified
Nominal-Bit-Rate	26.500Gb/s
Manufacturing-Date	10_04_19

Port 2 info	
State	Active
Physical-State	LinkUp
Speed	200G
Width	4x
Fec	Standard_RS-FEC - (544,514)
Loopback-Mode	No Loopback
Auto-Negotiation	ON
Identifier	QSFP28
Compliance	50GBASE-SR, 100GBASE-SR2, or 200GBASE-SR4
Cable-Technology	850 nm VCSEL
Cable-Type	Optical Module (separated)
OUI	Mellanox
Vendor-Name	Mellanox
Vendor-Part-Number	MMA1T00-VS
Vendor-Serial-Number	MT1915FT02027
Rev	A7
Wavelength	850
Transfer-Distance	50
Attenuation	N/A
FW-Version	37.51.302
Digital-Diagnostic-Monitoring	Yes
Power-Class	5.0 W max
CDR-Rx	ON,ON,ON,ON
CDR-Tx	ON,ON,ON,ON
Los-Alarm	N/A
Rx-Power-Current	0,0,-2,0 [-14..6]
Tx-Power-Current	-2,0,-2,0 [-12..6]
IB-Cable-Width	1x,2x,4x
Cable-Breakout	Channels implemented [1,2,3,4]/Far end is unspecified
Nominal-Bit-Rate	26.500Gb/s
Manufacturing-Date	09_04_19

Network NVQual

Outputs

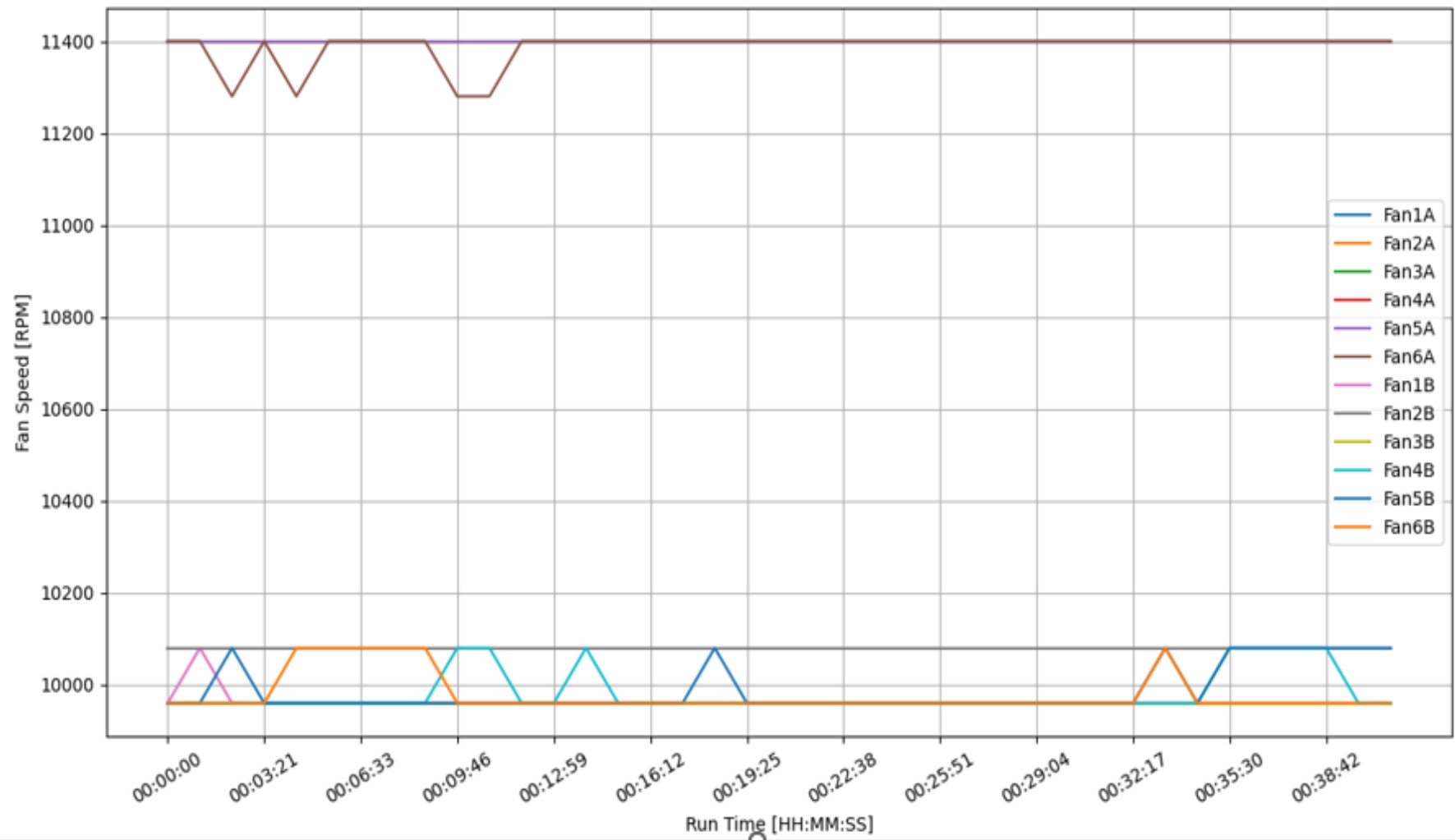
Measurements				
Run authentication	Min measurement	Max measurement	Avg measurement	
fan_speed [RPM] (Fan1A)	11400	11400	11400.0	
fan_speed [RPM] (Fan2A)	11400	11400	11400.0	
fan_speed [RPM] (Fan3A)	11400	11400	11400.0	
fan_speed [RPM] (Fan4A)	11400	11400	11400.0	
fan_speed [RPM] (Fan5A)	11400	11400	11400.0	
fan_speed [RPM] (Fan6A)	11280	11400	11387.69	
fan_speed [RPM] (Fan1B)	9960	10080	9963.08	
fan_speed [RPM] (Fan2B)	10080	10080	10080.0	
fan_speed [RPM] (Fan3B)	9960	9960	9960.0	
fan_speed [RPM] (Fan4B)	9960	10080	9981.54	
fan_speed [RPM] (Fan5B)	9960	10080	9987.69	
fan_speed [RPM] (Fan6B)	9960	10080	9978.46	
host_sensors_temperature [°C] (Temp_1)	30.0	37.0	35.16	
host_sensors_temperature [°C] (Temp_2)	32.0	40.0	38.71	
host_sensors_temperature [°C] (Inlet Temp)	17.0	17.0	17.0	
host_sensors_temperature [°C] (Exhaust Temp)	19.0	20.0	19.95	
module_temperature_1 [°C]	46.0	55.0	53.63	
module_temperature_2 [°C]	48.0	58.0	56.53	
temperature [°C]	44.0	70.0	68.21	
power [W]	47.0	79.0	74.95	
throttling_state [% CPU]	100	100	100.0	
arm_frequency [MHz]	disabled	disabled	disabled	

Measurement Counters				
Run authentication	Initial count	Final count	Status	
power_throttling	0	0	N/A	
thermal_throttling	0	0	PASS	

