INCREMENTAL INSERTION OF STRATUM/P4

Strategy and Use Cases

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ONF CONNECT 2018

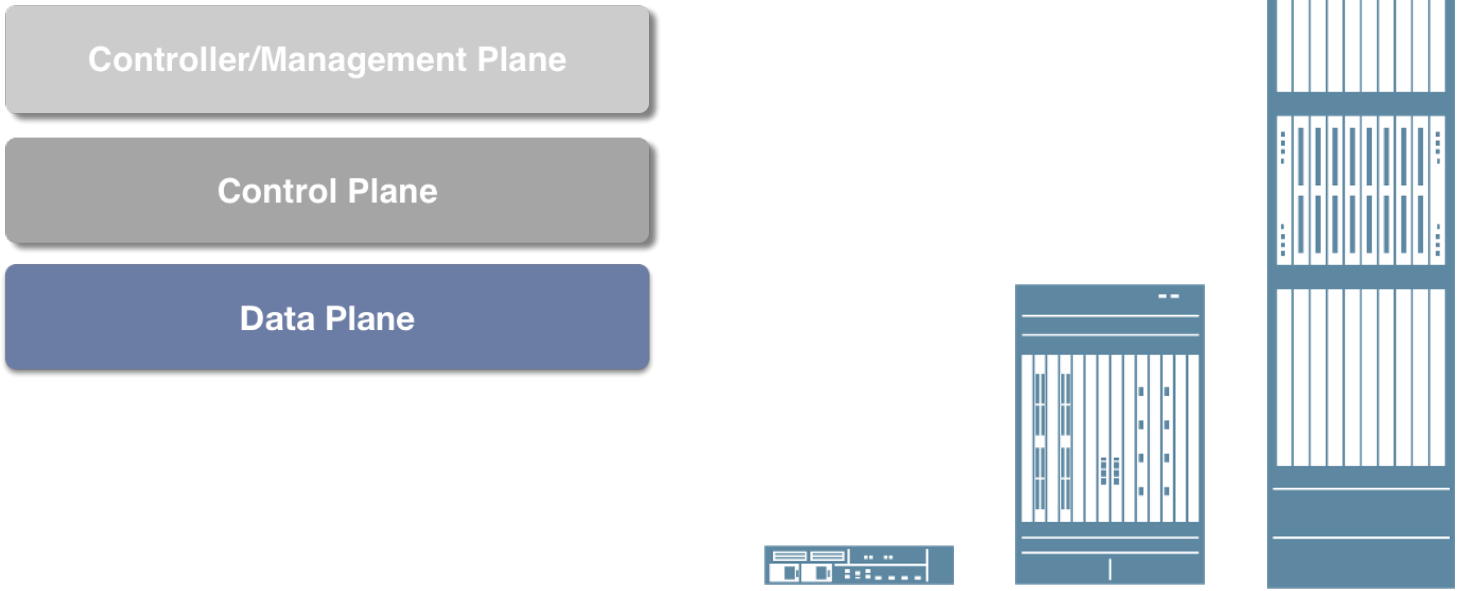
AGENDA

- Motivation
- Introduction to AFI and AFI Sandboxes
- Use Case: Transponder, Flexible Tunnels
- Stratum/P4 in Juniper

