What OpenFlow Is

Martìn Casado

BACK TO CISCO SUBNET

No Interference

Art Fewell

◂ Previous Post

OpenFlow inventor: automated

Martin Casado, inventor of Oper

By

OpenFlow op

New networking protocol fo

By Jim Duffy, Network World

April 14, 2011

1 Commer

Instant Expert: All you need to know about OpenFlow

Is OpenFlow a true revolution in routing - or not?

By Julie Bort, Network World

May

The Verdict: Either OpenFlow Matters a Lot, or Not at All

Will Network Virtualization be the Killer App for OpenFlow?

By wendell on Mon, 05/16/11 - 9:59am.

Email | 6 Comments | Print | Like 2 | +1 0

Unsurprisingly, the opinions on OpenFlow from the vendors at Interop were all over the map.

How Software Will Redefine Networking

By Om Malik | Mar. 2

Tweet

Jonathan Heiliger, proponent of shakin servers, he has been specifications of larg

Let's talk abou

Software defined

By **Chris Mellor** •

Posted in Network

Free whitepaper – IB

Where they can, products into verti hardware.

Furthermore, a sometimes tortuous stand changes and raises the barriers of entry t

uture of Google's Network?

Tweet

rgest

eat

time

Vice

t two

will be

roduct line to support OpenFlow

he farm that OpenFlow will be a bit

GIGAOM

HOME | APPLE | BROADBAND | CLEANTECH | CLOUD | COLLABORATI

EVE

KevinCTofel: Some more T-Mobile Galaxy S 2 speed test results in a 21 Mbps coverage area, but not moving this time. http://t.co/oFiTPL4m

Article Options

Take control of the network: OpenFlow – a new tool for building and deploying enterprise networks

by HPNetworking on 05-12-2011 05:15 PM - last edited on 05-12-2011 06:30 PM

By Dan Montesanto, HP Networking Strategy and Business Planning

Before he jumped on a plane for this week's Interop show in Las Vegas, I had a chance to sit down with Kai Chang, HP Networking switch software product manager, to talk about OpenFlow – an interesting up-and-coming networking technology that's gotten a lot of buzz recently. I wanted Kai to help explain what OpenFlow is about and how it might change the way customers and vendors build and deploy networks.

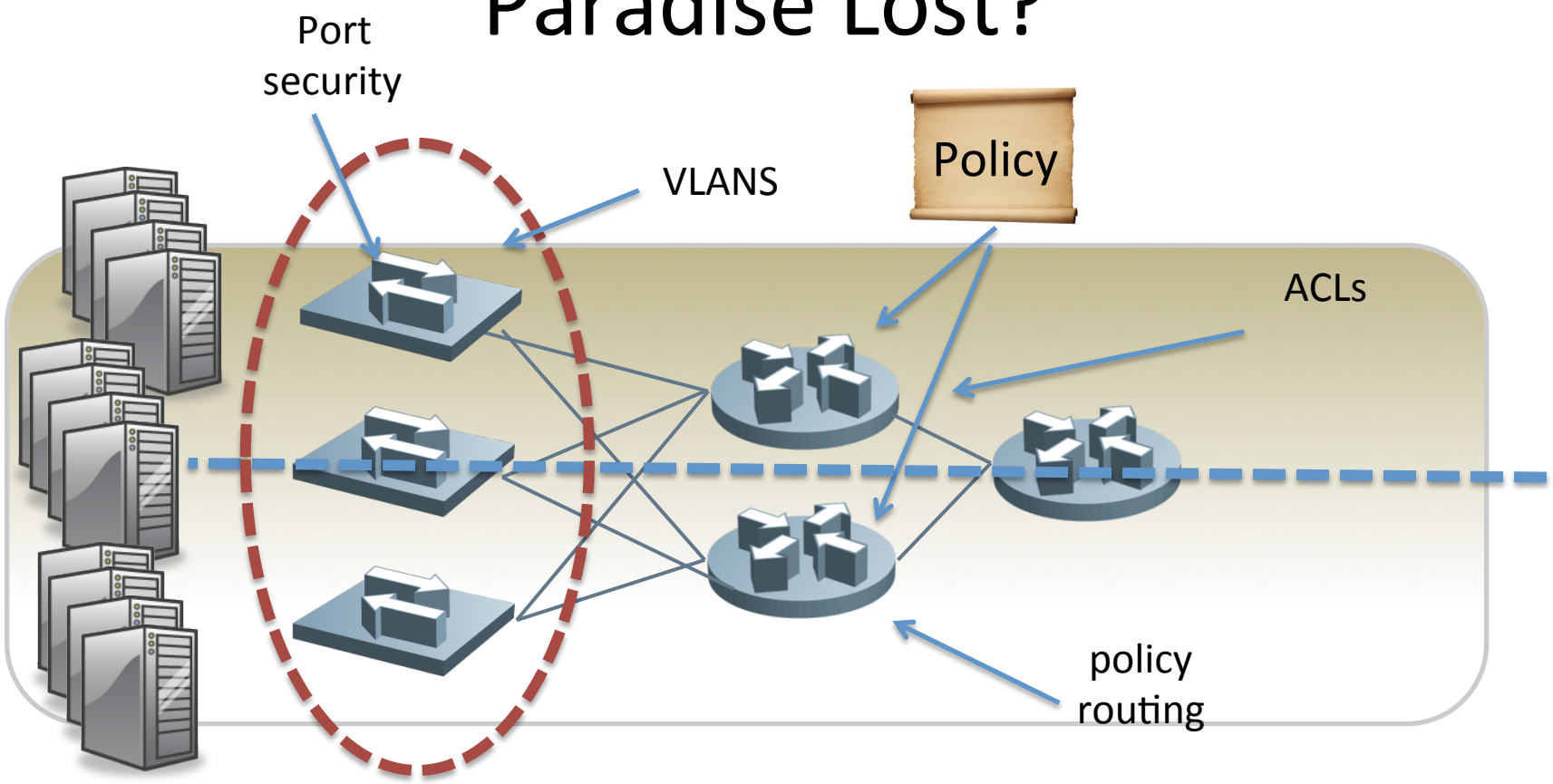
DM: Hi Kai. Can you describe OpenFlow – what it is, how it works?