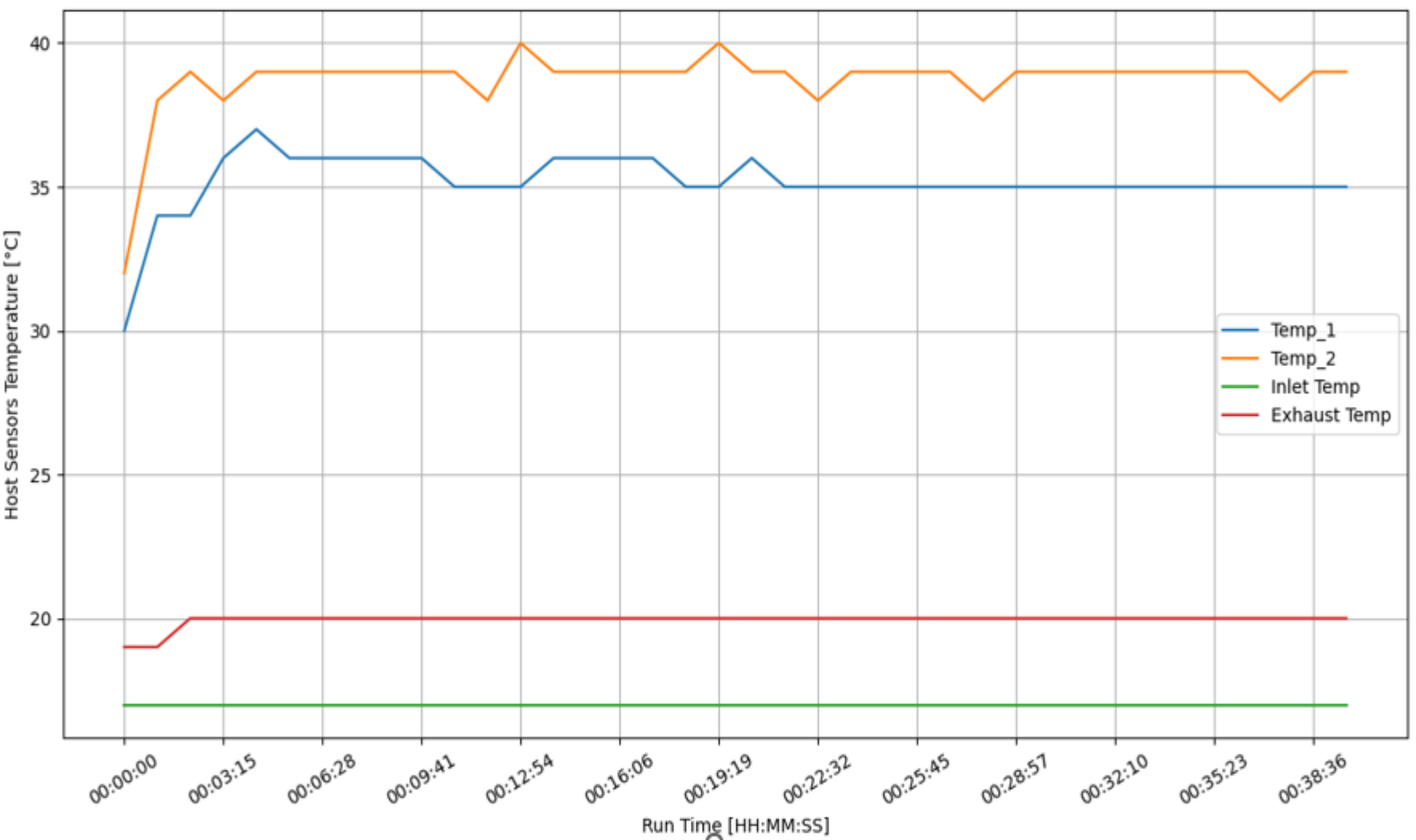
Thermal Stress Output

Host Fan/Temperature

Fan Speed Graph
15-03-2023 22:29:19



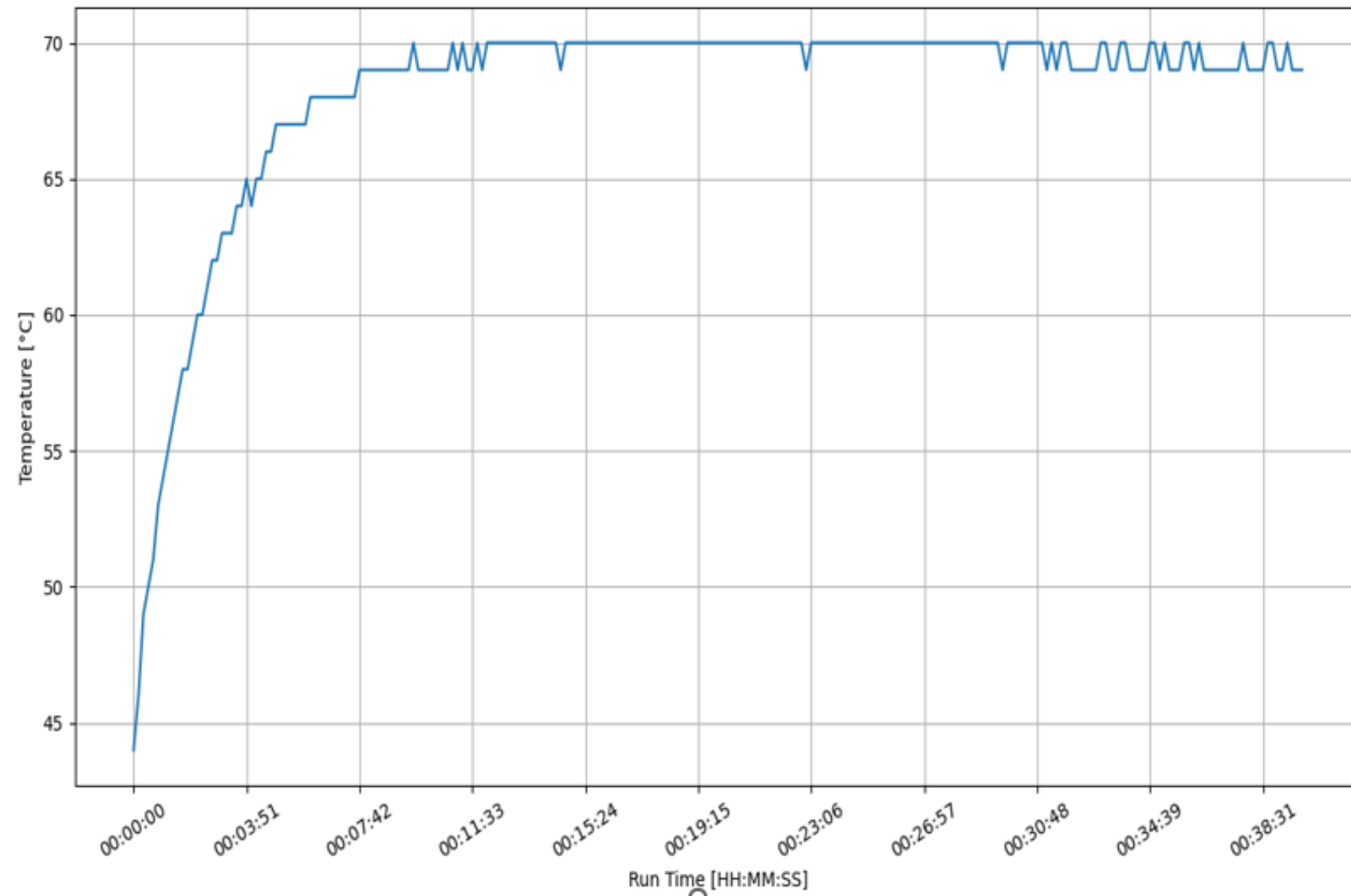
Host Sensors Temperature Graph
15-03-2023 22:29:19



