



ODL NIC Tutorial: The basic Operations for NIC using Intents – How to start contributing

Demo using Intents for Blocking, Allow and QoS Attribute Mapping

Yrineu Rodrigues (Independent contributor)

Agenda

- Intent concept and NIC overview
- NIC modules and interaction
- Allowing using Intent
- Blocking using Intent
- QoS Attribute mapping using Intent
- How to start contributing

Network Intent Composition:Main

This Network Intent Composition project will enable the controller to manage and direct network services and network resources based on describing the "Intent" for network behaviors and network policies. Intents are described to the controller through a new NorthBound Interface, which provides generalized and abstracted policy semantics instead of Openflow-like flow rules. The Intent based NBI allows for a descriptive way to get what is desired from the infrastructure, unlike the current SDN interfaces which are based on describing how to provide different services. This NBI will accommodate orchestration services and network and business oriented SDN applications, including OpenStack Neutron, Service Function Chaining, and Group Based Policy. The Network Intent Composition function will use existing OpenDaylight Network Service Functions and Southbound Plugins to control both virtual and physical network devices. The Network Intent Composer will be designed to be protocol agnostic such that any control protocol can be used such as Openflow, OVSDB, I2RS, Netconf, SNMP etc.

Contents

[hide]

- 1 NIC basics
 - 1.1 Basic guide using Intents for QoS
 - 1.2 Basic guide to create Intents to ALLOW or BLOCK
- 2 List of available commands
- 3 How to install
- 4 List of commands
 - 4.1 intent:add
 - 4.2 intent:remove
 - 4.3 intent:show
 - 4.4 intent:list
 - 4.5 intent:compile (EXPERIMENTAL)
- 5 Compilation process demo
- 6 Project Information
- 7 Proposed Community Goals for NIC project



Network Intent Composition (NIC) Facts

Project Creation Date: [January 22nd, 2015](#)

Lifecycle State: Incubation

Primary Contact: Yrineu Rodrigues - yrfelipe@gmail.com

Project Lead: Yrineu Rodrigues - yrfelipe@gmail.com

Committers:

- Dave Lenrow – david.lenrow@huawei.com
- Hideyuki Tai - hideyuki.tai@necam.com ODL username: `hideyuki`
- Mathieu Lemay - mlemay@inocybe.com ODL username: `mlemay`
- Colin Dixon - colin@colindixon.com ODL username: `ckd`
- Helen Chen - Helen.Chen@huawei.com ODL username: `helenc878`
- George Zhao - george.y.zhao@huawei.com username: `gzhao`
- Raphael Amorim - raphael.amorim@hpe.com username: `raphaelamorim`
- Renato Aguiar - renato.aguiar@hpe.com ODL username: `renato`
- Alexis De Talhouet - adetalhouet@inocybe.com username: `adetalhouet`
- Icaro Camelo - icamelo@inocybe.ca username: `icarocamelo`
- Saket Mahajani - saket.mahajani@hpe.com username: `saket`
- Yrineu Rodrigues - yrfelipe@gmail.com username: `yrineu`

IRC: [freenode.net #opendaylight-nic](#)

Mailing List: nic-dev@lists.opendaylight.org

Archives: [mailing list archives](#)

Meetings: [Friday 3:30PM PT, Webex](#)

Repository: [git clone https://git.opendaylight.org/gerrit/p/nic](https://git.opendaylight.org/gerrit/p/nic)

Jenkins: [jenkins silo](#)

Gerrit Patches: [code patches/reviews](#)

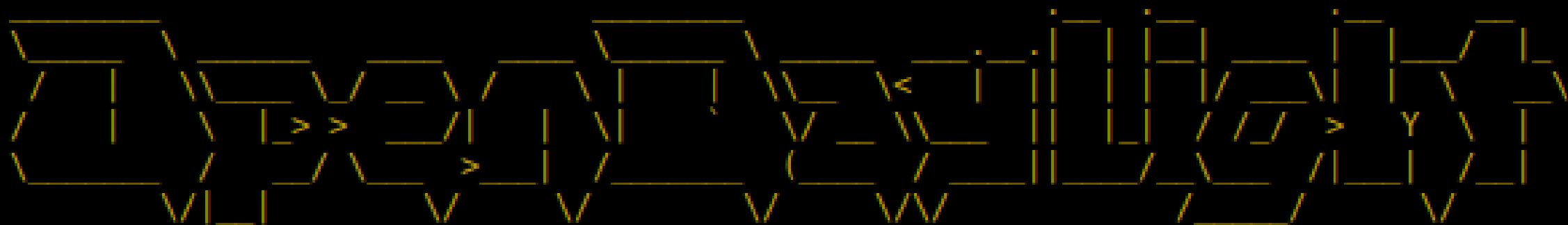
Bugs:

- [open bugs](#)
- [components](#)
- [report a bug](#)

