
Systemd DHCPAP notes Documentation

Release 0.1

jugass

Jul 17, 2017

Contents

| | | |
|----------|--|-----------|
| 1 | Building systemd | 3 |
| 1.1 | Install dependencies | 3 |
| 1.2 | Clone and compile systemd | 3 |
| 1.3 | Hacky way to test new systemd-networkd binary | 3 |
| 1.4 | Scan DHCP packages | 4 |
| 1.5 | Tests | 5 |
| 2 | systemd DHCP client code related to Anonymity Profiles | 7 |
| 3 | Options to modify systemd DHCP client | 9 |
| 3.1 | Options | 9 |
| 4 | Summary of systemd modifications for the Anonymity Profiles | 11 |
| 4.1 | Option A | 11 |
| 5 | Systemd modification for Anonymity Profiles TODO | 15 |
| 6 | Indices and tables | 17 |

Contents:

CHAPTER 1

Building systemd

Install dependencies

```
apt build-dep systemd
```

Clone and compile systemd

```
git clone https://github.com/systemd/systemd
cd systemd
./autogen.sh
./configure CFLAGS='-g -O0 -ftrapv' --sysconfdir=/etc --localstatedir=/var --libdir=/
usr/lib --with-rootprefix=/ --with-rootlibdir=/lib
make -j`nproc`
```

The generated binaries will be in `.libs`

Hacky way to test new systemd-networkd binary

Check that the system binary is different to the generated binary:

```
sha256sum .libs/systemd-networkd /lib/systemd/systemd-networkd
```

To find required library:

```
ldd .libs/systemd-networkd | grep system
```

To find which declarations are missing:

```
readelf -Ws /lib/systemd/libsystemd-shared-233.so | grep config_parse_uint
readelf -Ws .libs/libsystemd-shared-233.so | grep config_parse_uint
```

Configure network:

```
cat /etc/systemd/network/20-dhcp.network

[Match]
Name=en*

[Network]
DHCP=ipv4

[DHCP]
UseAnonymityProfile=true
```

Replace system binaries with the compiled ones:

If Network Manager is running, stop it:

```
systemctl stop NetworkManager
```

Restart:

```
systemctl restart systemd-networkd
```

To keep it running in the system:

```
systemctl enable systemd-networkd
systemctl enable systemd-resolved
systemctl disable NetworkManager
```

To enable wifi interface:

```
wpa_passphrase MyNetwork SuperSecretPassphrase > /etc/wpa_supplicant/wpa_supplicant-
↳ wlan0.conf
systemctl enable wpa_supplicant@wlan0.conf
```

To obtain debugging logs, add to the unit:

```
[Service]
Environment=SYSTEMD_LOG_LEVEL=debug
```

The unit in Debian is in `/lib/systemd/system/systemd-networkd.service`

If other unit is created, it needs to have the correct file system permissions:

```
touch /etc/systemd/system/name.service
chmod 664 /etc/systemd/system/name.service
```

Scan DHCP packages

```
/usr/sbin/tcpdump -r /tmp/dhcp-before.pcap -X -n
```


Tests

```
make -j`nproc` check
```


systemd DHCP client code related to Anonymity Profiles

UML class diagram:

Files that (might) need changes:

```
src/libsystemd-network/sd-dhcp-client.c src/network/networkd-link.c
src/network/networkd-manager.c src/libsystemd-network/dhcp-internal.h
src/libsystemd-network/dhcp-packet.c
src/libsystemd-network/dhcp-protocol.h
src/libsystemd-network/test-dhcp-client.c
src/libsystemd-network/test-dhcp-option.c
```

Configuration variables related to the Anonymity Profile (AP):

```
src/network/networkd-network-gperf.gperf

DHCP.ClientIdentifier,          config_parse_dhcp_client_identifier,
↪ 0,                          offsetof(Network, dhcp_client_identifier)
DHCP.UseDNS,                   config_parse_bool,
↪ 0,                          offsetof(Network, dhcp_use_dns)
DHCP.UseNTP,                   config_parse_bool,
↪ 0,                          offsetof(Network, dhcp_use_ntp)
DHCP.UseMTU,                   config_parse_bool,
↪ 0,                          offsetof(Network, dhcp_use_mtu)
DHCP.UseHostname,              config_parse_bool,
↪ 0,                          offsetof(Network, dhcp_use_hostname)
DHCP.UseDomains,               config_parse_dhcp_use_domains,
↪ 0,                          offsetof(Network, dhcp_use_domains)
DHCP.UseRoutes,                config_parse_bool,
↪ 0,                          offsetof(Network, dhcp_send_hostname)
DHCP.Hostname,                  config_parse_hostname,
↪ 0,                          offsetof(Network, dhcp_critical)
DHCP.VendorClassIdentifier,     config_parse_string,
```

Options to modify systemd DHCP client

Options

A.