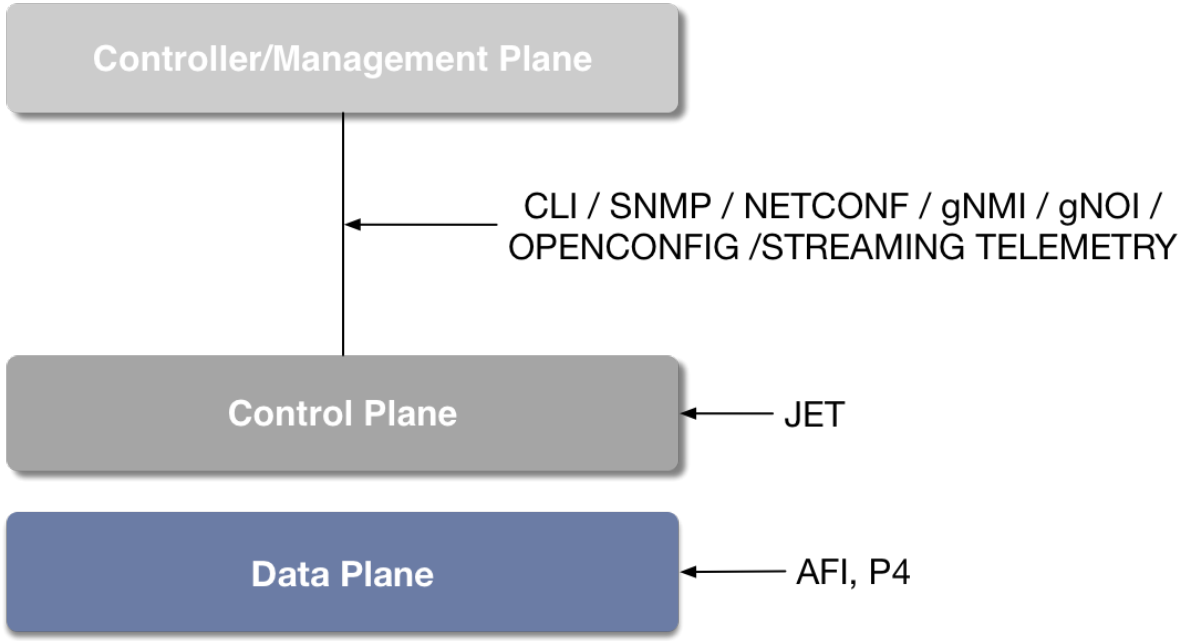
MOTIVATION

- Existing data plane code of various networking vendors has value which has been created over a long period of time.
- Defining (re-writing) the complete data plane in P4, which would involve compiler backend changes and changing the existing local control planes' south-bound interface to P4Runtime) for all the features, which are currently supported by vendors' routers and switches, would require significant development and testing efforts.
- Customers may not want to assume complete ownership of control plane. They may not either be equipped (read resource constraints) or do not want to handle/rewrite P4 enabled control plane (even if vendors are willing to provide P4 programmable data plane) for features which are already available from vendors' existing field-proven control-plane and data-plane code.

