

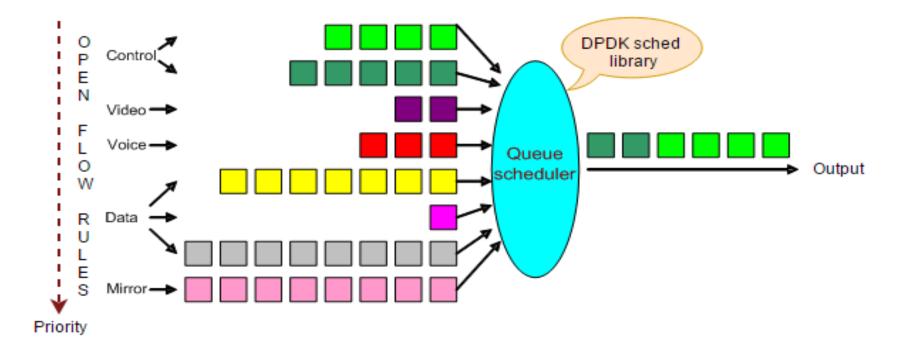
#### 'Flow based QoS' for SDN-NFV platform using OVS and DPDK on Intel x86 Architecture

Karuppusamy M

# **Solution Overview**

- The project objective is to implement 'Flow based QoS' feature for SDN-NFV platform using OVS and DPDK on Intel x86 architecture
- Enable support for packet classification and shaping on egress queue of OVS-DPDK, which is currently not supported
- Enable support for flow classification and shaping on egress even when there is no QoS marking in ingress stream
- Approach:
  - Classify traffic types
  - Assign higher priority queues for processing real time traffic
- Assign lower priority queues for processing best effort traffic with necessary rate limiting algorithms to shape the traffic
- Benefits:
  - Reduce packet loss, latency and jitter
  - Ensure deterministic performance of real time applications
  - Eliminate the need for dedicated custom hardware for QoS support

#### **QoS with OVS-DPDK**



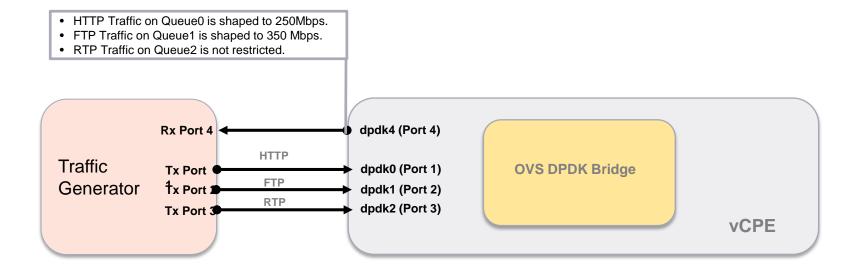
# **Intel Technologies leveraged**

INTEL TECHNOLOGY	BENEFITS
Intel Xeon-E	Xeon-E based platform variant can fit in the mid / large branch office segment and central DC as the private/public cloud
Intel Xeon-D	Xeon-D based platform variant can fit in the mid segment deployment in the branch office
ATOM C2000	ATOM based platform fits for small office or home office environment
I350/i210 based NIC	Used as a physical interface to realize the DPDK accelerated network interface

### **Partner Technologies Leveraged**

PARTNER TECHNOLOGY	BENEFIT TO POC
OpenvSwitch and DPDK	Enabling the QoS feature would accelerate the adoption of Intel x86 based virtualization platform in realizing networking use cases

