Dokumentácia cvičenie č.3

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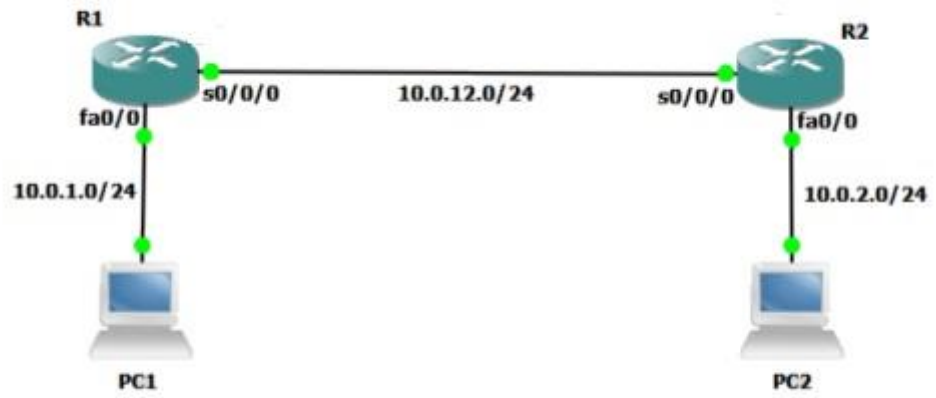
Topológia

V našej topológii sme použili 2 smerovače prepojené sériovým rozhraním a 2 koncové zariadenia, z ktorých jeden bol Linux host (PC1).



Úloha č.1 (AutoQoS)

Auto QoS sa spúšťa na rozhraniach, na ktorých chceme aby bola daná politika uplatnená. V našom prípade sériové porty medzi smerovačmi – s0/0/0.

Spúšťa sa príkazom:

#R1(config-if)#auto qos voip

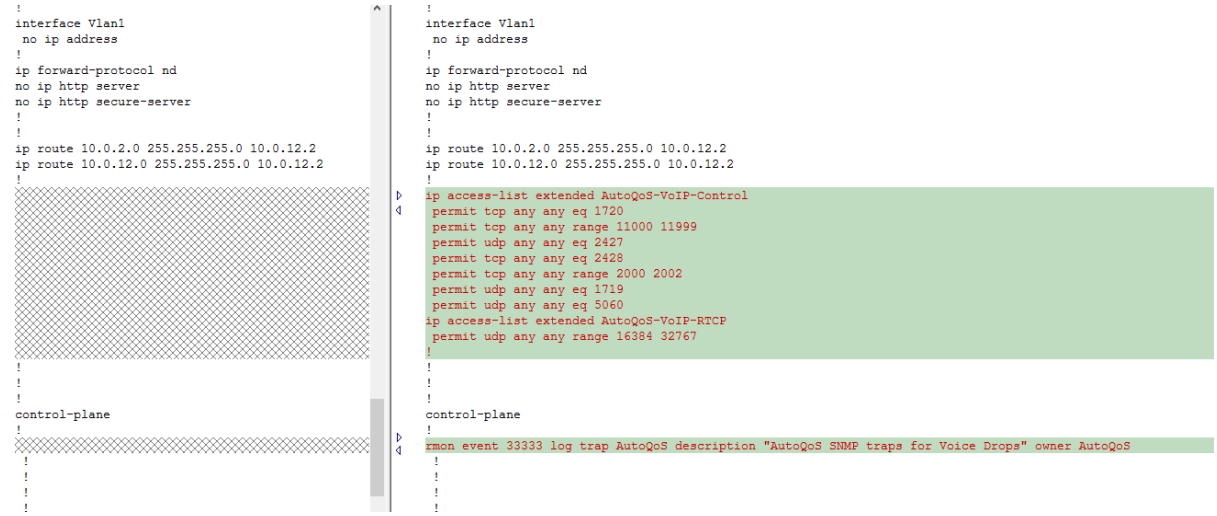
Čo tento príkaz pridá do running configu je možné vidieť na obrázkoch nižšie.

```
!
!
!
!
!
license udi pid CISCO2811 sn FCZ094972BG
!
redundancy
!
!
!
!
!
!
!
!
!
!
```

```
!
!
!
!
!
license udi pid CISCO2811 sn FCZ094972BG
!
redundancy
!
!
!
class-map match-any AutoQoS-VoIP-Remark
 match ip dscp ef
 match ip dscp cs3
 match ip dscp af31
class-map match-any AutoQoS-VoIP-Control-UnTrust
 match access-group name AutoQoS-VoIP-Control
class-map match-any AutoQoS-VoIP-RTP-UnTrust
 match protocol rtp audio
 match access-group name AutoQoS-VoIP-RTCP
!
policy-map AutoQoS-Policy-UnTrust
 class AutoQoS-VoIP-RTP-UnTrust
  priority percent 70
  set dscp ef
 class AutoQoS-VoIP-Control-UnTrust
  bandwidth percent 5
  set dscp af31
 class AutoQoS-VoIP-Remark
  set dscp default
 class class-default
  fair-queue
!
!
```

```
!
interface FastEthernet0/0
 ip address 10.0.1.1 255.255.255.0
 duplex auto
 speed auto
!
interface FastEthernet0/1
 no ip address
 shutdown
 duplex auto
 speed auto
!
interface Serial0/0/0
 bandwidth 128
 ip address 10.0.12.1 255.255.255.0
!
```

```
!
!
interface Multilink6
 bandwidth 128
 ip address 10.0.12.1 255.255.255.0
 ip tcp header-compression iphc-format
 ppp multilink
 ppp multilink interleave
 ppp multilink group 6
 ppp multilink fragment delay 10
 service-policy output AutoQoS-Policy-UnTrust
 ip rtp header-compression iphc-format
!
interface FastEthernet0/0
 ip address 10.0.1.1 255.255.255.0
 duplex auto
 speed auto
!
interface FastEthernet0/1
 no ip address
 shutdown
 duplex auto
 speed auto
!
interface Serial0/0/0
 bandwidth 128
 ip address 10.0.12.1 255.255.255.0
 encapsulation ppp
 auto qos voip
 ppp multilink
 ppp multilink group 6
!
```