NETWORK DEVICE PROGRAMMABILITY



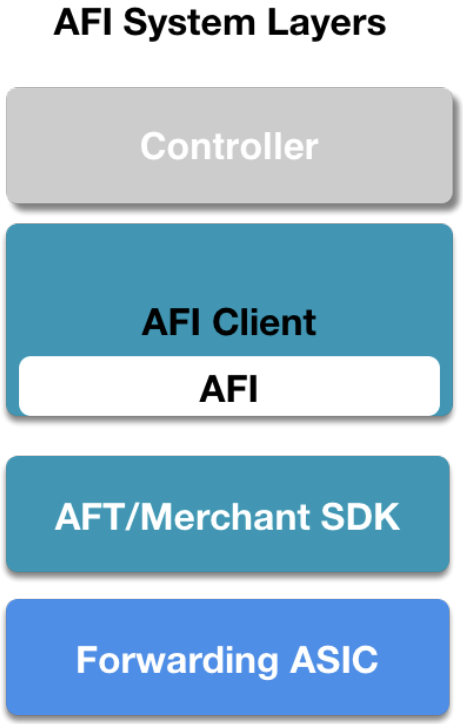
NETWORK DEVICE PROGRAMMABILITY



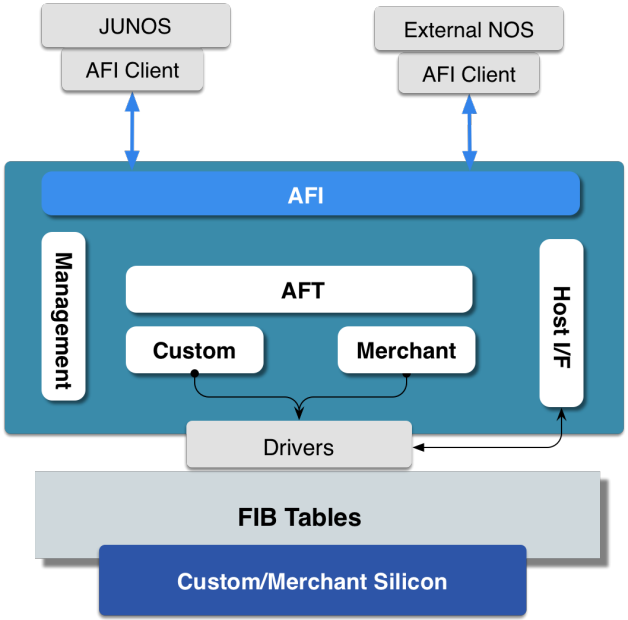
AFI

Advanced Forwarding Interface

AFI SYSTEM

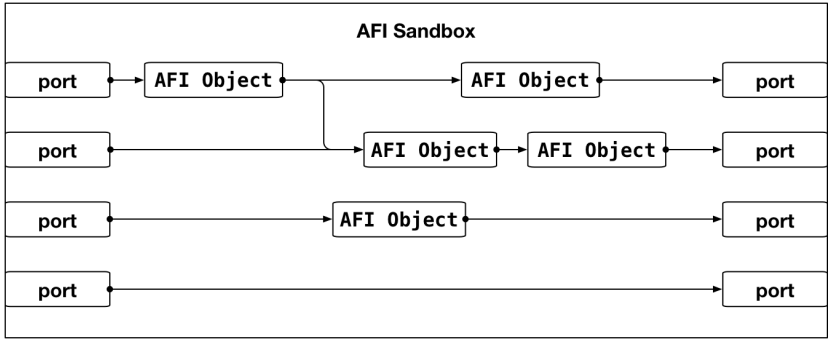


AFI HIGH LEVEL ARCHITECTURE

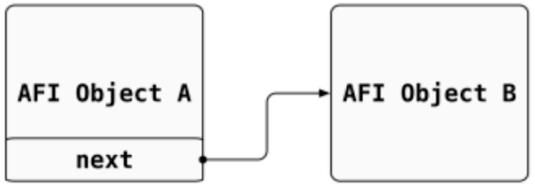


ADVANCED FORWARDING INTERFACE

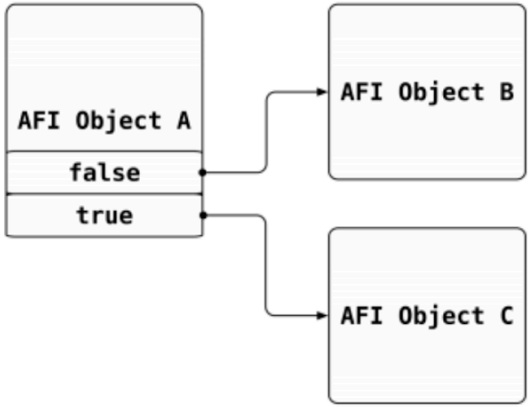
AFI (Advanced Forwarding Interface) is Juniper's approach of modeling the forwarding plane of networking devices. AFI defines data plane as graph of potential operations (AFI Objects) to be performed by packet forwarding engine (PFE) on the packet.



AFI OBJECTS



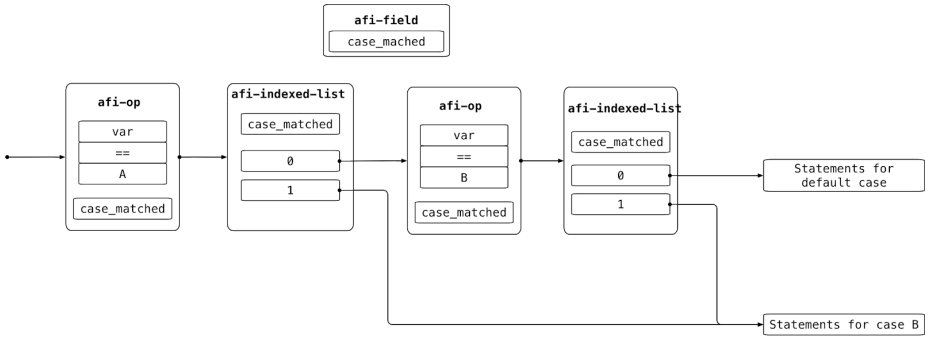
An AFI object can reference other AFI objects



A conditional if-else AFI object

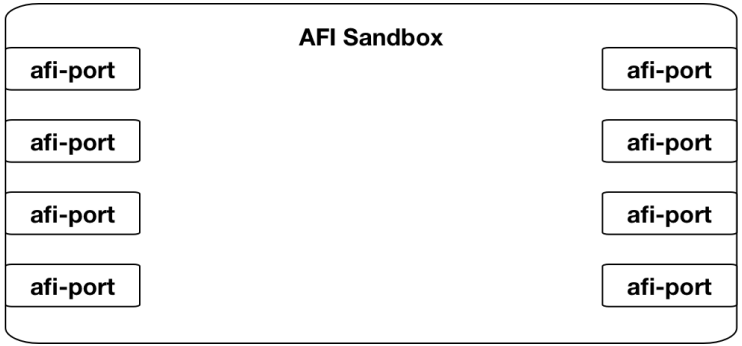
SWITCH STATEMENT AFI MODEL

```
switch(var) {

   case A:
      /* fall through */

   case B:
      statements (s);
      break; /* optional */


   default : /* Optional */
      statements (s);
}
```



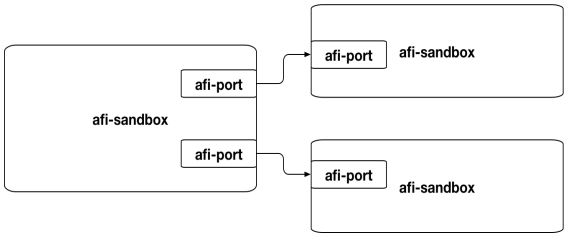
AFI SANDBOX

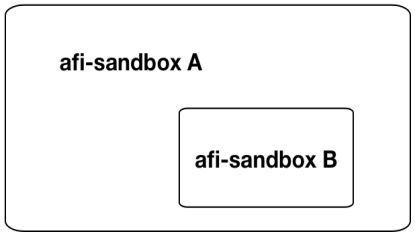
AFI defines a sandbox as a section of forwarding topology graph. A sandbox is small virtual container which can be programmed via AFI.

