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2008

7600 Router Architecture



Subtitle Size 20PT - Aleksandar Vidakovic

Agenda

1. C7600 General Architecture
2. 7600 ES+ Card Architecture
3. 7600 ES20 Card Architecture
4. 7600 SIP-600 Card Architecture
5. 7600 SIP-400 Card Architecture
6. LAN Card Architecture
7. Packet flows



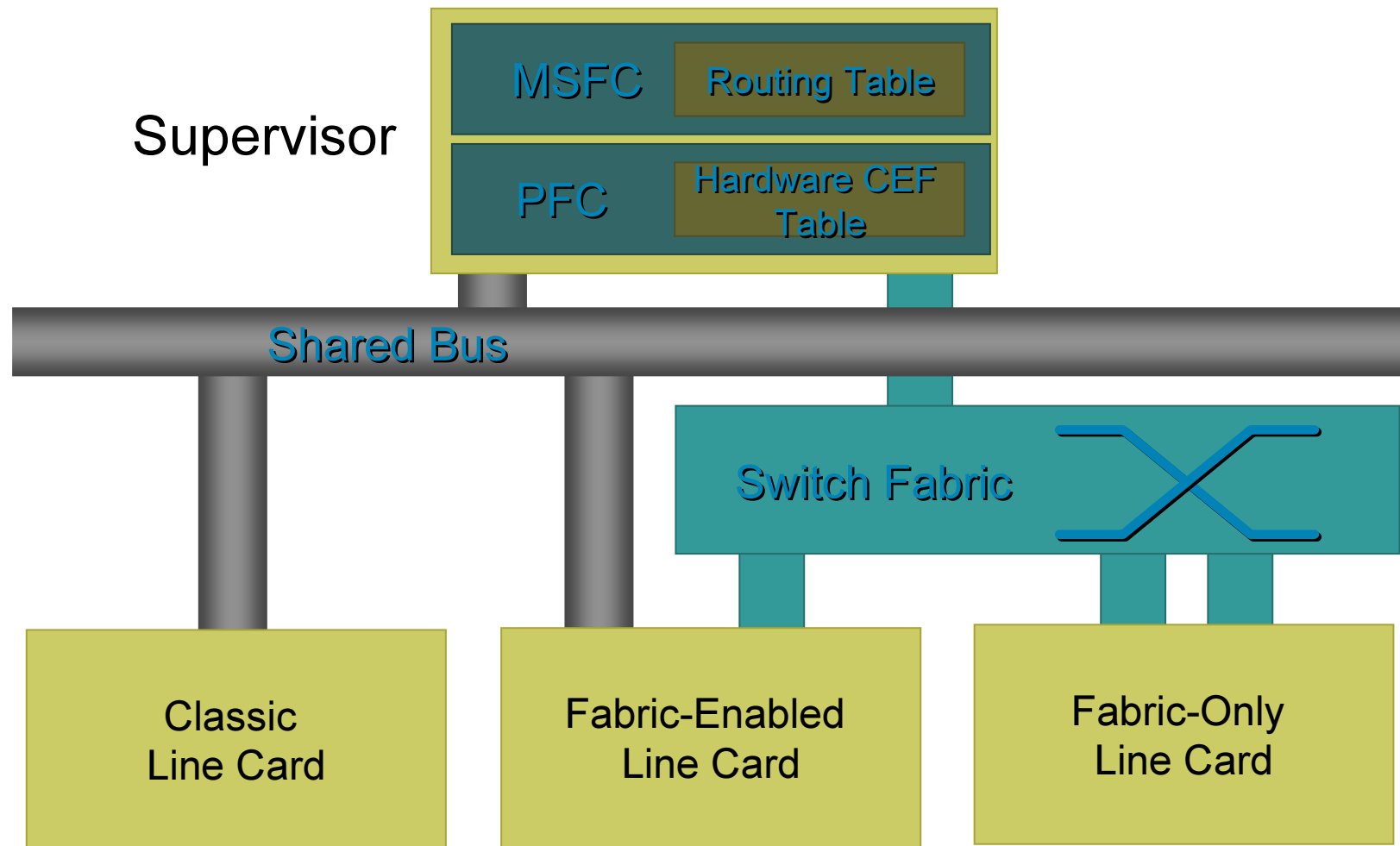
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7600 Router Architecture

