Тема: Настройка агрегирования каналов

1) Для заданной на схеме schema-lab3 сети, состоящей из управляемых коммутаторов и персональных компьютеров настроить на коммутаторах протокол LACP агрегирования каналов технологии EtherChannel.

Настроим протокол LACP между 1 и 2 коммутатором. Порты между коммутаторами с обоих сторон: Ethernet0 (Gi 0/0), Ethernet1 (Gi 0/1), Ethernet8 (Gi 2/0).

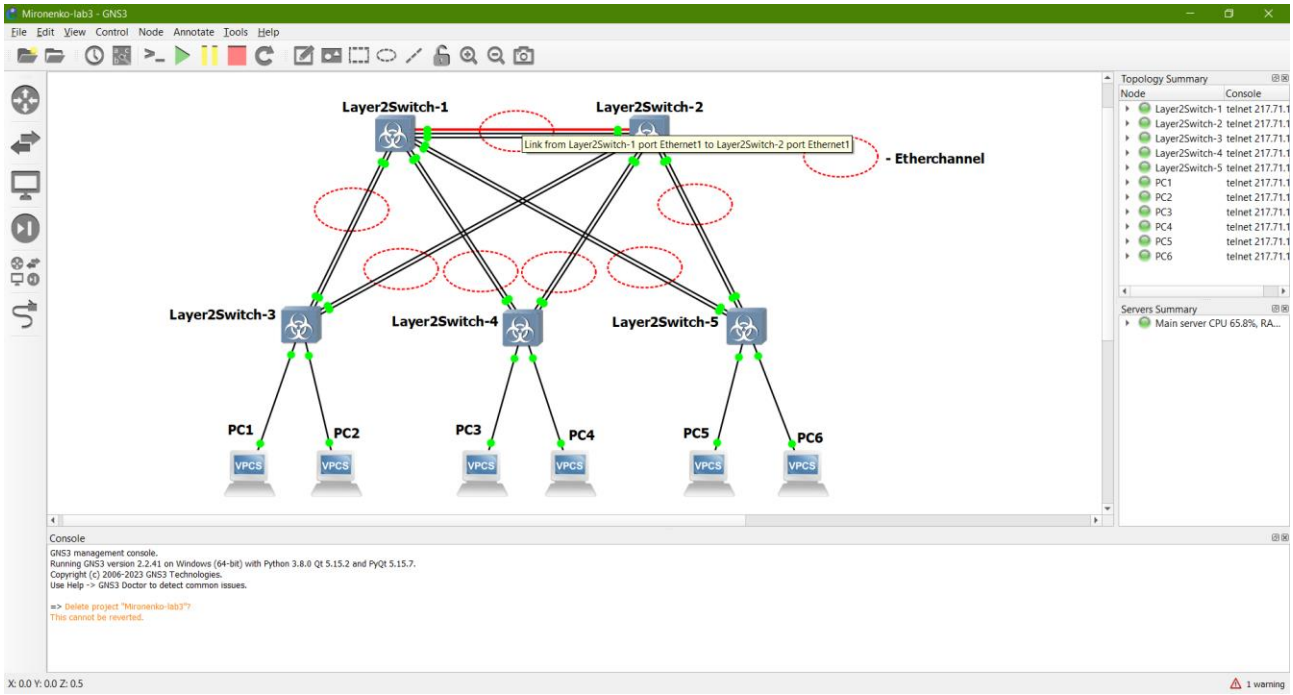

Рисунок 1 - Настройка LACP

Ниже представлена настройка etherchannel на коммутаторах. В качестве номера группы берется число, по направлению к какому коммутатору находится группа портов.

На 1 коммутаторе *no shutdown* выполняется после настройки на 2 коммутаторе.

```
vIOS-L2-01#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
vIOS-L2-01(config)#hostname S1
S1(config)#int
S1(config)#interface rn
S1(config)#interface ra
S1(config)#interface range Gi
S1(config)#interface range GigabitEthernet 0/0-1, G
S1(config)#interface range GigabitEthernet 0/0-1, GigabitEthernet 2/0
S1(config-if-range)#shut
S1(config-if-range)#shutdown
S1(config-if-range)#
*Aug  8 07:51:54.283: %LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to administratively down
*Aug  8 07:51:54.308: %LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to administratively down
*Aug  8 07:51:54.333: %LINK-5-CHANGED: Interface GigabitEthernet2/0, changed state to administratively down
*Aug  8 07:51:55.283: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to do
wn
S1(config-if-range)#
*Aug  8 07:51:55.308: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to do
wn
*Aug  8 07:51:55.333: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet2/0, changed state to do
wn
S1(config-if-range)#ch
S1(config-if-range)#channel-g
S1(config-if-range)#channel-group 2 mode active
Creating a port-channel interface Port-channel 2

S1(config-if-range)#no sht
S1(config-if-range)#no shu
S1(config-if-range)#no shutdown
S1(config-if-range)#
*Aug  8 07:53:23.744: %LINK-3-UPDOWN: Interface GigabitEthernet0/0, changed state to up
*Aug  8 07:53:23.886: %LINK-3-UPDOWN: Interface GigabitEthernet0/1, changed state to up
*Aug  8 07:53:24.027: %LINK-3-UPDOWN: Interface GigabitEthernet2/0, changed state to up
*Aug  8 07:53:24.744: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up
S1(config-if-range)#
*Aug  8 07:53:24.886: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up
*Aug  8 07:53:25.027: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet2/0, changed state to up
S1(config-if-range)#
```