Acknowledgements

Ben Pfaff, Justin Pettit, Nick McKeown, Scott Shenker, Jianying Luo, Natasha Gude, Teemu Koponen, DK Moon, Ben Pfaff, Peter Balland, Keith Amidon, Dan Boneh, Tal Garfinkel, Michael Freedman, Aditya Akella, Daniel Wendlant, Gregory Watson, John Lockwood, Mendel Rosenblum, Reid Price, David Erickson, Tim Hinrichs, John Mitchell, Henrik Amren, Junda Liu, Rob Sherwood, Jesse Grosse, Ethan Jackson, Jeremy Stribling, Alex Yip, KK Yap, Murphy McCauley, Brandon Heller, Rajiv Ramanathan, Jean Tourhilles, Edward Crabbe, Scott Whyte, Min Zuo, Leon Poutieksi, Jim Wanderer, Igor Ganichev, Teemu Koponen, Andrew Lambeth, Pankaj Thakker, Ronghua Zhang, Guru Parulkar, Dan Pitt, Curt Beckman, Ali Yahya, Kay Ousterhaut, David Ward, Jan Medved, Joe Tardo, Puneet Agarwal, Dave McDyson, Romain Lenglet, Simon Horman … and many, many others

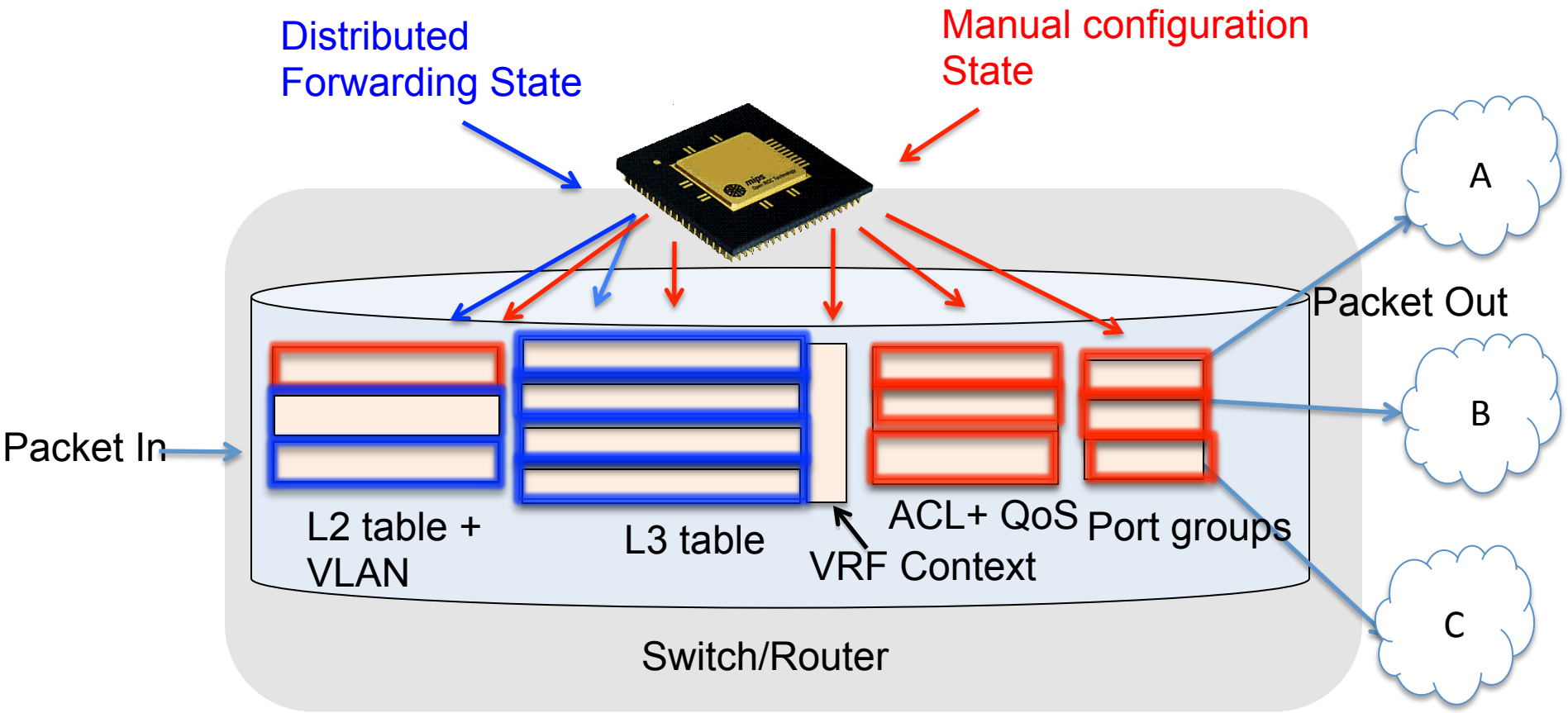
Prehistory (2002-2003)

