Flow-Pulse: Traffic classification using P4 and ML

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Visibility is VITAL but EXPENSIVE

- ## ISPs have lost the ability to derive value from their network infrastructure
  - Investment into "fattening" network pipes cannot be recouped
  - ISPs must create new value-add services and retain customers via exceptional user experience

- ## Traditional DPI appliances don't scale
  - Prohibitively expensive: custom hardware
  - Packet inspection: losing efficacy due to encryption
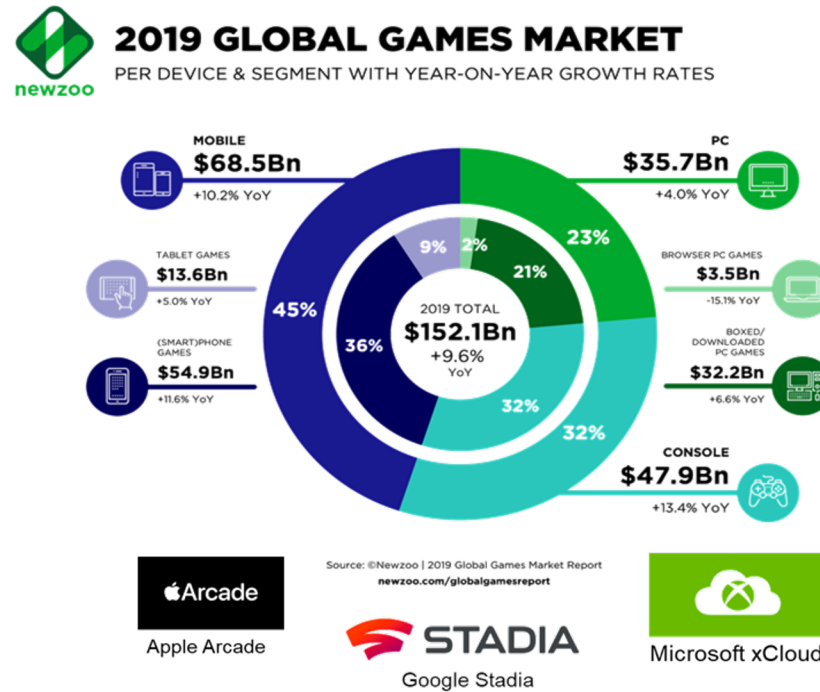
Traffic is growing at 26% each year
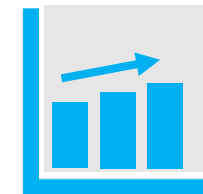
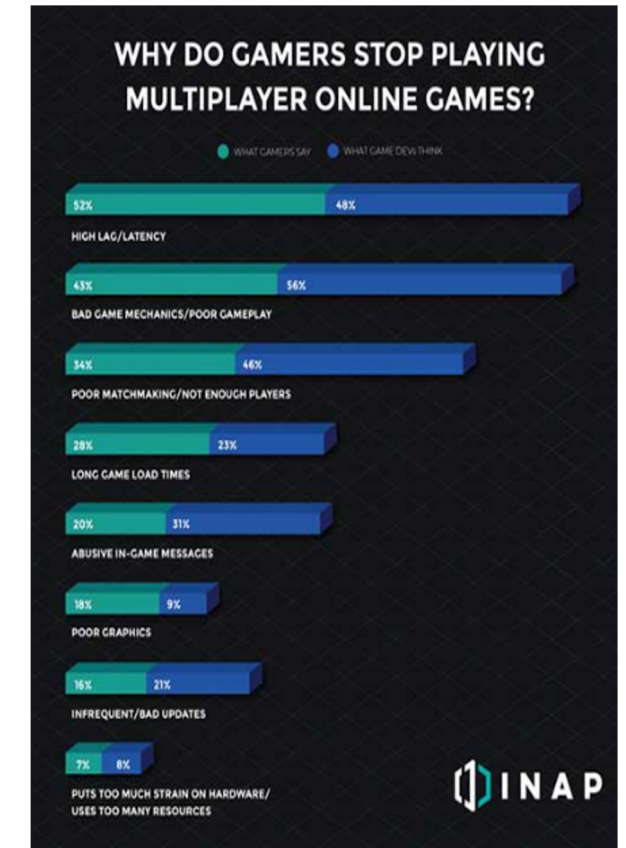Global Telco revenue for 2015-18 grew by 3.7% & margin by 0.6%

