

## Практическая работа 3: Применение сетевого коммутатора (switch)

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### Цель работы

В данной работе я настроил локальную сеть с использованием коммутатора (switch), изучил его отличие от концентратора, проверил работу arp и расширил сеть.

### Ход работы

#### 1. Подготовка оборудования

Добавил в рабочую область:

- 2 ПК
- 2 ноутбука
- 1 коммутатор (switch 2960-24TT). Затем соединил все устройства с коммутатором с помощью copper straight-through.

#### 2. Настройка IP-адресов

Я настроил IP-адреса для каждого устройства:

- PC0: 192.168.0.1
- PC1: 192.168.0.2
- Laptop0: 192.168.0.3
- Laptop1: 192.168.0.4 Маска подсети установилась автоматически: 255.255.255.0.

#### 3. Проверка соединения

Я включил simulation Mode, использовал Simple pdu и выполнил ping между устройствами для проверки передачи данных.

#### 4. Исследование arp

Я открыл command prompt, выполнил команду:

arp -a

и проанализировал список известных mac-адресов в сети.

#### 5. Расширение сети

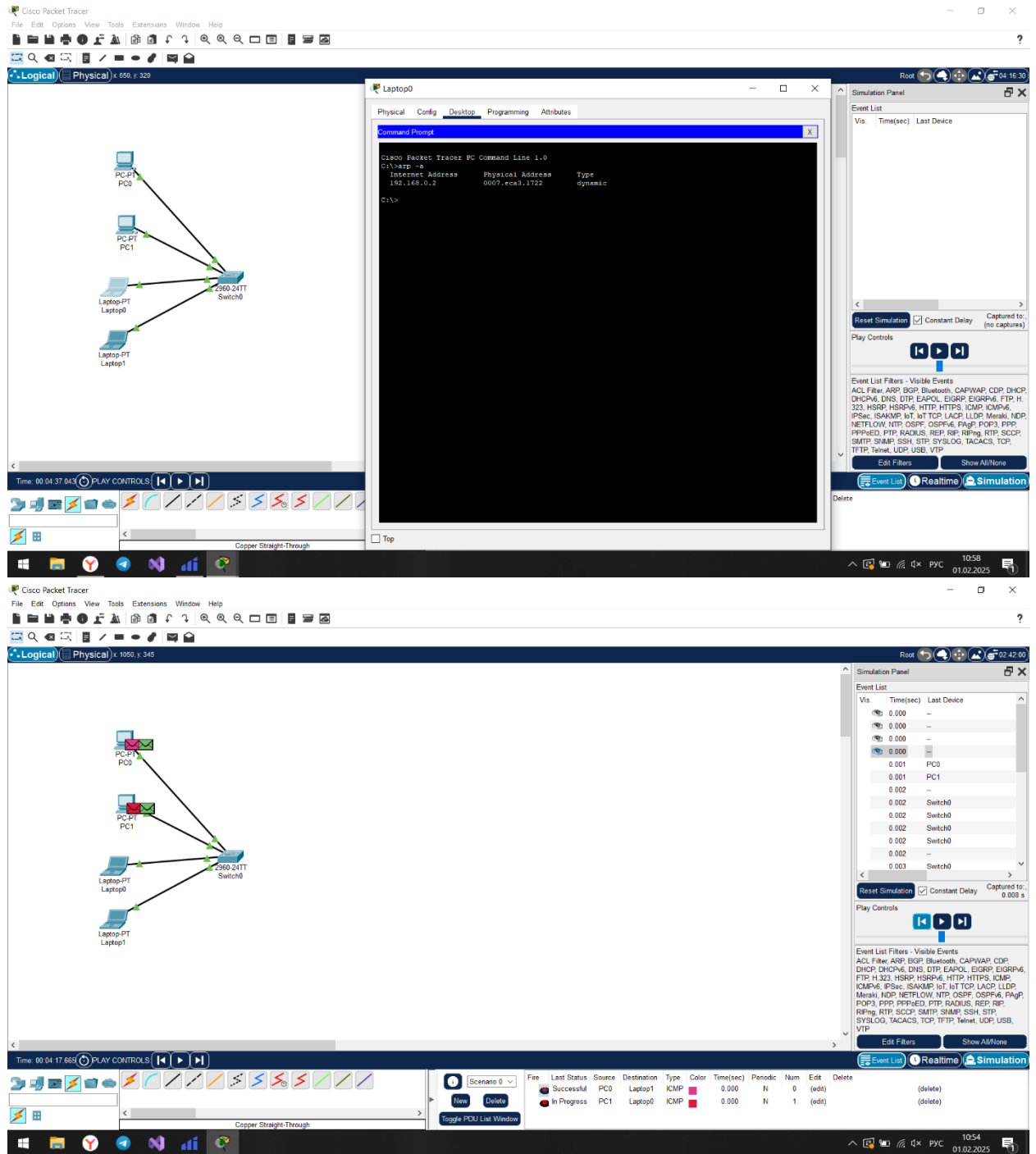
Я добавил ещё 2 коммутатора (switch 2960-24TT), соединил их с основным коммутатором через copper crossOver, подключил дополнительные устройства и проверил соединение.

