

TLB @MX

отчет о тестировании

Версия v0.1 (12.12.2018)

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Список сокращений

TLB = Traffic Load Balancer

CG-NAT = Carrier-Grade NAT

dNAT = destination NAT (трансляция IP адреса назначения, и, возможно, TCP/UDP порта назначения)

sNAT = source NAT (трансляция IP адреса источника, и, возможно, TCP/UDP порта источника)

BP = iXia Breaking Point

Краткое описание функционала

Функционал TLB реализует балансировку трафика между серверами, с использованием механизмов контроля работоспособности сервиса (health-check) на уровнях L3-L7. Одновременно с балансировкой трафика между серверами, может выполняться dNAT (и, соответственно, sNAT для обратного трафика от серверов). Поддерживаются VRF, а также IPv4/IPv6 трафик.

Функционал требует маршрутизатора серии MX с линейными картами MPC и сервисной картой MS-MPC (или сервисного модуля MS-MIC).

Следующие пробы могут быть использованы для выполнения health-check:

```
matvey@mx480-12# set services network-monitoring profile TEST ?
```

```
> custom          Custom probe options
  failure-retries  Probe failure retries (1..255)
> http            HTTP probe options
  icmp            ICMP probe options
  probe-interval  Probe interval (1..180 seconds)
  recovery-retries Probe recovery retries (1..255)
> ssl-hello       SSL hello probe options
> tcp             TCP probe options
```

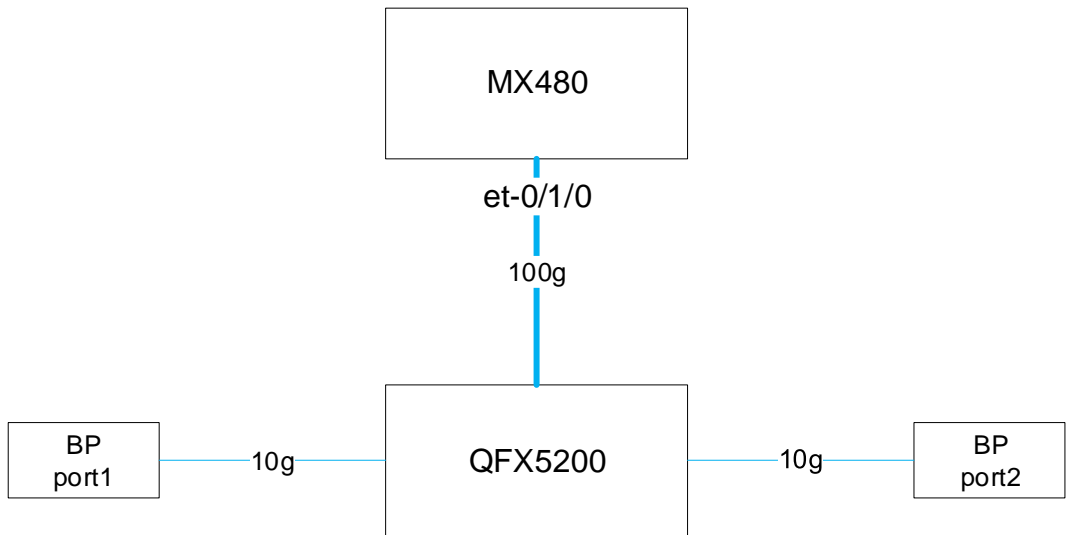
Важная особенность 1. Балансировку и NAT выполняет PFE линейной карты. Сервисный процессор нужен только для выполнения health-check, т.е. транзитный трафик сервисным процессором не обрабатывается.

Важная особенность 2. TLB является stateless функционалом и работает по-пакетно.

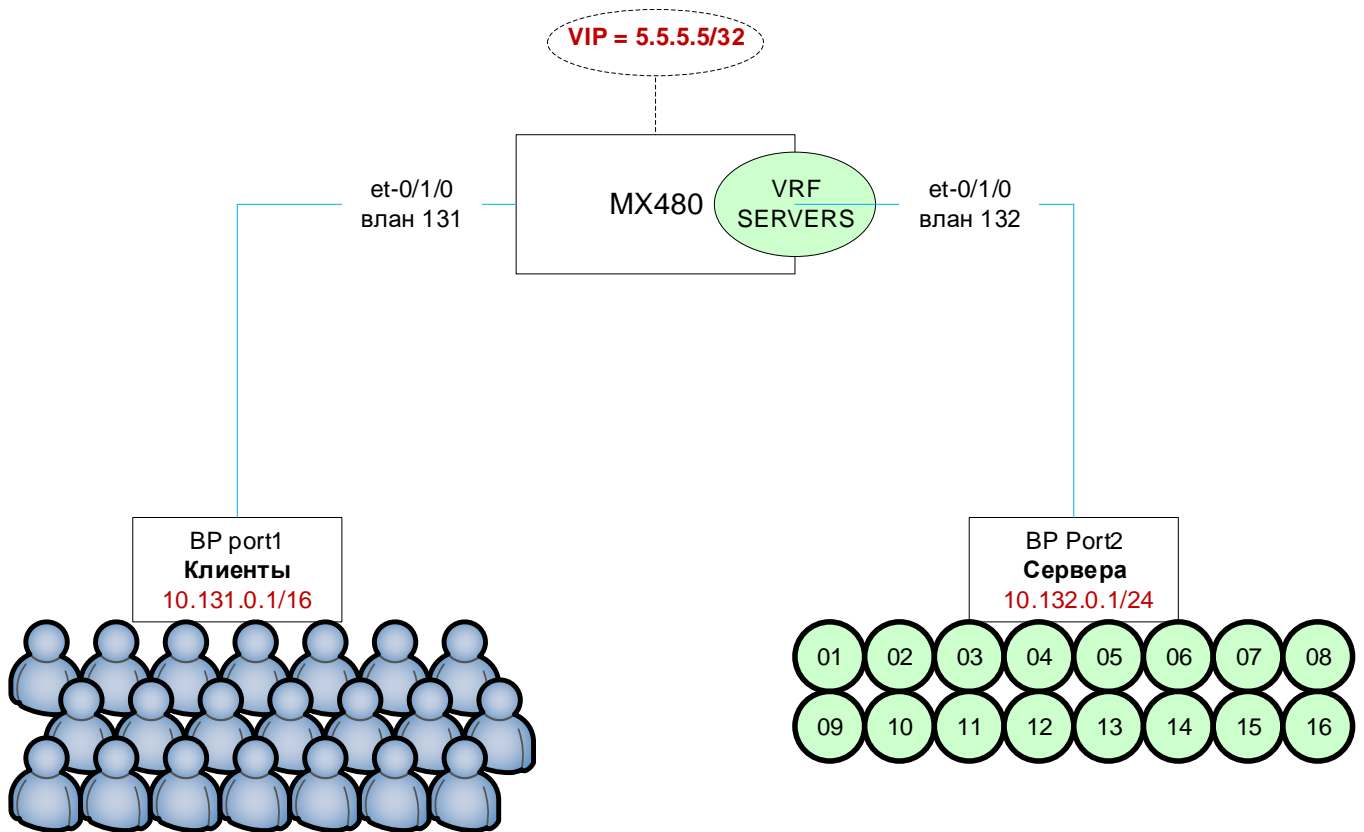
Важная особенность 3. Следствием предыдущих особенностей является высокая производительность решения (близкая к line-rate).

Важная особенность 4. Сервера не обязательно должны быть directly connected к MX, они могут быть доступны через Layer3 сеть (например, находиться за файерволлом).

Физическая топология



Логическая топология



Эмуляцию /17 клиентов и 16-и серверов выполняет трафик-генератор iXia Breaking Point. Клиенты отправляют HTTP GET запрос на адрес 5.5.5.5. Получив запрос, MX выполняет dNAT (адрес 5.5.5.5 транслируется в один из 16-и адресов 10.132.0.2 – 10.132.0.17) и отправляет его на выбранный сервер. Сервер отвечает клиенту (HTTP 200 OK + эмулируемый контент) в обратном направлении. Получив обратный трафик, MX выполняет sNAT в адрес 5.5.5.5 и маршрутизирует “наверх” в сторону клиента.

Таким образом, клиенты общаются с сервером 5.5.5.5 и не подозревают, что за этим адресом скрывается целая фабрика.

