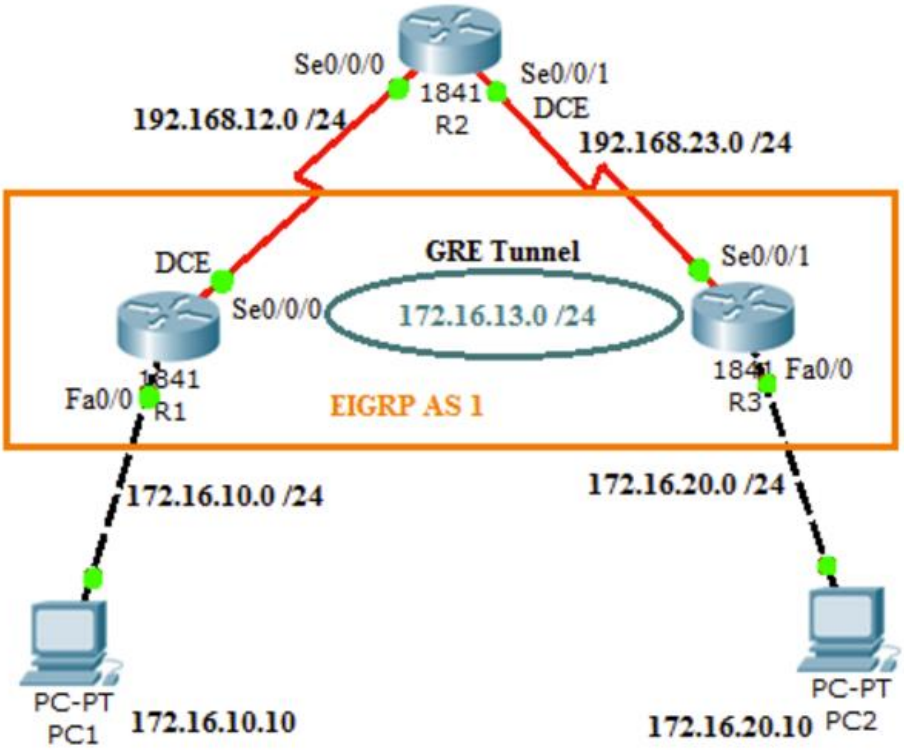
Experimenty MLP s LFI

Topológia:



Generované toky:

Generovali sme 3 UDP toky cez D-ITG:

1) hlasový tok:
   - konštantný, intenzita 50 pak/s;
   - veľkosti paketov: konšt., 160B telo (s hlavičkami 218B)
   - využite možnosť v D-ITG vybrať application
   - Voice s kodekom G.711 (2 samples per packet)
2) dátový tok:
   - konštantný, veľkosť paketu 1500B
   - intenzita toku 1p/s
   - Intenzita toku 3p/s
   - Intenzita toku 5p/s
3) Gaming tok:
   - Prednastavený z D-ITG

Vždy budeme spúšťať všetky tri toky naraz a budeme používať 3 scenáre:

1). Súčet tokov bude dosahovať približne 75 % z kapacity linky
2). Súčet tokov bude dosahovať približne 100 % z kapacity linky
3). Súčet tokov bude dosahovať približne 125 % z kapacity linky

Popis tokov:

1.Tok Konštantný hlasový tok, kodek G.711

- intenzita 50 p/s
- veľkosť paketu 200B

2.tok Gaming tok

3.tok Náhodný dátový tok

- intenzita 1 p/s, 3p/s, 5p/s
- veľkosť 1500B

Základná konfigurácia

Potrebné WFQ na sériovom rozhraní R1

```
policy-map WFQ
class class-default
fair-queue
int s0/0/0
service-policy output WFQ
```

Značkovanie

Pakety toku 1 dostanú značku EF
Pakety toku 2 dostanú značku AF11
Pakety toku 3 budú ako best-effort

```
class-map match-all EF
match access-group 101
class-map match-all BF
match access-group 103
class-map match-all AF11
match access-group 102
!
policy-map Znackovanie
class EF
set ip dscp ef
class AF11
set ip dscp af11
class BF
set ip dscp default
policy-map WFQ
class class-default
fair-queue
```

Statické smerovanie

R1

```
ip route 172.16.20.0 255.255.255.0 Tunnel0
ip route 192.168.23.0 255.255.255.0 Serial0/0/0
```