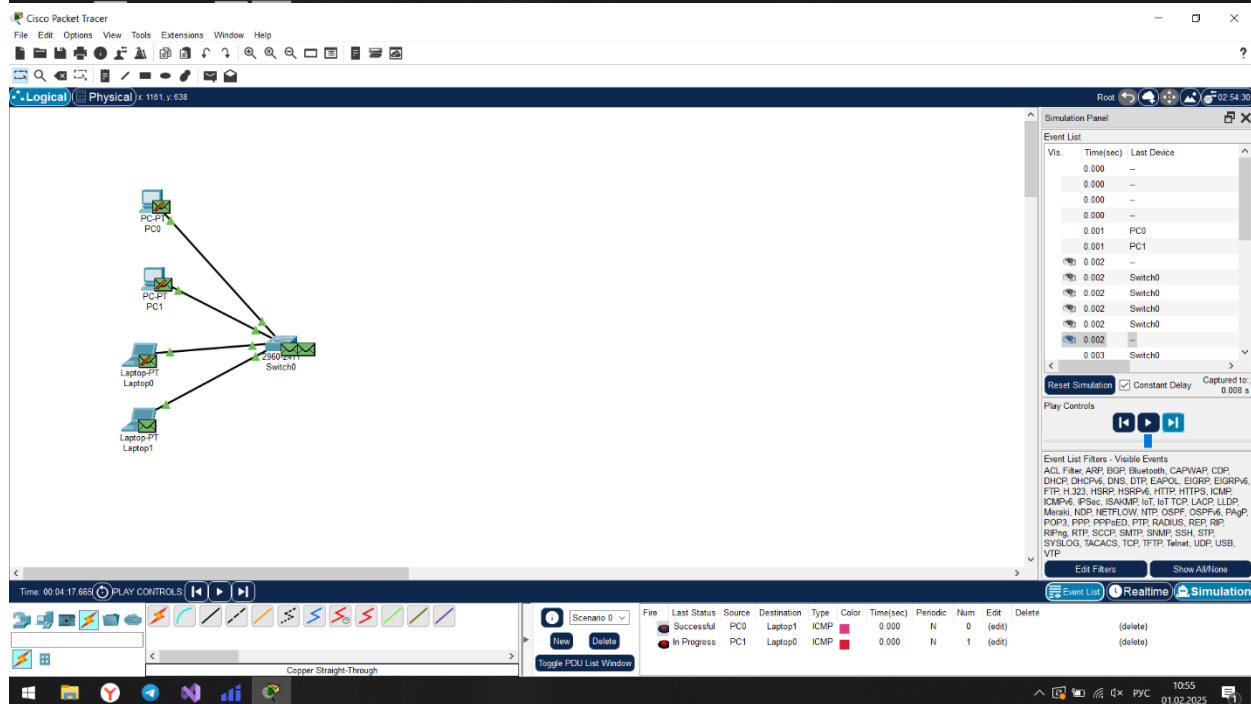
### Выводы

- Switch направляет данные только нужному устройству, в отличие от hub, который рассылает их всем.
- Arp позволяет узнать mac-адреса устройств по их IP-адресам.

- Расширение сети через дополнительные коммутаторы повышает её эффективность.

## Скрины





Cisco Packet Tracer

File Edit Options View Tools Extensions Window Help

Logical Physical 1383 v 470

Simulation Panel

Event List

Vis.	Time(sec)	Last Device
	0.002	Switch0
	0.002	Switch0
	0.002	Switch0
	0.002	Switch0
	0.002	Switch0
	0.002	Switch0
	0.003	Switch0
	0.003	Switch0
	0.003	Laptop1
	0.004	Laptop0
	0.004	Switch0
	0.004	Switch0
	0.005	Switch0