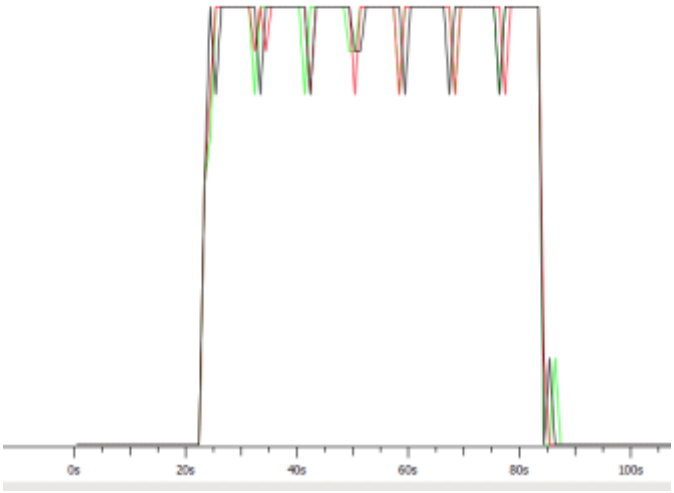


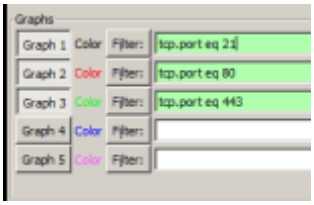
```
!
interface Vlan1
 no ip address
!
ip forward-protocol nd
no ip http server
no ip http secure-server
!
!
ip route 10.0.2.0 255.255.255.0 10.0.12.2
ip route 10.0.12.0 255.255.255.0 10.0.12.2
!
!
!
!
control-plane
!
 !
 !
 !
 !
```

```
!
interface Vlan1
 no ip address
!
ip forward-protocol nd
no ip http server
no ip http secure-server
!
!
ip route 10.0.2.0 255.255.255.0 10.0.12.2
ip route 10.0.12.0 255.255.255.0 10.0.12.2
!
ip access-list extended AutoQoS-VoIP-Control
 permit tcp any any eq 1720
 permit tcp any any range 11000 11999
 permit udp any any eq 2427
 permit tcp any any eq 2428
 permit tcp any any range 2000 2002
 permit udp any any eq 1719
 permit udp any any eq 5060
ip access-list extended AutoQoS-VoIP-RTCP
 permit udp any any range 16384 32767
!
!
!
!
control-plane
!
rmon event 33333 log trap AutoQoS description "AutoQoS SNMP traps for Voice Drops" owner AutoQoS
 !
 !
 !
 !
```