Рисунок 2 - Настройка etherchannel на 1 коммутаторе

```
* This software is provided as is without warranty for internal          *
* development and testing purposes only under the terms of the Cisco     *
* Early Field Trial agreement.  Under no circumstances may this software *
* be used for production purposes or deployed in a production            *
* environment.                                                           *
*                                                                        *
* By using the software, you agree to abide by the terms and conditions  *
* of the Cisco Early Field Trial Agreement as well as the terms and      *
* conditions of the Cisco End User License Agreement at                  *
* http://www.cisco.com/go/eula                                           *
*                                                                        *
* Unauthorized use or distribution of this software is expressly         *
* Prohibited.                                                            *
**************************************************************************
vIOS-L2-01>en
vIOS-L2-01#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
vIOS-L2-01(config)#hostname S2
S2(config)#int ran gi 0/0-1, gi 2/0
S2(config-if-range)#ch
S2(config-if-range)#channel-gro
S2(config-if-range)#channel-group 1 mode active
Creating a port-channel interface Port-channel 1

S2(config-if-range)#end
S2#
*Aug  8 07:53:14.656: %SYS-5-CONFIG_I: Configured from console by console
S2#
*Aug  8 07:53:16.564: %EC-5-L3DONTBNDL2: Gi2/0 suspended: LACP currently not enabled on the remote port.
*Aug  8 07:53:16.664: %EC-5-L3DONTBNDL2: Gi0/0 suspended: LACP currently not enabled on the remote port.
*Aug  8 07:53:16.677: %EC-5-L3DONTBNDL2: Gi0/1 suspended: LACP currently not enabled on the remote port.
S2#
*Aug  8 07:53:21.954: %EC-5-CANNOT_BUNDLE2: Gi0/0 is not compatible with Gi0/1 and will be suspended (trunk m
ode of Gi0/0 is access, Gi0/1 is trunk)
*Aug  8 07:53:21.954: %EC-5-CANNOT_BUNDLE2: Gi0/1 is not compatible with Gi2/0 and will be suspended (trunk m
ode of Gi0/1 is access, Gi2/0 is trunk)
S2#
*Aug  8 07:53:29.808: %LINEPROTO-5-UPDOWN: Line protocol on Interface Port-channel1, changed state to up
S2#
```

Рисунок 3 - Настройка etherchannel на 2 коммутаторе

Аналогичные действия проводятся с остальными коммутаторами.

```
S1(config)#int ran gi 1/2-3
S1(config-if-range)#ch
S1(config-if-range)#channel-g
S1(config-if-range)#channel-group 5 mode active
Creating a port-channel interface Port-channel 5

S1(config-if-range)#
*Aug  8 08:30:26.099: %EC-5-L3DONTBNDL2: Gi1/3 suspended: LACP currently not enabled on the remote port.
*Aug  8 08:30:27.002: %EC-5-L3DONTBNDL2: Gi1/2 suspended: LACP currently not enabled on the remote port.
S1(config-if-range)#end
S1#
*Aug  8 08:30:52.764: %LINEPROTO-5-UPDOWN: Line protocol on Interface Port-channel5, changed state to up
*Aug  8 08:30:53.607: %SYS-5-CONFIG_I: Configured from console by console
S1#show etherc
S1#show etherchannel s
S1#show etherchannel summary
Flags:  D - down        P - bundled in port-channel
        I - stand-alone s - suspended
        H - Hot-standby (LACP only)
        R - Layer3      S - Layer2
        U - in use      f - failed to allocate aggregator

        M - not in use, minimum links not met
        u - unsuitable for bundling
        w - waiting to be aggregated
        d - default port


Number of channel-groups in use: 4
Number of aggregators:           4

Group  Port-channel  Protocol    Ports
------+-------------+-----------+-----------------------------------------------
2      Po2(SU)         LACP      Gi0/0(P)    Gi0/1(P)    Gi2/0(P)
3      Po3(SU)         LACP      Gi0/2(P)    Gi0/3(P)
4      Po4(SU)         LACP      Gi1/0(P)    Gi1/1(P)
5      Po5(SU)         LACP      Gi1/2(P)    Gi1/3(P)

S1#
```

