X520-DA2 10G SFP+

Оглавление

Linux: проверка обнаружения карты

Дистрибутив: Ubuntu Desktop 22.04.6 LTS

```
user@user-ext-ssd:~$ uname -a
Linux user-ext-ssd 6.8.0-59-generic #61~22.04.1-Ubuntu SMP PREEMPT_DYNAMIC Tue Apr 15 17:03:15 UTC 2
x86_64 x86_64 x86_64 GNU/Linux
```

После установки ОС принимаем предлагаемые обновления программ и пакетов.
Драйвер для сетевой карты уже присутствует по умолчанию.
Проверяем лог сообщений ядра:

```
dmesg | grep ixgbe

[    0.664525] ixgbe: Intel(R) 10 Gigabit PCI Express Network Driver
[    0.664528] ixgbe: Copyright (c) 1999-2016 Intel Corporation.

[    0.827157] ixgbe 0000:01:00.0: Multiqueue Enabled: Rx Queue count = 16, Tx Queue count = 16 XDP Queue count = 0
[    0.827430] ixgbe 0000:01:00.0: 32.000 Gb/s available PCIe bandwidth (5.0 GT/s PCIe x8 link)
[    0.827549] ixgbe 0000:01:00.0: MAC: 2, PHY: 20, SFP+: 5, PBA No: Unknown
[    0.827551] ixgbe 0000:01:00.0: 00:1b:21:be:5b:30
[    0.828816] ixgbe 0000:01:00.0: Intel(R) 10 Gigabit Network Connection


[    0.991252] ixgbe 0000:01:00.1: Multiqueue Enabled: Rx Queue count = 16, Tx Queue count = 16 XDP Queue count = 0
[    0.991531] ixgbe 0000:01:00.1: 32.000 Gb/s available PCIe bandwidth (5.0 GT/s PCIe x8 link)
[    0.991646] ixgbe 0000:01:00.1: MAC: 2, PHY: 17, SFP+: 6, PBA No: Unknown
[    0.991648] ixgbe 0000:01:00.1: 00:1b:21:be:5b:31


[    1.099463] ixgbe 0000:01:00.1 enp1s0f1: renamed from eth2
[    1.135613] ixgbe 0000:01:00.0 enp1s0f0: renamed from eth1

[    7.352929] ixgbe 0000:01:00.0: registered PHC device on enp1s0f0
[    7.531459] ixgbe 0000:01:00.0 enp1s0f0: detected SFP+: 5
[    7.532963] ixgbe 0000:01:00.1: registered PHC device on enp1s0f1
[    9.144589] ixgbe 0000:01:00.1 enp1s0f1: detected SFP+: 6
```

Ищем адаптер на шине PCI:

```
root@user-ext-ssd:~# lspci

00:00.0 Host bridge: Intel Corporation Device 4c43 (rev 01)
00:01.0 PCI bridge: Intel Corporation Device 4c01 (rev 01)
…
01:00.0 Ethernet controller: Intel Corporation 82599ES 10-Gigabit SFI/SFP+ Network Connection (rev 01)
01:00.1 Ethernet controller: Intel Corporation 82599ES 10-Gigabit SFI/SFP+ Network Connection (rev 01)
```

```
root@user-ext-ssd:~# lspci -s 01:00.0 -v -mm

Slot:   01:00.0
Class:  Ethernet controller
Vendor: Intel Corporation
Device: 82599ES 10-Gigabit SFI/SFP+ Network Connection
SVendor:        Intel Corporation
SDevice:        Ethernet Server Adapter X520-2
Rev:            01
IOMMUGroup:     15
```

```
root@user-ext-ssd:~# lspci -s 01:00.0 -v

01:00.0 Ethernet controller: Intel Corporation 82599ES 10-Gigabit SFI/SFP+ Network Connection (rev 01)
        Subsystem: Intel Corporation Ethernet Server Adapter X520-2
        Flags: bus master, fast devsel, latency 0, IRQ 16, IOMMU group 15
        Memory at a1b00000 (64-bit, non-prefetchable) [size=512K]
        I/O ports at 4020 [size=32]
        Memory at a1d00000 (64-bit, non-prefetchable) [size=16K]
        Expansion ROM at a1b80000 [disabled] [size=512K]
        Capabilities: [40] Power Management version 3
        Capabilities: [50] MSI: Enable- Count=1/1 Maskable+ 64bit+
        Capabilities: [70] MSI-X: Enable+ Count=64 Masked-
        Capabilities: [a0] Express Endpoint, MSI 00
        Capabilities: [e0] Vital Product Data
        Capabilities: [100] Advanced Error Reporting
        Capabilities: [140] Device Serial Number 00-1b-21-ff-ff-be-5b-30
        Capabilities: [150] Alternative Routing-ID Interpretation (ARI)
        Capabilities: [160] Single Root I/O Virtualization (SR-IOV)
        Kernel driver in use: ixgbe
        Kernel modules: ixgbe
```

```
root@user-ext-ssd:~# lspci -s 01:00.0 -vv

01:00.0 Ethernet controller: Intel Corporation 82599ES 10-Gigabit SFI/SFP+ Network Connection (rev 01)
        Subsystem: Intel Corporation Ethernet Server Adapter X520-2
        Control: I/O+ Mem+ BusMaster+ SpecCycle- MemWINV- VGASnoop- ParErr- Stepping- SERR- FastB2B- DisINTx+
        Status: Cap+ 66MHz- UDF- FastB2B- ParErr- DEVSEL=fast >TAbort- <TAbort- <MAbort- >SERR- <PERR- INTx-
        Latency: 0, Cache Line Size: 64 bytes
        Interrupt: pin A routed to IRQ 16
```

```
        IOMMU group: 15
        Region 0: Memory at a1b00000 (64-bit, non-prefetchable) [size=512K]
        Region 2: I/O ports at 4020 [size=32]
        Region 4: Memory at a1d00000 (64-bit, non-prefetchable) [size=16K]
        Expansion ROM at a1b80000 [disabled] [size=512K]
        Capabilities: [40] Power Management version 3
                Flags: PMEClk- DSI+ D1- D2- AuxCurrent=0mA PME(D0+,D1-,D2-,D3hot+,D3cold-)
                Status: D0 NoSoftRst- PME-Enable- DSel=0 DScale=1 PME-
        Capabilities: [50] MSI: Enable- Count=1/1 Maskable+ 64bit+
                Address: 0000000000000000  Data: 0000
                Masking: 00000000  Pending: 00000000
        Capabilities: [70] MSI-X: Enable+ Count=64 Masked-
                Vector table: BAR=4 offset=00000000
                PBA: BAR=4 offset=00002000
        Capabilities: [a0] Express (v2) Endpoint, MSI 00
                DevCap: MaxPayload 512 bytes, PhantFunc 0, Latency L0s <512ns, L1 <64us
                        ExtTag- AttnBtn- AttnInd- PwrInd- RBE+ FLReset+ SlotPowerLimit 0.000W
                DevCtl: CorrErr+ NonFatalErr+ FatalErr+ UnsupReq+
                        RlxdOrd+ ExtTag- PhantFunc- AuxPwr- NoSnoop+ FLReset-
                        MaxPayload 256 bytes, MaxReadReq 512 bytes
                DevSta: CorrErr+ NonFatalErr- FatalErr- UnsupReq+ AuxPwr- TransPend-
                LnkCap: Port #0, Speed 5GT/s, Width x8, ASPM L0s, Exit Latency L0s <1us
                        ClockPM- Surprise- LLActRep- BwNot- ASPMOptComp-
                LnkCtl: ASPM Disabled; RCB 64 bytes, Disabled- CommClk+
                        ExtSynch- ClockPM- AutWidDis- BWInt- AutBWInt-
                LnkSta: Speed 5GT/s (ok), Width x8 (ok)
                        TrErr- Train- SlotClk+ DLActive- BWMgmt- ABWMgmt-
                DevCap2: Completion Timeout: Range ABCD, TimeoutDis+ NROPrPrP- LTR-
                         10BitTagComp- 10BitTagReq- OBFF Not Supported, ExtFmt- EETLPPrefix-
                         EmergencyPowerReduction Not Supported, EmergencyPowerReductionInit-
                         FRS- TPHComp- ExtTPHComp-
                         AtomicOpsCap: 32bit- 64bit- 128bitCAS-
                DevCtl2: Completion Timeout: 50us to 50ms, TimeoutDis- LTR- OBFF Disabled,
                         AtomicOpsCtl: ReqEn-
                LnkCtl2: Target Link Speed: 5GT/s, EnterCompliance- SpeedDis-
                         Transmit Margin: Normal Operating Range, EnterModifiedCompliance- ComplianceSOS-
                         Compliance De-emphasis: -6dB
                LnkSta2: Current De-emphasis Level: -6dB, EqualizationComplete- EqualizationPhase1-
                         EqualizationPhase2- EqualizationPhase3- LinkEqualizationRequest-
                         Retimer- 2Retimers- CrosslinkRes: unsupported
        Capabilities: [e0] Vital Product Data
                Product Name: ������������Broadnet Digo
��������������V01.00��������070156��������100614��������V2.0.44.14
                No end tag found
        Capabilities: [100 v1] Advanced Error Reporting
                UESta:  DLP- SDES- TLP- FCP- CmpltTO- CmpltAbrt- UnxCmplt- RxOF- MalfTLP- ECRC- UnsupReq- ACSViol-
                UEMsk:  DLP- SDES- TLP- FCP- CmpltTO- CmpltAbrt- UnxCmplt- RxOF- MalfTLP- ECRC- UnsupReq- ACSViol-
                UESvrt: DLP+ SDES- TLP- FCP+ CmpltTO- CmpltAbrt- UnxCmplt- RxOF+ MalfTLP+ ECRC- UnsupReq- ACSViol-
                CESta:  RxErr- BadTLP- BadDLLP- Rollover- Timeout- AdvNonFatalErr-
                CEMsk:  RxErr- BadTLP- BadDLLP- Rollover- Timeout- AdvNonFatalErr+
                AERCap: First Error Pointer: 00, ECRCGenCap+ ECRCGenEn- ECRCChkCap+ ECRCChkEn-
                        MultHdrRecCap- MultHdrRecEn- TLPPfxPres- HdrLogCap-
                HeaderLog: 00000000 00000000 00000000 00000000
        Capabilities: [140 v1] Device Serial Number 00-1b-21-ff-ff-be-5b-30
        Capabilities: [150 v1] Alternative Routing-ID Interpretation (ARI)
                ARICap: MFVC- ACS-, Next Function: 1
                ARICtl: MFVC- ACS-, Function Group: 0
        Capabilities: [160 v1] Single Root I/O Virtualization (SR-IOV)
                IOVCap: Migration-, Interrupt Message Number: 000
                IOVCtl: Enable- Migration- Interrupt- MSE- ARIHierarchy+
                IOVSta: Migration-
                Initial VFs: 64, Total VFs: 64, Number of VFs: 0, Function Dependency Link: 00
                VF offset: 128, stride: 2, Device ID: 10ed
                Supported Page Size: 00000553, System Page Size: 00000001
                Region 0: Memory at 00000000a1d04000 (64-bit, non-prefetchable)
                Region 3: Memory at 00000000a1e04000 (64-bit, non-prefetchable)
                VF Migration: offset: 00000000, BIR: 0
        Kernel driver in use: ixgbe
        Kernel modules: ixgbe
```