Úloha č.2

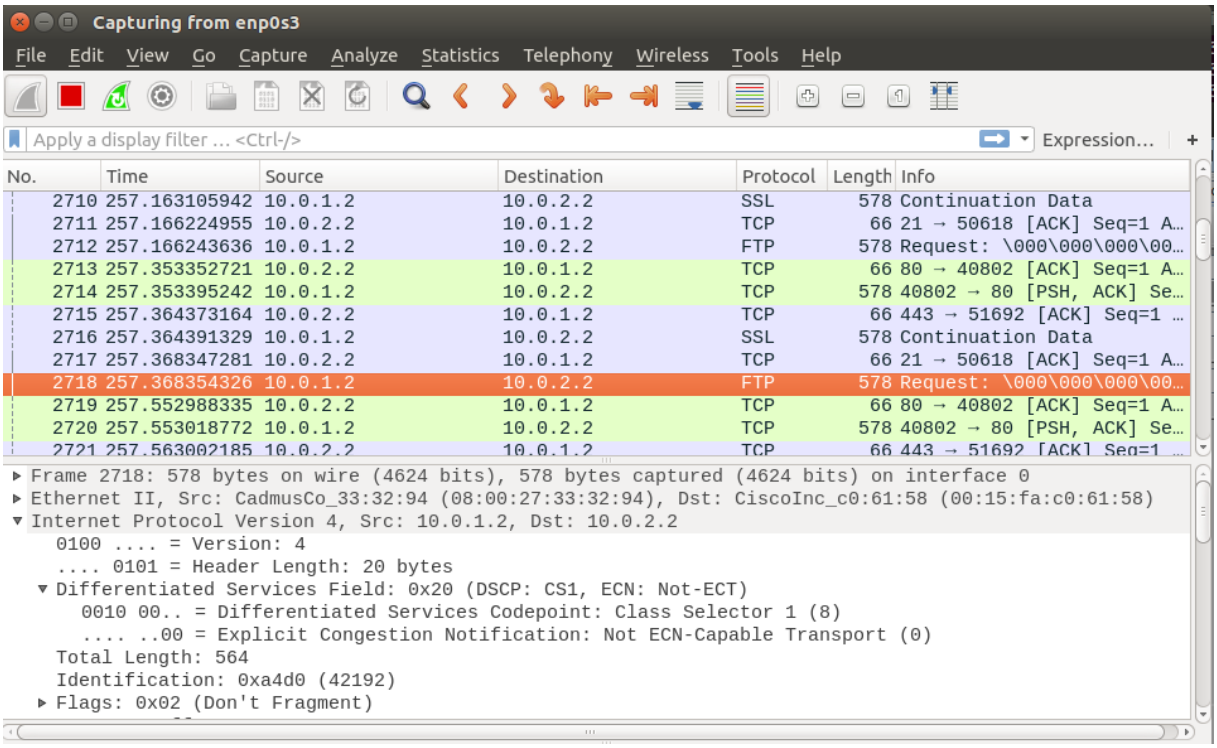
V úlohe č.2 sme mali za úlohu značkovať (DSCP) protokoly FTP, HTTP, S-FTP, HTTPS. V D-ITG sme vygenerovali túto prevádzku, ktorú sme taktiež aj značkovali (Linux host PC).

