ОТЧЕТ
по лабораторной работе №2
по дисциплине АОКС

Вариант №859

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Теоретическая часть

1. Для применения в лабораторной работе был выбран маршрутизатор. Получилась конфигурация router-on-stick. Она дешевле и доступнее для покупки. Был настроен vtp для упрощения работы с vlan.

2. Для настройки агрегации каналов был выбран LACP (Link Aggregation Control Protocol) стандартный протокол. Его рекомендует cisco и он более унверсальный.

3. В качестве port-security были применены достаточно жесткие настройки, а именно: shutdown, макс кол-во ip – 1 и режим запоминания ip – sticky. Это должно повысить безопасность адм. сети.

Практическая часть:

1. **Настройка VLAN**

Построенная топология.
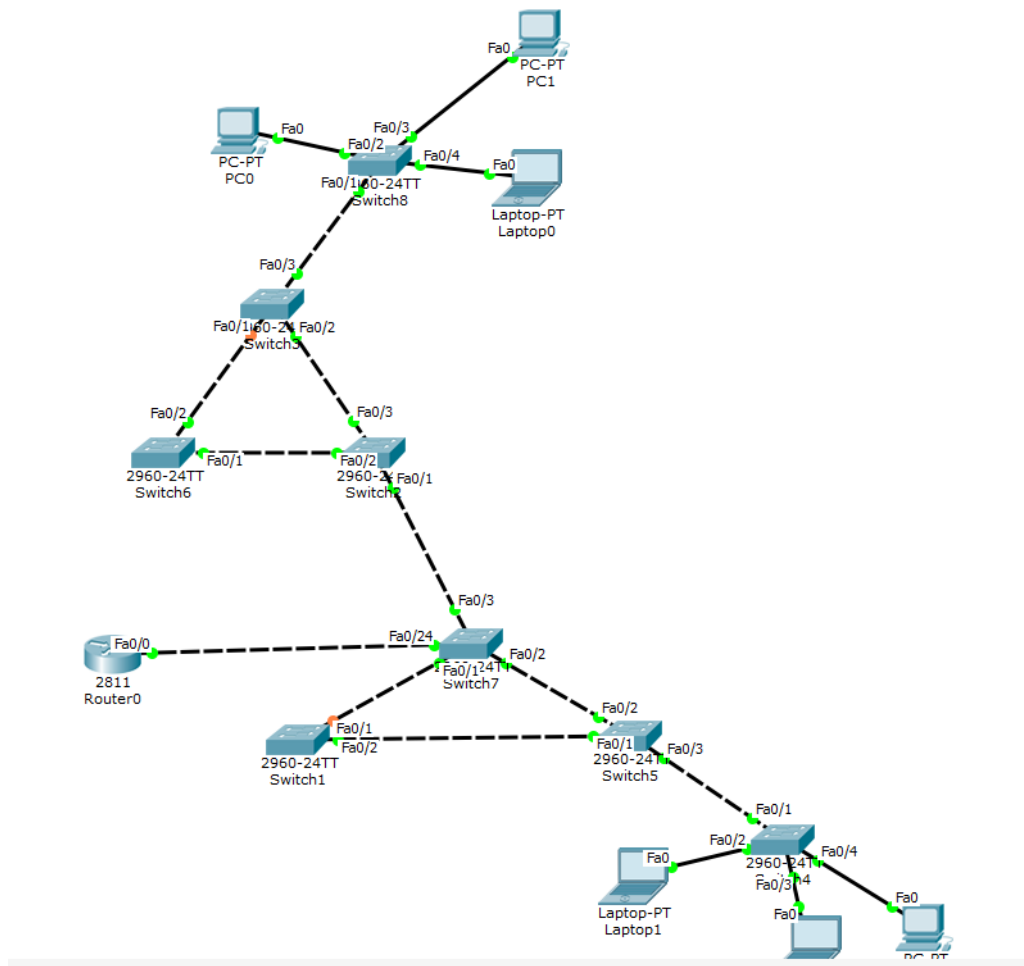
Настройка VTP.