Информация о драйвере:

```
root@user-ext-ssd:~# modinfo ixgbe

filename:       /lib/modules/6.8.0-59-generic/kernel/drivers/net/ethernet/intel/ixgbe/ixgbe.ko
license:        GPL v2
description:    Intel(R) 10 Gigabit PCI Express Network Driver
author:         Intel Corporation, <linux.nics@intel.com>
srcversion:     6BF1A5A47043DC1DD3134D6
alias:          pci:v00008086d000015E5sv*sd*bc*sc*i*
alias:          pci:v00008086d000015E4sv*sd*bc*sc*i*
…
alias:          pci:v00008086d000010C6sv*sd*bc*sc*i*
alias:          pci:v00008086d000010B6sv*sd*bc*sc*i*
depends:        dca,xfrm_algo,mdio
retpoline:      Y
intree:         Y
name:           ixgbe
vermagic:       6.8.0-59-generic SMP preempt mod_unload modversions
sig_id:         PKCS#7
```

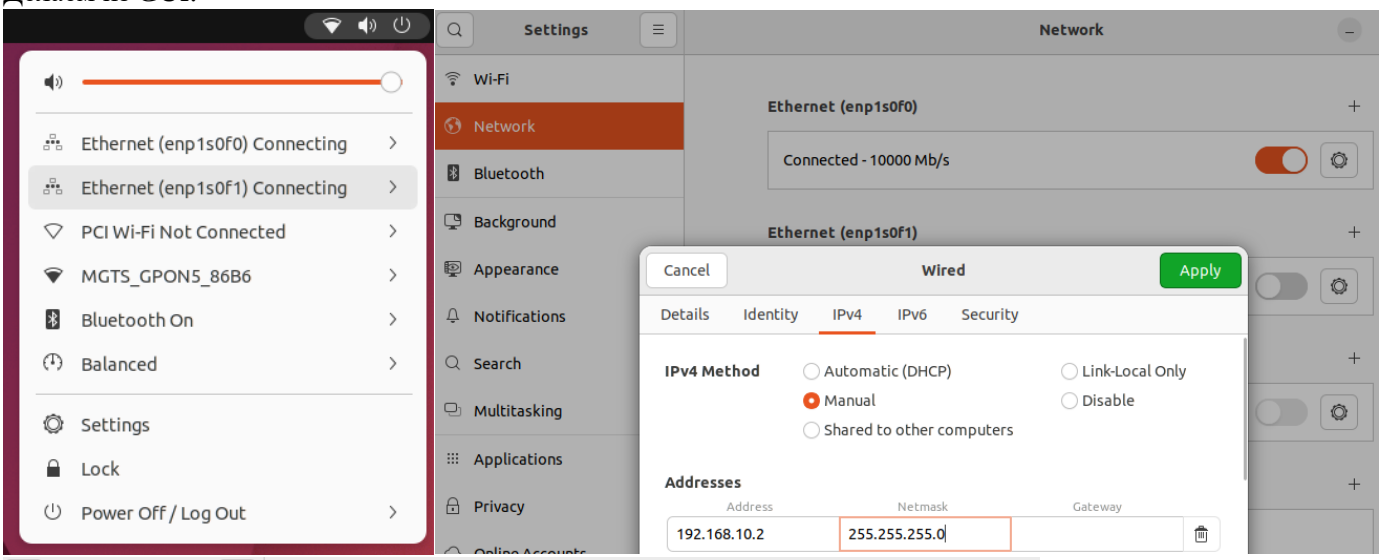
```
signer:         Build time autogenerated kernel key
sig_key:        75:AD:D7:34:47:6D:BE:4B:5B:46:AD:09:BC:DE:F2:F3:C6:78:A1:FD
sig_hashalgo:   sha512
signature:      3B:BB:4E:A1:26:CE:0C:9C:F2:32:8B:C4:D4:20:D3:12:5C:08:41:C6:
                BC:AE:0A:FF:D1:B1:93:4D:09:3D:70:C9:F3:D9:16:4D:EC:DC:B2:B8:
                …
                90:0F:FA:63:00:A4:5C:04:48:BC:C4:07
parm:           max_vfs:Maximum number of virtual functions to allocate per physical function - default is
zero and maximum value is 63. (Deprecated) (uint)
parm:           allow_unsupported_sfp:Allow unsupported and untested SFP+ modules on 82599-based adapters
(bool)
parm:           debug:Debug level (0=none,...,16=all) (int)
```

