

# Introduction to CXL Fabrics

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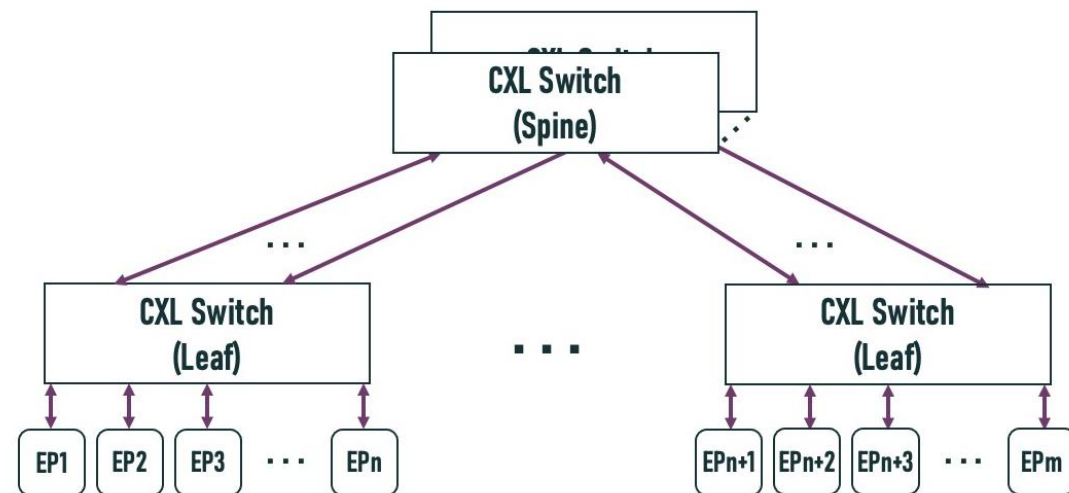
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# Introduction to CXL Fabrics

- Overview
- Transport Level Details
- Routing Model
- Fabric Management Architecture
- Specification Roadmap

# CXL Fabrics – Motivation and Overview

- Disaggregated, Composable Systems – Pooled Host, Device and Memory Resources
- Scale-out Systems – HPC/ML/Analytics
- Add capabilities to expand CXL from node to small number of racks
- Limited by 12b ID space (4k IDs)
- Scale beyond tree-based topologies
- Does not compromise node level properties

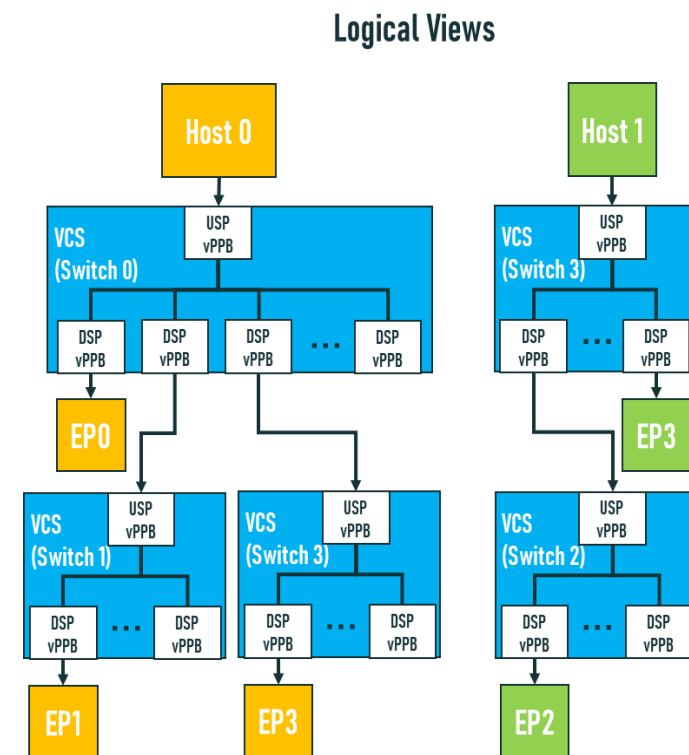
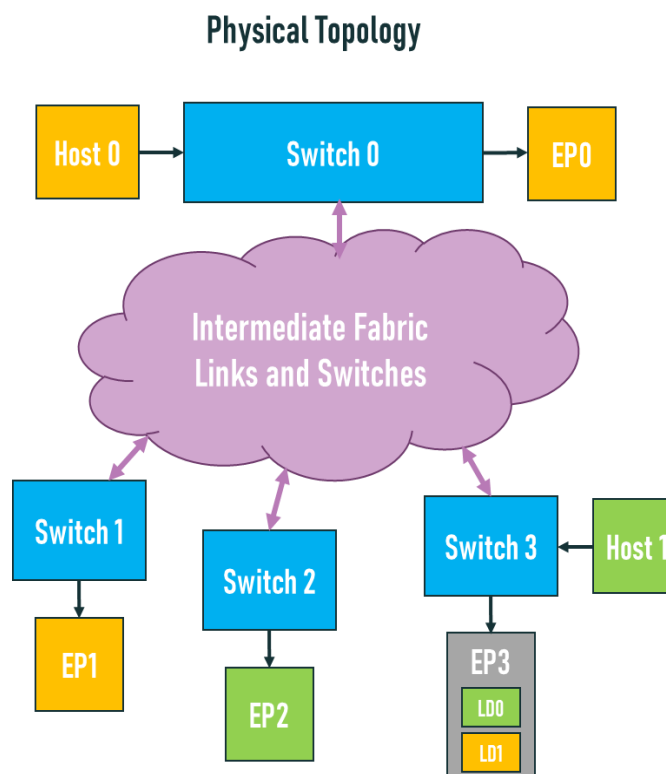