Настройка сервера VTP домена dom (switch 7):

```
Switch>
Switch>enable
Switch#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#vtp domain dom
Changing VTP domain name from NULL to dom
Switch(config)#vtp mode server
Device mode already VTP SERVER.
Switch(config)#
```

Пример настройки клиентов (выполняем для всех кроме root остальных):

```
Switch>en
Switch#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#vtp domain dom
Changing VTP domain name from NULL to dom
Switch(config)#vtp mode client
Setting device to VTP CLIENT mode.
Switch(config)#
```

Настройка портов в режим access (все порты, которые будут передавать нетегированный трафик).

Для switch4:
```
Switch(config)#interface range fa0/2 - 4
Switch(config-if-range)#switchport mode access
Switch(config-if-range)#
```

Для switch8:
```
Switch(config)#interface range fa0/2 - 4
Switch(config-if-range)#switchport mode access
Switch(config-if-range)#
```

Настройка портов в режим trunk (все порты, которые будут передавать тегированный трафик).

Switch4:	Switch2:

`Switch(config)#int fa0/1`
`Switch(config-if)#switchport mode trunk`
 	
`Switch(config-if)#`
`%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1,`
`changed state to down`
 	
`%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1,`
`changed state to up`
 	
`Switch(config-if)#`
	`Switch(config)#int range fa0/1-3`
	`Switch(config-if-range)#switchport mode trunk`
	
	`Switch(config-if-range)#`
	`%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/2,`
	`changed state to down`
	
	`%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/2,`
	`changed state to up`
	
	`%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3,`
	`changed state to down`
	
	`%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3,`
	`changed state to up`
	
	`Switch(config-if-range)#`

Switch5:	Switch6:

`Switch(config)#int range fa0/2-3`
`Switch(config-if-range)#switchport mode trunk`
 	
`Switch(config-if-range)#`
`%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/2,`
`changed state to down`
 	
`%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/2,`
`changed state to up`
 	
`Switch(config-if-range)#`
	`Switch(config)#int range fa0/1-2`
	`Switch(config-if-range)#switchport mode trunk`
	
	`Switch(config-if-range)#`
	`%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/2,`
	`changed state to down`
	
	`%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/2,`
	`changed state to up`
	
	`Switch(config-if-range)#`

Switch1:	Switch3:

	`Switch(config)#int range fa0/1-3`
	`Switch(config-if-range)#switchport mode trunk`
	
	`Switch(config-if-range)#`
	`%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3,`
	`changed state to down`
	
	`%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3,`
	`changed state to up`
	
	`Switch(config-if-range)#`

```
Switch(config)#interface range fa0/1 -2
Switch(config-if-range)#switchport mode trunk

Switch(config-if-range)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1,
changed state to down

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1,
changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/2,
changed state to down

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/2,
changed state to up

Switch(config-if-range)#
```

Switch7:	Switch 8:

`Switch(config)#int range fa0/1-3`
`Switch(config-if-range)#switchport mode trunk`
 	
`Switch(config-if-range)#`
`%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3, changed state to down`
 	
`%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3, changed state to up`
 	
`Switch(config-if-range)#exit`
`Switch(config)#int fa0/24`
`Switch(config-if)#switchport mode trunk`
 	
`Switch(config-if)#`
`%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/24, changed state to down`
 	
`%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/24, changed state to up`
	`Switch(config)#int fa 0/1`
	`Switch(config-if)#switchport mode trunk`
	`Switch(config-if)#`

Создаем 3 VLAN на root коммутаторе:

```
Switch(config)#vlan 2
Switch(config-vlan)#name adm0
Switch(config-vlan)#exit
Switch(config)#vlan 3
Switch(config-vlan)#name usr0
Switch(config-vlan)#exit
Switch(config)#vlan 4
Switch(config-vlan)#name usr1
Switch(config-vlan)#exit
```

Show vlan на root (sw7)	Show vlan на sw4
```Switch#show vlan```	```Switch#show vlan```
VLAN Name / default active Fa0/4, Fa0/5, Fa0/6, Fa0/7 ... 2 adm0 active 3 usr0 active 4 usr1 active 1002 fddi-default act/unsup 1003 token-ring-default act/unsup 1004 fddinet-default act/unsup 1005 trnet-default act/unsup	VLAN Name / default active Fa0/2, Fa0/3, Fa0/4, Fa0/5 ... 2 adm0 active 3 usr0 active 4 usr1 active 1002 fddi-default act/unsup 1003 token-ring-default act/unsup 1004 fddinet-default act/unsup 1005 trnet-default act/unsup

Подключение пользовательских станций к VLAN.

Switch8:	Switch4:

Подключение к адм. vlan:
`Switch(config-if)#switchport access vlan`
`Switch(config-if)#exit`
 	
Пример подключения к пользовательским vlan:
	`Switch(config)#int range fa0/2-3`
	`Switch(config-if-range)#switchport access vlan`
	`Switch(config-if-range)#exit`
	`Switch(config)#int fa0/4`
	`Switch(config-if)#switchport access vlan 4`

