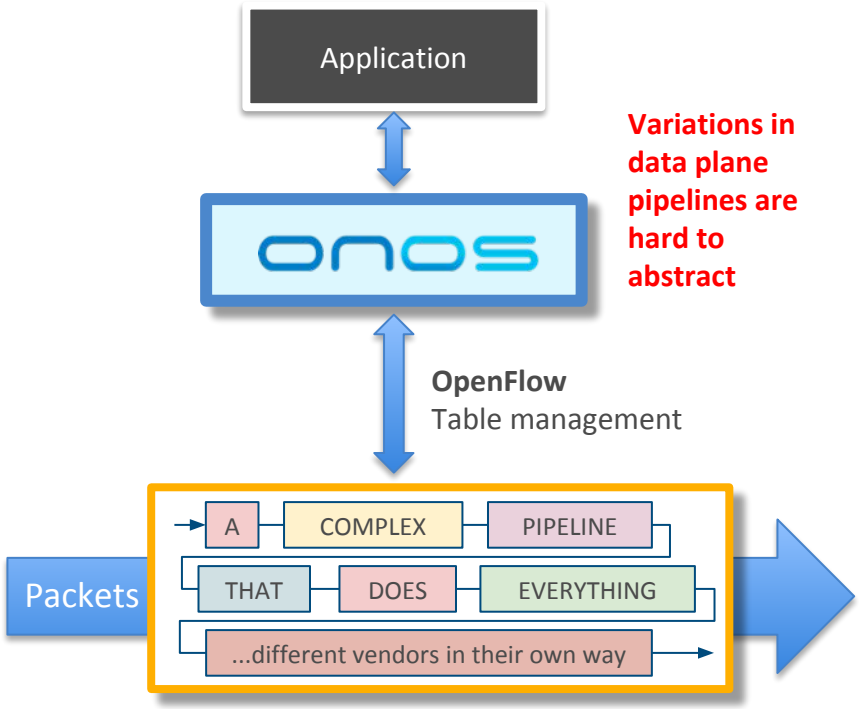

# P4 Runtime Demo

## ONOS Controlling Barefoot Tofino Fabric

# P4 Runtime – Enabling Data Plane Pipeline Independence

## Fixed-function data plane pipeline

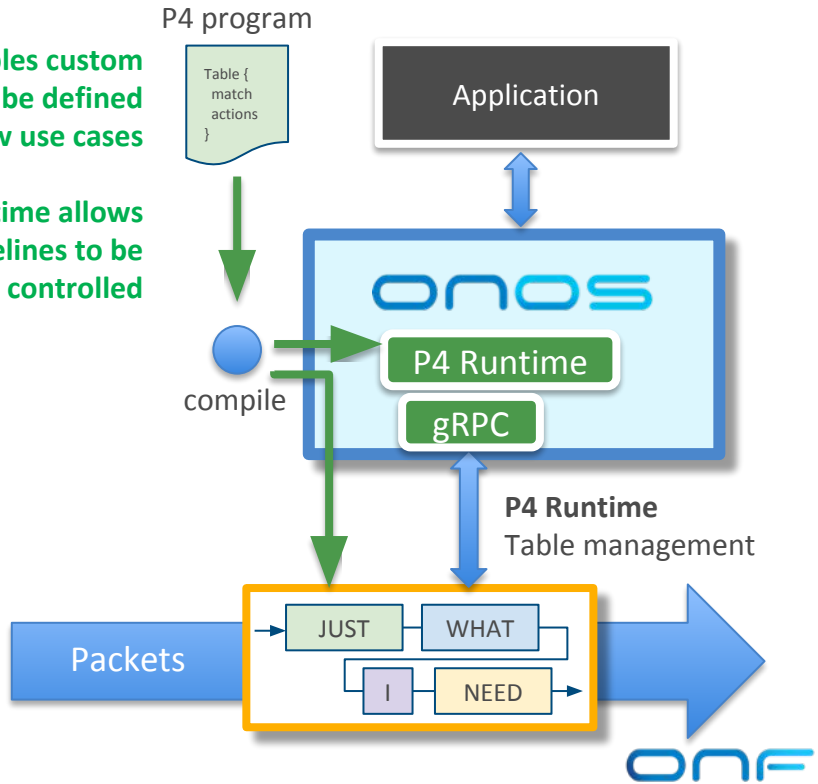



**Variations in data plane pipelines are hard to abstract**

## Programmable or fixed data plane pipeline

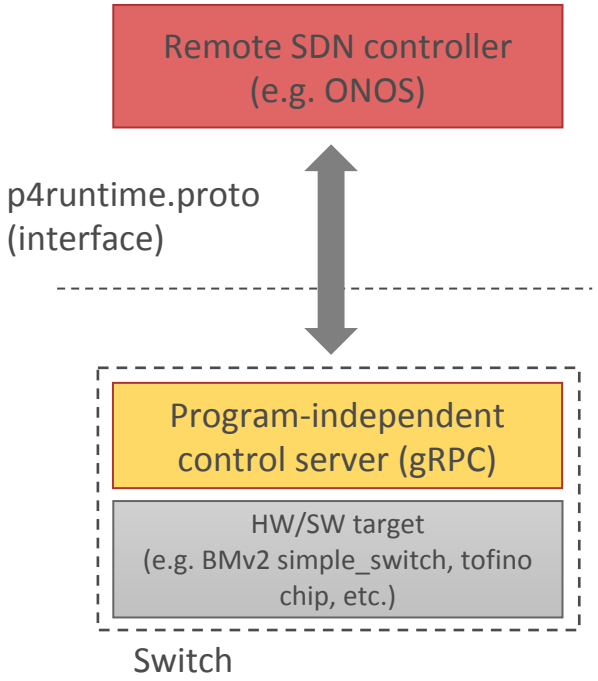
**P4 enables custom pipelines to be defined to meet new use cases**

**P4 Runtime allows