Where  $m \leq 4K$  Source Port IDs

# CXL Fabrics – Composability

EP binding from across fabric:

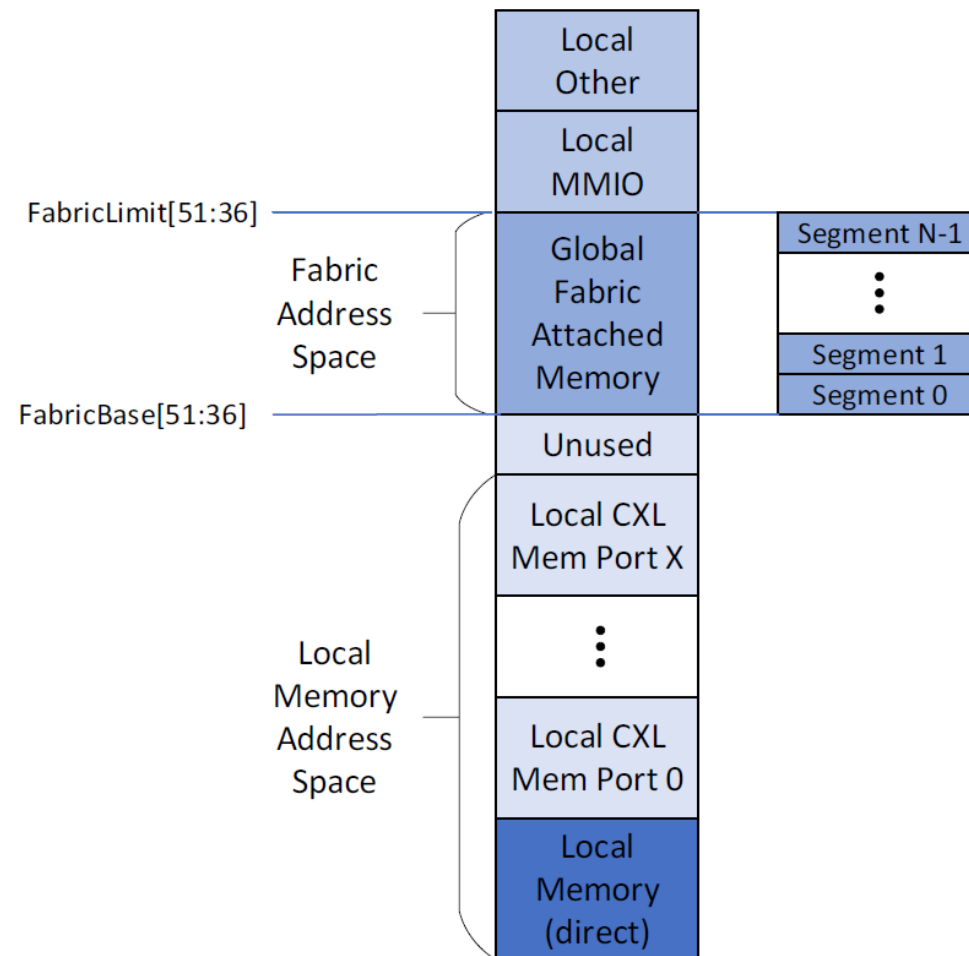
- Host sees up to 2 layers of standard switches: host edge and downstream edge
- Enables re-use of existing host SW