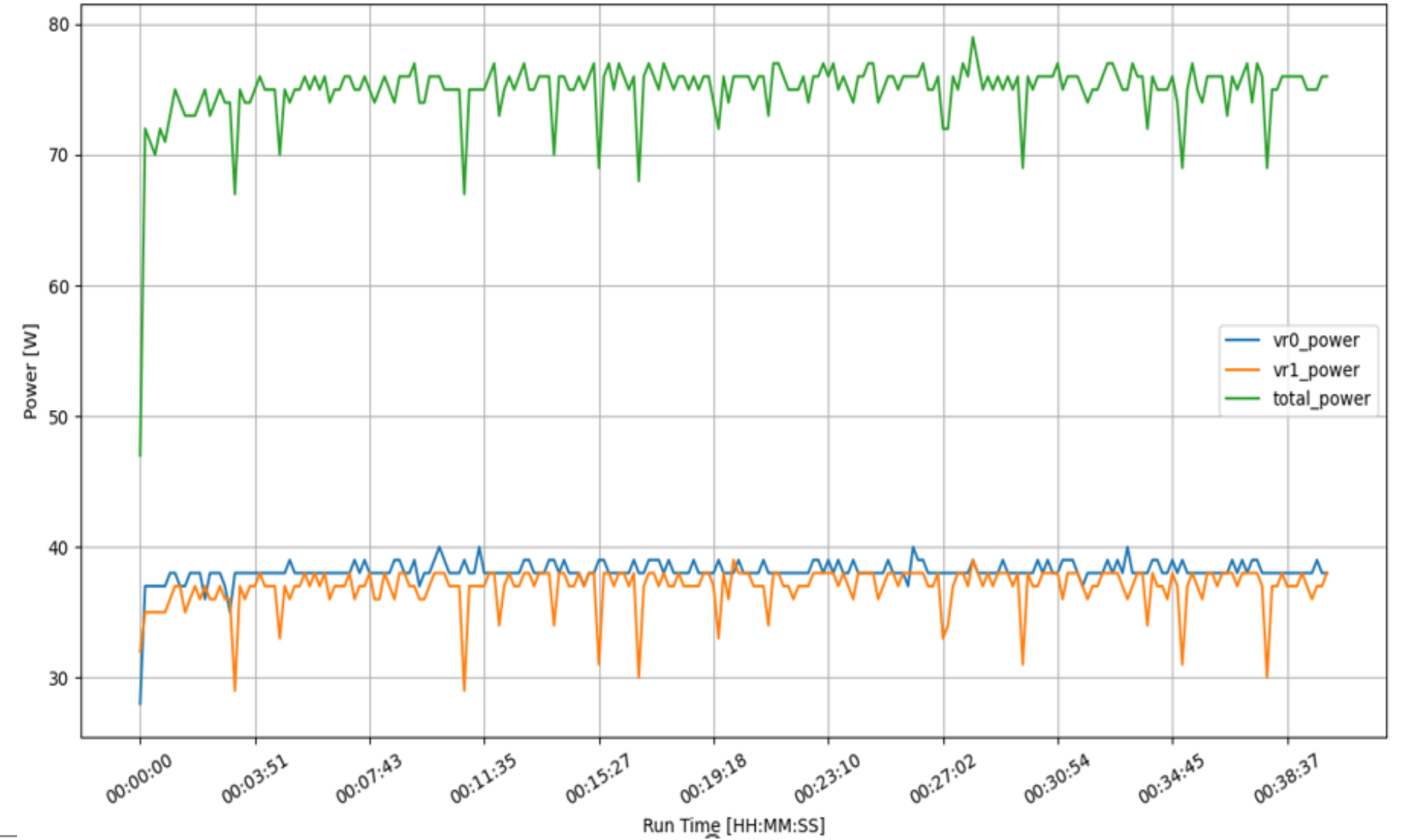
Thermal Stress Output

DPU temperature & power

Temperature Graph
15-03-2023 22:29:19



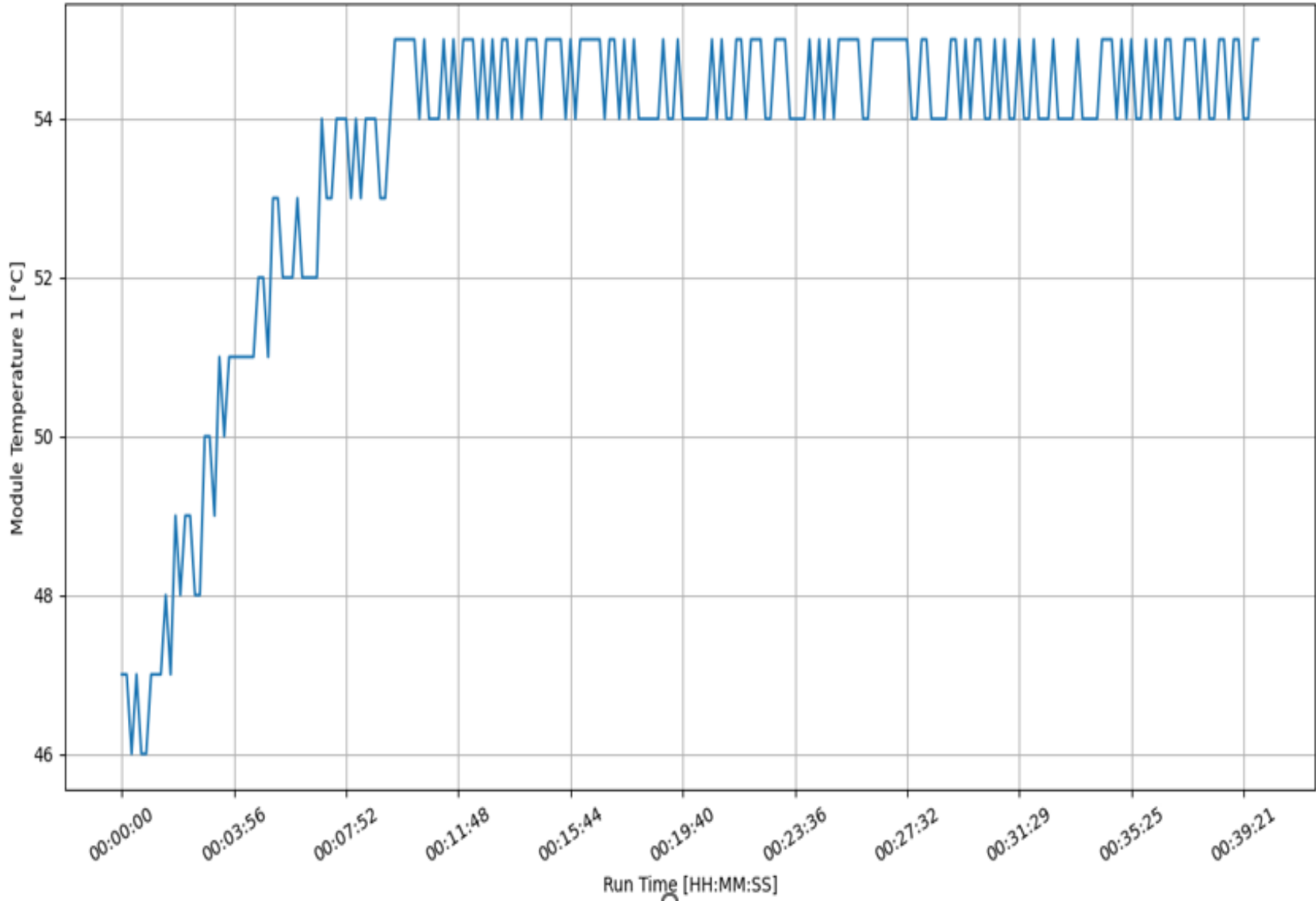
Power Graph
15-03-2023 22:29:19



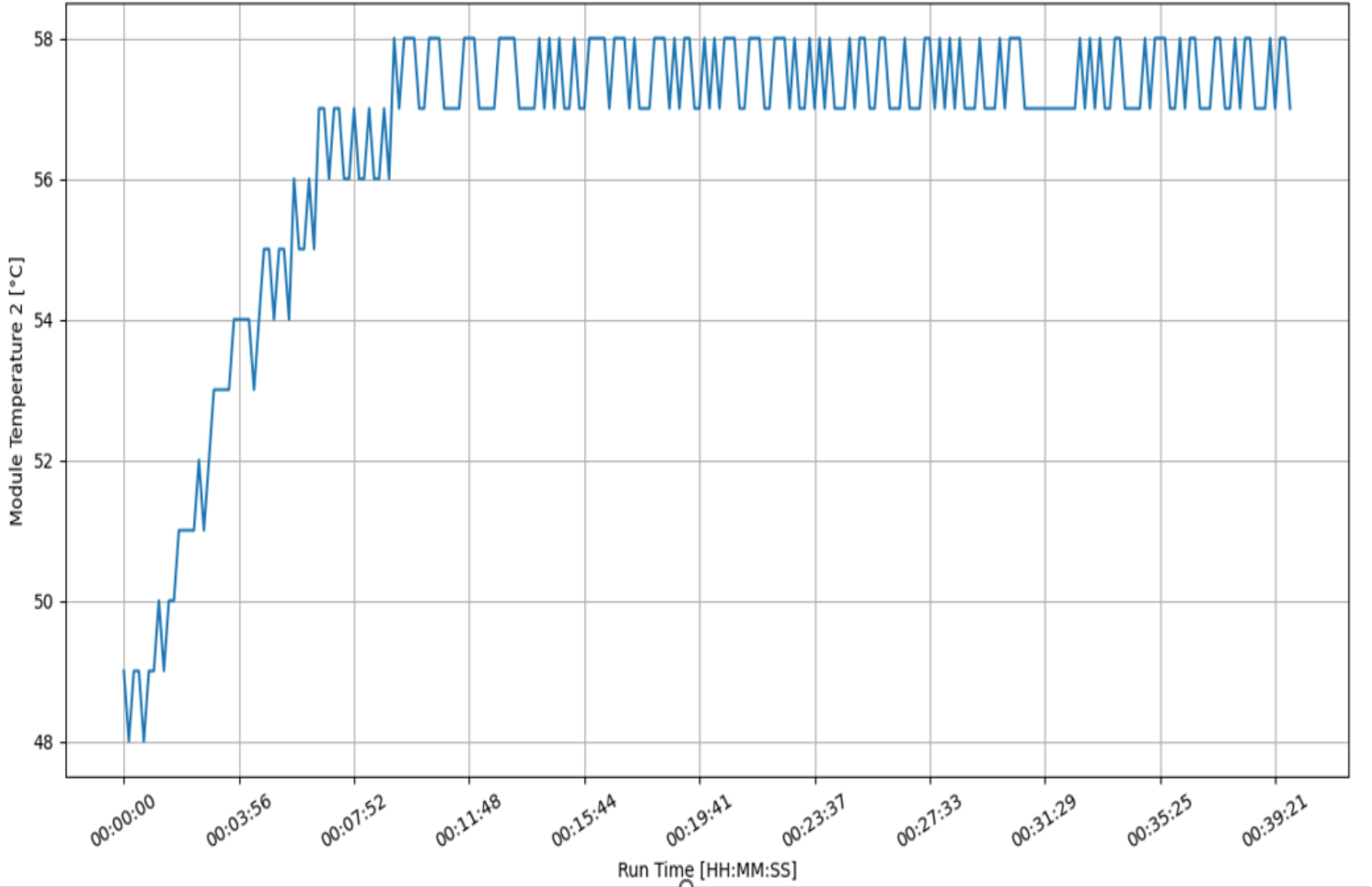
Thermal Stress Output

Module temperature

Module Temperature 1 Graph
15-03-2023 22:29:19



Module Temperature 2 Graph
15-03-2023 22:29:19




Thermal Test Result Evaluation

DPU Electrical and Thermal Specification

- **Download from nv-online and refer to latest DPU electrical and thermal specification**
 - BF-2: NVIDIA_BlueField-2_DPUs_Power_and_Airflow_Specifications_Rev_1.7.pdf
 - BF-3: NVIDIA BlueField-3 Network Platforms Electrical and Thermal Specifications - Mar24.pdf
 - Check the specific DPU ONP and compare the thermal and power with the specific.

☐ **1103274** [NVIDIA BlueField-3 Network Platforms Electrical and Thermal Specifications](#)
RESTRICTED | Modified : 4/14/2024 | Electrical and Thermal specifications for BlueField-3 DPUs and SuperNICs.
Matching fields: *DocId*

☐ **1076964** [NVIDIA BlueField-2 DPUs Power and Airflow Specifications](#)
Group Package: 
Modified : 1/17/2023 | Thermal and electrical specifications for BlueField-2 DPUs.
Matching fields: *Description* *Title*

PCIE Eye Margin and Traffic Test

