



МІНІСТЕРСТВО ОСВІТИ І НАУКИ, МОЛОДІ ТА СПОРТУ УКРАЇНИ  
НАЦІОНАЛЬНИЙ ТЕХНІЧНИЙ УНІВЕРСИТЕТ УКРАЇНИ  
«КИЇВСЬКИЙ ПОЛІТЕХНІЧНИЙ ІНСТИТУТ ІМЕНІ ІГОРЯ СІКОРСЬКОГО»  
ФІЗИКО-ТЕХНІЧНИЙ ІНСТИТУТ  
Кафедра Інформаційної Безпеки

Практикум з Основ комп'ютерних мереж

Налаштування протоколу STP та резервування маршрутизатора

Перевірив:

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Виконав:

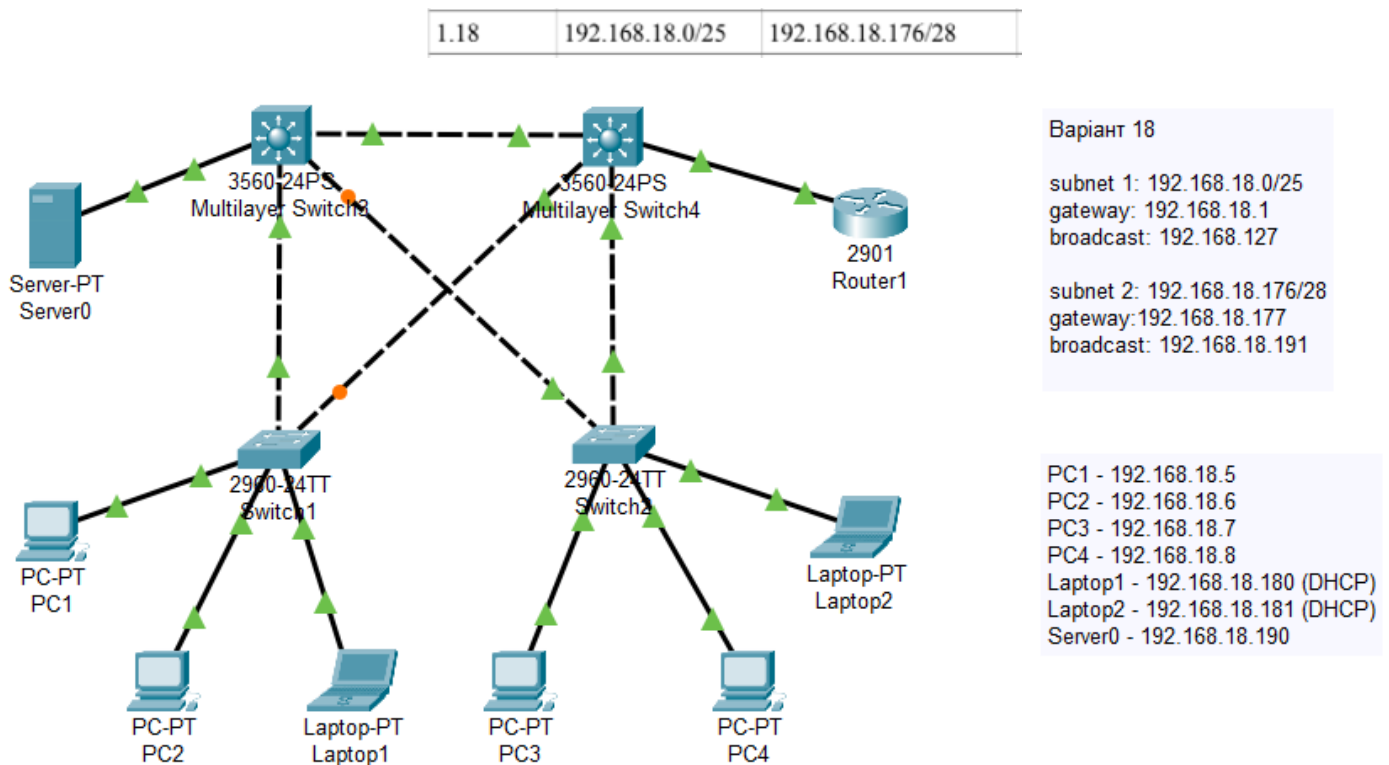
студент I курсу

групи ФБ-01

Сахній Н.Р.

