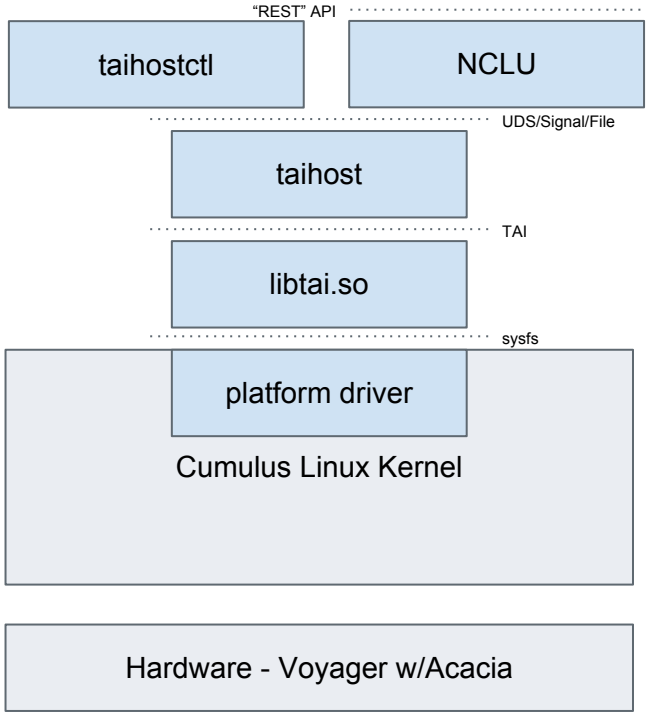
TAI Demo - Voyager

Scott Emery

Cumulus Network's Development

- Platform driver which allows Optical Modules Control/Status pins and MDIO access through sysfs interface
- libtai.so - Develop for AC400
- taihost daemon - Provide interfaces to TAI and other system software
  - Unix domain socket
  - File: /etc/cumulus/transponders.ini
  - SIGHUP Signal
- taihostctl - User interface to the taihost daemon
  - Mainly to get status
- /etc/cumulus/transponders.ini is documented on http://docs.cumulusnetworks.com
- NCLU - Network command line utility
  - Modifies transponders.ini and issues reload



Live Demo Time!

taihost example

- A systemd daemon
- start, stop, status, reload, restart
- Logging is done to syslog
  - grep for “taihost”

```
cumulus@fb-vgr-01:~$ systemctl status taihost
● taihost.service - TAI host daemon
   Loaded: loaded (/lib/systemd/system/taihost.service; enabled)
   Active: active (running) since Fri 2018-06-01 18:31:29 UTC; 3 days ago
 Main PID: 488 (taihost)
   CGroup: /system.slice/taihost.service
           └─488 /usr/sbin/taihost -f


cumulus@fb-vgr-01:~$ sudo grep taihost /var/log/syslog

2018-06-01T18:27:27.858750+00:00 cumulus taihost[11113]: Adding module at location 1.
2018-06-01T18:27:37.066596+00:00 cumulus taihost[11113]: Module at location 1 was successfully added.
2018-06-01T18:27:37.067132+00:00 cumulus taihost[11113]: Reloading the configuration file
'/etc/cumulus/transponders.ini'
2018-06-01T18:27:37.071454+00:00 cumulus taihost[11113]: Setting [L3] TxChannel (0x5) to 52, was 48
2018-06-01T18:27:37.074855+00:00 cumulus taihost[11113]: Setting [L3] OutputPower (0x6) to 1.000000, was
0.000000
...
2018-06-01T18:27:37.257054+00:00 cumulus taihost[11113]: Setting [Host3] SerialTap2Gain (0x1000000c) to 12,
was 8
2018-06-01T18:27:37.260504+00:00 cumulus taihost[11113]: Setting [Host3] SerialTap2Delay (0x1000000d) to 6,
was 5
2018-06-01T18:27:37.266298+00:00 cumulus taihost[11113]: Setting [AC400_1] OperStatus (0xa) to 7, was 3
2018-06-01T18:28:54.729659+00:00 cumulus taihost[11113]: There is no module at location 2
2018-06-01T18:28:54.730533+00:00 cumulus taihost[11113]: Reloading the configuration file
'/etc/cumulus/transponders.ini' is complete.
```

taihostctl example

- Shows status of the modules
  - --json option outputs json
  - --verbose include more
- First two lines show module status
- Rest of output is network interface status
- “taihostctl reload” will reload a modified /etc/cumulus/transponders.ini file

```
cumulus@fb-vgr-01:~$ taihostctl
Module: 1 ready Acacia Comm Inc. AC400-004-330 S/N:170212599 52.00C 11.89V
    Laser: 191.15 THz - 196.10 THz, 6.00 GHz fine tune, independent lanes

                                        Network Interfaces
                                  L3                          L4
                    --------------------------- ---------------------------
           Modulation 16-qam                      16-qam
            Frequency 193.70 THz, Channel 52      193.70 THz, Channel 52
          Current BER 6.900e-05                   1.400e-05
    Cfg/Measured Power 1.00dBm/0.99dBm            1.00dBm/1.00dBm
             Encoding differential                differential
            Alignment TX & RX                     TX & RX
         Grid Spacing 50ghz                       50ghz
             FEC Mode 25%                          25%
Uncorrectable FEC Errs 0                          0
        TX/RX Turn-up power_adjusted/locked       power_adjusted/locked

Module: 2 ready Acacia Comm Inc. AC400-004-330 S/N:170212585 52.75C 11.89V
    Laser: 191.15 THz - 196.10 THz, 6.00 GHz fine tune, independent lanes

                                        Network Interfaces
                                  L1                          L2
                    --------------------------- ---------------------------
           Modulation 16-qam                      16-qam
            Frequency 193.70 THz, Channel 52      193.70 THz, Channel 52
          Current BER 2.700e-05                   4.600e-05
    Cfg/Measured Power 1.00dBm/0.99dBm            1.00dBm/0.99dBm
             Encoding differential                differential
            Alignment TX & RX                     TX & RX
         Grid Spacing 50ghz                       50ghz
             FEC Mode 25%                          25%
Uncorrectable FEC Errs 0                          0
        TX/RX Turn-up power_adjusted/locked       power_adjusted/locked
```