PCIe Eye Margin Test

Test Command and Pass Criteria

```
./network_diag -ip <oob_net0 IP address> -p <DPU PCIe  
Domain:Bus:Device> -pw <root password of DPU> -si -a pcie_eye
```

Socket Direct:

```
./network_diag -ip <oob_net0 IP address> -p <DPU PCIe  
Domain:Bus:Device> -pw <root password of DPU> -sdp <  
socket_direct Domain:Bus:Device> -si -a pcie_eye
```

Json

```
./network_diag -j /home/test/two_dpu_pcie_eye.json
```

Table 7. PCIe Eye Margin Test FOM

Criteria	Gen 3.0 or 4.0	Gen 5.0
Pass	Last FOM > 100	Last FOM > 70
Marginal	70 < Last FOM < 99	50 < Last FOM < 69
Fail	Last FOM < 70	Last FOM < 49

PCIe Eye Last FOM Test			
Lane	Average Value	Status	Info
0	105.2	PASS	
1	100.8	PASS	
2	97.6	PASS	
3	98.8	PASS	
4	100.6	PASS	
5	95.2	PASS	
6	100.0	PASS	
7	110.4	PASS	
8	113.8	PASS	
9	107.8	PASS	
10	109.0	PASS	
11	108.6	PASS	
12	108.6	PASS	
13	110.4	PASS	
14	105.0	PASS	
15	115.8	PASS	

Notes:
Last FOM fail threshold: 49
Last FOM pass threshold: 70

PCIe Eye		
Test Name	Status	Info
Link Speed	PASS	
Link Width	PASS	

PCIe Interface Traffic Test

- Nvqual的log会记录每分钟的结果，每次测试时长70分钟，需要跑3个回合
- 每次测试结果确保没有rx和tx错误

```
./network_diag -d 4200 -ip <oob_net0 IP address> -p <DPU PCIe  
Domain:Bus:Device> -pw <root password> -si -a  
{ib_traffic,mlxlink_counter}
```