R2

```
ip route 192.168.12.0 255.255.255.0 Serial0/0/0
ip route 192.168.23.0 255.255.255.0 FastEthernet0/0
```

R3

ip route 172.16.10.0 255.255.255.0 Tunnel0
ip route 192.168.12.0 255.255.255.0 FastEthernet0/0

GRE Tunel

R1

interface Tunnel0
ip address 172.16.13.1 255.255.255.0
tunnel source Serial0/0/0
tunnel destination 192.168.23.3

R3

interface Tunnel0
ip address 172.16.13.3 255.255.255.0
tunnel source FastEthernet0/0
tunnel destination 192.168.12.1

Port mirroring

Na SW medzi R2 a R3

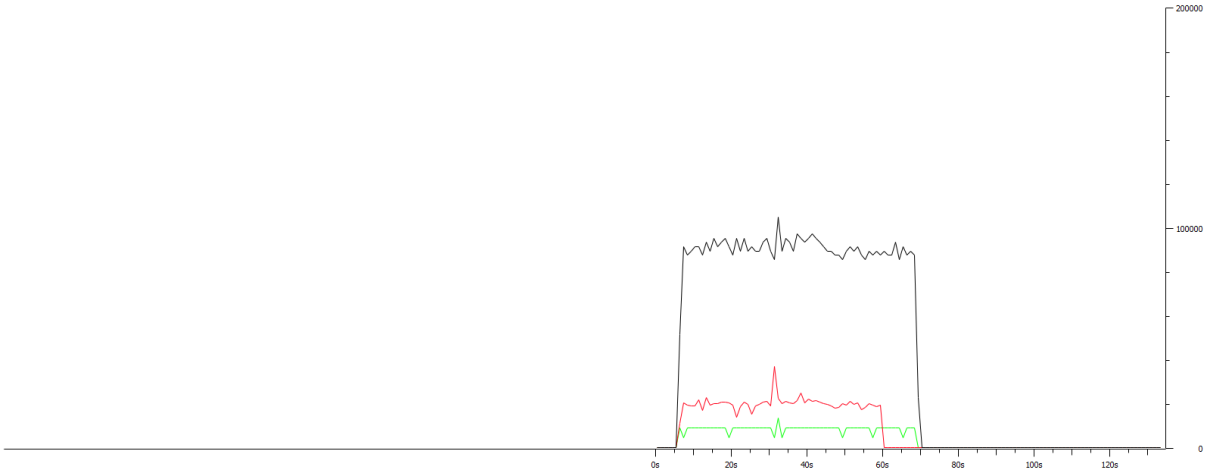
monitor session 1 source interface Gi0/1
monitor session 1 destination interface Fa0/1

Úloha 1:

- Bez značkovania paketov na vstupe
- Bez použitia QoS pre-classify

1. Scenár

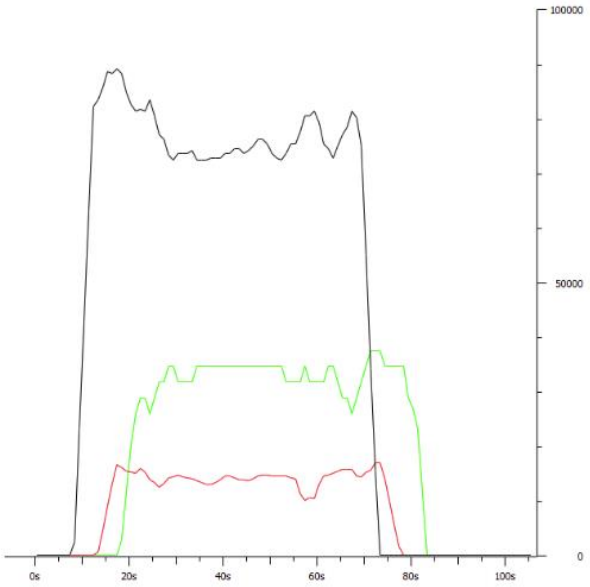
- Súčtový tok je 75%




```
_____________________________________________________________
****************  TOTAL RESULTS   ******************

_____________________________________________________________
Number of flows          =              3
Total time               =      61.465000 s
Total packets            =           4307
Minimum delay            =     -71.834000 s
Maximum delay            =     -70.342000 s
Average delay            =     -71.107117 s
Average jitter           =       0.005796 s
Delay standard deviation =       0.439867 s
Bytes received           =         627654
Average bitrate          =      81.692540 Kbit/s
Average packet rate      =      70.072399 pkt/s
Packets dropped          =              0 (0.00 %)
Average loss-burst size  =              0 pkt
Error lines              =              0
```