Рисунок 4 - результат настройки на 1 коммутаторе

```
S2#
S2#
S2#
S2#
S2#
S2#
S2#
S2#
S2#
S2#
S2#
S2#
S2#
S2#
S2#
S2#show etherc
S2#show etherchannel s
S2#show etherchannel summary
Flags:  D - down        P - bundled in port-channel
        I - stand-alone s - suspended
        H - Hot-standby (LACP only)
        R - Layer3      S - Layer2
        U - in use      f - failed to allocate aggregator

        M - not in use, minimum links not met
        u - unsuitable for bundling
        w - waiting to be aggregated
        d - default port


Number of channel-groups in use: 4
Number of aggregators:           4

Group  Port-channel  Protocol    Ports
------+-------------+-----------+-----------------------------------------------
1      Po1(SU)         LACP      Gi0/0(P)    Gi0/1(P)    Gi2/0(P)
3      Po3(SU)         LACP      Gi0/2(P)    Gi0/3(P)
4      Po4(SU)         LACP      Gi1/0(P)    Gi1/1(P)
5      Po5(SU)         LACP      Gi1/2(P)    Gi1/3(P)

S2#
```

Рисунок 5 - результат настройки на 2 коммутаторе

```
        M - not in use, minimum links not met
        u - unsuitable for bundling
        w - waiting to be aggregated
        d - default port


Number of channel-groups in use: 2
Number of aggregators:           2

Group  Port-channel  Protocol    Ports
------+-------------+-----------+-----------------------------------------------
1      Po1(SU)         LACP      Gi0/0(P)    Gi0/1(P)
2      Po2(SU)         LACP      Gi0/2(P)    Gi0/3(P)

S3#show etherchannel summary
Flags:  D - down        P - bundled in port-channel
        I - stand-alone s - suspended
        H - Hot-standby (LACP only)
        R - Layer3      S - Layer2
        U - in use      f - failed to allocate aggregator

        M - not in use, minimum links not met
        u - unsuitable for bundling
        w - waiting to be aggregated
        d - default port


Number of channel-groups in use: 2
Number of aggregators:           2

Group  Port-channel  Protocol    Ports
------+-------------+-----------+-----------------------------------------------
1      Po1(SU)         LACP      Gi0/0(P)    Gi0/1(P)
2      Po2(SU)         LACP      Gi0/2(P)    Gi0/3(P)

S3#
*Aug  8 09:02:28.152: %IDBMAN-3-INVALIDAGGPORTBANDWIDTH: Port-channel2(16 / 0) has an invalid bandwidth value
 of 0
S3#
```

Рисунок 6 - результат настройки на 3 коммутаторе

```
Number of channel-groups in use: 2
Number of aggregators:           2

Group  Port-channel  Protocol    Ports
------+-------------+-----------+-----------------------------------------------
1      Po1(SU)         LACP      Gi0/0(P)    Gi0/1(P)
2      Po2(SU)         LACP      Gi0/2(P)    Gi0/3(P)

S4#copy ru
S4#copy running-config st
S4#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
Compressed configuration from 5225 bytes to 2022 bytes[OK]
S4#
*Aug  8 08:57:02.583: %GRUB-5-CONFIG_WRITING: GRUB configuration is being updated on disk. Please wait...
*Aug  8 08:57:03.287: %GRUB-5-CONFIG_WRITTEN: GRUB configuration was written to disk successfully.
S4#show etherchannel summary
Flags:  D - down        P - bundled in port-channel
        I - stand-alone s - suspended
        H - Hot-standby (LACP only)
        R - Layer3      S - Layer2
        U - in use      f - failed to allocate aggregator

        M - not in use, minimum links not met
        u - unsuitable for bundling
        w - waiting to be aggregated
        d - default port


Number of channel-groups in use: 2
Number of aggregators:           2

Group  Port-channel  Protocol    Ports
------+-------------+-----------+-----------------------------------------------
1      Po1(SU)         LACP      Gi0/0(P)    Gi0/1(P)
2      Po2(SU)         LACP      Gi0/2(P)    Gi0/3(P)

S4#
```