# CXL Fabrics – Scale-Out

## Global Fabric Attached Memory (G-FAM):

- Highly-scalable memory pool – e.g., 2000+ hosts accessing a memory pool of 2000+ G-FAM devices (GFDs)
- Accessible by all hosts through Fabric Address Segment Table (FAST)



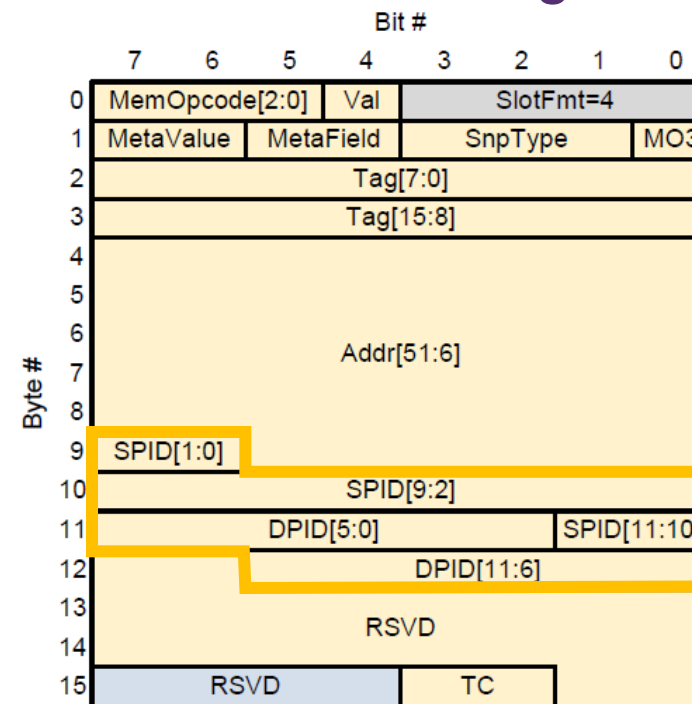
# Transport Level Details

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## Port-Based Routing (PBR)

- Brand new flit mode in 3.0
- Transactions routed by PBR-ID:
  - Destination PBR-ID (DPID) carried by all transactions
  - Source PBR-ID (SPID) carried by select transactions as needed
- Inter-switch links can carry traffic from multiple VHs
- Supported only in 256B flit mode

