DPDK Usability for OVS DPDK

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DPDK USERSPACE 2018

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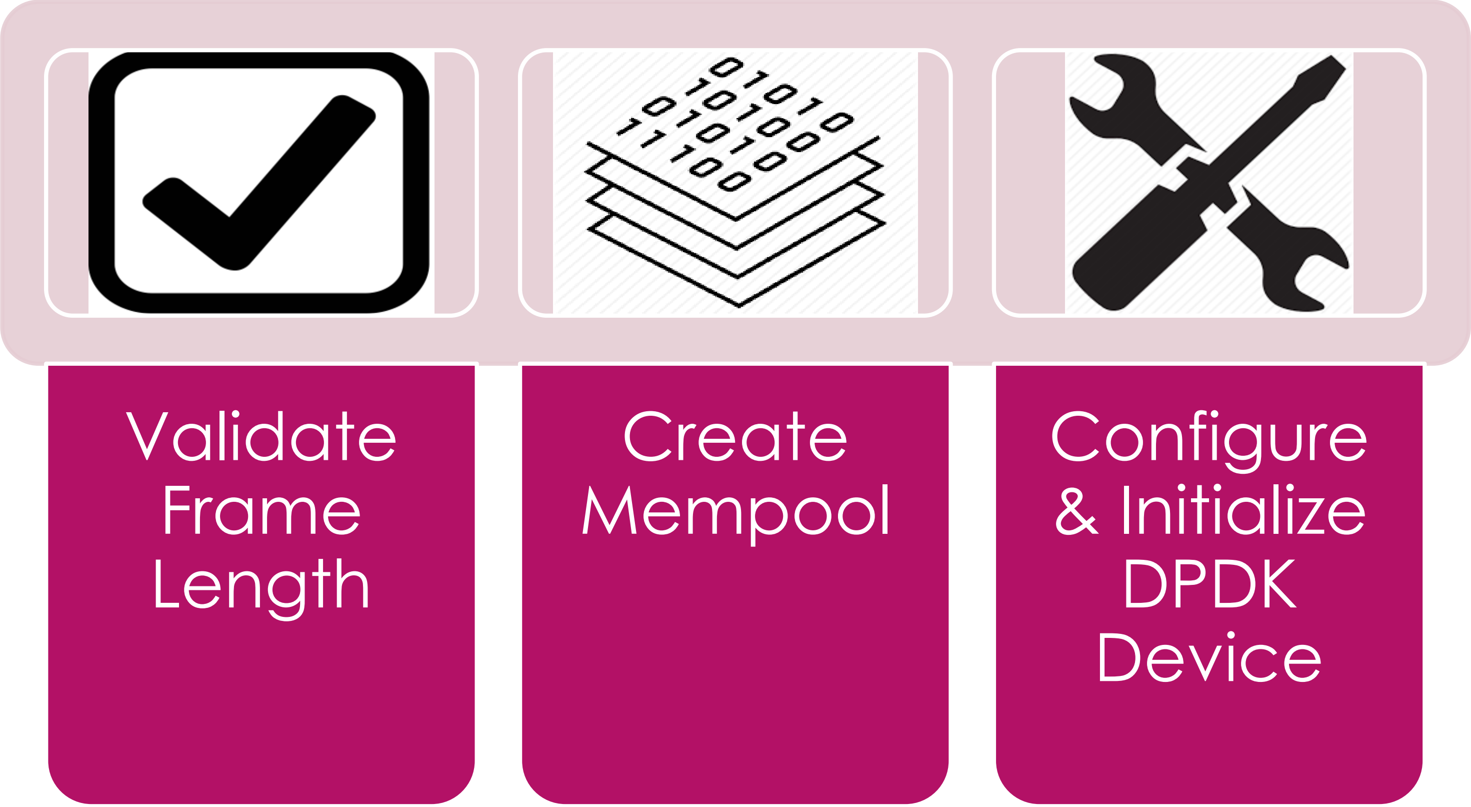
OVS DPDK MTU configuration

- OVS DPDK Uses DPDK 17.11 LTS.
- 3 stages to setting the MTU of a device.