Australian traffic grew +50% YoY while revenue declined -4.1%
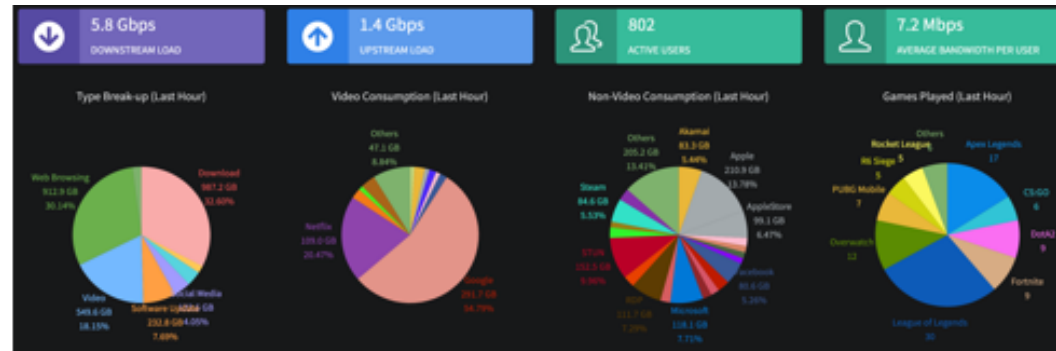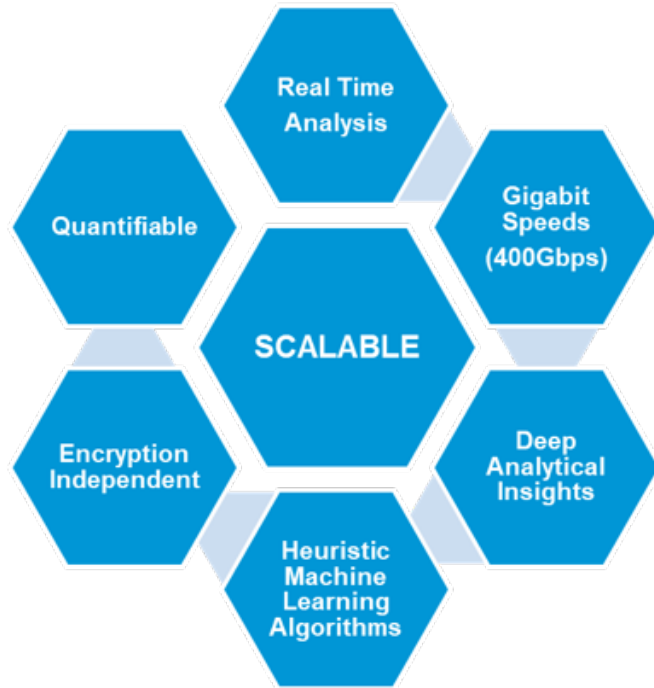
The data-driven opportunity