## **QoS test topology**



## **Platform configuration**

[root@lab-atom ~]# lsc	DU					
Architecture:	x86 64					
CPU op-mode(s):	32-bit, 64-bit					
Byte Order:	Little Endian					
CPU(s):	8					
On-line CPU(s) list:	0-7					
Thread(s) per core:	1					
Core(s) per socket:	8					
Socket(s):	ī					
NUMA node(s):	i i i i i i i i i i i i i i i i i i i					
Vendor ID:	GenuineIntel					
CPU family:	6					
Model:	77					
Model name:	Intel(R) Atom(TM) CP	U C2758	@ 2.40GHz			
Stepping:	8					
CPU MHz:	2400.000					
BogoMIPS:	4799.52					
Virtualization:	VT-x					
Lld cache:	24K					
Lli cache:	32K					
L2 cache:	1024K					
NUMA node0 CPU(s):	0-7					
[root@lab-atom ~]# lsp	ci   grep -i ether					
00:14.0 Ethernet contr		ion Ether	net Connection	1354 (rev 0	3)	
00:14.1 Ethernet contr	oller: Intel Corporat	ion Ethern	net Connection	1354 (rev 0	3)	
00:14.2 Ethernet contr	oller: Intel Corporat	ion Ether	net Connection	1354 (rev 0	3)	
00:14.3 Ethernet contr	oller: Intel Corporat	ion Ethern	net Connection	1354 (rev 0	3)	
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04:00.3 Ethernet contr	oller: Intel Corporat	ion 1350 (	Gigabit Networ	k Connection	(rev 01)	
[root@lab-atom ~]#						
[root@lab-atom ~]# fre	e-g					
total	used free	shared	buffers	cached		
Mem: 15	10 4	Θ	Θ	Θ		
<pre>-/+ buffers/cache:</pre>	10 4					
Swap: 7	0 7					
[root@lab-atom ~]# 📕						

## **Details of the Intel x86 CPUs**

Family: Atom Manufacturer: Intel(R) Corporation Version: Intel(R) Atom(TM) CPU C2758 @ 2.40GHz Voltage: 1.6 V External Clock: 100 MHz Max Speed: 2600 MHz Current Speed: 2400 MHz Core Count: 8 Core Enabled: 8 Thread Count: 8 Characteristics: 64-bit capable

Family: Xeon Manufacturer: Intel Version: Intel(R) Xeon(R) CPU D-1548 @ 2.00GHz Voltage: 0.0 V External Clock: 100 MHz Max Speed: 4000 MHz Current Speed: 2000 MHz Core Count: 8 Core Enabled: 8 Thread Count: 16 Characteristics: 64-bit capable, Multi-Core, Hardware Thread, Execute Protection, Enhanced Virtualization, Power/Performance Control

### **Details of the Intel x86 CPUs and NIC**

Family: Xeon Manufacturer: Intel Version: Intel(R) Xeon(R) CPU E5-2603 v3 @ 1.60GHz Voltage: 1.8 v External Clock: 100 MHz Max Speed: 4000 MHz Current Speed: 1600 MHz Core Count: 6 Core Enabled: 6 Thread Count: 6 Characteristics: 64-bit capable, Multi-Core, Execute Protection, Enhanced Virtualization, Power/Performance Control

Ethernet controller: Intel Corporation I350 Gigabit Network Connection (rev 01) Ethernet controller: Intel Corporation I210 Gigabit Network Connection (rev 03)

## Sample Configuration to enable QoS

To enable tx multi queuing on dpdk0 interface

ovs-vsctl --no-wait set Interface dpdk0 options:n\_txq=4

#### To enable egress shaping of 100Mbps on single queue (q0) on dpdk0 interface

ovs-vsctl -- set port dpdk0 qos=@newqos -- --id=@newqos create qos type=none \ queues=0=@q0 -- --id=@q0 create Queue type=egress-shaper \ other-config:cir=12500000 other-config:cbs=125000

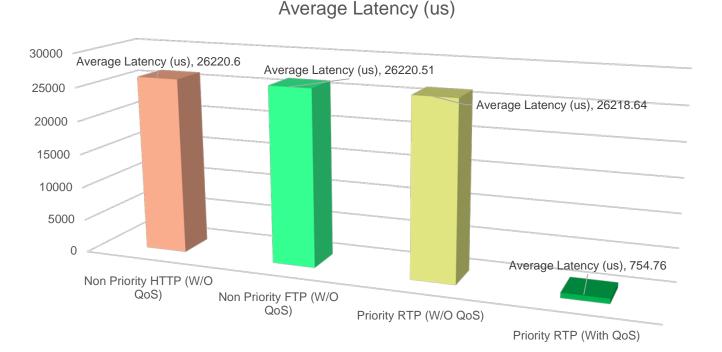
#### Performance(w/o QoS) - Equal treatment for all the flows