Київ 2021

Відкриємо "проект" мережі - результат виконання 1-ї роботи:



Ознайомимось з відомостями про принципи роботи протоколу STP. Командою *show spanning-tree* на кожному комутаторі **подивимось стан дерева STP.**

1

```
SW1#show spanning-tree
VLAN0001
Spanning tree enabled protocol ieee
Root ID    Priority    32769
Address     0003.E412.8E4B
Cost        12
Port        25 (GigabitEthernet0/1)
Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec

Bridge ID   Priority    32769 (priority 32768 sys-id-ext 1)
Address     0004.9A58.DBED
Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec
Aging Time  20

Interface   Role Sts Cost      Prio.Nbr Type
-----
Fa0/3       Desg FWD 19        128.3    P2p
Gi0/2       Altn BLK 19        128.26   P2p
Gi0/1       Root FWD 4         128.25   P2p

VLAN0010
Spanning tree enabled protocol ieee
Root ID    Priority    32778
Address     0003.E412.8E4B
Cost        12
Port        25 (GigabitEthernet0/1)
Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec

Bridge ID   Priority    32778 (priority 32768 sys-id-ext 10)
Address     0004.9A58.DBED
Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec
Aging Time  20

Interface   Role Sts Cost      Prio.Nbr Type
-----
Fa0/2       Desg FWD 19        128.2    P2p
Fa0/1       Desg FWD 19        128.1    P2p
Gi0/2       Altn BLK 19        128.26   P2p
```

2

SW2#show spanning-tree

VLAN0001

Spanning tree enabled protocol ieee

Root ID      Priority      32769  
 Address      0003.E412.8E4B

This bridge is the root

Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

Bridge ID    Priority      32769 (priority 32768 sys-id-ext 1)  
 Address      0003.E412.8E4B  
 Hello Time   2 sec    Max Age 20 sec   Forward Delay 15 sec  
 Aging Time   20

Interface	Role	Sts	Cost	Prio.Nbr	Type
Fa0/3	Desg	FWD	19	128.3	P2p
Gi0/2	Desg	FWD	19	128.26	P2p
Gi0/1	Desg	FWD	4	128.25	P2p

VLAN0010

Spanning tree enabled protocol ieee

Root ID      Priority      32778  
 Address      0003.E412.8E4B

This bridge is the root

Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

Bridge ID    Priority      32778 (priority 32768 sys-id-ext 10)  
 Address      0003.E412.8E4B  
 Hello Time   2 sec    Max Age 20 sec   Forward Delay 15 sec  
 Aging Time   20

Interface	Role	Sts	Cost	Prio.Nbr	Type
Fa0/1	Desg	FWD	19	128.1	P2p
Fa0/2	Desg	FWD	19	128.2	P2p
Gi0/2	Desg	FWD	19	128.26	P2p
Gi0/1	Desg	FWD	4	128.25	P2p

3

SW3#show spanning-tree

VLAN0001

Spanning tree enabled protocol ieee

Root ID      Priority      32769  
 Address      0003.E412.8E4B  
 Cost          8  
 Port          25(GigabitEthernet0/1)

Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

Bridge ID    Priority      32769 (priority 32768 sys-id-ext 1)  
 Address      0009.7C24.D7DD  
 Hello Time   2 sec    Max Age 20 sec   Forward Delay 15 sec  
 Aging Time   20

Interface	Role	Sts	Cost	Prio.Nbr	Type
Fa0/2	Desg	FWD	19	128.2	P2p
Fa0/1	Altn	BLK	19	128.1	P2p
Gi0/1	Root	FWD	4	128.25	P2p
Gi0/2	Desg	FWD	4	128.26	P2p

VLAN0010

Spanning tree enabled protocol ieee

Root ID      Priority      32778  
 Address      0003.E412.8E4B  
 Cost          8  
 Port          25(GigabitEthernet0/1)

Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

Bridge ID    Priority      32778 (priority 32768 sys-id-ext 10)  
 Address      0009.7C24.D7DD  
 Hello Time   2 sec    Max Age 20 sec   Forward Delay 15 sec  
 Aging Time   20

