Memory in P4

Presented to P4 AWG

May 17, 2018

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Outline

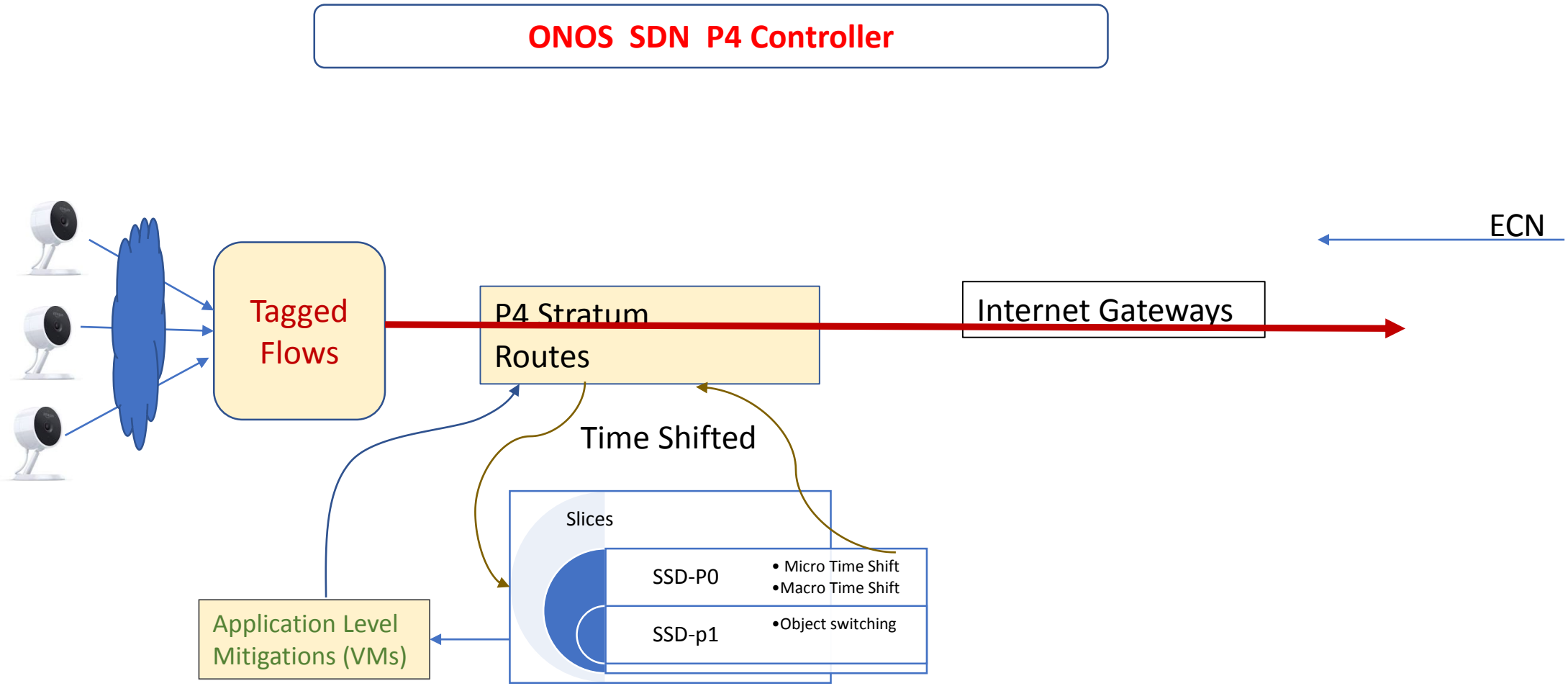
- Disclaimer: Very early thoughts …….
- Intent – P4 could benefit from memory at a higher-level of abstraction
  - e.g. switching all the packets corresponding to one image differently. That is, switch on application events
- Sub use cases to motivate application switching
  - Time-shifting traffic for more efficient utilization of network resources
  - Object/application switching to make network more intelligent, and enable new services network can provide.