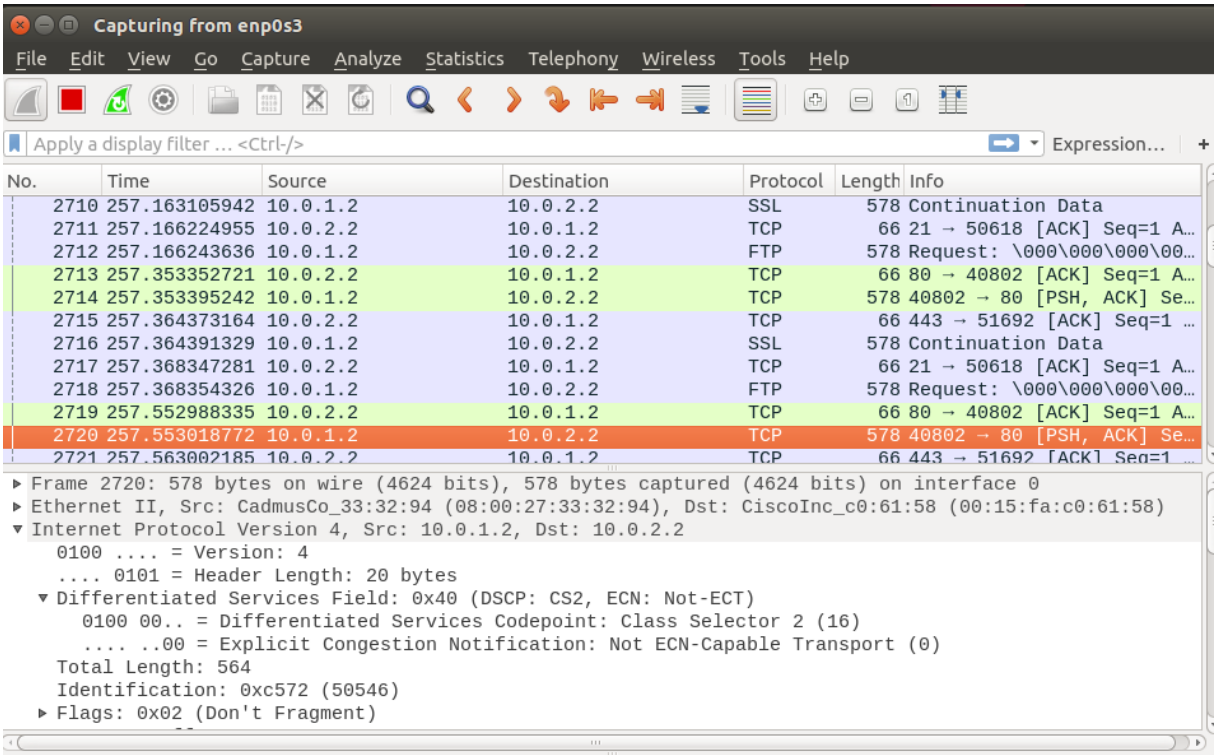


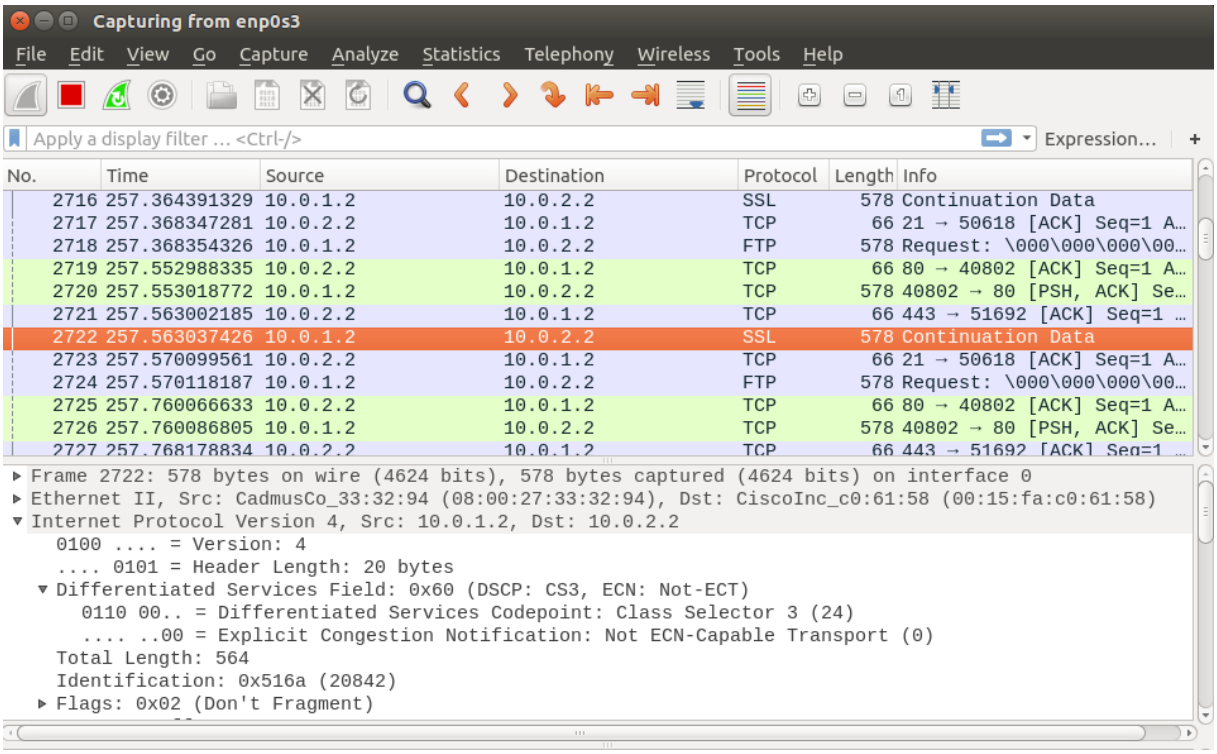


Značkované pakety sme následne overili aj na smerovači (ip nbar protocol-discovery na Fa0/0) aj vo Wiresharku.

```
Router#sh ip nbar port-map
port-map bittorrent                udp 3724
port-map bittorrent                tcp 3724 1080 6969 6881 6882 6883 6884 6885 68
86 6887 6888 6889
port-map citrix                    udp 1604
port-map citrix                    tcp 2598 2512 2513 1494
port-map cuseeme                   udp 7648 7649 24032
port-map cuseeme                   tcp 7648 7649
port-map dhcp                      udp 67 68
port-map directconnect             tcp 411 412 413
port-map dns                       udp 53
port-map dns                       tcp 53
port-map edonkey                   tcp 4662
port-map exchange                  tcp 135
port-map fasttrack                 tcp 1214
port-map ftp                       tcp 21
port-map gnutella                  udp 6346 6347 6348
port-map gnutella                  tcp 6346 6347 6348 6349 6355 5634
port-map h323                      udp 1300 1718 1719 1720 11720
port-map h323                      tcp 1300 1718 1719 1720 11000 - 11999
port-map http                      tcp 80
port-map imap                      tcp 143 220
port-map irc                       tcp 80
port-map kazaa2                    tcp 80
port-map mgcp                      udp 2427 2727
port-map mgcp                      tcp 2427 2428 2727
port-map netbios                   udp 137 138
port-map netbios                   tcp 139 137
port-map netshow                   tcp 1755
port-map nntp                      udp 119
port-map nntp                      tcp 119
port-map novadigm                  udp 3460 3461 3462 3463 3464 3465
port-map novadigm                  tcp 3460 3461 3462 3463 3464 3465
port-map ntp                       udp 123
port-map pcanywhere                udp 22 5632
port-map pcanywhere                tcp 65301 5631
port-map pop3                      tcp 110
port-map pptp                      tcp 1723
port-map rsvp                      udp 1698 1699
