DPDK
DATA PLANE DEVELOPMENT KIT

THE LINUX FOUNDATION

DPDK SUMMIT CHINA 2017

主办方： intel

参与方： 腾讯云 ZTE 美团云 Panabit® 太一星晨 Balance Your Networks UnitedStack有云 云杉网络 Yunshan Networks

协办方： SDNLAB 专注网络创新技术

视频支持方： IT大咖说

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Optimized Packet Distribution Library

Liang Ma, INTEL

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Agenda

- **Problem** – How to distribute workload across cores
- **Solution** – OPDL high level design
- **Characteristics of OPDL** – low latency, in order, asynchronous
- **Simple Example** - IPSEC in-bound processing
- **Next Steps** – Future Work

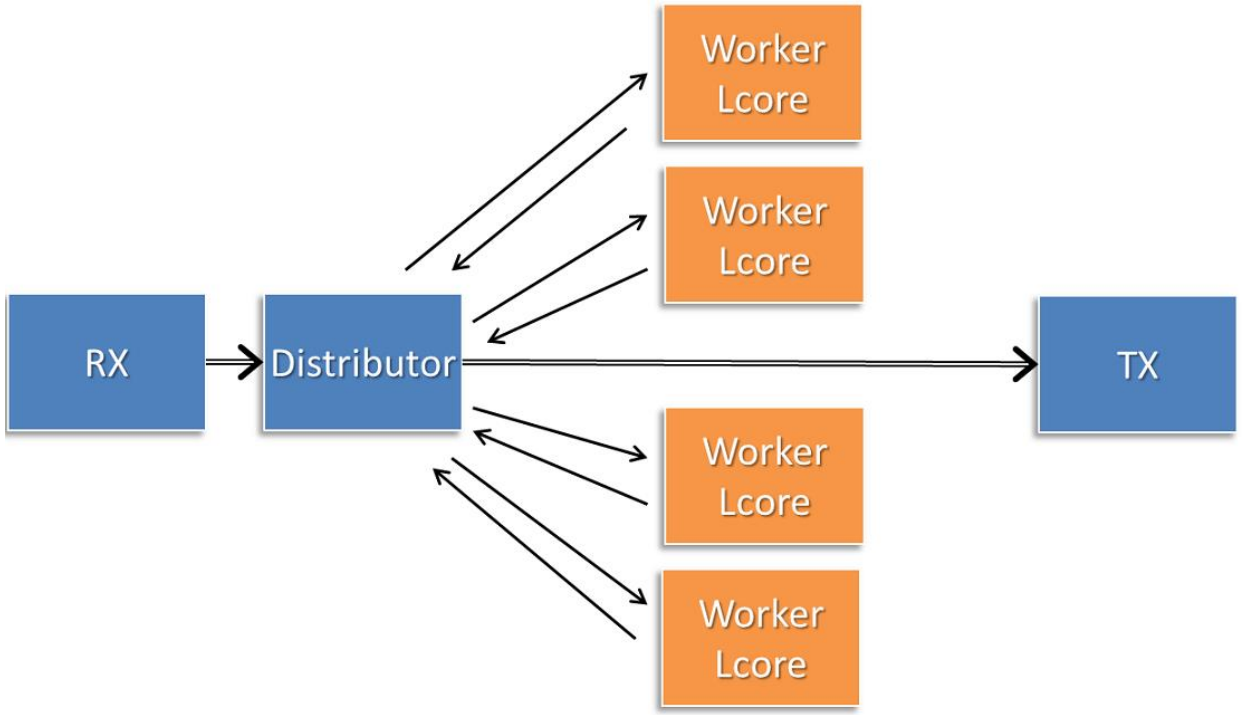
Problem and Challenge

- **Stringent latency and high throughput**
- **Minimizing cross core costs**
- **Re-Order, Asynchronous**
- **Centralized distributor**
- **Scalability, Flexibility**

