An open source implementation of SNBI & ACP with ODL Beryllium

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From Inception to current status (1)

Ideally NOC equipment should be autonomic

- Use case: “stable connectivity” management from NOC

Open Daylight: Open Source NOC (controller) Open Source reference

- Inception: Lets make it autonomic
  - ODL project: **S**ecure **N**etwork **B**ootstrap **I**nfrastructure
- Started with building AN Registrar code in Java (standard ODL dev. env.)

Challenge: ACP inside controller

- ODL uses OS-level transport (TCP/UDP). Building Java-level ACP (eg: Ipsec secure channels) and plug them underneath OS transport is challenging.

From Inception to current status (2)

Solution:

- Linux Open Source Autonomic Router code – “SNBI-FE”
- Packaged with Docker
  - Makes experimentation/fast-deployment easy.
  - For embedded platforms one would rather install only the SNBI software packages needed natively. Eg: OpenWrt (TBD)>

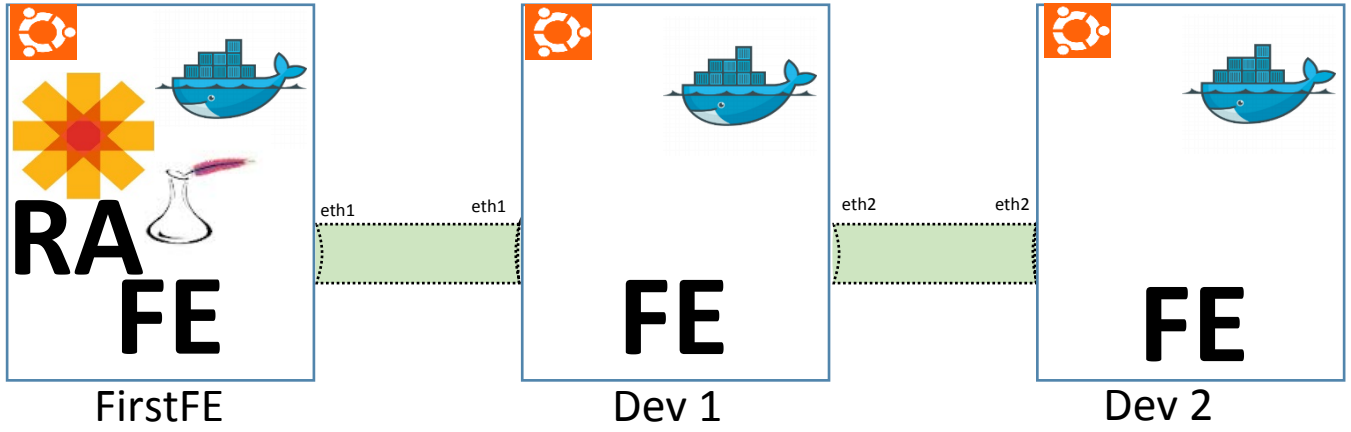
- SW Architecture
  - “HOST package” part includes those components that are linux specific
  - Porting SNBI to other Oss poossible by replacing HOST package
  - Higher layers are OS independent

Current functionality: ODL Beryllium release

Docker:

- RA: Registrar - Karaf ODL package (stripped to only include what is needed for Registrar)
  - White List configuration.
  - Internal CA – Bouncy Castle.
- FE: Forwarding Element
  - SNBI Daemon
    - Neighbor Discovery.
    - Device Bootstrap with device domain Certificates.
    - Proxy bootstrap new devices.
    - Protocols: Not GRASP (yet), but those used in Cisco Autonomic Implementation
  - HOST Package
    - Secure channels via IPSEC/GRE leveraging linux Kernel functionalities (no kernel changes). Unstrung ipsec.
    - IPv6 Routing across the secure channels via RPL – unstrung (Michael Richardson).
    - Linux Kernel Version - 4.4.3-040403-generic #201602251634 SMP Thu Feb 25 21:36:25 UTC 2016 x86_64 x86_64 x86_64 GNU/Linux
      required for some channel details – IPv6 secure association via link-local address etc..

What can it do ?



Full Autonomic Network

But very rough on the edges.

