

Лабораторная работа № 8

Настройка сетевых сервисов. DHCP

Демидова Е. А.

29 марта 2024

Российский университет дружбы народов, Москва, Россия

Вводная часть

Цели

Приобретение практических навыков по настройке динамического распределения IP-адресов посредством протокола DHCP (Dynamic Host Configuration Protocol) в локальной сети.

Задачи

1. Добавить DNS-записи для домена `donskaya.rudn.ru` на сервере `dns`.
2. Настроить DHCP-сервис на маршрутизаторе.
3. Заменить в конфигурации конечных устройств статическое распределение адресов на динамическое.
4. При выполнении работы необходимо учитывать соглашение об именовании.

Выполнение лабораторной работы

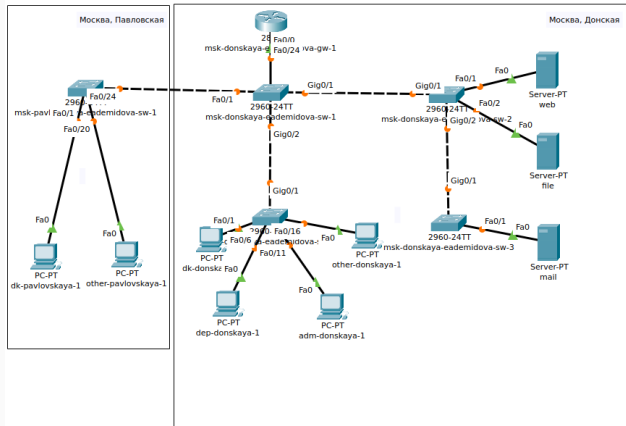


Рис. 1: Схема сети без учёта физических параметров сети в логической рабочей области Packet Tracer

Настройка DNS-сервера

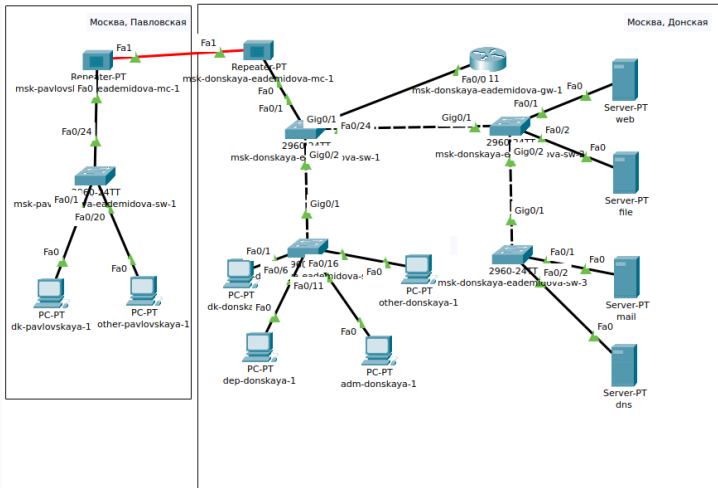


Рис. 2: Логическая схема локальной сети с добавленным DNS-сервером

```
msk-donskaya-eademidova-sw-3>en
msk-donskaya-eademidova-sw-3#conf t
msk-donskaya-eademidova-sw-3(config)#interface f0/2
msk-donskaya-eademidova-sw-3(config-if)#switchport mode access
msk-donskaya-eademidova-sw-3(config-if)#switchport access vlan 3
msk-donskaya-eademidova-sw-3(config-if)#exit
```

Настройка DNS-сервера

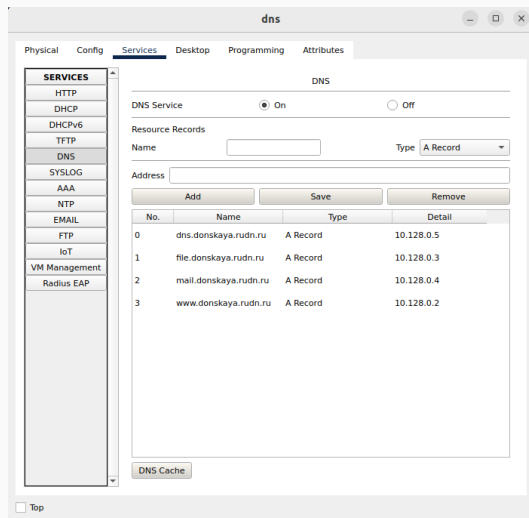
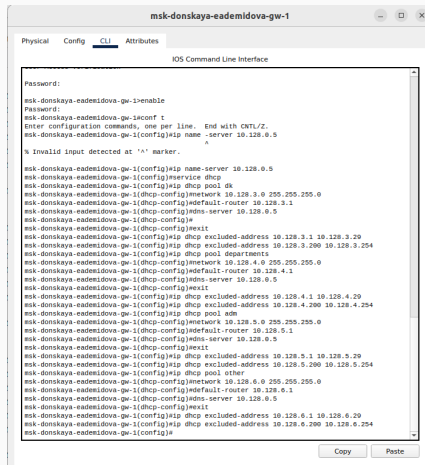