Socket Direct

```
./network_diag -d 4200 -ip <oob_net0 IP address> -p <DPU PCIe  
Domain:Bus:Device> -pw <root password> -sdp <socket direct PCIe  
Domain:Bus:Device> -si -a {ib_traffic,mlxlink_counter}
```

Single-port

```
./network_diag -d 4200 -ip <oob_net0 IP address> -p <DPU PCIe  
Domain:Bus:Device> -pw <root password> -si -phip <Partner Host IP> -  
phpw <Partner Host password> -php <Partner Host PCI DOMAIN:BUS:DEVICE>  
-a {ib_traffic,mlxlink_counter}
```

Json

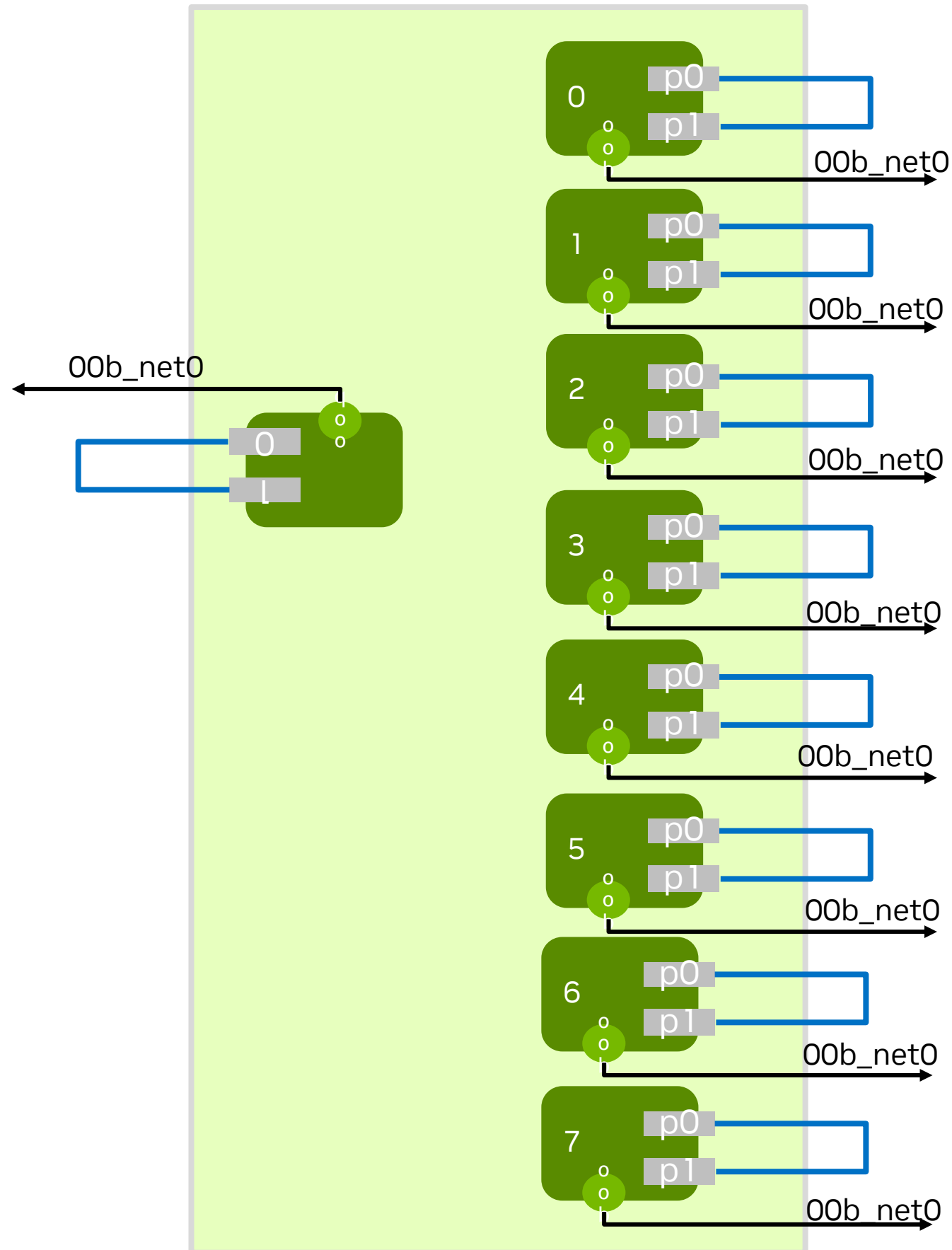
```
./network_diag -j /home/test/pcie_interface.json
```

Accelerators	
mlxlink_counter	DEVICE: mlx5_3 RESULTS: PCIe Operational (Enabled) Info ----- Depth, pcie index, node : 0, 0, 0 Link Speed Active (Enabled) : 32G-Gen 5 (32G-Gen 5) Link Width Active (Enabled) : 16X (16X) Management PCIe Performance Counters Info ----- RX Errors : 0 TX Errors : 2 CRC Error dllp : 0 CRC Error tlp : 0 Effective ber : 15E-255 DEVICE: mlx5_2 RESULTS: PCIe Operational (Enabled) Info ----- Depth, pcie index, node : 0, 0, 0 Link Speed Active (Enabled) : 32G-Gen 5 (32G-Gen 5) Link Width Active (Enabled) : 16X (16X) Management PCIe Performance Counters Info ----- RX Errors : 0 TX Errors : 2 CRC Error dllp : 0 CRC Error tlp : 0 Effective ber : 15E-255
ib_traffic	server platform: local host client platform: local host server device: mlx5_3 client device: mlx5_2 BW average [Gb/sec]: 367.78