Interface	Role	Sts	Cost	Prio.Nbr	Type
Fa0/1	Altn	BLK	19	128.1	P2p
Gi0/1	Root	FWD	4	128.25	P2p
Gi0/2	Desg	FWD	4	128.26	P2p

4

SW4#show spanning-tree

VLAN0001

Spanning tree enabled protocol ieee

```

Root ID    Priority    32769
           Address    0003.E412.8E4B
           Cost       4
           Port       26 (GigabitEthernet0/2)
Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec

```

```

Bridge ID  Priority    32769 (priority 32768 sys-id-ext 1)
           Address    00D0.976C.6563
           Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec
           Aging Time  20

```

Interface	Role	Sts	Cost	Prio.Nbr	Type
Gi0/1	Desg	FWD	4	128.25	P2p
Gi0/2	Root	FWD	4	128.26	P2p
Fa0/1	Desg	FWD	19	128.1	P2p
Fa0/2	Desg	FWD	19	128.2	P2p

VLAN0010

Spanning tree enabled protocol ieee

```

Root ID    Priority    32778
           Address    0003.E412.8E4B
           Cost       4
           Port       26 (GigabitEthernet0/2)
Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec

```

```

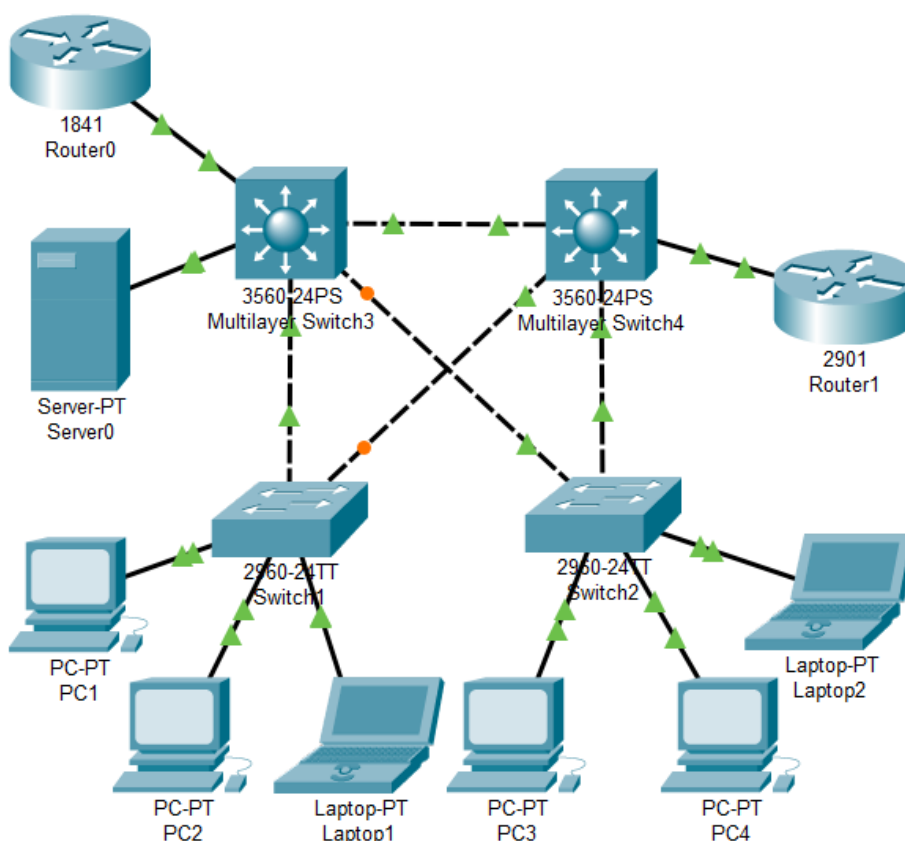
Bridge ID  Priority    32778 (priority 32768 sys-id-ext 10)
           Address    00D0.976C.6563
           Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec
           Aging Time  20

```

Interface	Role	Sts	Cost	Prio.Nbr	Type
Gi0/1	Desg	FWD	4	128.25	P2p
Gi0/2	Root	FWD	4	128.26	P2p
Fa0/1	Desg	FWD	19	128.1	P2p
Fa0/2	Desg	FWD	19	128.2	P2p

