DHCP Migration to Kea

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Experience with Migrations

- Alan’s Background
  - University and ISP network deployments
  - ISC and multiple IPAM appliance vendors
- Observations from experience
  - Migrations are hard
  - Migrations are not always wanted or needed

Experience with Migrations

- Unexpected benefits of migration
  - There is always something you don’t know about your network
  - There is always something you don’t understand about your DHCP configuration
  - Your configuration may become simpler
  - Your configuration may end up documented

Experience with Migrations

- Estimating the effort required
  - Project managers aren’t (always) evil
  - **Effort required** and **Time required** are NOT the same thing
    - Several small- to mid-sized-migrations over a planned period are much better than one large migration

When/Why to migrate

- Infrastructure at rest tends to remain at rest
- When should you migrate?
  - Major infrastructure changes
  - New campus/facility/remote-office additions
  - End-of-life of existing infrastructure tools
  - Hundreds of available hours and tens of thousands of “left over” budget dollars

High Level Plan

- Document/review existing configuration
  - Is it possible to consolidate or would it be beneficial to distribute functionality?
- Decide Kea deployment options
  - Database backends
  - High Availability
  - IPv6 if it’s not already in place

High Level Plan

- Translate configuration
  - Tools (Keama) are available
  - Manual translation (or rewrite) may be possible or necessary
- Test translated configuration
  - Not only functionality testing, but also performance testing!

High Level Plan

- Migrate leases
  - Existing leases must be rebuilt from scratch
    - Depends on clients and lease traffic (timers)
- Perform cutover
  - Little bits at a time
  - Off hours

ISC DHCP vs. Kea

- Failover
  - Not implemented in Kea
- High Availability
  - Not implemented in ISC DHCP
- Option inheritance
  - Differs between ISC DHCP and Kea

Kea Options

- Configuration backend
  - Keep your Kea configurations in a database
- Host reservations backend (optional)
- Lease database backend (optional)
  - Is there a high-speed database available?
  - Is there a NEED to keep leases in a database?

Kea Migration Assistant

- A branch of the legacy ISC DHCP server
  - Input: ISC DHCP configuration
    - DHCP configuration language
  - Output: Kea configuration
    - JSON Kea configuration

Kea Migration Assistant

- Run once for IPv6 and once for IPv4
  - Produces separate output files per protocol
- Provides diagnostics when a direct translation is not available or possible
  - Linked to the Kea gitlab

Kea Migration Assistant

- Converting lease files is not currently supported
  - Impacts:
    - Existing leases
    - Host reservations created manually in the lease file or by OMAPI
- Additional tools are under consideration

Keama Install

- Keama can be found in the “migration-assistant” branch of the ISC DHCP git repo:

  https://gitlab.isc.org/isc-projects/dhcp/tree/migration-assistant

- Compile/run instructions are in the wiki:

  https://gitlab.isc.org/isc-projects/dhcp/wikis/kea-migration-assistant

Keama Install

```
# First fetch the source tarball
wget https://gitlab.isc.org/isc-projects/dhcp/-/archive/migration-assistant/dhcp-
migration-assistant.tar.gz

#  Unarchive it
tar -xf dhcp-migration-assistant.tar.gz

#  Change into main directory
cd dhcp-migration-assistant

#  Configure the build.  If you want to install it somewhere specific use
#       --prefix=<path> parameter
./configure

# Change into the migration assistant directory
cd keama

# Run make to build keama
make

# Install it (optional)
sudo make install
```

Translating Configuration

```
NAME
       keama - Kea Migration Assistant

SYNOPSIS
       keama  [ -4 | -6] [ -N ] [ -r {perform|fatal|pass} ] [ -l hook-library-
       path ] [ -i input-file ] [ -o output-file ]

DESCRIPTION
       The Kea Migration Assistant converts an  ISC  DHCP  configuration  file
       into the corresponding Kea configuration file.

COMMAND LINE
       Protocol selection options:

       -4     The input configuration is for DHCPv4.  Incompatible with the -6
              option.

       -6     The input configuration is for DHCPv6.  Incompatible with the -4
              option.

       -N     Instead  of  using  global  host  reservations,  put them in the
              matching subnet.
```

Translating Configuration

- Sample:
  - `keama -4 -i dhcp.conf -o kea.conf`
  - Simple enough!
    - Unfortunately, there are lots of assumptions here.