Run concurrently multiple CX7 or BF3

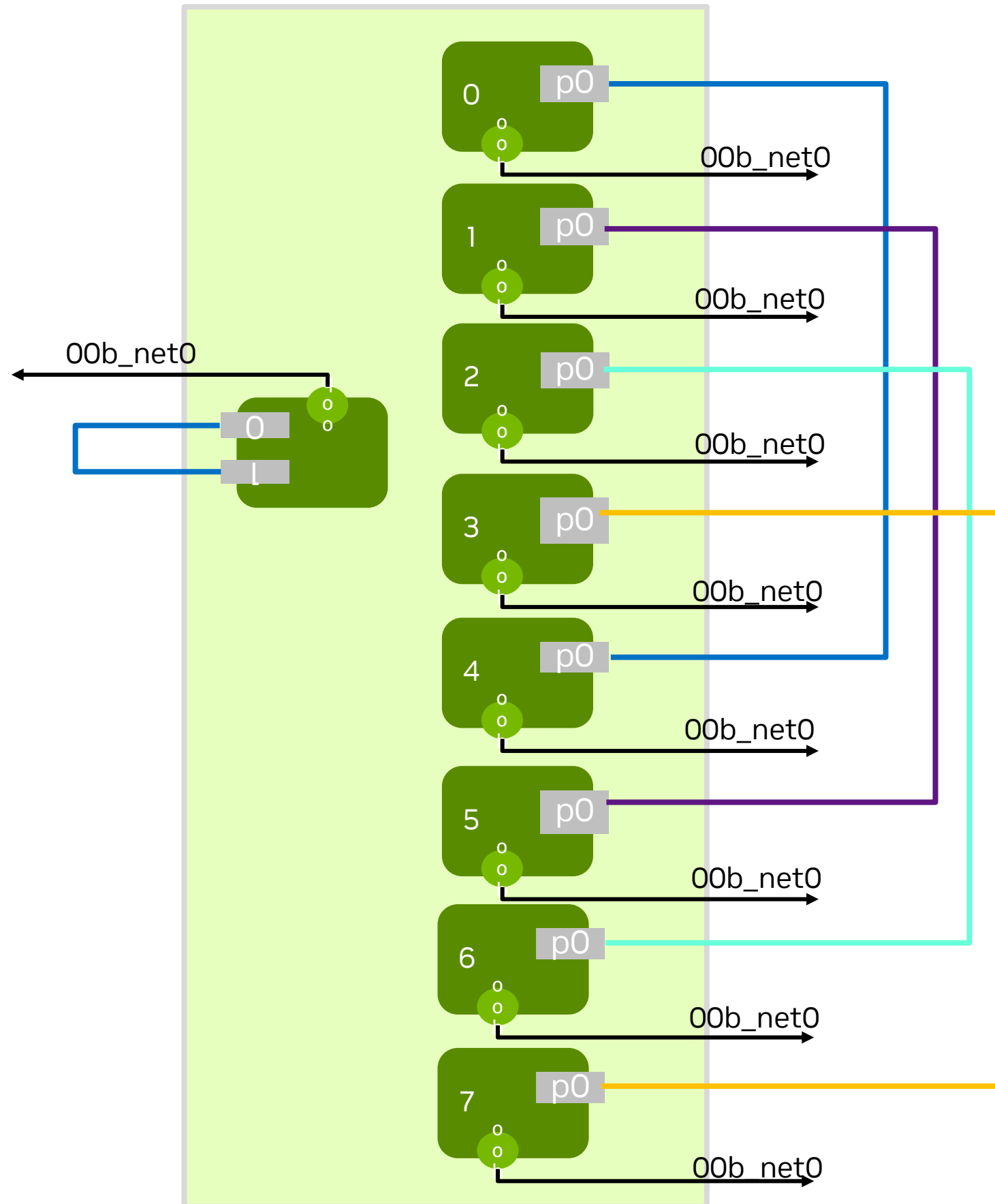
1*N-S and 8*E-W dual 200G ports



```
./network_diag -j /home/test/nine_dpu_dual_port_thermal.json
```

```
nine_dpu_dual_port_thermal.json
{
  "general": {
    "duration": 2400,
    "setup_prep": true,
    "system_info": true,
    "not_safe_mode": false,
    "port_ip_subnet": null,
    "disabled_measurements": [],
    "debug": false,
    "ports_config": true
  },
  "players": [
    {
      "bf": {
        "ip": "192.168.21.200",
        "password": "Admin123",
        "pci": "0000:1b:00",
        "sd_pci": null
      },
      "cores": null,
      "accelerators": []
    },
    {
      "bf": {
        "ip": "192.168.21.201",
        "password": "Admin123",
        "pci": "0000:9d:00",
        "sd_pci": null
      },
      "cores": null,
      "accelerators": []
    }
  ] .....
}
```

1*N-S dual ports and 8*E-W single ports



```
./network_diag -j /home/test/1dual_ports_8single_port_thermal.json
```

```
1dual_ports_8single_port_thermal.json
```

```
{
  "general": {
    "duration": 2400,
    "setup_prep": true,
    "system_info": true,
    "not_safe_mode": false,
    "port_ip_subnet": null,
    "disabled_measurements": [],
    "debug": false,
    "ports_config": true
  },
  "players": [
    {
      "bf": {
        "ip": "192.168.21.200",
        "password": "BF1_123",
        "pci": "0000:1a:00",
        "sd_pci": null
      },
      "cores": null,
      "accelerators": [],
      "partner": {
        "bf": {
          "ip": "192.168.21.204",
          "password": "BF2_123",
          "pci": "0000:3a:00",
          "sd_pci": null
        },
        "cores": null,
        "accelerators": []
      }
    }
  ]
}
```




Run in Docker Container or VM

Run Nvqual from docker container

- **Advantages to running the Network NVQual using Docker container:**
 - Eliminates the dependency on installing software packages on host
 - Running with Docker container provides a larger set of host OS support
 - DPU no need to access the external network for software package installation
- **Two Docker container modes:**
 - Running a Docker container on the external host server and a Docker container on the BlueField DPU.
 - Running a Docker container only on the BlueField DPU.
- **In both scenarios, the IP for the BlueField DPU must use port 2200**
- **Download docker container images including host and DPU containers from nvonline**
- **Limit:** Only BF-3 is supported for Docker mode, can be run on X86 or ARM server

☐ 1111407 NVIDIA Network NVQual x86 Host Docker Container Image

Modified : 3/6/2024 | x86 Host Docker Container Image for use with Network NVQual when container mode is selected

Matching fields: [Description](#) [Notes](#) [Title](#)

☐ 1111408 NVIDIA Network NVQual Arm64 Host Docker Container Image

Modified : 3/6/2024 | Arm64 Host Docker Container Image for use with Network NVQual when container mode is selected

Matching fields: [Description](#) [Notes](#) [Title](#)

☐ 1110878 NVIDIA Network NVQual BlueField-3 Docker Container Image

Modified : 3/6/2024 | BlueField-3 Docker Container Image for use with Network NVQual when container mode is selected

Matching fields: [Description](#) [Notes](#) [Title](#)

Host Prepare and Load Container Images

- Install **Docker Engine** on the Host Server (no need on DPU)
- Install **MLNX_OFED** on the External Host Server
- Load docker container image:

[host]

```
systemctl enable docker; systemctl start docker
docker image load -i nvqual_v2_6_host_x86_container_image.gz
docker images
```

[dpu]

```
systemctl enable docker; systemctl start docker
docker image load -i nvqual_v2_6_bf3_container_image.gz
docker images
```

```
[root@l-csi-g5-1323h ~]# docker images
Emulate Docker CLI using podman. Create /etc/containers/nodocker to quiet msg.
REPOSITORY                                TAG          IMAGE ID          CREATED           SIZE
harbor.mellanox.com/fw_hca_sa/nvqual/x86  latest       42667a1b765a     3 weeks ago      4.79 GB
```

```
root@l-csi-bf3-200g-16:~# docker images
REPOSITORY                                TAG          IMAGE ID          CREATED           SIZE
harbor.mellanox.com/fw_hca_sa/nvqual/bf3  latest       09db3d63ec93     2 weeks ago      4.66GB
```


Run nvqual in containers

- Copy network_diag from nvqual package, choose the right CPU specific network_diag
- Run the following commands (no need '-sp') for both host and DPU containers :

```
./network_diag -d <duration> -ip <dpu_oob_ip>:2200 -p <bf_pci_bus_id> -pw <dpu passwd> -si -cm
```

Example: `./network_diag -d 600 -ip 10.7.157.121:2200 -p 0000:8a:00 -pw 3tango@11 -si -cm`