Reset Simulation Constant Delay Captured to: 0.008 s

Play Controls

Event List Filters - Visible Events

ACL, Filter, ARP, BGP, Bluetooth, CAPWAP, CDP, DHCP, DHCPv6, DNS, DTP, EAPOL, EIGRP, EIGRPv6, FTP, H.323, HSRP, HSRPv6, HTTP, HTTPS, ICMP, ICMPv6, IPsec, ISAKMP, IAT, IAT TCP, LACP, LLDP, Meraki, NDP, NETFLOW, NTP, OSPF, OSPFv6, PAgP, POP3, PPP, PPPoE, PTP, RADIUS, REP, RIP, RIPv2, RIPv3, RIPv4, RIPv6, SFTP, SSH, SIP, SYSLOG, TACACS, TCP, TFTP, Telnet, UDP, USB, VTP

Edit Filters Show AllNone

Scenario 0

New Delete

Toggle PDU List Window

File Last Status Source Destination Type Color Time(sec) Periodic Num Edit Delete

Successful	PC0	Laptop1	ICMP		0.000	N	0	(edit)	(delete)
In Progress	PC1	Laptop0	ICMP		0.000	N	1	(edit)	(delete)

Copper Straight-Through

Time: 00:04:17.669 PLAY CONTROLS

1055 01.02.2025

Cisco Packet Tracer

File Edit Options View Tools Extensions Window Help

Logical Physical 790 v 690

Simulation Panel

Event List

Vis.	Time(sec)	Last Device
	0.002	Switch0
	0.002	Switch0
	0.002	Switch0
	0.002	Switch0
	0.003	Switch0
	0.003	Switch0
	0.003	Laptop1
	0.004	Laptop0
	0.004	Switch0
	0.004	Switch0
	0.004	Switch0
	0.005	Switch0
	0.005	PC0
	0.005	PC1
	0.005	PC1

Reset Simulation Constant Delay Captured to: 0.008 s

Play Controls

Event List Filters - Visible Events

ACL, Filter, ARP, BGP, Bluetooth, CAPWAP, CDP, DHCP, DHCPv6, DNS, DTP, EAPOL, EIGRP, EIGRPv6, FTP, H.323, HSRP, HSRPv6, HTTP, HTTPS, ICMP, ICMPv6, IPsec, ISAKMP, IAT, IAT TCP, LACP, LLDP, Meraki, NDP, NETFLOW, NTP, OSPF, OSPFv6, PAgP, POP3, PPP, PPPoE, PTP, RADIUS, REP, RIP, RIPv2, RIPv3, RIPv4, RIPv6, SFTP, SSH, SIP, SYSLOG, TACACS, TCP, TFTP, Telnet, UDP, USB, VTP

Edit Filters Show AllNone

Scenario 0

New Delete

Toggle PDU List Window

File Last Status Source Destination Type Color Time(sec) Periodic Num Edit Delete

Successful	PC0	Laptop1	ICMP		0.000	N	0	(edit)	(delete)
In Progress	PC1	Laptop0	ICMP		0.000	N	1	(edit)	(delete)

USB

Time: 00:04:17.669 PLAY CONTROLS

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Cisco Packet Tracer

File Edit Options View Tools Extensions Window Help

Logical Physical v. 1101, v. 671

Simulation Panel

Event List

Vis.	Time(sec)	Last Device
	0.002	—
	0.003	Switch0
	0.003	Laptop1
	0.004	Laptop0
	0.004	Switch0
	0.004	—
	0.005	Switch0
	0.005	PC0
	0.005	—
	0.006	PC1
	0.006	Switch0
	0.007	Switch0

Reset Simulation ☒ Constant Delay Captured to: 0.008 s

Play Controls

Event List Filters - Visible Events

ACL, Filter, ARP, BGP, Bluetooth, CAPWAP, CDP, DHCP, DHCPv6, DNS, DTP, EAPOL, EIGRP, EIGRPv6, FTP, H.323, HSRP, HSRPv6, HTTP, HTTPS, ICMP, ICMPv6, IPsec, ISAKMP, IAT, IAT TCP, LACP, LLDP, Meraki, NDP, NETFLOW, NTP, OSPF, OSPFv6, PAgP, POP3, PPP, PPPoE, PTP, RADIUS, RER, RIP, RIPv2, RIPv3, SCP, SMTP, SNMP, SSH, SIP, SYSLOG, TACACS, TCP, TFTP, Telnet, UDP, USB, VTP

Edit Filters Show AllNone

Scenario 0

File	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
	Successful	PC0	Laptop1	ICMP		0.000	N	0	(edit)	(delete)
	In Progress	PC1	Laptop0	ICMP		0.000	N	1	(edit)	(delete)