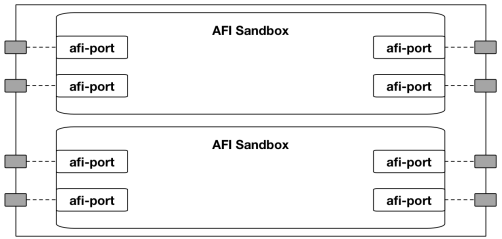


AFI SANDBOXES CHAINING/NESTING/SLICING

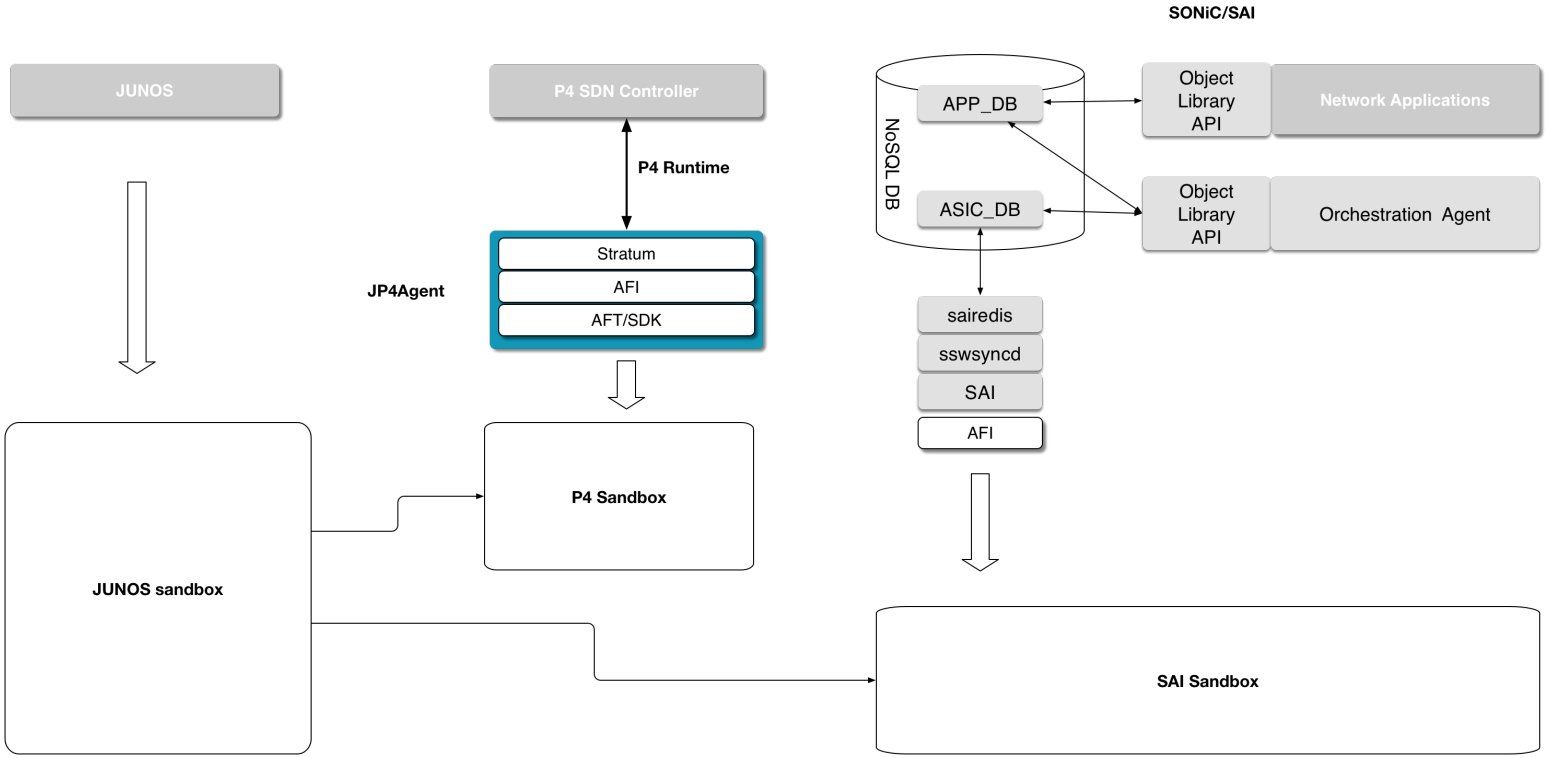
AFI defines a sandbox as a section of forwarding topology graph. A sandbox is small virtual container which can be programmed via AFI.