Configure your environment

- Execute the `odl-summit-nic.ova`
- Into `/home/intent/nic` change to branch stable/beryllium-sr2
 - git checkout stable/beryllium-sr2
 - Execute: `mvn clean install -Dmaven.test.skip=true -DskipTests -U`
- Execute the NIC
 - Go to `/home/intent/nic/distribution/target/bin`
 - Execute `./karaf`
 - `karaf> feature:install odl-nic-core-mdsal odl-nic-console odl-nic-listeners`

```
yrineu@yrineu:~/project/nic/distribution/target/assembly/bin (beryllium)$ ./karaf clean
karaf: Ignoring predefined value for KARAF_HOME
karaf: JAVA_HOME not set; results may vary
OpenJDK 64-Bit Server VM warning: ignoring option MaxPermSize=512m; support was removed in 8.0
```



```
Hit '<tab>' for a list of available commands
and '[cmd] --help' for help on a specific command.
Hit '<ctrl-d>' or type 'system:shutdown' or 'logout' to shutdown OpenDaylight.
```

```
opendaylight-user@root>feature:install odl-nic-core-mdsal odl-nic-console odl-nic-listeners
```

Configure your environment

- Execute the mininet
 - `sudo mn -topo single,3 -mac -controller remote -switch ovsk,protocols=OpenFlow13`

Intent

- What not How!
- "...SDN controller becomes the intelligence that translates what is needed into specific protocols, interfaces, vendor-specific features, etc. This approach allows the description to be portable across multiple infrastructure implementations..." (LENROW, David)
- "Allow all traffic from Finance to Admin"
- "Block all traffic from Finance to Admin"

NIC

- The Network Intent Composition project enables the controller to **manage** and **direct network services** and resources based on describing the "Intent" for network behaviors and policies.
- Through a **NorthBound interface** providing abstracted policy semantics instead OpenFlow-like rules.

NIC, how it works...

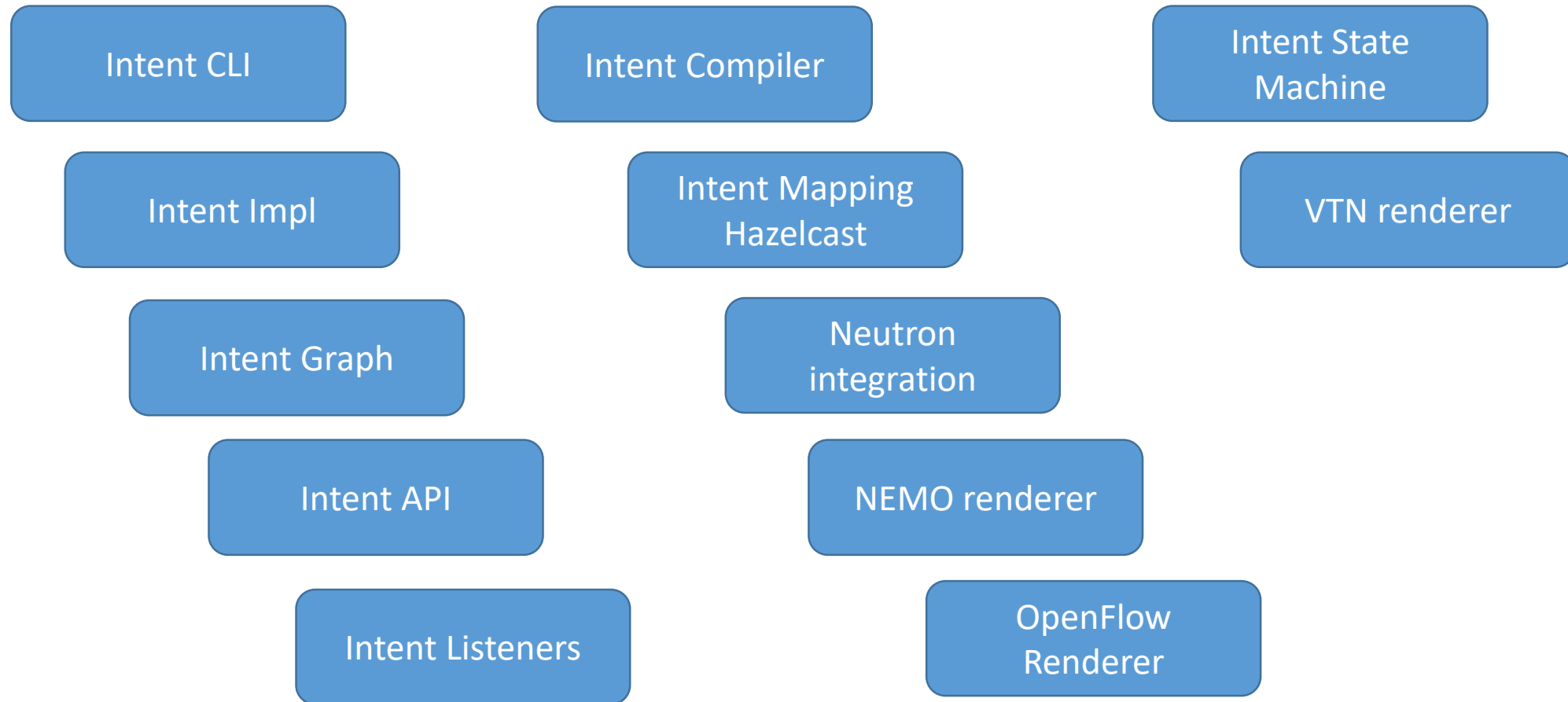
- The core is the Intent model which specifies the details of the **desired network state**.
- The NIC transforms this desired state to the resources under the control of ODL.
- Orchestration services and network business SDN applications (OpenStack Neutron, Service Function Chaining and Group Based Policy)

NIC, how it works...

