YANG model for management of Network Tester

- IETF116 Hackathon
- March 25-26, 2023
- Online



The project

Specification:

* draft-ietf-bmwg-network-tester-cfg-02

Client side:

* Test script - rfc2544-benchmark (Python)

Device side:

- * Software YANG/NETCONF server instrumentation code (C)
- * Firmware (<u>Verilog</u>)
- * Hardware off-the-shelf FPGA module Ultra96 + 6x SFP+ network programmability kit shield (<u>KiCAD</u>, <u>Walk-through</u>)

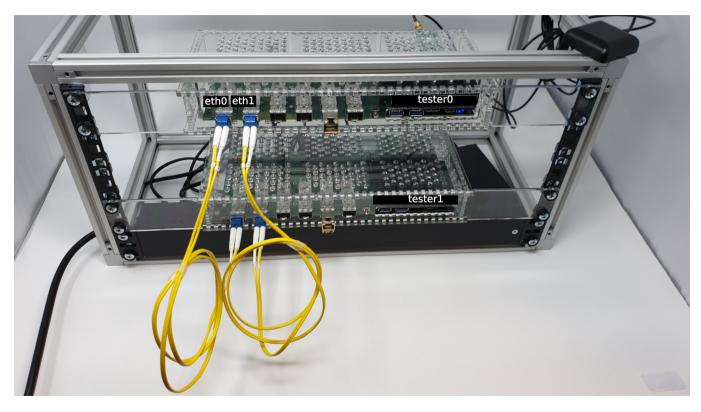
Design and implementation

```
NETCONF Server (Model (YANG), Implementation Generator module (\underline{C}), Analyzer module (\underline{C}))
TRAFFIC-GENERATOR-SW (C)
                                          TRAFFIC-ANALYZER-SW (C)
Socket API
                                           Socket API
            Sync ->{RTCLOCK}(Verilog)
Kernel
                                              Kernel
DMA
                                            DMA
  | [AXI]
                                               [AXI]
MAC TRAFFIC-GENERATOR-HW (C, Verilog)
                                            MAC
                                                   TRAFFIC-ANALYZER-HW (C, Verilog)
   GMII MUX
      | [GMII]
                                                   | [GMII]
     PHY
                                                 PHY
    SFP+ TX
                                                SFP+ RX
```

* - underlined text has links to repositories

Network testers

+		+
eth0		eth1
+-< TG	tester0	TA <-+
1 1		
+		+
1	++	
+	-> DUT >-	+
	++	
+		+
eth0		eth1
+-< TG	tester0	x
1 1		
+		+
++		
DUT		
++		
+		+
1 1		
+-> TA	tester1	
1		



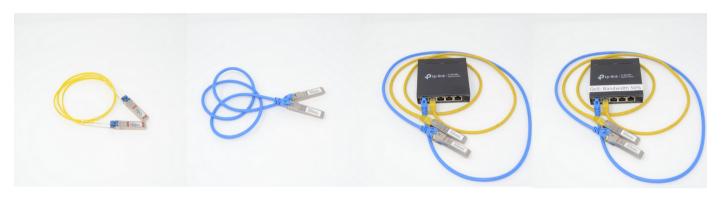
Mobile lab with DUT - front



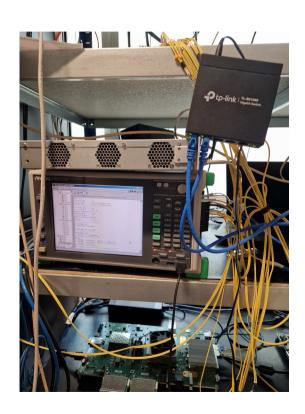
Mobile lab with DUT - back



Results



- * DUT0 (optical SFP modules + 1 m. fiber) report, verbose-log
- * DUT1 (copper 1000BASE-T modules + 1 m. Ethernet cable) report, verbose-log
- * DUT2 (low cost Ethernet bridge TL-SG105E wo QoS 100% bandwidth) report, verbose-log
- * DUT3 (low cost Ethernet bridge TL-SG105E w QoS 50% bandwidth) report, verbose-log



Validation of results

Validated results for DUT3 (low cost Ethernet bridge TL-SG105E w QoS - 50% bandwidth) against results for same DUT3 tested with commercial tester:

- * reference (anritsu-md1230b-log.txt)
- * result

Summary:

- * 997024 (67%) vs. 1000000 (67.2%)
- * 6668 ns vs. 24440.4 nanoseconds (24 ns is the actual maximum delay. None is wrong.)
- * Frame loss 32%,25%,15%,3% vs 32%,24%,15%,3%
- * 1682 back-to-back frames vs. 1679
- * System recovery 0.000491 sec vs. N/A

The End