Железо и софт

```
matvey@mx480-12# run show chassis hardware
```

```
Hardware inventory:
```

Item	Version	Part number	Serial number	Description
Chassis			JN124E874AFB	MX480
Midplane	REV 04	750-047862	ACRD7314	Enhanced MX480 Midplane
FPM Board	REV 02	710-017254	CABX4221	Front Panel Display
PEM 0	Rev 10	740-029970	QCS1433U0WL	PS 1.4-2.52kW; 90-264V AC in
PEM 1	Rev 10	740-029970	QCS1328U07P	PS 1.4-2.52kW; 90-264V AC in
Routing Engine 0	REV 05	740-031116	9009089087	RE-S-1800x4
Routing Engine 1	REV 10	740-031116	9009211417	RE-S-1800x4
CB 0	REV 15	750-031391	CAAR4348	Enhanced MX SCB
CB 1	REV 16	750-031391	CAAW4360	Enhanced MX SCB
FPC 0	REV 22	750-054564	CADC5724	MPC5E 3D 2CGE+4XGE
CPU	REV 11	711-045719	CADG2970	RMPC PMB
PIC 0		BUILTIN	BUILTIN	2X10GE SFPP OTN
PIC 1		BUILTIN	BUILTIN	1X100GE CFP2 OTN
Xcvr 0	REV 01	740-049775	USH0L8C	100GBASE-LR4-D
PIC 2		BUILTIN	BUILTIN	2X10GE SFPP OTN
PIC 3		BUILTIN	BUILTIN	1X100GE CFP2 OTN
FPC 1	REV 06	750-038491	ZS1855	MPCE Type 2 3D
CPU	REV 03	711-038484	ZR7376	MPCE PMB 2G
FPC 2	REV 13	750-038768	CACG6984	MS-MPC
CPU		BUILTIN	BUILTIN	MS-MPC-PMB
PIC 0		BUILTIN	BUILTIN	MS-MPC-PIC
PIC 1		BUILTIN	BUILTIN	MS-MPC-PIC
PIC 2		BUILTIN	BUILTIN	MS-MPC-PIC
PIC 3		BUILTIN	BUILTIN	MS-MPC-PIC
Fan Tray				Enhanced Left Fan Tray

```
matvey@mx480-12# run show version
```

```
Hostname: mx480-12
```

```
Model: mx480
```

```
Junos: 17.3R3-S1.5
```

```
JUNOS OS Kernel 64-bit [20180725.146b4b3_builder_stable_10]
```

Конфигурация MX

Запуск нужного процесса:

```
matvey@mx480-12# show system processes
```

```
sdk-service enable;
```

// специфичная для TLB настройка

Активация нужного пакета на сервисном интерфейсе (NPU) ms-2/0/0:

```
matvey@mx480-12# show chassis
```

```
fpc 2 {  
  pic 0 {  
    adaptive-services {  
      service-package {  
        extension-provider {
```



```
}
```

Для health-check выбираем проверку протокола TCP порт 80:

```
matvey@mx480-12# show services network-monitoring
profile TCP-80 {
    tcp {
        port 80;
    }
    probe-interval 1;           // каждую секунду
    failure-retries 2;         // количество проб, чтобы умереть
    recovery-retries 2;       // количество проб, чтобы ожить
}
```

Конфигурация TLB:

```
matvey@mx480-12# show services traffic-load-balance
instance TLB-INSTANCE-1 {
    interface ms-2/0/0.0;      // ссылка на сервисный интерфейс
    client-interface et-0/1/0.131;
    server-interface et-0/1/0.132;
    client-vrf default;       // клиенты в GRT (inet.0)
    server-vrf SERVERS;       // сервера в отдельном VRF
    group G1 {                // группа серверов (16 штук)
        real-services [ S002 S003 S004 S005 S006 S007 S008 S009 S010 S011
S012 S013 S014 S015 S016 S017 ];
        health-check-interface-subunit 0;
        network-monitoring-profile TCP-80; // ссылка на профиль health-check
    }
    real-service S002 {        // конкретный сервер
        address 10.132.0.2;
    }
    real-service S003 {
        address 10.132.0.3;
    }
    real-service S004 {
        address 10.132.0.4;
    }
    real-service S005 {        // конкретный сервер
        address 10.132.0.5;
        inactive: admin-down; // может быть выведен из пула
    }
    real-service S006 {
        address 10.132.0.6;
        inactive: admin-down;
    }
    real-service S007 {
        address 10.132.0.7;
    }
    real-service S008 {
        address 10.132.0.8;
    }
}
```

```

real-service S009 {
    address 10.132.0.9;
}
real-service S010 {
    address 10.132.0.10;
}
real-service S011 {
    address 10.132.0.11;
}
real-service S012 {
    address 10.132.0.12;
}
real-service S013 {
    address 10.132.0.13;
}
real-service S014 {
    address 10.132.0.14;
}
real-service S015 {
    address 10.132.0.15;
}
real-service S016 {
    address 10.132.0.16;
}
real-service S017 {
    address 10.132.0.17;
}
real-service S201 {
    address 10.132.0.201;
}
virtual-service V1 {
    mode translated;                // режим TLB + dNAT
    address 5.5.5.5;                 // публичный IP адрес сервиса
    service HTTP {
        virtual-port 80;             // публичный порт сервиса
        server-listening-port 80;    // реальный порт на серверах
        protocol tcp;
    }
    group G1;                        // группа реальных серверов для данного сервиса
    load-balance-method {           // метод вычисления хэша балансировки, в данном
        hash {                      // случае – по source IP адресу клиентов
            hash-key {
                source-ip;
            }
        }
    }
}
}

```

Тест 1. TLB

В этом тесте проверяем работоспособность функционала. В исходном состоянии сценарий на ВР не запущен, все сервера в состоянии DOWN:

```
matvey@mx480-12# run clear services traffic-load-balance statistics
```

```
matvey@mx480-12# run show services traffic-load-balance statistics
```

```
Traffic load balance instance name      : TLB-INSTANCE-1
Multi services interface name           : ms-2/0/0
Interface state                          : UP
Interface type                           : Multi services
Route hold timer                         : 180

Traffic load balance virtual svc name   : V1
IP address                               : 5.5.5.5
Virtual service mode                     : Translate mode
Routing instance name                    : default
Traffic load balance group name         : G1
Health check interface subunit          : 0
Protocol                                 : tcp
Port number                              : 80
Server Listening Port Number              : 80
Demux Nexthop index                     : 711
Nexthop index                           : 934
Down time                                : 01:02:20
Total packet sent count                  : 0
Total byte sent count                    : 0
Total packet received count              : 0
Total byte received count                : 0
```

Real service	Address	Sts	Packet Sent	Byte Sent	Packet Recv	Byte Recv
S002	10.132.0.2	DOWN	0	0	0	0
S003	10.132.0.3	DOWN	0	0	0	0
S004	10.132.0.4	DOWN	0	0	0	0
S005	10.132.0.5	DOWN	0	0	0	0
S006	10.132.0.6	DOWN	0	0	0	0
S007	10.132.0.7	DOWN	0	0	0	0
S008	10.132.0.8	DOWN	0	0	0	0
S009	10.132.0.9	DOWN	0	0	0	0
S010	10.132.0.10	DOWN	0	0	0	0
S011	10.132.0.11	DOWN	0	0	0	0
S012	10.132.0.12	DOWN	0	0	0	0
S013	10.132.0.13	DOWN	0	0	0	0
S014	10.132.0.14	DOWN	0	0	0	0
S015	10.132.0.15	DOWN	0	0	0	0
S016	10.132.0.16	DOWN	0	0	0	0
S017	10.132.0.17	DOWN	0	0	0	0