custom pipelines to be loaded and controlled**

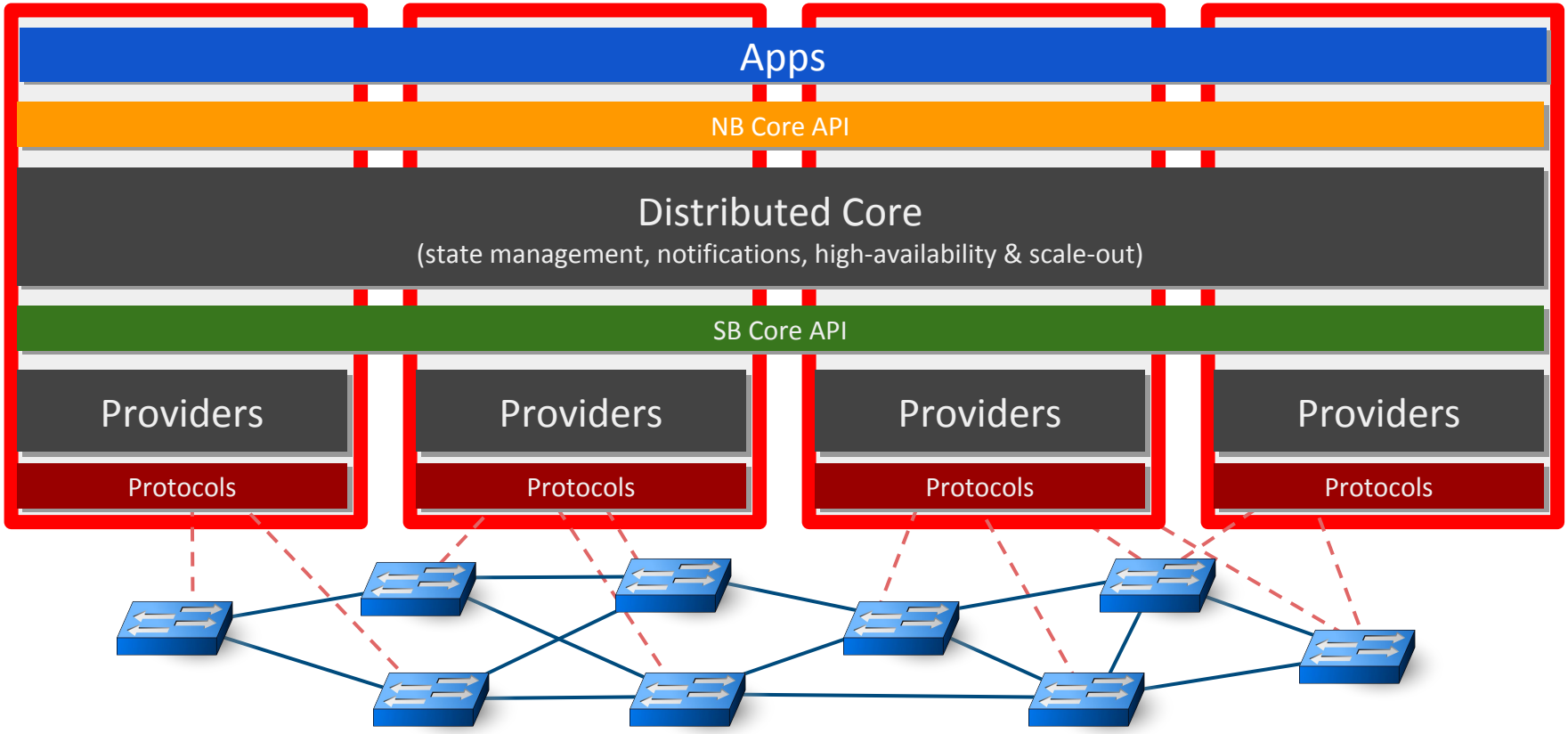


# What is P4 Runtime?

- Framework for **runtime control** of P4 devices
  - Open-source: https://github.com/p4lang/PI
- Developed by the **P4.org API WG**
- Targeted for **remote controllers**
  - Protobuf + gRPC implementation
- P4 **program-independent**
  - API doesn't change with the P4 program
- Enables **field-reconfigurability**
  - Ability to push new P4 program to the device



