SG300 DHCP-IP-Conflict

Behavior

Customer reported several IP-Conflicts. After connecting a new device to the Network, the device is not reachable. Checking the device IP shows an already existing IP. DHCP Server is not working

Test

Test environment:

1x SG300-52

- Firmware: 1.4.3
- Config: startup-DLC-SGR21-4-DANTE-PRI-F07-S02-SG300-52
- Configured port mirroring for debugging network traffic

9x DHCP Clients

To reproduce the reported behavior, we've made the following steps.

1. Connected all devices. Checked the DHCP-Bindings for all devices
2. Changed the DHCP-IP Pool size. Range: 10.185.57.1-10.185.57.8
3. Changed the Lease duration to 5 Minutes
4. Deleted all existing DHCP bindings
5. Reconnected all devices
6. Checking the DHCP bindings. After the DHCP Server served the IPs to 8 Devices we've checked which device doesn't get an IP and disconnected it
   Binding Table:

IP	Eth.addr (last 2 bytes)
10.185.57.1	20:2c
10.185.57.2	22:0c
10.185.57.3	20:4a
10.185.57.4	20:30
10.185.57.5	1b:46
10.185.57.6	1b:c6
10.185.57.7	1b:c8
10.185.57.8	22:10
No IP	22:18

7. Disconnected the Device 20:2c. Waiting for lease is expired
8. After Lease is expired we've connected the device with eth.addr 22:18
9. Device 22:18 sending a DHCP Discover with Option 50 (Requested IP Address). Requested IP Address is set to 10.185.57.4 (last IP the device was connected to the network)
10. The DHCP-Server didn't offer 10.185.57.1 to Device 22:18. Instead the DHCP-Server sends a DHCP-NAK to the Device 20:30 which had a valid lease for 10.185.57.4 and offered the requested IP to device 22:18

```
0.0.0.0       255.255.255.255 DHCP       590 DHCP Discover - Transaction ID 0x3e28765e Audinate_0d:22:18 Broadcast
0.0.0.0       255.255.255.255 DHCP       590 DHCP Discover - Transaction ID 0x3e28765e Audinate_0d:22:18 Broadcast
0.0.0.0       255.255.255.255 DHCP       590 DHCP Discover - Transaction ID 0x3e28765e Audinate_0d:22:18 Broadcast
10.185.57.125 10.185.57.4     DHCP       286 DHCP NAK      - Transaction ID 0x0        Cisco_f8:a8:db    Audinate_0d:20:30
10.185.57.4   10.185.57.125   ICMP       314 Destination unreachable (Port unreachable) Audinate_0d:20:30 Cisco_f8:a8:db
10.185.57.125 10.185.57.4     DHCP       358 DHCP Offer    - Transaction ID 0x3e28765e Cisco_f8:a8:db    Audinate_0d:22:18
```

*DHCP-Server sending DHCP NAK to Device 20:30 with Network Address 10.85.57.4. After device
20:30 released the IP the DHCP-Server offers the IP to Device 22:18*

11. After device released his lease the device is sending DHCP-Requests to the DHCP-Server. The
    DHCP-Server didn't offer any IP to the Device.
12. Disconnected Device 22:18
13. Device 20:30 still sending Requests and Discover Messages. After Disconnected Device 22:18
    the DHCP-Server sends a DHCP-NAK to Device 20:30
14. After an ICMP Message to the DHCP-Server – 10.185.57.4 is not reachable – the DHCP Server
    offered the 10.185.57.4 to the device. DHCP-Server still not offered the expired lease of
    10.185.57.1

```
0.0.0.0       255.255.255.255 DHCP       590 DHCP Discover - Transaction ID 0x4d9a3344 Audinate_0d:20:30 Broadcast
10.185.57.125 10.185.57.4     DHCP       286 DHCP NAK      - Transaction ID 0x0        Cisco_f8:a8:db    Audinate_0d:20:30
10.185.57.4   10.185.57.125   ICMP       314 Destination unreachable (Port unreachable) Audinate_0d:20:30 Cisco_f8:a8:db
10.185.57.125 10.185.57.4     DHCP       358 DHCP Offer    - Transaction ID 0x4d9a3344 Cisco_f8:a8:db    Audinate_0d:20:30
10.185.57.4   10.185.57.125   ICMP       386 Destination unreachable (Port unreachable) Audinate_0d:20:30 Cisco_f8:a8:db
0.0.0.0       255.255.255.255 DHCP       590 DHCP Request  - Transaction ID 0x1e09776f Audinate_0d:20:30 Broadcast
0.0.0.0       255.255.255.255 DHCP       590 DHCP Request  - Transaction ID 0x1e09776f Audinate_0d:20:30 Broadcast
0.0.0.0       255.255.255.255 DHCP       590 DHCP Request  - Transaction ID 0x1e09776f Audinate_0d:20:30 Broadcast
10.185.57.125 10.185.57.4     DHCP       358 DHCP ACK      - Transaction ID 0x1e09776f Cisco_f8:a8:db    Audinate_0d:20:30
```

Every time device 20:30 and 22:18 are connected to the network at the same time, the DHCP-Server
didn't offer an expired lease. The DHCP-Server only changed the bindings for 10.185.57.4. So both
devices were reachable under 10.185.57.4.

15. We've changed the IP-Pool back to 10.185.57.1-10.185.57.124 and the Lease-duration back
    to 1 Day
16. Connected all 9 Devices
17. DHCP-Server didn't offers any other IP to 22:18 and 20:30 than 10.85.57.4
    Still sending NAK to the device with the allocated Lease and Offers the IP to the other device

After disconnecting all Devices, rebooting Switch and devices, flushing all Binding-Tables and
reconnecting the Devices, the DHCP-Server offers new addresses to the Devices.

Summary

- We could only reproduce the reported behavior, when a device already had an IP in the
  network and another device uses this IP
- DHCP-Server doesn't offer expired leases
- DHCP-Server every time offers the IP which is requested and doesn't offer a "free" IP
- We've checked Option 61. Client identifier is the hardware address which is unique.

Questions

- Why is the DHCP-Server not offering any "free" IP-Address?
- Why the DHCP-Server does "steal" the actual lease and offers the IP to another Device which
  is requesting the IP?
- Why is the DHCP-Server not offering any expired lease?