Кореневий комутатор: SW2;

Кореневі порти: GigabitEthernet0/1 (комутатор SW1), GigabitEthernet0/1 (комутатор SW3),  
GigabitEthernet0/2 (комутатор SW4);



Варіант 18

subnet 1: 192.168.18.0/25  
gateway: 192.168.18.1  
broadcast: 192.168.127

subnet 2: 192.168.18.176/28  
gateway: 192.168.18.177  
broadcast: 192.168.18.191

PC1 - 192.168.18.5  
PC2 - 192.168.18.6  
PC3 - 192.168.18.7  
PC4 - 192.168.18.8  
Laptop1 - 192.168.18.180 (DHCP)  
Laptop2 - 192.168.18.181 (DHCP)  
Server0 - 192.168.18.190

## Перевірка статусу HSRP маршрутизаторів.

**R0#show standby**

**FastEthernet0/0.1** - Group 110

State is **Active**

5 state changes, last state change 00:05:28

Virtual IP address is 192.168.18.1

Active virtual MAC address is 0000.0C07.AC6E

Local virtual MAC address is 0000.0C07.AC6E (v1 default)

Hello time 3 sec, hold time 10 sec

Next hello sent in 1.759 secs

Preemption enabled

Active router is local

Standby router is 192.168.18.3

Priority 150 (configured 150)

Group name is hsrp-Fa-110 (default)

**FastEthernet0/0.2** - Group 101

State is **Standby**

6 state changes, last state change 00:05:39

Virtual IP address is 192.168.18.177

Active virtual MAC address is 0000.0C07.AC65

Local virtual MAC address is 0000.0C07.AC65 (v1 default)

Hello time 3 sec, hold time 10 sec

Next hello sent in 0.132 secs

Preemption enabled

Active router is 192.168.18.179

Standby router is local

Priority 100 (default 100)

Group name is hsrp-Fa-101 (default)

---

**R1#show standby**

**GigabitEthernet0/0.1** - Group 110

State is **Standby**

14 state changes, last state change 00:20:48

Virtual IP address is 192.168.18.1

Active virtual MAC address is 0000.0C07.AC6E

Local virtual MAC address is 0000.0C07.AC6E (v1 default)

Hello time 3 sec, hold time 10 sec

Next hello sent in 0.941 secs

Preemption enabled

Active router is 192.168.18.2

Standby router is local

Priority 100 (default 100)

Group name is hsrp-Gig-110 (default)

**GigabitEthernet0/0.2** - Group 110

State is **Active**

5 state changes, last state change 00:00:17

Virtual IP address is 192.168.18.177

Active virtual MAC address is 0000.0C07.AC6E

Local virtual MAC address is 0000.0C07.AC6E (v1 default)

Hello time 3 sec, hold time 10 sec

Next hello sent in 1.487 secs

Preemption enabled

Active router is local

Standby router is 192.168.18.178

Priority 150 (configured 150)

Group name is hsrp-Gig-110 (default)

За аналогією з п.2 перевірте, які порти на яких комутаторах є **кореневими**, а які заблоковані.

```
SW1#show spanning-tree
VLAN0001
  Spanning tree enabled protocol ieee
  Root ID    Priority    20481
             Address     0002.4AD6.9318
             Cost        8
             Port        25(GigabitEthernet0/1)
             Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID  Priority    32769  (priority 32768 sys-id-ext 1)
             Address     00D0.BC49.535D
             Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec
             Aging Time  20
```

Interface	Role	Sts	Cost	Prio.Nbr	Type
Gi0/2	Altn	BLK	19	128.26	P2p
Gi0/1	Root	FWD	4	128.25	P2p
Fa0/3	Desg	FWD	19	128.3	P2p

```
VLAN0010
  Spanning tree enabled protocol ieee
  Root ID    Priority    24586
             Address     000A.F3EB.03A5
             Cost        4
             Port        25(GigabitEthernet0/1)
             Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID  Priority    32778  (priority 32768 sys-id-ext 10)
             Address     00D0.BC49.535D
             Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec
             Aging Time  20
```