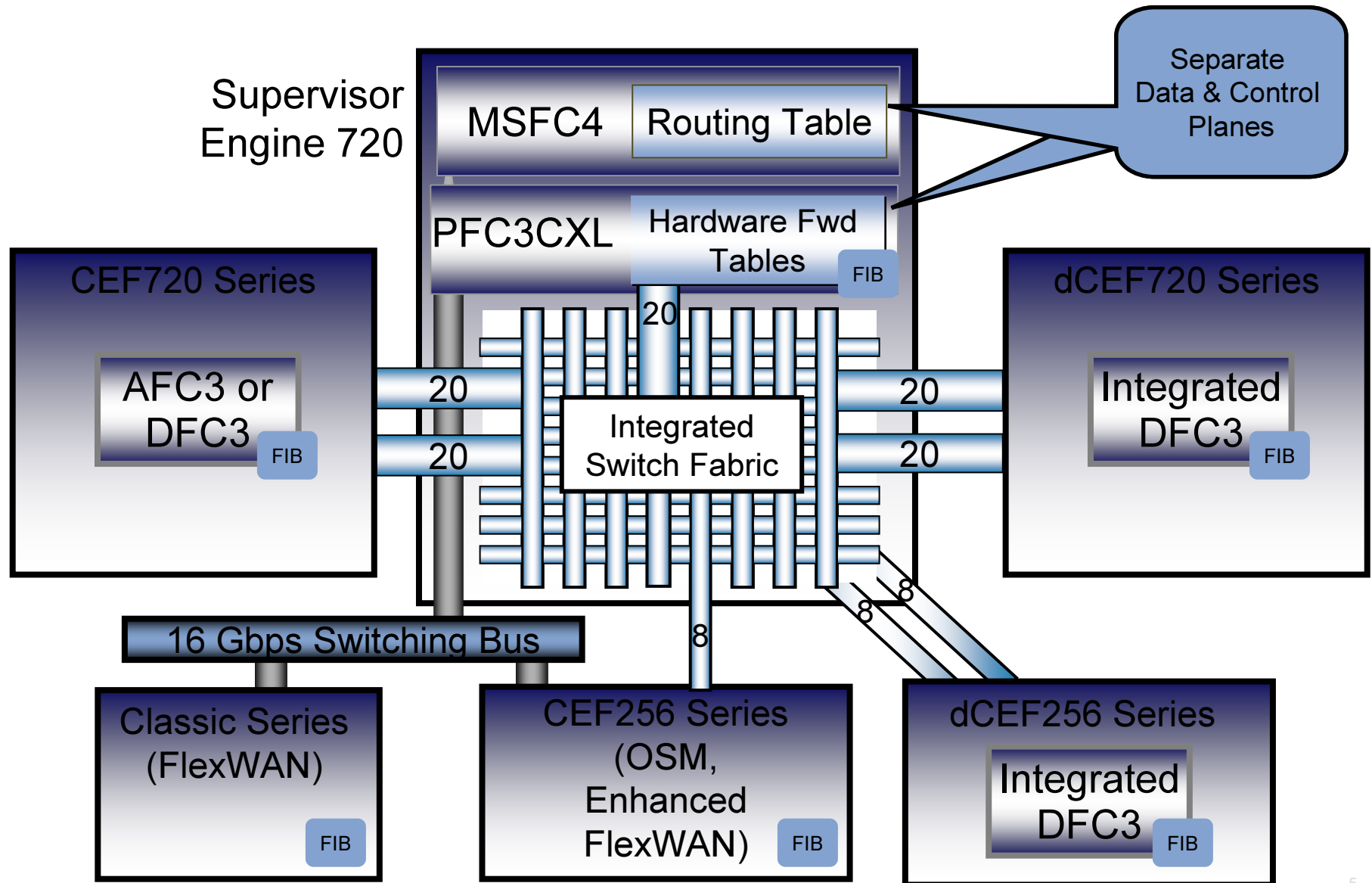


C7600 General Architecture

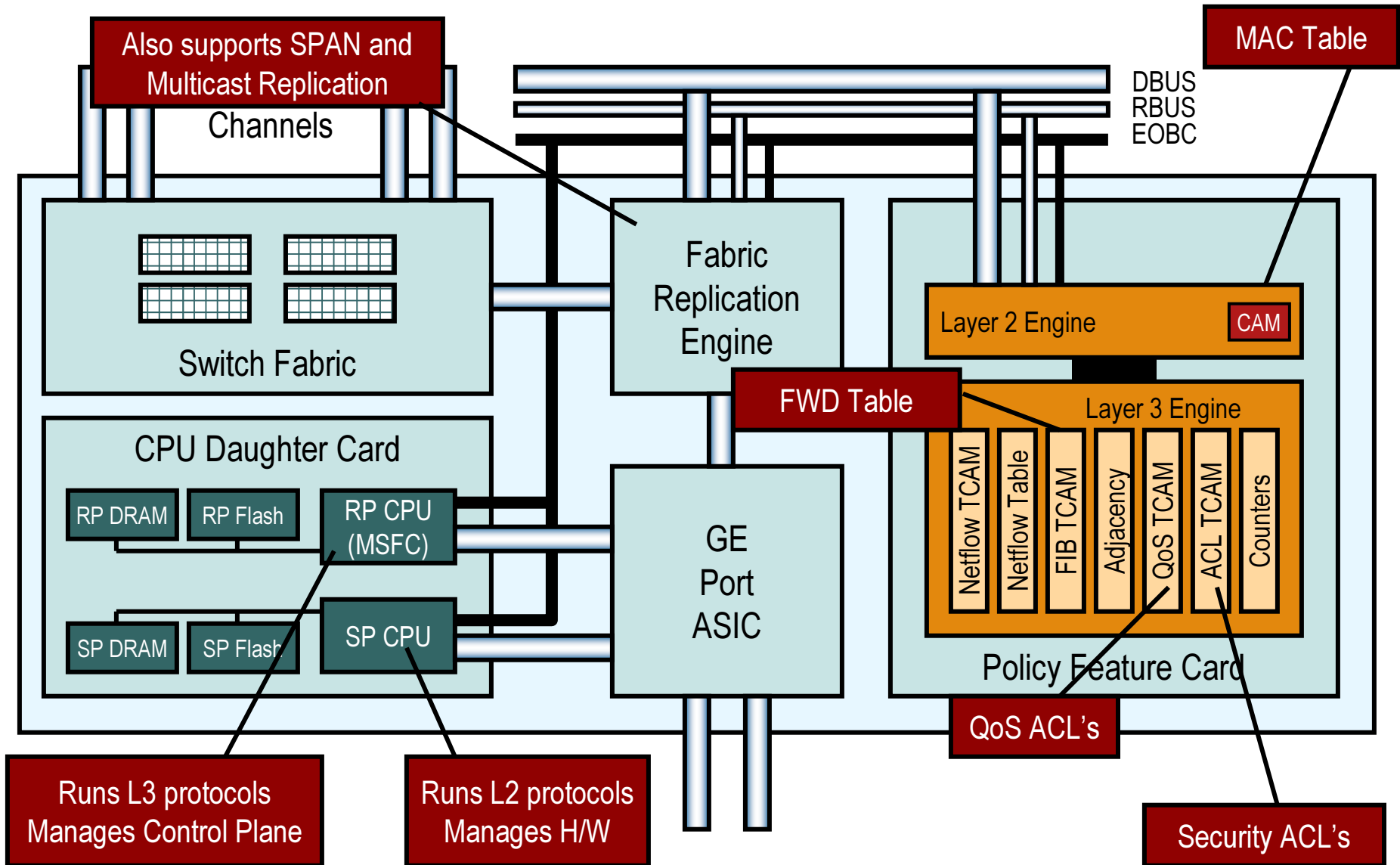
Cisco 7600 Architecture Overview



Cisco 7600 Architecture *with RSP 720-3CXL*



Cisco 7600 Internals Sup720/RSP720



RSP720-3CXL/Sup720-3BXL

Integrated Switch Fabric

- Integrated Fabric

An existing SFM must be removed when using a SUP720-3BXL

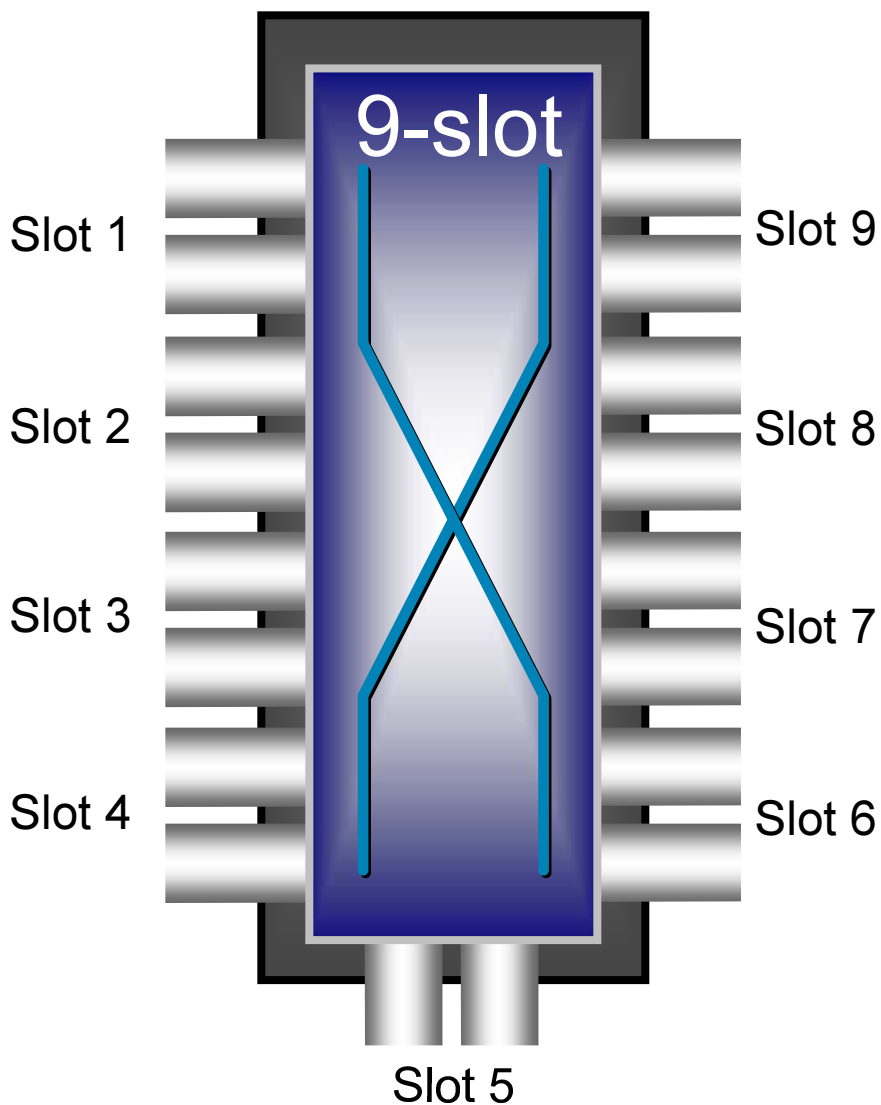
- Fabric channels run at 20 Gbps

Full Duplex, so 20 Gbps in / 20 Gbps out per channel

Two fabric channels allocated to each slot

40 Gbps/slot with dual fabric channels