Рисунок 7 - результат настройки на 4 коммутаторе

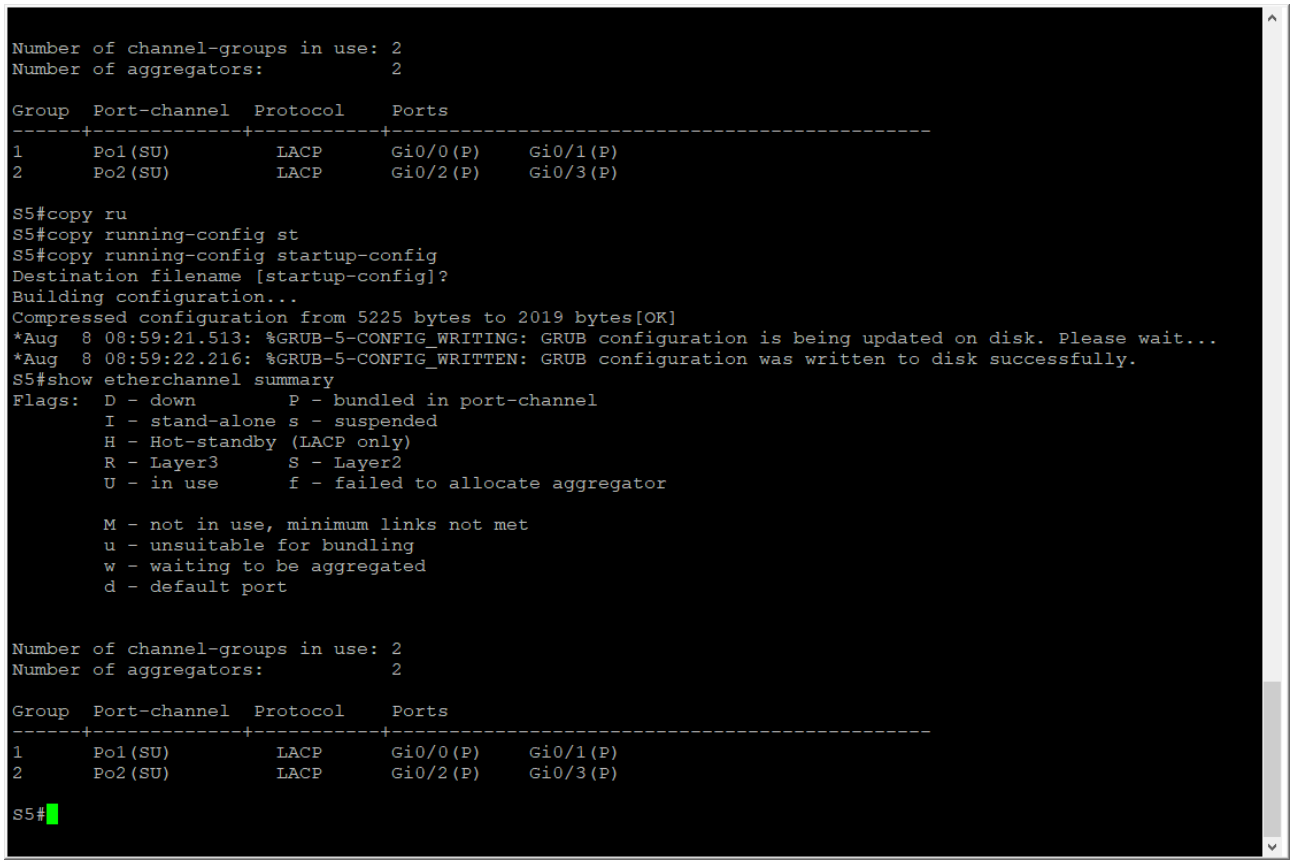

Рисунок 8 - результат настройки на 5 коммутаторе

Проверка доступности ПК: PC1 (10.0.0.1) пингует PC6 (10.0.0.6):

```
                  of the subnet. In the example above the tapx ip would be
                  10.1.1.126
                  mask may be written as /26, 26 or 255.255.255.192
    auto          Attempt to obtain IPv6 address, mask and gateway using SLAAC
    dhcp [OPTION] Attempt to obtain IPv4 address, mask, gateway, DNS via DHCP
         -d         Show DHCP packet decode
         -r         Renew DHCP lease
         -x         Release DHCP lease
    dns ip        Set DNS server ip, delete if ip is '0'
    dns6 ipv6     Set DNS server ipv6, delete if ipv6 is '0'
    domain NAME   Set local domain name to NAME

PC1> show ip

NAME        : PC1[1]
IP/MASK     : 0.0.0.0/0
GATEWAY     : 0.0.0.0
DNS         :
MAC         : 00:50:79:66:68:03
LPORT       : 20170
RHOST:PORT  : 127.0.0.1:20171
MTU         : 1500

PC1> ip 10.0.0.1
Checking for duplicate address...
PC1 : 10.0.0.1 255.255.255.0

PC1> save
Saving startup configuration to startup.vpc
.  done

PC1> ping 10.0.0.6

84 bytes from 10.0.0.6 icmp_seq=1 ttl=64 time=12.986 ms
84 bytes from 10.0.0.6 icmp_seq=2 ttl=64 time=9.406 ms
84 bytes from 10.0.0.6 icmp_seq=3 ttl=64 time=13.721 ms
84 bytes from 10.0.0.6 icmp_seq=4 ttl=64 time=6.809 ms
84 bytes from 10.0.0.6 icmp_seq=5 ttl=64 time=10.508 ms

PC1>
```

Рисунок 9 - PC1 -> PC6

2) Изменяя режим работы групп портов в режиме агрегирования произвольных соседних коммутаторов проверить работоспособность режима агрегации.