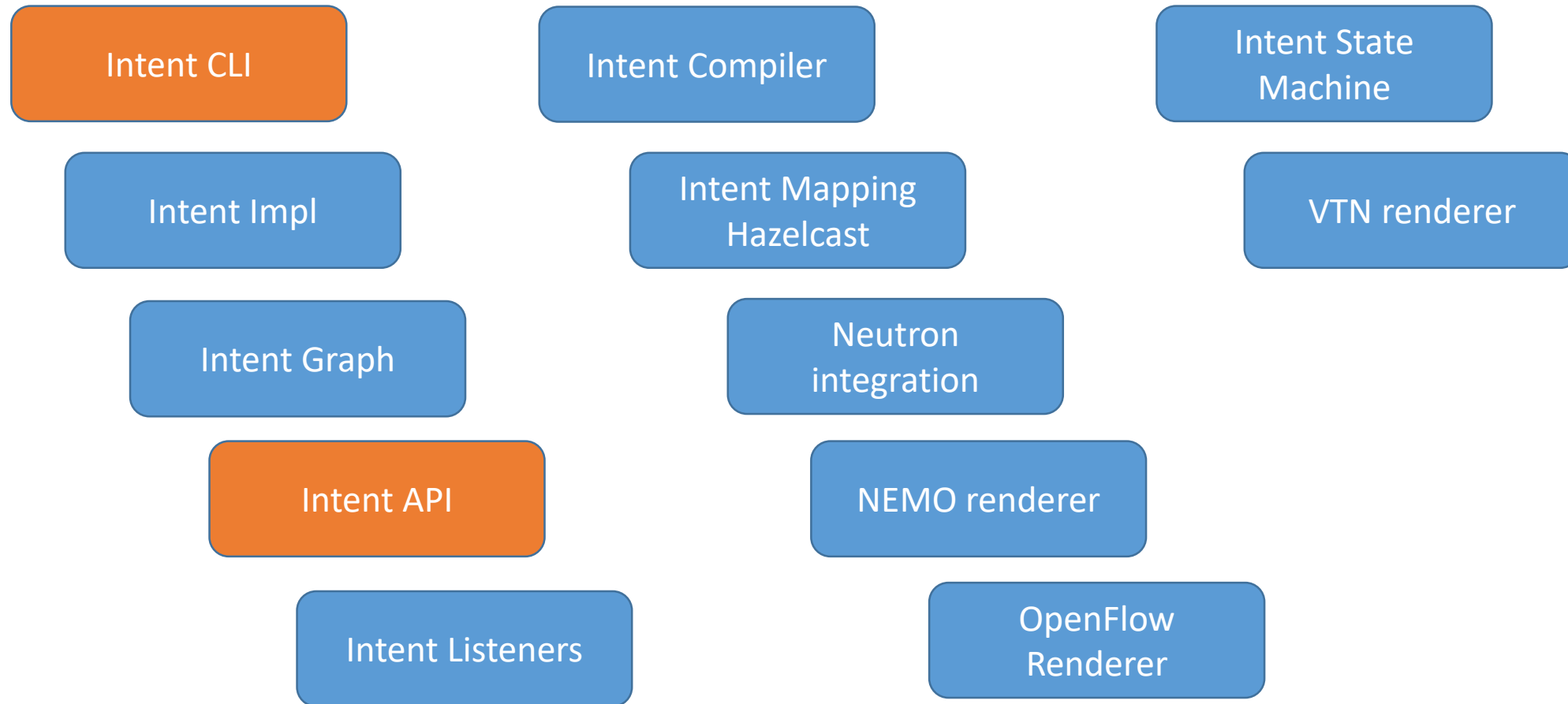
- On Boron release the NIC project has **multiple renderers**
- For Boron release, simultaneous renderes will **not be** supported.
- For Boron release, only "REDIRECT", " ALLOW" and "BLOCK" actions are supported.
- Allow: Indicates that traffic can flow between source and destination end points.
- Block: Prevents that flow between source and destination.
- Redirect: Create a mirroring action