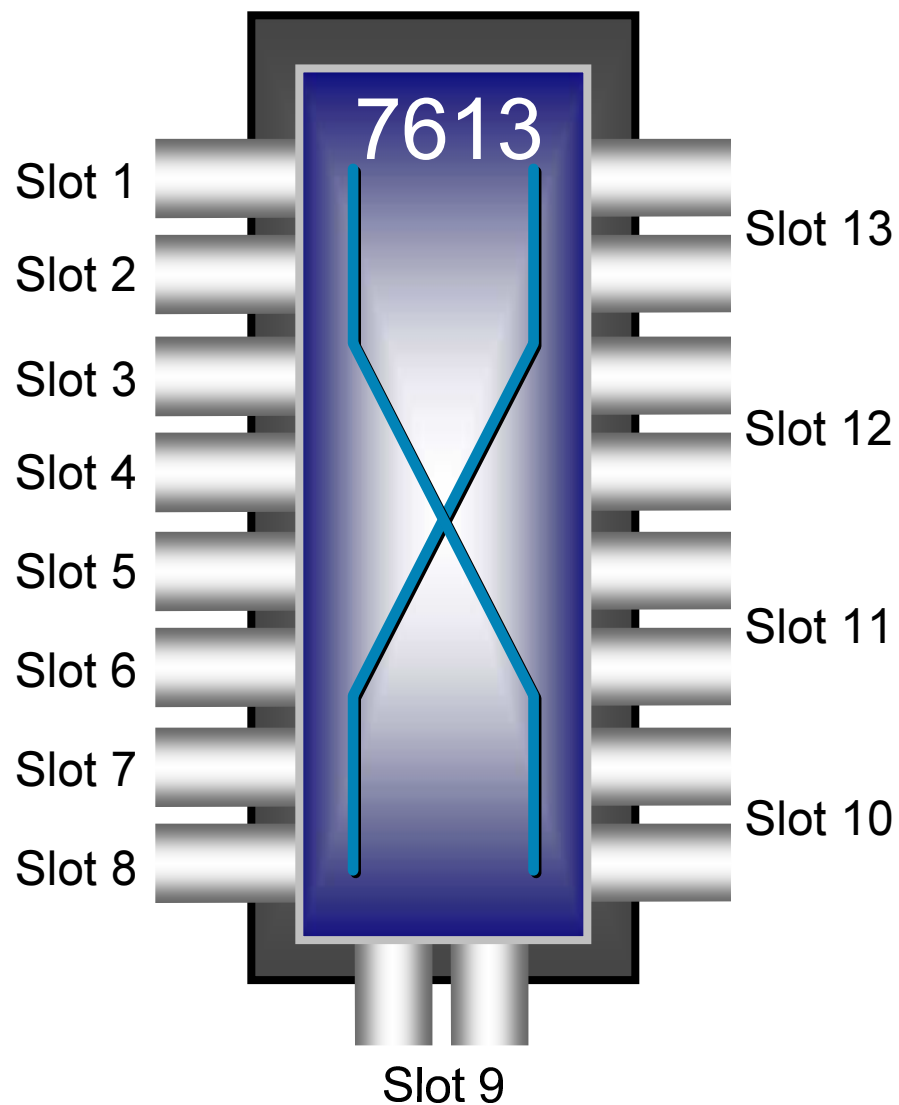
16 Gbps/slot Backward Compatibility



RSP720-3CXL/Sup720-3BXL

Switch Fabric - Channel Allocation

- Two Channels per slot:
 - 3 slot chassis (7603)
 - 6 slot chassis (7606)
 - 9 slot chassis (7609)
- 13 Slot chassis fabric channel allocation is the same as the SFM2
 - Slots 1 thru 8 receive a single fabric channel
 - Slots 9 thru 13 receive dual fabric channels
- Fabric channels for xCEF256 modules will auto-sync to 8 Gbps





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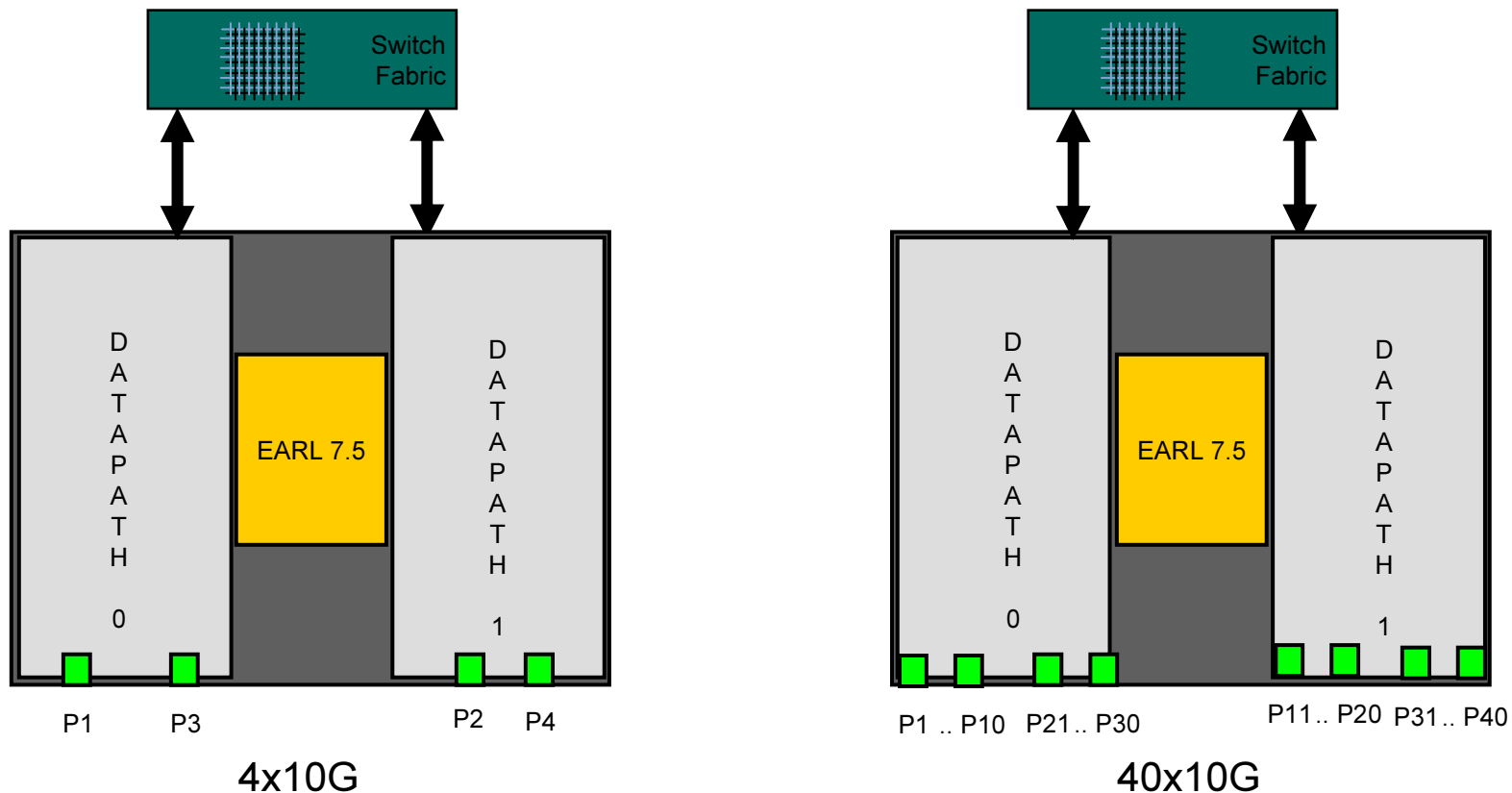