Paradise Lost?



- Limited redundancy
- Constrained topology
- Poor response to dynamic events
- Scaling limited by operational complexity

Networking in Practice



The Problems …

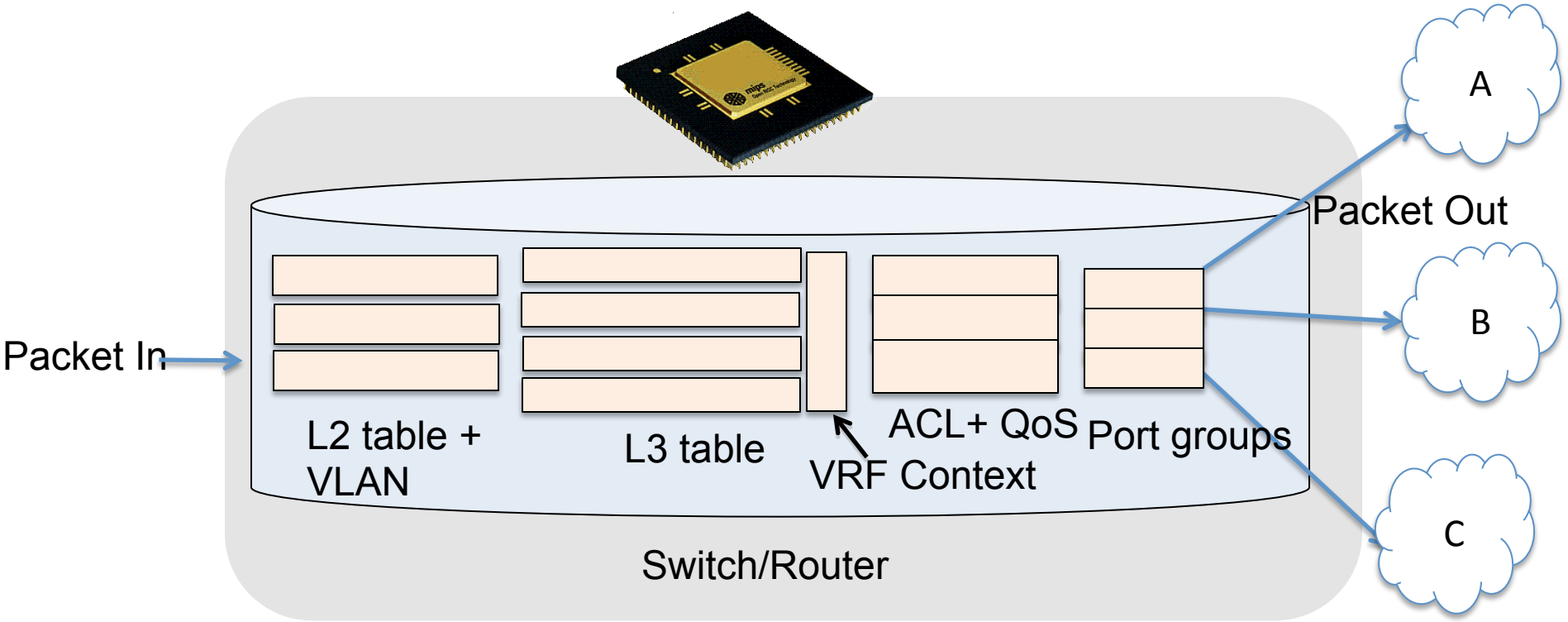
- Humans suck at state management
- No well defined APIs for datapath state
- No general distributed algorithms for all datapath state