Toggle PDU List Window

Copper Straight-Through

Time: 00:04:17.669s PLAY CONTROLS

1055 01.02.2025

Cisco Packet Tracer

File Edit Options View Tools Extensions Window Help

Logical Physical v. 1101, v. 698

Simulation Panel

Event List

Vis.	Time(sec)	Last Device
	0.003	Switch0
	0.003	Laptop1
	0.004	Laptop0
	0.004	Switch0
	0.004	—
	0.005	Switch0
	0.005	PC0
	0.005	—
	0.006	PC1
	0.006	Switch0
	0.007	Switch0
	0.007	Laptop1
	0.008	Laptop0

Reset Simulation ☒ Constant Delay Captured to: 0.008 s

Play Controls

Event List Filters - Visible Events

ACL, Filter, ARP, BGP, Bluetooth, CAPWAP, CDP, DHCP, DHCPv6, DNS, DTP, EAPOL, EIGRP, EIGRPv6, FTP, H.323, HSRP, HSRPv6, HTTP, HTTPS, ICMP, ICMPv6, IPsec, ISAKMP, IAT, IAT TCP, LACP, LLDP, Meraki, NDP, NETFLOW, NTP, OSPF, OSPFv6, PAgP, POP3, PPP, PPPoE, PTP, RADIUS, RER, RIP, RIPv2, RIPv3, SCP, SMTP, SNMP, SSH, SIP, SYSLOG, TACACS, TCP, TFTP, Telnet, UDP, USB, VTP

Edit Filters Show AllNone

Scenario 0

File	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
	Successful	PC0	Laptop1	ICMP		0.000	N	0	(edit)	(delete)
	In Progress	PC1	Laptop0	ICMP		0.000	N	1	(edit)	(delete)

Toggle PDU List Window

Copper Straight-Through

Time: 00:04:17.669s PLAY CONTROLS

1056 01.02.2025

Cisco Packet Tracer

File Edit Options View Tools Extensions Window Help

Logical Physical x 1054 y 480

Simulation Panel

Event List

Vis.	Time(sec)	Last Device
	0.004	Laptop1
	0.004	Switch1
	0.004	---
	0.005	Switch1
	0.005	Switch2
	0.005	Switch1
	0.005	Switch0
	0.005	---
	0.006	Switch2
	0.006	PC2
	0.006	Laptop2
	0.006	PC1
	0.007	Switch2

Reset Simulation Constant Delay Captured to: 0.017 s

Play Controls

Event List Filters - Visible Events

ACL Filter, ARP, BGP, Bluetooth, CAPWAP, CDP, DHCP, DHCPv6, DNS, DTP, EAPOL, EIGRP, EIGRPv6, FTP, H.323, HSRP, HSRPv6, HTTP, HTTPS, ICMP, ICMPv6, IPsec, ISAKMP, IOT, IOT, LACP, LLDP, Meraki, NDP, NETFLOW, NTP, OSPF, OSPFv6, PAgP, POP3, PPP, PPPoE, PTP, RADIUS, REP, RIP, RIPv2, RIPv3, SCCP, SMTP, SNMP, SSH, STP, SYSLOG, TACACS, TFTP, Telnet, UDP, USB, VTP

Edit Filters Show All/None

Scenario 0

New Delete

Toggle PDU List Window

Fire Last Status Source Destination Type Color Time(sec) Periodic Num Edit Delete

Successful	PC0	PC2	ICMP	0.000	N	0	(edit)	(delete)
Successful	PC1	Laptop1	ICMP	0.000	N	1	(edit)	(delete)
Successful	Laptop0	Laptop2	ICMP	0.000	N	2	(edit)	(delete)

Time: 00:00:18.949 PLAY CONTROLS

Copper Straight-Through

Windows Taskbar

Cisco Packet Tracer

File Edit Options View Tools Extensions Window Help

Logical Physical x 1202 y 796

Simulation Panel

Event List

Vis.	Time(sec)	Last Device
	0.000	---
	0.000	---
	0.000	---
	0.000	---
	0.000	---
	0.001	PC0
	0.001	PC1
	0.001	Laptop0
	0.002	---
	0.002	---
	0.002	---
	0.002	Switch1
	0.002	Switch0

Reset Simulation Constant Delay Captured to: 0.017 s

Play Controls

Event List Filters - Visible Events

ACL Filter, ARP, BGP, Bluetooth, CAPWAP, CDP, DHCP, DHCPv6, DNS, DTP, EAPOL, EIGRP, EIGRPv6, FTP, H.323, HSRP, HSRPv6, HTTP, HTTPS, ICMP, ICMPv6, IPsec, ISAKMP, IOT, IOT, LACP, LLDP, Meraki, NDP, NETFLOW, NTP, OSPF, OSPFv6, PAgP, POP3, PPP, PPPoE, PTP, RADIUS, REP, RIP, RIPv2, RIPv3, SCCP, SMTP, SNMP, SSH, STP, SYSLOG, TACACS, TFTP, Telnet, UDP, USB, VTP