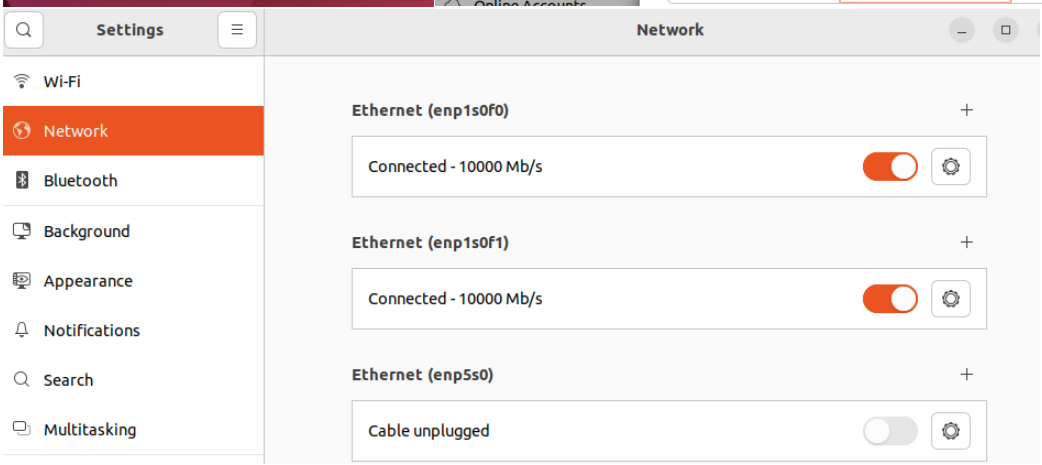
Если не поднимается Link…

Замечено, что после перезагрузки может не подниматься Link, хотя в оба SFP модуля вставлен оптический патч-корд. Решается – вытащить патч-корд из любого из модулей и вставить снова.

Linux: настройка static ip

Делаем из GUI:





Любое изменение Link можно увидеть в логе сообщений (dmesg):

```
[   55.587508] ixgbe 0000:01:00.0 enp1s0f0: NIC Link is Up 10 Gbps, Flow Control: RX/TX
[   55.587683] ixgbe 0000:01:00.1 enp1s0f1: NIC Link is Up 10 Gbps, Flow Control: RX/TX
```

Linux: iperf3

```
root@user-ext-ssd:~# apt install iperf3

Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  libiperf0 libsctp1
Suggested packages:
  lksctp-tools
The following NEW packages will be installed:
  iperf3 libiperf0 libsctp1
0 upgraded, 3 newly installed, 0 to remove and 0 not upgraded.
Need to get 106 kB of archives.
After this operation, 346 kB of additional disk space will be used.
Do you want to continue? [Y/n] Y
```

Чтобы запустить клиент и сервер iperf3 на одной машине, слегка изменим данный скрипт (на github он просто для iperf, нам надо везде прописать iperf3):

```
#/bin/bash

#echo $1

#echo $2

#echo Thanks
ip netns add ns_server
ip netns add ns_client
ip link set $1 netns ns_server
ip link set $2 netns ns_client
ip netns exec ns_server ip addr add dev $1 192.168.10.1/24
ip netns exec ns_client ip addr add dev $2 192.168.10.2/24
ip netns exec ns_server ip link set dev $1 up
ip netns exec ns_client ip link set dev $2 up

ip netns exec ns_server iperf3 -s &
ip netns exec ns_client iperf3 -c 192.168.10.1

killall iperf3

ip netns exec ns_client iperf3 -s &
ip netns exec ns_server iperf3 -c 192.168.10.2

killall iperf3

ip netns del ns_server
ip netns del ns_client
```

