SDN'S IMPACT ON ETHERNET SWITCHES

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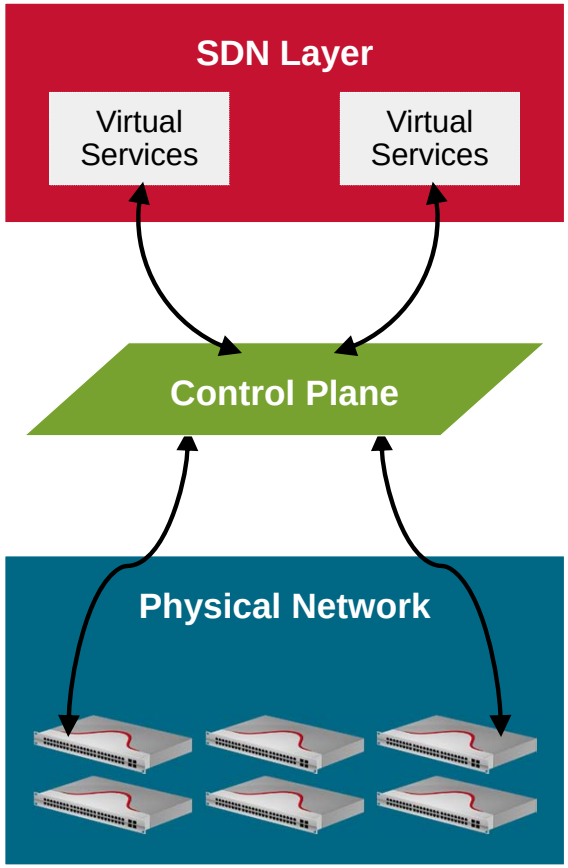
WHAT IS SDN?

Software-defined Networking (SDN) allows network administrators to manage network services through abstraction of lower level functionality



This is done by decoupling the system that makes decisions about where traffic is sent (the control plane) from the underlying systems that forwards traffic to the selected destination (the data plane).

Source: Wikipedia 2013

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VARIOUS FLAVORS OF SDN EVOLVING

- OpenFlow
- Network Virtualization
- Bare metal switches (white boxes) with common off-the-shelf (COTS) network OS
- Open Switch APIs to allow network OS extensibility
- Network function virtualization (NFV) initiated by Carriers

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EXPANDING OPPORTUNITIES WITH SDN

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SDN EXAMPLE – EVOLUTION OF OPENFLOW SWITCH SUPPORT

PRE-PHASE 1	PHASE 1	PHASE 2	PHASE 3	PHASE 4
Experimental Deployments Idea Formulation Application Exploration	Lab Experiments & Campus Trials	Initial Alpha/Beta Commercial Trials	Hybrid Production Model Open Flow as a Feature on Top of an Existing Fully Functional L2/L3 Switch	Optimized Focused Systems (SW & HW) for Specific Applications

Ever Increasing Support for OF

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EVOLUTION OF SDN CAPABILITIES IN 10G SWITCHES

24 x 10 GbE	64 x 10 GbE 16 x 40 GbE	100+ x 10 GbE 32 x 40 GbE	Higher Density
BCM56820	Trident+	Trident II	Next-Gen
2008-2009*	2010-2011*	2012-2013*	2014-

* Sample-Production Dates

Enabling Higher SDN Capabilities

- More Network Virtualization Scale
- More OpenFlow Scale
- More Pipeline Flexibility and Instrumentation

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HIGH DENSITY SINGLE-CHIP SWITCH

- **1.28 Tb/s**
- **32 X 40G**
- **Packet Processing**
  - L2, L3, tunneling
- **350+ Mb Memory**
  - For packet buffer and forwarding tables

Significant memory for forwarding tables including TCAMS

4B+
Transistors

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SDN TABLE AND FORWARDING EVOLUTION

- Flow based forwarding database
- Flexible parsing of packet headers
- Potential to forward on L4-L7 packet contents
- Access control (ACL's) for network security based on flows (micro-firewall)
- Load balancing and multipath support based on higher layer
- Virtualization overlays
- Tunnel to tunnel mapping