Validate Frame Length

Create Mempool

Configure & Initialize DPDK Device

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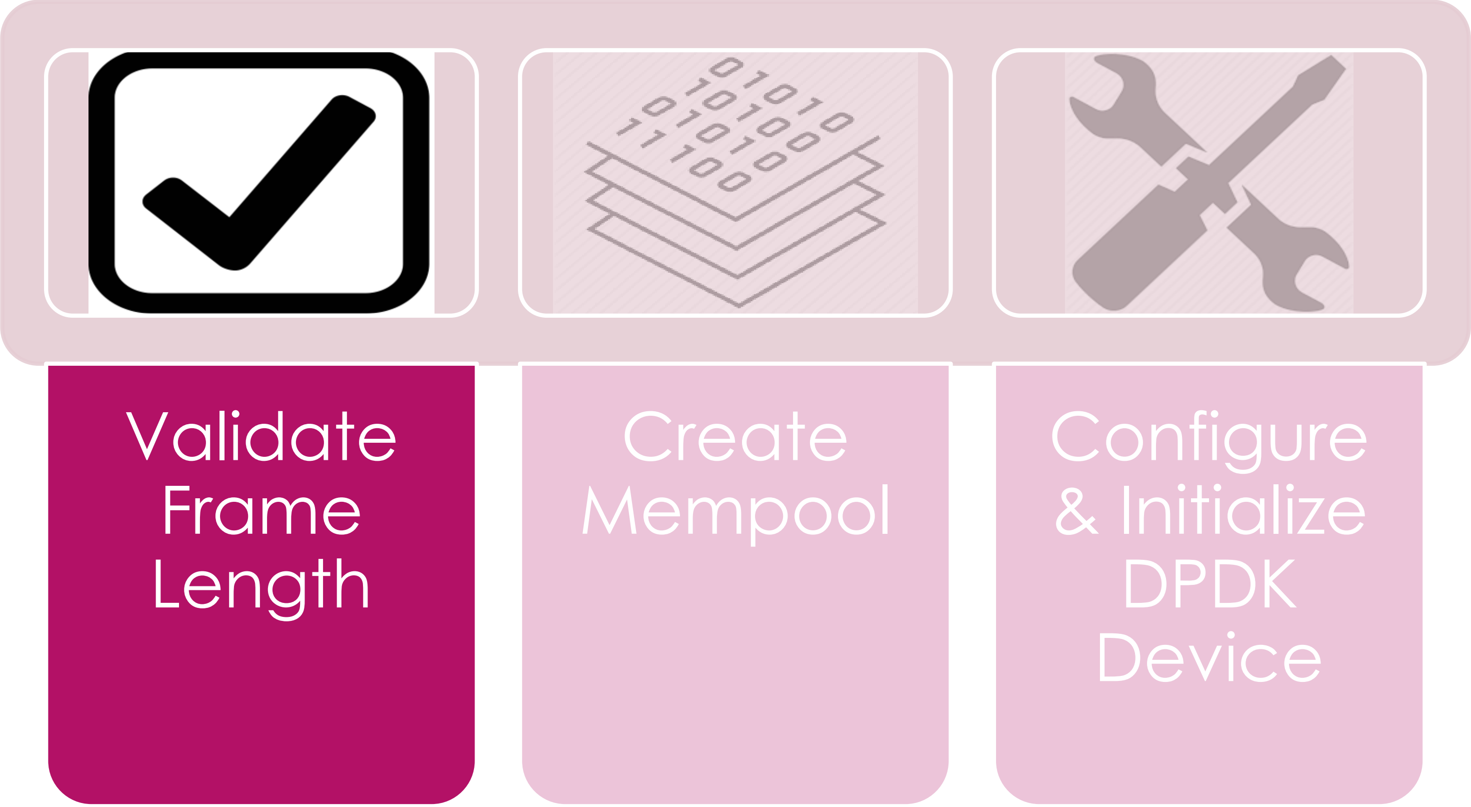