## 256B Packing: G4/H4 PBR Message

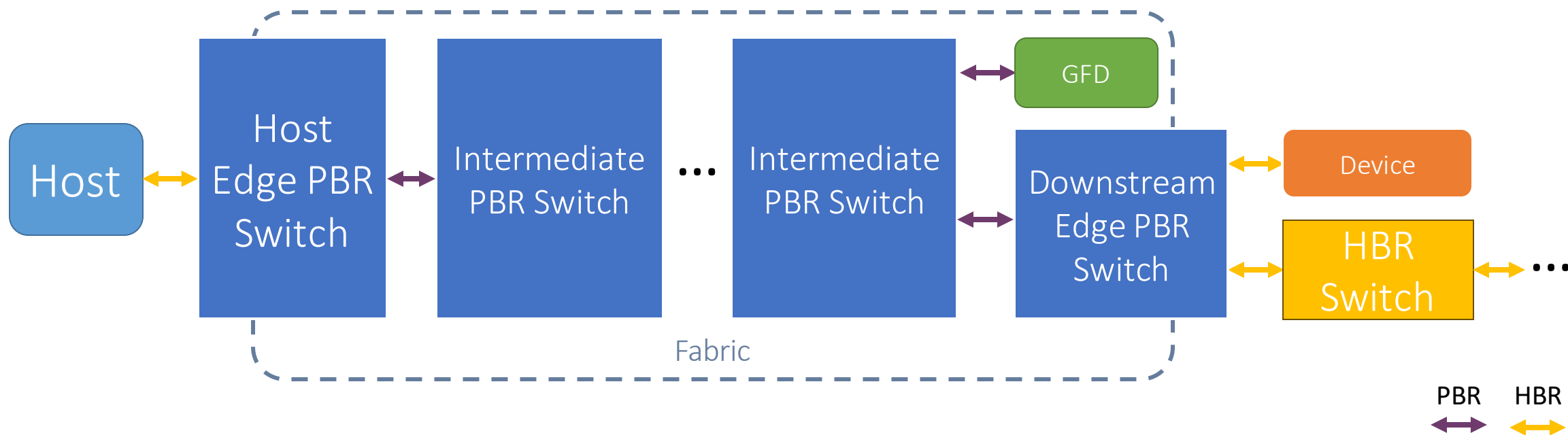


# Routing Model



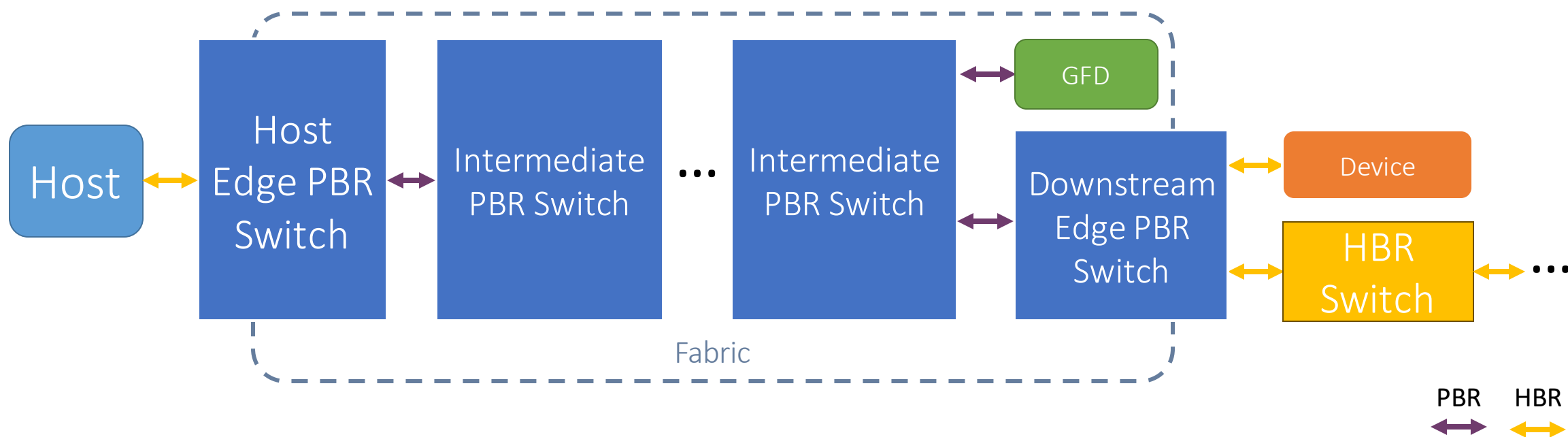
# Routing Model

- Host requests begin in HBR format
- Host edge PBR switch converts to PBR format



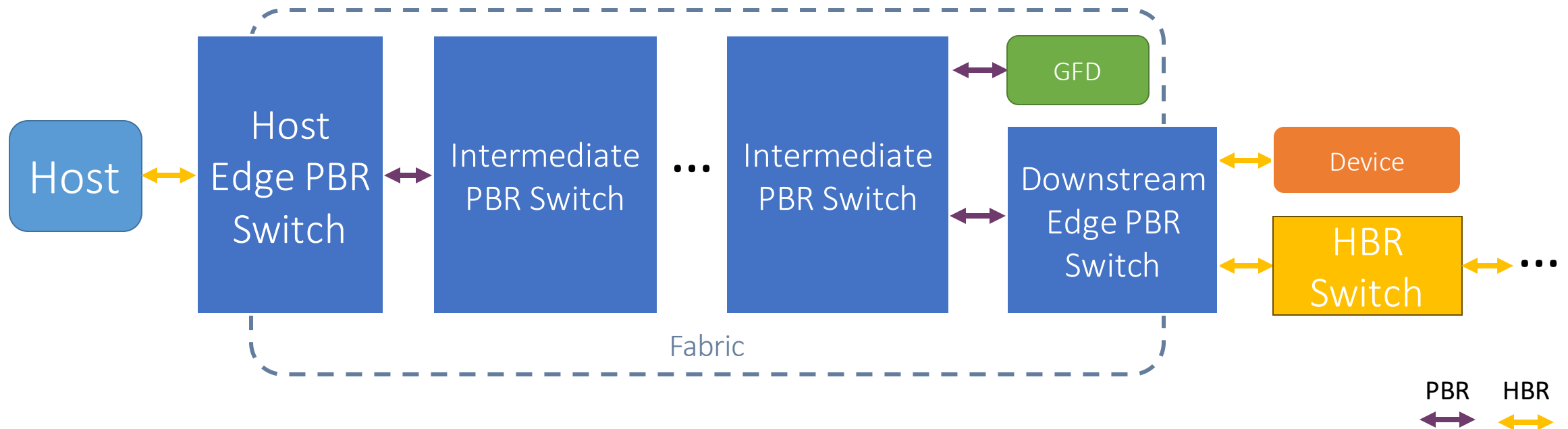
# Routing Model

- Any intermediate switches route by DPID
- GFDs support PBR flit mode



# Routing Model

- All other EP types connected to Downstream edge switch
- Downstream edge converts to HBR