AFI SANDBOXES



P4 IN JUNIPER

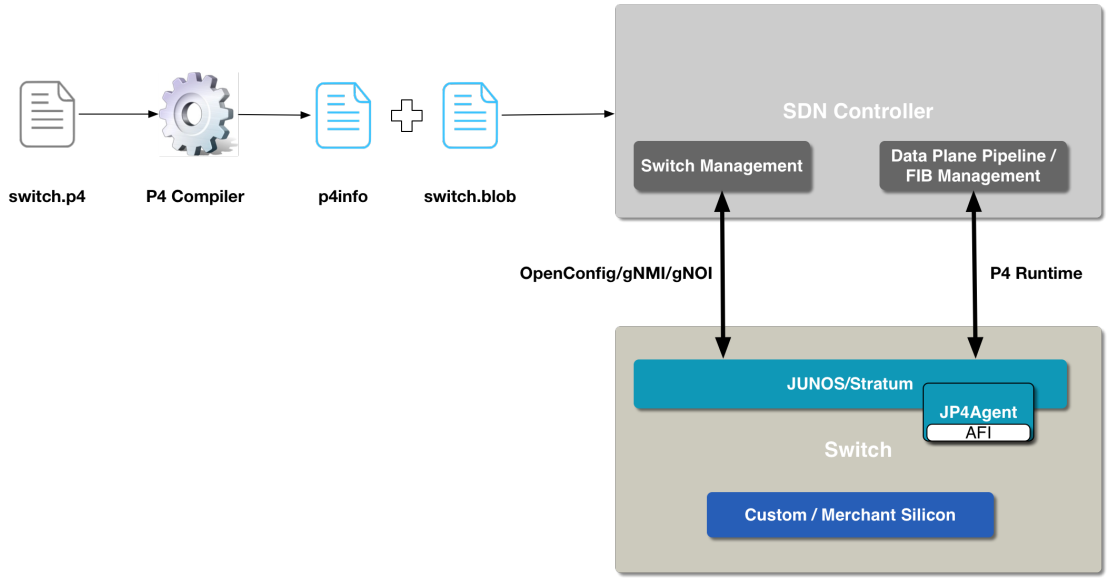
P4 is a great language to have conversations with our customers and partners. In P4, customers can articulate intent of feature which they want Juniper to implement in our forwarding plane. P4 compiler and JP4Agent translates that intent, written in P4, to data plane of Juniper's routing and switching platforms.

TRIO/PENTA:
With TRIO, full potential of P4 can be realized.

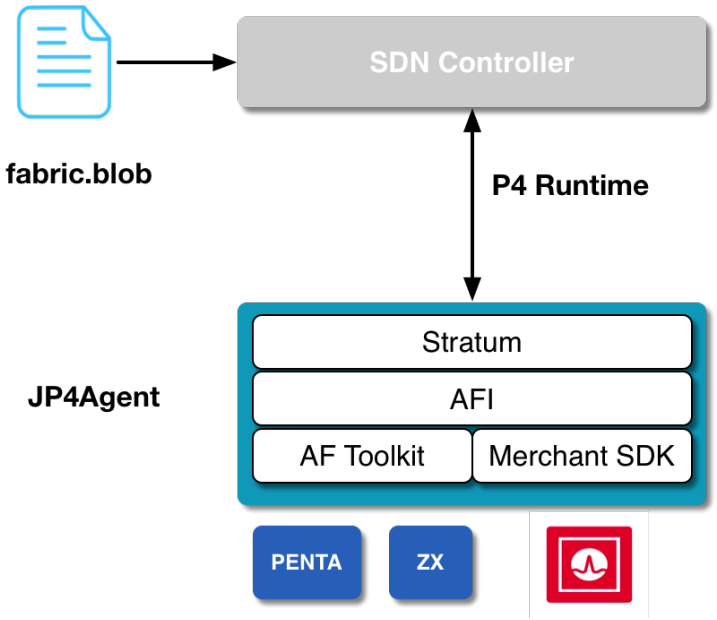
Fixed Function ASICs: ZX
P4 can be used to program our fixed pipeline ASICs based platform

Merchant Silicon:
Support of P4 on the platforms which Juniper builds using merchant silicon.