Validate Frame Length

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Configure & Initialize DPDK Device

- Validate Frame Length
  - Requested MTU represents layer 3 MTU.
  - Must account for layer 2 header and CRC.
  - **Ensure overall frame length of the requested MTU does not surpass the NETDEV_DPDK_MAX_PKT_LEN (9728 B).**

OVS DPDK MTU configuration

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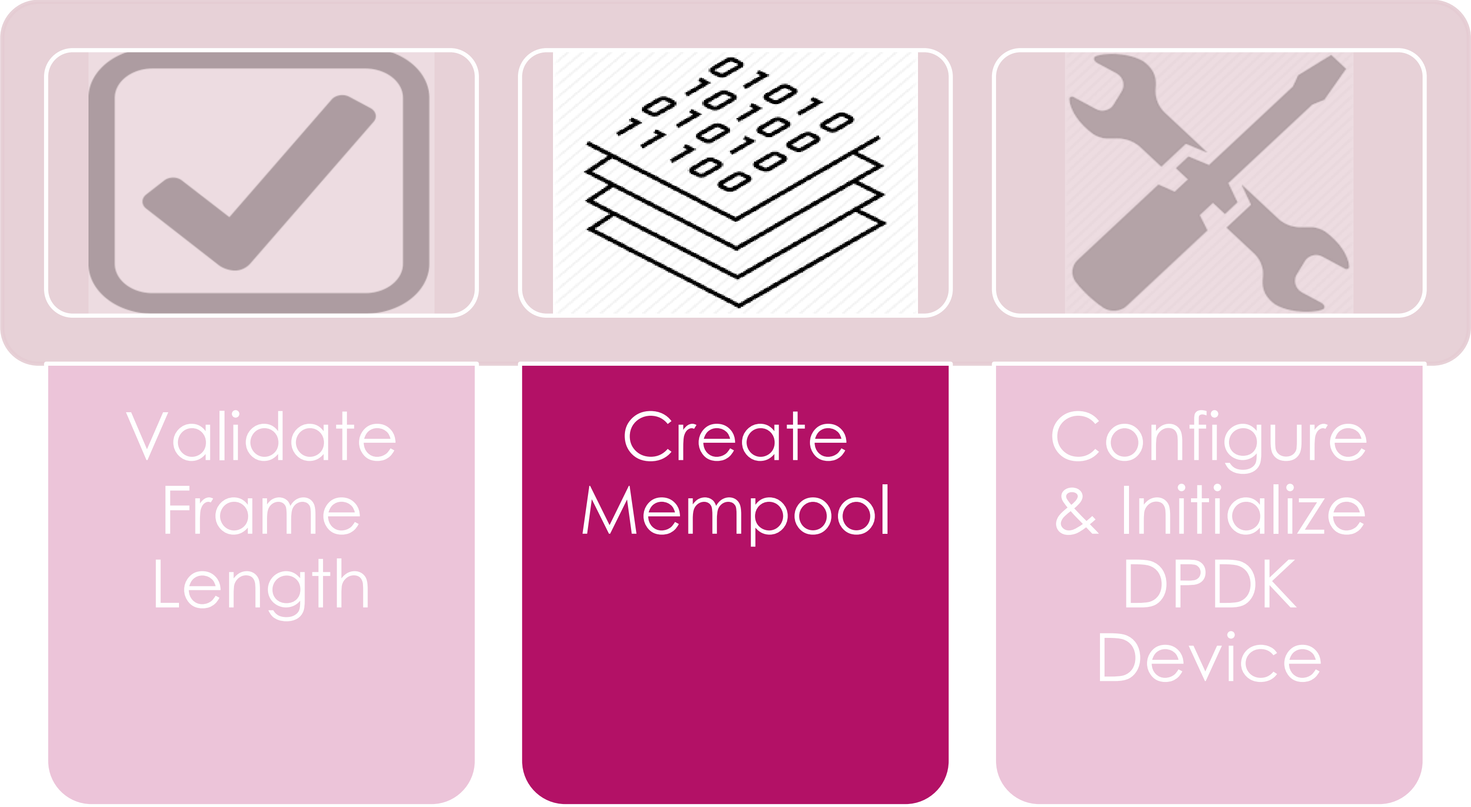
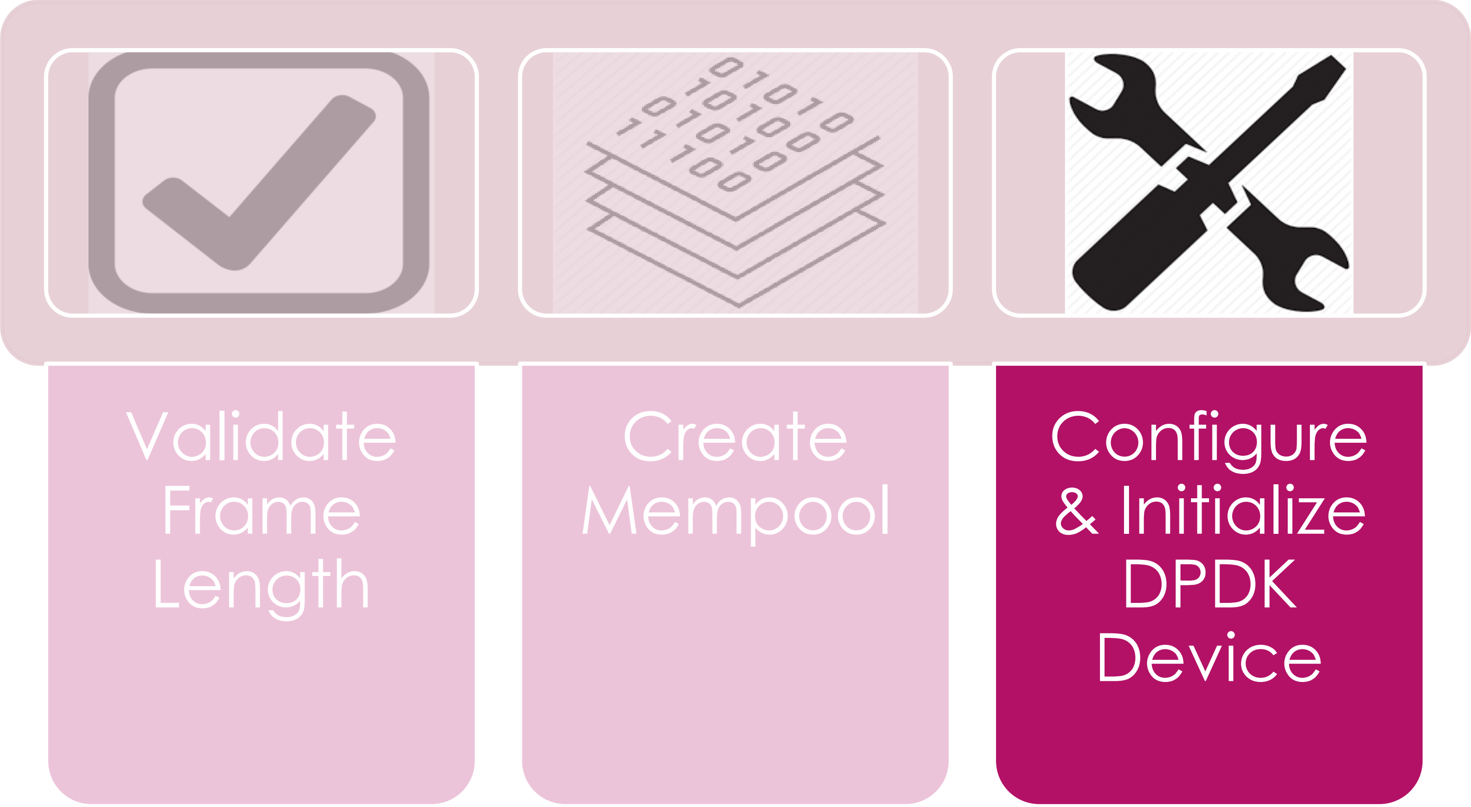