Developing OpenFlow (2004-Now)

"How to program a network”

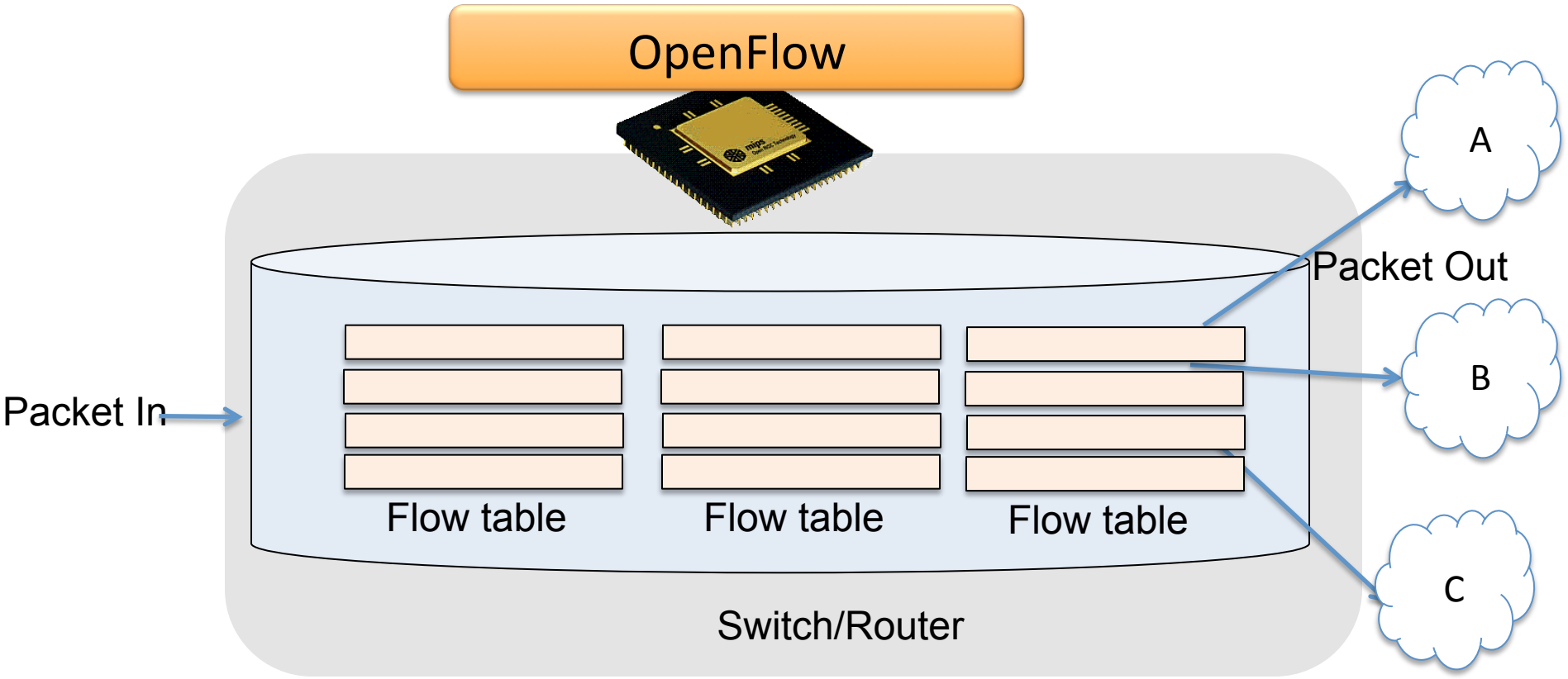
"How to programmatically manage all of the datapath state in the network"