Не забываем сделать его исполняемым (chmod a+x). Все настройки адаптера пока что по умолчанию.

```
root@user-ext-ssd:/home/user/Downloads/iPerfCableTest-main# bash cabletest.sh enp1s0f0 enp1s0f1
------------------------------------------------------------
Server listening on 5201
------------------------------------------------------------
Connecting to host 192.168.10.1, port 5201
Accepted connection from 192.168.10.2, port 44786
[  5] local 192.168.10.2 port 44796 connected to 192.168.10.1 port 5201
[  5] local 192.168.10.1 port 5201 connected to 192.168.10.2 port 44796
[ ID] Interval           Transfer     Bitrate
[  5]   0.00-1.00   sec  1.05 GBytes  9.02 Gbits/sec
[ ID] Interval           Transfer     Bitrate         Retr  Cwnd
[  5]   0.00-1.00   sec  1.10 GBytes  9.43 Gbits/sec  779   1.10 MBytes
[  5]   1.00-2.00   sec  1.10 GBytes  9.41 Gbits/sec
[  5]   1.00-2.00   sec  1.09 GBytes  9.41 Gbits/sec   35   1.37 MBytes
[  5]   2.00-3.00   sec  1.10 GBytes  9.41 Gbits/sec
[  5]   2.00-3.00   sec  1.10 GBytes  9.42 Gbits/sec    0   1.38 MBytes
[  5]   3.00-4.00   sec  1.10 GBytes  9.41 Gbits/sec
[  5]   3.00-4.00   sec  1.10 GBytes  9.42 Gbits/sec    0   1.38 MBytes
[  5]   4.00-5.00   sec  1.10 GBytes  9.41 Gbits/sec
[  5]   4.00-5.00   sec  1.10 GBytes  9.42 Gbits/sec   13   1.38 MBytes
[  5]   5.00-6.00   sec  1.10 GBytes  9.41 Gbits/sec
[  5]   5.00-6.00   sec  1.10 GBytes  9.42 Gbits/sec    0   1.38 MBytes
[  5]   6.00-7.00   sec  1.10 GBytes  9.41 Gbits/sec
[  5]   6.00-7.00   sec  1.10 GBytes  9.42 Gbits/sec    0   1.38 MBytes
[  5]   7.00-8.00   sec  1.10 GBytes  9.41 Gbits/sec
[  5]   7.00-8.00   sec  1.09 GBytes  9.41 Gbits/sec    0   1.38 MBytes
[  5]   8.00-9.00   sec  1.10 GBytes  9.41 Gbits/sec
[  5]   8.00-9.00   sec  1.10 GBytes  9.42 Gbits/sec    0   1.38 MBytes
[  5]   9.00-10.00  sec  1.10 GBytes  9.41 Gbits/sec
```

```
[  5]  10.00-10.04  sec  45.5 MBytes  9.41 Gbits/sec
- - - - - - - - - - - - - - - - - - - - - - - - -
[ ID] Interval           Transfer     Bitrate
[  5]   0.00-10.04  sec  11.0 GBytes  9.37 Gbits/sec                  receiver
[  5]   9.00-10.00  sec  1.10 GBytes  9.42 Gbits/sec    0   1.45 MBytes
- - - - - - - - - - - - - - - - - - - - - - - - -
[ ID] Interval           Transfer     Bitrate         Retr
[  5]   0.00-10.00  sec  11.0 GBytes  9.42 Gbits/sec  827             sender
[  5]   0.00-10.04  sec  11.0 GBytes  9.37 Gbits/sec                  receiver

iperf Done.
-----------------------------------------------------------
Server listening on 5201
-----------------------------------------------------------
iperf3: interrupt - the server has terminated
-----------------------------------------------------------
Server listening on 5201
-----------------------------------------------------------
Connecting to host 192.168.10.2, port 5201
Accepted connection from 192.168.10.1, port 36986
[  5] local 192.168.10.1 port 37000 connected to 192.168.10.2 port 5201
[  5] local 192.168.10.2 port 5201 connected to 192.168.10.1 port 37000
[ ID] Interval           Transfer     Bitrate
[  5]   0.00-1.00   sec  1.04 GBytes  8.94 Gbits/sec
[ ID] Interval           Transfer     Bitrate         Retr  Cwnd
[  5]   0.00-1.00   sec  1.09 GBytes  9.34 Gbits/sec   95   1.31 MBytes
[  5]   1.00-2.00   sec  1.10 GBytes  9.41 Gbits/sec
[  5]   1.00-2.00   sec  1.10 GBytes  9.42 Gbits/sec   17   1.37 MBytes
[  5]   2.00-3.00   sec  1.10 GBytes  9.41 Gbits/sec
[  5]   2.00-3.00   sec  1.10 GBytes  9.42 Gbits/sec   42   1.37 MBytes
[  5]   3.00-4.00   sec  1.10 GBytes  9.41 Gbits/sec
[  5]   3.00-4.00   sec  1.10 GBytes  9.42 Gbits/sec   20   1.37 MBytes
[  5]   4.00-5.00   sec  1.10 GBytes  9.41 Gbits/sec
[  5]   4.00-5.00   sec  1.09 GBytes  9.41 Gbits/sec    0   1.37 MBytes
[  5]   5.00-6.00   sec  1.10 GBytes  9.41 Gbits/sec
[  5]   5.00-6.00   sec  1.10 GBytes  9.42 Gbits/sec    0   1.38 MBytes
[  5]   6.00-7.00   sec  1.10 GBytes  9.41 Gbits/sec
[  5]   6.00-7.00   sec  1.10 GBytes  9.42 Gbits/sec    0   1.38 MBytes
[  5]   7.00-8.00   sec  1.10 GBytes  9.41 Gbits/sec
[  5]   7.00-8.00   sec  1.10 GBytes  9.42 Gbits/sec    0   1.38 MBytes
[  5]   8.00-9.00   sec  1.10 GBytes  9.41 Gbits/sec
[  5]   8.00-9.00   sec  1.09 GBytes  9.41 Gbits/sec    0   1.38 MBytes
[  5]   9.00-10.00  sec  1.10 GBytes  9.41 Gbits/sec
[  5]  10.00-10.04  sec  45.5 MBytes  9.40 Gbits/sec
- - - - - - - - - - - - - - - - - - - - - - - - -
[ ID] Interval           Transfer     Bitrate
[  5]   0.00-10.04  sec  10.9 GBytes  9.37 Gbits/sec                  receiver
[  5]   9.00-10.00  sec  1.10 GBytes  9.42 Gbits/sec    0   1.38 MBytes
- - - - - - - - - - - - - - - - - - - - - - - - -
[ ID] Interval           Transfer     Bitrate         Retr
[  5]   0.00-10.00  sec  11.0 GBytes  9.41 Gbits/sec  174             sender
[  5]   0.00-10.04  sec  10.9 GBytes  9.37 Gbits/sec                  receiver

iperf Done.
-----------------------------------------------------------
Server listening on 5201
-----------------------------------------------------------
iperf3: interrupt - the server has terminated
```