После запуска сценария на ВР:

```
matvey@mx480-12#
*** messages ***
```

```
Dec 12 15:22:06 mx480-12 traffic-dird[5147]: %DAEMON-5-TDIR_SERVER_EVENT:
Real server event :TLB instance [TLB-INSTANCE-1] real-service group [G1] real
service [S002] oper state [UP]
Dec 12 15:22:06 mx480-12 traffic-dird[5147]: %DAEMON-5-TDIR_SERVER_EVENT:
Real server event :TLB instance [TLB-INSTANCE-1] real-service group [G1] real
service [S010] oper state [UP]
Dec 12 15:22:06 mx480-12 traffic-dird[5147]: %DAEMON-5-TDIR_SERVER_EVENT:
Real server event :TLB instance [TLB-INSTANCE-1] real-service group [G1] real
service [S003] oper state [UP]
Dec 12 15:22:06 mx480-12 traffic-dird[5147]: %DAEMON-5-TDIR_SERVER_EVENT:
Real server event :TLB instance [TLB-INSTANCE-1] real-service group [G1] real
service [S011] oper state [UP]
Dec 12 15:22:06 mx480-12 traffic-dird[5147]: %DAEMON-5-TDIR_SERVER_EVENT:
Real server event :TLB instance [TLB-INSTANCE-1] real-service group [G1] real
service [S004] oper state [UP]
Dec 12 15:22:06 mx480-12 traffic-dird[5147]: %DAEMON-5-TDIR_SERVER_EVENT:
Real server event :TLB instance [TLB-INSTANCE-1] real-service group [G1] real
service [S012] oper state [UP]
Dec 12 15:22:06 mx480-12 traffic-dird[5147]: %DAEMON-5-TDIR_SERVER_EVENT:
Real server event :TLB instance [TLB-INSTANCE-1] real-service group [G1] real
service [S005] oper state [UP]
Dec 12 15:22:06 mx480-12 traffic-dird[5147]: %DAEMON-5-TDIR_SERVER_EVENT:
Real server event :TLB instance [TLB-INSTANCE-1] real-service group [G1] real
service [S013] oper state [UP]
Dec 12 15:22:06 mx480-12 traffic-dird[5147]: %DAEMON-5-TDIR_SERVER_EVENT:
Real server event :TLB instance [TLB-INSTANCE-1] real-service group [G1] real
service [S006] oper state [UP]
Dec 12 15:22:06 mx480-12 traffic-dird[5147]: %DAEMON-5-TDIR_SERVER_EVENT:
Real server event :TLB instance [TLB-INSTANCE-1] real-service group [G1] real
service [S014] oper state [UP]
Dec 12 15:22:06 mx480-12 traffic-dird[5147]: %DAEMON-5-TDIR_SERVER_EVENT:
Real server event :TLB instance [TLB-INSTANCE-1] real-service group [G1] real
service [S007] oper state [UP]
Dec 12 15:22:06 mx480-12 traffic-dird[5147]: %DAEMON-5-TDIR_SERVER_EVENT:
Real server event :TLB instance [TLB-INSTANCE-1] real-service group [G1] real
service [S015] oper state [UP]
Dec 12 15:22:06 mx480-12 traffic-dird[5147]: %DAEMON-5-TDIR_SERVER_EVENT:
Real server event :TLB instance [TLB-INSTANCE-1] real-service group [G1] real
service [S008] oper state [UP]
Dec 12 15:22:06 mx480-12 traffic-dird[5147]: %DAEMON-5-TDIR_SERVER_EVENT:
Real server event :TLB instance [TLB-INSTANCE-1] real-service group [G1] real
service [S016] oper state [UP]
Dec 12 15:22:06 mx480-12 traffic-dird[5147]: %DAEMON-5-TDIR_SERVER_EVENT:
Real server event :TLB instance [TLB-INSTANCE-1] real-service group [G1] real
service [S009] oper state [UP]
Dec 12 15:22:06 mx480-12 traffic-dird[5147]: %DAEMON-5-TDIR_SERVER_EVENT:
Real server event :TLB instance [TLB-INSTANCE-1] real-service group [G1] real
service [S017] oper state [UP]
Dec 12 15:22:06 mx480-12 traffic-dird[5147]: %DAEMON-5-TDIR_ROUTE_EVENT:
Route Demux add request :for family [IPv4] XLBNH [5.5.5.5.711]
```

matvey@mx480-12# run show route 5.5.5.5

inet.0: 10 destinations, 10 routes (9 active, 0 holddown, 1 hidden)
+ = Active Route, - = Last Active, * = Both

5.5.5.5/32 *[Static/1] 00:00:00, metric 1
to private composite next hop index 711

Посмотрим на “private composite next hop index 711” более подробно:

```
matvey@mx480-12> start shell pfe network fpc0
```

RMPC platform (1200Mhz QorIQ P2020 processor, 3584MB memory, 512KB flash)

```
RMPC0(mx480-12 vty)# show nhdb id 711 detail
```

MTU	ID	Type	Interface	Next Hop Addr	Protocol	Encap
		Flags	PFE internal	Flags		
	711	Compst -	-	-	IPv4	-
0	0x0000000000000000		0x0000000000000000			

BFD Session Id: 0

Composite NH:

Function: VIP load balance demux to different LBNH based on ip/ip6 protocol and port

Hardware Index: 0x0

Composite flag: 0x0

Composite pfe flag: 0xe

Lower-level NH Ids: 934

// next-hop следующего (низкого) уровня

Derived NH Ids:

```
-- opq -----  
IPProto Port  
  6 80  
-----
```

```
[pfe-0]: 0x42eb83c1c3c00021
```

IP protocol demux/EnumCheck: 0x38300780ce880808

L4 Port demux/EnumCheck:

IP protocol[proto: 6]: 0x3a2c0780cc480810

Port -> NHId

80-> 934

Routing-table id: 0

```
RMPC0(mx480-12 vty)# show nhdb id 934 detail
```

MTU	ID	Type	Interface	Next Hop Addr	Protocol	Encap
		Flags	PFE internal	Flags		

934 Compst - -
0 0x0000000000000000 0x0000000000000000

IPv4 -

BFD Session Id: 0

Composite NH:

Function: VIP based load balancing to real servers

Hardware Index: 0x0

Composite flag: 0x0

Composite pfe flag: 0xe

Lower-level NH Ids:

Derived NH Ids:

Extended selector descriptor (PFE0) : 0x14efc000000100

Distribution Table:PFE0

...

opq_vip_port : 80
opq_rip_port : 80
opq_vip_vrf : 0
opq_rip_vrf : 6
opq_rip_count : 16
Virtual Server IP : 5.5.5.5
Real Server IP List :

```
[ 0] 10.132.0.2 [cntr: 65537 status:0x01]
[ 1] 10.132.0.3 [cntr: 65538 status:0x01]
[ 2] 10.132.0.4 [cntr: 65539 status:0x01]
[ 3] 10.132.0.5 [cntr: 65540 status:0x01]
[ 4] 10.132.0.6 [cntr: 65541 status:0x01]
[ 5] 10.132.0.7 [cntr: 65542 status:0x01]
[ 6] 10.132.0.8 [cntr: 65543 status:0x01]
[ 7] 10.132.0.9 [cntr: 65544 status:0x01]
[ 8] 10.132.0.10 [cntr: 65545 status:0x01]
[ 9] 10.132.0.11 [cntr: 65546 status:0x01]
[10] 10.132.0.12 [cntr: 65547 status:0x01]
[11] 10.132.0.13 [cntr: 65548 status:0x01]
[12] 10.132.0.14 [cntr: 65549 status:0x01]
[13] 10.132.0.15 [cntr: 65550 status:0x01]
[14] 10.132.0.16 [cntr: 65551 status:0x01]
[15] 10.132.0.17 [cntr: 65552 status:0x01]
```

...

RMPC0(mx480-12 vty)# exit

matvey@mx480-12# run show services traffic-load-balance statistics

Traffic load balance instance name : TLB-INSTANCE-1
Multi services interface name : ms-2/0/0
Interface state : UP
Interface type : Multi services
Route hold timer : 180

Traffic load balance virtual svc name : V1
IP address : 5.5.5.5
Virtual service mode : Translate mode
Routing instance name : default

```

Traffic load balance group name      : G1
Health check interface subunit      : 0
Protocol                             : tcp
Port number                          : 80
Server Listening Port Number         : 80
Demux Nexthop index                 : 711
Nexthop index                       : 934
Up time                              : 00:01:21
Total packet sent count              : 1197831
Total byte sent count                : 72570900
Total packet received count          : 38949868
Total byte received count            : 57259752465

```

Real service	Address	Sts	Packet Sent	Byte Sent	Packet	
Recv	Byte Recv					
S002	10.132.0.2	UP	72936	4418892	2372013	3487054314
S003	10.132.0.3	UP	72213	4374440	2344461	3446379060
S004	10.132.0.4	UP	77594	4701976	2528312	3717227870
S005	10.132.0.5	UP	78814	4776624	2572555	3782540900
S006	10.132.0.6	UP	72702	4404058	2360551	3469955557
S007	10.132.0.7	UP	73982	4481386	2400839	3529062783
S008	10.132.0.8	UP	77202	4678646	2518634	3703221091
S009	10.132.0.9	UP	77767	4710982	2525536	3712584073
S010	10.132.0.10	UP	73531	4453900	2385024	3505736066
S011	10.132.0.11	UP	76497	4635116	2490415	3661246290
S012	10.132.0.12	UP	76173	4615930	2482452	3649897628
S013	10.132.0.13	UP	75640	4582698	2459355	3615494237
S014	10.132.0.14	UP	73873	4475394	2400712	3529055655
S015	10.132.0.15	UP	74365	4505444	2418518	3555486430
S016	10.132.0.16	UP	71957	4358394	2333173	3429524247
S017	10.132.0.17	UP	72585	4397020	2357318	3465286264

```
matvey@mx480-12# run show interfaces et-0/1/0 | match rate
```

```

Input rate      : 7343566816 bps (640833 pps)
Output rate     : 7343556752 bps (640669 pps)
FEC Corrected Errors Rate      0
FEC Uncorrected Errors Rate    0