Будет меняться режим работы портов между 1 и 2 коммутаторами (active -> passive).

```
S1(config)#int ran gi 0/0-1, gi 2/0
S1(config-if-range)#shutdown
S1(config-if-range)#ch
S1(config-if-range)#channel-
*Aug  8 09:10:33.175: %IDBMAN-3-INVALIDAGGPORTBANDWIDTH: Port-channel2(16 / 3) has an invalid bandwidth value
 of 0
*Aug  8 09:10:33.203: %IDBMAN-3-PORTNOTINAGGPORT: GigabitEthernet0/1(0 / 1) is not present in Aggport Port-ch
annel2(16 / 3)
*Aug  8 09:10:33.228: %IDBMAN-3-PORTNOTINAGGPORT: GigabitEthernet2/0(2 / 0) is not present in Aggport Port-ch
annel2(16 / 3)
S1(config-if-range)#channel-g
S1(config-if-range)#channel-group
*Aug  8 09:10:35.149: %LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to administratively down
*Aug  8 09:10:35.178: %LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to administratively down
*Aug  8 09:10:35.203: %LINK-5-CHANGED: Interface GigabitEthernet2/0, changed state to administratively down
S1(config-if-range)#channel-group 2
*Aug  8 09:10:35.228: %LINK-3-UPDOWN: Interface Port-channel2, changed state to down
S1(config-if-range)#channel-group 2 mode
*Aug  8 09:10:36.149: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to do
wn
*Aug  8 09:10:36.178: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to do
wn
*Aug  8 09:10:36.203: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet2/0, changed state to do
wn
*Aug  8 09:10:36.228: %LINEPROTO-5-UPDOWN: Line protocol on Interface Port-channel2, changed state to down
S1(config-if-range)#channel-group 2 mode passive
S1(config-if-range)#no shutd
S1(config-if-range)#no shutdown
S1(config-if-range)#end
S1#
*Aug  8 09:10:47.315: %SYS-5-CONFIG_I: Configured from console by console
S1#
*Aug  8 09:10:47.344: %LINK-3-UPDOWN: Interface GigabitEthernet0/0, changed state to up
*Aug  8 09:10:47.481: %LINK-3-UPDOWN: Interface GigabitEthernet0/1, changed state to up
*Aug  8 09:10:47.618: %LINK-3-UPDOWN: Interface GigabitEthernet2/0, changed state to up
*Aug  8 09:10:48.344: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up
S1#
*Aug  8 09:10:48.481: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up
*Aug  8 09:10:48.618: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet2/0, changed state to up
S1#
```

Рисунок 10 - Изменение работы 2 группы 1 коммутатора на passive

```
*Aug  8 09:10:56.836: %EC-5-L3DONTBNDL2: Gi0/0 suspended: LACP currently not enabled on the remote port.
*Aug  8 09:10:57.049: %EC-5-L3DONTBNDL2: Gi2/0 suspended: LACP currently not enabled on the remote port.
S1#
*Aug  8 09:10:58.506: %IDBMAN-3-INVALIDAGGPORTBANDWIDTH: Port-channel2(16 / 3) has an invalid bandwidth value
 of 0
S1#
*Aug  8 09:11:00.506: %LINK-3-UPDOWN: Interface Port-channel2, changed state to up
*Aug  8 09:11:01.506: %LINEPROTO-5-UPDOWN: Line protocol on Interface Port-channel2, changed state to up
S1#
*Aug  8 09:11:06.025: %IDBMAN-3-INVALIDAGGPORTBANDWIDTH: Port-channel2(16 / 3) has an invalid bandwidth value
 of 0
*Aug  8 09:11:06.285: %IDBMAN-3-INVALIDAGGPORTBANDWIDTH: Port-channel2(16 / 3) has an invalid bandwidth value
 of 0
S1#show etehrc
S1#show etherc
S1#show etherchannel s
S1#show etherchannel summary
Flags:  D - down        P - bundled in port-channel
        I - stand-alone s - suspended
        H - Hot-standby (LACP only)
        R - Layer3      S - Layer2
        U - in use      f - failed to allocate aggregator

        M - not in use, minimum links not met
        u - unsuitable for bundling
        w - waiting to be aggregated
        d - default port


Number of channel-groups in use: 4
Number of aggregators:           4

Group  Port-channel  Protocol    Ports
------+-------------+-----------+-----------------------------------------------
2      Po2(SU)         LACP      Gi0/0(P)    Gi0/1(P)    Gi2/0(P)
3      Po3(SU)         LACP      Gi0/2(P)    Gi0/3(P)
4      Po4(SU)         LACP      Gi1/0(P)    Gi1/1(P)
5      Po5(SU)         LACP      Gi1/2(P)    Gi1/3(P)

S1#
```