- <u>Create Mempool</u>
  - **Requested MTU directly affects mbuf size.**
  - Mbuf size calculated as ‘Requested mtu + L2 headers + CRC + RTE_PKTMBUF_HEADROOM’
  - Round final value to be multiple of 1024.

OVS DPDK MTU configuration

- Note: OVS DPDK Uses DPDK 17.11 LTS.
- 3 stages to setting the MTU of a device.



Validate Frame Length

Create Mempool

Configure & Initialize DPDK Device

- Configure & Initialize DPDK Device
  - **Device stopped** as part of configuration,
  - MTU is configured with **`rte_eth_dev_set_mtu(port_id, mtu);`**
  - Various other configurations (TXQs, RXQs etc.).
  - **Device started** when configuration completes.

Case Study 1: Device specific overhead

IXGBE

MTU REQUEST 9710

□ Frame length Validated. ✓

□ Mempool created. ✓

□ Device configured & initialized. ✓

Case Study 1: Device specific overhead cont.

IXGBE

MTU REQUEST 9710

- □ Frame length Validated. ✓
- □ Mempool created. ✓
- □ Device configured & initialized. ✓

i40e

MTU REQUEST 9710

- □ Frame length Validated. ✓
- □ Mempool created. ✓
- □ Device configured & initialized. X

- Interface dpdk0 MTU (9710) setup error: Invalid argument (-EINVAL)
- Why?

Case Study 1: Device specific overhead cont.