7600 ES+ Card Architecture

7600 ES+ Card Overview

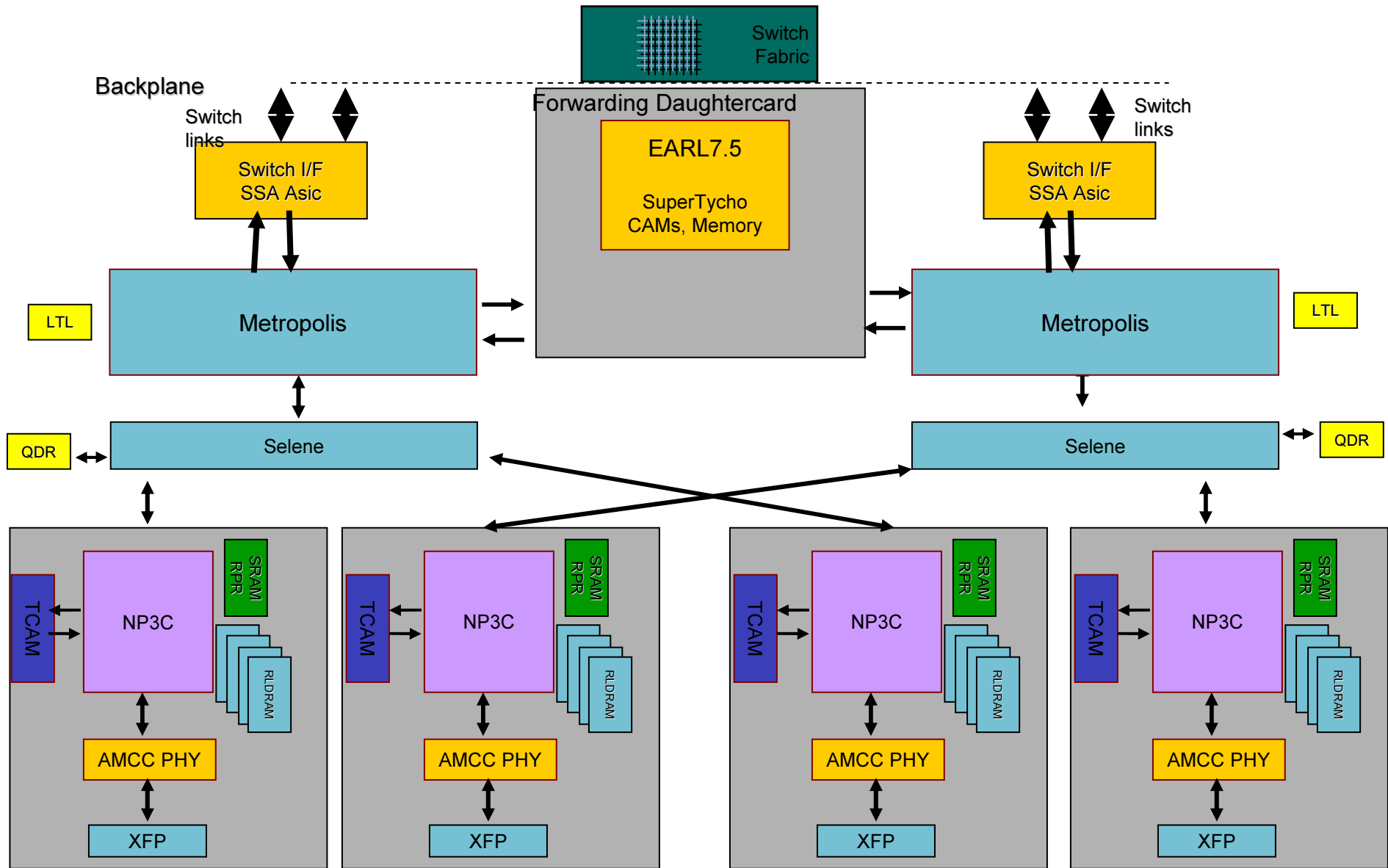
1. New 7600 Series Ethernet Services Cards
2. Each ES+ board consists of one Baseboard, one Link Daughter card and one Earl Daughter card
Earl flavours: 3CXL & 3C
3. Models:
 - 40Gbps fabric connection:
 - 4 x 10Gig interface
 - 40 x 1Gig interface
 - 20Gbps fabric connection:
 - 2 x 10Gig interface
 - 20 x 1Gig interface
4. Supported from IOS version 12.2(33)SRD

7600-ES+ Conceptual Model

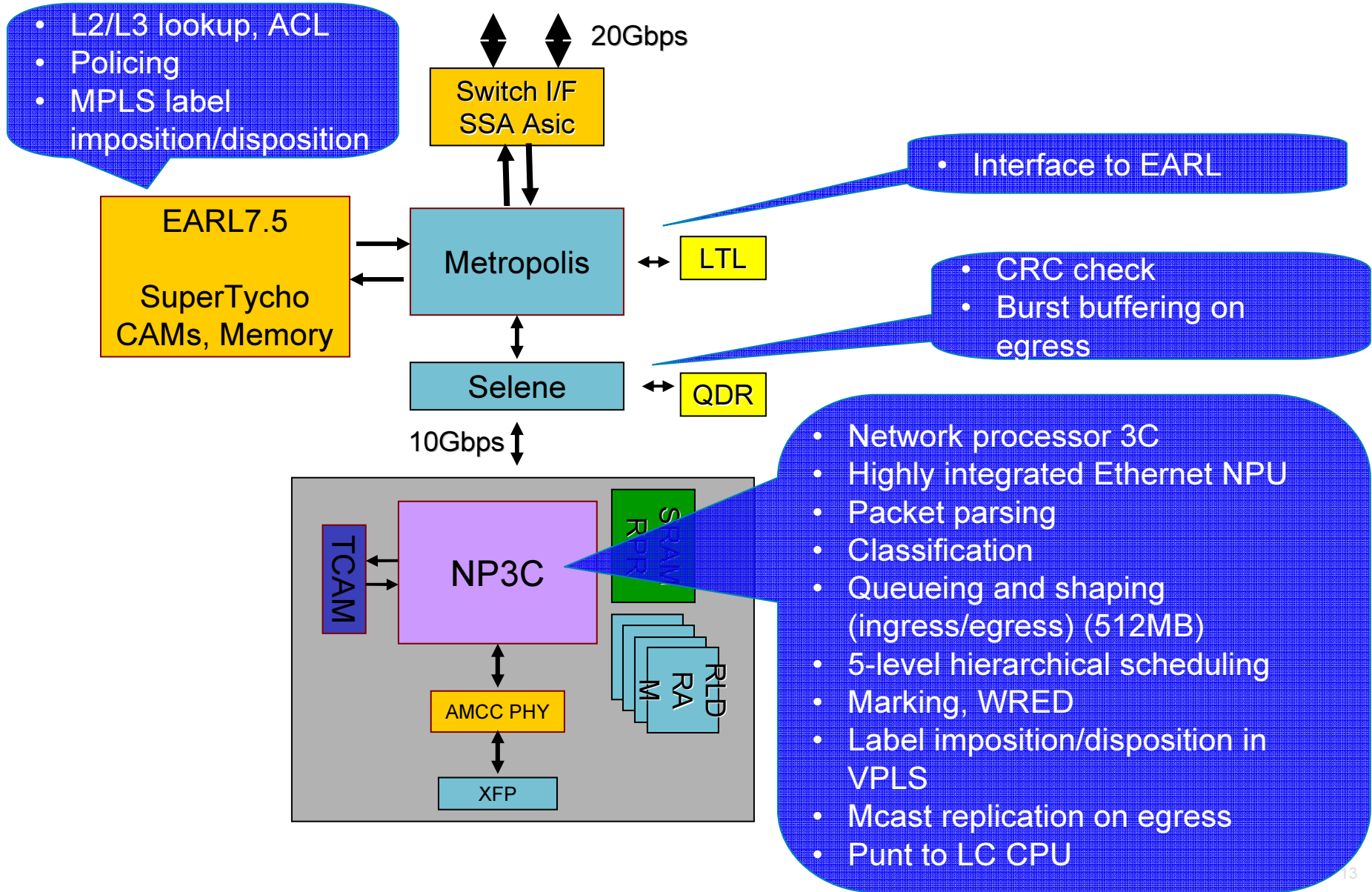


- From a packet forwarding perspective, a ES+ can be broken down to two datapaths sharing a single EARL 7.5
 - Each data path services a subset of the ports (two 10G port on 4x10G, twenty 1G ports on 40x1G)
 - Each data path has it's own 20Gbps fabric connection