A Small Network

```
option domain-name "boat";
option domain-name-servers 44.127.8.1;
default-lease-time 600;
max-lease-time 7200;
authoritative;

subnet 44.127.8.0 netmask 255.255.255.0 {
   range 44.127.8.128 44.127.8.249;
   option routers 44.127.8.1;
}

host roku {
    hardware ethernet 1c:1e:e3:9b:48:83;
    option host-name "roku-tv";
    fixed-address 44.127.8.2;
}
```

```
keama -4 -i home.conf -o home.kea
```

A Small Network

- Much more verbose
  - Input: 16 lines
  - Output: 70 lines
- And… some issues.

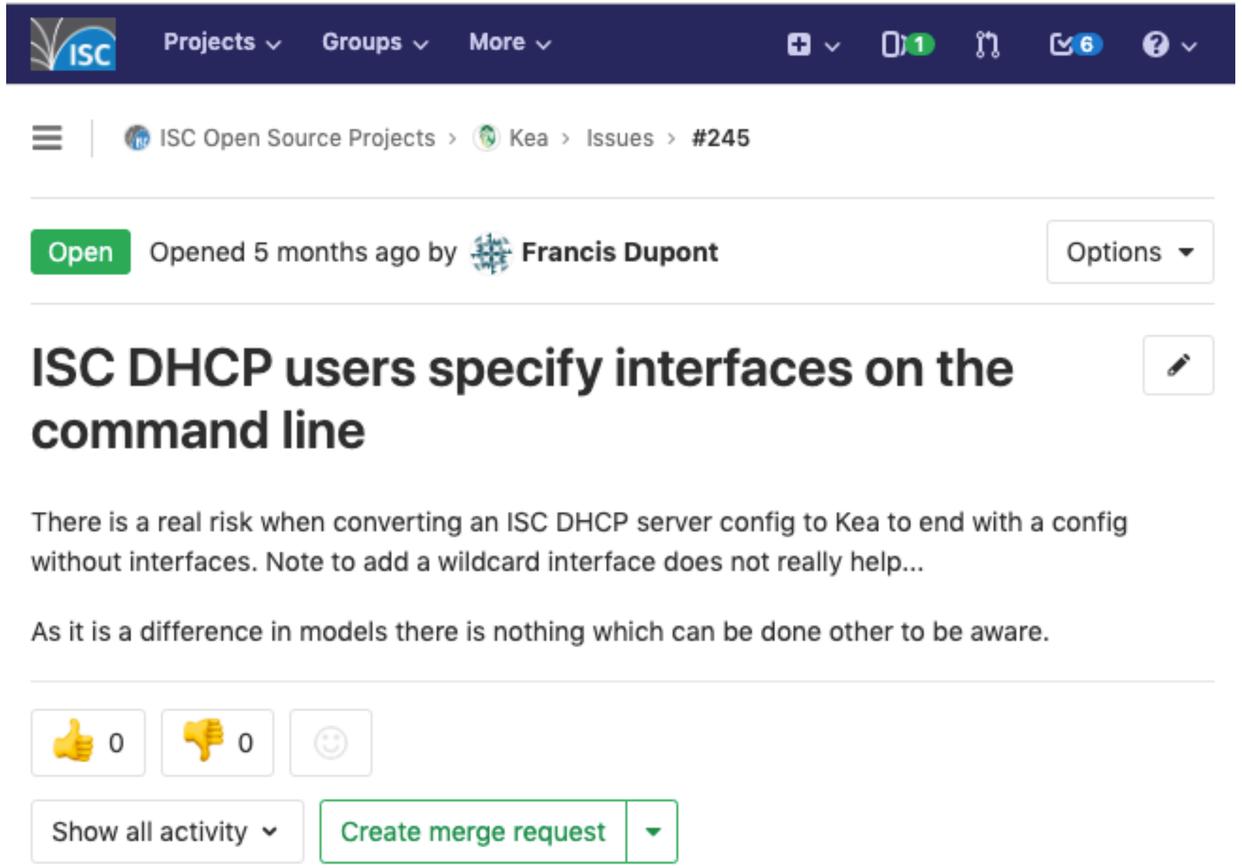
A Small Network

```
{
  /// This configuration declares some subnets but has no interfaces-config
  /// Reference Kea #245
  "Dhcp4": {
    "option-data": [
      {
        "space": "dhcp4",
        "name": "domain-name",
        "code": 15,
        "data": "boat"
      },
      {
        "space": "dhcp4",
        "name": "domain-name-servers",
        "code": 6,
        "data": "44.127.8.1"
      }
    ],
    "valid-lifetime": 600,
```

