

Настройка DHCP-сервера Kea

Лабораторная работа №3

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Введение

- Настроить DHCP-сервер Kea.
- Конфигурировать DNS Bind9.
- Реализовать автоматические DDNS-обновления.

Конфигурирование DHCP

- Обновлено `domain-name` и DNS-параметры.
- Настроена подсеть, шлюз и диапазон IP.
- Удалены примеры конфигураций.

```
142     // {
143     //     "name": "domain-name-servers",
144     //     "code": 6,
145     //     "csv-format": "true",
146     //     "space": "dhcp4",
147     //     "data": "192.0.2.1, 192.0.2.2"
148     // }
149     // but it's a lot of writing, so it's easier to do this instead:
150     {
151         "name": "domain-name-servers",
152         "data": "192.168.1.1"
153     },
154
155     // Typically people prefer to refer to options by their names, so they
156     // don't need to remember the code names. However, some people like
157     // to use numerical values. For example, option "domain-name" uses
158     // option code 15, so you can reference to it either by
159     // "name": "domain-name" or "code": 15.
160     {
161         "code": 15,
162         "data": "ngaforov.net"
163     },
164
165     // Domain search is also a popular option. It tells the client to
```

Проверка и запуск

- Привязка DHCP к интерфейсу eth1.
- Успешная проверка конфигурации.
- Автоматический запуск сервиса.

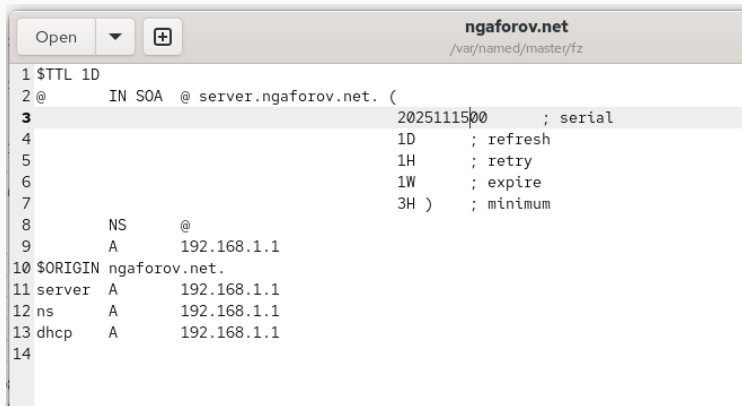
```
[root@server.ngaforov.net ~]# firewall-cmd --add-service=dhcp
success
[root@server.ngaforov.net ~]# firewall-cmd --add-service=dhcp --permanent
success
[root@server.ngaforov.net ~]# restorecon -vR /etc
Relabeled /etc/NetworkManager/system-connections/eth1.nmconnection from unconfined_u:object_r:user_tmp_t:s0 to unconfined_u:object_r:NetworkManager_etc_rw_t:s0
[root@server.ngaforov.net ~]# restorecon -vR /var/named
[root@server.ngaforov.net ~]# restorecon -vR /var/lib/kea/
[root@server.ngaforov.net ~]# systemctl start kea-dhcp4.service
[root@server.ngaforov.net ~]#
[root@server.ngaforov.net ~]# systemctl status kea-dhcp4.service
● kea-dhcp4.service - Kea DHCPv4 Server
   Loaded: loaded (/usr/lib/systemd/system/kea-dhcp4.service; enabled; preset: disabled)
   Active: active (running) since Sat 2025-11-15 08:07:40 UTC; 6s ago
 Invocation: 3266268e73824dcd8d9be21c54f7f246
    Docs: man:kea-dhcp4(8)
  Main PID: 14076 (kea-dhcp4)
    Tasks: 7 (limit: 10378)
  Memory: 3.2M (peak: 6.1M)
     CPU: 15ms
   CGroup: /system.slice/kea-dhcp4.service
           └─14076 /usr/sbin/kea-dhcp4 -c /etc/kea/kea-dhcp4.conf

Nov 15 08:07:40 server.ngaforov.net systemd[1]: Started kea-dhcp4.service - Kea DHCPv4 Server.
Nov 15 08:07:40 server.ngaforov.net kea-dhcp4[14076]: 2025-11-15 08:07:40.523 INFO [kea-dhcp4.dhcp4/14076.13969]
Nov 15 08:07:40 server.ngaforov.net kea-dhcp4[14076]: 2025-11-15 08:07:40.524 INFO [kea-dhcp4.commands/14076.13969]
ESCOC
```

Настройка DNS-зон

Внесённые изменения

- Добавлены A- и PTR-записи.
- Обновлено серийные номера зон.
- Перезапуск Bind9.



