



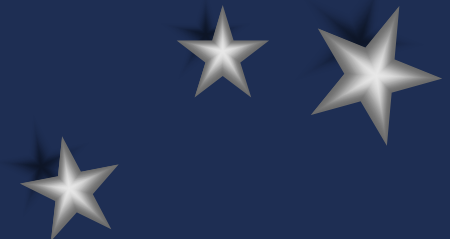
# Bi-directional ORBs — Two approaches

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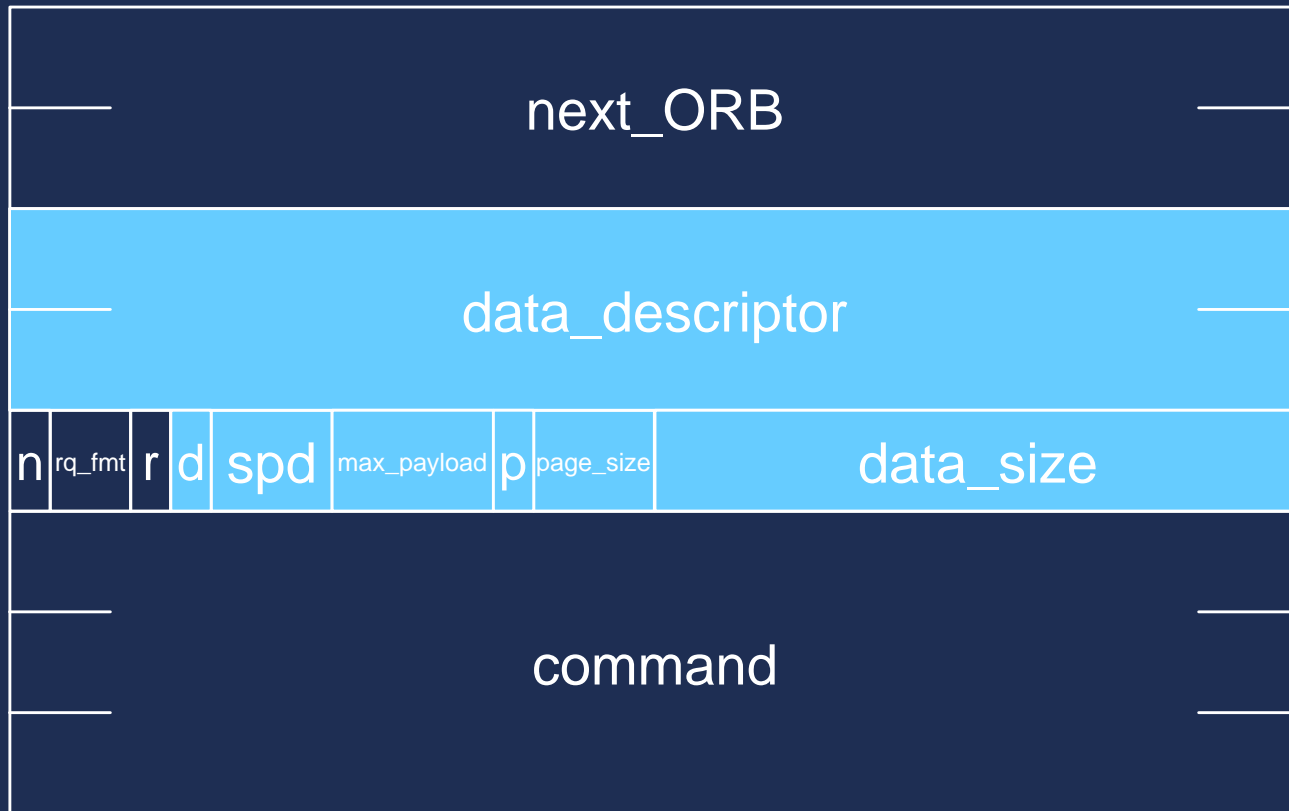
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**SBP-3 Working group  
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# Normal command block ORB