2. Scenár

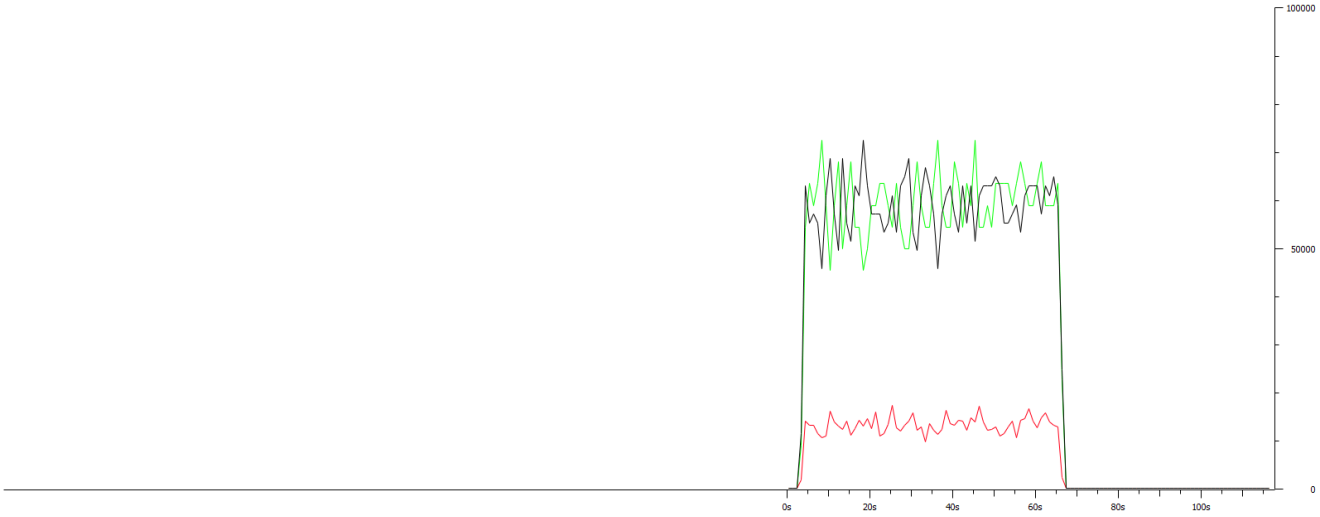
- Súčtový tok je 100%




```
_____________________________________________________________________
*****************  TOTAL RESULTS    ******************

_____________________________________________________________________
Number of flows          =             3
Total time               =     70.235000 s
Total packets            =          4207
Minimum delay            =   -264.935000 s
Maximum delay            =   -263.091000 s
Average delay            =   -263.697360 s
Average jitter           =      0.016396 s
Delay standard deviation =      0.335792 s
Bytes received           =        773655
Average bitrate          =     88.121877 Kbit/s
Average packet rate      =     59.898911 pkt/s
Packets dropped          =           377 (8.22 %)
Average loss-burst size  =      1.597458 pkt
Error lines              =             0
```

3. Scenár

- Súčtový tok je 125%



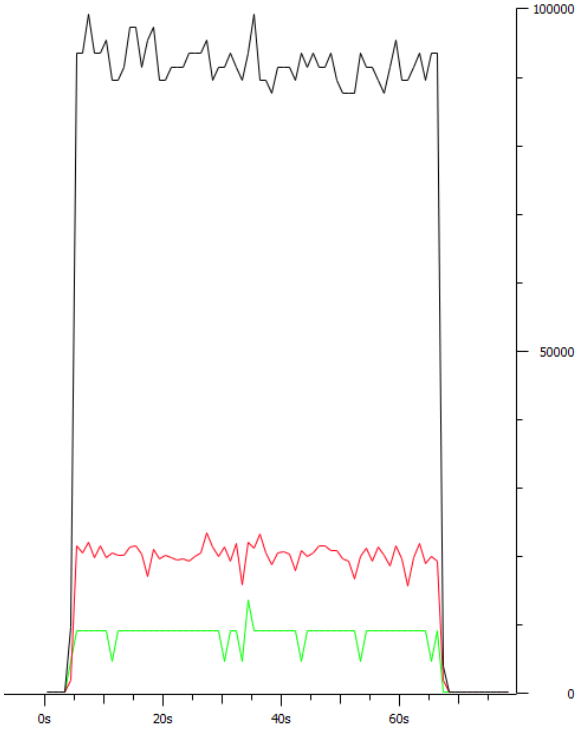

```
_____________________________________________________________________
*****************  TOTAL RESULTS    ******************

_____________________________________________________________________
Number of flows          =             3
Total time               =    29.850000  s
Total packets            =          1211
Minimum delay            =   -39.841000  s
Maximum delay            =   -38.944000  s
Average delay            =   -263.697360 s
Average jitter           =      0.036741 s
Delay standard deviation =      0.228907 s
Bytes received           =        329511
Average bitrate          =     88.311156 Kbit/s
Average packet rate      =     40.569514 pkt/ s
Packets dropped          =          1364 (52.97 %)
Average loss-burst size  =      2.744467 pkt
Error lines              =             0
```