Рисунок 11 - Соединение etherchannel активно

```
*Aug  8 09:12:49.500: %EC-5-CANNOT_BUNDLE2: Gi0/3 is not compatible with Gi0/2 and will be suspended (trunk m
ode of Gi0/3 is access, Gi0/2 is trunk)
S2#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
S2(config)#int ran gi
*Aug  8 09:13:26.860: %IDBMAN-3-AGGPORTMISMATCH: idbman_add_port_to_agport: Port-channel3(16 / 1) does match
internal slot/port state GigabitEthernet0/1(0 / 1)
S2(config)#int ran gi 0/0-1, gi 2/0
S2(config-if-range)#ch
S2(config-if-range)#channel-g
S2(config-if-range)#shutdown
S2(config-if-range)#
*Aug  8 09:13:47.325: %IDBMAN-3-PORTNOTINAGGPORT: GigabitEthernet0/0(0 / 0) is not present in Aggport Port-ch
annel1(16 / 0)
*Aug  8 09:13:47.351: %IDBMAN-3-PORTNOTINAGGPORT: GigabitEthernet0/1(0 / 1) is not present in Aggport Port-ch
annel1(16 / 0)
*Aug  8 09:13:47.375: %IDBMAN-3-PORTNOTINAGGPORT: GigabitEthernet2/0(2 / 0) is not present in Aggport Port-ch
annel1(16 / 0)
S2(config-if-range)#
*Aug  8 09:13:49.301: %LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to administratively down
*Aug  8 09:13:49.326: %LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to administratively down
*Aug  8 09:13:49.351: %LINK-5-CHANGED: Interface GigabitEthernet2/0, changed state to administratively down
S2(config-if-range)#c
*Aug  8 09:13:49.376: %LINK-3-UPDOWN: Interface Port-channel1, changed state to down
S2(config-if-range)#ch
S2(config-if-range)#channel-g
*Aug  8 09:13:50.301: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to do
wn
*Aug  8 09:13:50.326: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to do
wn
*Aug  8 09:13:50.351: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet2/0, changed state to do
wn
*Aug  8 09:13:50.376: %LINEPROTO-5-UPDOWN: Line protocol on Interface Port-channel1, changed state to down
S2(config-if-range)#channel-g
S2(config-if-range)#channel-group 1 mode passive
S2(config-if-range)#no shutdown
S2(config-if-range)#end
S2#
*Aug  8 09:14:11.381: %SYS-5-CONFIG_I: Configured from console by console
S2#
```

Рисунок 12 - Изменение работы 1 группы 2 коммутатора на passive

```
S1#
*Aug  8 09:14:18.618: %IDBMAN-3-PORTNOTINAGGPORT: GigabitEthernet0/1(0 / 1) is not present in Aggport Port-ch
annel2(16 / 3)
*Aug  8 09:14:18.619: %IDBMAN-3-PORTNOTINAGGPORT: GigabitEthernet0/0(0 / 0) is not present in Aggport Port-ch
annel2(16 / 3)
*Aug  8 09:14:18.756: %IDBMAN-3-PORTNOTINAGGPORT: GigabitEthernet2/0(2 / 0) is not present in Aggport Port-ch
annel2(16 / 3)
S1#
*Aug  8 09:14:20.756: %LINK-3-UPDOWN: Interface Port-channel2, changed state to down
*Aug  8 09:14:21.756: %LINEPROTO-5-UPDOWN: Line protocol on Interface Port-channel2, changed state to down
S1#
*Aug  8 09:14:30.882: %EC-5-L3DONTBNDL2: Gi0/0 suspended: LACP currently not enabled on the remote port.
*Aug  8 09:14:31.423: %EC-5-L3DONTBNDL2: Gi0/1 suspended: LACP currently not enabled on the remote port.
*Aug  8 09:14:31.612: %EC-5-L3DONTBNDL2: Gi2/0 suspended: LACP currently not enabled on the remote port.
S1#show etherc
S1#show etherchannel s
S1#show etherchannel summary
Flags:  D - down        P - bundled in port-channel
        I - stand-alone s - suspended
        H - Hot-standby (LACP only)
        R - Layer3      S - Layer2
        U - in use      f - failed to allocate aggregator

        M - not in use, minimum links not met
        u - unsuitable for bundling
        w - waiting to be aggregated
        d - default port


Number of channel-groups in use: 4
Number of aggregators:           4

Group  Port-channel  Protocol    Ports
------+-------------+-----------+-----------------------------------------------
2      Po2(SD)         LACP      Gi0/0(s)    Gi0/1(s)    Gi2/0(s)
3      Po3(SU)         LACP      Gi0/2(P)    Gi0/3(P)
4      Po4(SU)         LACP      Gi1/0(P)    Gi1/1(P)
5      Po5(SU)         LACP      Gi1/2(P)    Gi1/3(P)

S1#
```

