# Configurações e testes de ECN

## Windows

### Verificando Estado

netsh interface tcp show global

Dentre varios parametros olhar:

ECN Capability : disabled

### Habilitando

netsh interface tcp set global ecncapability=enabled

Usar “disabled” para desabilitar

## Linux

### Verificando estado

sysctl net.ipv4.tcp\_ecn

Possiveis respostas:

net.ipv4.tcp\_ecn=0 - desabiltado

net.ipv4.tcp\_ecn=1 - habilitado

net.ipv4.tcp\_ecn=2 – habilitado apenas para conexões entrantes

### Habilitando

sudo sysctl -w net.ipv4.tcp\_ecn=1

Ou, para deixar permanente e automático no reboot, editando o arquivo /etc/sysctl.conf, e incluindo a linha

net.ipv4.tcp\_ecn=1

## Teste

É necessário ter acesso de administrador no Windows e root no Linux, para executar essas configurações e testes.

Nas duas máquinas é necessário ter o python3.x instalado. Na máquina que for executar o script de teste (cliente), é necessário ter o Wireshark instalado (para disponibilizar a biblioteca pcap) e o scapy (pip install scapy).

### Habilitando servidor HTTP

Em sistemas com Python3:

python -m http.server <porta> -b <meu IP>

Configuração: duas maquinas Linux Ubuntu no lab:

Maquina NUC2

enp0s31f6: 201.36.80.57

sudo ethtool enp0s31f6

Supported link modes: 10baseT/Half 10baseT/Full

100baseT/Half 100baseT/Full

1000baseT/Full

### Testando com scapy

#### Notebook Windows e maquina (NUC2) do lab:

- Server

Maquina NUC2 no lab: 172.31.36.11 (pela VPN)

enp0s31f6: 201.36.80.57

whatsmyip: 72.14.201.202

net.ipv4.tcp\_ecn = 1

- Cliente

Maquina Windows (notebook conectado via 5G e VPN):

IPv4 Address. . . . . . . . . . . : 100.93.154.27

Whatsmyip: 163.116.228.106

ECN Capability : enabled

C:\Users\F8075402\OneDrive - TIM\TechCenter\ECN\_BBR>ping 72.14.201.202

Pinging 72.14.201.202 with 32 bytes of data:

Reply from 72.14.201.202: bytes=32 time=122ms TTL=105

Reply from 72.14.201.202: bytes=32 time=125ms TTL=105

Reply from 72.14.201.202: bytes=32 time=122ms TTL=105

Reply from 72.14.201.202: bytes=32 time=123ms TTL=105

Ping statistics for 72.14.201.202:

Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),

Approximate round trip times in milli-seconds:

Minimum = 122ms, Maximum = 125ms, Average = 123ms

Estando com a VPN para o lab ativa, consigo fazer:

C:\Users\F8075402\OneDrive - TIM\TechCenter\ECN\_BBR>ping 172.31.36.11

Pinging 172.31.36.11 with 32 bytes of data:

Reply from 172.31.36.11: bytes=32 time=17ms TTL=57

Reply from 172.31.36.11: bytes=32 time=16ms TTL=57

Reply from 172.31.36.11: bytes=32 time=15ms TTL=57

Reply from 172.31.36.11: bytes=32 time=17ms TTL=57

Ping statistics for 172.31.36.11:

Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),

Approximate round trip times in milli-seconds:

Minimum = 15ms, Maximum = 17ms, Average = 16ms

Rodar servidor web python no server:

$ sudo python3 -m http.server 8080

Consegue acessar pelo browser em <http://172.31.36.11:8080/>

Rodar script python com scapy no client:

import argparse

from scapy.all import \*

def test\_ecn\_support(target\_ip, target\_port):

# Craft SYN packet with ECN flags set

syn\_packet = IP(dst=target\_ip) / TCP(dport=target\_port, flags=0x0c2) # ECN flags set

#flags=0x0c2 = (SYN, ECN, CWR)

#resposta deve ter flags=0x052 = (SYN, ACK, ECN)

# Send SYN packet and wait for response

response = sr1(syn\_packet, timeout=5, verbose=True)

print("Response: ")

print(response)

if response is not None:

# Check if SYN-ACK packet received and ECN flags are set (flags='SAE')

print("TCP flags:")

print(response[TCP].flags)

if response.haslayer(TCP) and response[TCP].flags == 0x052:

print("ECN support detected on", target\_ip, ":", target\_port)

return True

else:

print("ECN support NOT detected on", target\_ip, ":", target\_port)

return False

else:

print("No response received from", target\_ip, ":", target\_port)

return False

if \_\_name\_\_ == "\_\_main\_\_":

parser = argparse.ArgumentParser(description="Test ECN support on a TCP server.")

parser.add\_argument("target\_ip", help="IP address of the target server")

parser.add\_argument("target\_port", type=int, help="Port number of the target server")

args = parser.parse\_args()

print("Testing ECN support on", args.target\_ip, ":", args.target\_port)

test\_ecn\_support(args.target\_ip, args.target\_port)

No cliente windows em DOS prompt como administrador (é preciso ter python, scapy e wireshark – para disponibilizar pcap - na maquina) :

C:\Users\F8075402\OneDrive - TIM\TechCenter\ECN\_BBR>python test\_ecn.py 172.31.36.11 8080

Testing ECN support on 172.31.36.11 : 8080

WARNING: Mac address to reach destination not found. Using broadcast.

Response:

IP / TCP 172.31.36.11:8080 > 100.66.0.1:ftp\_data SAE

TCP flags:

SAE

ECN support detected on 172.31.36.11 : 8080

Para confirmar, desligamos suporte a ECN no server:

sudo sysctl -w net.ipv4.tcp\_ecn=0

Rodamos teste de novo:

C:\Users\F8075402\OneDrive - TIM\TechCenter\ECN\_BBR>python test\_ecn.py 172.31.36.11 8080

Testing ECN support on 172.31.36.11 : 8080

WARNING: Mac address to reach destination not found. Using broadcast.