Flow Distribution Type

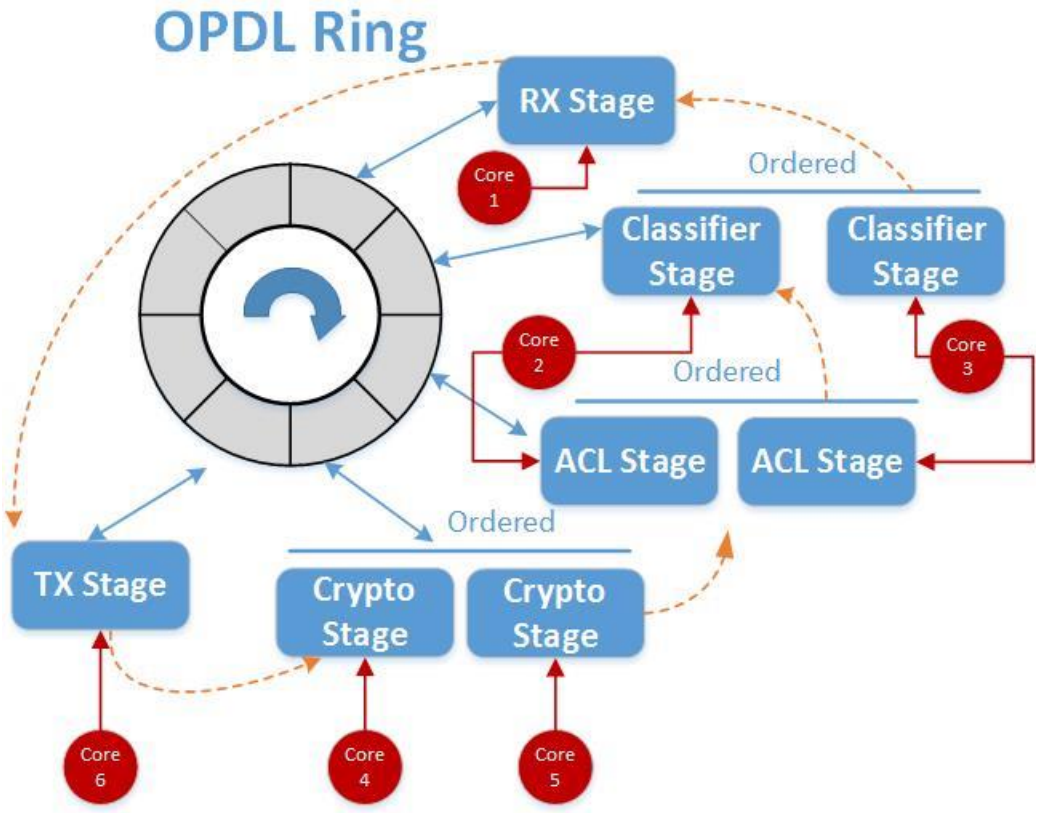
- Parallel
  - Packets from same flow can be distributed to multiple cores
  - Without Ordering
- Ordered
  - Packets from same flow can be distributed to multiple cores
  - With Ordering
- Atomic
  - Only one packet from same flow is processed at a time

DPDK Packet Distributor



- Very efficient for high volume small packets with synchronous work load
- Centralized distributor, Dedicated Core
- Round Robin to worker cores
- Atomic, and Parallel(un-ordered)
- Buffer Pointer will be send back to Distributor
- Asynchronous operation can be very complex

Optimized Packet Distributor

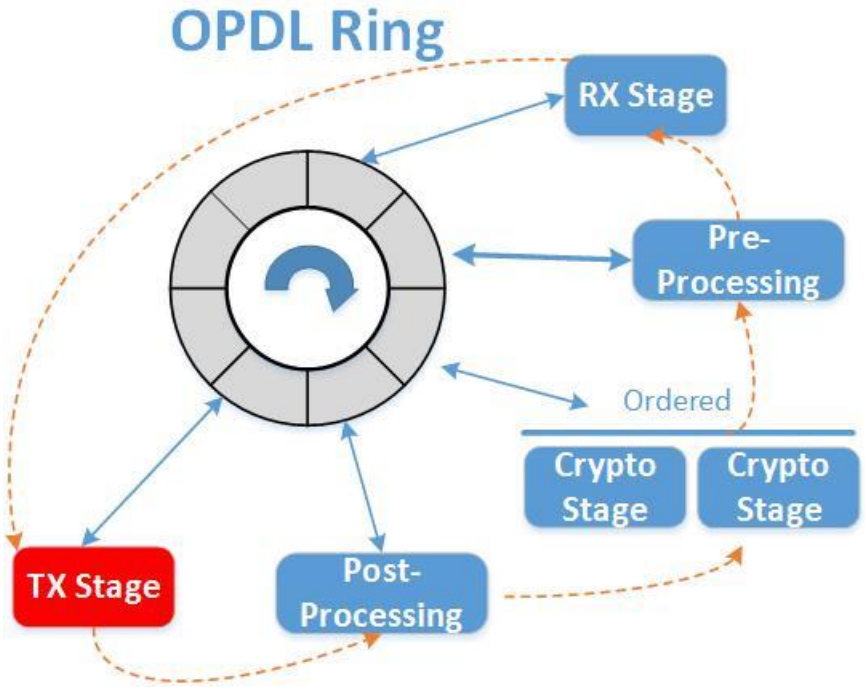


- No multiple queue cost, decentralized distributer
- Stage topology is configurable and extremely flexible.
- All packets are maintained in order
- Using meta-data to synchronize stages within an application
- Support ATOMIC/ORDERED method
- Stage instance and Core mapping is flexible.
- Support asynchronous device seamless.(E.g. Crypto Dev)