This drives the need to more flexible tables – not tied to a specific field or layer

Alternative to TCAM technologies for tables versus TCAMS

Flexible packet parsers that can operate at line rate in excess of 1-2 tbs

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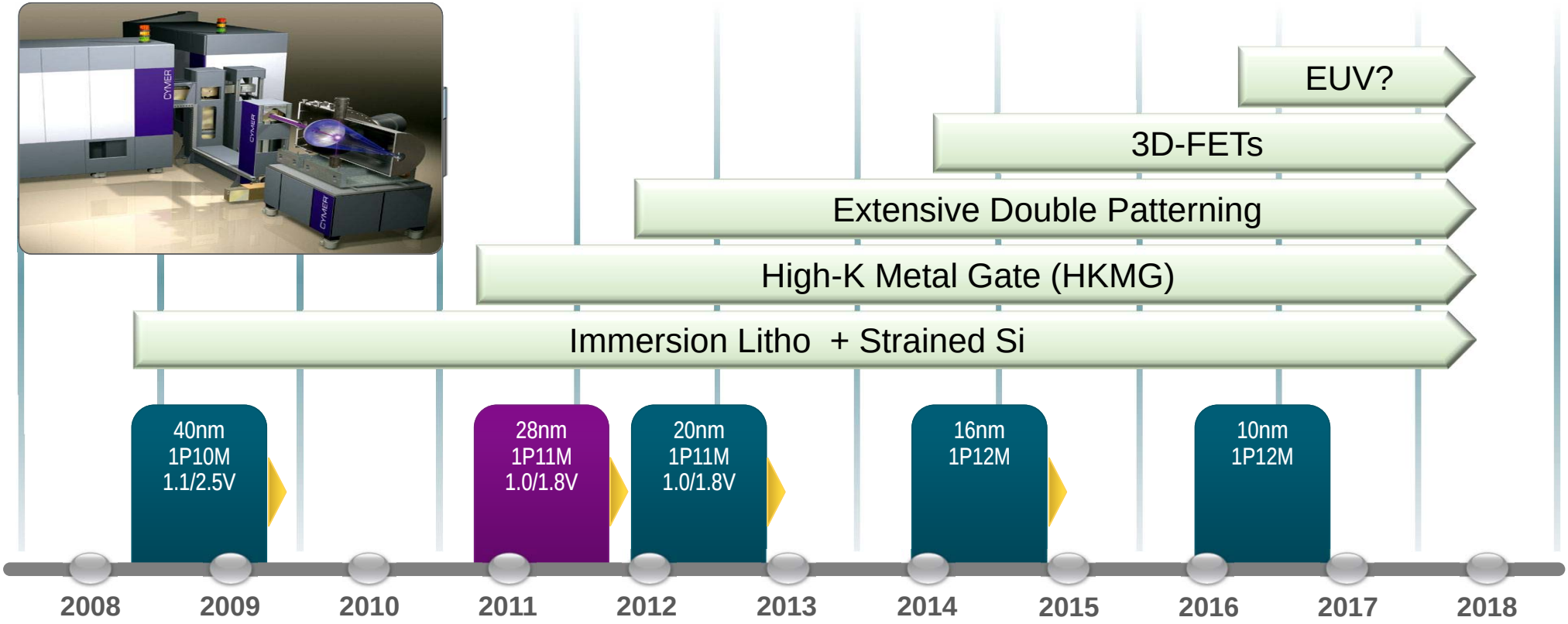
PROCESS TECHNOLOGY EVOLUTION: 2008 – 2018



In 10nm, 15B logic transistors can fit in 1cm²

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SEMICONDUCTOR ROADMAP IMPACT ON SDN

- **So what can we do with 10B Transistors**
  - More flexible parsers
  - Multiple parsers in parallel – multiple match results
  - Larger tables
  - More flexible tables
  - More use of TCAM's for don't care fields
  - ……

But does building an SDN "only" switch chip make business sense?

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Thank You!