NIC modules

NIC modules



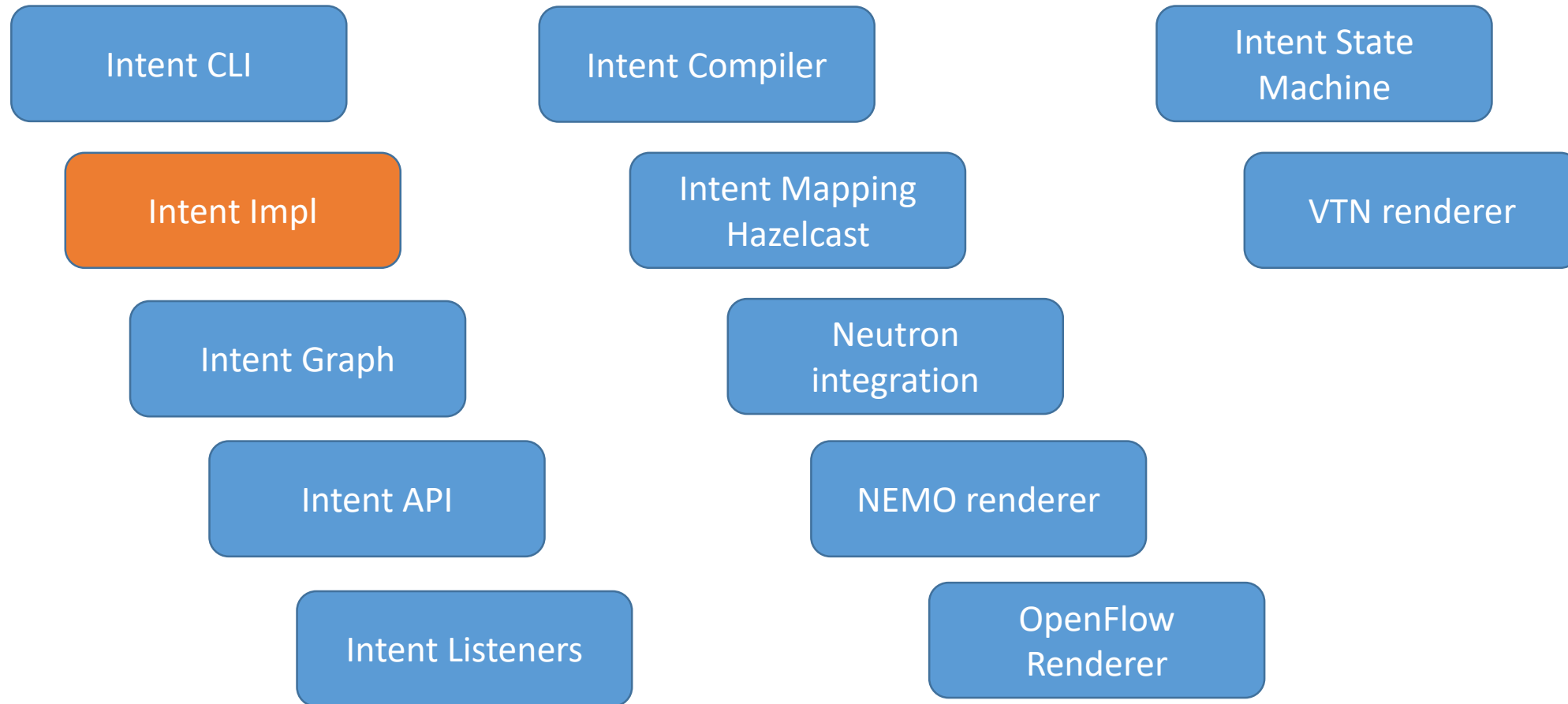
NIC modules



NIC modules – Intent CLI

- Provide a Command-line interface integrated with the Karaf CLI to create Intents
- Uses the structures generated using the YANG models defined on 'intent-api' module
- Extract all needed information to create the Intent objects created and send to 'intent-impl'
- Can extract information provided by a previously mapped endpoints