Рисунок 13 - etherchannel отключен на коммутаторе 1

```
        M - not in use, minimum links not met
        u - unsuitable for bundling
        w - waiting to be aggregated
        d - default port


Number of channel-groups in use: 4
Number of aggregators:           4

Group  Port-channel  Protocol    Ports
------+-------------+-----------+-----------------------------------------------
1      Po1(SD)         LACP      Gi0/0(s)    Gi0/1(s)    Gi2/0(s)
3      Po3(SU)         LACP      Gi0/2(P)    Gi0/3(P)
4      Po4(SU)         LACP      Gi1/0(P)    Gi1/1(P)
5      Po5(SU)         LACP      Gi1/2(P)    Gi1/3(P)

S2#show etherchannel summary
Flags:  D - down        P - bundled in port-channel
        I - stand-alone s - suspended
        H - Hot-standby (LACP only)
        R - Layer3      S - Layer2
        U - in use      f - failed to allocate aggregator

        M - not in use, minimum links not met
        u - unsuitable for bundling
        w - waiting to be aggregated
        d - default port


Number of channel-groups in use: 4
Number of aggregators:           4

Group  Port-channel  Protocol    Ports
------+-------------+-----------+-----------------------------------------------
1      Po1(SD)         LACP      Gi0/0(s)    Gi0/1(s)    Gi2/0(s)
3      Po3(SU)         LACP      Gi0/2(P)    Gi0/3(P)
4      Po4(SU)         LACP      Gi1/0(P)    Gi1/1(P)
5      Po5(SU)         LACP      Gi1/2(P)    Gi1/3(P)

S2#
```

Рисунок 14 - etherchannel отключен на коммутаторе 2

3) Получить статистику пакетов для портов коммутаторов, результаты сохранить в файл, создать некоторый трафик между различными персональными компьютерами, сохранить новую статистику (рекомендуется использовать таблицы excel или его opensource аналоги для наглядности).

Статистика пакетов выводится при помощи команды *show interfaces stats*. Для создания трафика используется команда *ping* между PC1 и PC6. Статистика сохраняется в файлы S1_1.log. Первая цифра – номер коммутатора, вторая (1 – до ping, 2 – после ping).