Problem: Poor Forwarding Abstractions

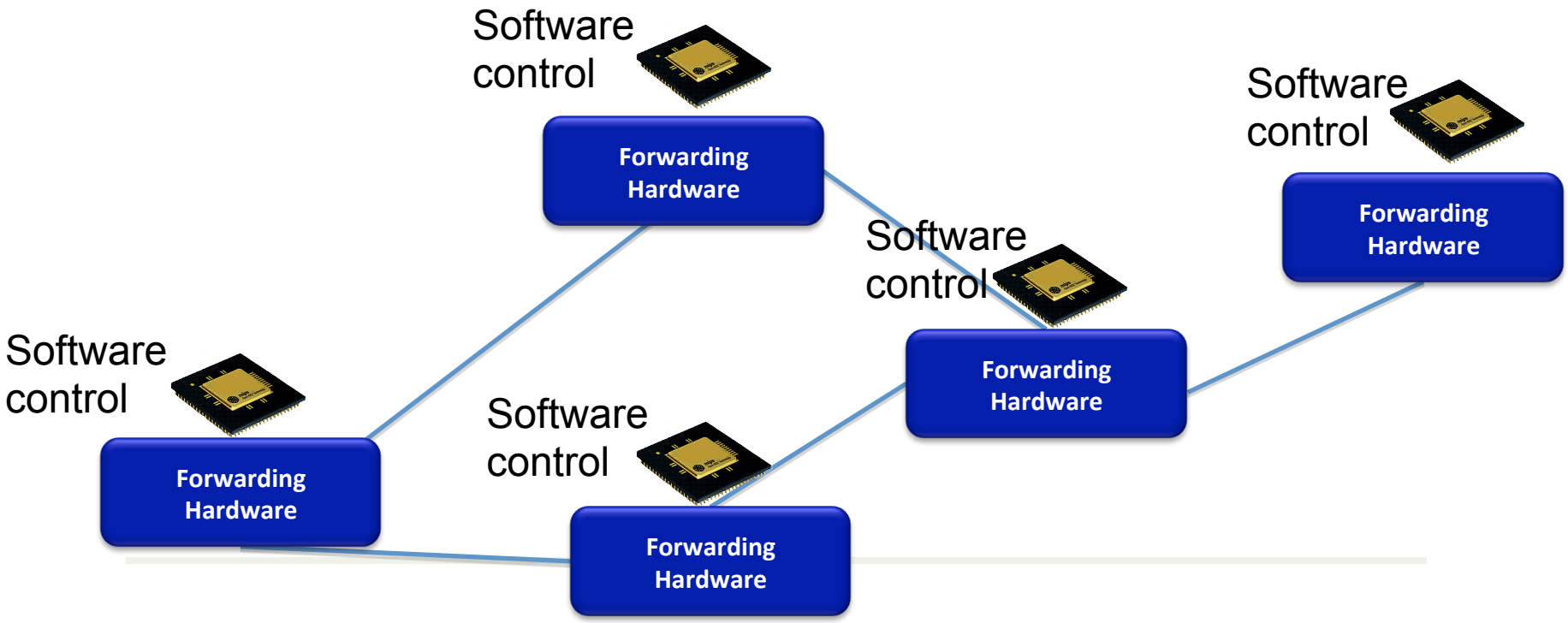


- Fixed function
- Often expose implementation details
- Non-standard/non-existent state management APIs