Úloha 2:

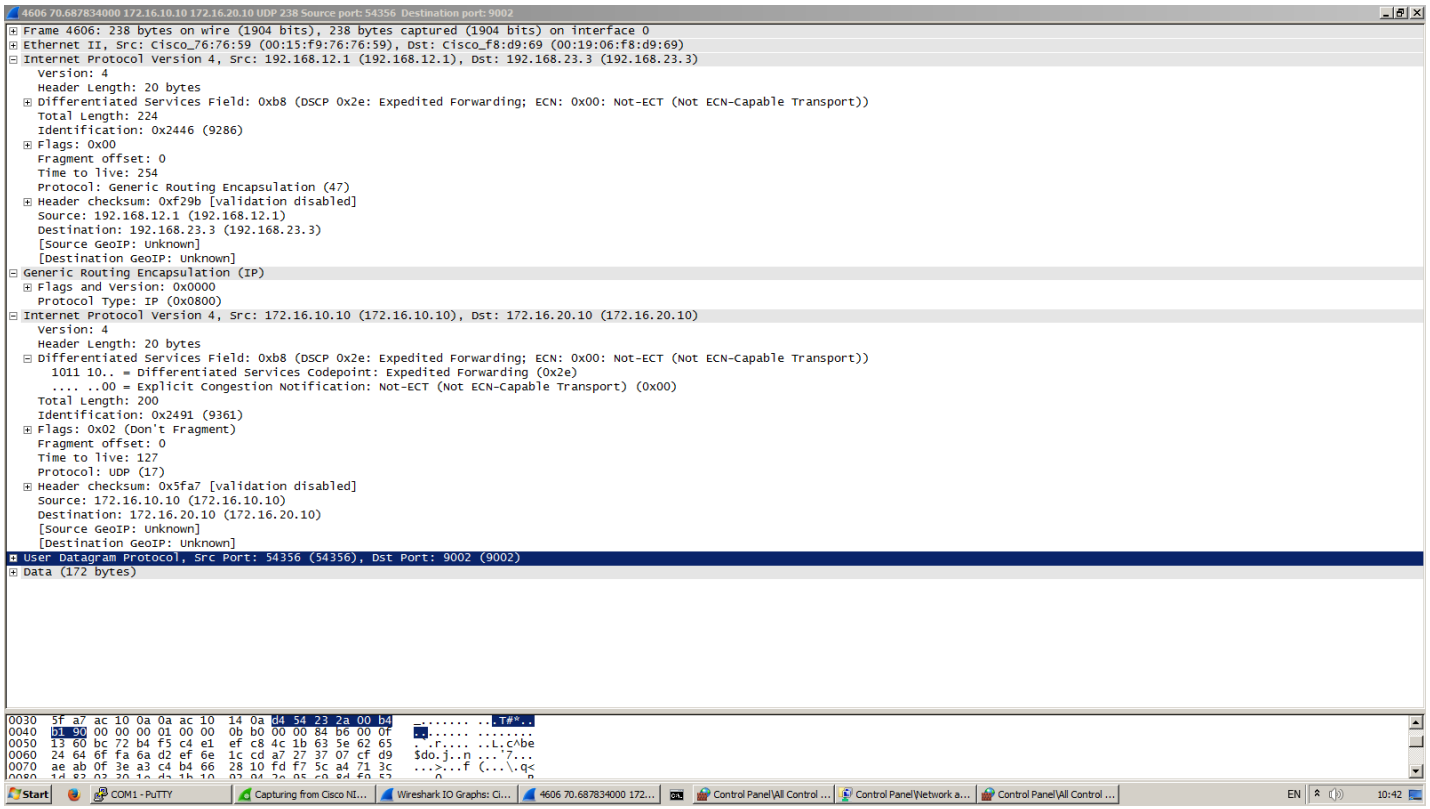
- Značkovanie paketov na vstupe
- Bez použitia QoS pre-classify