OPDL APIs

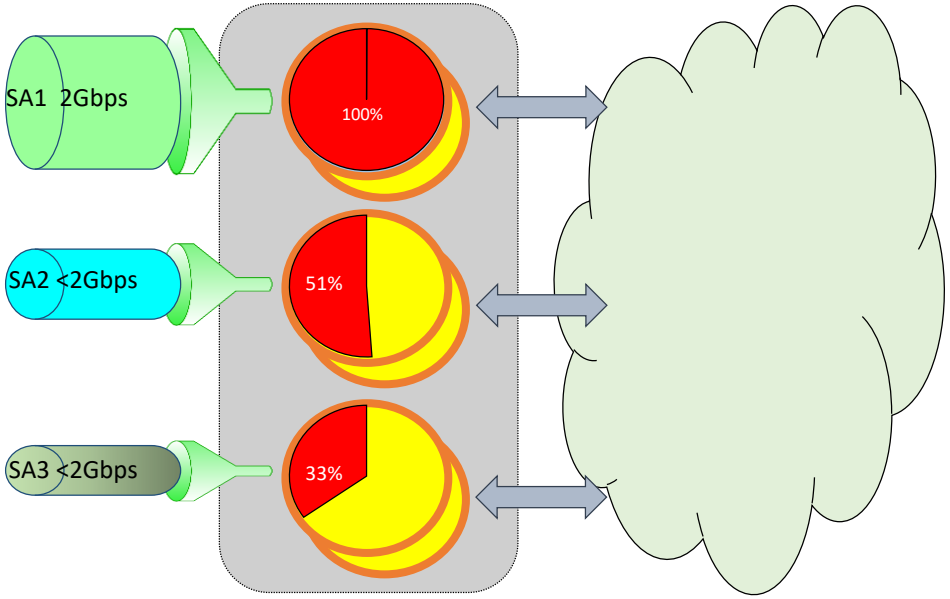
- OPDL_init()
  - Invocate stage initialization handler call back function
- OPDL_claim()
  - Claim available slot from OPDL Ring
- OPDL_Processing()
  - Invocate stage packet processing handler call back function
- OPDL_disclaim_n()
  - Can do partial disclaim to handler asynchronies device

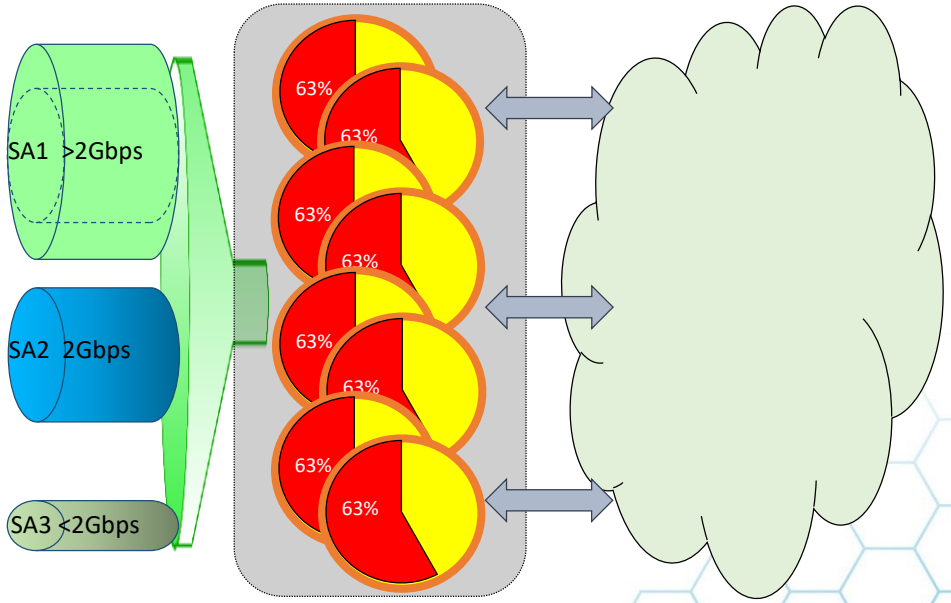
Example : Simple IPSEC In-bound Processing



- RX is atomic stage. RX will poll packet from port/queue and put packet into the OPDL Ring slot.
- Pre Processing stage is atomic. SA look-up, esn processing, put sequence number into meta data
- Decryption Stage is Ordered, there are 2 instances, processing the packet based on modulo.
- Post Processing will do de capsule first then apply Acl rules against the decrypted packet

Example : Single large SA & Multiple unevenly distributed SA's





RTC

- Single SA - Load is distributed according to SA throughput(not evenly distributed across cores)
- External Load Balancer required

OPDL

- Multiple SA - Can scale to max capacity (function of #cores)
- Load is distributed evenly across all available cores

Future Work

- **Looking for opportunity of up-streaming OPDL to DPDK mainstream repository**
- **Optimization research for multiple workload**

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  - John, Browne
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Q&A

Thanks!!

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