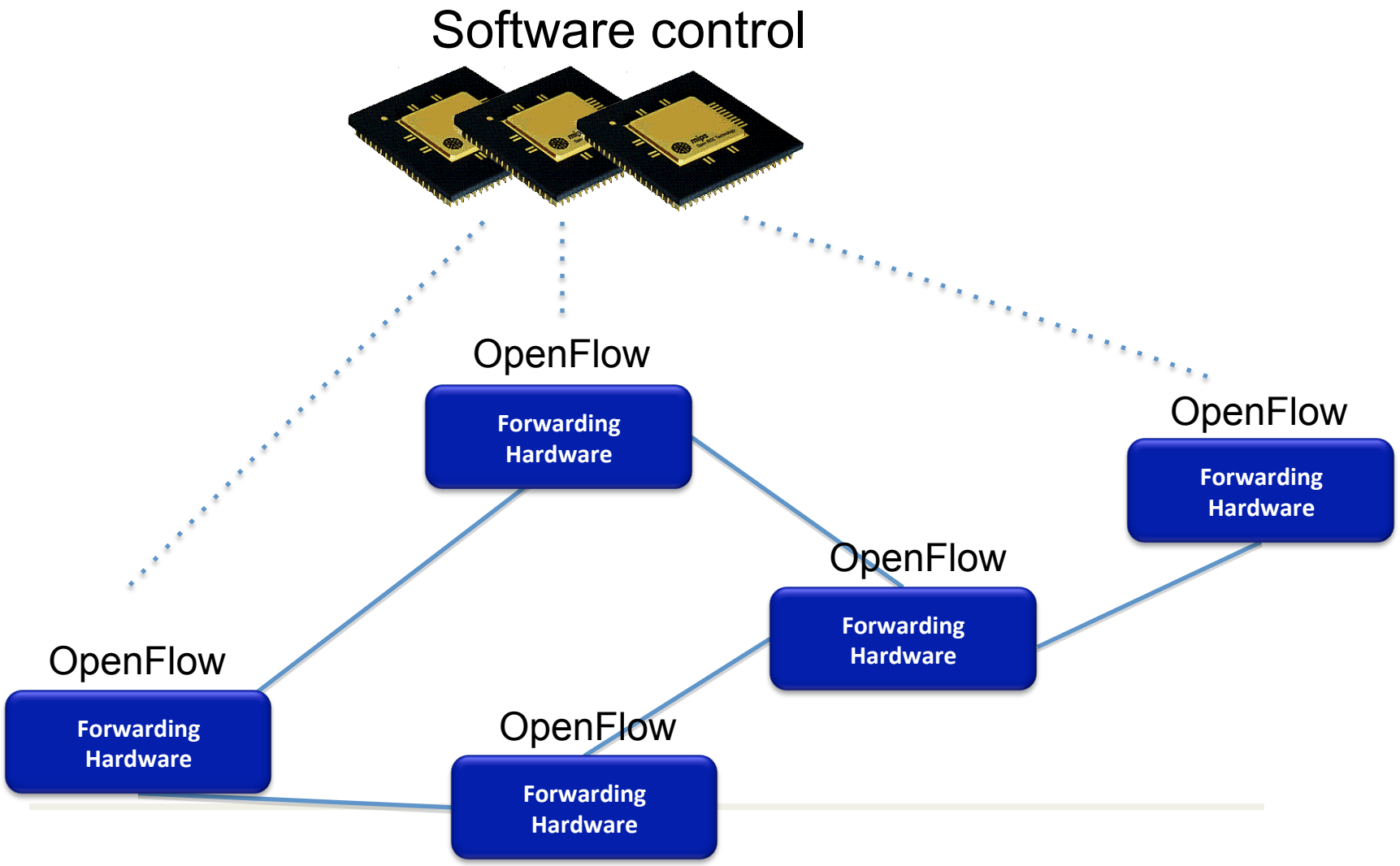
Solution: Generalize Dataplane



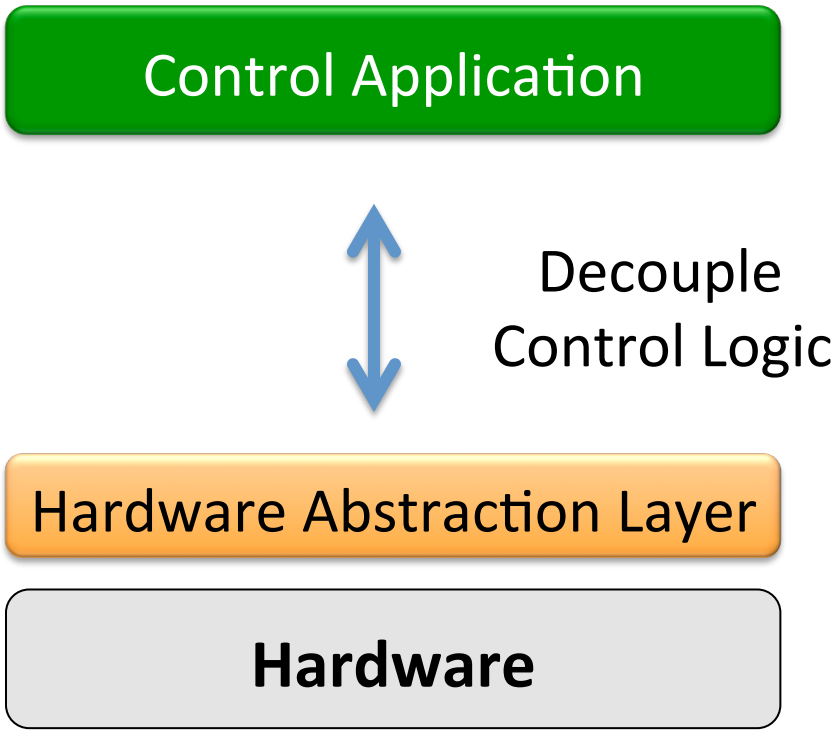