NCLU examples

- Most configuration is done through “net add interface” commands
- New interfaces “L1-4”

```
cumulus@fb-vgr-01:~$ net add interface <tab>
        <interface>  :  An interface name "swp1" or glob "swp1-4,6,10-12"
        lo              :  interface
        eth0            :  interface
        eth0.4088       :  interface
        swp1            :  interface
        swp2            :  interface
        swp3            :  interface
        swp4            :  interface
        swp5            :  interface
        swp6            :  interface
        swp7            :  interface
        swp8            :  interface
        swp9            :  interface
        swp10           :  interface
        swp11           :  interface
        swp12           :  interface
        swpL1s0         :  interface
        swpL1s1         :  interface
        swpL2s0         :  interface
        swpL2s1         :  interface
        swpL3s0         :  interface
        swpL3s1         :  interface
        swpL4s0         :  interface
        swpL4s1         :  interface
        L1              :  Transponder interface
        L2              :  Transponder interface
        L3              :  Transponder interface
        L4              :  Transponder interface
```

NCLU examples

- Options for configuring the network interfaces
- Tab completion is supported
  - Even for frequencies
- Prevents illegal combinations
  - 15%_ac100 FEC is only allowed in pm-qpsk modulation
- 8-qam modulation will also change coupling mode

```
cumulus@fb-vgr-01:~$ net add interface L1 <tab>
        fec               :  Forward error correction
        frequency         :  Frequency for the channel
        grid-spacing      :  Distance between channel frequencies in GHz
        modulation        :  Modulation technique used
        non-differential      :  Use non-differential encoding
        power             :  Transmit power in dBm
        state             :  Operational state of the module
        transmit-disable      :  Transmitter is disabled

cumulus@fb-vgr-01:~$ net add interface L1 frequency 195.<tab>
        195.00 THz  :  Channel 78, Wavelength 1537.40 nm
        195.05 THz  :  Channel 79, Wavelength 1537.00 nm
        195.10 THz  :  Channel 80, Wavelength 1536.61 nm
        195.15 THz  :  Channel 81, Wavelength 1536.22 nm
        195.20 THz  :  Channel 82, Wavelength 1535.82 nm
        195.25 THz  :  Channel 83, Wavelength 1535.43 nm
        195.30 THz  :  Channel 84, Wavelength 1535.04 nm
        195.35 THz  :  Channel 85, Wavelength 1534.64 nm
        195.40 THz  :  Channel 86, Wavelength 1534.25 nm
        195.45 THz  :  Channel 87, Wavelength 1533.86 nm
        195.50 THz  :  Channel 88, Wavelength 1533.47 nm
        195.55 THz  :  Channel 89, Wavelength 1533.07 nm
        195.60 THz  :  Channel 90, Wavelength 1532.68 nm
        195.65 THz  :  Channel 91, Wavelength 1532.29 nm
        195.70 THz  :  Channel 92, Wavelength 1531.90 nm
        195.75 THz  :  Channel 93, Wavelength 1531.51 nm
        195.80 THz  :  Channel 94, Wavelength 1531.12 nm
        195.85 THz  :  Channel 95, Wavelength 1530.72 nm
        195.90 THz  :  Channel 96, Wavelength 1530.33 nm
        195.95 THz  :  Channel 97, Wavelength 1529.94 nm
```

NCLU examples

- del commands
  - Undo the boolean commands
    - non-differential
    - transmit-disable
  - “All” reverts to default config
- show commands
  - Same status as taihostctl
  - Frequency table
  - Configuration commands
  - Configuration state
- NCLU’s REST-like API
  - Provides off-box interface

```
cumulus@fb-vgr-01:~$ net del interface L1 <tab>
         non-differential  :  Use non-differential encoding
         transmit-disable  :  Transmitter is disabled

cumulus@fb-vgr-01:~$ net show transponder
         1                 :  Transponder Module
         2                 :  Transponder Module
         frequency-map  :  Print a map of supported frequencies, channels, and
wavelengths
         json              :  Print output in json
         verbose           :  show detailed output
         <ENTER>

cumulus@fb-vgr-01:~$ net show transponder 1
Module: 1 ready Acacia Comm Inc. AC400-004-330 S/N:170212599 52.50C 11.90V
    Laser: 191.15 THz - 196.10 THz, 6.00 GHz fine tune, independent lanes

                                        Network Interfaces
                                  L3                          L4
                     --------------------------  --------------------------
           Modulation 16-qam                      16-qam
            Frequency 193.70 THz, Channel 52      193.70 THz, Channel 52
          Current BER 7.000e-05                   1.700e-05
    Cfg/Measured Power 1.00dBm/1.00dBm            1.00dBm/1.00dBm
             Encoding differential                differential
            Alignment TX & RX                     TX & RX
         Grid Spacing 50ghz                       50ghz
              FEC Mode 25%                        25%
Uncorrectable FEC Errs 0                          0
        TX/RX Turn-up power_adjusted/locked       power_adjusted/locked
```