Response:

IP / TCP 172.31.36.11:8080 > 100.66.0.1:ftp\_data SA

TCP flags:

SA

ECN support NOT detected on 172.31.36.11 : 8080

Para confirmar outra config, religamos suporte a ECN no server apenas para conexões entrantes:

sudo sysctl -w net.ipv4.tcp\_ecn=2

Rodamos teste de novo:

C:\Users\F8075402\OneDrive - TIM\TechCenter\ECN\_BBR>python test\_ecn.py 172.31.36.11 8080

Testing ECN support on 172.31.36.11 : 8080

WARNING: Mac address to reach destination not found. Using broadcast.

Response:

IP / TCP 172.31.36.11:8080 > 100.66.0.1:ftp\_data SAE

TCP flags:

SAE

ECN support detected on 172.31.36.11 : 8080

CONCLUSÃO: conexão via VPN permitiu passagem de ECN

#### Sem VPN para o lab ativa, acessando pelo 5G no IP publico da maquina do lab:

C:\Windows\System32>ping 201.36.80.57

Pinging 201.36.80.57 with 32 bytes of data:

Reply from 201.36.80.57: bytes=32 time=33ms TTL=50

Reply from 201.36.80.57: bytes=32 time=21ms TTL=50

Reply from 201.36.80.57: bytes=32 time=21ms TTL=50

Reply from 201.36.80.57: bytes=32 time=17ms TTL=50

Ping statistics for 201.36.80.57:

Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),

Approximate round trip times in milli-seconds:

Minimum = 17ms, Maximum = 33ms, Average = 23ms

Rodar servidor web python no server:

$ sudo python3 -m http.server 80

No cliente windows em DOS prompt como administrador (é preciso ter python, scapy e wireshark – para disponibilizar pcap - na maquina) :

C:\Users\F8075402\OneDrive - TIM\TechCenter\ECN\_BBR>python test\_ecn.py 201.36.80.57 80

Barrado no micro da empresa por Cyber – tem que pedir liberação de acesso.

#### Testando com note pessoal, via WiFi NET:

No cliente windows em DOS prompt como administrador (é preciso ter python, scapy e wireshark – para disponibilizar pcap - na maquina) :

C:\Atila\XVRI\TIM\ECN>python test\_ecn.py 201.36.80.57 80

WARNING: Wireshark is installed, but cannot read manuf !

Testing ECN support on 201.36.80.57 : 80

Response:

IP / TCP 201.36.80.57:http > 192.168.0.243:ftp\_data SAE / Padding

TCP flags:

SAE

ECN support detected on 201.36.80.57 : 80

Para confirmar, desligamos suporte a ECN no server:

sudo sysctl -w net.ipv4.tcp\_ecn=0

Rodamos teste de novo:

C:\Atila\XVRI\TIM\ECN>python test\_ecn.py 201.36.80.57 80

WARNING: Wireshark is installed, but cannot read manuf !

Testing ECN support on 201.36.80.57 : 80

Response:

IP / TCP 201.36.80.57:http > 192.168.0.243:ftp\_data SA / Padding

TCP flags:

SA

ECN support NOT detected on 201.36.80.57 : 80

Para confirmar, religamos suporte a ECN no server:

sudo sysctl -w net.ipv4.tcp\_ecn=1

Rodamos teste de novo:

C:\Atila\XVRI\TIM\ECN>python test\_ecn.py 201.36.80.57 80

WARNING: Wireshark is installed, but cannot read manuf !

Testing ECN support on 201.36.80.57 : 80

Response:

IP / TCP 201.36.80.57:http > 192.168.0.243:ftp\_data SAE / Padding

TCP flags:

SAE

ECN support detected on 201.36.80.57 : 80

#### Testando com note pessoal, via WiFi de roteador/CPE 5G TIM (meu celular com chip 5GSA):

Testei com celular conectado em 5GSA e em 4G.

No cliente windows em DOS prompt como administrador (é preciso ter python, scapy e wireshark – para disponibilizar pcap - na maquina) :

C:\Atila\XVRI\TIM\ECN>python test\_ecn.py 201.36.80.57 80

WARNING: Wireshark is installed, but cannot read manuf !

Testing ECN support on 201.36.80.57 : 80

Response:

IP / TCP 201.36.80.57:http > 192.168.0.243:ftp\_data SAE / Padding

TCP flags:

SAE

ECN support detected on 201.36.80.57 : 80

Para confirmar, desligamos suporte a ECN no server:

sudo sysctl -w net.ipv4.tcp\_ecn=0

Rodamos teste de novo:

C:\Atila\XVRI\TIM\ECN>python test\_ecn.py 201.36.80.57 80

WARNING: Wireshark is installed, but cannot read manuf !

Testing ECN support on 201.36.80.57 : 80

Response:

IP / TCP 201.36.80.57:http > 192.168.8.164:ftp\_data SA

TCP flags:

SA

ECN support NOT detected on 201.36.80.57 : 80

Para confirmar, religamos suporte a ECN no server:

sudo sysctl -w net.ipv4.tcp\_ecn=1

Rodamos teste de novo:

C:\Atila\XVRI\TIM\ECN>python test\_ecn.py 201.36.80.57 80

WARNING: Wireshark is installed, but cannot read manuf !

Testing ECN support on 201.36.80.57 : 80

Response:

IP / TCP 201.36.80.57:http > 192.168.8.164:ftp\_data SAE

TCP flags:

SAE

ECN support detected on 201.36.80.57 : 80