P4-enabled NICs
Acceleration of OVS

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Challenge - volume & complexity

Exabytes per Month

- Smartphones (inc. Phablets) (76.81%)
- Nonsmartphones (2.1%)
- PCs (9.3%)
- M2M (3.7%)
- Tablets (9.8%)
- Other Portable Devices (0.03%, 0.00%)

53% CAGR 2015–2020
Building blocks

- **Packet header processor**
  - Configurable decoding of packets now running at 100G and 400G under preparation
- **Lookups and classifiers**
  - Various hashes: cuckoo hash, perfect hash; bloom filter, TCAMs, Tries, pattern matching
- **Packet editing IPs** (e.g. encryption)
- **Network interfaces** 10/40/100GE
- **Software interfaces** DPDK and NDP API
NFV integration

- Virtualization of compute, storage and now *network*
- OVS is a key component
- OVS data plane expressed using P4
- P4 to VHDL to automate FPGA programming
P4 pipeline

INPUT

PARSER

M+A Table

Queues Buffers

M+A Table

OUTPUT

parser

match_action

deparser

p4vhdlt_op

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Goal for NFV deployments

- VM 1: VPN
- VM 2: FW
- VM 3: Netflow

OVS

- OVS acc
- VM1 acc
- AES
- VM2 acc
- DROP
- VM3 acc
- UH exp

FPGA NIC

Mega (heavy) flows

Hypervisor