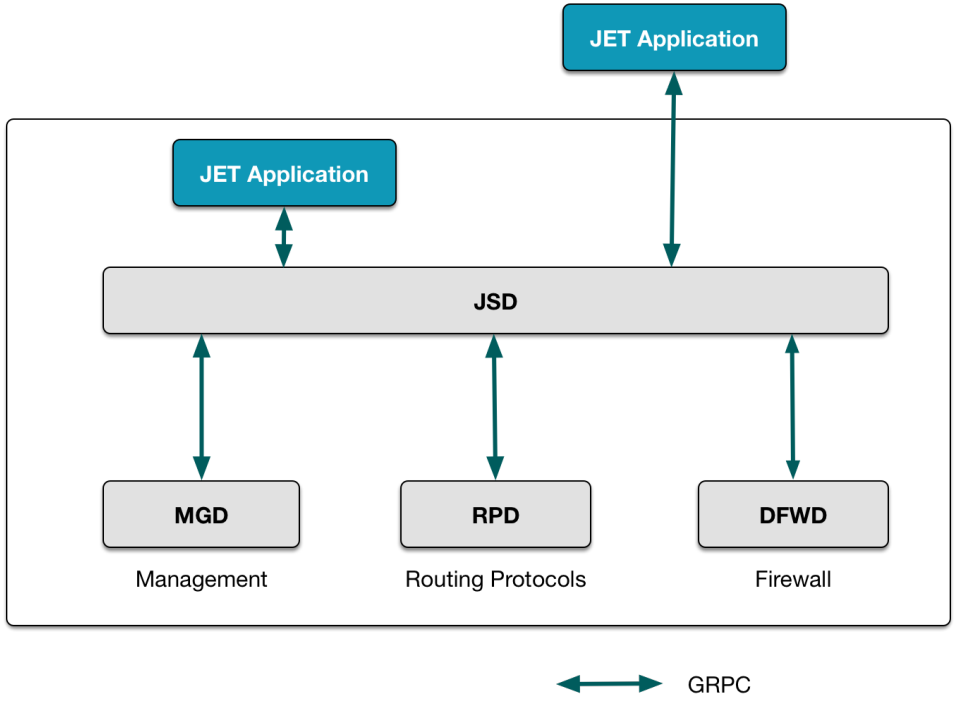
P4/STRATUM IN JUNIPER



P4/STRATUM IN JUNIPER: JP4AGENT

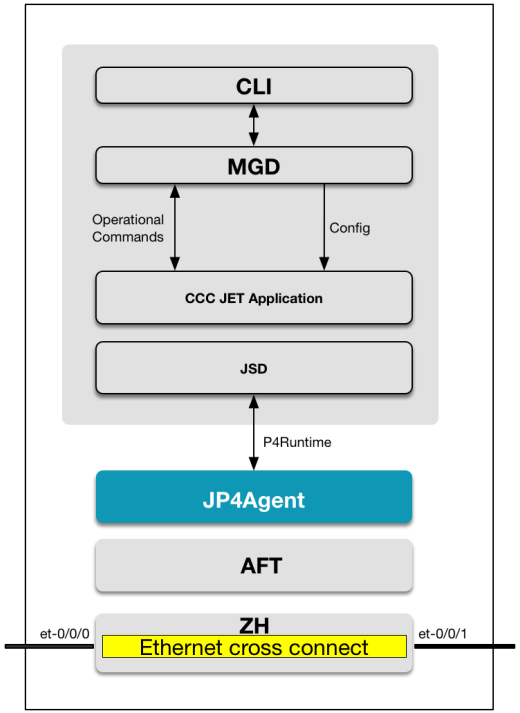


JET (JUNIPER EXTENSION TOOLKIT)