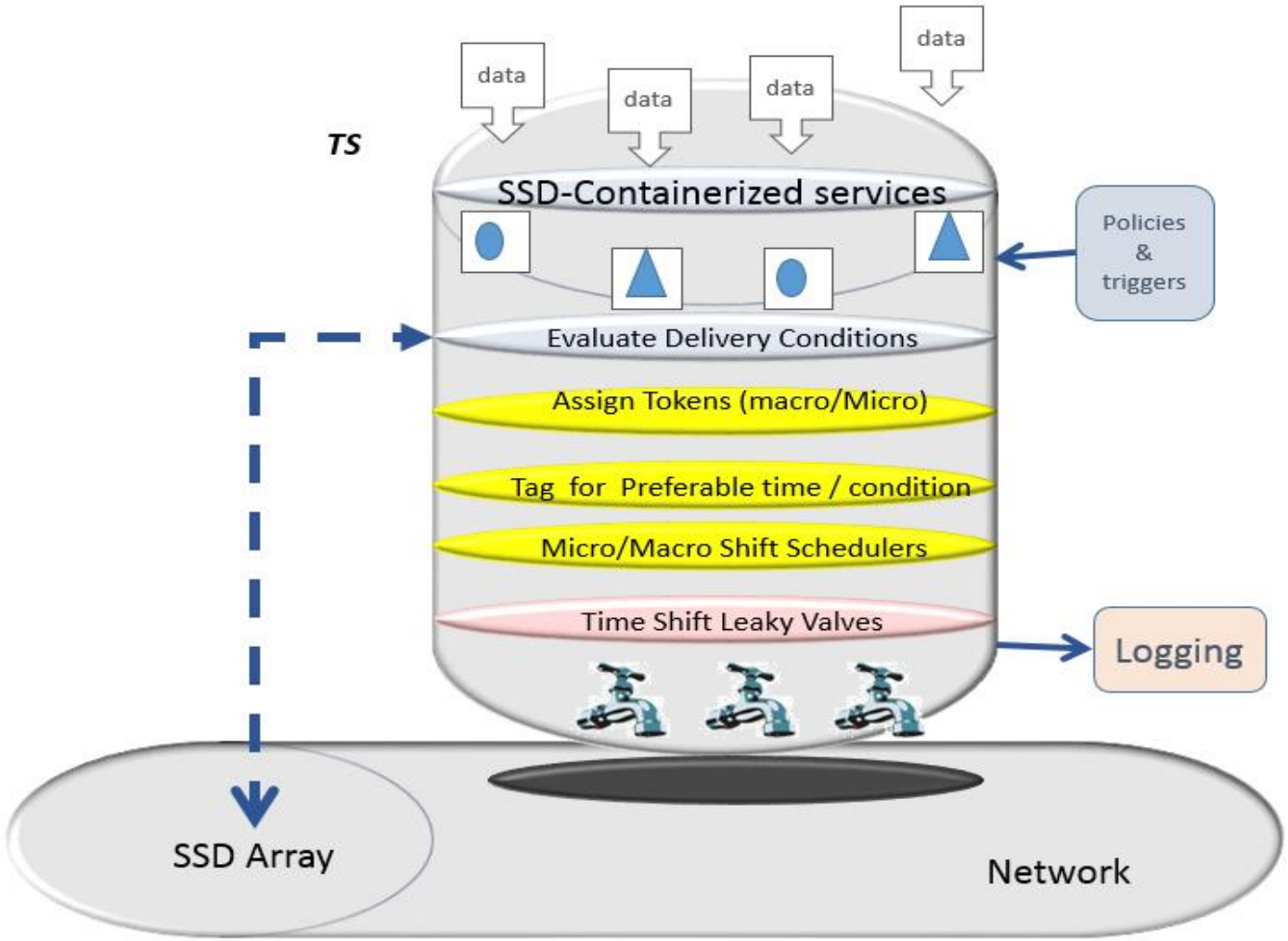
Time Shifting Traffic P4 use Cases

- Requirements
  - Multi-tenant platform at the network edge to meet application performance, latency, scaling and user data privacy requirements
- Technology trends
  - Pooled resources for compute, accelerators, storage and memory
  - Time Shift model in the cloud, i.e. function on demand has significant traction
- SSD & memory integrated with Fabric at the Edge
  - Edge functionality implemented with Time Shift model
  - Easy to support multi-tenant, exploits technology trends.
  - We propose a use case “Time Shift As A Service” to evaluate benefits

Time Shift Use Case:

-- Steering Tagged traffic flows adaptively to the directed P4 Fabric attached SSD slices when the ECN is on