Рис. 3: Окно настройки сервиса DNS

Настройка DHCP-сервиса



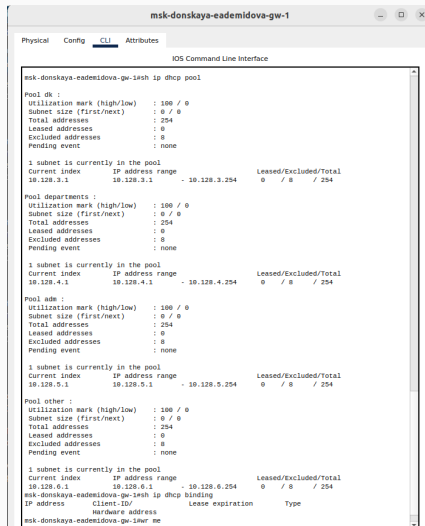
```
msk-donskaya-eademidova-gw-1
Physical Config CLI Attributes
IOS Command Line Interface

Password:
msk-donskaya-eademidova-gw-1#enable
Password:
msk-donskaya-eademidova-gw-1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
msk-donskaya-eademidova-gw-1(config)#ip name -server 10.128.0.5
                                     ^
% Invalid input detected at '^' marker.

msk-donskaya-eademidova-gw-1(config)#ip name-server 10.128.0.5
msk-donskaya-eademidova-gw-1(config)#service dhcp
msk-donskaya-eademidova-gw-1(config)#ip dhcp pool dk
msk-donskaya-eademidova-gw-1(dhcp-config)#network 10.128.3.0 255.255.255.0
msk-donskaya-eademidova-gw-1(dhcp-config)#default-router 10.128.3.1
msk-donskaya-eademidova-gw-1(dhcp-config)#dns-server 10.128.0.5
msk-donskaya-eademidova-gw-1(dhcp-config)#
msk-donskaya-eademidova-gw-1(dhcp-config)#exit
msk-donskaya-eademidova-gw-1(config)#ip dhcp excluded-address 10.128.3.1 10.128.3.29
msk-donskaya-eademidova-gw-1(config)#ip dhcp excluded-address 10.128.3.290 10.128.3.254
msk-donskaya-eademidova-gw-1(config)#ip dhcp pool departments
msk-donskaya-eademidova-gw-1(dhcp-config)#network 10.128.4.0 255.255.255.0
msk-donskaya-eademidova-gw-1(dhcp-config)#default-router 10.128.4.1
msk-donskaya-eademidova-gw-1(dhcp-config)#dns-server 10.128.0.5
msk-donskaya-eademidova-gw-1(dhcp-config)#exit
msk-donskaya-eademidova-gw-1(config)#ip dhcp excluded-address 10.128.4.1 10.128.4.29
msk-donskaya-eademidova-gw-1(config)#ip dhcp excluded-address 10.128.4.290 10.128.4.254
msk-donskaya-eademidova-gw-1(config)#ip dhcp pool adm
msk-donskaya-eademidova-gw-1(dhcp-config)#network 10.128.5.0 255.255.255.0
msk-donskaya-eademidova-gw-1(dhcp-config)#default-router 10.128.5.1
msk-donskaya-eademidova-gw-1(dhcp-config)#dns-server 10.128.0.5
msk-donskaya-eademidova-gw-1(dhcp-config)#exit
msk-donskaya-eademidova-gw-1(config)#ip dhcp excluded-address 10.128.5.1 10.128.5.29
msk-donskaya-eademidova-gw-1(config)#ip dhcp excluded-address 10.128.5.290 10.128.5.254
msk-donskaya-eademidova-gw-1(config)#ip dhcp pool other
msk-donskaya-eademidova-gw-1(dhcp-config)#network 10.128.6.0 255.255.255.0
msk-donskaya-eademidova-gw-1(dhcp-config)#default-router 10.128.6.1
msk-donskaya-eademidova-gw-1(dhcp-config)#dns-server 10.128.0.5
msk-donskaya-eademidova-gw-1(dhcp-config)#exit
msk-donskaya-eademidova-gw-1(config)#ip dhcp excluded-address 10.128.6.1 10.128.6.29
msk-donskaya-eademidova-gw-1(config)#ip dhcp excluded-address 10.128.6.290 10.128.6.254
msk-donskaya-eademidova-gw-1(config)#
```