Linux: DDM

SFP модули, которые шли к плате (модули-то немного разные, а наклейки одинаковые 😊). Из полезного – есть термодатчик. В ходе тестов iperf3 температура увеличивалась ну максимум на 1 град, т.е. сами по себе они особо не греются.

```
user@user-ext-ssd:~$ sudo ethtool --module-info enp1s0f0

Identifier                                : 0x03 (SFP)
Extended identifier                       : 0x04 (GBIC/SFP defined by 2-wire interface ID)
Connector                                 : 0x07 (LC)
Transceiver codes                         : 0x10 0x00 0x00 0x01 0x00 0x00 0x00 0x00 0x00
Transceiver type                          : 10G Ethernet: 10G Base-SR
Transceiver type                          : Ethernet: 1000BASE-SX
Encoding                                  : 0x06 (64B/66B)
BR, Nominal                               : 10300MBd
Rate identifier                           : 0x02 (8/4/2G Rx Rate_Select only)
Length (SMF,km)                           : 0km
Length (SMF)                              : 0m
Length (50um)                             : 80m
Length (62.5um)                           : 30m
Length (Copper)                           : 0m
Length (OM3)                              : 300m
Laser wavelength                          : 850nm
Vendor name                               : Intel Corp
Vendor OUI                                : 00:1b:21
Vendor PN                                 : FTLX8571D3BCV-I3
Vendor rev                                : A
Option values                             : 0x00 0x3a
Option                                    : RX_LOS implemented
Option                                    : TX_FAULT implemented
Option                                    : TX_DISABLE implemented
Option                                    : RATE_SELECT implemented
```

```
user@user-ext-ssd:~$ sudo ethtool --module-info enp1s0f1

Identifier                                : 0x03 (SFP)
Extended identifier                       : 0x04 (GBIC/SFP defined by 2-wire
interface ID)
Connector                                 : 0x07 (LC)
Transceiver codes           : 0x10 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
Transceiver type                          : 10G Ethernet: 10G Base-SR

Encoding                                  : 0x06 (64B/66B)
BR, Nominal                               : 10300MBd
Rate identifier                           : 0x00 (unspecified)
Length (SMF,km)                           : 0km
Length (SMF)                              : 0m
Length (50um)                             : 80m
Length (62.5um)                           : 30m
Length (Copper)                           : 0m
Length (OM3)                              : 300m
Laser wavelength                          : 850nm
Vendor name                               : FINISAR CORP.
Vendor OUI                                : 00:90:65
Vendor PN                                 : FTLX8571D3BNL-E5
Vendor rev                                : B
Option values                             : 0x00 0x1a
Option                                    : RX_LOS implemented
Option                                    : TX_FAULT implemented
Option                                    : TX_DISABLE implemented
```

```
BR margin, max                          : 0%
BR margin, min                          : 0%
Vendor SN                               : ARM1MUN
Date code                               : 140523
Optical diagnostics support             : Yes
Laser bias current                      : 8.052 mA
Laser output power                      : 0.5909 mW / -2.28 dBm
Receiver signal average optical power   : 0.5243 mW / -2.80 dBm
Module temperature                      : 41.84 degrees C / 107.30 degrees F
Module voltage                          : 3.3114 V
Alarm/warning flags implemented         : Yes
Laser bias current high alarm           : Off
Laser bias current low alarm            : Off
Laser bias current high warning         : Off
Laser bias current low warning          : Off
Laser output power high alarm           : Off
Laser output power low alarm            : Off
Laser output power high warning         : Off
Laser output power low warning          : Off
Module temperature high alarm           : Off
Module temperature low alarm            : Off
Module temperature high warning         : Off
Module temperature low warning          : Off
Module voltage high alarm               : Off
Module voltage low alarm                : Off
Module voltage high warning             : Off
Module voltage low warning              : Off
Laser rx power high alarm               : Off
Laser rx power low alarm                : Off
Laser rx power high warning             : Off
Laser rx power low warning              : Off
Laser bias current high alarm threshold   : 11.800 mA
Laser bias current low alarm threshold    : 2.000 mA
Laser bias current high warning threshold : 10.800 mA
Laser bias current low warning threshold  : 3.000 mA
Laser output power high alarm threshold   : 0.8318 mW / -0.80 dBm
Laser output power low alarm threshold    : 0.1585 mW / -8.00 dBm
Laser output power high warning threshold : 0.6607 mW / -1.80 dBm
Laser output power low warning threshold  : 0.1995 mW / -7.00 dBm
Module temperature high alarm threshold   : 78.00 degrees C / 172.40 degrees F
Module temperature low alarm threshold    : -13.00 degrees C / 8.60 degrees F
Module temperature high warning threshold : 73.00 degrees C / 163.40 degrees F
Module temperature low warning threshold  : -8.00 degrees C / 17.60 degrees F
Module voltage high alarm threshold       : 3.7000 V
Module voltage low alarm threshold        : 2.9000 V
Module voltage high warning threshold     : 3.6000 V
Module voltage low warning threshold      : 3.0000 V
Laser rx power high alarm threshold       : 1.0000 mW / 0.00 dBm
Laser rx power low alarm threshold        : 0.0100 mW / -20.00 dBm
Laser rx power high warning threshold     : 0.7943 mW / -1.00 dBm
Laser rx power low warning threshold      : 0.0158 mW / -18.01 dBm
```

```
BR margin, max                          : 0%
BR margin, min                          : 0%
Vendor SN                               : AP321QW
Date code                               : 130227
Optical diagnostics support             : Yes
Laser bias current                      : 7.978 mA
Laser output power                      : 0.6243 mW / -2.05 dBm
Receiver signal average optical power   : 0.5167 mW / -2.87 dBm
Module temperature                      : 42.70 degrees C / 108.86 degrees F
Module voltage                          : 3.2784 V
Alarm/warning flags implemented         : Yes
Laser bias current high alarm           : Off
Laser bias current low alarm            : Off
Laser bias current high warning         : Off
Laser bias current low warning          : Off
Laser output power high alarm           : Off
Laser output power low alarm            : Off
Laser output power high warning         : Off
Laser output power low warning          : Off
Module temperature high alarm           : Off
Module temperature low alarm            : Off
Module temperature high warning         : Off
Module temperature low warning          : Off
Module voltage high alarm               : Off
Module voltage low alarm                : Off
Module voltage high warning             : Off
Module voltage low warning              : Off
Laser rx power high alarm               : Off
Laser rx power low alarm                : Off
Laser rx power high warning             : Off
Laser rx power low warning              : Off
Laser bias current high alarm threshold   : 11.800 mA
Laser bias current low alarm threshold    : 4.000 mA
Laser bias current high warning threshold : 10.800 mA
Laser bias current low warning threshold  : 5.000 mA
Laser output power high alarm threshold   : 1.0000 mW / 0.00 dBm
Laser output power low alarm threshold    : 0.2512 mW / -6.00 dBm
Laser output power high warning threshold : 0.7943 mW / -1.00 dBm
Laser output power low warning threshold  : 0.3162 mW / -5.00 dBm
Module temperature high alarm threshold : 93.00 degrees C / 199.40 degrees F
Module temperature low alarm threshold  : -13.00 degrees C / 8.60 degrees F
Module temperature high warning threshold:88.00 degrees C / 190.40 degrees F
Module temperature low warning threshold : -8.00 degrees C / 17.60 degrees F
Module voltage high alarm threshold       : 3.7000 V
Module voltage low alarm threshold        : 2.9000 V
Module voltage high warning threshold     : 3.6000 V
Module voltage low warning threshold      : 3.0000 V
Laser rx power high alarm threshold       : 1.0000 mW / 0.00 dBm
Laser rx power low alarm threshold        : 0.0251 mW / -16.00 dBm
Laser rx power high warning threshold     : 0.7943 mW / -1.00 dBm
Laser rx power low warning threshold      : 0.0398 mW / -14.00 dBm
```

Тест с модулем Puzhi PG-SFP10

Скорость, стабильность такая же, как и у комплектных. Температура PG-SFP10 была на 1,5 градуса ниже, чем у комплектных, м быть погрешность начальной калибровки термодатчиков. Важно, что карта спокойно заработала с неродным SFP модулем.


```
user@user-ext-ssd:~/Downloads/iPerfCableTest-main$ sudo ethtool --module-info enp1s0f0
[sudo] password for user:
        Identifier                                : 0x03 (SFP)
        Extended identifier                       : 0x04 (GBIC/SFP defined by 2-wire interface ID)
        Connector                                 : 0x07 (LC)
        Transceiver codes                         : 0x10 0x00 0x00 0x00 0x20 0x40 0x0c 0x80 0x00
        Transceiver type                          : 10G Ethernet: 10G Base-SR
        Transceiver type                          : FC: intermediate distance (I)
        Transceiver type                          : FC: Shortwave laser w/o OFC (SN)
        Transceiver type                          : FC: Multimode, 62.5um (M6)
        Transceiver type                          : FC: Multimode, 50um (M5)
        Transceiver type                          : FC: 1200 MBytes/sec
        Encoding                                  : 0x06 (64B/66B)
        BR, Nominal                               : 10300MBd
        Rate identifier                           : 0x00 (unspecified)
        Length (SMF,km)                           : 0km
        Length (SMF)                              : 0m
        Length (50um)                             : 80m
        Length (62.5um)                           : 30m
        Length (Copper)                           : 0m
        Length (OM3)                              : 300m
```

```
        Laser wavelength                          : 850nm
        Vendor name                               : OEM
        Vendor OUI                                : 00:00:00
        Vendor PN                                 : PZ-SFP10G
        Vendor rev                                : 2
        Option values                             : 0x00 0x1a
        Option                                    : RX_LOS implemented
        Option                                    : TX_FAULT implemented
        Option                                    : TX_DISABLE implemented
        BR margin, max                            : 0%
        BR margin, min                            : 0%
        Vendor SN                                 : 24092600006
        Date code                                 : 240926
        Optical diagnostics support               : Yes
        Laser bias current                        : 6.300 mA
        Laser output power                        : 0.5086 mW / -2.94 dBm
        Receiver signal average optical power     : 0.5325 mW / -2.74 dBm
        Module temperature                        : 37.07 degrees C / 98.73 degrees F
        Module voltage                            : 3.3136 V
…
```