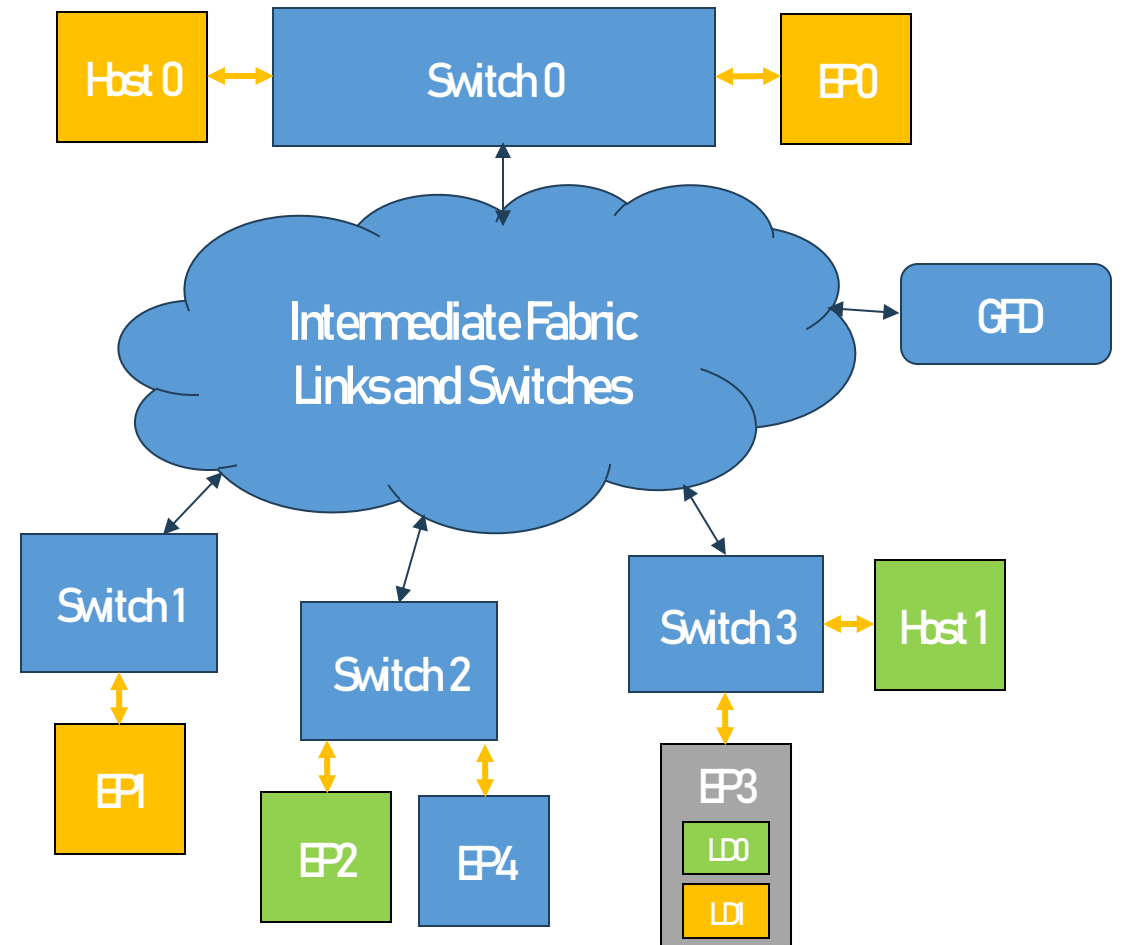
# Fabric Management Architecture

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Fabric Manager (FM) is responsible for:

- Fabric discovery and initialization
- Composition (binding)
- Inter-switch link management
- GFD Management
- Unbound EPs

Host manages its edge link and bound EPs



# Specification Roadmap

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Items to be defined in future specification release:

- CXL Fabric Management Specification
  - PBR Switch Management
  - GFD Management
- Host-to-Host communication
- Device-to-Device communication
- Cross-domain traffic

# Thank You