https://gitlab.isc.org/isc-projects/kea/issues/245

Resolving Issues

https://gitlab.isc.org/isc-projects/kea/issues/245



A Small Network

```
//   "config": [
//     /// max-lease-time is not supported
//     /// use default-lease-time instead
//     /// Reference Kea #221
//     {
//       "name": "max-lease-time",
//       "code": 2,
//       "value": 7200
//     }
//   ],
     "authoritative": true,
```

- https://gitlab.isc.org/isc-projects/kea/issues/221

Resolving Issues

https://gitlab.isc.org/isc-projects/kea/issues/221

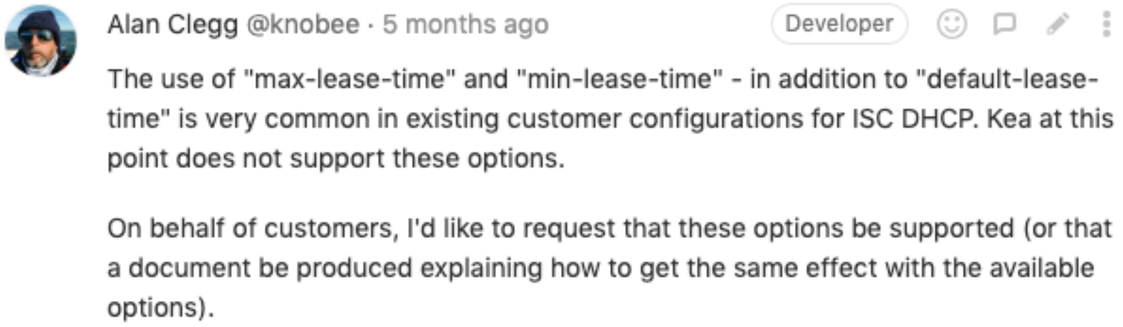
Kea vs ISC DHCP timers

ISC DHCP uses 3 values (max, min and default) values for lease-time (valid-lifetime) in Kea). These 3 values are in the Kea code (aka the triplet class) but are not reflected in config. (note I don't say a solution is better but they are different). As the valid-lifetime is a mandatory config parameter this means Kea is rigid (same comment).

[The gitlab issue goes on to explain a couple of other timers]

Resolving Issues

- Did that help any?
  - If yes, great!
  - If no, you are now in gitlab and can express your opinions and desires as to the expected outcome:



Alan Clegg @knobee · 5 months ago Developer

The use of "max-lease-time" and "min-lease-time" - in addition to "default-lease-time" is very common in existing customer configurations for ISC DHCP. Kea at this point does not support these options.

On behalf of customers, I'd like to request that these options be supported (or that a document be produced explaining how to get the same effect with the available options).