```
Switch(config)#int fa0/2
Switch(config-if)#switchport access vlan
Switch(config-if)#exit
Switch(config)#int fa0/3
Switch(config-if)#switchport access vlan
```

Теперь нужно поменять native trunk и запретить передачу по trunk пакеты из неизвестных VLAN. Всё делается на trunk портах каждого коммутатора. В качестве native – vlan 5

```
Switch(config)#vlan 5
Switch(config-vlan)#name def
```

Switch4:

```
Switch(config-if)#switchport trunk native vlan 5
Switch(config-if)#switchport trunk allowed vlan 1-5
```

Switch5:

```
Switch(config)#int range fa0/1 -3
Switch(config-if-range)#
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on FastEthernet0/3
(1), with Switch FastEthernet0/1 (5).
switchport trunk native vlan 5
Switch(config-if-range)#%SPANTREE-2-UNBLOCK_CONSIST_PORT: Unblocking
FastEthernet0/3 on VLAN0005. Port consistency restored.

%SPANTREE-2-UNBLOCK_CONSIST_PORT: Unblocking FastEthernet0/3 on VLAN0001. Port
consistency restored.


%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on FastEthernet0/2
(5), with Switch FastEthernet0/2 (1).
switchport trunk allowed vlan 1-5
```

Switch1:

```
Switch(config)#int range fa0/1-2
Switch(config-if-range)#switchport trunk native vlan 5
Switch(config-if-range)#switchport trunk allowed vlan 1-5
```

Switch7:

```
Switch(config)#int range fa0/1-3
Switch(config-if-range)#switchport trunk native vlan 5
Switch(config-if-range)#%SPANTREE-2-UNBLOCK_CONSIST_PORT: Unblocking FastEthernet0/2 on VLAN0005. Port
consistency restored.

SPANTREE-2-UNBLOCK_CONSIST_PORT: Unblocking FastEthernet0/2 on VLAN0001. Port consistency restored.

SPANTREE-2-UNBLOCK_CONSIST_PORT: Unblocking FastEthernet0/1 on VLAN0005. Port consistency restored.

SPANTREE-2-UNBLOCK_CONSIST_PORT: Unblocking FastEthernet0/1 on VLAN0001. Port consistency restored.

switchport trunk allowed vlan 1-5
Switch(config-if-range)#
```

Switch2:

```
Switch(config)#int range fa 0/1-3
Switch(config-if-range)#
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on
FastEthernet0/1 (1), with Switch FastEthernet0/3 (5).
switchport trunk native vlan 5
Switch(config-if-range)#%SPANTREE-2-UNBLOCK_CONSIST_PORT:
Unblocking FastEthernet0/1 on VLAN0005. Port consistency
restored.

%SPANTREE-2-UNBLOCK_CONSIST_PORT: Unblocking FastEthernet0/1 on
VLAN0001. Port consistency restored.

switchport trunk allowed vlan 1-5
Switch(config-if-range)#
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on
FastEthernet0/3 (5), with Switch FastEthernet0/2 (1).
```

Switch6:
```
Switch(config)#int range fa 0/1-2
Switch(config-if-range)#switchport trunk native vlan 5
Switch(config-if-range)#%SPANTREE-2-UNBLOCK_CONSIST_PORT:
Unblocking FastEthernet0/1 on VLAN0005. Port consistency
restored.

%SPANTREE-2-UNBLOCK_CONSIST_PORT: Unblocking FastEthernet0/1 on
VLAN0001. Port consistency restored.

switchport trunk allowed vlan 1-5
Switch(config-if-range)#
```

Switch3:
```
Switch(config)#int range fa 0/1 -3
Switch(config-if-range)#switchport trunk native vlan 5
Switch(config-if-range)#%SPANTREE-2-UNBLOCK_CONSIST_PORT:
Unblocking FastEthernet0/2 on VLAN0005. Port consistency
restored.