Traffic Management

UX Enhancement

New Service Offerings

Data-driven Actions

Gamers are frustrated by unstable latency

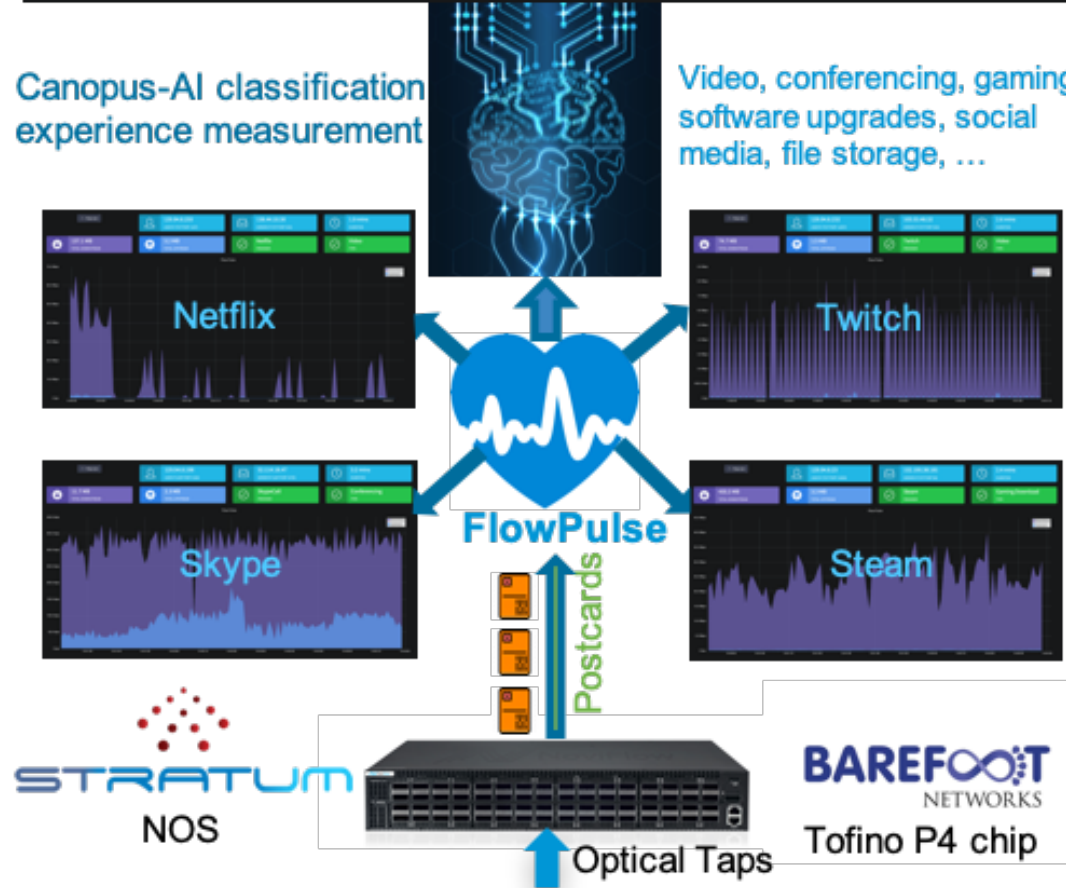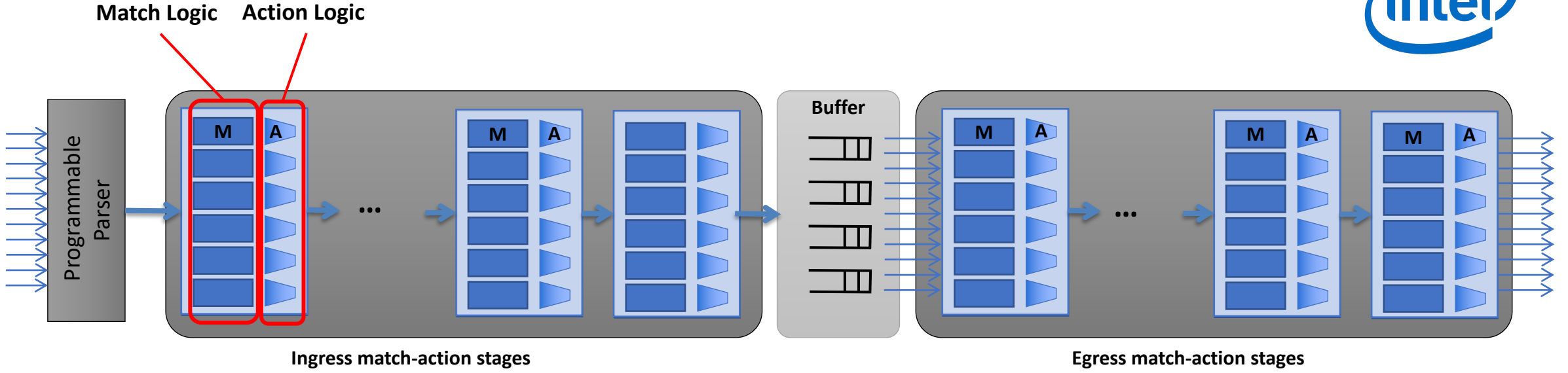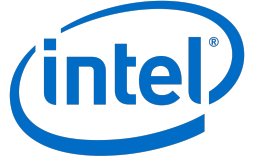# Flow Pulse