1. your “greenfield” devices have SNBI code

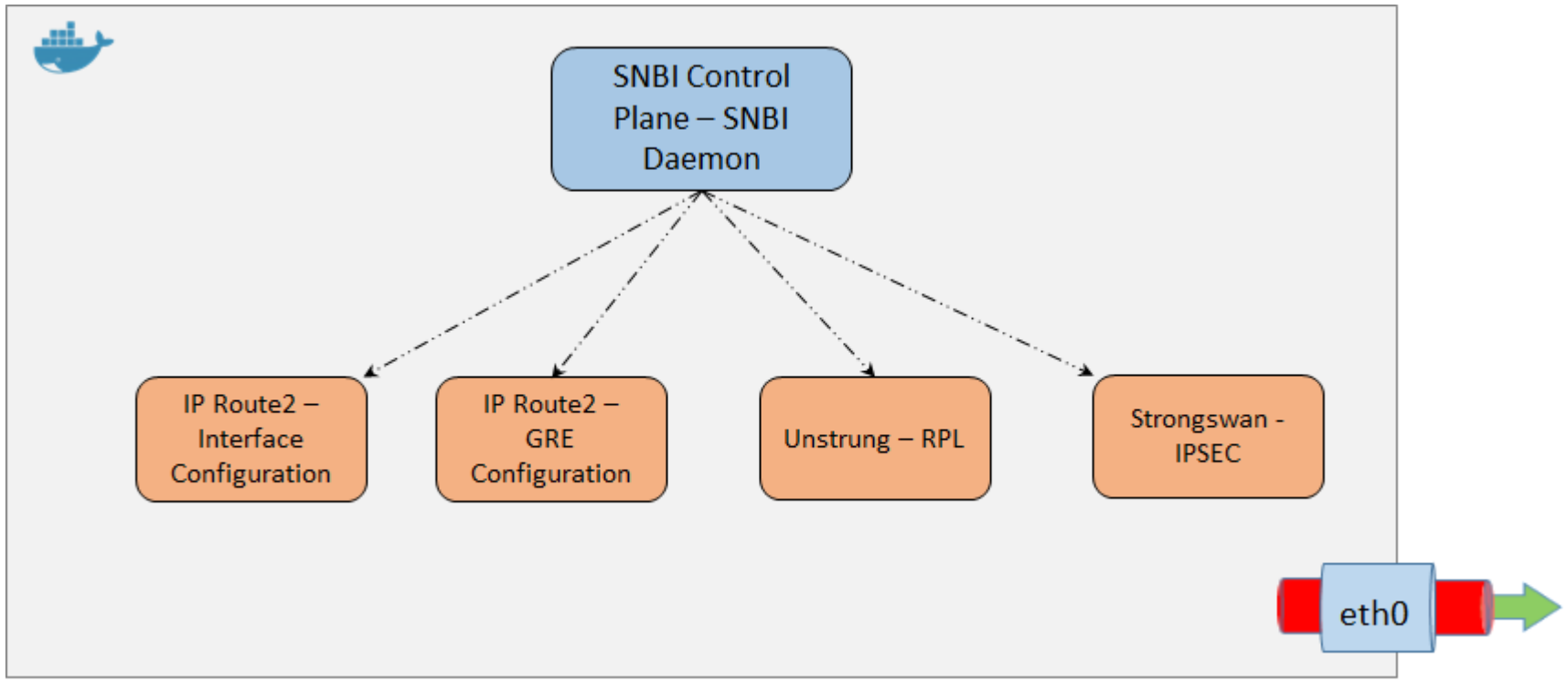
2. Configure Registrar (FirstFE)
   (eg: whitelist, domain-name)
   Registrar enrolls itself into autonomic