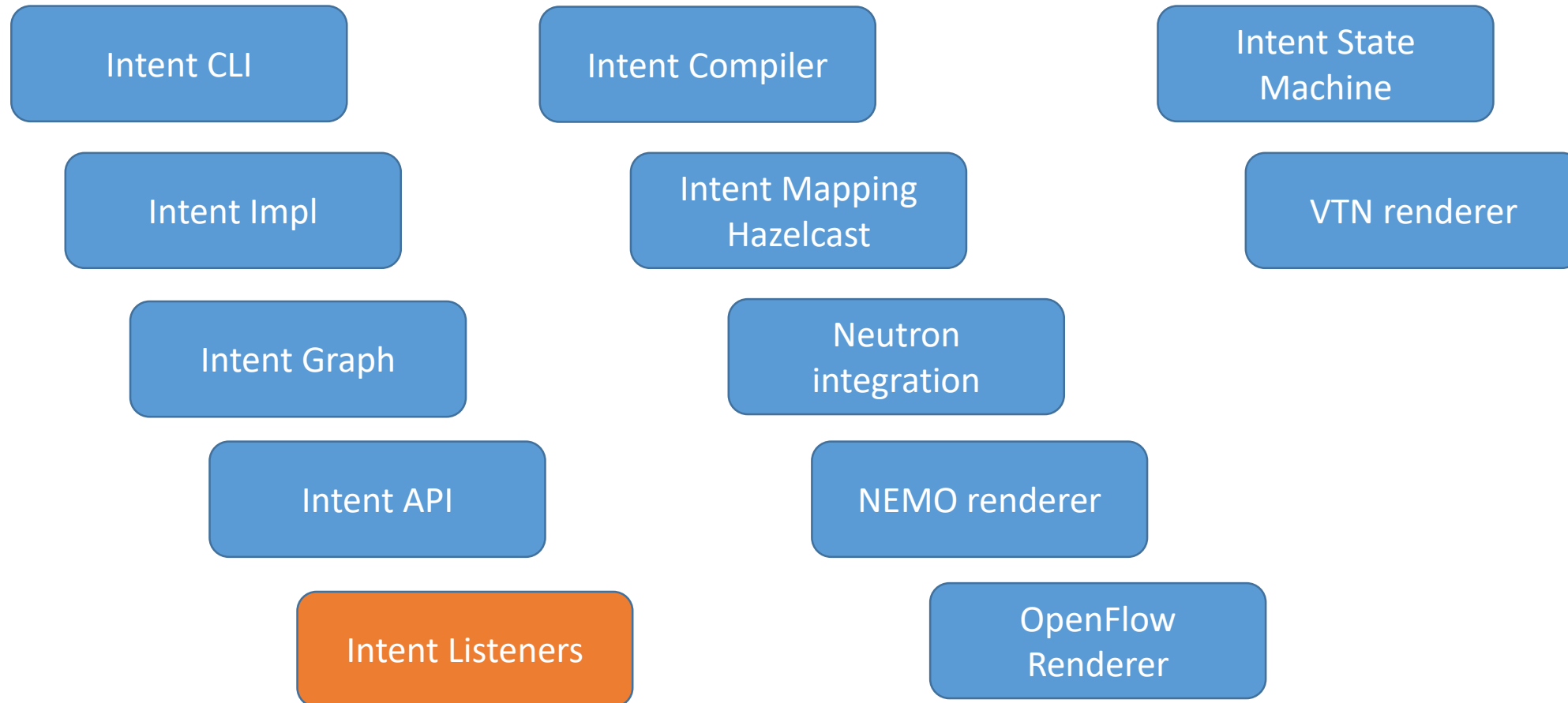
NIC modules



NIC Modules – Intent impl

- Connection with MD-SAL
- Receive the Intent object created by 'intent-cli'
- Send the Intent to MD-SAL to be stored