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			Port	//1/5 Click to ad	Port Based	Seconds	60 1	1			Fixed	Percent (%)	1	-	
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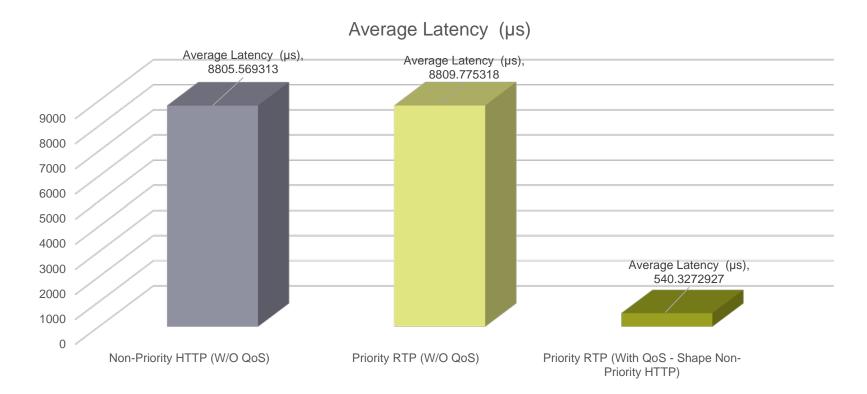
#### **Performance(with QoS) – Prioritized treatment for RTP**

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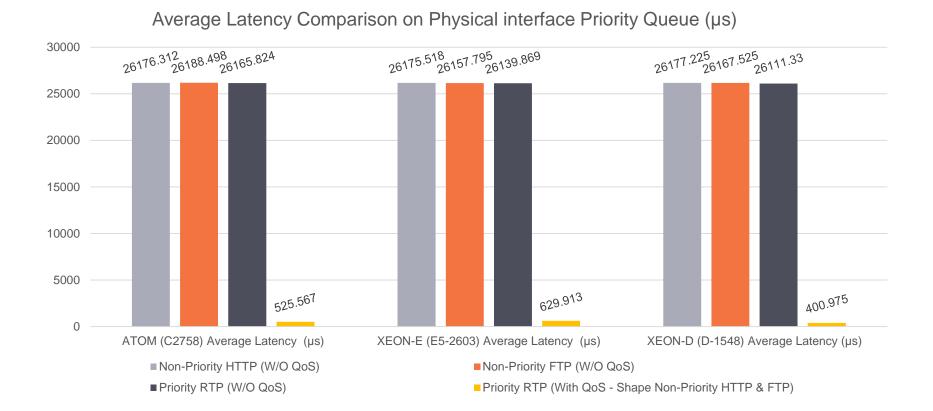
#### Latency comparison with and without QoS (ATOM) on the Physical ports



#### Latency comparison with and without QoS on DPDK vhost-user Interface (Xeon-E platform)



### Latency across platforms



## **Key Benefits / Use cases**

Business Benefits	•	To deploy various latency sensitive services which needs QoS handling in the OVS-DPDK environment
	•	Ability to create differentiated service chaining path for critical network functions
	•	Improving quality of video traffic
Use Case(s)	•	Differentiated Service Function Chaining
	•	Enabling QoS profile support based on application priority
Market Potential	•	Telecom Service Provider- For providing enterprise connectivity in a managed services model.
	•	Enterprise- To address their Branch networking requirement
	•	IOT- Industrial process automation and manufacturing customers who needs an IOT gateway as part of their IIOT offering.

#### **Thank You**