1. Scenár

- Súčtový tok je 75%,

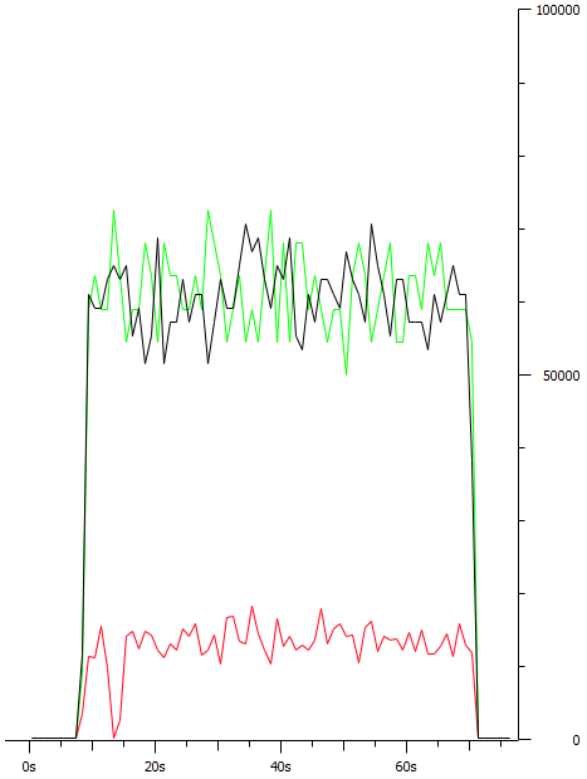



```
------------------------------------------------------------
*****************  TOTAL RESULTS    ******************
------------------------------------------------------------
Number of flows          =             3
Total time               =     72.587000 s
Total packets            =          4400
Minimum delay            =    283.569000 s
Maximum delay            =    292.764000 s
Average delay            =    288.166537 s
Average jitter           =      0.041019 s
Delay standard deviation =      1.494578 s
Bytes received           =        621889
Average bitrate          =     79.491140 Kbit/s
Average packet rate      =     70.302139 pkt/s
Packets dropped          =             0 (0.00 %)
Average loss-burst size  =             0 pkt
Error lines              =             0
------------------------------------------------------------
```



2. Scenár

- Súčtový tok je 100%,

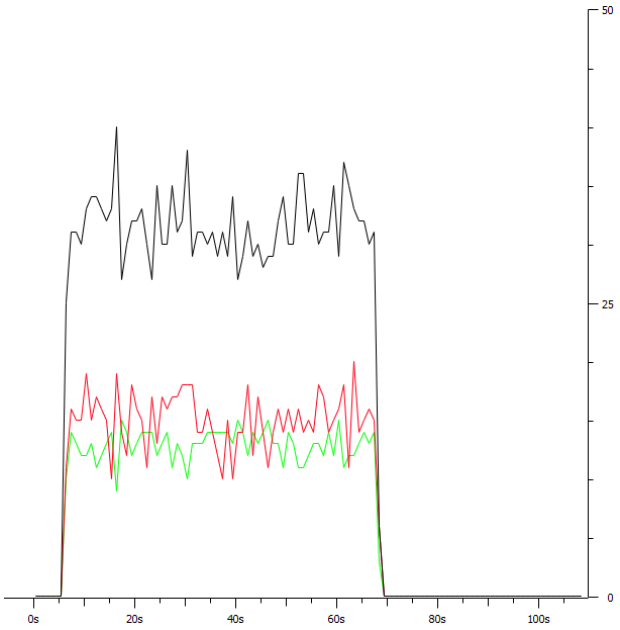


```
****************  TOTAL RESULTS    ******************

_____________________________________________________________________
Minimum delay                =    -71.641000 s
Maximum delay                =    -68.528000 s
Average delay                =    -70.182153 s
Average jitter               =      0.010447 s
Packets dropped              =          1858 (12.85 %)
```