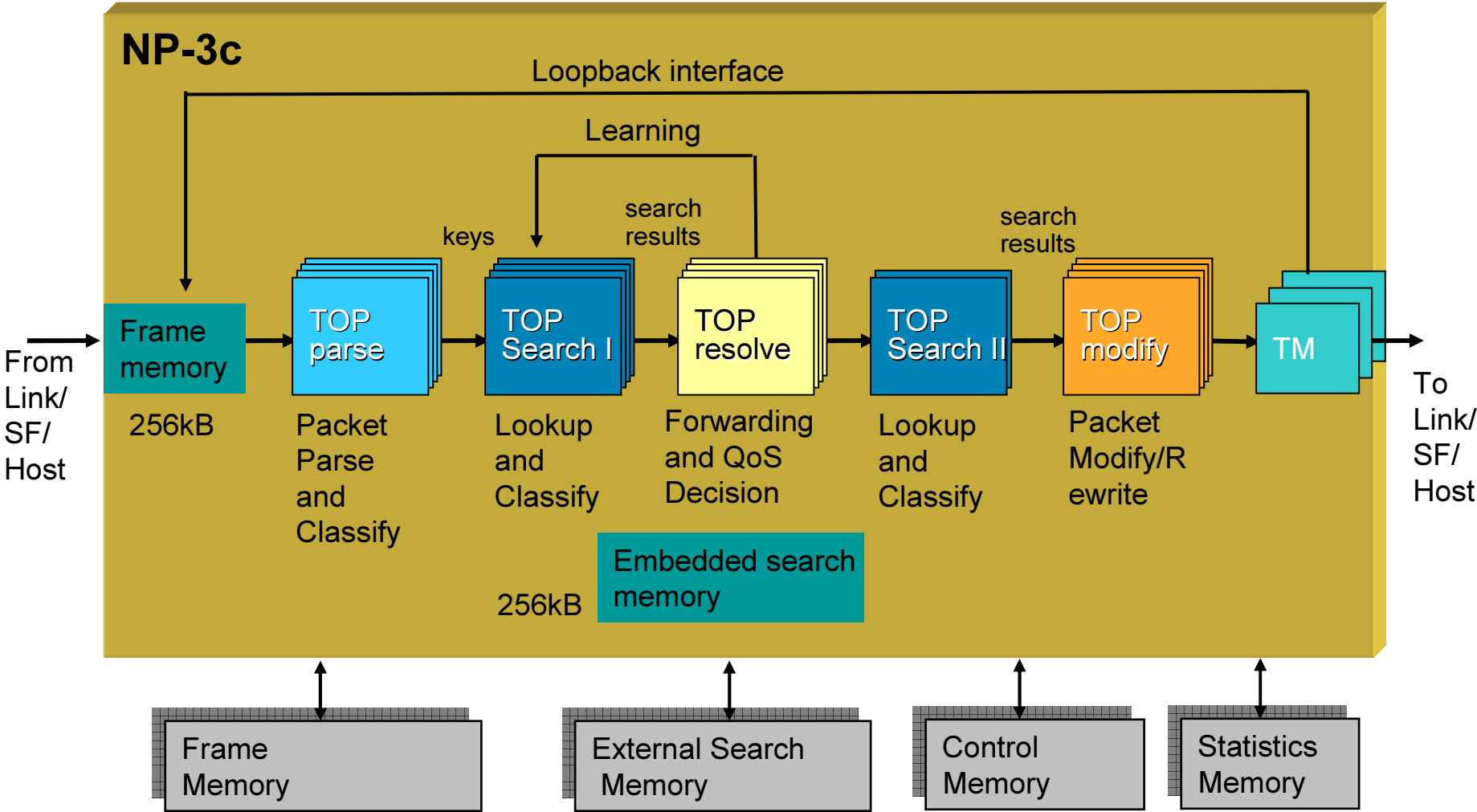
7600-ES+4TG Block Diagram



7600-ES+ Block Diagram



NP-3C



NP-3C

1. Core Frequency of operation at 300MHz, Memory at 333MHz.
2. Task Optimized Processing Engines (TOPs):
 - 12 TOP parse, 12 TOP resolve engines
 - 40 TOP search I engines, 4 TOP search II engines.
 - 8 TOP modify engines
3. Parallel processing in hardware
 - Packet order maintained through the Pipeline
4. Memory:
 - RLDRAM2 @ 333MHz for Frame buffer memory & TOPs
 - Search/Lookup Memory, 72b TCAM @ 266MHz, QDRII
 - SRAM @ 250MHz for Statistics/Token Buckets

7600-ES+ QoS Highlights

1. Classification:

Each frame assigned a flowID with appropriate QoS parameters

Both HW based (pre-classification) and microcode based classification

2. Metering:

Measures rates and burst sizes

Uses Token Buckets and rate counters in Hardware

Supports 1r3c, 2r3c (RFC2697, RFC2698, MEF.5)

3. Marking:

Three color marking for next hop done in microcode

7600-ES+ QoS Highlights

4. Congestion Avoidance

WRED based Early packet discard based on congestion level (buffers available), packet priority and metering results

5. Traffic Conditioning

Policing: Frames that violate traffic parameters are dropped. Can also use WRED mechanism and metering results for traffic policing

Shaping: Frames that violate traffic parameters are queued for scheduling, to be compliant with traffic parameters. Supports both dual or single leaky bucket mechanism

7600-ES+ QoS Highlights

1. 5-level hierarchical scheduling

L0 : Groups (Interface)

L1 : 32 Ports

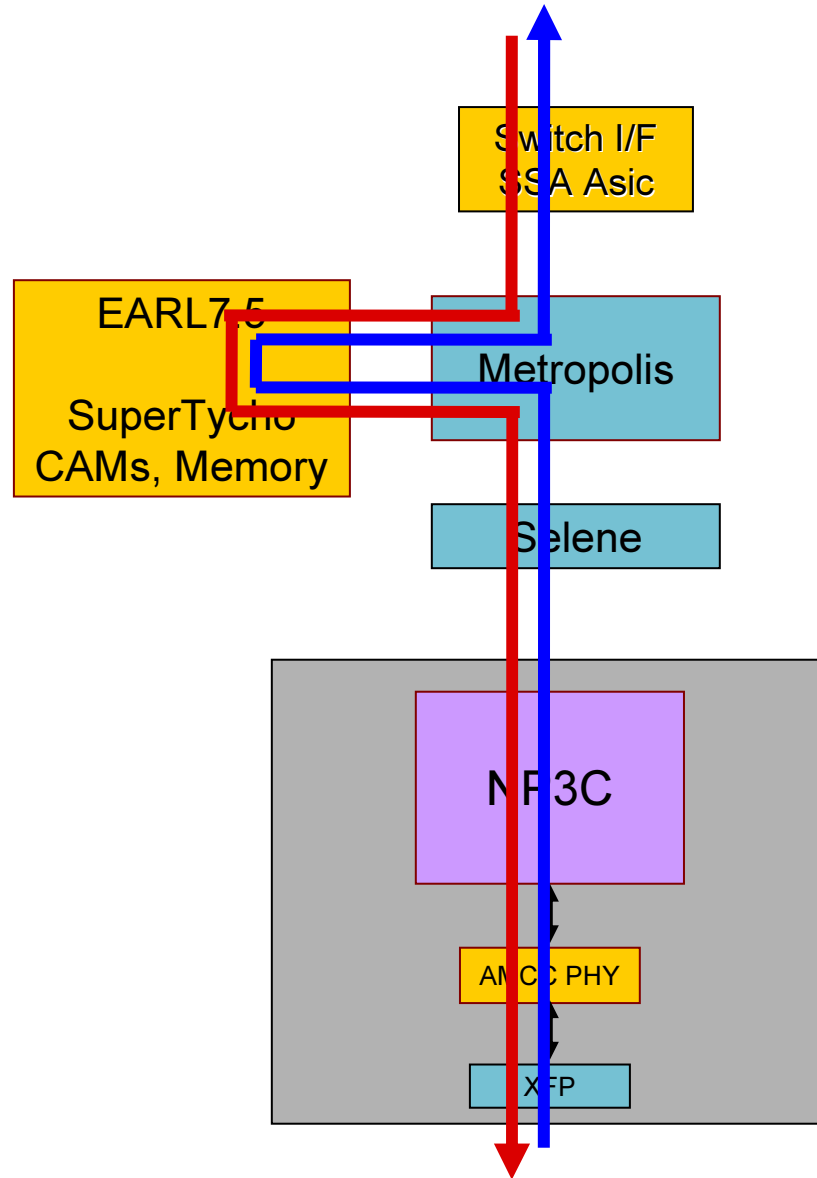
L2 : Upto 256 Subports (L1+L2 is 256 max)