Linux: статистика по пакетам, ethtool / ip

Посмотреть ошибки по пакетам можно так (результаты сразу после загрузки ОС):

```
root@user-ext-ssd:/home/user/Downloads/iPerfCableTest-main# ip -s -s a sh enp1s0f0
3: enp1s0f0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc mq state UP group default qlen 1000
    link/ether 00:1b:21:be:5b:30 brd ff:ff:ff:ff:ff:ff
    inet 192.168.10.1/24 brd 192.168.10.255 scope global noprefixroute enp1s0f0
       valid_lft forever preferred_lft forever
    inet6 fe80::c286:f896:1c64:21fe/64 scope link noprefixroute
       valid_lft forever preferred_lft forever
    RX:  bytes packets errors dropped  missed   mcast
          4562      32      0       0       0      29
    RX errors:  length    crc   frame    fifo overrun
                     0      0       0       0       0
    TX:  bytes packets errors dropped carrier collsns
          6871      55      0       0       0       0
    TX errors: aborted   fifo  window heartbt transns
                     0      0       0       0       2
```

```
root@user-ext-ssd:/home/user/Downloads/iPerfCableTest-main# ip -s -s a sh enp1s0f0
3: enp1s0f0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc mq state UP group default qlen 1000
    link/ether 00:1b:21:be:5b:30 brd ff:ff:ff:ff:ff:ff
    inet 192.168.10.1/24 brd 192.168.10.255 scope global noprefixroute enp1s0f0
       valid_lft forever preferred_lft forever
    inet6 fe80::c286:f896:1c64:21fe/64 scope link noprefixroute
       valid_lft forever preferred_lft forever
    RX:  bytes packets errors dropped  missed   mcast
          4562      32      0       0       0      29
    RX errors:  length    crc   frame    fifo overrun
                     0      0       0       0       0
    TX:  bytes packets errors dropped carrier collsns
          6871      55      0       0       0       0
    TX errors: aborted   fifo  window heartbt transns
                     0      0       0       0       2
```

Запускаем тест:

```
root@user-ext-ssd:/home/user/Downloads/iPerfCableTest-main# bash cabletest.sh enp1s0f0 enp1s0f1 300

[  5] 299.00-300.00 sec  1.10 GBytes  9.41 Gbits/sec
[  5] 300.00-300.04 sec  45.4 MBytes  9.41 Gbits/sec
- - - - - - - - - - - - - - - - - - - - - - - - -
[ ID] Interval           Transfer     Bitrate
[  5]   0.00-300.04 sec   329 GBytes  9.41 Gbits/sec                  receiver
[  5] 299.00-300.00 sec  1.09 GBytes  9.41 Gbits/sec    0   2.37 MBytes
- - - - - - - - - - - - - - - - - - - - - - - - -
[ ID] Interval           Transfer     Bitrate         Retr
[  5]   0.00-300.00 sec   329 GBytes  9.41 Gbits/sec  180             sender
[  5]   0.00-300.04 sec   329 GBytes  9.41 Gbits/sec                  receiver

iperf Done.

[  5]  10.00-10.04  sec  46.6 MBytes  9.40 Gbits/sec
- - - - - - - - - - - - - - - - - - - - - - - - -
[ ID] Interval           Transfer     Bitrate
[  5]   0.00-10.04  sec  11.0 GBytes  9.37 Gbits/sec                  receiver
[  5]   9.00-10.00  sec  1.09 GBytes  9.41 Gbits/sec    0   1.47 MBytes
- - - - - - - - - - - - - - - - - - - - - - - - -
```

```
[ ID] Interval           Transfer     Bitrate         Retr
[  5]   0.00-10.00  sec  11.0 GBytes  9.41 Gbits/sec  400             sender
[  5]   0.00-10.04  sec  11.0 GBytes  9.37 Gbits/sec                  receiver

iperf Done.
```

Еще раз смотрим ошибки:

```
root@user-ext-ssd:/home/user/Downloads/iPerfCableTest-main# ip -s -s a sh enp1s0f0
3: enp1s0f0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc mq state UP group default qlen 1000
    link/ether 00:1b:21:be:5b:30 brd ff:ff:ff:ff:ff:ff
    inet 192.168.10.1/24 brd 192.168.10.255 scope global noprefixroute enp1s0f0
       valid_lft forever preferred_lft forever
    inet6 fe80::c286:f896:1c64:21fe/64 scope link noprefixroute
       valid_lft forever preferred_lft forever
    RX:    bytes   packets errors dropped  missed   mcast
    369170149987 244086660      0       0       0      47
    RX errors:      length    crc   frame    fifo overrun
                         0      0       0       0       0
    TX:    bytes   packets errors dropped carrier collsns
     12815602733  15922794      0       0       0       0
    TX errors:     aborted   fifo  window heartbt transns
                         0      0       0       0       6
```

```
root@user-ext-ssd:/home/user/Downloads/iPerfCableTest-main# ip -s -s a sh enp1s0f1
4: enp1s0f1: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc mq state UP group default qlen 1000
    link/ether 00:1b:21:be:5b:31 brd ff:ff:ff:ff:ff:ff
    inet 192.168.10.2/24 brd 192.168.10.255 scope global noprefixroute enp1s0f1
       valid_lft forever preferred_lft forever
    inet6 fe80::44ec:4f14:a771:e462/64 scope link noprefixroute
       valid_lft forever preferred_lft forever
    RX:    bytes   packets errors dropped  missed   mcast
     12815598679  15922749      0       0       0      48
    RX errors:      length    crc   frame    fifo overrun
                         0      0       0       0       0
    TX:    bytes   packets errors dropped carrier collsns
    369170152687 244086703      0       0       0       0
    TX errors:     aborted   fifo  window heartbt transns
                         0      0       0       0       6
```

Также очень расширенную статистику дает ethtool:

```
root@user-ext-ssd:/home/user/Downloads/iPerfCableTest-main# ethtool -S enp1s0f0 | grep error
     rx_errors: 0
     tx_errors: 0
     rx_over_errors: 0
     rx_crc_errors: 0
     rx_frame_errors: 0
     rx_fifo_errors: 0
     rx_missed_errors: 0
     tx_aborted_errors: 0
     tx_carrier_errors: 0
     tx_fifo_errors: 0
     tx_heartbeat_errors: 0
     rx_length_errors: 0
     rx_long_length_errors: 0
     rx_short_length_errors: 0
     rx_csum_offload_errors: 0
```

```
root@user-ext-ssd:/home/user/Downloads/iPerfCableTest-main# ethtool -S enp1s0f1 | grep error
     rx_errors: 0
     tx_errors: 0
     rx_over_errors: 0
     rx_crc_errors: 0
     rx_frame_errors: 0
     rx_fifo_errors: 0
     rx_missed_errors: 0
     tx_aborted_errors: 0
     tx_carrier_errors: 0
     tx_fifo_errors: 0
     tx_heartbeat_errors: 0
     rx_length_errors: 0
     rx_long_length_errors: 0
     rx_short_length_errors: 0
     rx_csum_offload_errors: 0
```

```
root@user-ext-ssd:/home/user/Downloads/iPerfCableTest-main# ethtool -S enp1s0f0 | grep drop
     rx_dropped: 0
     tx_dropped: 0
     rx_fcoe_dropped: 0
```

```
root@user-ext-ssd:/home/user/Downloads/iPerfCableTest-main# ethtool -S enp1s0f1 | grep drop
     rx_dropped: 0
     tx_dropped: 0
     rx_fcoe_dropped: 0
```