---

3. Scenár

- Súčtový tok je 125%,



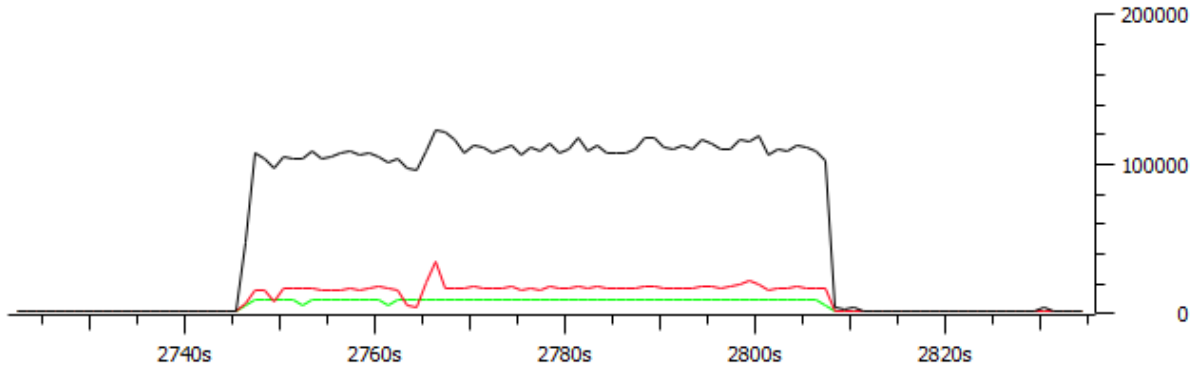

```
****************  TOTAL RESULTS    ******************

_____________________________________________________________________
Number of flows              =             3
Total time                   =     62.530000 s
Total packets                =          3718
Minimum delay                =    -71.450000 s
Maximum delay                =    -68.875000 s
Average delay                =    -70.021046 s
Average jitter               =      0.018767 s
Delay standard deviation     =      0.697949 s
Bytes received               =         786783
Average bitrate              =    100.659907 Kbit/s
Average packet rate          =     59.459459 pkt/s
Packets dropped              =          1917 (34.02 %)
Average loss-burst size      =      1.429530 pkt
Error lines                  =             0
```

Úloha 3:

- Bez značkovania paketov na vstupe
    - značkovanie sa do GRE tunela prenáša, nemusíme teda značkovať
- S použitím QoS pre-classify

1. Scenár

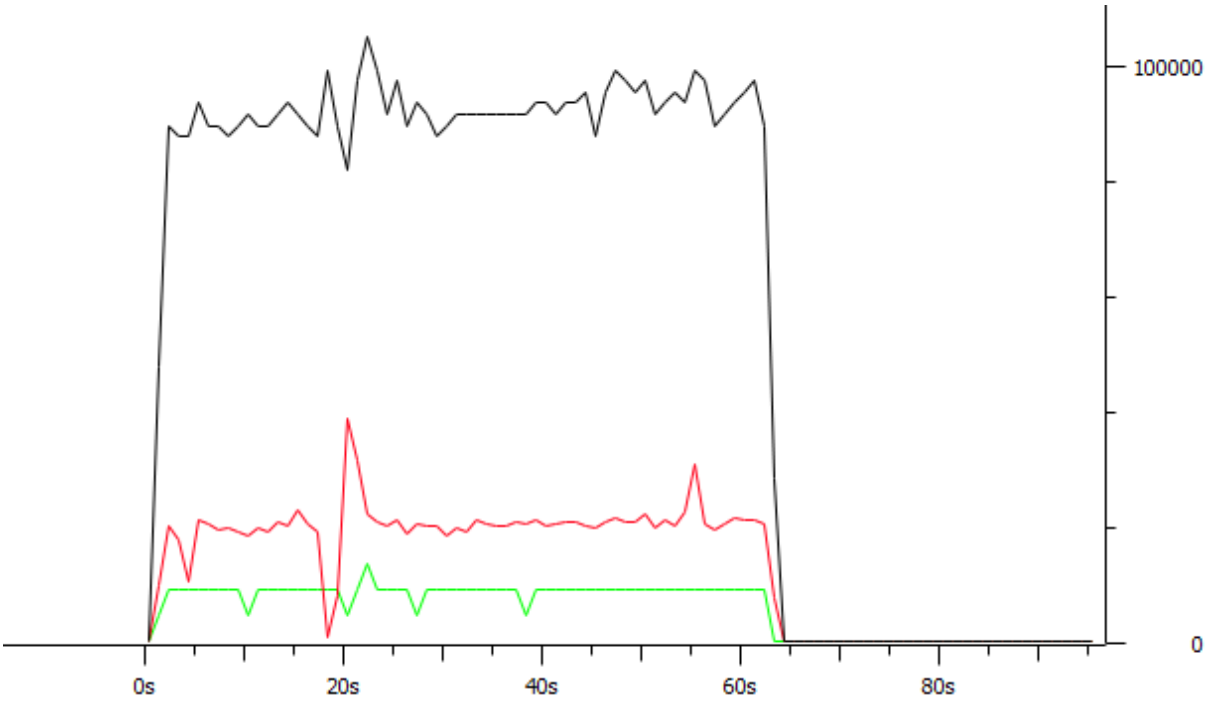
- Súčtový tok je 75%




```
_____________________________________________________________________
*****************  TOTAL RESULTS    ******************

_____________________________________________________________________
Number of flows          =             3
Total time               =     61.275000 s
Total packets            =          4557
Minimum delay            =    -71.624000 s
Maximum delay            =    -70.146000 s
Average delay            =    -70.617270 s
Average jitter           =      0.006331 s
Delay standard deviation =      0.343078 s
Bytes received           =        638477
Average bitrate          =     83.358890 Kbit/s
Average packet rate      =     74.369645 pkt/s
Packets dropped          =           493 (9.76 %)
Average loss-burst size  =    123.250000 pkt
Error lines              =             0
```