Interface	Role	Sts	Cost	Prio.Nbr	Type
Gi0/2	Altn	BLK	19	128.26	P2p
Gi0/1	Root	FWD	4	128.25	P2p
Fa0/1	Desg	FWD	19	128.1	P2p
Fa0/2	Desg	FWD	19	128.2	P2p

```
SW2#show spanning-tree
VLAN0001
  Spanning tree enabled protocol ieee
  Root ID    Priority    20481
             Address     0002.4AD6.9318
             Cost        4
             Port        25(GigabitEthernet0/1)
             Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID  Priority    32769  (priority 32768 sys-id-ext 1)
             Address     000A.F376.308D
             Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec
             Aging Time  20
```

Interface	Role	Sts	Cost	Prio.Nbr	Type
Fa0/3	Desg	FWD	19	128.3	P2p
Gi0/1	Root	FWD	4	128.25	P2p
Gi0/2	Altn	BLK	19	128.26	P2p

```
VLAN0010
  Spanning tree enabled protocol ieee
  Root ID    Priority    24586
             Address     000A.F3EB.03A5
             Cost        8
             Port        25(GigabitEthernet0/1)
             Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID  Priority    32778  (priority 32768 sys-id-ext 10)
             Address     000A.F376.308D
             Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec
             Aging Time  20
```

Interface	Role	Sts	Cost	Prio.Nbr	Type
Fa0/2	Desg	FWD	19	128.2	P2p
Fa0/1	Desg	FWD	19	128.1	P2p
Gi0/1	Root	FWD	4	128.25	P2p
Gi0/2	Altn	BLK	19	128.26	P2p

```
SW3#show spanning-tree
VLAN0001
  Spanning tree enabled protocol ieee
  Root ID    Priority    20481
             Address     0002.4AD6.9318
             Cost        4
             Port        25(GigabitEthernet0/1)
             Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID  Priority    28673  (priority 28672 sys-id-ext 1)
             Address     000A.F3EB.03A5
             Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec
             Aging Time  20

Interface                Role Sts Cost          Prio.Nbr Type
-----
Fa0/2                    Desg FWD 19          128.2   P2p
Fa0/3                    Desg FWD 19          128.3   P2p
Fa0/1                    Desg FWD 19          128.1   P2p
Gi0/1                    Root FWD 4           128.25  P2p
Gi0/2                    Desg FWD 4           128.26  P2p

VLAN0010
  Spanning tree enabled protocol ieee
  Root ID    Priority    24586
             Address     000A.F3EB.03A5
             This bridge is the root
             Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID  Priority    24586  (priority 24576 sys-id-ext 10)
             Address     000A.F3EB.03A5
             Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec
             Aging Time  20

Interface                Role Sts Cost          Prio.Nbr Type
-----
Fa0/2                    Desg FWD 19          128.2   P2p
Fa0/1                    Desg FWD 19          128.1   P2p
Gi0/1                    Desg FWD 4           128.25  P2p
Gi0/2                    Desg FWD 4           128.26  P2p
```

```
SW4#show spanning-tree
VLAN0001
  Spanning tree enabled protocol ieee
  Root ID    Priority    20481
             Address     0002.4AD6.9318
             This bridge is the root
             Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID  Priority    20481  (priority 20480 sys-id-ext 1)
             Address     0002.4AD6.9318
             Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec
             Aging Time  20

Interface                Role Sts Cost          Prio.Nbr Type
-----
Fa0/2                    Desg FWD 19          128.2   P2p
Fa0/1                    Desg FWD 19          128.1   P2p
Gi0/2                    Desg FWD 4           128.26  P2p
Gi0/1                    Desg FWD 4           128.25  P2p

VLAN0010
  Spanning tree enabled protocol ieee
  Root ID    Priority    24586
             Address     000A.F3EB.03A5
             Cost        4
             Port        25(GigabitEthernet0/1)
             Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID  Priority    28682  (priority 28672 sys-id-ext 10)
             Address     0002.4AD6.9318
             Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec
             Aging Time  20

Interface                Role Sts Cost          Prio.Nbr Type
-----
Fa0/2                    Desg FWD 19          128.2   P2p
Fa0/1                    Desg FWD 19          128.1   P2p
Gi0/2                    Desg FWD 4           128.26  P2p
Gi0/1                    Root FWD 4           128.25  P2p
```