IXGBE

i40e

□ MTU REQUEST 97

UEST 9710

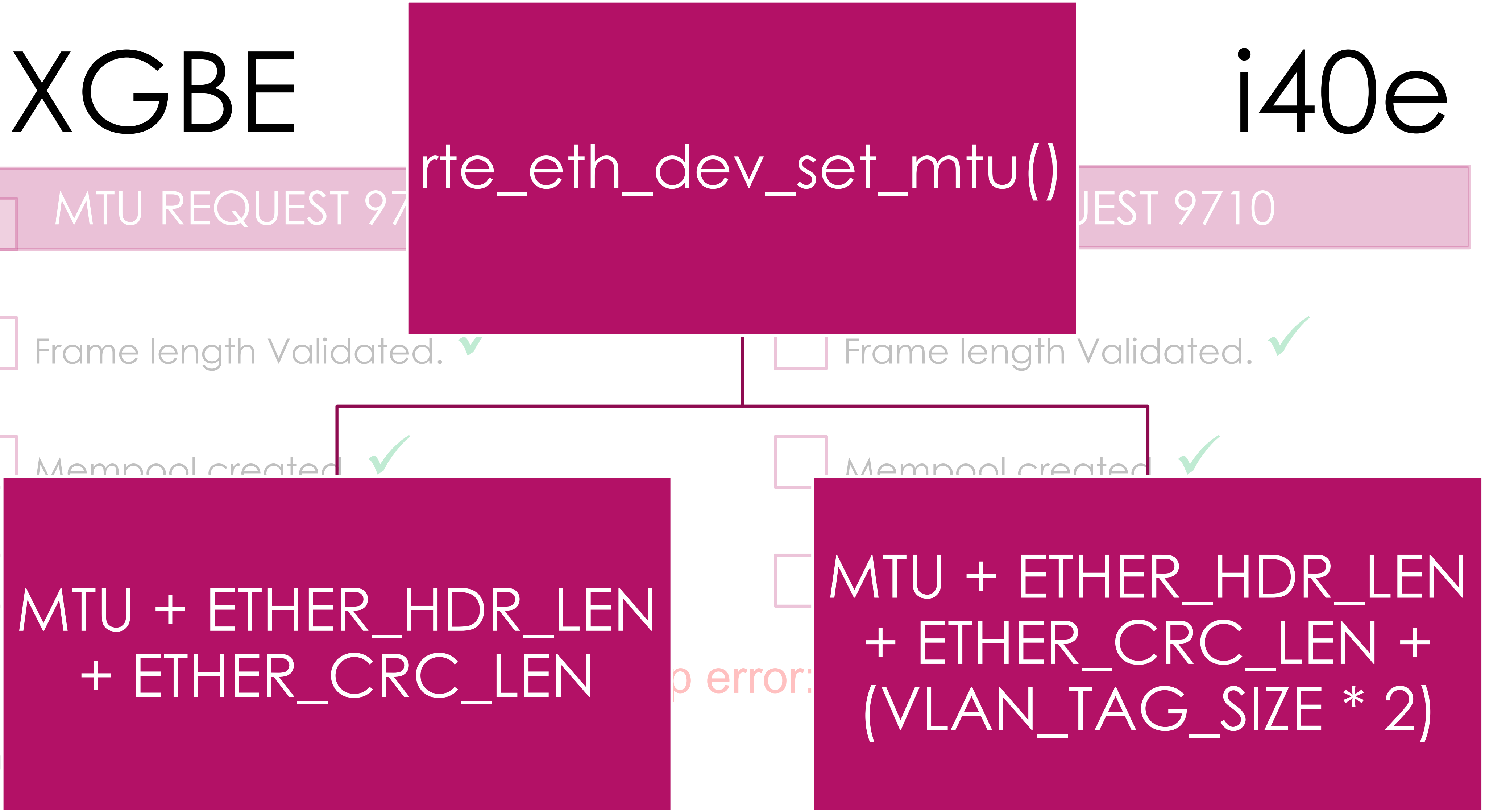
□ Frame length Validated. ✓

□ Frame length Validated. ✓

□ Mempool created ✓

□ Mempool created ✓

- I p error:
- V



rte_eth_dev_set_mtu()

MTU + ETHER_HDR_LEN + ETHER_CRC_LEN

MTU + ETHER_HDR_LEN + ETHER_CRC_LEN + (VLAN_TAG_SIZE * 2)

Case Study 1: PMD & Associated Overhead

PMD	Overhead	Total Bytes
qede	ETHER_HDR_LEN + ETHER_CRC_LEN	18
cxgbe	ETHER_HDR_LEN + ETHER_CRC_LEN	18
dpaa2	ETHER_HDR_LEN + ETHER_CRC_LEN	18
ixgbe	ETHER_HDR_LEN + ETHER_CRC_LEN	18
luiquidio	ETHER_HDR_LEN + ETHER_CRC_LEN	18
thunderx	ETHER_HDR_LEN + ETHER_CRC_LEN	18
em1000	ETHER_HDR_LEN + ETHER_CRC_LEN + VLAN_TAG_SIZE	22
igb	ETHER_HDR_LEN + ETHER_CRC_LEN + VLAN_TAG_SIZE	22
bnxt	ETHER_HDR_LEN + ETHER_CRC_LEN + (VLAN_TAG_SIZE * 2)	26
i40e	ETHER_HDR_LEN + ETHER_CRC_LEN + (VLAN_TAG_SIZE * 2)	26
mrvl	MV_MH_SIZE + ETHER_HDR_LEN + ETHER_CRC_LEN	?

