



DHCP Migration to Kea

Alan Clegg – ISC Webinar
22-May-2019



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>

The screenshot shows the top navigation bar of GitLab with the ISC logo, 'Projects', 'Groups', and 'More' dropdowns. On the right, there are icons for a home page, a notification bell with '1', a search icon, and a mail icon with '6'. Below the navigation bar is a breadcrumb trail: 'ISC Open Source Projects > Kea > Issues > #245'. The issue status is 'Open', opened 5 months ago by Francis Dupont. The issue title is 'ISC DHCP users specify interfaces on the command line'. The description reads: 'There is a real risk when converting an ISC DHCP server config to Kea to end with a config without interfaces. Note to add a wildcard interface does not really help... As it is a difference in models there is nothing which can be done other to be aware.' Below the description are three reaction buttons: thumbs up (0), thumbs down (0), and a smiley face. At the bottom, there are two buttons: 'Show all activity' and 'Create merge request'.

ISC Projects Groups More

ISC Open Source Projects > Kea > Issues > #245

Open Opened 5 months ago by Francis Dupont Options

ISC DHCP users specify interfaces on the command line

There is a real risk when converting an ISC DHCP server config to Kea to end with a config without interfaces. Note to add a wildcard interface does not really help...

As it is a difference in models there is nothing which can be done other to be aware.

👍 0 👎 0 😊

Show all activity Create merge request

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).

For other timers ISC DHCP has preferred-lifetime but derives t1 and t2 (aka renew and rebind timers) from the valid one using standard formula. ISC DHCP follows more the client query, i.e., it uses configured values including computed values only as default and bounds.

This is not a call to change something: it is just a summary for documentation and some infos in the case a customer requests more flexibility.

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

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