Flow-Pulse leverages Tofino programmability

BAREFOOT
NETWORKS | an Intel company

(intel)

Match Logic   Action Logic

Ingress match-action stages

Egress match-action stages

Buffer

```
                                        table mac {
                                          key = {
                                            ingress_metadata.bd : exact;
                                            l2_metadata.lkp_mac_da : exact;
                                          }
        header ethernet_t {               actions = {          action dmac_hit(bit<16> ifindex, bit<16> port_lag_index) {
          bit<48>   dstAddr;                dmac_hit;             ingress_metadata.egress_ifindex = ifindex;
          bit<48>   srcAddr;                dmac_miss;            ingress_metadata.egress_port_lag_index = port_lag_index;
          bit<16>   etherType;             dmac_redirect_to_cpu;  l2_metadata.same_if_check = l2_metadata.same_if_check, ^ ifindex;
        }                                 }                     }
                                          default_action = dmac_miss;
                                          size =MAC_TABLE_SIZE;
                                        }
```
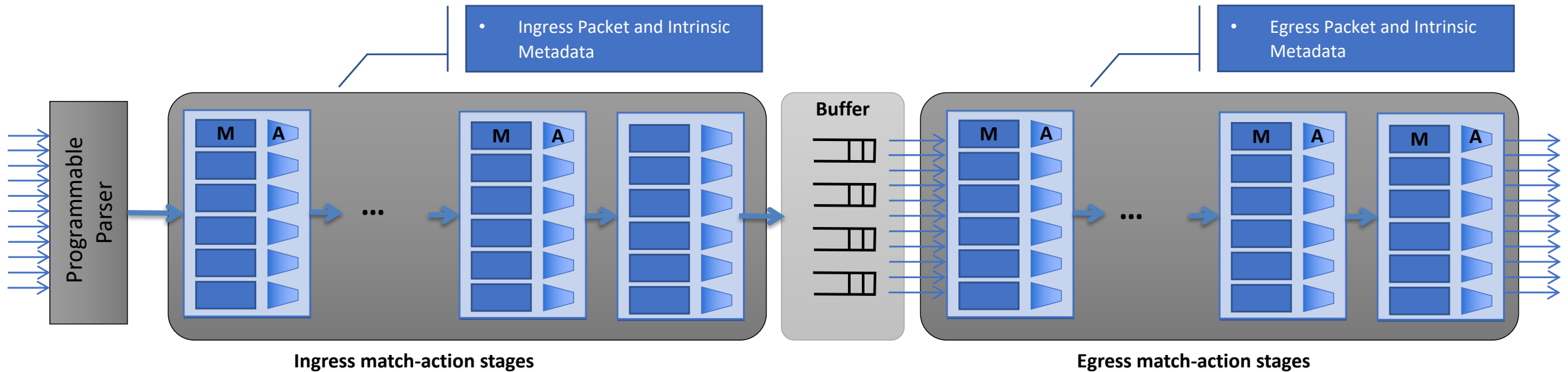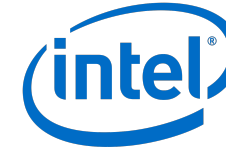
P4