Problem: Distributed Computing is Hard



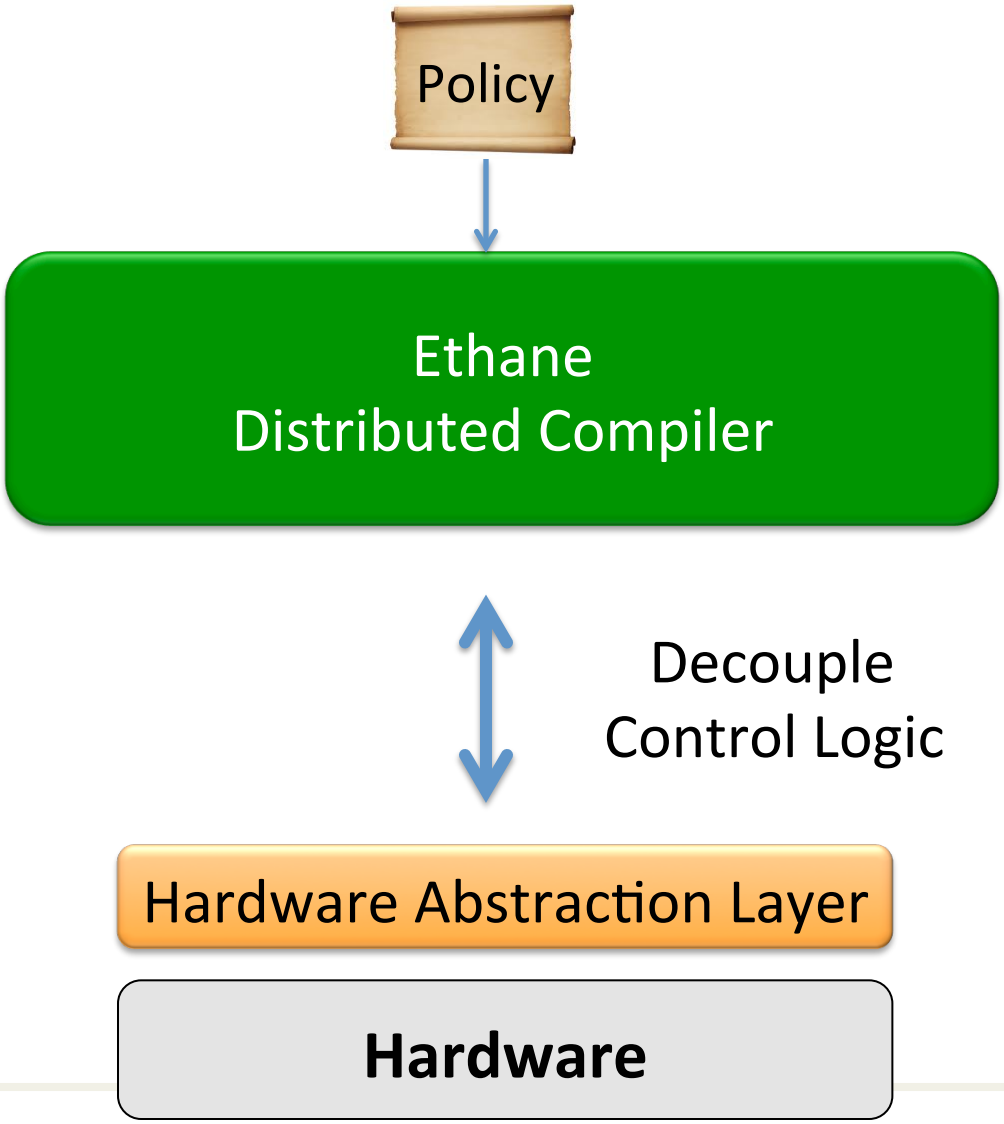
Solution: Decouple Distribution Model from Topology