Ethtool также выводит полную статистику карты (можем видеть, что используется 16 очередей на Tx и на Rx:

```
root@user-ext-ssd:/home/user/Downloads/iPerfCableTest-main# ethtool -S enp1s0f0
NIC statistics:
     rx_packets: 244086668
     tx_packets: 15922806
     rx_bytes: 369170150763
     tx_bytes: 12815603757
     rx_pkts_nic: 244042372
     tx_pkts_nic: 14533586
     rx_bytes_nic: 370143395055
     tx_bytes_nic: 10770446573
     lsc_int: 3
     tx_busy: 0
     non_eop_descs: 0
```

```
     rx_errors: 0
     tx_errors: 0
     rx_dropped: 0
     tx_dropped: 0
     multicast: 55
     broadcast: 7
     rx_no_buffer_count: 0
     collisions: 0
     rx_over_errors: 0
     rx_crc_errors: 0
     rx_frame_errors: 0
     hw_rsc_aggregated: 0
     hw_rsc_flushed: 0
     fdir_match: 244042299
     fdir_miss: 57
     fdir_overflow: 0
     rx_fifo_errors: 0
     rx_missed_errors: 0
     tx_aborted_errors: 0
     tx_carrier_errors: 0
     tx_fifo_errors: 0
     tx_heartbeat_errors: 0
     tx_timeout_count: 0
     tx_restart_queue: 0
     rx_length_errors: 0
     rx_long_length_errors: 0
     rx_short_length_errors: 0
     tx_flow_control_xon: 0
     rx_flow_control_xon: 0
     tx_flow_control_xoff: 0
     rx_flow_control_xoff: 0
     rx_csum_offload_errors: 0
     alloc_rx_page: 25902
     alloc_rx_page_failed: 0
     alloc_rx_buff_failed: 0
     rx_no_dma_resources: 0
     os2bmc_rx_by_bmc: 0
     os2bmc_tx_by_bmc: 0
     os2bmc_tx_by_host: 0
     os2bmc_rx_by_host: 0
     tx_hwtstamp_timeouts: 0
     tx_hwtstamp_skipped: 0
     rx_hwtstamp_cleared: 0
     tx_ipsec: 0
     rx_ipsec: 0
     fcoe_bad_fccrc: 0
     rx_fcoe_dropped: 0
     rx_fcoe_packets: 0
     rx_fcoe_dwords: 0
     fcoe_noddp: 0
     fcoe_noddp_ext_buff: 0
     tx_fcoe_packets: 0
     tx_fcoe_dwords: 0
     tx_queue_0_packets: 101399
     tx_queue_0_bytes: 6694418
     tx_queue_1_packets: 219288
     tx_queue_1_bytes: 14476068
     tx_queue_2_packets: 256289
     tx_queue_2_bytes: 48269235
     tx_queue_3_packets: 83821
     tx_queue_3_bytes: 5535390
     tx_queue_4_packets: 10382893
     tx_queue_4_bytes: 12254167824
     tx_queue_5_packets: 2145302
     tx_queue_5_bytes: 198237277
     tx_queue_6_packets: 905595
     tx_queue_6_bytes: 91927761
     tx_queue_7_packets: 31100
     tx_queue_7_bytes: 2053562
     tx_queue_8_packets: 84941
     tx_queue_8_bytes: 38171537
     tx_queue_9_packets: 653055
     tx_queue_9_bytes: 86158462
     tx_queue_10_packets: 19579
     tx_queue_10_bytes: 1292678
     tx_queue_11_packets: 1233
     tx_queue_11_bytes: 81448
     tx_queue_12_packets: 321469
     tx_queue_12_bytes: 21220151
     tx_queue_13_packets: 532918
     tx_queue_13_bytes: 35174039
     tx_queue_14_packets: 182889
     tx_queue_14_bytes: 12073032
     tx_queue_15_packets: 1035
```

```
     tx_queue_15_bytes: 70875
     tx_queue_16_packets: 0
     tx_queue_16_bytes: 0
…
     tx_queue_63_packets: 0
     tx_queue_63_bytes: 0
     rx_queue_0_packets: 3992133
     rx_queue_0_bytes: 6044064644
     rx_queue_1_packets: 6762454
     rx_queue_1_bytes: 10238304965
     rx_queue_2_packets: 7336357
     rx_queue_2_bytes: 11106055822
     rx_queue_3_packets: 2679665
     rx_queue_3_bytes: 4057012810
     rx_queue_4_packets: 74454027
     rx_queue_4_bytes: 112353023308
     rx_queue_5_packets: 65611149
     rx_queue_5_bytes: 99333440854
     rx_queue_6_packets: 27775946
     rx_queue_6_bytes: 42051621819
     rx_queue_7_packets: 1127854
     rx_queue_7_bytes: 1707546031
     rx_queue_8_packets: 1928858
     rx_queue_8_bytes: 2919180552
     rx_queue_9_packets: 19469731
     rx_queue_9_bytes: 29475884370
     rx_queue_10_packets: 590564
     rx_queue_10_bytes: 894112456
     rx_queue_11_packets: 40593
     rx_queue_11_bytes: 61454914
     rx_queue_12_packets: 10035177
     rx_queue_12_bytes: 15193257978
     rx_queue_13_packets: 16594538
     rx_queue_13_bytes: 25124130532
     rx_queue_14_packets: 5664053
     rx_queue_14_bytes: 8575376242
     rx_queue_15_packets: 23569
     rx_queue_15_bytes: 35683466
     rx_queue_16_packets: 0
     rx_queue_16_bytes: 0
     rx_queue_17_packets: 0
     rx_queue_17_bytes: 0
…
     rx_queue_63_packets: 0
     rx_queue_63_bytes: 0
     tx_pb_0_pxon: 0
     tx_pb_0_pxoff: 0
…
     rx_pb_7_pxon: 0
     rx_pb_7_pxoff: 0
```

Linux: iperf3, UDP тест

Что на Windows, что на Linux, iperf3 на UDP показывает меньшую пропускную способность, чем на TCP. И это не только с X520, с другими ethernet картами тоже.

Прописываем в скрипте опции запуска UDP (параметр $3 это время теста в сек):

-b 0 – без ограничения пропускной способоности

```
ip netns exec ns_client iperf3 -c 192.168.10.1 -V -u -b 0 -t $3
…
ip netns exec ns_server iperf3 -c 192.168.10.2 -V -u -b 0 -t $3
```

```
[  5] 298.00-299.00 sec   630 MBytes  5.29 Gbits/sec  456570
[  5] 299.00-300.00 sec   738 MBytes  6.19 Gbits/sec  0.005 ms  0/534668 (0%)
[  5] 300.00-300.04 sec  23.5 MBytes  4.85 Gbits/sec  0.000 ms  0/17006 (0%)
- - - - - - - - - - - - - - - - - - - - - - - - -
[ ID] Interval           Transfer     Bitrate         Jitter    Lost/Total Datagrams
[  5]   0.00-300.04 sec   170 GBytes  4.88 Gbits/sec  0.000 ms  3393/126306440 (0.0027%)  receiver
[  5] 299.00-300.00 sec   733 MBytes  6.15 Gbits/sec  531030
- - - - - - - - - - - - - - - - - - - - - - - - -
Test Complete. Summary Results:
[ ID] Interval           Transfer     Bitrate         Jitter    Lost/Total Datagrams
[  5]   0.00-300.00 sec   170 GBytes  4.88 Gbits/sec  0.000 ms  0/126306460 (0%)  sender
[  5]   0.00-300.04 sec   170 GBytes  4.88 Gbits/sec  0.000 ms  3393/126306440 (0.0027%)  receiver

CPU Utilization: local/sender 64.2% (5.3%u/58.9%s), remote/receiver 42.9% (6.2%u/36.6%s)
```

```
[  5] 299.00-300.00 sec   649 MBytes  5.45 Gbits/sec  0.006 ms  66/470144 (0.014%)
[  5] 300.00-300.04 sec  26.9 MBytes  5.43 Gbits/sec  0.003 ms  0/19492 (0%)
- - - - - - - - - - - - - - - - - - - - - - - - -
[ ID] Interval           Transfer     Bitrate         Jitter    Lost/Total Datagrams
[  5]   0.00-300.04 sec   190 GBytes  5.45 Gbits/sec  0.003 ms  13336/141172864 (0.0094%)  receiver
[  5] 299.00-300.00 sec   644 MBytes  5.40 Gbits/sec  466120
```

```
- - - - - - - - - - - - - - - - - - - - - - - - -
Test Complete. Summary Results:
[ ID] Interval           Transfer     Bitrate         Jitter    Lost/Total Datagrams
[  5]   0.00-300.00 sec   190 GBytes  5.45 Gbits/sec  0.000 ms  0/141172890 (0%)  sender
[  5]   0.00-300.04 sec   190 GBytes  5.45 Gbits/sec  0.003 ms  13336/141172864 (0.0094%)  receiver

CPU Utilization: local/sender 67.6% (5.6%u/62.0%s), remote/receiver 45.9% (7.2%u/38.8%s)
```