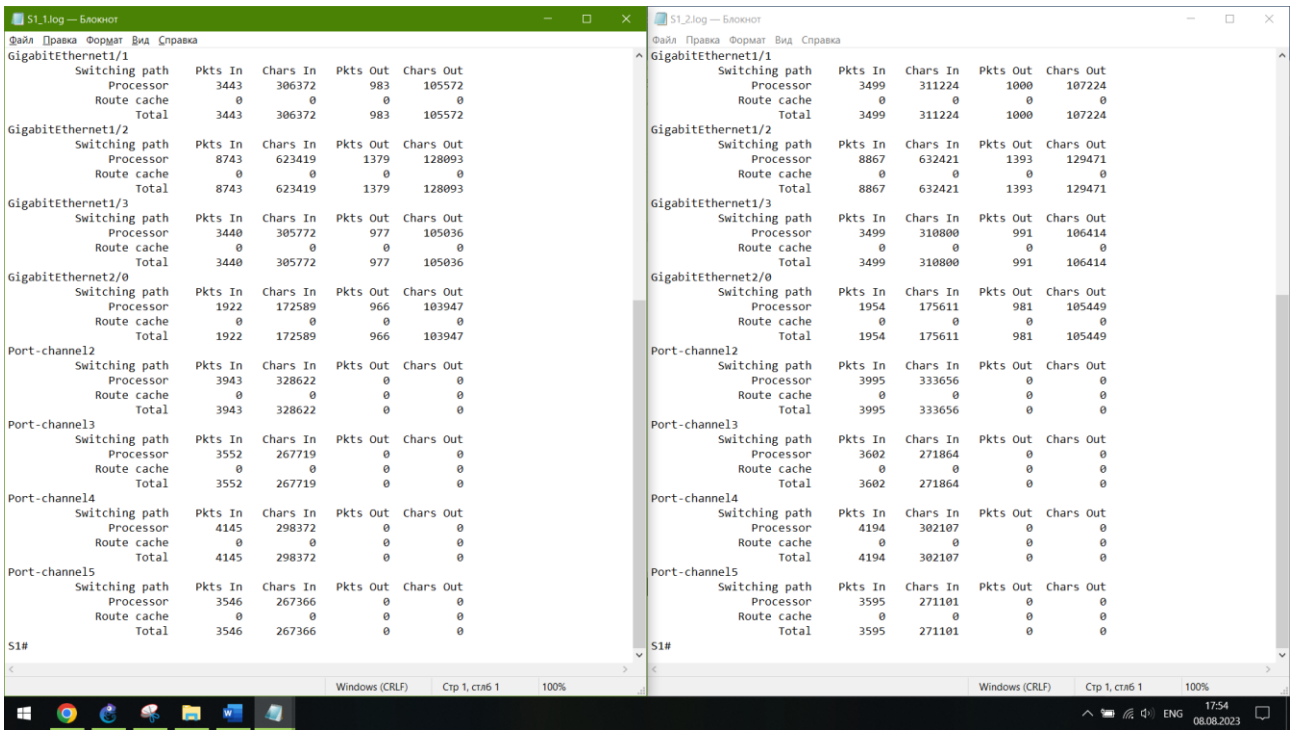

Рисунок 15 - статистика пакетов до и после ping

(Xlsx – файлы не открываются, результаты также выводились в csv – файлы, выбраны в конечном итоге log – файлы как более читаемые)

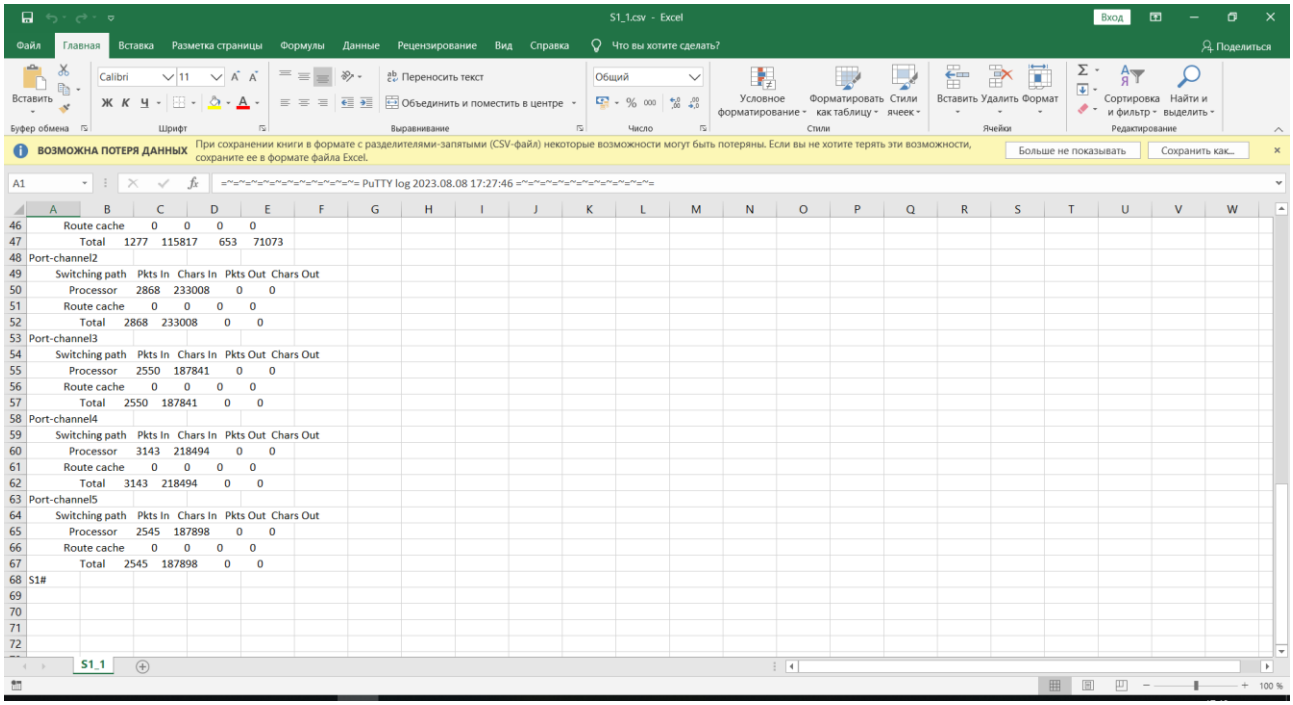

Рисунок 16 - вывод в csv

4) Сохранить файлы конфигураций устройств в виде набора файлов с именами, соответствующими именам устройств

Конфигурации сохранены в S*.conf.