port-map rtsp                      tcp 554 8554
port-map sap                       tcp 3200 3300 3600
port-map secure-http               tcp 443
port-map sip                       udp 5060
port-map sip                       tcp 5060
port-map skinny                    tcp 2000 2001 2002
port-map smtp                      tcp 25 587
port-map socks                     tcp 1080
port-map sqlnet                    tcp 1521
port-map streamwork                udp 1558
port-map sunrpc                    udp 111
```


Capturing from enp0s3
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help
Apply a display filter ... <Ctrl-/>
Expression...
No. Time Source Destination Protocol Length Info
2710 257.163105942 10.0.1.2 10.0.2.2 SSL 578 Continuation Data
2711 257.166224955 10.0.2.2 10.0.1.2 TCP 66 21 → 50618 [ACK] Seq=1 A…
2712 257.166243636 10.0.1.2 10.0.2.2 FTP 578 Request: \000\000\000\00…
2713 257.353352721 10.0.2.2 10.0.1.2 TCP 66 80 → 40802 [ACK] Seq=1 A…
2714 257.353395242 10.0.1.2 10.0.2.2 TCP 578 40802 → 80 [PSH, ACK] Se…
2715 257.364373164 10.0.2.2 10.0.1.2 TCP 66 443 → 51692 [ACK] Seq=1 …
2716 257.364391329 10.0.1.2 10.0.2.2 SSL 578 Continuation Data
2717 257.368347281 10.0.2.2 10.0.1.2 TCP 66 21 → 50618 [ACK] Seq=1 A…
2718 257.368354326 10.0.1.2 10.0.2.2 FTP 578 Request: \000\000\000\00…
2719 257.552988335 10.0.2.2 10.0.1.2 TCP 66 80 → 40802 [ACK] Seq=1 A…
2720 257.553018772 10.0.1.2 10.0.2.2 TCP 578 40802 → 80 [PSH, ACK] Se…
2721 257.563002185 10.0.2.2 10.0.1.2 TCP 66 443 → 51692 [ACK] Seq=1 …
Frame 2718: 578 bytes on wire (4624 bits), 578 bytes captured (4624 bits) on interface 0
Ethernet II, Src: CadmusCo_33:32:94 (08:00:27:33:32:94), Dst: CiscoInc_c0:61:58 (00:15:fa:c0:61:58)
Internet Protocol Version 4, Src: 10.0.1.2, Dst: 10.0.2.2
0100 .... = Version: 4
.... 0101 = Header Length: 20 bytes
Differentiated Services Field: 0x20 (DSCP: CS1, ECN: Not-ECT)
0010 00.. = Differentiated Services Codepoint: Class Selector 1 (8)
.... ..00 = Explicit Congestion Notification: Not ECN-Capable Transport (0)
Total Length: 564
Identification: 0xa4d0 (42192)
Flags: 0x02 (Don't Fragment)