```


Summary Interface TCP SSL/TLS IPsec Application Superflow LiveAppSim Client Attacks GTP Resources

Application Transaction Rate

Attempted: 599
 Successful: 601
 Failed: N/A

TCP Client Connection Rate

Attempted: 598
 Established: 599
 Closed: 600

TCP Server Connection Rate

Established: 613
 Closed: 600

Bandwidth

Tx (Mbps): 7,695
 Rx (Mbps): 7,692

Application Transactions

Attempted: 83,953
 Successful: 83,946
 Failed: N/A
 Aborted: N/A

Cumulative Client TCP Connections

Attempted: 98,005
 Established: 83,951
 Closed (FIN): 83,945
 Close (RST): N/A

Cumulative Server TCP Connections

Established: 86,543
 Closed (FIN): 83,945
 Close (RST): N/A

Frame Rate

Tx (Fps): 652,100
 Rx (Fps): 651,800

Concurrent Flows

Superflows: 24
 TCP Flows: 14
 UDP Flows: 0
 SCTP Flows: 0

Average TCP Time

Syn/Ack (ms): 150.091
 1st Byte (ms): 126.919
 Close (ms): 0.068
 Duration (ms): 7.82

Errors

Ethernet MAC Errors: N/A

Cumulative Frames

Tx: 91,419,876
 Rx: 91,295,214

Посмотрим на дампы трафика между клиентами и серверами, идущего через МХ.

Трафик, уходящий с “клиентского” порта ВР:

No.	Time	Source	Destination	Protocol	Length	Info
7	0.001639	10.131.48.208	5.5.5.5	TCP	74	16911 → 80 [ACK] Seq=1 Ack=393163 Win=65535 Len=0 TSval=2716996802 TSecr=2716995966
8	0.001863	10.131.48.208	5.5.5.5	TCP	74	16911 → 80 [ACK] Seq=1 Ack=458690 Win=65535 Len=0 TSval=2716998593 TSecr=2716997951
9	0.002130	10.131.48.208	5.5.5.5	TCP	74	16911 → 80 [ACK] Seq=1 Ack=524217 Win=65535 Len=0 TSval=2717000728 TSecr=2716999856
10	0.002413	10.131.48.208	5.5.5.5	TCP	74	16911 → 80 [ACK] Seq=1 Ack=589744 Win=65535 Len=0 TSval=2717002998 TSecr=2717001925
11	0.002673	10.131.48.208	5.5.5.5	TCP	74	16911 → 80 [ACK] Seq=1 Ack=655271 Win=65535 Len=0 TSval=2717005074 TSecr=2717004115
12	0.002916	10.131.48.208	5.5.5.5	TCP	74	16911 → 80 [ACK] Seq=1 Ack=720798 Win=65535 Len=0 TSval=2717007016 TSecr=2717006220
13	0.003204	10.131.48.208	5.5.5.5	TCP	74	16911 → 80 [ACK] Seq=1 Ack=786325 Win=65535 Len=0 TSval=2717009324 TSecr=2717008505
14	0.003470	10.131.48.208	5.5.5.5	TCP	74	16911 → 80 [ACK] Seq=1 Ack=851852 Win=65535 Len=0 TSval=2717011452 TSecr=2717010499
15	0.003636	10.131.48.208	5.5.5.5	TCP	74	16911 → 80 [ACK] Seq=1 Ack=890291 Win=65535 Len=0 TSval=2717012777 TSecr=2717012252
16	0.003646	10.131.48.208	5.5.5.5	TCP	74	16911 → 80 [FIN, ACK] Seq=1 Ack=890291 Win=65535 Len=0 TSval=2717012856 TSecr=2717012252
17	0.003690	10.131.48.208	5.5.5.5	TCP	74	16911 → 80 [ACK] Seq=2 Ack=890292 Win=65535 Len=0 TSval=2717013214 TSecr=2717013019
18	0.164335	10.131.23.172	5.5.5.5	TCP	78	10116 → 80 [SYN] Seq=0 Win=5792 Len=0 MSS=1460 TSval=2718298371 TSecr=0
19	0.164425	10.131.23.172	5.5.5.5	TCP	74	10116 → 80 [ACK] Seq=1 Ack=1 Win=5792 Len=0 TSval=2718299093 TSecr=2718298809
20	0.164452	10.131.23.172	5.5.5.5	HTTP	344	GET /index.html HTTP/1.1
21	0.164657	10.131.23.172	5.5.5.5	TCP	74	10116 → 80 [ACK] Seq=271 Ack=5791 Win=11584 Len=0 TSval=2718300951 TSecr=2718300410
22	0.164755	10.131.23.172	5.5.5.5	TCP	74	10116 → 80 [ACK] Seq=271 Ack=17375 Win=23168 Len=0 TSval=2718301732 TSecr=2718301416
23	0.164868	10.131.23.172	5.5.5.5	TCP	74	10116 → 80 [ACK] Seq=271 Ack=40543 Win=46336 Len=0 TSval=2718302632 TSecr=2718302264
24	0.165086	10.131.23.172	5.5.5.5	TCP	74	10116 → 80 [ACK] Seq=271 Ack=85798 Win=65535 Len=0 TSval=2718304383 TSecr=2718303467
25	0.165309	10.131.23.172	5.5.5.5	TCP	74	10116 → 80 [ACK] Seq=271 Ack=151325 Win=65535 Len=0 TSval=2718306162 TSecr=2718305513
26	0.165560	10.131.23.172	5.5.5.5	TCP	74	10116 → 80 [ACK] Seq=271 Ack=216852 Win=65535 Len=0 TSval=2718308173 TSecr=2718307268
27	0.165812	10.131.23.172	5.5.5.5	TCP	74	10116 → 80 [ACK] Seq=271 Ack=282379 Win=65535 Len=0 TSval=2718310189 TSecr=2718309301
28	0.166091	10.131.23.172	5.5.5.5	TCP	74	10116 → 80 [ACK] Seq=271 Ack=347906 Win=65535 Len=0 TSval=2718312418 TSecr=2718311341
29	0.166350	10.131.23.172	5.5.5.5	TCP	74	10116 → 80 [ACK] Seq=271 Ack=413433 Win=65535 Len=0 TSval=2718314491 TSecr=2718313566
30	0.166584	10.131.23.172	5.5.5.5	TCP	74	10116 → 80 [ACK] Seq=271 Ack=478960 Win=65535 Len=0 TSval=2718316360 TSecr=2718315605
31	0.166864	10.131.23.172	5.5.5.5	TCP	74	10116 → 80 [ACK] Seq=271 Ack=544487 Win=65535 Len=0 TSval=2718318606 TSecr=2718317491
32	0.167125	10.131.23.172	5.5.5.5	TCP	74	10116 → 80 [ACK] Seq=271 Ack=610014 Win=65535 Len=0 TSval=2718320695 TSecr=2718319859
33	0.167403	10.131.23.172	5.5.5.5	TCP	74	10116 → 80 [ACK] Seq=271 Ack=675541 Win=65535 Len=0 TSval=2718322914 TSecr=2718321807

> Frame 20: 344 bytes on wire (2752 bits), 344 bytes captured (2752 bits)
> Ethernet II, Src: MS-NLB-PhysServer-26_c5:03:17:aa (02:1a:c5:03:17:aa), Dst: JuniperN_77:f1:52 (f0:1c:2d:77:f1:52)
> 802.1Q Virtual LAN, PRI: 0, DEI: 0, ID: 131
> Internet Protocol Version 4, Src: 10.131.23.172, Dst: 5.5.5.5
> Transmission Control Protocol, Src Port: 10116, Dst Port: 80, Seq: 1, Ack: 1, Len: 270
> Hypertext Transfer Protocol

Трафик, приходящий на “серверный” порт ВР:

No.	Time	Source	Destination	Protocol	Length	Info
4	0.000808	10.131.48.208	10.132.0.7	TCP	74	16911 → 80 [ACK] Seq=1 Ack=196582 Win=65535 Len=0 TSval=2716994789 TSecr=2716993826
5	0.001060	10.131.48.208	10.132.0.7	TCP	74	16911 → 80 [ACK] Seq=1 Ack=262109 Win=65535 Len=0 TSval=2716996802 TSecr=2716995966
6	0.001284	10.131.48.208	10.132.0.7	TCP	74	16911 → 80 [ACK] Seq=1 Ack=327636 Win=65535 Len=0 TSval=2716998593 TSecr=2716997951
7	0.001551	10.131.48.208	10.132.0.7	TCP	74	16911 → 80 [ACK] Seq=1 Ack=393163 Win=65535 Len=0 TSval=2717000728 TSecr=2716999856
8	0.001834	10.131.48.208	10.132.0.7	TCP	74	16911 → 80 [ACK] Seq=1 Ack=458690 Win=65535 Len=0 TSval=2717002998 TSecr=2717001925
9	0.002094	10.131.48.208	10.132.0.7	TCP	74	16911 → 80 [ACK] Seq=1 Ack=524217 Win=65535 Len=0 TSval=2717005074 TSecr=2717004115
10	0.002336	10.131.48.208	10.132.0.7	TCP	74	16911 → 80 [ACK] Seq=1 Ack=589744 Win=65535 Len=0 TSval=2717007016 TSecr=2717006220
11	0.002625	10.131.48.208	10.132.0.7	TCP	74	16911 → 80 [ACK] Seq=1 Ack=655271 Win=65535 Len=0 TSval=2717009324 TSecr=2717008505
12	0.002891	10.131.48.208	10.132.0.7	TCP	74	16911 → 80 [ACK] Seq=1 Ack=720798 Win=65535 Len=0 TSval=2717011452 TSecr=2717010499
13	0.003056	10.131.48.208	10.132.0.7	TCP	74	16911 → 80 [ACK] Seq=1 Ack=759237 Win=65535 Len=0 TSval=2717012777 TSecr=2717012252
14	0.003063	10.131.48.208	10.132.0.7	TCP	74	16911 → 80 [FIN, ACK] Seq=1 Ack=759237 Win=65535 Len=0 TSval=2717012856 TSecr=2717012252
15	0.003108	10.131.48.208	10.132.0.7	TCP	74	16911 → 80 [ACK] Seq=2 Ack=759238 Win=65535 Len=0 TSval=2717013214 TSecr=2717013019
16	0.163756	10.131.23.172	10.132.0.14	TCP	78	10116 → 80 [SYN] Seq=0 Win=5792 Len=0 MSS=1460 TSval=2718298371 TSecr=0
17	0.163843	10.131.23.172	10.132.0.14	TCP	74	10116 → 80 [ACK] Seq=1 Ack=1 Win=5792 Len=0 TSval=2718299093 TSecr=2718298809
18	0.163870	10.131.23.172	10.132.0.14	HTTP	344	GET /index.html HTTP/1.1
19	0.164078	10.131.23.172	10.132.0.14	TCP	74	10116 → 80 [ACK] Seq=271 Ack=5791 Win=11584 Len=0 TSval=2718300951 TSecr=2718300410
20	0.164172	10.131.23.172	10.132.0.14	TCP	74	10116 → 80 [ACK] Seq=271 Ack=17375 Win=23168 Len=0 TSval=2718301732 TSecr=2718301416
21	0.164285	10.131.23.172	10.132.0.14	TCP	74	10116 → 80 [ACK] Seq=271 Ack=40543 Win=46336 Len=0 TSval=2718302632 TSecr=2718302264
22	0.164507	10.131.23.172	10.132.0.14	TCP	74	10116 → 80 [ACK] Seq=271 Ack=85798 Win=65535 Len=0 TSval=2718304383 TSecr=2718303467
23	0.164726	10.131.23.172	10.132.0.14	TCP	74	10116 → 80 [ACK] Seq=271 Ack=151325 Win=65535 Len=0 TSval=2718306162 TSecr=2718305513
24	0.164981	10.131.23.172	10.132.0.14	TCP	74	10116 → 80 [ACK] Seq=271 Ack=216852 Win=65535 Len=0 TSval=2718308173 TSecr=2718307268
25	0.165233	10.131.23.172	10.132.0.14	TCP	74	10116 → 80 [ACK] Seq=271 Ack=282379 Win=65535 Len=0 TSval=2718310189 TSecr=2718309301
26	0.165512	10.131.23.172	10.132.0.14	TCP	74	10116 → 80 [ACK] Seq=271 Ack=347906 Win=65535 Len=0 TSval=2718312418 TSecr=2718311341
27	0.165771	10.131.23.172	10.132.0.14	TCP	74	10116 → 80 [ACK] Seq=271 Ack=413433 Win=65535 Len=0 TSval=2718314491 TSecr=2718313566
28	0.166004	10.131.23.172	10.132.0.14	TCP	74	10116 → 80 [ACK] Seq=271 Ack=478960 Win=65535 Len=0 TSval=2718316360 TSecr=2718315605
29	0.166285	10.131.23.172	10.132.0.14	TCP	74	10116 → 80 [ACK] Seq=271 Ack=544487 Win=65535 Len=0 TSval=2718318606 TSecr=2718317491
30	0.166546	10.131.23.172	10.132.0.14	TCP	74	10116 → 80 [ACK] Seq=271 Ack=610014 Win=65535 Len=0 TSval=2718320695 TSecr=2718319859

> Frame 18: 344 bytes on wire (2752 bits), 344 bytes captured (2752 bits)
> Ethernet II, Src: JuniperN_77:f1:52 (f0:1c:2d:77:f1:52), Dst: MS-NLB-PhysServer-26_c5:04:00:0c (02:1a:c5:04:00:0c)
> 802.1Q Virtual LAN, PRI: 0, DEI: 0, ID: 132
> Internet Protocol Version 4, Src: 10.131.23.172, Dst: 10.132.0.14
> Transmission Control Protocol, Src Port: 10116, Dst Port: 80, Seq: 1, Ack: 1, Len: 270
> Hypertext Transfer Protocol

Ответный трафик, уходящий с “серверного” порта ВР:

Slot5Port1Hostnp5-0Dirx.1544546331716.pcap

No.	Time	Source	Destination	Protocol	Length	Info
536	0.003186	10.132.0.7	10.131.48.208	TCP	1522	80 → 16911 [ACK] Seq=762790 Ack=1 Win=5792 Len=1448 TSval=2717012116 TSecr=2717011452
537	0.003188	10.132.0.7	10.131.48.208	TCP	1522	80 → 16911 [PSH, ACK] Seq=764238 Ack=1 Win=5792 Len=1448 TSval=2717012132 TSecr=2717011452
538	0.003191	10.132.0.7	10.131.48.208	TCP	1522	80 → 16911 [ACK] Seq=765686 Ack=1 Win=5792 Len=1448 TSval=2717012152 TSecr=2717011452
539	0.003193	10.132.0.7	10.131.48.208	TCP	1522	80 → 16911 [PSH, ACK] Seq=767134 Ack=1 Win=5792 Len=1448 TSval=2717012169 TSecr=2717011452
540	0.003195	10.132.0.7	10.131.48.208	TCP	1522	80 → 16911 [ACK] Seq=768582 Ack=1 Win=5792 Len=1448 TSval=2717012191 TSecr=2717011452
541	0.003197	10.132.0.7	10.131.48.208	TCP	1522	80 → 16911 [PSH, ACK] Seq=770030 Ack=1 Win=5792 Len=1448 TSval=2717012207 TSecr=2717011452
542	0.003200	10.132.0.7	10.131.48.208	TCP	1522	80 → 16911 [ACK] Seq=771478 Ack=1 Win=5792 Len=1448 TSval=2717012226 TSecr=2717011452
543	0.003202	10.132.0.7	10.131.48.208	TCP	1522	80 → 16911 [PSH, ACK] Seq=772926 Ack=1 Win=5792 Len=1448 TSval=2717012243 TSecr=2717011452
544	0.003203	10.132.0.7	10.131.48.208	TCP	865	80 → 16911 [PSH, ACK] Seq=774374 Ack=1 Win=5792 Len=791 TSval=2717012252 TSecr=2717011452
545	0.003299	10.132.0.7	10.131.48.208	TCP	74	80 → 16911 [FIN, ACK] Seq=775165 Ack=1 Win=5792 Len=0 TSval=2717013019 TSecr=2717012777
546	0.003306	10.132.0.7	10.131.48.208	TCP	74	80 → 16911 [ACK] Seq=775166 Ack=2 Win=5792 Len=0 TSval=2717013074 TSecr=2717012856
547	0.164023	10.132.0.14	10.131.23.172	TCP	78	80 → 10116 [SYN, ACK] Seq=0 Ack=1 Win=5792 Len=0 MSS=1460 TSval=2718298809 TSecr=2718299306
548	0.164215	10.132.0.14	10.131.23.172	TCP	1522	80 → 10116 [ACK] Seq=1 Ack=271 Win=5792 Len=1448 TSval=2718300350 TSecr=2718299306 [TCP
549	0.164218	10.132.0.14	10.131.23.172	TCP	1520	80 → 10116 [PSH, ACK] Seq=1449 Ack=271 Win=5792 Len=1446 TSval=2718300371 TSecr=2718299306
550	0.164221	10.132.0.14	10.131.23.172	TCP	1522	80 → 10116 [ACK] Seq=2895 Ack=271 Win=5792 Len=1448 TSval=2718300393 TSecr=2718299306 [T
551	0.164223	10.132.0.14	10.131.23.172	TCP	1522	80 → 10116 [PSH, ACK] Seq=4343 Ack=271 Win=5792 Len=1448 TSval=2718300410 TSecr=2718299306 [T
552	0.164332	10.132.0.14	10.131.23.172	TCP	1522	80 → 10116 [ACK] Seq=5791 Ack=271 Win=5792 Len=1448 TSval=2718301286 TSecr=2718300951 [T
553	0.164335	10.132.0.14	10.131.23.172	TCP	1522	80 → 10116 [PSH, ACK] Seq=7239 Ack=271 Win=5792 Len=1448 TSval=2718301306 TSecr=2718300951 [T
554	0.164338	10.132.0.14	10.131.23.172	TCP	1522	80 → 10116 [ACK] Seq=8687 Ack=271 Win=5792 Len=1448 TSval=2718301328 TSecr=2718300951 [T
555	0.164340	10.132.0.14	10.131.23.172	TCP	1522	80 → 10116 [PSH, ACK] Seq=10135 Ack=271 Win=5792 Len=1448 TSval=2718301344 TSecr=2718300951 [T
556	0.164342	10.132.0.14	10.131.23.172	TCP	1522	80 → 10116 [ACK] Seq=11583 Ack=271 Win=5792 Len=1448 TSval=2718301364 TSecr=2718300951 [T
557	0.164344	10.132.0.14	10.131.23.172	TCP	1522	80 → 10116 [PSH, ACK] Seq=13031 Ack=271 Win=5792 Len=1448 TSval=2718301380 TSecr=2718300951 [T
558	0.164346	10.132.0.14	10.131.23.172	TCP	1522	80 → 10116 [ACK] Seq=14479 Ack=271 Win=5792 Len=1448 TSval=2718301400 TSecr=2718300951 [T
559	0.164348	10.132.0.14	10.131.23.172	TCP	1522	80 → 10116 [PSH, ACK] Seq=15927 Ack=271 Win=5792 Len=1448 TSval=2718301416 TSecr=2718300951 [T
560	0.164419	10.132.0.14	10.131.23.172	TCP	1522	80 → 10116 [ACK] Seq=17375 Ack=271 Win=5792 Len=1448 TSval=2718301981 TSecr=2718301732 [T
561	0.164422	10.132.0.14	10.131.23.172	TCP	1522	80 → 10116 [PSH, ACK] Seq=18823 Ack=271 Win=5792 Len=1448 TSval=2718302000 TSecr=2718301732 [T
562	0.164424	10.132.0.14	10.131.23.172	TCP	1522	80 → 10116 [ACK] Seq=20271 Ack=271 Win=5792 Len=1448 TSval=2718302020 TSecr=2718301732 [T

> Frame 547: 78 bytes on wire (624 bits), 78 bytes captured (624 bits)
 > Ethernet II, Src: MS-NLB-PhysServer-26_c5:04:00:0c (02:1a:c5:04:00:0c), Dst: JuniperN_77:f1:52 (f0:1c:2d:77:f1:52)
 > 802.1Q Virtual LAN, PRI: 0, DEI: 0, ID: 132
 > Internet Protocol Version 4, Src: 10.132.0.14, Dst: 10.131.23.172
 > Transmission Control Protocol, Src Port: 80, Dst Port: 10116, Seq: 0, Ack: 1, Len: 0

Slot5Port1Hostnp5-0Dirx.1544546331716.pcap Packets: 143492 - Displayed: 143492 (100.0%) Profile: Default

Ответный трафик, приходящий на “клиентский” порт ВР:

Slot5Port0Hostnp5-0Dirx.1544546780167.pcap

No.	Time	Source	Destination	Protocol	Length	Info
625	0.003693	5.5.5.5	10.131.48.208	TCP	1522	80 → 16911 [ACK] Seq=889500 Ack=1 Win=5792 Len=1448 TSval=2717012152 TSecr=2717011452
626	0.003695	5.5.5.5	10.131.48.208	TCP	1522	80 → 16911 [PSH, ACK] Seq=890948 Ack=1 Win=5792 Len=1448 TSval=2717012169 TSecr=2717011452
627	0.003698	5.5.5.5	10.131.48.208	TCP	1522	80 → 16911 [ACK] Seq=892396 Ack=1 Win=5792 Len=1448 TSval=2717012191 TSecr=2717011452
628	0.003700	5.5.5.5	10.131.48.208	TCP	1522	80 → 16911 [PSH, ACK] Seq=893844 Ack=1 Win=5792 Len=1448 TSval=2717012207 TSecr=2717011452
629	0.003702	5.5.5.5	10.131.48.208	TCP	1522	80 → 16911 [ACK] Seq=895292 Ack=1 Win=5792 Len=1448 TSval=2717012226 TSecr=2717011452
630	0.003704	5.5.5.5	10.131.48.208	TCP	1522	80 → 16911 [PSH, ACK] Seq=896740 Ack=1 Win=5792 Len=1448 TSval=2717012243 TSecr=2717011452
631	0.003706	5.5.5.5	10.131.48.208	TCP	865	80 → 16911 [PSH, ACK] Seq=898188 Ack=1 Win=5792 Len=791 TSval=2717012252 TSecr=2717011452
632	0.003803	5.5.5.5	10.131.48.208	TCP	74	80 → 16911 [FIN, ACK] Seq=898979 Ack=1 Win=5792 Len=0 TSval=2717013019 TSecr=2717012777
633	0.003806	5.5.5.5	10.131.48.208	TCP	74	80 → 16911 [ACK] Seq=898980 Ack=2 Win=5792 Len=0 TSval=2717013074 TSecr=2717012856
634	0.164526	5.5.5.5	10.131.23.172	TCP	78	80 → 10116 [SYN, ACK] Seq=0 Ack=1 Win=5792 Len=0 MSS=1460 TSval=2718298809 TSecr=2718299306
635	0.164718	5.5.5.5	10.131.23.172	TCP	1522	80 → 10116 [ACK] Seq=1 Ack=271 Win=5792 Len=1448 TSval=2718300350 TSecr=2718299306 [TCP
636	0.164721	5.5.5.5	10.131.23.172	TCP	1520	80 → 10116 [PSH, ACK] Seq=1449 Ack=271 Win=5792 Len=1446 TSval=2718300371 TSecr=2718299306
637	0.164723	5.5.5.5	10.131.23.172	TCP	1522	80 → 10116 [ACK] Seq=2895 Ack=271 Win=5792 Len=1448 TSval=2718300393 TSecr=2718299306 [T
638	0.164725	5.5.5.5	10.131.23.172	TCP	1522	80 → 10116 [PSH, ACK] Seq=4343 Ack=271 Win=5792 Len=1448 TSval=2718300410 TSecr=2718299306
639	0.164835	5.5.5.5	10.131.23.172	TCP	1522	80 → 10116 [ACK] Seq=5791 Ack=271 Win=5792 Len=1448 TSval=2718301286 TSecr=2718300951 [T
640	0.164838	5.5.5.5	10.131.23.172	TCP	1522	80 → 10116 [PSH, ACK] Seq=7239 Ack=271 Win=5792 Len=1448 TSval=2718301306 TSecr=2718300951 [T
641	0.164840	5.5.5.5	10.131.23.172	TCP	1522	80 → 10116 [ACK] Seq=8687 Ack=271 Win=5792 Len=1448 TSval=2718301328 TSecr=2718300951 [T
642	0.164842	5.5.5.5	10.131.23.172	TCP	1522	80 → 10116 [PSH, ACK] Seq=10135 Ack=271 Win=5792 Len=1448 TSval=2718301344 TSecr=2718300951 [T
643	0.164845	5.5.5.5	10.131.23.172	TCP	1522	80 → 10116 [ACK] Seq=11583 Ack=271 Win=5792 Len=1448 TSval=2718301364 TSecr=2718300951 [T
644	0.164847	5.5.5.5	10.131.23.172	TCP	1522	80 → 10116 [PSH, ACK] Seq=13031 Ack=271 Win=5792 Len=1448 TSval=2718301380 TSecr=2718300951 [T
645	0.164849	5.5.5.5	10.131.23.172	TCP	1522	80 → 10116 [ACK] Seq=14479 Ack=271 Win=5792 Len=1448 TSval=2718301400 TSecr=2718300951 [T
646	0.164851	5.5.5.5	10.131.23.172	TCP	1522	80 → 10116 [PSH, ACK] Seq=15927 Ack=271 Win=5792 Len=1448 TSval=2718301416 TSecr=2718300951 [T
647	0.164922	5.5.5.5	10.131.23.172	TCP	1522	80 → 10116 [ACK] Seq=17375 Ack=271 Win=5792 Len=1448 TSval=2718301981 TSecr=2718301732 [T
648	0.164924	5.5.5.5	10.131.23.172	TCP	1522	80 → 10116 [PSH, ACK] Seq=18823 Ack=271 Win=5792 Len=1448 TSval=2718302000 TSecr=2718301732 [T
649	0.164927	5.5.5.5	10.131.23.172	TCP	1522	80 → 10116 [ACK] Seq=20271 Ack=271 Win=5792 Len=1448 TSval=2718302020 TSecr=2718301732 [T
650	0.164929	5.5.5.5	10.131.23.172	TCP	1522	80 → 10116 [PSH, ACK] Seq=21719 Ack=271 Win=5792 Len=1448 TSval=2718302037 TSecr=2718301732 [T
651	0.164931	5.5.5.5	10.131.23.172	TCP	1522	80 → 10116 [ACK] Seq=23167 Ack=271 Win=5792 Len=1448 TSval=2718302057 TSecr=2718301732 [T