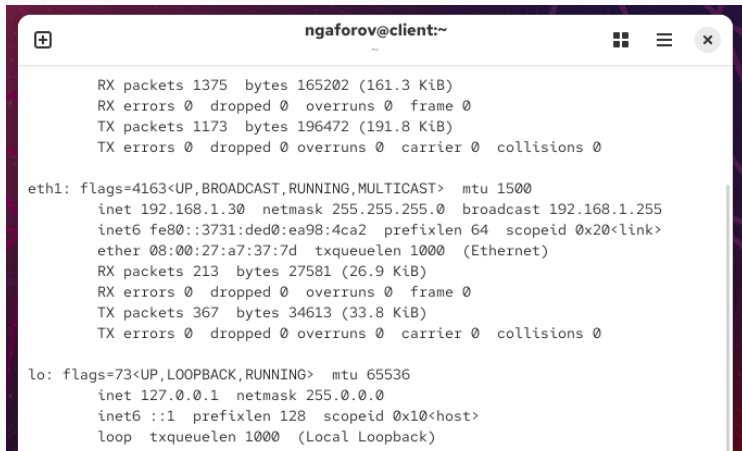
The screenshot shows a text editor window titled 'ngaforov.net' with the file path '/var/named/master/fz'. The editor contains a DNS zone file with the following content:

```
1 $TTL 1D
2 @      IN SOA  @ server.ngaforov.net. (
3          2025111500      ; serial
4          1D              ; refresh
5          1H              ; retry
6          1W              ; expire
7          3H )            ; minimum
8      NS      @
9      A       192.168.1.1
10 $ORIGIN ngaforov.net.
11 server A     192.168.1.1
12 ns      A     192.168.1.1
13 dhcp    A     192.168.1.1
14
```


Анализ работы DHCP

Проверка клиента

- Клиент получил IP: 192.168.1.30.
- Lease записан в kea-leases4.csv.
- Соответствие MAC-адреса подтверждено.



```
ngaforov@client:~  
  
RX packets 1375  bytes 165202 (161.3 KiB)  
RX errors 0  dropped 0  overruns 0  frame 0  
TX packets 1173  bytes 196472 (191.8 KiB)  
TX errors 0  dropped 0  overruns 0  carrier 0  collisions 0  
  
eth1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500  
    inet 192.168.1.30  netmask 255.255.255.0  broadcast 192.168.1.255  
    inet6 fe80::3731:ded0:ea98:4ca2  prefixlen 64  scopeid 0x20<link>  
    ether 08:00:27:a7:37:7d  txqueuelen 1000  (Ethernet)  
    RX packets 213  bytes 27581 (26.9 KiB)  
    RX errors 0  dropped 0  overruns 0  frame 0  
    TX packets 367  bytes 34613 (33.8 KiB)  
    TX errors 0  dropped 0  overruns 0  carrier 0  collisions 0  
  
lo: flags=73<UP,LOOPBACK,RUNNING>  mtu 65536  
    inet 127.0.0.1  netmask 255.0.0.0  
    inet6 ::1  prefixlen 128  scopeid 0x10<host>  
    loop txqueuelen 1000  (Local Loopback)
```

Настройка DDNS

- Создан ключ обновления зон.
- Подключён в Bind9.
- Задана политика `update-policy`.

```
[root@server.ngaforov.net ~]#  
[root@server.ngaforov.net ~]# mkdir -p /etc/named/keys  
[root@server.ngaforov.net ~]# tsig-keygen -a HMAC-SHA512 DHCP_UPDATER > /etc/named/keys/dhcp_updater.key  
[root@server.ngaforov.net ~]# chown -R named:named /etc/named/keys  
[root@server.ngaforov.net ~]#  
[root@server.ngaforov.net ~]# cat /etc/named/keys/dhcp_updater.key  
key "DHCP_UPDATER" {  
    algorithm hmac-sha512;  
    secret "Oebs2cL4BskF3Q7iKFejZixe53C4nAFbNMtQceJdJah3VWg8iT0cV5HdCvYXfmAlvInlQZvxxv4pjUXnWeP7iLg==";  
};  
[root@server.ngaforov.net ~]#
```