A Small Network

```
"authoritative": true,
"subnet4": [
  {
    "id": 1,
    "subnet": "44.127.8.0/24",
    "pools": [
      {
        "pool": "44.127.8.128 - 44.127.8.249"
      }
    ],
    "option-data": [
      {
        "space": "dhcp4",
        "name": "routers",
        "code": 3,
        "data": "44.127.8.1"
      }
    ]
  }
],
```

A Small Network

```
    "host-reservation-identifiers": [
      "hw-address"
    ],
    "reservation-mode": "global",
    "reservations": [
      {
        "hostname": "roku",
        "hw-address": "1c:1e:e3:9b:48:83",
        "option-data": [
          {
            "space": "dhcp4",
            "name": "host-name",
            "code": 12,
            "data": "roku-tv"
          }
        ],
        "ip-address": "44.127.8.2"
      }
    ]
  }
}
```

A Small Network

- This configuration “migrated” relatively well
  - What did not migrate was documented
- *Caveat*: This was a very simple configuration and I removed the dynamic DNS zones to make it fit the screen!
- Over the next slides, a number of configuration snippets with more complex issues will be presented

OMAPI

```
#### Omapi Statements;
omapi-port 7911;
include "/etc/omapi.key";
#### End of Omapi Statements;
```

```
//    /// omapi-port is an internal ISC DHCP feature
//    {
//      "name": "omapi-port",
//      "code": 31,
//      "value": 7911
//    },
```

delayed-ack

```
delayed-ack 28;
```

```
//     /// delayed ack no supported
//     {
//       "name": "delayed-ack",
//       "code": 58,
//       "value": 28
//     },
```

Update Optimization

dynamic DNS configuration

```
update-optimization false;
```

```
//     /// update-optimization is not supported
//     /// Kea follows RFC 4702
//     {
//       "name": "update-optimization",
//       "code": 41,
//       "value": false
//     },
```

“programming”

```
if substring (option dhcp-client-identifier, 1, 4) = "RAS " {
   ignore booting;
}
```

- Very common construct in ISC DHCP
- Keama creates interesting output

“programming”

```
//  "statement": {
//    "if": {
//      "condition": {
//        "equal": {
//          "left": {
//            "substring": {
//              "expression": {
//                "option": {
//                  "universe": "dhcp",
//                  "name": "dhcp-client-identifier",
//                  "code": 61
//                }
//              },
//              "offset": 1,
//              "length": 4
//            }
//          },
//          "right": "RAS "
//        }
//      },
//      "then": [
//        {
//          "config": {
//            "value": "ignore",
//            "name": "allow-booting",
//            "code": 9
//          }
//        }
//      ]
//    }
//  },
```

Watch out!

```
//    /// omapi-port is an internal ISC DHCP feature

//    /// delayed ack no supported

//    /// ddns-ttl is a D2 not (yet?) supported feature
//    /// Reference Kea #225

//    /// update-optimization is not supported
//    /// Kea follows RFC 4702

//    /// do-reverse-updates is not supported
//    /// Kea model is equivalent but different

//    /// server-id-check is not (yet?) supported
//    /// Reference Kea #242

//    /// ping-check is not supported
//    /// Kea has no ping probing

//    /// update-static-leases is an obsolete feature

//    /// min-lease-time is not supported
//    /// use default-lease-time instead
//    /// Reference Kea #221

//    /// max-lease-time is not supported
//    /// use default-lease-time instead
//    /// Reference Kea #221
```

Summary

- Migration to Kea may or may not make sense for you at this time
  - Migration is a large undertaking
    - Even in a small environment
- Keama is available from the ISC git repo:

  https://gitlab.isc.org/isc-projects/dhcp/tree/migration-assistant
- Keama How-To is in the wiki:

  https://gitlab.isc.org/isc-projects/dhcp/wikis/kea-migration-assistant

Questions?

Comments?