%SPANTREE-2-UNBLOCK_CONSIST_PORT: Unblocking FastEthernet0/2 on
VLAN0001. Port consistency restored.

%SPANTREE-2-UNBLOCK_CONSIST_PORT: Unblocking FastEthernet0/1 on
VLAN0005. Port consistency restored.

%SPANTREE-2-UNBLOCK_CONSIST_PORT: Unblocking FastEthernet0/1 on
VLAN0001. Port consistency restored.

switchport trunk allowed vlan 1-5
Switch(config-if-range)#
```

Swithc8:
```
Switch(config)#int fa 0/1
Switch(config-if)#switchport trunk native vlan 5
Switch(config-if)#%SPANTREE-2-UNBLOCK_CONSIST_PORT: Unblocking
FastEthernet0/1 on VLAN0005. Port consistency restored.

%SPANTREE-2-UNBLOCK_CONSIST_PORT: Unblocking FastEthernet0/1 on
VLAN0001. Port consistency restored.

switchport trunk allowed vlan 1-5
```

2. Настройка агрегации каналов

Соединяем root коммутатор с соседними.
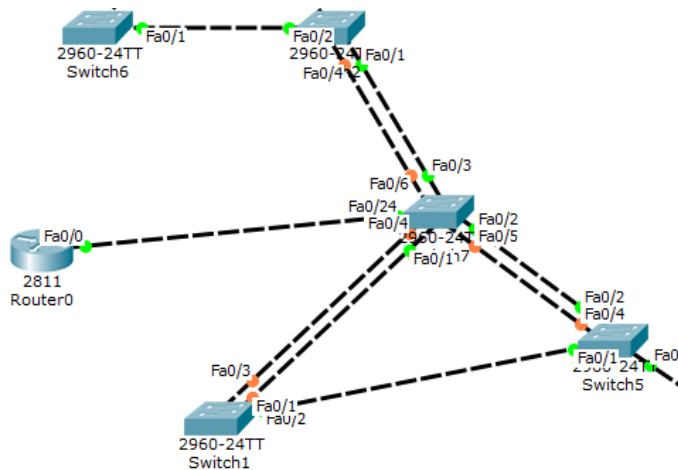
На root коммутаторе выбираем 2 интерфейса которые нужно объединить и делаем из них port channel.

```
Switch(config)#int range fa0/1, fa0/4
Switch(config-if-range)#channel-protocol lacp
Switch(config-if-range)#channel-group 1 mode active
Switch(config-if-range)#
Creating a port-channel interface Port-channel 1

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to
down

%EC-5-CANNOT_BUNDLE2: Fa0/1 is not compatible with Po1 and will be suspended (vlan
mask is different)

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/4, changed state to
down

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/4, changed state to
up
exit
Switch(config)#int port-channel 1
Switch(config-if)#switchport trunk encapsulation dot1q
                                       ^
% Invalid input detected at '^' marker.

Switch(config-if)#switchport trunk ?
  allowed  Set allowed VLAN characteristics when interface is in trunking mode
  native   Set trunking native characteristics when interface is in trunking
           mode
Switch(config-if)#switchport mode trunk

Switch(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/4, changed state to
down

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/4, changed state to
up

%LINK-5-CHANGED: Interface Port-channel 1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Port-channel 1, changed state to
up
|
```

На другой стороне делаем Switch1:

```
Switch(config)#int range fa0/1, fa0/3
Switch(config-if-range)#channel-protocol lacp
Switch(config-if-range)#channel-group 1 mode passive
Switch(config-if-range)#
Creating a port-channel interface Port-channel 1

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to
down

%EC-5-CANNOT_BUNDLE2: Fa0/1 is not compatible with Po1 and will be suspended (vlan
mask is different)

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3, changed state to
down

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3, changed state to
up
exit
Switch(config)#int port-channel 1
Switch(config-if)#switchport trunk ?
  allowed  Set allowed VLAN characteristics when interface is in trunking mode
  native   Set trunking native characteristics when interface is in trunking
           mode
Switch(config-if)#switchport mode trunk
Switch(config-if)#
```

Повторяем для остальных интерфейсов.

```
Switch(config)#int range fa0/2, fa0/5
Switch(config-if-range)#channel-group 2 mode active
Switch(config-if-range)#exir
                             ^
% Invalid input detected at '^' marker.