Flow-Pulse leverages INT Postcards

- Ingress Packet and Intrinsic Metadata

- Egress Packet and Intrinsic Metadata

Ingress match-action stages

Egress match-action stages

Buffer

Programmable Parser

Tofino Pipeline In-band Network Telemetry (INT) Capabilities
- Act on, filter, export metadata on per packet basis
- Embed metadata into packet header (INT-MD mode)
- **Accumulate metadata into digest packet (INT-XD mode)**
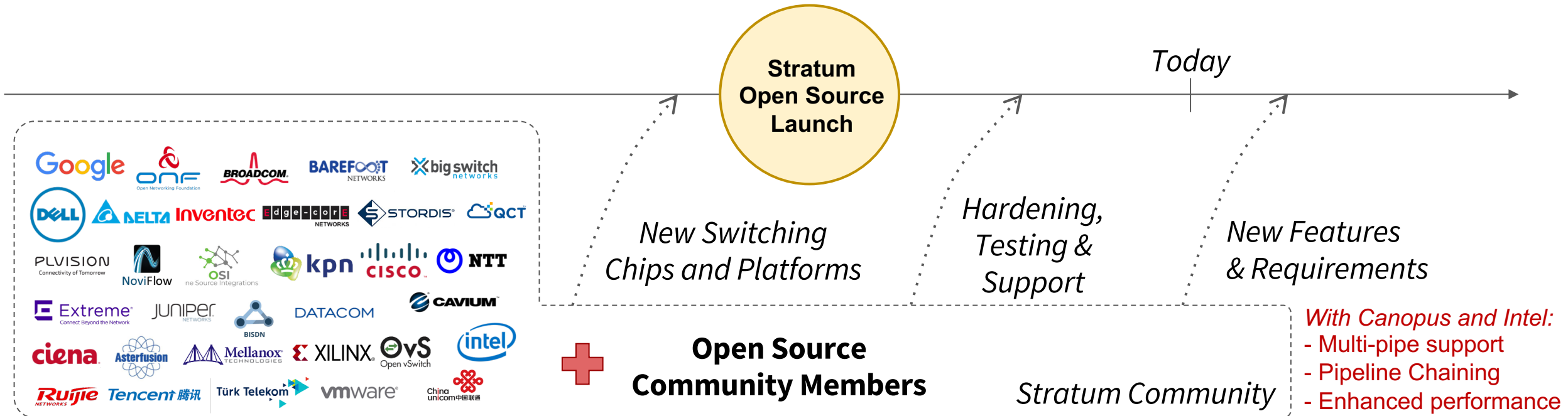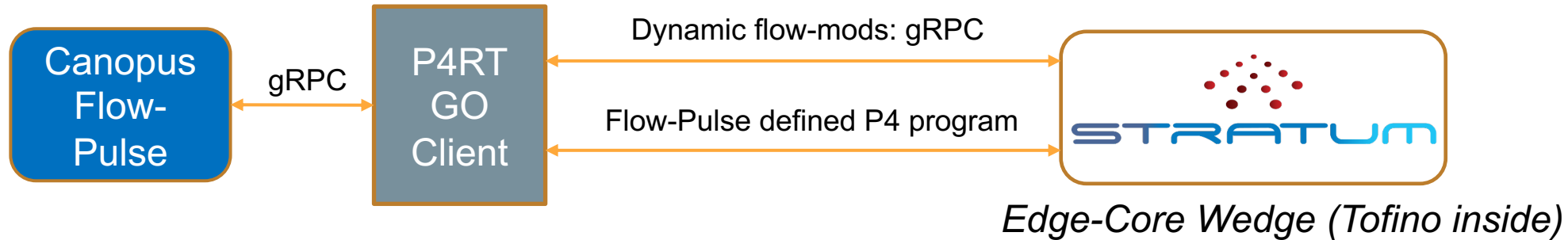
Stratum Project Roadmap