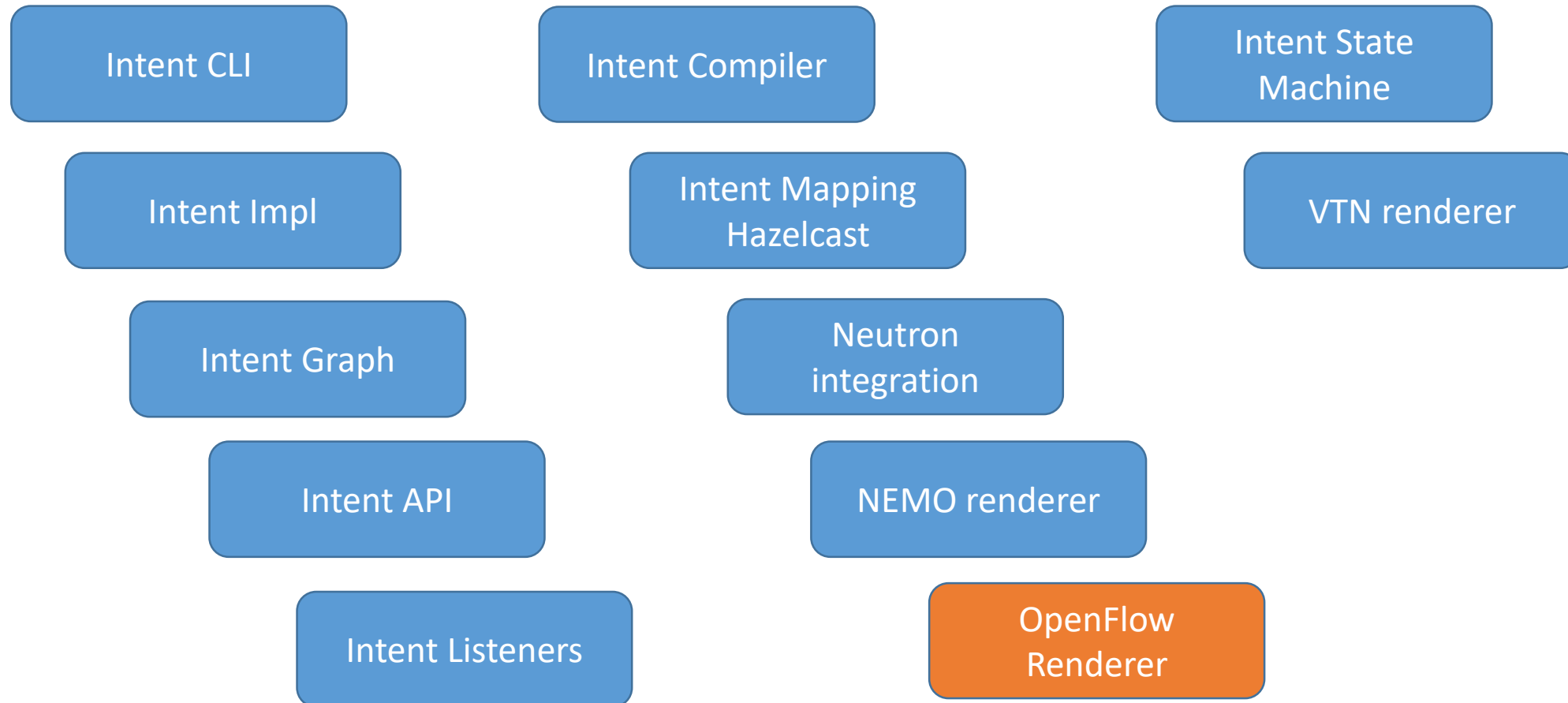
NIC modules



NIC Modules – Intent listeners

- Listener of events sent by MD-SAL
- Listen Intent events and Network events

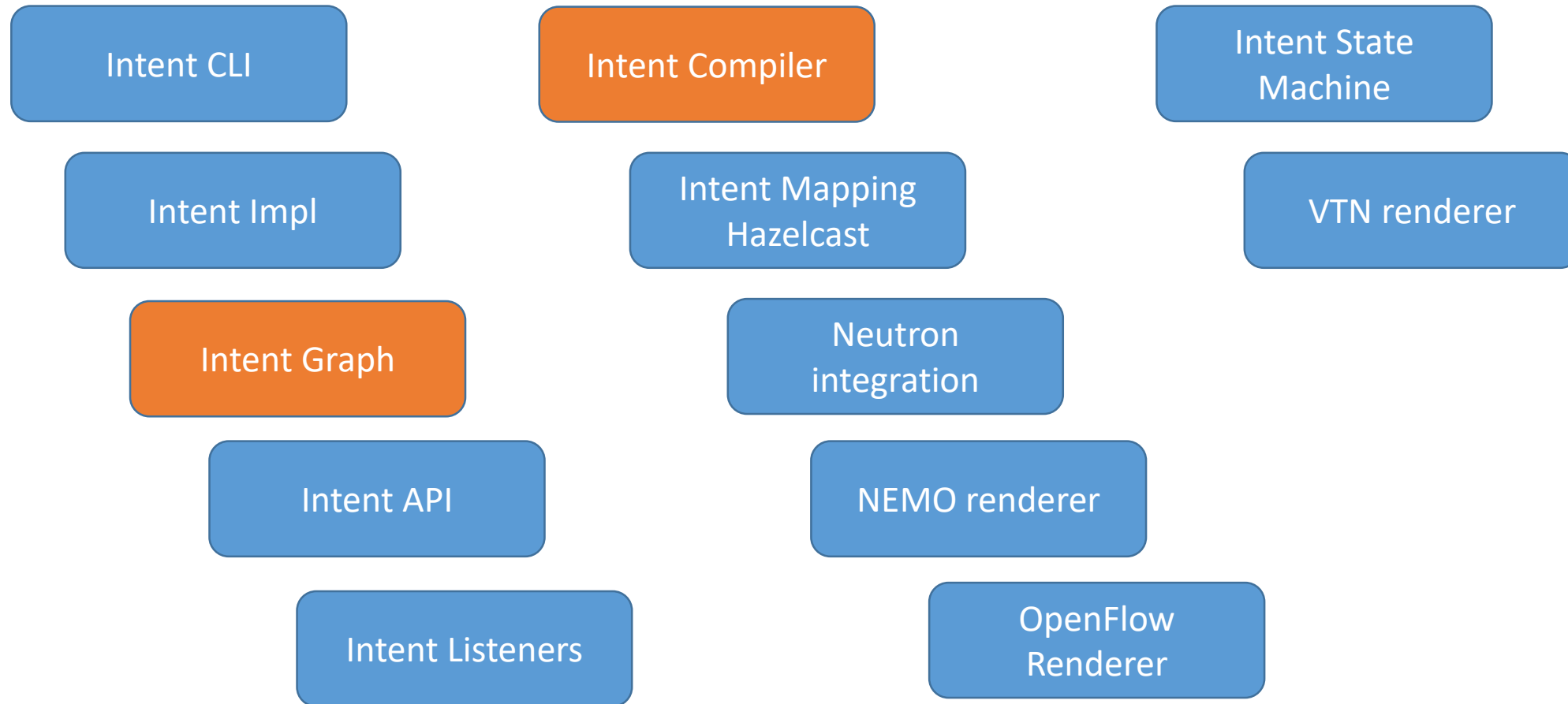
NIC modules



NIC Modules – OpenFlow renderer

- Responsible for translate intents in OpenFlow rules
- Send rules to the switches
- Firewall(,Allow and Block), QoS and Redirection