Рис. 4: Настройка DHCP-сервиса на маршрутизаторе

IP-адреса	Назначение
1	Шлюз
2-19	Сетевое оборудование
20-29	Серверы
30-199	Компьютеры, DHCP
200-219	Компьютеры, Static
220-229	Принтеры
230-254	Резерв



```
msk-donskaya-eademidova-gw-1
Physical Config CLI Attributes
IOS Command Line Interface

msk-donskaya-eademidova-gw-1#sh ip dhcp pool

Pool dk :
  Utilization mark (high/low) : 100 / 0
  Subnet size (first/next) : 0 / 0
  Total addresses : 254
  Leased addresses : 0
  Excluded addresses : 8
  Pending event : none

  1 subnet is currently in the pool
  Current index      IP address range      Leased/Excluded/Total
  10.128.3.1         10.128.3.1 - 10.128.3.254  0 / 8 / 254

Pool departments :
  Utilization mark (high/low) : 100 / 0
  Subnet size (first/next) : 0 / 0
  Total addresses : 254
  Leased addresses : 0
  Excluded addresses : 8
  Pending event : none

  1 subnet is currently in the pool
  Current index      IP address range      Leased/Excluded/Total
  10.128.4.1         10.128.4.1 - 10.128.4.254  0 / 8 / 254

Pool ade :
  Utilization mark (high/low) : 100 / 0
  Subnet size (first/next) : 0 / 0
  Total addresses : 254
  Leased addresses : 0
  Excluded addresses : 8
  Pending event : none

  1 subnet is currently in the pool
  Current index      IP address range      Leased/Excluded/Total
  10.128.5.1         10.128.5.1 - 10.128.5.254  0 / 8 / 254

Pool other :
  Utilization mark (high/low) : 100 / 0
  Subnet size (first/next) : 0 / 0
  Total addresses : 254
  Leased addresses : 0
  Excluded addresses : 8
  Pending event : none

  1 subnet is currently in the pool
  Current index      IP address range      Leased/Excluded/Total
  10.128.6.1         10.128.6.1 - 10.128.6.254  0 / 8 / 254

msk-donskaya-eademidova-gw-1#sh ip dhcp binding
IP address      Client-ID/      Lease expiration      Type
                Hardware address
msk-donskaya-eademidova-gw-1#wr me
...
```