Switch(config-if-range)#exit
Switch(config)#
Switch(config)#int port-channel 2
Switch(config-if)#switchport mode trunk
Switch(config-if)#
```

```
Switch(config)#int range fa0/3, fa0/6
Switch(config-if-range)#channel-protocol lacp
Switch(config-if-range)#channel-group 3 mode active
Switch(config-if-range)#
Creating a port-channel interface Port-channel 3

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3, changed state to
down

%EC-5-CANNOT_BUNDLE2: Fa0/3 is not compatible with Po3 and will be suspended (vlan
mask is different)

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/6, changed state to
down

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/6, changed state to
up

Switch(config-if-range)#exit
Switch(config)#int port-channel 3
Switch(config-if)#switchport mode trunk

Switch(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/6, changed state to
down

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/6, changed state to
up

%LINK-5-CHANGED: Interface Port-channel 3, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Port-channel 3, changed state to
up
```

На других сторонах:

```
Switch(config)#int range fa0/2, fa0/4
Switch(config-if-range)#channel-protocol lacp
Switch(config-if-range)#
Switch(config-if-range)#channel-group 1 mode passive
Switch(config-if-range)#
Creating a port-channel interface Port-channel 1

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/2, changed state
to down

%EC-5-CANNOT_BUNDLE2: Fa0/2 is not compatible with Po1 and will be suspended
(vlan mask is different)

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/4, changed state
to down

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/4, changed state
to up

Switch(config-if-range)#exir
                         ^
% Invalid input detected at '^' marker.

Switch(config-if-range)#exit
Switch(config)#int port-channel 1
Switch(config-if)#switchport mode trunk

Switch(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/4, changed state
to down

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/4, changed state
to up

%LINK-5-CHANGED: Interface Port-channel 1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Port-channel 1, changed state to
up
```

```
Switch(config)#int range fa0/1, fa0/4
Switch(config-if-range)#channel-protocol lacp
Switch(config-if-range)#channel-group 1 mode passive
Switch(config-if-range)#
Creating a port-channel interface Port-channel 1

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1,
changed state to down

%EC-5-CANNOT_BUNDLE2: Fa0/1 is not compatible with Po1 and will
be suspended (vlan mask is different)

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/4,
changed state to down

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/4,
changed state to up

Switch(config-if-range)#exir
                         ^
% Invalid input detected at '^' marker.

Switch(config-if-range)#int port-channel 1
Switch(config-if)#exit
Switch(config)#int port-channel 1
Switch(config-if)#
Switch(config-if)#switchport mode trunk
Switch(config-if)#
```

Настраиваем разрешенные vlan для новых интерфейсов:
Root:

```
Switch(config)#int port-channel 1
Switch(config-if)#switchport trunk native vlan 5
Switch(config-if)#
Switch(config-if)#switchport trunk allowed vlan 1-5

%%EC-5-COMPATIBLE: Fa0/1  is compatible with port-channel members

%%EC-5-COMPATIBLE: Fa0/4  is compatible with port-channel members
Switch(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to
up

%LINK-5-CHANGED: Interface Port-channel 1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Port-channel 1, changed state to
up

Switch(config-if)#exit
Switch(config)#int port-channel 2
Switch(config-if)#switchport trunk native vlan 5
Switch(config-if)#switchport trunk allowed vlan 1-5

%%EC-5-COMPATIBLE: Fa0/2  is compatible with port-channel members

%%EC-5-COMPATIBLE: Fa0/5  is compatible with port-channel members
Switch(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/2, changed state to
up

%LINK-5-CHANGED: Interface Port-channel 2, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Port-channel 2, changed state to
up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/5, changed state to
up

Switch(config-if)#exit
Switch(config)#int port-channel 3
Switch(config-if)#switchport trunk native vlan 5
Switch(config-if)#
Switch(config-if)#switchport trunk allowed vlan 1-5

%%EC-5-COMPATIBLE: Fa0/3  is compatible with port-channel members

%%EC-5-COMPATIBLE: Fa0/6  is compatible with port-channel members
Switch(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3, changed state to
up
```

Остальные:

Switch1:

```
Switch(config)#int port-channel 1
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on FastEthernet0/3
(1), with Switch FastEthernet0/4 (5).