3. Plug together FirstFE, Dev1, Dev2

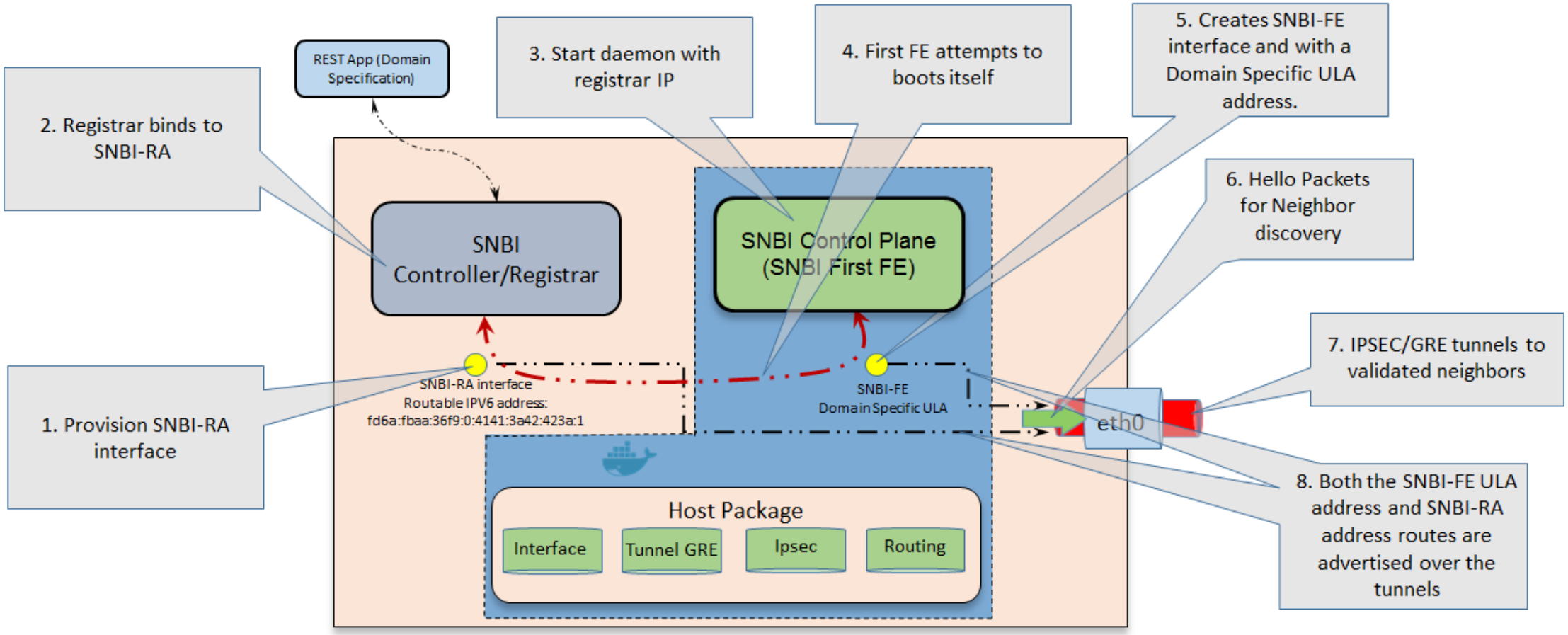
3.1 Dev1 enrolls via registrar,
   ACP FirstFE/Dev1 forms

3.2 Dev1 acts as enrollment proxy for Dev 2,
   Dev2 enrolls. ACP Dev 1 – Dev 2 forms.

Docker


SNBI Control Plane – SNBI Daemon
IP Route2 – Interface Configuration
IP Route2 – GRE Configuration
Unstrung – RPL
Strongswan - IPSEC
eth0

Step-by-Step



OPENDAYLIGHT

References

- Contact:
  - snbi-dev@lists.opendaylight.org
- Tutorial:
  - https://wiki.opendaylight.org/view/SNBI_Beryllium:Tutorial

- SNBI Project Main Wiki
  https://wiki.opendaylight.org/view/SecureNetworkBootstrapping:Main
- Beryllium Release Plan
  https://wiki.opendaylight.org/view/SecureNetworkBootstrapping:BerylliumReleasePlan
- Beryllium Release Review
  https://wiki.opendaylight.org/view/SecureNetworkBootstrapping:BerylliumReleaseReview
- Documentation
  - Adoc Gerrit - https://git.opendaylight.org/gerrit/#/c/34063/