Open Source Ecosystem
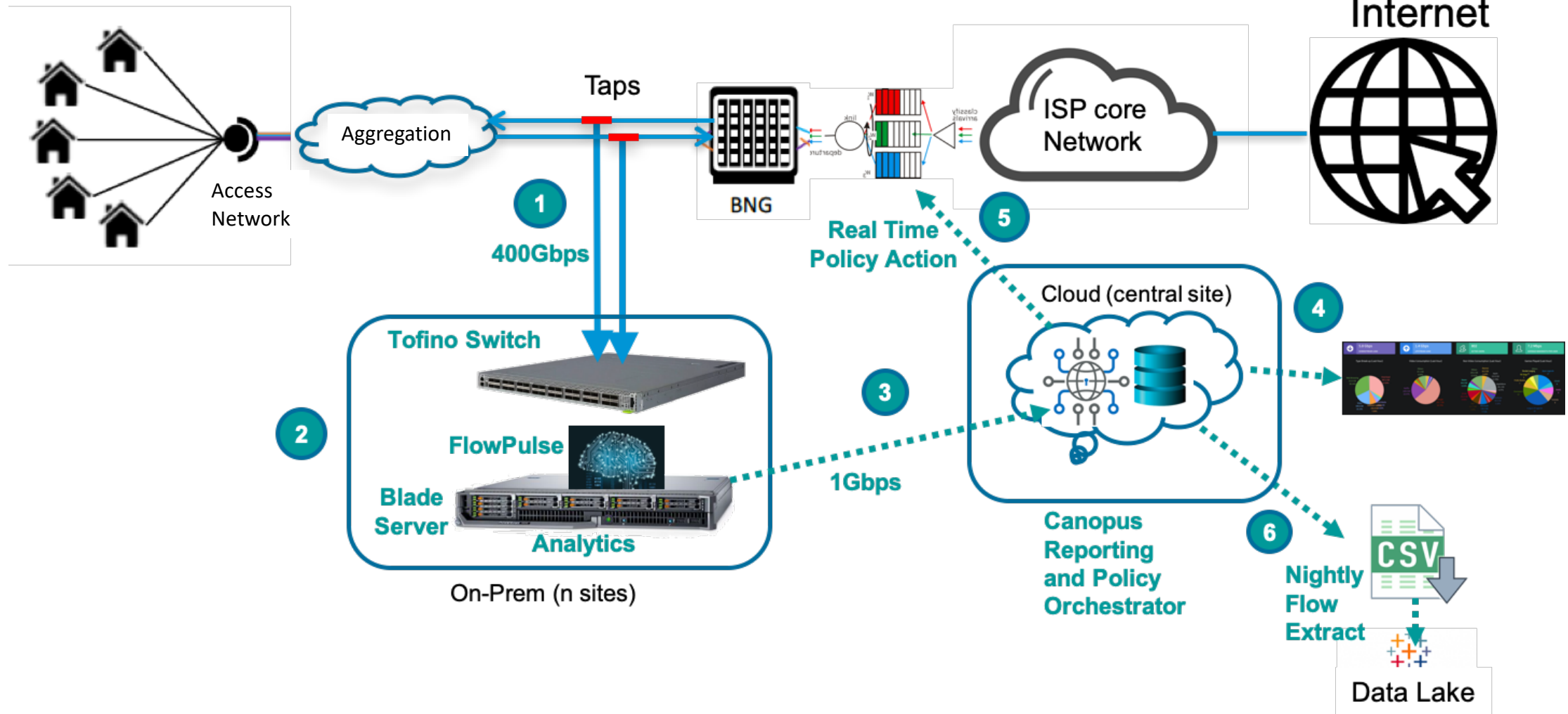*Focus on customer value-add*

Scalable
Tested to 14k flow updates per second

Next-Gen SDN Interfaces
P4Runtime & gNMI
P4 + OpenConfig

Canopus Flow-Pulse

gRPC

P4RT GO Client

Dynamic flow-mods: gRPC

Flow-Pulse defined P4 program

STRATUM

Edge-Core Wedge (Tofino inside)

Today

Stratum Open Source Launch

New Switching Chips and Platforms

Hardening, Testing & Support

New Features & Requirements

Google · ONF Open Networking Foundation · BROADCOM · BAREFOOT NETWORKS · big switch networks

DELL · DELTA · Inventec · edge-core NETWORKS · STORDIS · QCT

PLVISION Connectivity of Tomorrow · NoviFlow · OSI ne Source Integrations · kpn · CISCO · NTT

Extreme Connect Beyond the Network · JUNIPER NETWORKS · BISDN · DATACOM · CAVIUM

ciena · Asterfusion · Mellanox TECHNOLOGIES · XILINX · OvS Open vSwitch · intel

Ruijie NETWORKS · Tencent 腾讯 · Türk Telekom · vmware · China unicom中国联通

Open Source Community Members

Stratum Community

With Canopus and Intel:
- *Multi-pipe support*
- *Pipeline Chaining*
- *Enhanced performance*

Flow Pulse Architecture

Thank You

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