- Add option `UseAnonymityProfile`
- defaults to false
- setting it to true override settings, even if they've been explicitly setup. Produce a warning about it
- modifying as less as possible existing code.

B.

- Add option `UseAnonymityProfile`
- defaults to false
- variables that are explicitly set would still take effect
- unset variables would be controlled according to the `AnonymityProfile`

C.

- do not have `UseAnonymityProfile` variable
- remove all the code that is not needed for the `Anonymity Profiles`

Summary of systemd modifications for the Anonymity Profiles

Option A

1. Add UseAnonymityProfile configuration variable:

```
src/network/networkd-network-gperf.gperf

DHCP.UseAnonymityProfile, config_parse_bool, 0, offsetof(Network,
dhcp_use_anonymity_profile)
```

2. Add dhcp_use_anonymity_profile variable and network_apply_anonymity_profile_if_set function:

```
src/network/networkd-network.h

bool dhcp_use_anonymity_profile;

int network_apply_anonymity_profile_if_set(Network *network);
```

3. Implement function network_apply_anonymity_profile_if_set:

```
src/network/networkd-network.c

/* RFC7844*/
int network_apply_anonymity_profile_if_set(Network *network) {
    if (network->dhcp_use_anonymity_profile) {
        /* RFC7844 3.7
        SHOULD NOT send the Host Name option */
        network->dhcp_send_hostname = false;
        /* RFC 7844 3:
        MAY contain the Client Identifier option
        Section 3.5:
        clients MUST use client identifiers based solely
        on the link-layer address */
        network->dhcp_client_identifier = DHCP_CLIENT_ID_MAC;
```

```
/* RFC 7844 3.10:
   SHOULD NOT use the Vendor Class Identifier option */
network->dhcp_vendor_class_identifier = NULL;
/* RFC 7844 3:
   SHOULD NOT contain any other option. */
network->dhcp_use_mtu = false;
network->dhcp_use_routes = false;

network->dhcp_use_timezone = false;
/* FIXME RFC7844: check if the following options are needed */
network->dhcp_use_ntp = false;
network->dhcp_use_dns = false;
network->dhcp_use_domains = false;
/* FIXME: check options for ipv6 */
// network->ipv6_privacy_extensions = IPV6_PRIVACY_EXTENSIONS_NO;
}
return 0;
}
```

Unordered parts of code modified/to modify

```
src/network/networkd-dhcp4.c

if (!link->network->dhcp_use_anonymity_profile) {
    r = sd_dhcp_client_set_request_option_defaults(link->dhcp_client);
}

src/systemd/sd-dhcp-client.h

int sd_dhcp_client_set_request_option_defaults(
    sd_dhcp_client *client);

src/libsystemd-network/sd-dhcp-client.c

int sd_dhcp_client_set_request_option_defaults(sd_dhcp_client *client) {

    // FIXME RFC788: set this here instead of
    // sd_dhcp_client_set_request_option_defaults? (defined here and called in networkd-
    // ↪ dhcp4.c)
    // bool anonymity_profile;

    /* RFC2131 section 3.5:
       in its initial DHCPDISCOVER or DHCPREQUEST message, a
       client may provide the server with a list of specific
       parameters the client is interested in. If the client
       includes a list of parameters in a DHCPDISCOVER message,
       it MUST include that list in any subsequent DHCPREQUEST
       messages.
    */
    /* RFC7844: parameter request list is not set now by default,
       so it must be checked that there are actually options. */
    if(client->req_opts_size > 0) {
        r = dhcp_option_append(

    /* FIXME RFC7844: there should not be a REBOOT state */

    /* RFC7844 section 3
```



```
SHOULD NOT contain any other option.  
Link->Network->dhcp_use_anonymity_profile is already set here,  
but client struct does not have this field  
The code to set default options for PARAMETER_REQUEST_LIST  
is moved to a function */
```

```
src/network/networkd-link.c
```

```
r = sd_dhcp_client_start(link->dhcp_client);
```

```
src/network/networkd-manager.c
```

```
src/libsystemd-network/dhcp-internal.h
```

```
src/libsystemd-network/dhcp-packet.c
```

```
src/libsystemd-network/dhcp-protocol.h
```

```
src/libsystemd-network/test-dhcp-client.c
```

```
src/libsystemd-network/test-dhcp-option.c
```

```
src/?/sd-dhcp-lease.c
```

Systemd modification for Anonymity Profiles TODO

- unit tests
- verification of DHCPDISCOVER and DHCPREQUEST against the spec – what about DHCP
- mkosi tests? looking at HACKING and mkosi, it's not clear to me that there's any specific tests to run there –they're just showing you a way to make a “legacy-free” system and launch it (so you can fiddle with the vm running the new installation, i guess)
- documentation – what needs to change to communicate this to the local admin?
- a nice clean series of commits and commit messages that match existing upstream practice, to convince upstream that you're serious and have paid attention to detail
- some other ideas (...)

CHAPTER 6

Indices and tables

- `genindex`
- `modindex`
- `search`