Edit Filters Show All/None

Scenario 0

New Delete

Toggle PDU List Window

Fire Last Status Source Destination Type Color Time(sec) Periodic Num Edit Delete

Successful	PC0	PC2	ICMP	0.000	N	0	(edit)	(delete)
Successful	PC1	Laptop1	ICMP	0.000	N	1	(edit)	(delete)
Successful	Laptop0	Laptop2	ICMP	0.000	N	2	(edit)	(delete)

Time: 00:00:18.949 PLAY CONTROLS

Copper Straight-Through

Windows Taskbar

Cisco Packet Tracer

File Edit Options View Tools Extensions Window Help

Logical Physical x 1405, y 407

Simulation Panel

Event List

Vis.	Time(sec)	Last Device
0.000	0.000	PC0
0.001	0.001	PC1
0.002	0.002	Switch0
0.002	0.002	Switch1
0.002	0.002	Switch0

Reset Simulation Constant Delay Captured to: 0.017 s

Play Controls

Event List Filters - Visible Events

ACL Filter, ARP, BGP, Bluetooth, CAPWAP, CDP, DHCP, DHCPv6, DNS, DTP, EAPOL, EIGRP, EIGRPv6, FTP, H.323, HSRP, HSRPv6, HTTP, HTTPS, ICMP, ICMPv6, IPsec, ISAKMP, IOT, IOT, LACP, LLDP, Meraki, NDP, NETFLOW, NTP, OSPF, OSPFv6, PAP, POP3, PPP, PPPoE, PTP, RADIUS, REP, RIP, RIPv2, RIPv3, SCCP, SMTP, SNMP, SSH, STP, SYSLOG, TACACS, TFTP, Telnet, UDP, USB, VTP

Edit Filters Show All/None

Scenario 0

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
Successful	PC0	PC2	ICMP	0.000	N	0	(edit)	(delete)		
Successful	PC1	Laptop1	ICMP	0.000	N	1	(edit)	(delete)		
Successful	Laptop0	Laptop2	ICMP	0.000	N	2	(edit)	(delete)		

Toggle PDU List Window

Copper Straight-Through

Time: 00:00:18.944 PLAY CONTROLS

Windows: File Explorer, Command Prompt, Packet Tracer

System Tray: 11:04, 01.02.2025

Cisco Packet Tracer

File Edit Options View Tools Extensions Window Help

Logical Physical x 1550, y 520

Simulation Panel

Event List

Vis.	Time(sec)	Last Device
0.014	0.014	PC2
0.015	0.015	Switch2
0.016	0.016	Switch1
0.017	0.017	Switch0
0.517	0.517	Switch0
0.518	0.518	Switch0
1.994	1.994	Switch0
1.995	1.995	Switch0
1.995	1.995	Switch0
1.995	1.995	Switch0
1.995	1.995	Switch0
1.995	1.995	Switch1

Reset Simulation Constant Delay Captured to: 3.995 s

Play Controls

Event List Filters - Visible Events

ACL Filter, ARP, BGP, Bluetooth, CAPWAP, CDP, DHCP, DHCPv6, DNS, DTP, EAPOL, EIGRP, EIGRPv6, FTP, H.323, HSRP, HSRPv6, HTTP, HTTPS, ICMP, ICMPv6, IPsec, ISAKMP, IOT, IOT, LACP, LLDP, Meraki, NDP, NETFLOW, NTP, OSPF, OSPFv6, PAP, POP3, PPP, PPPoE, PTP, RADIUS, REP, RIP, RIPv2, RIPv3, SCCP, SMTP, SNMP, SSH, STP, SYSLOG, TACACS, TFTP, Telnet, UDP, USB, VTP

Edit Filters Show All/None

Scenario 0

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
Successful	PC0	PC2	ICMP	0.000	N	0	(edit)	(delete)		
Successful	PC1	Laptop1	ICMP	0.000	N	1	(edit)	(delete)		
Successful	Laptop0	Laptop2	ICMP	0.000	N	2	(edit)	(delete)		

Toggle PDU List Window

Copper Straight-Through

Time: 00:00:22.924 PLAY CONTROLS

Windows: File Explorer, Command Prompt, Packet Tracer

System Tray: 11:05, 01.02.2025