# One buffer per ORB

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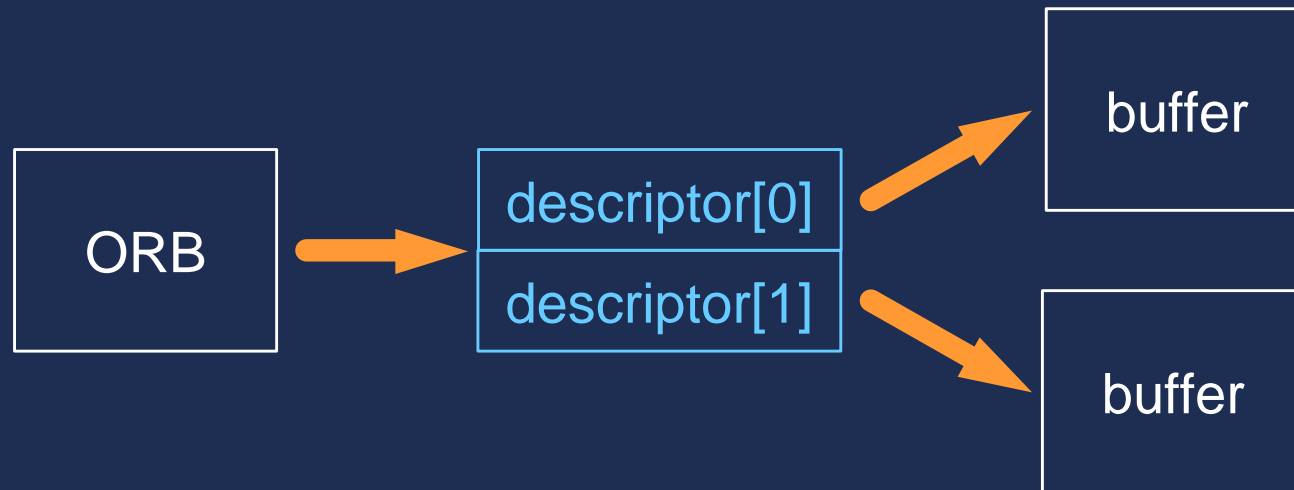
- **Either direct or indirect (page table)**
- **Required fields**

*data\_descriptor, direction, spd, max\_payload, page\_table\_present, page\_size and data\_size*

- **92 bits total (round to three quadlets)**



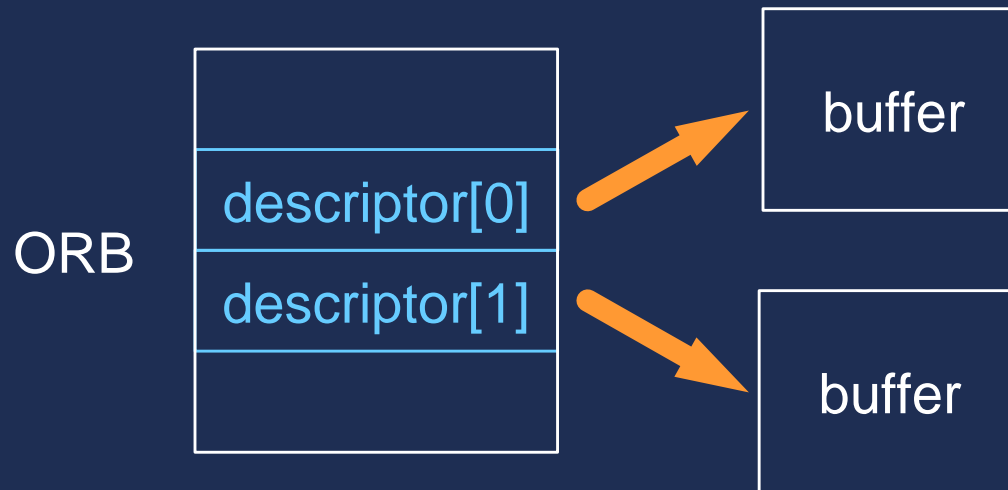
# Indirect access to two buffers



- Typical ORB size remains 32 bytes
- Inefficient access through indirect descriptors
- ORB fields wasted



# Direct access to two buffers



- ORB header increased by 12 bytes
- Efficient direct access via descriptors in ORB
- Compatible with FAST\_START



# FAST\_START strategy

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- **Write *only* one page table to FAST\_START**
  - Included page table is for the first *data\_descriptor* field in the ORB
- **Software optimizes descriptor usage**
  - If target needs data first, zero *direction* bit
  - Else target provides data first: set *direction* bit to one
- **Target fetches other page table at its leisure**



# Operating system considerations

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- **Examine typical commands that would use bi-directional ORBs**
  - RAID combined XOR and write
- **Enhance API**
  - ORB type selection (single or dual buffer)
  - Preserve ordered relationship of buffers from API to ORB
  - All buffer parameters are independent!



# Contact information

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