2. Scenár

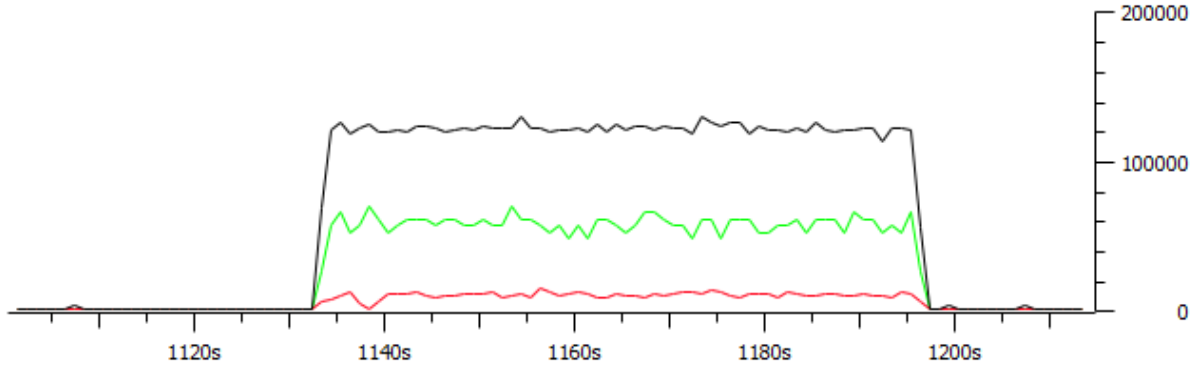
- Súčtový tok je 100%



********** TOTAL RESULTS **********			
Number of flows	=	3	
Total time	=	63.708000	s
Total packets	=	4136	
Minimum delay	=	11.921000	s
Maximum delay	=	19.468000	s
Average delay	=	17.210229	s
Average jitter	**=**	**0.069938**	**s**
Delay standard deviation	=	1.793478	s
Bytes received	=	731130	
Average bitrate	=	91.810134	Kbit/s
Average packet rate	=	64.921203	pkt/s
Packets dropped	**=**	**467**	**(9.96 %)**
Average loss-burst size	=	2.185000	pkt
Error lines	=	0	

3. Scenár

- Súčtový tok je 125%,




```
_____________________________________________________________
****************  TOTAL RESULTS    ******************

_____________________________________________________________
Number of flows          =             3
Total time               =     61.650000 s
Total packets            =          3989
Minimum delay            =    -71.676000 s
Maximum delay            =    -69.484000 s
Average delay            =    -70.768316 s
Average jitter           =      0.047363 s
Delay standard deviation =      0.495891 s
Bytes received           =        770116
Average bitrate          =     99.933950 Kbit/s
Average packet rate      =     64.703974 pkt/s
Packets dropped          =          1528 (27.70 %)
Average loss-burst size  =      1.986996 pkt
Error lines              =             0
-------------------------------------------------------------
```