> Frame 634: 78 bytes on wire (624 bits), 78 bytes captured (624 bits)
 > Ethernet II, Src: JuniperN_77:f1:52 (f0:1c:2d:77:f1:52), Dst: MS-NLB-PhysServer-26_c5:03:17:aa (02:1a:c5:03:17:aa)
 > 802.1Q Virtual LAN, PRI: 0, DEI: 0, ID: 131
 > Internet Protocol Version 4, Src: 5.5.5.5, Dst: 10.131.23.172
 > Transmission Control Protocol, Src Port: 80, Dst Port: 10116, Seq: 0, Ack: 1, Len: 0

Slot5Port0Hostnp5-0Dirx.1544546780167.pcap Packets: 142926 - Displayed: 142926 (100.0%) Profile: Default

Трафик health-check между МХ и сервером 10.132.0.14:

No.	Time	Source	Destination	Protocol	Length	Info
4945	0.719725	10.132.0.252	10.132.0.14	TCP	86	55093 → 80 [SYN] Seq=0 Win=65535 Len=0 MSS=9152 WS=2 TSval=6160054 TSecr=0 SACK_PERM=1
4946	0.719743	10.132.0.14	10.132.0.252	TCP	82	80 → 55093 [SYN, ACK] Seq=0 Ack=1 Win=5792 Len=0 MSS=1460 WS=1 TSval=2722744571 TSecr=6160054
4955	0.720399	10.132.0.252	10.132.0.14	TCP	74	55093 → 80 [ACK] Seq=1 Ack=1 Win=66608 Len=0 TSval=6160055 TSecr=2722744571
4966	0.721067	10.132.0.252	10.132.0.14	TCP	64	55093 → 80 [RST, ACK] Seq=1 Ack=1 Win=66608 Len=0
11527	1.734071	10.132.0.252	10.132.0.14	TCP	86	55109 → 80 [SYN] Seq=0 Win=65535 Len=0 MSS=9152 WS=2 TSval=6161062 TSecr=0 SACK_PERM=1
11528	1.734088	10.132.0.14	10.132.0.252	TCP	82	80 → 55109 [SYN, ACK] Seq=0 Ack=1 Win=5792 Len=0 MSS=1460 WS=1 TSval=2730859329 TSecr=6161062
11538	1.734818	10.132.0.252	10.132.0.14	TCP	74	55109 → 80 [ACK] Seq=1 Ack=1 Win=66608 Len=0 TSval=6161063 TSecr=2730859329
11548	1.735412	10.132.0.252	10.132.0.14	TCP	64	55109 → 80 [RST, ACK] Seq=1 Ack=1 Win=66608 Len=0
18113	2.748432	10.132.0.252	10.132.0.14	TCP	86	55125 → 80 [SYN] Seq=0 Win=65535 Len=0 MSS=9152 WS=2 TSval=6162070 TSecr=0 SACK_PERM=1
18114	2.748457	10.132.0.14	10.132.0.252	TCP	82	80 → 55125 [SYN, ACK] Seq=0 Ack=1 Win=5792 Len=0 MSS=1460 WS=1 TSval=2738974284 TSecr=6162070
18124	2.749180	10.132.0.252	10.132.0.14	TCP	74	55125 → 80 [ACK] Seq=1 Ack=1 Win=66608 Len=0 TSval=6162071 TSecr=2738974284
18134	2.749779	10.132.0.252	10.132.0.14	TCP	64	55125 → 80 [RST, ACK] Seq=1 Ack=1 Win=66608 Len=0
24698	3.763211	10.132.0.252	10.132.0.14	TCP	86	55141 → 80 [SYN] Seq=0 Win=65535 Len=0 MSS=9152 WS=2 TSval=6163078 TSecr=0 SACK_PERM=1
24699	3.763231	10.132.0.14	10.132.0.252	TCP	82	80 → 55141 [SYN, ACK] Seq=0 Ack=1 Win=5792 Len=0 MSS=1460 WS=1 TSval=2747092478 TSecr=6163078
24708	3.763887	10.132.0.252	10.132.0.14	TCP	74	55141 → 80 [ACK] Seq=1 Ack=1 Win=66608 Len=0 TSval=6163079 TSecr=2747092478
24719	3.764556	10.132.0.252	10.132.0.14	TCP	64	55141 → 80 [RST, ACK] Seq=1 Ack=1 Win=66608 Len=0
31283	4.777587	10.132.0.252	10.132.0.14	TCP	86	55157 → 80 [SYN] Seq=0 Win=65535 Len=0 MSS=9152 WS=2 TSval=6164086 TSecr=0 SACK_PERM=1
31284	4.777610	10.132.0.14	10.132.0.252	TCP	82	80 → 55157 [SYN, ACK] Seq=0 Ack=1 Win=5792 Len=0 MSS=1460 WS=1 TSval=2755207510 TSecr=6164086
31294	4.778341	10.132.0.252	10.132.0.14	TCP	74	55157 → 80 [ACK] Seq=1 Ack=1 Win=66608 Len=0 TSval=6164087 TSecr=2755207510
31304	4.778937	10.132.0.252	10.132.0.14	TCP	64	55157 → 80 [RST, ACK] Seq=1 Ack=1 Win=66608 Len=0
37866	5.791993	10.132.0.252	10.132.0.14	TCP	86	55173 → 80 [SYN] Seq=0 Win=65535 Len=0 MSS=9152 WS=2 TSval=6165094 TSecr=0 SACK_PERM=1
37867	5.792018	10.132.0.14	10.132.0.252	TCP	82	80 → 55173 [SYN, ACK] Seq=0 Ack=1 Win=5792 Len=0 MSS=1460 WS=1 TSval=2763322773 TSecr=6165094
37876	5.792691	10.132.0.252	10.132.0.14	TCP	74	55173 → 80 [ACK] Seq=1 Ack=1 Win=66608 Len=0 TSval=6165095 TSecr=2763322773
37887	5.793341	10.132.0.252	10.132.0.14	TCP	64	55173 → 80 [RST, ACK] Seq=1 Ack=1 Win=66608 Len=0
44451	6.806480	10.132.0.252	10.132.0.14	TCP	86	55189 → 80 [SYN] Seq=0 Win=65535 Len=0 MSS=9152 WS=2 TSval=6166102 TSecr=0 SACK_PERM=1
44452	6.806502	10.132.0.14	10.132.0.252	TCP	82	80 → 55189 [SYN, ACK] Seq=0 Ack=1 Win=5792 Len=0 MSS=1460 WS=1 TSval=2771438646 TSecr=6166102
44462	6.807202	10.132.0.252	10.132.0.14	TCP	74	55189 → 80 [ACK] Seq=1 Ack=1 Win=66608 Len=0 TSval=6166103 TSecr=2771438646

```

> Frame 4945: 86 bytes on wire (688 bits), 86 bytes captured (688 bits)
> Ethernet II, Src: JuniperN_77:f1:52 (f0:1c:2d:77:f1:52), Dst: MS-NLB-PhysServer-26_c5:04:00:0c (02:1a:c5:04:00:0c)
> 802.1Q Virtual LAN, PRI: 0, DEI: 0, ID: 132
> Internet Protocol Version 4, Src: 10.132.0.252, Dst: 10.132.0.14
> Transmission Control Protocol, Src Port: 55093, Dst Port: 80, Seq: 0, Len: 0