Рис. 5: Просмотр информации о DHCP пулах и выданных адресах

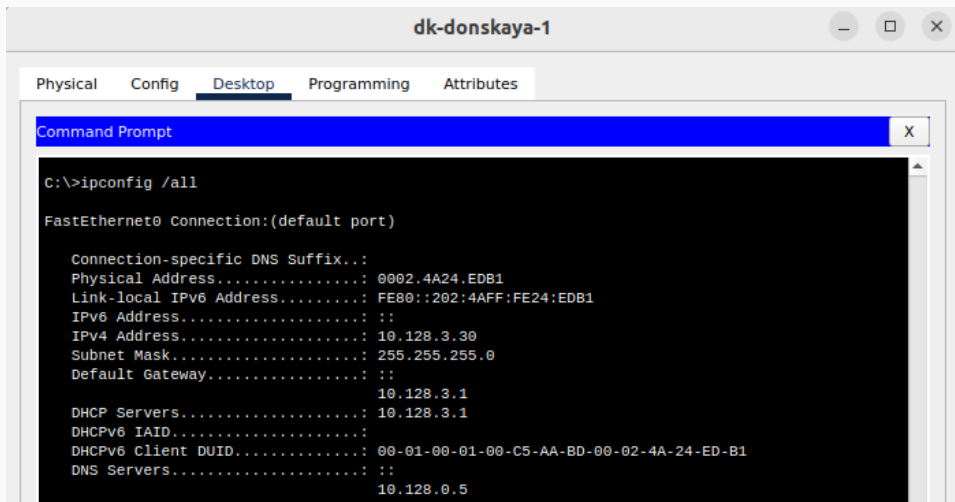


Рис. 6: IP-адрес выделенный DHCP

Проверка соединения

```
other-donskaya-1
Physical Config Desktop Programming Attributes
Command Prompt
C:\>ping www.donskaya.rudn.ru
Pinging 10.128.0.2 with 32 bytes of data:
Request timed out.
Reply from 10.128.0.2: bytes=32 time<1ms TTL=127
Reply from 10.128.0.2: bytes=32 time<1ms TTL=127
Reply from 10.128.0.2: bytes=32 time<1ms TTL=127
Ping statistics for 10.128.0.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms
C:\>ping 10.128.3.30
Pinging 10.128.3.30 with 32 bytes of data:
Request timed out.
Reply from 10.128.3.30: bytes=32 time<1ms TTL=127
Reply from 10.128.3.30: bytes=32 time<1ms TTL=127
Reply from 10.128.3.30: bytes=32 time<1ms TTL=127
Ping statistics for 10.128.3.30:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms
C:\>ping 10.128.5.30
Pinging 10.128.5.30 with 32 bytes of data:
Request timed out.
Reply from 10.128.5.30: bytes=32 time<1ms TTL=127
Reply from 10.128.5.30: bytes=32 time<1ms TTL=127
Reply from 10.128.5.30: bytes=32 time<1ms TTL=127
Ping statistics for 10.128.5.30:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

Рис. 7: Проверка доступности устройств из разных подсетей

Запрос адреса по протоколу DHCP

Event List				
Vis.	Time(sec)	Last Device	At Device	Type
	0.000	--	dk-donskaya-1	DHCP
	0.000	--	dk-donskaya-1	DHCP
	0.001	dk-donskaya-1	msk-donskaya-eademidova-sw-4	DHCP
	0.001	--	dk-donskaya-1	DHCP
	0.002	dk-donskaya-1	msk-donskaya-eademidova-sw-4	DHCP
	0.002	msk-donskaya-eademidova-sw-4	msk-donskaya-eademidova-sw-1	DHCP
	0.003	msk-donskaya-eademidova-sw-4	msk-donskaya-eademidova-sw-1	DHCP
	0.003	msk-donskaya-eademidova-sw-1	msk-donskaya-eademidova-mc-1	DHCP
	0.003	msk-donskaya-eademidova-sw-1	msk-donskaya-eademidova-gw-1	DHCP
	0.003	msk-donskaya-eademidova-sw-1	msk-donskaya-eademidova-sw-2	DHCP
	0.004	msk-donskaya-eademidova-sw-1	msk-donskaya-eademidova-mc-1	DHCP
	0.004	msk-donskaya-eademidova-sw-1	msk-donskaya-eademidova-gw-1	DHCP
	0.004	msk-donskaya-eademidova-sw-1	msk-donskaya-eademidova-sw-2	DHCP
	0.004	msk-donskaya-eademidova-mc-1	msk-pavlovskaya-eademidova-mc-1	DHCP
	0.004	msk-donskaya-eademidova-sw-2	msk-donskaya-eademidova-sw-3	DHCP
	0.005	msk-donskaya-eademidova-mc-1	msk-pavlovskaya-eademidova-mc-1	DHCP
	0.005	msk-donskaya-eademidova-sw-2	msk-donskaya-eademidova-sw-3	DHCP
	0.005	msk-pavlovskaya-eademidova-mc-1	msk-pavlovskaya-eademidova-sw-1	DHCP
	0.006	msk-pavlovskaya-eademidova-mc-1	msk-pavlovskaya-eademidova-sw-1	DHCP
	0.006	msk-pavlovskaya-eademidova-sw-1	dk-pavlovskaya-1	DHCP
	0.007	msk-pavlovskaya-eademidova-sw-1	dk-pavlovskaya-1	DHCP

Рис. 8: DHCP запрос на выделение адреса

Запрос адреса по протоколу DHCP

Event List				
Vis.	Time(sec)	Last Device	At Device	Type
	1.515	msk-donskaya-eademidova-gw-1	msk-donskaya-eademidova-sw-1	DHCP