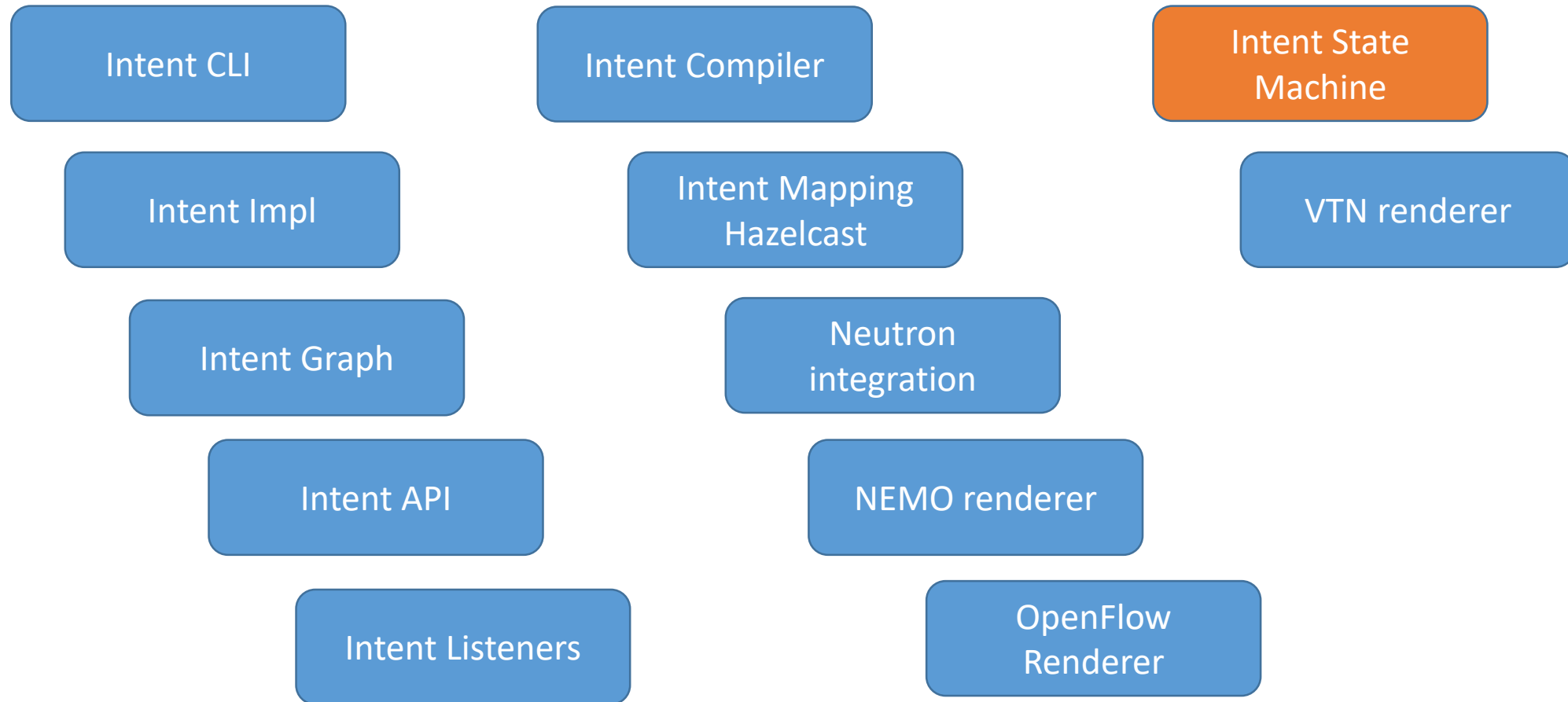
NIC modules



NIC Modules – Intent Graph

- Responsible for conflict resolution
- "BLOCK" always wins
- Different clients can create intents for with different actions for the same endpoints

NIC modules



NIC Modules – Intent State Machine

- Keep the track of all intents created
- Useful to avoid unnecessary flows under switches
- Create transactions for state changes of each Intent

Remember: *Anything that can go wrong, will go wrong.* (Murphy's law)

DEMO!



Demo

- Start the karaf
 - ./karaf
- Install NIC features
 - karaf> feature:install odl-nic-core-mdsal odl-nic-console odl-nic-listeners
- Configure the OpenVSwitch
- Create an Intent to allow bidirectional traffic

Demo – OVS Configuration

- To connect host machine with virtual machine
 - Sudo ovs-vsctl add-br summit
 - Sudo ovs-vsctl set Bridge summit protocols=OpenFlow13
 - Sudo set-controller summit tcp:<your_controller_ip>:6633
 - Sudo ovs-vsctl add-port summit port1
 - Sudo ip tuntap add mode tap port1
 - Sudo ifconfig port1 up
 - Ifconfig summit 10.0.0.2/16

- Sudo ovs-vsctl add-port summit eth0
- Sudo ifconfig eth0 0

```
yrineu@yrineu:~/summit $ ifconfig
eth0  Link encap:Ethernet  HWaddr e0:db:55:a4:be:97
      UP BROADCAST MULTICAST  MTU:1500  Metric:1
      RX packets:0 errors:0 dropped:0 overruns:0 frame:0
      TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
      collisions:0 txqueuelen:1000
      RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)
      Interrupt:17

lo    Link encap:Local Loopback
      inet addr:127.0.0.1  Mask:255.0.0.0
      inet6 addr: ::1/128 Scope:Host
      UP LOOPBACK RUNNING  MTU:65536  Metric:1
      RX packets:151630 errors:0 dropped:0 overruns:0 frame:0
      TX packets:151630 errors:0 dropped:0 overruns:0 carrier:0
      collisions:0 txqueuelen:0
      RX bytes:22422593 (22.4 MB)  TX bytes:22422593 (22.4 MB)
```

```
yrineu@yrineu:~/summit $ ifconfig
eth0  Link encap:Ethernet  HWaddr e0:db:55:a4:be:97
      UP BROADCAST MULTICAST  MTU:1500  Metric:1
      RX packets:0 errors:0 dropped:0 overruns:0 frame:0
      TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
      collisions:0 txqueuelen:1000
      RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)
      Interrupt:17
```



```
port1 Link encap:Ethernet  HWaddr 1e:e3:91:87:c9:32
      UP BROADCAST MULTICAST  MTU:1500  Metric:1
      RX packets:0 errors:0 dropped:0 overruns:0 frame:0
      TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
      collisions:0 txqueuelen:500
      RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)
```



```
summit  Link encap:Ethernet  HWaddr e0:db:55:a4:be:97
      inet addr:10.0.0.2  Bcast:10.0.255.255  Mask:255.255.0.0
      inet6 addr: fe80::e2db:55ff:fea4:be97/64  Scope:Link
      UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
      RX packets:0 errors:0 dropped:0 overruns:0 frame:0
      TX packets:55 errors:0 dropped:0 overruns:0 carrier:0
      collisions:0 txqueuelen:0
      RX bytes:0 (0.0 B)  TX bytes:8494 (8.4 KB)
```

```
yriueu@yriueu:~/summit $ sudo ovs-vsctl show
1f26d7ad-ab68-47e2-838f-c2cafa4e8352
Bridge summit
  Controller "tcp:127.0.0.1:6633"
    is_connected: true
  Port "eth0"
    Interface "eth0"
  Port "port1"
    Interface "port1"
Port summit
  Interface summit
    type: internal
```

The future of NIC and you...