```

Тест 2. TLV + авария на серверах

Еще раз запускаем тест номер 1, и в процессе выполнения теста “выключаем” 2 сервера из фабрики, применив на логическом интерфейсе et-0/1/0.132 соответствующий фильтр для входящего TCP трафика:

```

matvey@mx480-12# show interfaces et-0/1/0 unit 132
description "-- servers";
vlan-id 132;
family inet {
    filter {
        inactive: input BLOCK-SERVERS;
    }
    address 10.132.0.1/24;
}

```

```

matvey@mx480-12# show firewall family inet filter BLOCK-SERVERS
interface-specific;
term 1 {
    from {
        source-address {
            10.132.0.5/32;
        }
        protocol tcp;
    }
    then {
        discard;
    }
}

```

// блокируем TCP трафик от сервера S005

```

term 2 {
    from
        source-address {
            10.132.0.11/32;
        }
        protocol tcp;
    }
    then {
        discard;
    }
}
term 3 {
    then accept;
}

```

matvey@mx480-12# activate interfaces et-0/1/0 unit 132 family inet filter input

```

matvey@mx480-12# show | compare
[edit interfaces et-0/1/0 unit 132 family inet filter]
!      active: input { ... }

```

matvey@mx480-12# commit

```

matvey@mx480-12#
*** messages ***

```

```

Dec 12 15:23:07 mx480-12 mgd[81260]: %INTERACT-4-UI_COMMIT_COMPLETED:
commit complete
Dec 12 15:23:10 mx480-12 traffic-dird[5147]: %DAEMON-1-TDIR_SERVER_EVENT:
Real server event :TLB instance [TLB-INSTANCE-1] real-service group [G1] real
service [S005] oper state [DOWN]
Dec 12 15:23:10 mx480-12 traffic-dird[5147]: %DAEMON-1-TDIR_SERVER_EVENT:
Real server event :TLB instance [TLB-INSTANCE-1] real-service group [G1] real
service [S011] oper state [DOWN]

```

matvey@mx480-12# run show services traffic-load-balance statistics

```

Traffic load balance instance name      : TLB-INSTANCE-1
Multi services interface name          : ms-2/0/0
Interface state                        : UP
Interface type                         : Multi services
Route hold timer                       : 180

Traffic load balance virtual svc name  : V1
IP address                             : 5.5.5.5
Virtual service mode                   : Translate mode
Routing instance name                  : default
Traffic load balance group name        : G1
Health check interface subunit         : 0
Protocol                               : tcp
Port number                            : 80
Server Listening Port Number            : 80
Demux Nexthop index                    : 711

```

```

Nexthop index           : 934
Up time                 : 00:03:21
Total packet sent count : 1566976
Total byte sent count   : 92977758
Total packet received count : 39678509
Total byte received count : 57555690724

```

Real service	Address	Sts	Packet Sent	Byte Sent	Packet Recv	Byte Recv
S002	10.132.0.2	UP	103950	6164532	2608676	3781561830
S003	10.132.0.3	UP	108093	6410066	2730507	3961930410
S004	10.132.0.4	UP	107011	6351788	2737903	3975809853
S005	10.132.0.5	DOWN	24053	1409538	504027	720908473
S006	10.132.0.6	UP	107677	6392822	2744378	3982156493
S007	10.132.0.7	UP	110767	6581440	2852897	4142161121
S008	10.132.0.8	UP	108372	6441468	2804845	4073628565
S009	10.132.0.9	UP	112558	6677058	2856160	4145505052
S010	10.132.0.10	UP	107745	6390144	2707269	3924722530
S011	10.132.0.11	DOWN	22195	1297506	446715	636910631
S012	10.132.0.12	UP	106950	6347090	2711083	3932416925
S013	10.132.0.13	UP	104919	6222848	2638339	3825113494
S014	10.132.0.14	UP	106984	6345552	2691832	3902913396
S015	10.132.0.15	UP	109967	6534318	2834685	4115877023
S016	10.132.0.16	UP	112097	6657000	2867168	4161082022
S017	10.132.0.17	UP	113638	6754588	2942025	4272992906

После применения фильтра, MX детектирует недоступность серверов S005 и S011, и исключает эти сервера из балансировки.

Тест 3. TLB + NAT

Выполняемый TLB sNAT (для обратного трафика от серверов к клиентам) не может служить заменой “обычного” NAT-а. TLB транслирует только трафик, определенный в конфигурации виртуального сервиса:

```

matvey@mx480-12# show services traffic-load-balance instance TLB-INSTANCE-
1 virtual-service V1 service HTTP
virtual-port 80;
server-listening-port 80;
protocol tcp;

```

Для доступа серверов в “Интернет” мы можем поднять функционал CG-NAT на отдельном сервисном NPU (ms-2/1/0):

```

matvey@mx480-12# show interfaces ms-2/1/0
description "-- services-options interface CG-NAT";
unit 10 {
    family inet;
    service-domain inside;
}
unit 20 {
    family inet;
    service-domain outside;
}

```

```
matvey@mx480-12# show services
```

```
service-set SS-NAT {
  nat-options {
    max-sessions-per-subscriber 512;
  }
  nat-rule-sets RULESET1;
  next-hop-service {
    inside-service-interface ms-2/1/0.10;
    outside-service-interface ms-2/1/0.20;
  }
}
nat {
  pool POOL1 {
    address 6.6.6.6/32; // публичный адрес для трансляции
    port {
      automatic {
        random-allocation;
      }
    }
    address-allocation round-robin;
  }
  rule RULE1 {
    match-direction input;
    term 1 {
      from {
        source-address {
          10.132.0.0/24; // трафик от серверов
        }
      }
      then {
        translated {
          source-pool POOL1;
          translation-type {
            napt-44; // трансляция адреса и порта
          }
          mapping-type endpoint-independent;
          filtering-type {
            endpoint-independent;
          }
          address-pooling paired;
        }
      }
    }
  }
  rule-set RULESET1 {
    rule RULE1;
  }
}
```

```
matvey@mx480-12# show routing-instances SERVERS
```

```
instance-type virtual-router;
interface et-0/1/0.132;
```

```

interface ms-2/0/0.0;
interface ms-2/1/0.10;
routing-options {
    static {
        route 0.0.0.0/0 next-hop ms-2/1/0.10;
    }
}

```

Запускаем тестовый трафик от серверов к клиентам и убеждаемся что MX его благополучно транслирует:

```

matvey@mx480-12# run show services sessions
ms-2/1/0
Service Set: SS-NAT, Session: 268435463, ALG: none, Flags: 0x0000, IP
Action: no, Offload: no, Asymmetric: no
TCP    10.132.0.3:36957 -> 10.131.53.173:80    Forward I        2
TCP    10.131.53.173:80 ->      6.6.6.6:40290    Forward 0        1

Service Set: SS-NAT, Session: 301989918, ALG: none, Flags: 0x0000, IP
Action: no, Offload: no, Asymmetric: no
TCP    10.132.0.2:40280 -> 10.131.30.200:80    Forward I        2
TCP    10.131.30.200:80 ->      6.6.6.6:28783    Forward 0        1

Service Set: SS-NAT, Session: 369098754, ALG: none, Flags: 0x0000, IP
Action: no, Offload: no, Asymmetric: no
TCP    10.132.0.5:11357 -> 10.131.37.185:80    Forward I        2
TCP    10.131.37.185:80 ->      6.6.6.6:40451    Forward 0        1
...

```

ССЫЛКИ

Traffic Load Balancer Overview

https://www.juniper.net/documentation/en_US/junos/topics/concept/tdf-tlb-overview.html