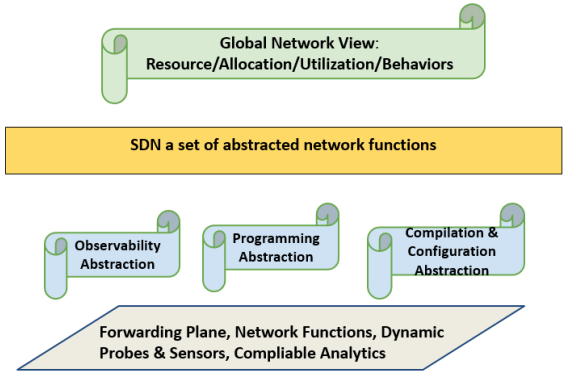


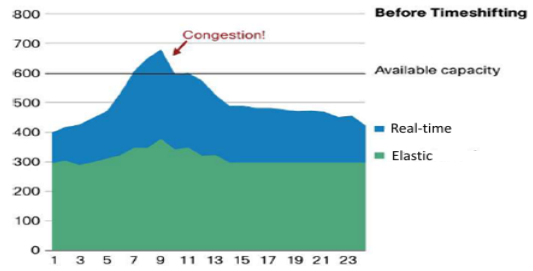

TS
data
data
data
data
SSD-Containerized services
Policies & triggers
Evaluate Delivery Conditions
Assign Tokens (macro/Micro)
Tag for Preferable time / condition
Micro/Macro Shift Schedulers
Time Shift Leaky Valves
Logging
SSD Array
Network

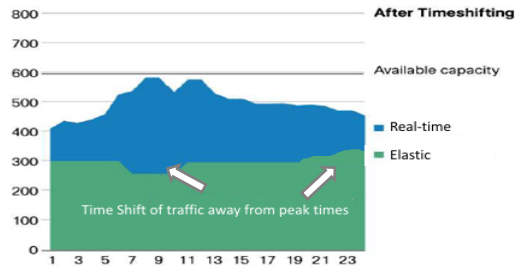
Possible Use Cases for 5G

- *Adapt to hard resource environment*
- *E2E Optimization*
- *Adaptation to channel*
- *Reduce interference*
- *Shift traffic to Off-Peak or offload to another media transport*