Capturing from enp0s3
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help
Apply a display filter ... <Ctrl-/>
Expression...
No. Time Source Destination Protocol Length Info
2710 257.163105942 10.0.1.2 10.0.2.2 SSL 578 Continuation Data
2711 257.166224955 10.0.2.2 10.0.1.2 TCP 66 21 → 50618 [ACK] Seq=1 A…
2712 257.166243636 10.0.1.2 10.0.2.2 FTP 578 Request: \000\000\000\00…
2713 257.353352721 10.0.2.2 10.0.1.2 TCP 66 80 → 40802 [ACK] Seq=1 A…
2714 257.353395242 10.0.1.2 10.0.2.2 TCP 578 40802 → 80 [PSH, ACK] Se…
2715 257.364373164 10.0.2.2 10.0.1.2 TCP 66 443 → 51692 [ACK] Seq=1 …
2716 257.364391329 10.0.1.2 10.0.2.2 SSL 578 Continuation Data
2717 257.368347281 10.0.2.2 10.0.1.2 TCP 66 21 → 50618 [ACK] Seq=1 A…
2718 257.368354326 10.0.1.2 10.0.2.2 FTP 578 Request: \000\000\000\00…
2719 257.552988335 10.0.2.2 10.0.1.2 TCP 66 80 → 40802 [ACK] Seq=1 A…
2720 257.553018772 10.0.1.2 10.0.2.2 TCP 578 40802 → 80 [PSH, ACK] Se…
2721 257.563002185 10.0.2.2 10.0.1.2 TCP 66 443 → 51692 [ACK] Seq=1 …
Frame 2720: 578 bytes on wire (4624 bits), 578 bytes captured (4624 bits) on interface 0
Ethernet II, Src: CadmusCo_33:32:94 (08:00:27:33:32:94), Dst: CiscoInc_c0:61:58 (00:15:fa:c0:61:58)
Internet Protocol Version 4, Src: 10.0.1.2, Dst: 10.0.2.2
0100 .... = Version: 4
.... 0101 = Header Length: 20 bytes
Differentiated Services Field: 0x40 (DSCP: CS2, ECN: Not-ECT)
0100 00.. = Differentiated Services Codepoint: Class Selector 2 (16)
.... ..00 = Explicit Congestion Notification: Not ECN-Capable Transport (0)
Total Length: 564
Identification: 0xc572 (50546)
Flags: 0x02 (Don't Fragment)



Úloha 3. (NBAR)

Pomocou príkazu *s hip nbar protocol-discovery* sme zistili, ktoré protokoly smerovač rozpoznal a zobrazili ich štatistiku.

```
Router(config-if)#do sh ip nbar protocol-discovery

 Serial0/0/0

 Last clearing of "show ip nbar protocol-discovery" counters 00:04:22


                             Input                    Output
                             -----                    ------
   Protocol                  Packet Count             Packet Count
                             Byte Count               Byte Count
                             5min Bit Rate (bps)      5min Bit Rate (bps)
                             5min Max Bit Rate (bps)  5min Max Bit Rate (bps)
   ------------------------  -----------------------  -----------------------
   secure-http               319                      315
                             183240                   17652
                             0                        0
                             15000                    2000
   ftp                       319                      317
                             182728                   17752
                             0                        0
                             15000                    2000
   ssh                       22                       21
                             12496                    1176
                             0                        0
                             0                        0
   unknown                   356                      340
                             185591                   19191
                             0                        0
                             15000                    2000
   Total                     1016                     993
                             564055                   55771
                             0                        0
                             45000                    6000
Router(config-if)#
```