L3 : 4K users/subscribers

L4 : 32K flow/class queues

2. Strict priority support at all levels (priority propagation)

7600-ES+ Packet Flow





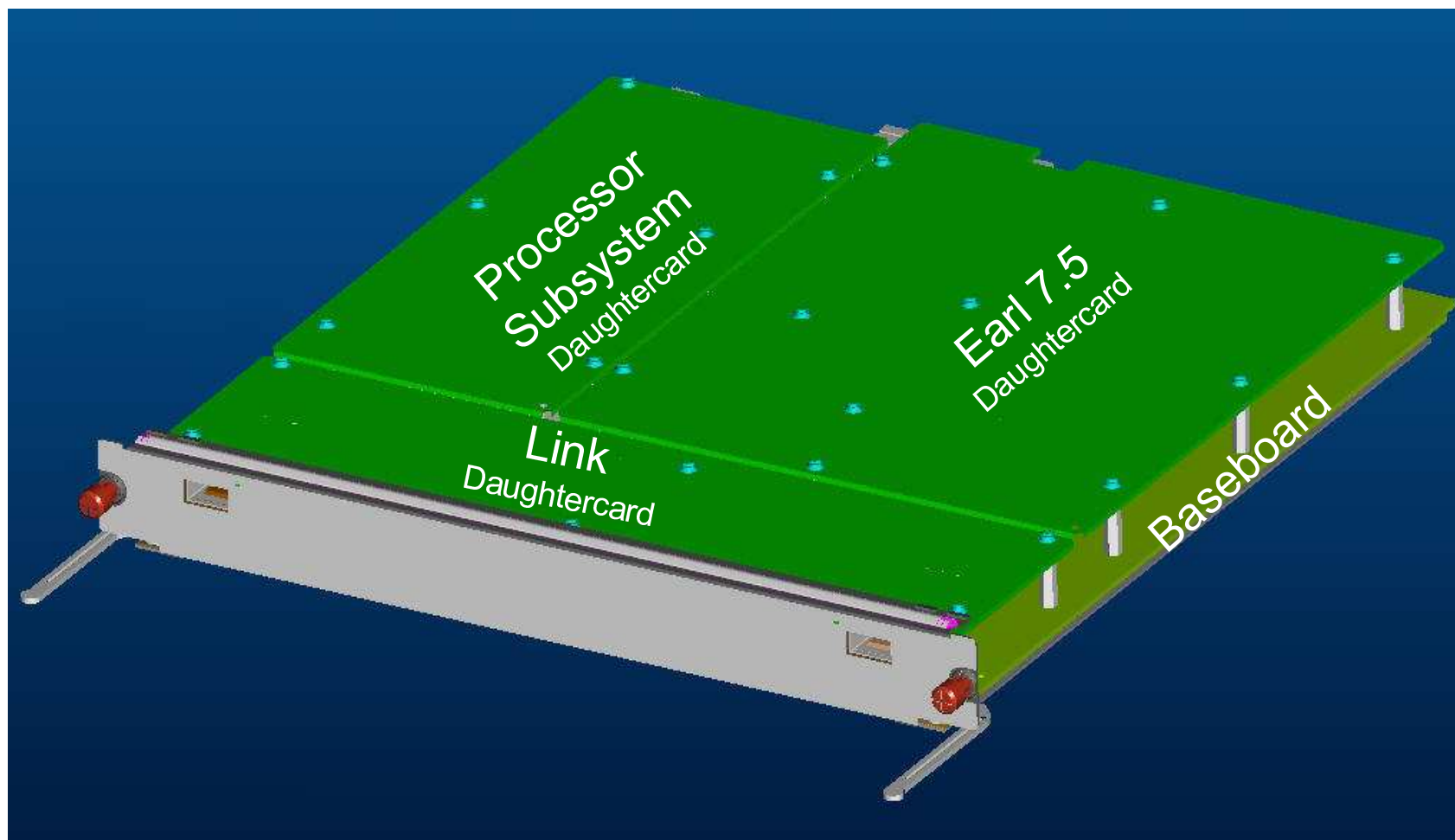
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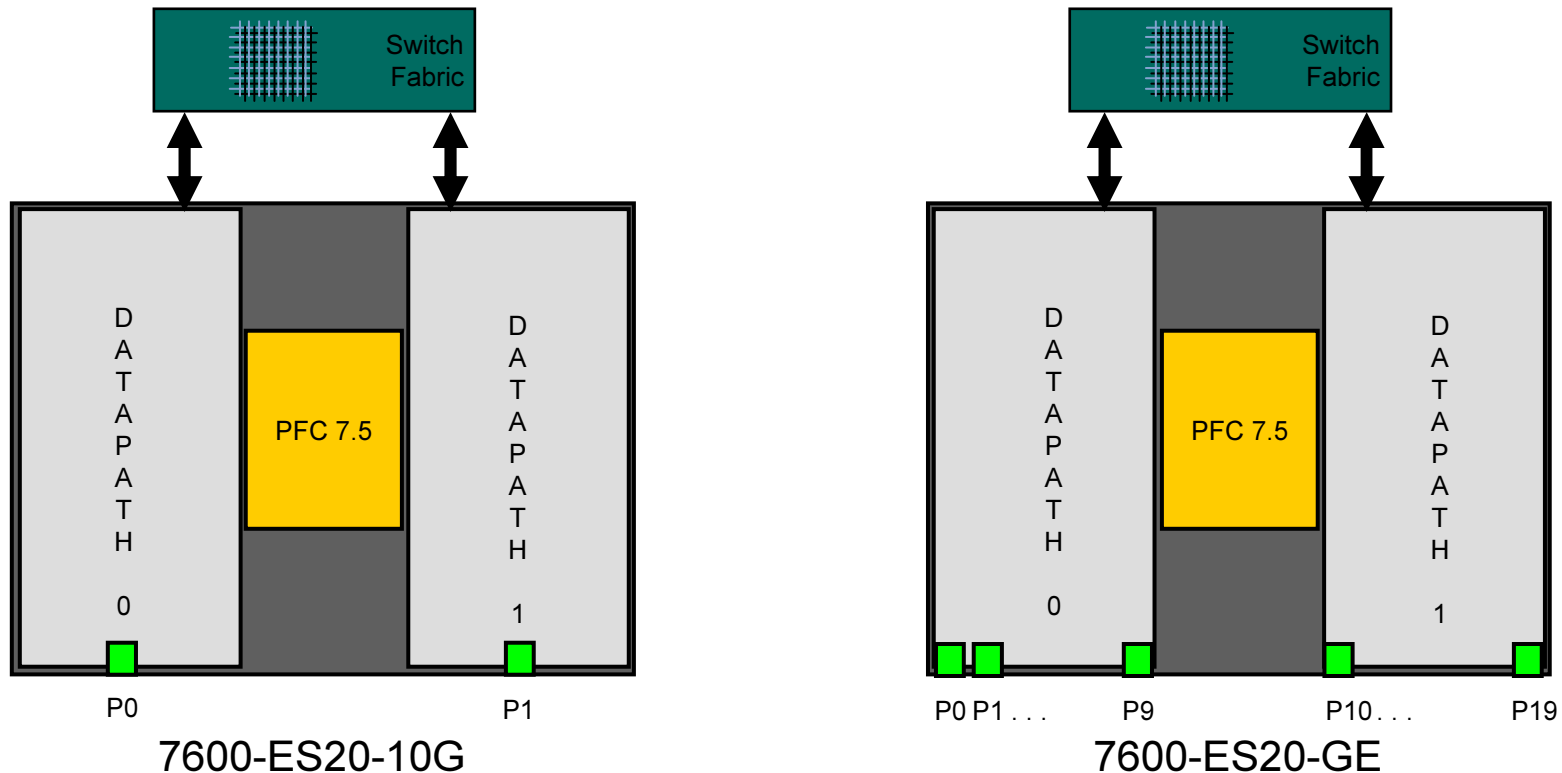