Case Study 1: OVS Solution

OVS Solution

- Must account for vlan * 2 when
  - `MTU + ETHER_HDR_LEN + ETHER_CRC_LEN + (VLAN_TAG_SIZE * 2) > NETDEV_DPDK_MAX_PKT_LEN`

Case Study 1: OVS Solution cont.

OVS Solution

- Must account for vlan * 2 when
  - `MTU + ETHER_HDR_LEN + ETHER_CRC_LEN + (VLAN_TAG_SIZE * 2) > NETDEV_DPDK_MAX_PKT_LEN`

Problem:

- MTU upper limit will be reduced by 4 or 8 bytes for devices that do not have to account for 2 * VLAN headers in overhead.

Case Study 1: OVS Solution cont.

OVS Solution

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Problem:

- MTU upper limit will be reduced by 4 or 8 bytes for devices that do not have to account for 2 * VLAN headers in overhead.

DPDK Solution

- Expose device specific overhead for PMDs.
- **Extend the existing ETH DEV API ?**
  - rte_eth_dev_get_max_mtu(port_id)
- **Make info available in rte_eth_dev_info struct ?**

Case Study 2: Scatter requirements

- PMDs can require **scatter** explicitly set for jumbo rx.

Case Study 2: Scatter requirements cont.

- PMDs can require **scatter** explicitly set for jumbo rx.

i40e

□ i40e: Not required, handled in i40e_set_mtu().

Case Study 2: Scatter requirements cont.

- PMDs can require **scatter** explicitly set for jumbo rx.

i40e/ixgbe

□ i40e: Not required, handled in i40e_set_mtu().

□ ixgbe: Required pre DPDK 17.11.

Case Study 2: Scatter requirements cont.

- PMDs can require **scatter** explicitly set for jumbo rx.

i40e/ixgbe/igb

□ i40e: Not required, handled in i40e_set_mtu().

□ ixgbe: Required pre DPDK 17.11.

□ igb: Required.

Case Study 2: Scatter requirements cont.

- PMDs can require **scatter** explicitly set for jumbo rx.

i40e/ixgbe/igb/nfp

□ i40e: Not required, handled in i40e_set_mtu().

□ ixgbe: Required pre DPDK 17.11.

□ igb: Required.

□ nfp: **Not supported**

Case Study 2: OVS Solution

OVS Solution

- Check for nfp driver explicitly before enabling scatter.
  - `if (strncmp(info.driver_name, "net_nfp", 7))`

Case Study 2: OVS Solution cont.

OVS Solution

- Check for nfp driver explicitly before enabling scatter.
  - `if (strncmp(info.driver_name, "net_nfp", 7))`

Problem:

- Device specific checks introduced to OVS DPDK code base.
- Only resolves issue for nfp PMD.

Case Study 2: OVS Solution cont.

OVS Solution

- Check for nfp driver explicitly before enabling scatter.
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Problem:

- Device specific checks introduced to OVS code base.
- Only resolves issue for nfp PMD.

DPDK Solution

- **Upcoming rx offload capability API.**
  - Implemented for nfp in 17.11, missing for ixgbe/i40e/igb.
- **Handle scatter configuration in class specifc mtu_set functions.**

Case Study 3: Device configuration state requirements

Configure & Initialize DPDK Device

- **Device stopped**
- MTU configured with **`rte_eth_dev_set_mtu();`**
- **Device started**

Case Study 3: Device configuration state requirements cont.

Configure & Initialize DPDK Device

- **Device stopped**
- MTU configured with `rte_eth_dev_set_mtu();`
- **Device started**

i40e/ixgbe/qede

□ i40e: Device must be stopped.

□ ixgbe: Stopped if scatter required.

□ qede: **Must be active** (pre 17.11.)