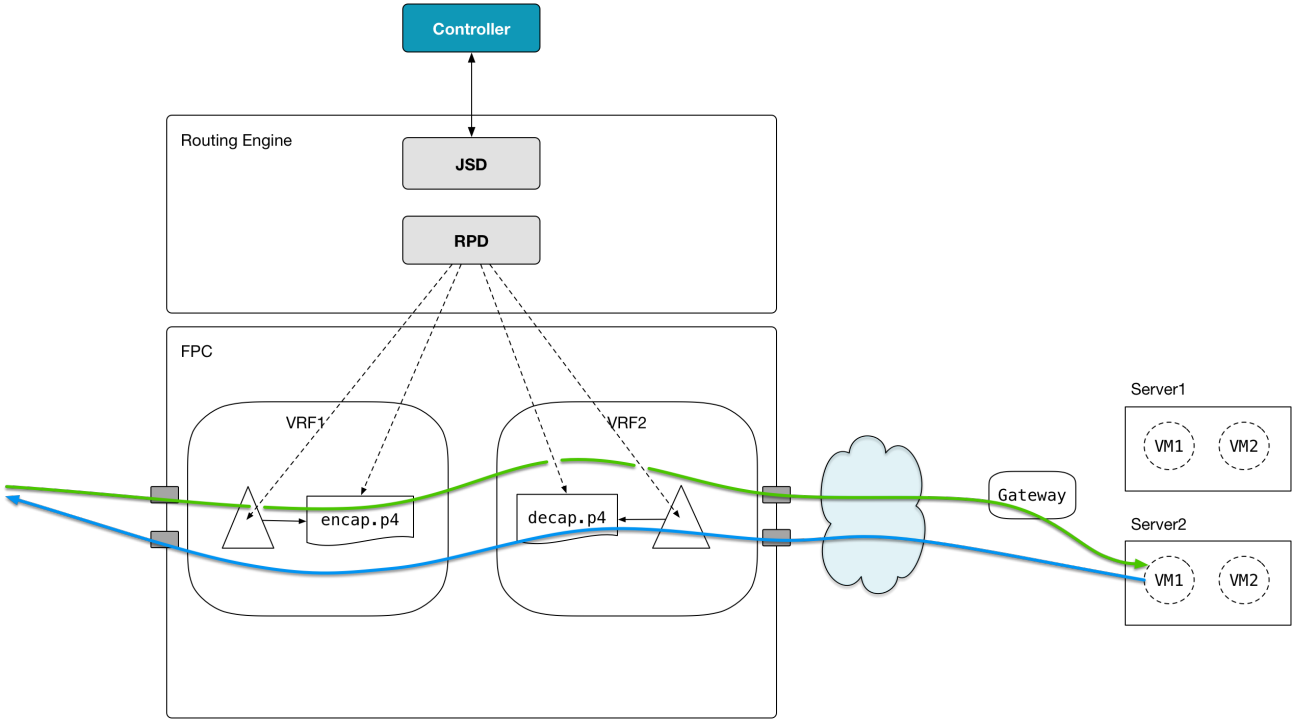


TRANSPONDER USE CASE

ACX6360

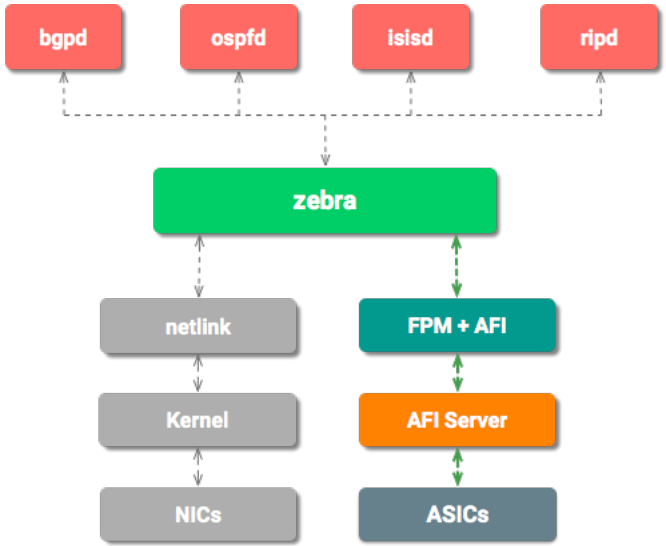


FLEXIBLE TUNNELS

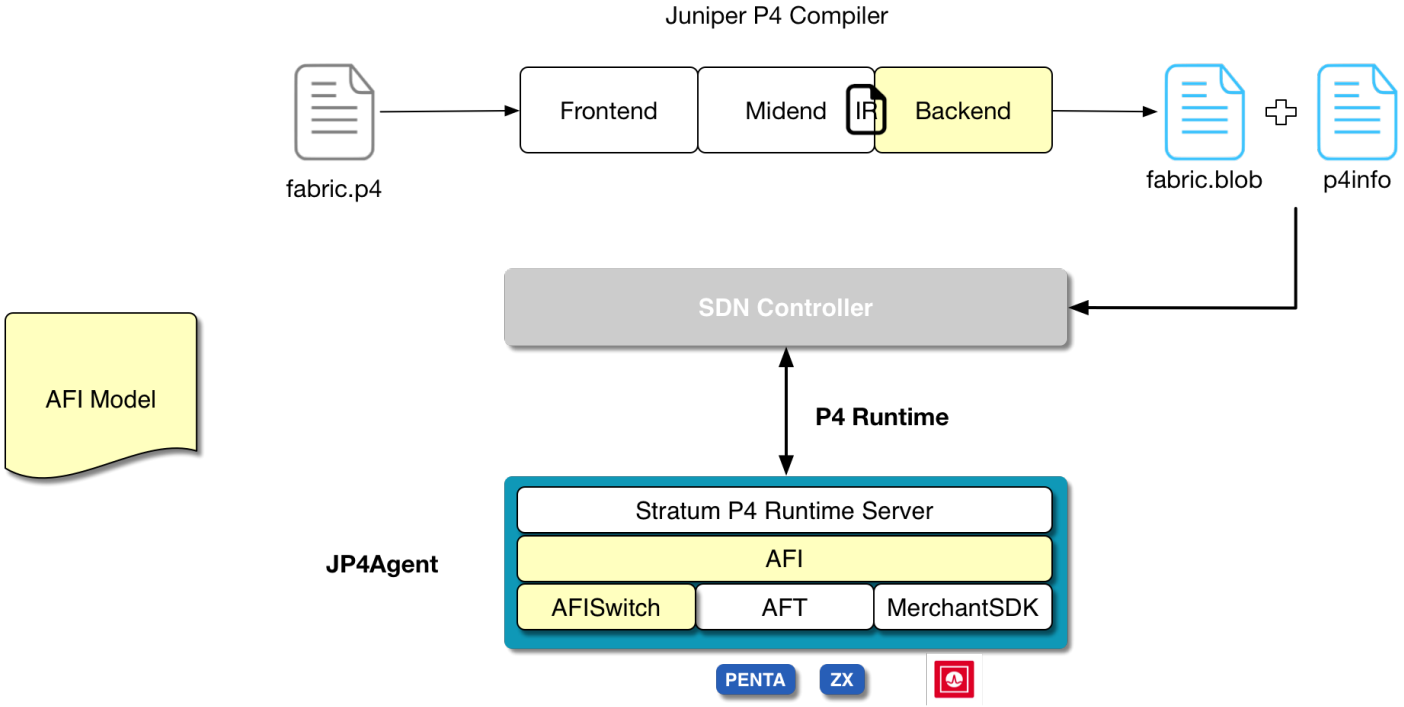


FRROUTING ON JUNIPER'S ADVANCED FORWARDING INTERFACE