	1.516	msk-donskaya-eademidova-sw-1	msk-donskaya-eademidova-mc-1	DHCP
	1.516	msk-donskaya-eademidova-sw-1	msk-donskaya-eademidova-sw-2	DHCP
	1.516	msk-donskaya-eademidova-sw-1	msk-donskaya-eademidova-sw-4	DHCP
	1.517	msk-donskaya-eademidova-mc-1	msk-pavlovskaya-eademidova-mc-1	DHCP
	1.517	msk-donskaya-eademidova-sw-2	msk-donskaya-eademidova-sw-3	DHCP
	1.517	msk-donskaya-eademidova-sw-4	dk-donskaya-1	DHCP
	1.518	msk-pavlovskaya-eademidova-mc-1	msk-pavlovskaya-eademidova-sw-1	DHCP
	1.518	dk-donskaya-1	msk-donskaya-eademidova-sw-4	DHCP
	1.519	msk-pavlovskaya-eademidova-sw-1	dk-pavlovskaya-1	DHCP
	1.519	msk-donskaya-eademidova-sw-4	msk-donskaya-eademidova-sw-1	DHCP
	1.520	msk-donskaya-eademidova-sw-1	msk-donskaya-eademidova-mc-1	DHCP
	1.520	msk-donskaya-eademidova-sw-1	msk-donskaya-eademidova-gw-1	DHCP
	1.520	msk-donskaya-eademidova-sw-1	msk-donskaya-eademidova-sw-2	DHCP
	1.521	msk-donskaya-eademidova-mc-1	msk-pavlovskaya-eademidova-mc-1	DHCP
	1.521	msk-donskaya-eademidova-gw-1	msk-donskaya-eademidova-sw-1	DHCP
	1.521	msk-donskaya-eademidova-sw-2	msk-donskaya-eademidova-sw-3	DHCP
	1.522	msk-pavlovskaya-eademidova-mc-1	msk-pavlovskaya-eademidova-sw-1	DHCP
	1.522	msk-donskaya-eademidova-sw-1	msk-donskaya-eademidova-mc-1	DHCP
	1.522	msk-donskaya-eademidova-sw-1	msk-donskaya-eademidova-sw-2	DHCP
	1.522	msk-donskaya-eademidova-sw-1	msk-donskaya-eademidova-sw-4	DHCP
	1.523	msk-pavlovskaya-eademidova-sw-1	dk-pavlovskaya-1	DHCP
	1.523	msk-donskaya-eademidova-mc-1	msk-pavlovskaya-eademidova-mc-1	DHCP
	1.523	msk-donskaya-eademidova-sw-2	msk-donskaya-eademidova-sw-3	DHCP
	1.523	msk-donskaya-eademidova-sw-4	dk-donskaya-1	DHCP
	1.524	msk-pavlovskaya-eademidova-mc-1	msk-pavlovskaya-eademidova-sw-1	DHCP
	1.525	msk-pavlovskaya-eademidova-sw-1	dk-pavlovskaya-1	DHCP
Reset Simulation <input checked="" type="checkbox"/> Constant Delay				
				Captured to: 1.963 s

Рис. 9: DHCP ответ с выделенным адресом

Запрос адреса по протоколу DHCP

PDU Information at Device: msk-donskaya-eademidova-gw-1

OSI Model [Inbound PDU Details](#)

PDU Formats

DHCP				Bytes
0	8	16	24	
OP:0x00000000 000000001	HW TYPE:1	HW LEN:6	HOPS:0	
TRANSACTION ID				
SECS:0		FLAGS:0x000000000000000000 000000008000		
CLIENT ADDRESS:0.0.0.0				
YOUR CLIENT ADDRESS:0.0.0.0				
SERVER ADDRESS:0.0.0.0				
RELAY AGENT ADDRESS:0.0.0.0				
CLIENT HARDWARE ADDRESS:0002.4A24.EDB1				
SERVER HOSTNAME (64 BYTES)				
FILE (128 BYTES)				
OPTIONS (312 BYTES)				

DHCP Client Identifier Option				Bits
0	4	8	12	
OP:0 x3d	LEN: 0x3d	HW:0x1		
CLIENT IDENTIFIER (VARIABLE LENGTH):0002.4A24.EDB1				

Рис. 10: DHCP запрос на выделение адреса. Заголовки пакета

Запрос адреса по протоколу DHCP

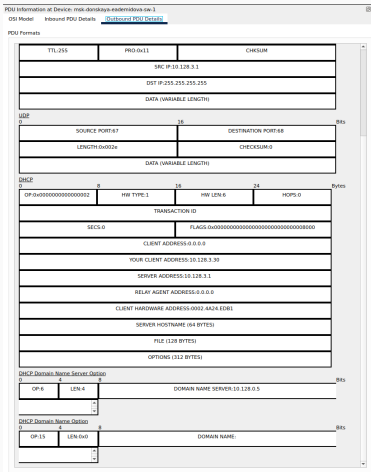


Рис. 11: DHCP ответ с выделенным адресом. Заголовки пакета

Выводы

В результате выполнения лабораторной работы получили навыки по настройке динамического распределения IP-адресов посредством протокола DHCP в локальной сети.