С **-b 10G** +- плюс минус те же значения (логично, она д быть эквивалента **-b 0**):

```
ip netns exec ns_client iperf3 -c 192.168.10.1 -V -u -b 10G -t $3
…
ip netns exec ns_server iperf3 -c 192.168.10.2 -V -u -b 10G -t $3
[  5] 148.00-149.00 sec   538 MBytes  4.52 Gbits/sec  389875
[  5] 149.00-150.00 sec   543 MBytes  4.55 Gbits/sec  0.002 ms  0/393002 (0%)
[  5] 150.00-150.04 sec  20.9 MBytes  4.30 Gbits/sec  0.001 ms  0/15107 (0%)
- - - - - - - - - - - - - - - - - - - - - - - - -
[ ID] Interval           Transfer     Bitrate         Jitter    Lost/Total Datagrams
[  5]   0.00-150.04 sec  79.3 GBytes  4.54 Gbits/sec  0.001 ms  226/58770254 (0.00038%)  receiver
[  5] 149.00-150.00 sec   541 MBytes  4.54 Gbits/sec  392106
- - - - - - - - - - - - - - - - - - - - - - - - -
Test Complete. Summary Results:
[ ID] Interval           Transfer     Bitrate         Jitter    Lost/Total Datagrams
[  5]   0.00-150.00 sec  79.3 GBytes  4.54 Gbits/sec  0.000 ms  0/58770255 (0%)  sender
[  5]   0.00-150.04 sec  79.3 GBytes  4.54 Gbits/sec  0.001 ms  226/58770254 (0.00038%)  receiver

CPU Utilization: local/sender 72.9% (8.1%u/64.8%s), remote/receiver 40.5% (6.0%u/34.5%s)
============================================================================================================
[  5] 148.00-149.00 sec   540 MBytes  4.53 Gbits/sec  391210
[  5] 149.00-150.00 sec   528 MBytes  4.43 Gbits/sec  0.002 ms  109/382685 (0.028%)
[  5] 150.00-150.04 sec  22.1 MBytes  4.56 Gbits/sec  0.004 ms  0/16025 (0%)
- - - - - - - - - - - - - - - - - - - - - - - - -
[ ID] Interval           Transfer     Bitrate         Jitter    Lost/Total Datagrams
[  5]   0.00-150.04 sec  79.3 GBytes  4.54 Gbits/sec  0.004 ms  937/58768924 (0.0016%)  receiver
[  5] 149.00-150.00 sec   529 MBytes  4.44 Gbits/sec  383347
- - - - - - - - - - - - - - - - - - - - - - - - -
Test Complete. Summary Results:
[ ID] Interval           Transfer     Bitrate         Jitter    Lost/Total Datagrams
[  5]   0.00-150.00 sec  79.3 GBytes  4.54 Gbits/sec  0.000 ms  0/58768935 (0%)  sender
[  5]   0.00-150.04 sec  79.3 GBytes  4.54 Gbits/sec  0.004 ms  937/58768924 (0.0016%)  receiver

CPU Utilization: local/sender 73.0% (8.2%u/64.9%s), remote/receiver 41.0% (6.2%u/34.8%s)
```

Пробуем ограничить пропускную способность на уровне 2Гбит, все равно видны потери пакетов. Нет потерь только на 1 Гбит:

```
ip netns exec ns_client iperf3 -c 192.168.10.1 -V -u -b 1G -t $3
…
ip netns exec ns_server iperf3 -c 192.168.10.2 -V -u -b 1G -t $3
-----------------------------------------------------------
[  5] 149.00-150.00 sec   119 MBytes  1.00 Gbits/sec  0.001 ms  0/86326 (0%)
[  5] 150.00-150.04 sec  4.77 MBytes   984 Mbits/sec  0.003 ms  0/3453 (0%)
- - - - - - - - - - - - - - - - - - - - - - - - -
[ ID] Interval           Transfer     Bitrate         Jitter    Lost/Total Datagrams
[  5]   0.00-150.04 sec  17.5 GBytes  1000 Mbits/sec  0.003 ms  0/12948828 (0%)  receiver
[  5] 149.00-150.00 sec   119 MBytes  1000 Mbits/sec  86326
- - - - - - - - - - - - - - - - - - - - - - - - -
Test Complete. Summary Results:
[ ID] Interval           Transfer     Bitrate         Jitter    Lost/Total Datagrams
[  5]   0.00-150.00 sec  17.5 GBytes  1000 Mbits/sec  0.000 ms  0/12948828 (0%)  sender
[  5]   0.00-150.04 sec  17.5 GBytes  1000 Mbits/sec  0.003 ms  0/12948828 (0%)  receiver
CPU Utilization: local/sender 16.8% (2.8%u/14.0%s), remote/receiver 10.5% (0.0%u/10.5%s)
-----------------------------------------------------------
[  5] 149.00-150.00 sec   119 MBytes  1.00 Gbits/sec  0.002 ms  0/86327 (0%)
[  5] 150.00-150.04 sec  4.77 MBytes   983 Mbits/sec  0.001 ms  0/3453 (0%)
- - - - - - - - - - - - - - - - - - - - - - - - -
[ ID] Interval           Transfer     Bitrate         Jitter    Lost/Total Datagrams
[  5]   0.00-150.04 sec  17.5 GBytes  1000 Mbits/sec  0.001 ms  0/12948828 (0%)  receiver
[  5] 149.00-150.00 sec   119 MBytes  1000 Mbits/sec  86326
- - - - - - - - - - - - - - - - - - - - - - - - -
Test Complete. Summary Results:
[ ID] Interval           Transfer     Bitrate         Jitter    Lost/Total Datagrams
[  5]   0.00-150.00 sec  17.5 GBytes  1000 Mbits/sec  0.000 ms  0/12948828 (0%)  sender
[  5]   0.00-150.04 sec  17.5 GBytes  1000 Mbits/sec  0.001 ms  0/12948828 (0%)  receiver
CPU Utilization: local/sender 15.7% (2.9%u/12.8%s), remote/receiver 11.1% (0.0%u/11.1%s)
```