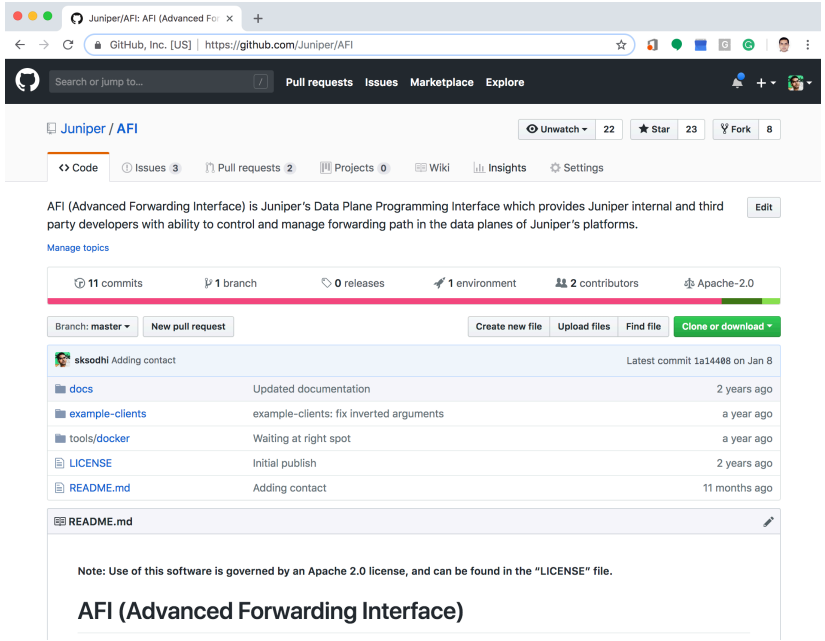
https://forums.juniper.net/t5/Industry-Solutions-and-Trends/FRRouting-on-Juniper-s-Advanced-Forwarding-Interface/ba-p/318708

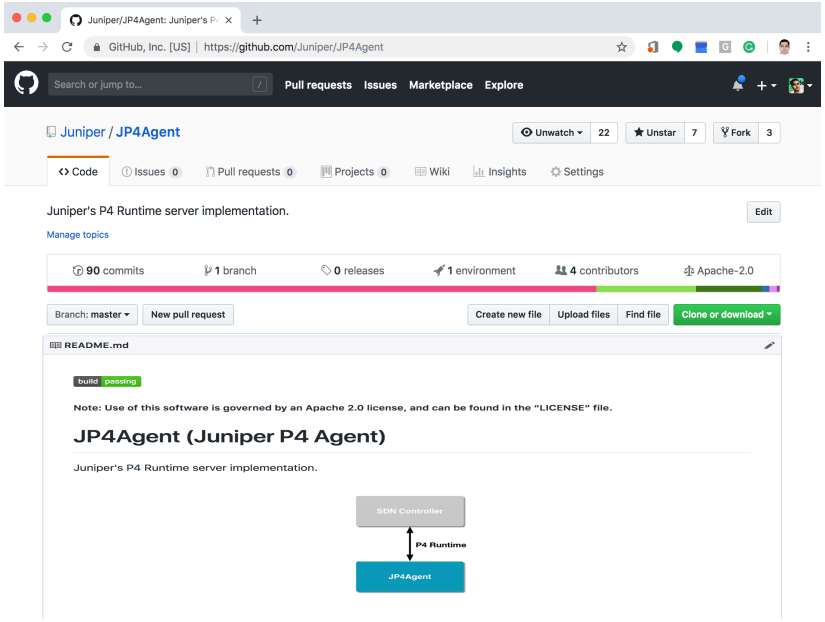


JUNIPER AND STRATUM



AFI AND JP4AGENT ON GITHUB





THANKS