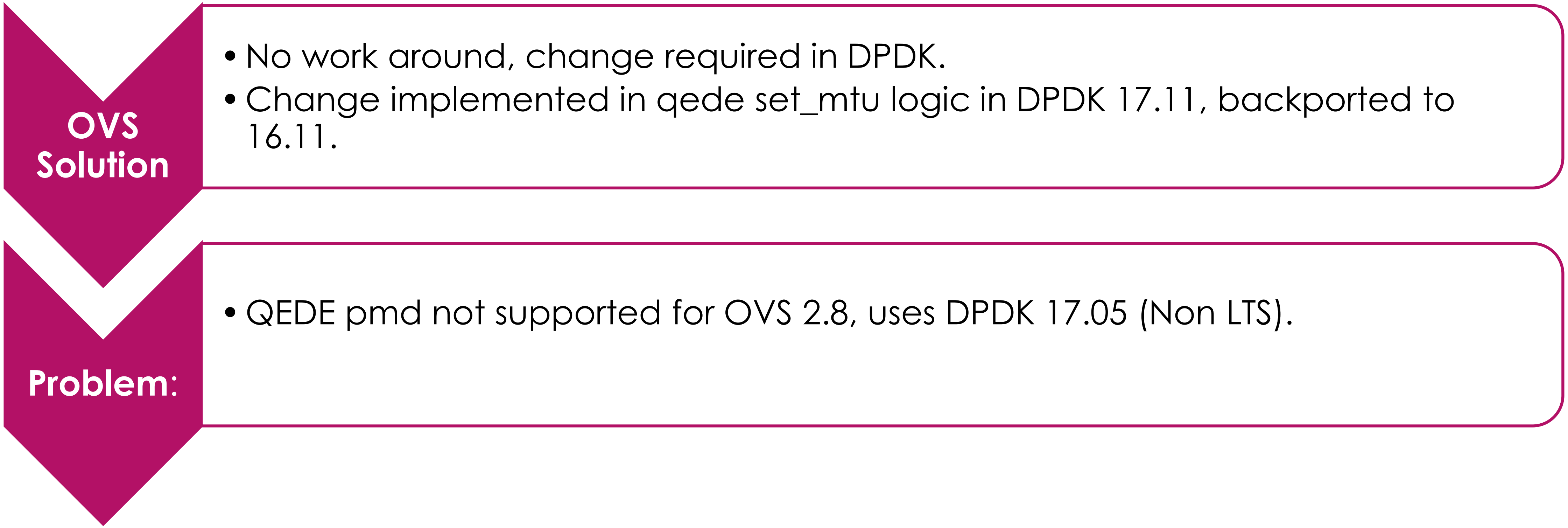
- **Explicit stop/start device within set_mtu()**

Case Study 3: OVS Solution

OVS Solution

- No work around, change required in DPDK.
- Change implemented in qede set_mtu logic in DPDK 17.11, backported to 16.11.

Case Study 3: OVS Solution cont.



OVS Solution

- No work around, change required in DPDK.
- Change implemented in qede set_mtu logic in DPDK 17.11, backported to 16.11.

Problem:

- QEDE pmd not supported for OVS 2.8, uses DPDK 17.05 (Non LTS).

Case Study 3: OVS Solution cont.

OVS Solution

- No work around, change required in DPDK.
- Change implemented in qede set_mtu logic in DPDK 17.11, backported to 16.11.

Problem:

- QEDE pmd not supported for OVS 2.8, uses DPDK 17.05 (Non LTS).

DPDK Solution

- **Solution already in place.**
- **Underlying behaviour should be uniform across PMDs.**

Conclusion/Discussion

- Ethdev API helps OVS DPDK be hardware agnostic.
- Corner cases can exist .e.g. behavior regarding rte_eth_dev_set_mtu().
- Solutions to avoid such cases
  - Expose device specific overhead via API extension or device info.
  - Expose device capabilities.
  - Follow uniform behavior in underlying API implementations.

DPDK
DATA PLANE DEVELOPMENT KIT

Questions?

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