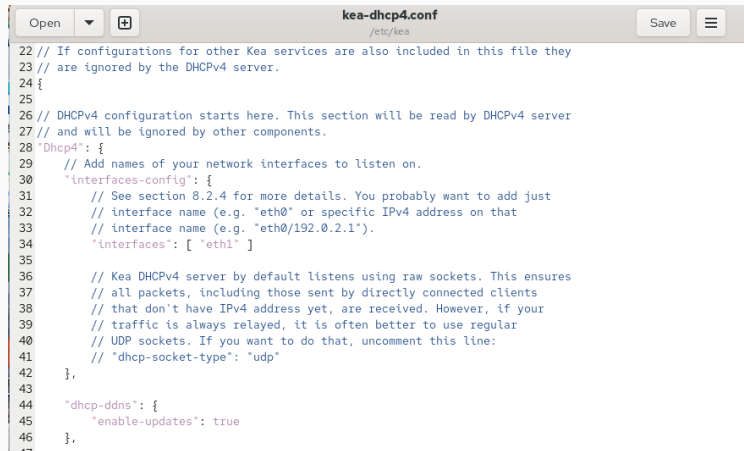
Рис. 5: TSIG-ключ

- Создан `tsig-keys.json`.
- Указаны параметры DDNS.
- Запущен сервис DDNS.

```
21
22 "ip-address": "127.0.0.1",
23 "port": 53001,
24 "control-socket": {
25     "socket-type": "unix",
26     "socket-name": "/run/kea/kea-ddns-ctrl-socket"
27 },
28 <?include "/etc/kea/tsig-keys.json"?>
29
30 "forward-ddns" : {
31     "ddns-domains": [
32         {
33             "name": "ngaforov.net.",
34             "key-name": "DHCP_UPDATER",
35             "dns-servers": [
36                 { "ip-address": "192.168.1.1" }
37             ]
38         }
39     ]
40 },
41
42 "reverse-ddns" : {
43     "ddns-domains": [
44         {
```

Активация DDNS в DHCP

- Включены обновления DNS.
- Указан суффикс **ngaforov.net**.
- Разрешено перезаписывать записи клиента.



```
22 // If configurations for other Kea services are also included in this file they
23 // are ignored by the DHCPv4 server.
24 {
25
26 // DHCPv4 configuration starts here. This section will be read by DHCPv4 server
27 // and will be ignored by other components.
28 "dhcp4": {
29     // Add names of your network interfaces to listen on.
30     "interfaces-config": {
31         // See section 8.2.4 for more details. You probably want to add just
32         // interface name (e.g. "eth0" or specific IPv4 address on that
33         // interface name (e.g. "eth0/192.0.2.1").
34         "interfaces": [ "eth1" ]
35
36         // Kea DHCPv4 server by default listens using raw sockets. This ensures
37         // all packets, including those sent by directly connected clients
38         // that don't have IPv4 address yet, are received. However, if your
39         // traffic is always relayed, it is often better to use regular
40         // UDP sockets. If you want to do that, uncomment this line:
41         // "dhcp-socket-type": "udp"
42     },
43
44     "dhcp-ddns": {
45         "enable-updates": true
46     },
47 }
```

Проверка DDNS

Результат проверки

- В DNS появилась запись:
 - client.ngaforov.net
 - IP → 192.168.1.30
- Обновление прошло автоматически.

```
[ngaforov@client.ngaforov.net ~]$ dig @192.168.1.1 client.ngaforov.net

; <<>> DiG 9.18.33 <<>> @192.168.1.1 client.ngaforov.net
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 29518
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 1232
; COOKIE: c045ec5d1a48efd00100000069183babc73ff3cef74eaf8e (good)
;; QUESTION SECTION:
;client.ngaforov.net.          IN      A

;; ANSWER SECTION:
client.ngaforov.net.  1200    IN      A      192.168.1.30

;; Query time: 0 msec
```


Выводы

- Настроены Kea DHCP и Bind9.
- Реализован DDNS на основе TSIG.
- Стенд полностью автоматизирован.