- Run DPU container only:


```
./network_diag_ubuntu2204 -d 600 -ip 10.7.157.121:2200 -p 0000:8a:00 -pw 3tango@11 -si --run_bf_container
```

```
[root@l-csi-g5-1323h ~]#  
[root@l-csi-g5-1323h ~]# ./network_diag -d 600 -ip 10.7.157.121:2200 -p 0000:8a:00 -pw 3tango@11 -si -cm  
fc-list: /tmp/_MEIFw6wgr/libz.so.1: version 'ZLIB_1.2.9' not found (required by /lib64/libpng16.so.16)  
  
Run NVQual in a container..  
  
[cmd]:  
sudo docker run -it --rm --privileged --network host -v /dev:/dev -v /sys:/sys -v /tmp:/tmp -v /etc/ibdev2netdev:/etc/ibdev2netdev -v /etc/init.d:/etc/init.d -v /etc/modprobe.d:/etc/modprobe.d -v /lib/modules:/lib/modules -v /usr/lib64/mft/python_tools:/usr/lib64/mft/python_tools -v /usr/sbin/ibdev2netdev:/usr/sbin/ibdev2netdev harbor.mellanox.com/fw_hca_sa/nvqual/x86:latest network_diag -d 600 -ip 10.7.157.121:2200 -p 0000:8a:00 -pw 3tango@11 -si --run_bf_container  
  
Emulate Docker CLI using podman. Create /etc/containers/nodocker to quiet msg.  
  
NVQual version: 2.6.0.5  
[general_info] duration: 600, setup_prep: False, system_info: True, not_safe_mode: False, ports_config: True, port_ip_subnet: 192.168.103.0, disabled_measurements: [], measurement_interval: 10, debug: False  
11:39:58 Player 0 is connecting to BF..  
[player 0 parameters] bf_ip: 10.7.157.121, bf_ssh_port: 2200, bf_username: root, pci: 0000:8a:00, sd_pci: None, partner_host_ip: None, partner_host_username: root, partner_pci: None, partner_host_sd_pci: None, given_cores: [], compd_cores: [], bf_nvme_devices: ['/dev/nvme0n1'], host_nvme_devices: [], accelerators: ['ib_traffic', 'dma', 'maxpwr_cpu', 'bf_ssd_stressor']  
11:40:11 Collecting HOST system info..
```

```
[18/03/2024 04:07:41] root INFO  
[run on 10.7.157.121]: sudo docker run --rm -it -d --privileged --network host -v /usr/sbin/ibdev2netdev:/usr/sbin/ibdev2netdev -v /dev:/dev -v /etc/ibdev2netdev:/etc/ibdev2netdev -v /etc/init.d:/etc/init.d -v /etc/modprobe.d:/etc/modprobe.d -v /lib/modules:/lib/modules -v /usr/bin/bfhcafw:/usr/bin/bfhcafw -v /usr/bin/bfcpu-freq:/usr/bin/bfcpu-freq -v /sys:/sys -v /lib/modules:/lib/modules --name nvqual_bf harbor.mellanox.com/fw_hca_sa/nvqual/bf3:latest /bin/bash -c '/usr/sbin/sshd -D -p 2200'  
[output]: 639b092455a60008a03f23964a016f946921c4ef2ef9f1c846a4946753019c79  
[rc]: 0
```

Run nvqual from VM

- 如果是主机不能更换OS，可以通过安装VM，并将DPU的PF直通到VM来测试
- VM 中安装nvqual 需要的OS，需要而外将host的一个oob接口直通到VM中
- 将BF的pcie bus id 包括DMA（给rshim用）都加入进去，bus id要和host的形势一致
- Host上的rshim service 需要stop
- Kunpeng上安装VM需要注意以下不同，其他操作和X86一样：
 - BIOS 中使能SMMU: “Advanced> MICC Config > Support Smmu”
 - Host grube env 中添加: “pci=realloc iommu.pt=1 smmu=1”



PCI 0000:af:00.0
PCI 0000:af:00.1
PCI 0000:af:00.2
PCI 0000:1a:00.1

```
[root@localhost bf2]# virsh list --all
Id      Name                                State
-----
-       ubuntu22.04                        shut off

[root@localhost bf2]# systemctl stop rshim
[root@localhost bf2]# virsh start ubuntu22.04
```

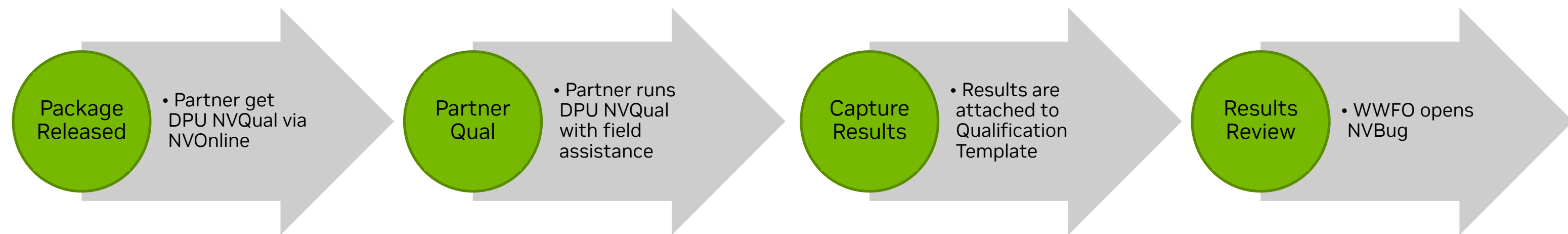
```
[root@localhost bf2]# virsh list --all
Id      Name                                State
-----
2       ubuntu22.04                        running
```

Process for PASS Approval Review

Network NVQual

NVIDIA Internal Process

- WWFO drives BlueField DPU NVQual to partner through [NVOnline](#)
- Partner execute each NVQual Test per instructions with field support assistance
 - Save/zip results and attach to NVQual Qualification Template
 - Fills out NVQual Qualification Template details
- WWFO opens NVBug with results
 - Systems only contains DPUs/ConnectX-7 -> Module = Network-CustomerReviews; Category = NVQual Review
 - Systems contains GPU + DPUs/ConnectX-7 -> Module = EnterprisePCIe-CustomerReviews; Category = NVQual Review
- Separate NVBug for each partner unique server/DPU



Network NVQual

NVIDIA NVQual Qualification Template



NVQual Report

Instructions:	<p>This template is intended to be used by OEM/ODM/system integrators for NVIDIA product qualification.</p> <p>This report should be populated in full and then submitted to NVIDIA for review and approval.</p> <p>ALL DATA REQUIRED FROM THE CUSTOMER IS HIGHLIGHTED IN YELLOW CELLS</p>
Product SKU	Please enter BlueField DPU SKU
Product Brand	NVIDIA BlueField DPU card
Date:	

Project Information	
Project Name	
Partner	
ODM	
System Model Name	

System Configuration	Product SKUs			
Number of NVIDIA Cards in system:				

Network NVQual

NVIDIA NVQual Qualification Template

NVQual Test Item	NVQual Test Name	Qualification Requirements	Customer Results	Comments Please add details regarding specific issues here.
Test #1	Thermal Stress Test	Minimum systems = 1 (multiple systems recommended) Test Condition: Max server supported conditions Minimum Loops: 3 or more consecutive !	Import Thermal Stress Test zip file	
Test #2	PCI Express Eye Margin Test	Minimum systems = 1 (multiple systems recommended) Test Condition: Room temperature Minimum Loops: 3 or more with power cycle in between each run	Import PCIe Eye Margin Test zip file	
Test #3	PCI Express Interface Traffic Test	Minimum systems = 1 (three or more systems recommended) Test Condition: Room temperature Minimum Loops: 3 or more with power cycle in between each run	Import PCIe Interface Traffic Test zip file	