Backlog

Make sure items here are well described and unique. User Stories: https://wiki.opendaylight.org/view/Network_Intent_Composition:Bron_Planning

- #19: Create Intent State Machine demo for ODLSummit Aug 13
- #9883: Intent state-machine
- #16: Integrate Intent Graph with OFRenderer
- #4: Maven archetype for actions

To Do

Legend: Green - UI; Red - New functionality; Blue - Code coverage

- #1: Create a design proposal for integration between DLUX and NIC
- #11: New parser on the javascript side

Doing

Items currently in progress

- #20: Investigate how to remove the dependency between Intent-listeners and Renderers
- #18: Unit test coverage for current NIC branch

Under Review/Testing

Items on gerrit right now

- #18.2 Unit test coverage for current NIC branch
- #21: Create module Intent-Common
- Testing the VPN intents MPLS

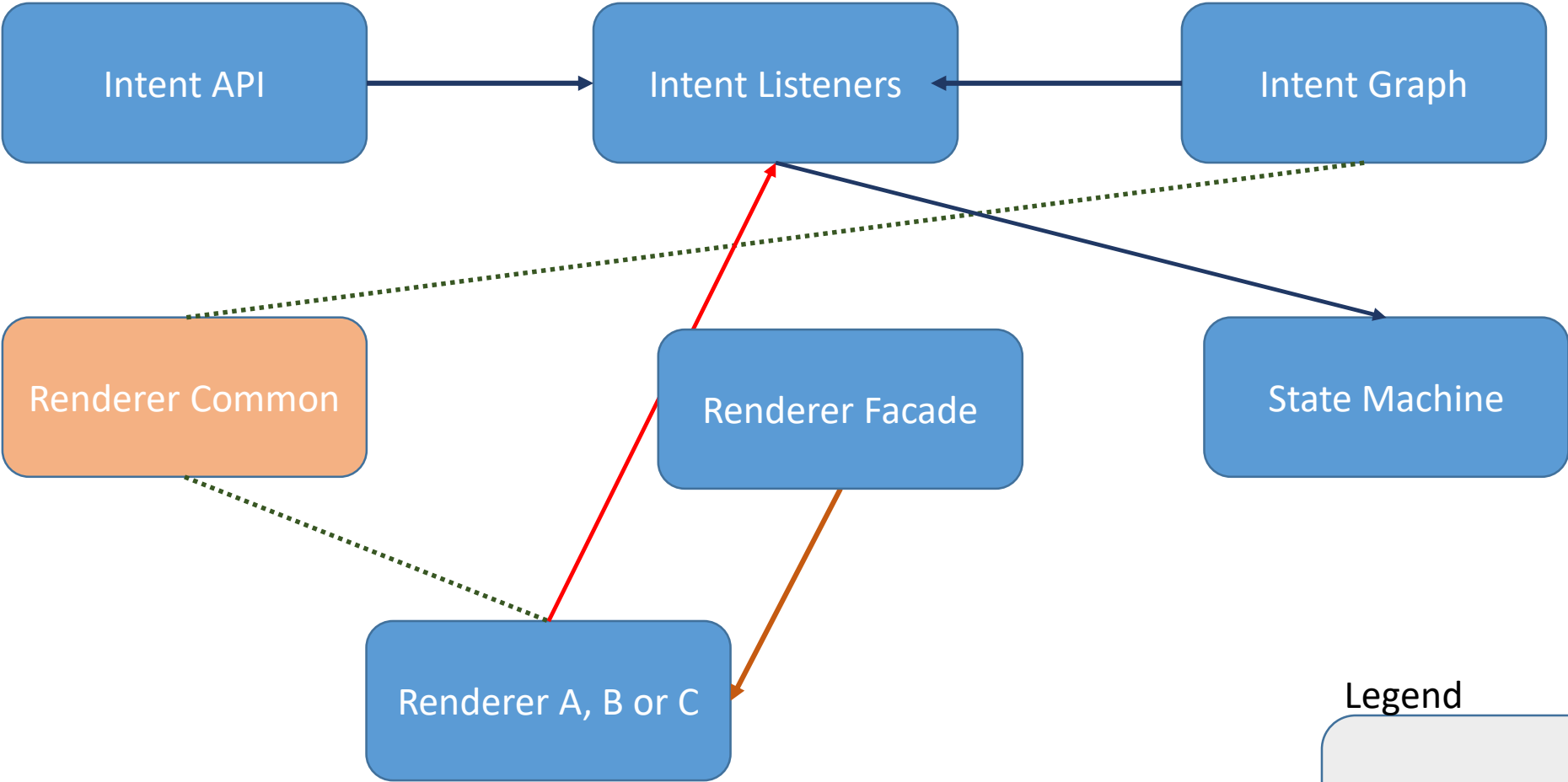
Issues / bugs

- Don't forget to add the link to the bug tracking system
- Build failure due to OFF YANG model change.

Next steps

- Increase code coverage
- Change current design for flexibility
- Integrate Intent State Machine with Intent Graph
- Integrate Intent Graph with Intent Listeners

Design proposal





Muito obrigado!! =)

THANK YOU!! =)