7600 ES20 Card Architecture

7600-ES20 Hardware

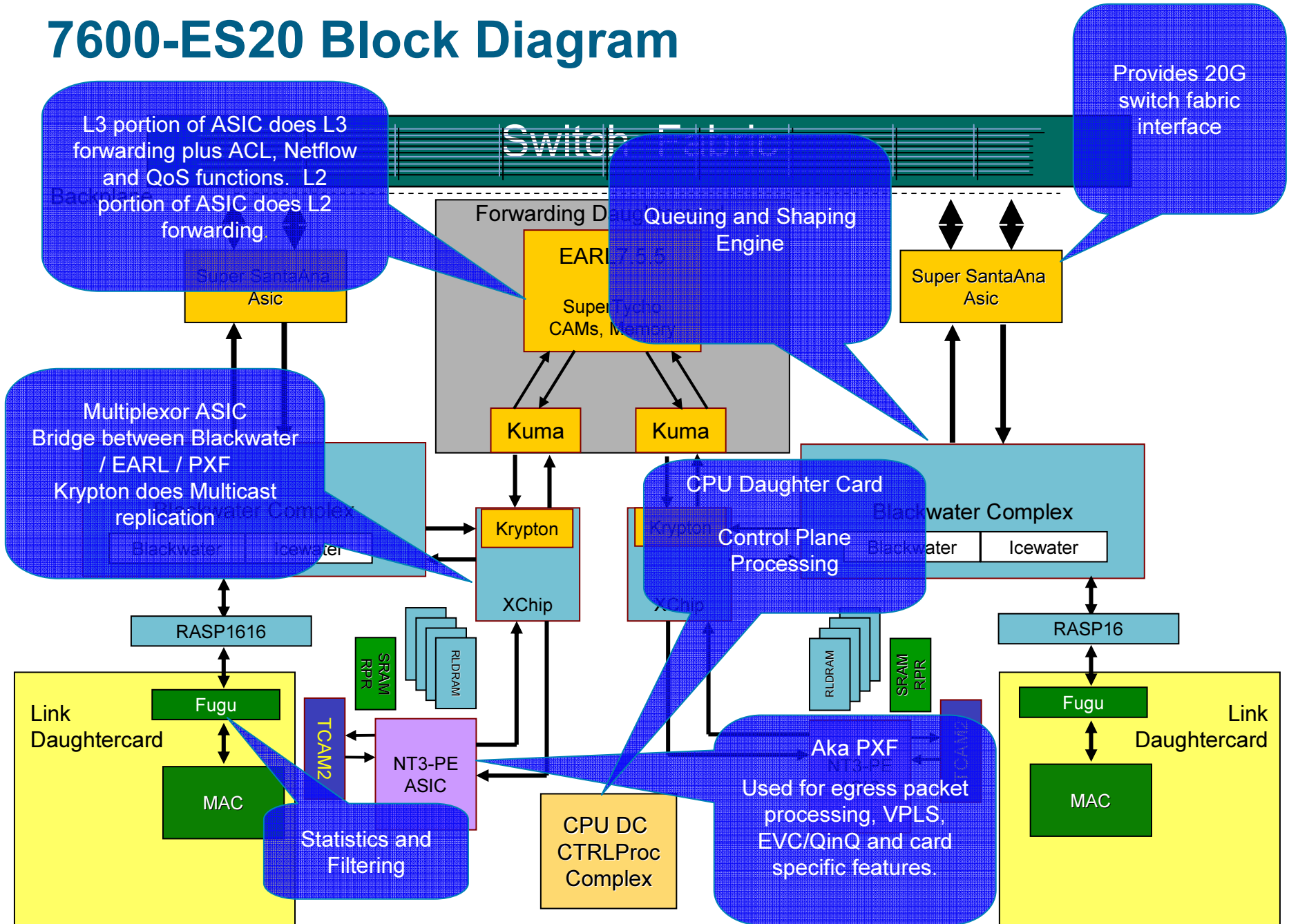


7600-ES20 Conceptual Model

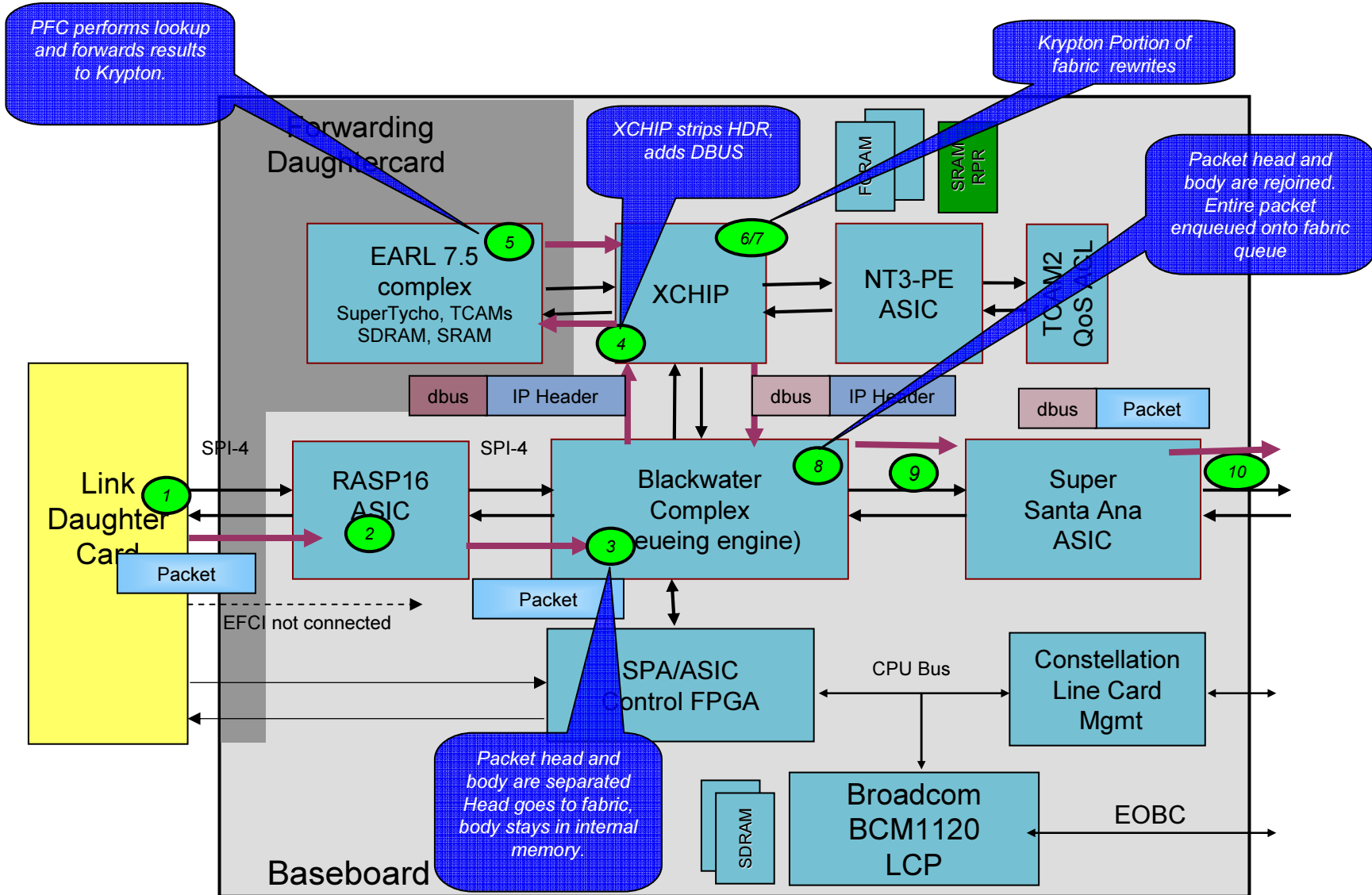


- From a packet forwarding perspective, a 7600-ES20 can be viewed conceptually as two 7600 cards that are sharing a single EARL 7.5
 - Each data path (“card”) services a subset of the ports (one 10G port on 7600-ES2—10G, ten 1G ports on the 7600-ES20-GE)
 - Each data path (“card”) has it’s own 20Gbps fabric connection