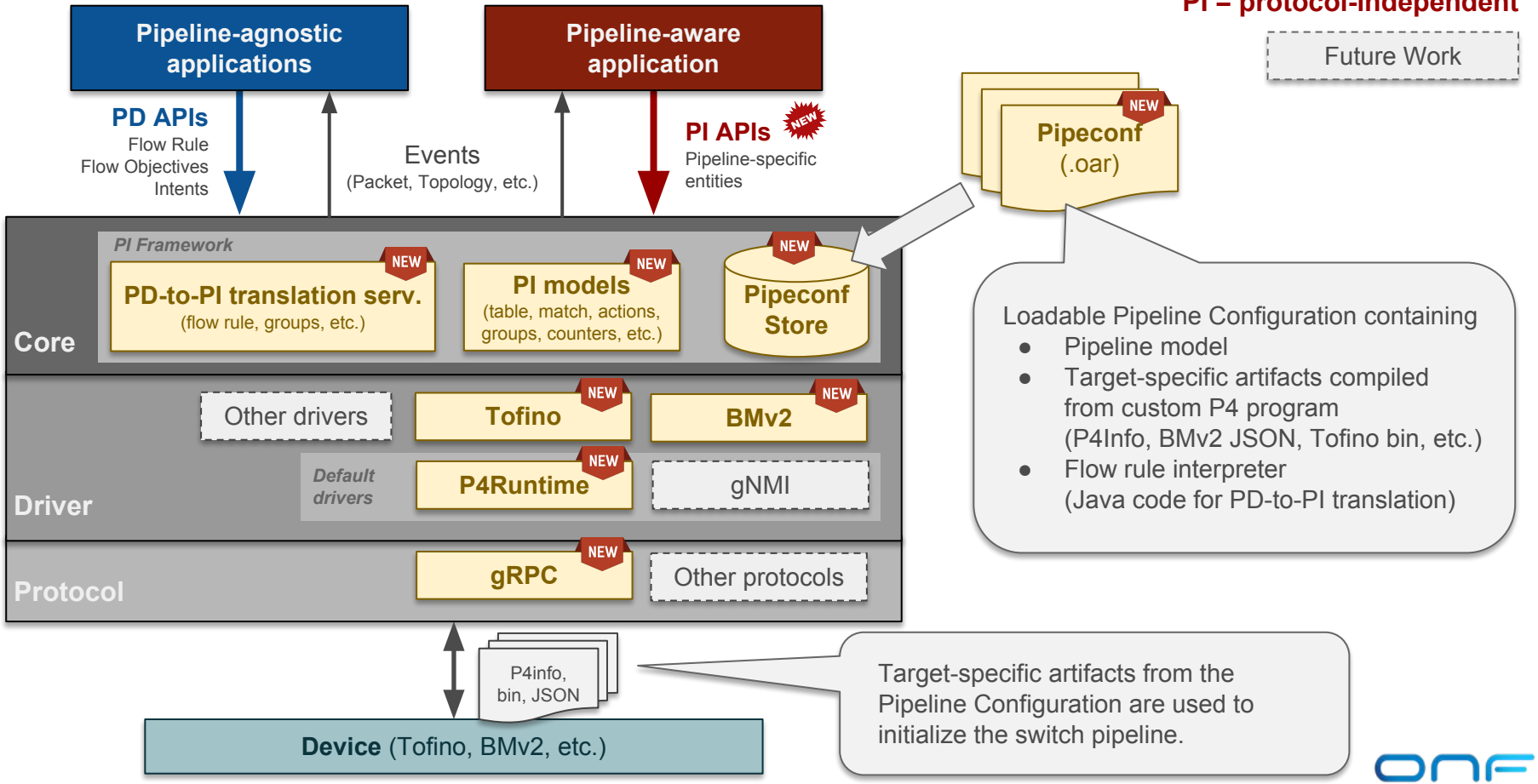
# ONOS – SDN Controller



# P4 support in ONOS

PD = protocol-dependent
PI = protocol-independent

Future Work




Loadable Pipeline Configuration containing

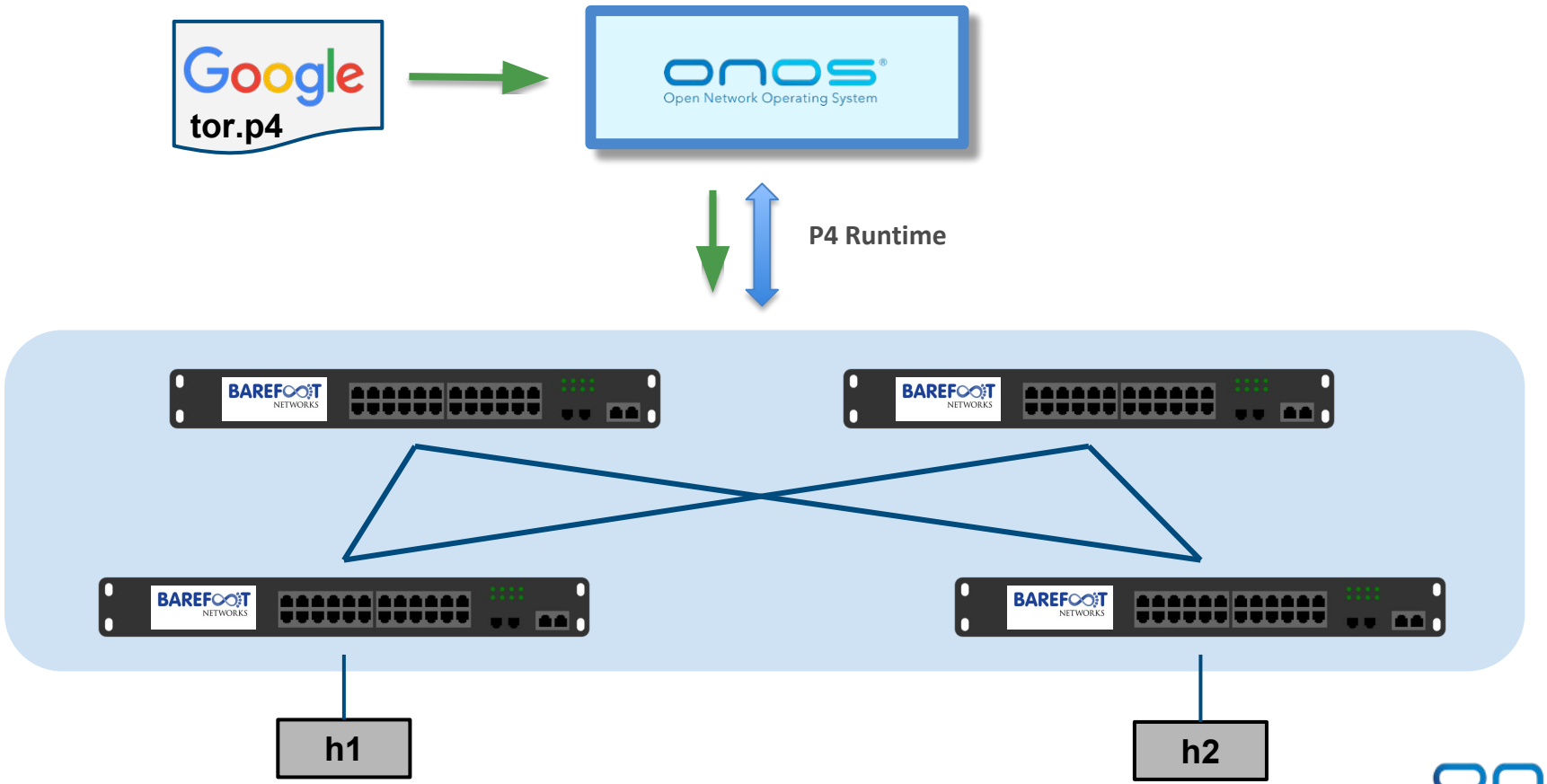
- Pipeline model
- Target-specific artifacts compiled from custom P4 program (P4Info, BMv2 JSON, Tofino bin, etc.)
- Flow rule interpreter (Java code for PD-to-PI translation)

Target-specific artifacts from the Pipeline Configuration are used to initialize the switch pipeline.

# Looking Forward - Beyond the Demo

- Next Steps:
  - Switch configuration via OpenConfig over gNMI
  - Extend P4 Runtime support to other switch vendors/ASICs
- Longer-Term Scope:
  - Ability to understand P4 programs (automatic PD-to-PI mapping)
  - Rethink Northbound API to enable the full potential of P4
  - New Use Cases
    - In-band Telemetry
    - Spine-Leaf Fabric Optimization
    - VNF Offloading

# Demo


Google
tor.p4
onos
Open Network Operating System
P4 Runtime
BAREFOOT NETWORKS
BAREFOOT NETWORKS
BAREFOOT NETWORKS
BAREFOOT NETWORKS
h1
h2


# Thank You