A Sensible (Humdrum) System Stack

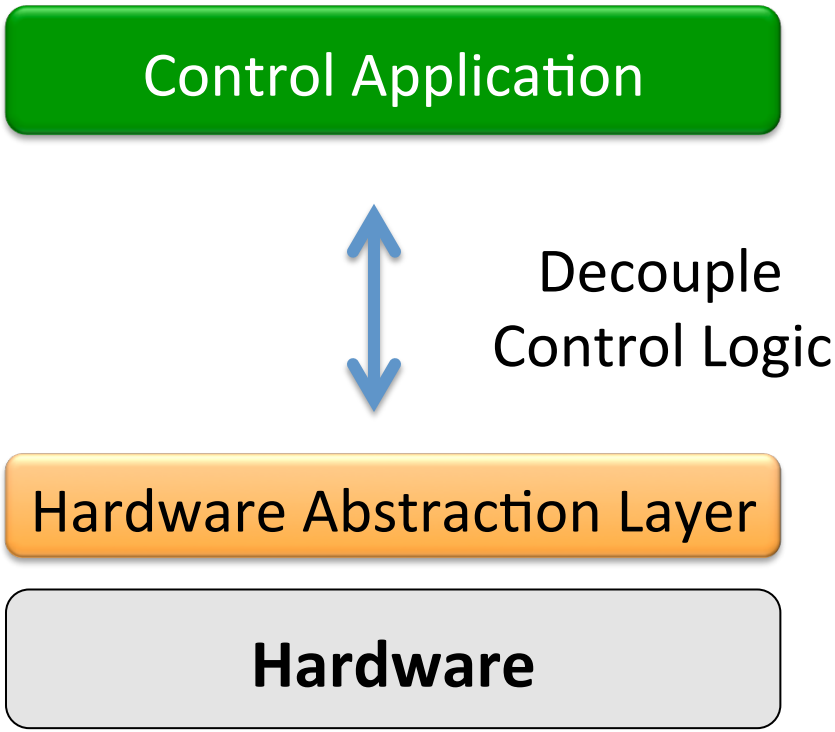


A Sensible (Humdrum) System Stack

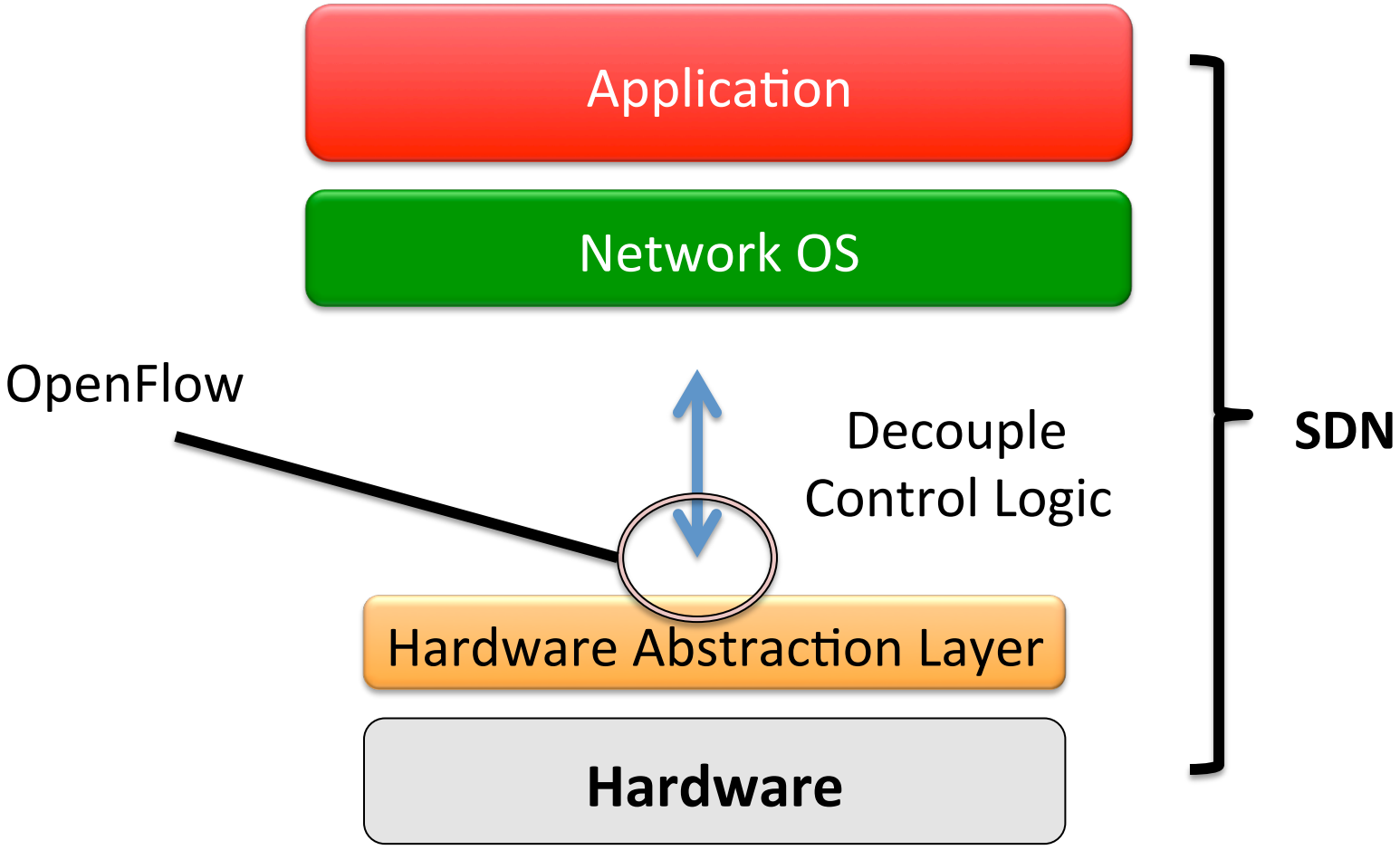


ALTEC LANSING
USB20W

The Network Operating System



The Network Operating System



OpenFlow/SDN FAQ

What is the Primary Value Proposition?

- Ability to innovate within the network

- Horizontal integration
  - Market efficiency
  - Rapid innovation at each layer

Does OpenFlow Offer New Functionality?

- Not really …

Does SDN Scale?

- Yes

A Restrospective on the Future of OpenFlow (Now-??)

Is OpenFlow …

- … a new idea?
- … well designed?
- … a path to new functionality?

So What is the Cause of its Success?

You