%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on FastEthernet0/3
(1), with Switch Port-channel 1 (5).

Switch(config-if)#switchport trunk native vlan 5
Switch(config-if)#%SPANTREE-2-UNBLOCK_CONSIST_PORT: Unblocking FastEthernet0/3 on
VLAN0005. Port consistency restored.

%SPANTREE-2-UNBLOCK_CONSIST_PORT: Unblocking FastEthernet0/3 on VLAN0001. Port
consistency restored.

Switch(config-if)#switchport trunk allowed vlan 1-5

%%EC-5-COMPATIBLE: Fa0/1  is compatible with port-channel members

%%EC-5-COMPATIBLE: Fa0/3  is compatible with port-channel members
Switch(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to
up

%LINK-5-CHANGED: Interface Port-channel 1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Port-channel 1, changed state to
up

Switch(config-if)#
```

Switch5:

```
Switch(config)#int port-channel 1
Switch(config-if)#
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on FastEthernet0/4
(1), with Switch FastEthernet0/5 (5).

%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on FastEthernet0/4
(1), with Switch Port-channel 2 (5).
switchport trunk native vlan 5
Switch(config-if)#%SPANTREE-2-UNBLOCK_CONSIST_PORT: Unblocking FastEthernet0/4
on VLAN0005. Port consistency restored.

%SPANTREE-2-UNBLOCK_CONSIST_PORT: Unblocking FastEthernet0/4 on VLAN0001. Port
consistency restored.

switchport trunk allowed vlan 1-5

%%EC-5-COMPATIBLE: Fa0/2  is compatible with port-channel members

%%EC-5-COMPATIBLE: Fa0/4  is compatible with port-channel members
Switch(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/2, changed state
to up
```

Switch2:

```
Switch(config)#int port-channel 1
Switch(config-if)#switchport trunk native vlan 5
Switch(config-if)#%SPANTREE-2-UNBLOCK_CONSIST_PORT: Unblocking
FastEthernet0/4 on VLAN0005. Port consistency restored.

%SPANTREE-2-UNBLOCK_CONSIST_PORT: Unblocking FastEthernet0/4 on
VLAN0001. Port consistency restored.

Switch(config-if)#switchport trunk allowed vlan 1-5

%%EC-5-COMPATIBLE: Fa0/1  is compatible with port-channel members

%%EC-5-COMPATIBLE: Fa0/4  is compatible with port-channel members
Switch(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1,
changed state to up

%LINK-5-CHANGED: Interface Port-channel 1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Port-channel 1,
changed state to up
```
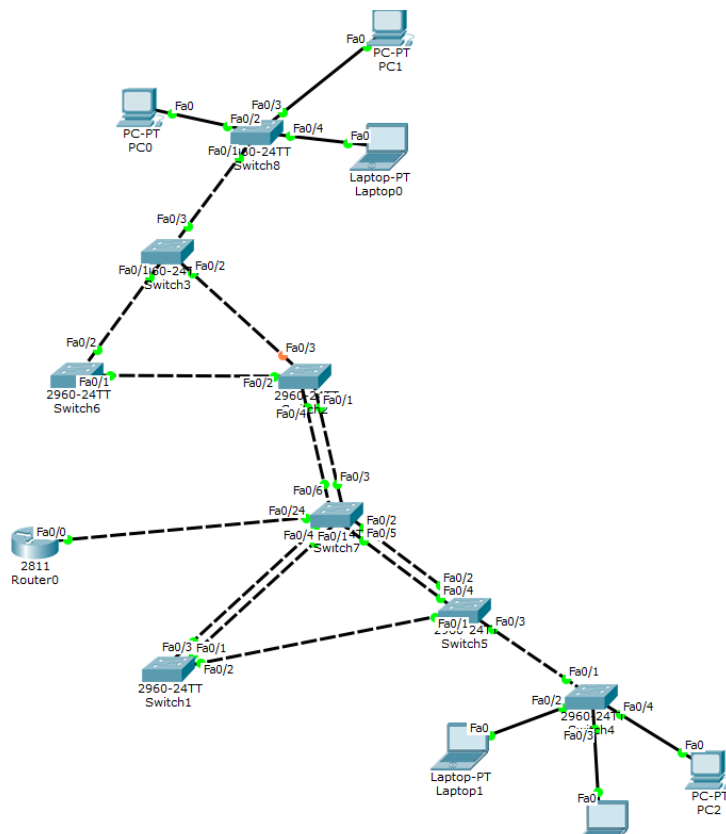
3. **Настройка spanning-tree**

Настройка PortFast и BPDUGuard на access портах.

Switch4:

```
Switch(config)#int range fa0/2 - 4
Switch(config-if-range)#spanning-treeportfast
                                    ^
% Invalid input detected at '^' marker.