Eliminate congestion peaks as shown



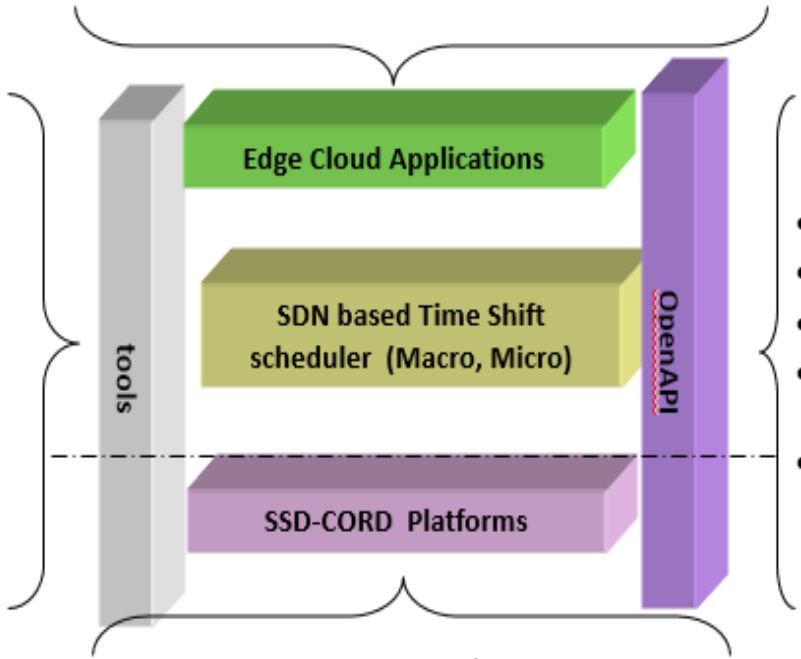




- SSD TS Services
- SSD containers to adapt to TS APIs

SSD primitive abstraction

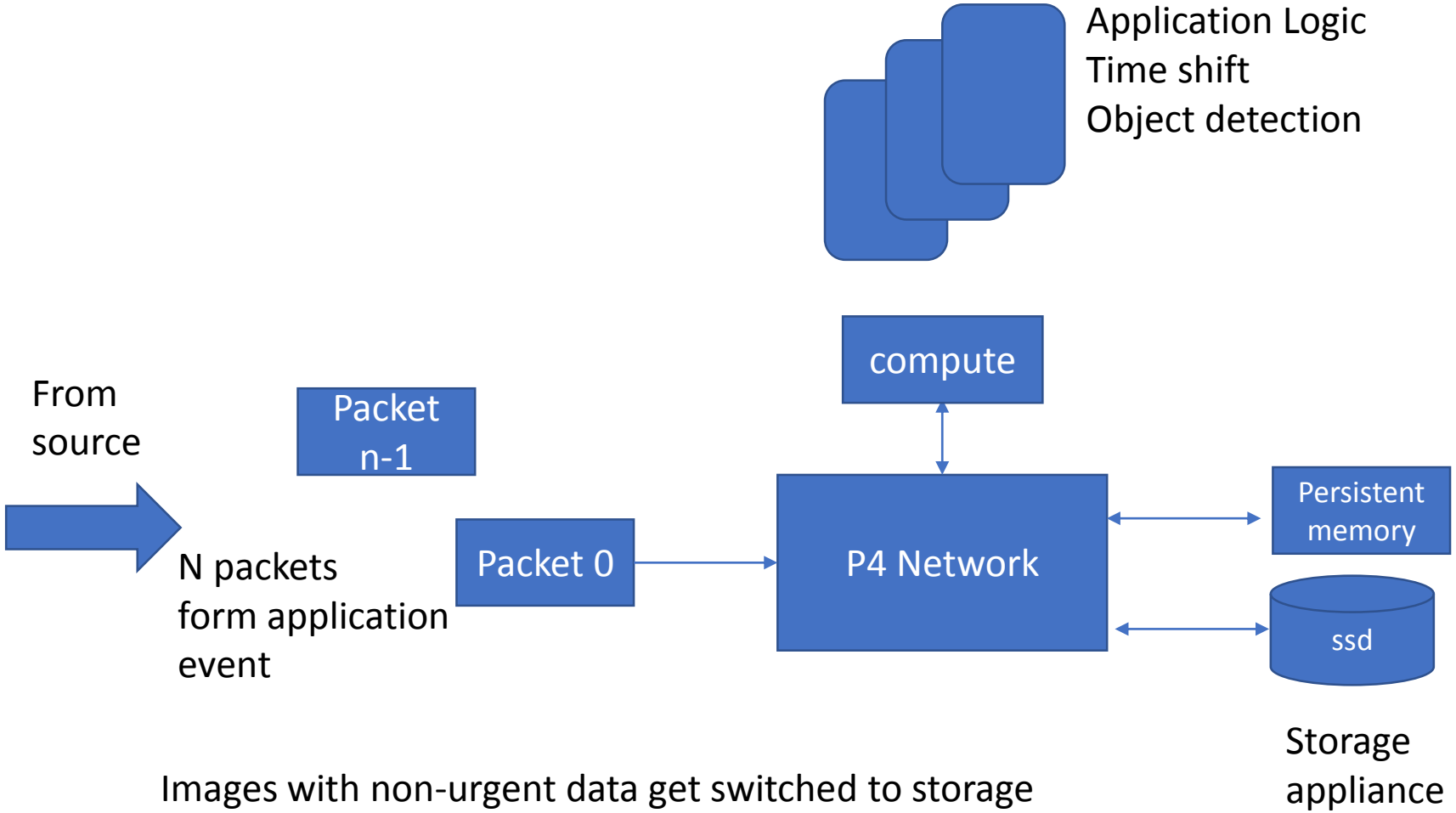
- tuning parameters
- Classification Triggers
- Cost and QOS Policies
- Performance Thresholds
- Sensor events & Triggers
- Security Control Options



- Policy Engine
- Optimization tuning
- Automation / data acquisition
- Adaptive to network /VNF Load & congestions
- Resource Sharing

- Open Time Shift API/Interface (P4 extensions)

Serverless Edge Prototype Proposal 2



Images with non-urgent data get switched to storage
Images with urgent data get processed immediately
Images tagged by source