Network NVQual

NVIDIA NVQual Qualification Template

	Item	Description	Customer Result	Comments
Environment for Cooling	Card orientation wrt airflow	Left-to-right, Right-to-left, etc.		
	Airflow bypass at this card	% bypass		
Air Measurements	Chassis inlet ambient temperature	Customer's <i>max specified</i> ambient temperature (outside system chassis)		
	System external ambient temperature <i>as measured during Thermal test</i>	External ambient temperature measurement <i>during test run</i>		
	Fan inlet air temperature (maximum) during NVQual Thermal test	maximum inlet temperature during the Thermal test		Please describe <i>how measured</i> . 3 thermocouples? List individual temperatures from
	System Fans PWM% <i>during test run</i>	System fans PWM% <i>during test (during steady state portion of test)</i>		
	System Fans <i>max allowable</i> PWM%	Maximum shippable PWM% of system fans		



TroubleShooting

常见问题

- **Nvqual Debug**

- 详细出错日志 在每次测试的log目录下的 /tmp/nvqual/nvqual_results_<date-time>/nvqual_logger.log
- 根据详细的错误排除和采取对应的错失
- 更详细的信息可以通过加 “--debug” 获取更详细的nvqual的执行信息

- **测试使用最新的nvqual**

- 从nvonline上下载最新的nvqual包，安装对应版本的Doca或者OFED版本
- 按手册要求使用对应的host OS和版本
- 如果是host确定不能使用要求的ubuntu，可以使用Docker container或者VM方式
- 如果DPU不能接internet，可以使用DPU上的container 方式

- **Host上的nvme冲突**

- 解决方法：运行中加入-nsm 参数

常见问题

- **Failed to run nvqual 2.6.0-1 on ubuntu-22.04**

- Failed to run 2.6.0-1, report python problem
- 解决方法: install matplotlib and copy matplotlibrc

```
pip3 install matplotlib
```

```
# python3 --version
```

```
Python 3.10.12
```

```
cp /usr/local/lib/python3.10/dist-packages/matplotlib/mpl-data/matplotlibrc /etc/
```

```
root@ubuntu-server:~#  
root@ubuntu-server:~# ./network_diag_ubuntu2204 -d 600 -ip 10.7.157.121 -p 0000:8a:00 -pw 3tango@11 -si -sp  
Traceback (most recent call last):  
  File "2607_ubuntu2204/network_diag.py", line 25, in <module>  
    File "/tmp/_MEI9tpnxk/utils/utils.py", line 31, in <module>  
      from matplotlib import pyplot  
  File "<frozen importlib._bootstrap>", line 1027, in _find_and_load  
  File "<frozen importlib._bootstrap>", line 1006, in _find_and_load_unlocked  
  File "<frozen importlib._bootstrap>", line 688, in _load_unlocked  
  File "PyInstaller/loader/pyimod02_importers.py", line 352, in exec_module  
  File "matplotlib/__init__.py", line 894, in <module>  
  File "matplotlib/__init__.py", line 575, in matplotlib_fname  
RuntimeError: Could not find matplotlibrc file; your Matplotlib install is broken  
[415011] Failed to execute script 'network_diag' due to unhandled exception!  
root@ubuntu-server:~#
```

常见问题

- Thermal_trottling FAIL

- The BF-3 thermal throttling temperature was lowered to 94C on the Ubuntu 2.6 release
- nvqual report max temperature is 91C, still report thermal_throttling fail by ATF which is higher
- Nvqual using NIC mget_temp to get temperature but thermal_throttling is calculated by ATF
- There is some discrepancy between ATF and NIC calculation.
- Soltuion : increase fans and decrease the max temperature of nvqual to get enough margin

Measurements					
Run authentication	Min measurement	Max measurement	Avg measurement	Performance Pass/Fail	Fail info
module_temperature_mlx5_3 [°C]	54.0	59.0	54.64	PASS	State: steady state Time in SS: 471.680716 seconds Time from PENDING to SS: 923.443413 seconds Last measurements window: 300 seconds Max temperature delta allowed: 10 °C Required time to switch from PENDING to SS: 600 seconds Max PENDING time allowed: 3600 seconds Failed cycles: 0 out of 5 allowed
module_temperature_mlx5_2 [°C]	56.0	61.0	57.56	PASS	
temperature [°C]	67.0	91.0	85.08		
bf_ssd_temperature_nvme0n1 [°C]	58.0	75.0	70.12	PASS	
power [W]	51.0	118.0	109.39		
throttling_state [% CPU]	50	100	92.51		
arm_frequency [MHz]	disabled	disabled	disabled		
Measurement Counters					
Run authentication	Initial count	Final count	Status		
power throttling	8778	17804			
thermal_throttling	69	102	FAIL		

02:49:48 NVQUAL_STATUS_PERF_ERROR!

常见问题

- Thermal_trottling FAIL

- The BF-3 thermal throttling temperature was lowered to 94C on the Ubuntu 2.6 release
- nvqual report max temperature is 91C, still report thermal_throttling fail by ATF which is higher
- Nvqual using NIC mget_temp to get temperature but thermal_throttling is calculated by ATF
- There is some discrepancy between ATF and NIC calculation.
- Soltuion : increase fans and decrease the max temperature of nvqual to get enough margin

Measurements					
Run authentication	Min measurement	Max measurement	Avg measurement	Performance Pass/Fail	Fail info
module_temperature_mlx5_3 [°C]	54.0	59.0	54.64	PASS	State: steady state Time in SS: 471.680716 seconds Time from PENDING to SS: 923.443413 seconds Last measurements window: 300 seconds Max temperature delta allowed: 10 °C Required time to switch from PENDING to SS: 600 seconds Max PENDING time allowed: 3600 seconds Failed cycles: 0 out of 5 allowed
module_temperature_mlx5_2 [°C]	56.0	61.0	57.56	PASS	
temperature [°C]	67.0	91.0	85.08		
bf_ssd_temperature_nvme0n1 [°C]	58.0	75.0	70.12	PASS	
power [W]	51.0	118.0	109.39		
throttling_state [% CPU]	50	100	92.51		
arm_frequency [MHz]	disabled	disabled	disabled		
Measurement Counters					
Run authentication	Initial count	Final count	Status		
power throttling	8778	17804			
thermal_throttling	69	102	FAIL		

02:49:48 NVQUAL_STATUS_PERF_ERROR!

常见问题

- **PORTS_CONFIGURATION ERROR**

- At the nvqual log end, it report fail PORTS_CONFIGURATION
- Nvqual will configure ip rule and clean after running
- If nvqual is ended not gracefully, ip rule will not clean fully, once run nvqual again, it will report such problem
- **Solution** : reboot server and run nvqual again

[26/03/2024 09:00:34] PORTS_CONFIGURATION INFO

[run on local host]: sudo /opt/mellanox/iproute2/sbin/ip rule del from all oif ens9f1np1 table 10 pref 10

[output]: RTNETLINK answers: No such file or directory

[rc]: 2

[26/03/2024 09:00:34] PORTS_CONFIGURATION ERROR

From utils Couldn't complete PORTS_CONFIGURATION action: RTNETLINK answers: No such file or directory

[26/03/2024 09:00:34] PORTS_CONFIGURATION ERROR

deconfigure_port failed: From utils Couldn't complete PORTS_CONFIGURATION action: RTNETLINK answers: No such file or directory

[26/03/2024 09:00:34] PORTS_CONFIGURATION ERROR

deconfigure_all_ports failed: deconfigure_port failed: From utils Couldn't complete PORTS_CONFIGURATION action: RTNETLINK answers: No such file or directory

[26/03/2024 09:00:34] PORTS_CONFIGURATION ERROR

ports_deconfiguration failed: deconfigure_all_ports failed: deconfigure_port failed: From utils Couldn't complete PORTS_CONFIGURATION action: RTNETLINK answers: No such file or directory