Switch(config-if-range)#spanning-tree portfast
%Warning: portfast should only be enabled on ports connected to a single
 host. Connecting hubs, concentrators, switches, bridges, etc... to this
 interface  when portfast is enabled, can cause temporary bridging loops.
 Use with CAUTION

%Portfast will be configured in 3 interfaces due to the range command
 but will only have effect when the interfaces are in a non-trunking mode.
Switch(config-if-range)#
```

```
Switch(config-if-range)#spanning-tree bpduguard enable
Switch(config-if-range)#
```

Switch8:

```
Switch(config-if-range)#spanning-tree portfast
%Warning: portfast should only be enabled on ports connected to a single
 host. Connecting hubs, concentrators, switches, bridges, etc... to this
 interface  when portfast is enabled, can cause temporary bridging loops.
 Use with CAUTION

%Portfast will be configured in 3 interfaces due to the range command
 but will only have effect when the interfaces are in a non-trunking mode.
Switch(config-if-range)#spanning-tree bpduguard enable
Switch(config-if-range)#
```

4. Маршрутизация между Vlan

```
Switch(config)#int fa0/24
Switch(config-if)#switchport mode trunk
Switch(config-if)#switchport trunk encapsulation dotlq
                                    ^
% Invalid input detected at '^' marker.
```

103.105.96.0/19 – адм подсеть (vlan2)

133.138.10.0/25 – рабочая подсеть (vlan3)

146.85.169.176/29 – рабочая подсеть (vlan4)

99.146.203.128/26 – native vlan 5.

Настройка ip адресов vlan-ов

```
Switch(config)#int vlan2
Switch(config-if)#ip addr 103.105.96.2 255.255.224.0
Switch(config-if)#exir
                    ^
% Invalid input detected at '^' marker.

Switch(config-if)#exit
Switch(config)#int vlan3
Switch(config-if)#ip addr 103.105.96.2 255.255.224.0133.138.10.2 255.255.255.128
                                                     ^
% Invalid input detected at '^' marker.

Switch(config-if)#ip addr 133.138.10.2 255.255.255.128
Switch(config-if)#exi
Switch(config)#int vlan4
Switch(config-if)#
%LINK-5-CHANGED: Interface Vlan4, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan4, changed state to up

%LINK-5-CHANGED: Interface FastEthernet0/24, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/24, changed state to
up

Switch(config-if)#ip addr 146.85.169.178 255.255.255.248
Switch(config-if)#exit
```

Настройка роутера

```
Router(config)#int fa0/0
Router(config-if)#no ip address
Router(config-if)#duplex auto
Router(config-if)#speed auto
Router(config-if)#int fa0/0.1
Router(config-subif)#encapsulation dotlq 5 native
Router(config-subif)#ip address 199.146.203.129 255.255.255.192
Router(config-subif)#int fa0/0.2
Router(config-subif)#encapsulation dotlq 2
Router(config-subif)#ip addr 103.105.96.1 255.255.224.0
Router(config-subif)#int fa0/0.3
Router(config-subif)#encapsulation dotlq 3
Router(config-subif)#ip addr 133.138.10.1 255.255.255.128
Router(config-subif)#int fa0/0.4
Router(config-subif)#encapsulation dotlq 4
Router(config-subif)#ip addr 146.85.169.177 255.255.255.248
Router(config-subif)#
```

На каждой станции прописан default gateway согласно используемому vlan (адрес vlan на Router0).

5. Port Security

На Switch8:

```
Switch(config-if)#int fa0/4
Switch(config-if)#switchport mode access
Switch(config-if)#switchport port-security
Switch(config-if)#switchport port-security maximum 1
Switch(config-if)#switchport port-security violation shutdown
Switch(config-if)#switchport port-security mac-address sticky
Switch(config-if)#exit
Switch(config)#int fa0/4
Switch(config-if)#shutdown
```