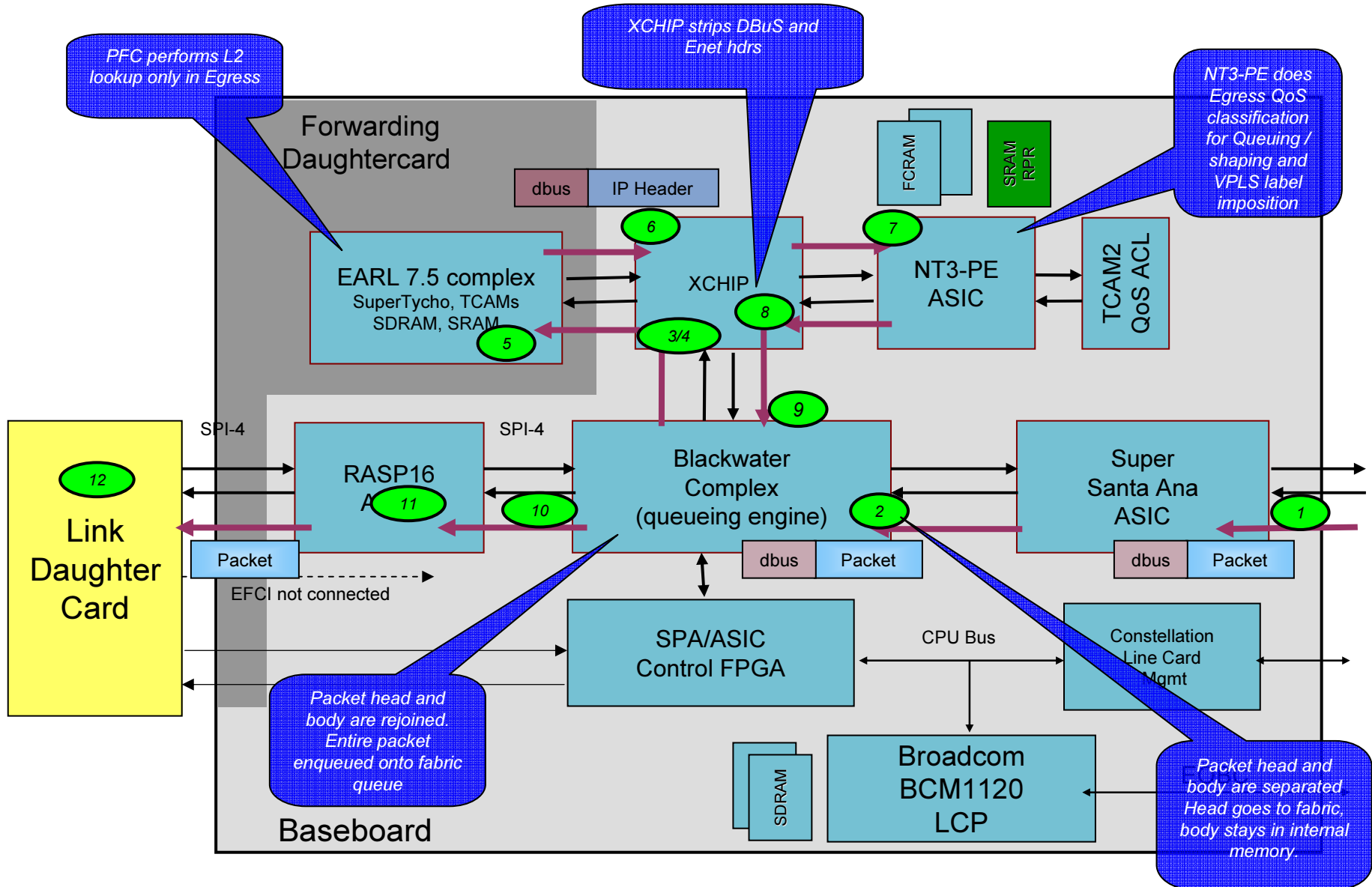
7600-ES20 Block Diagram



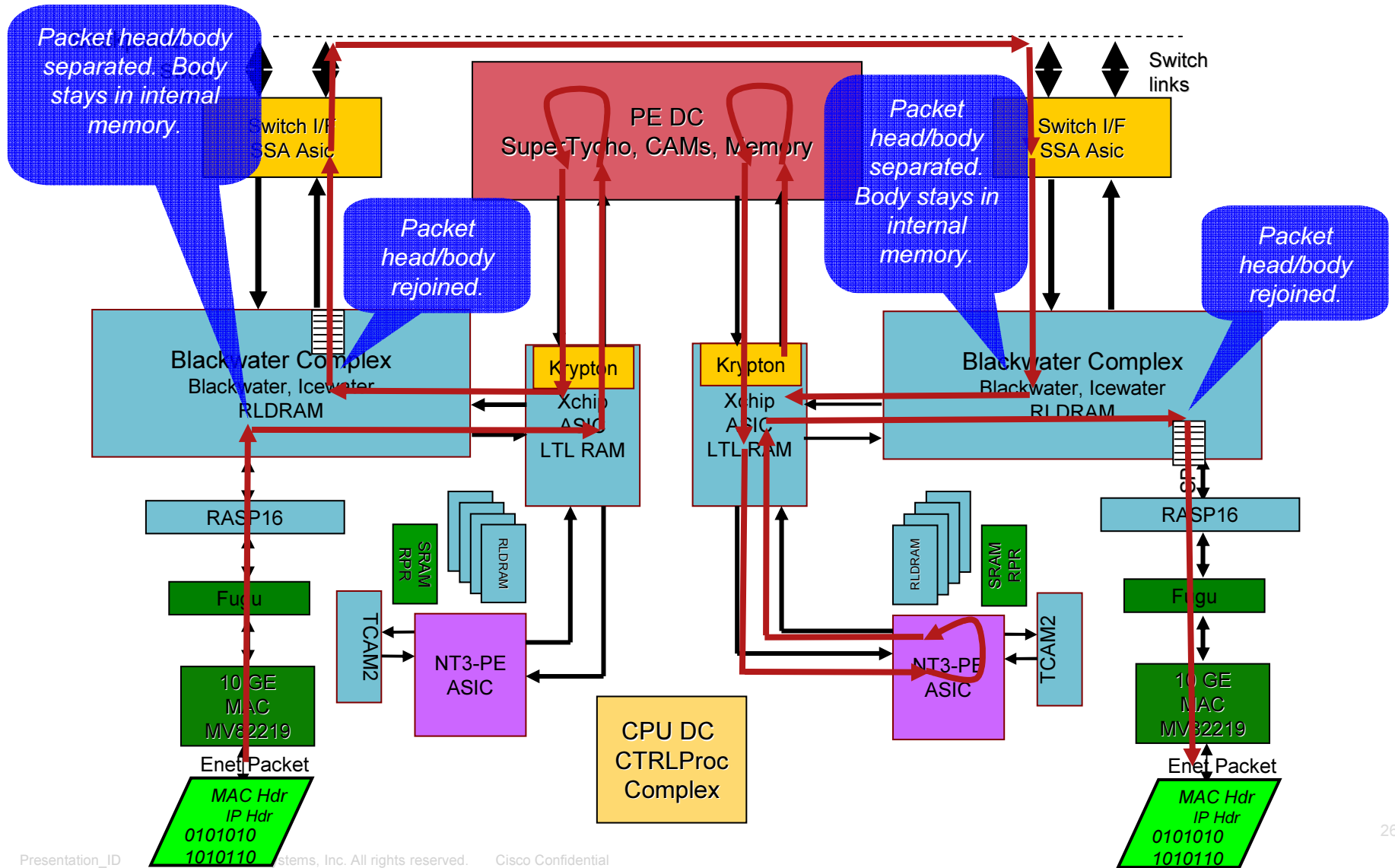
7600-ES20 Ingress Packet Processing



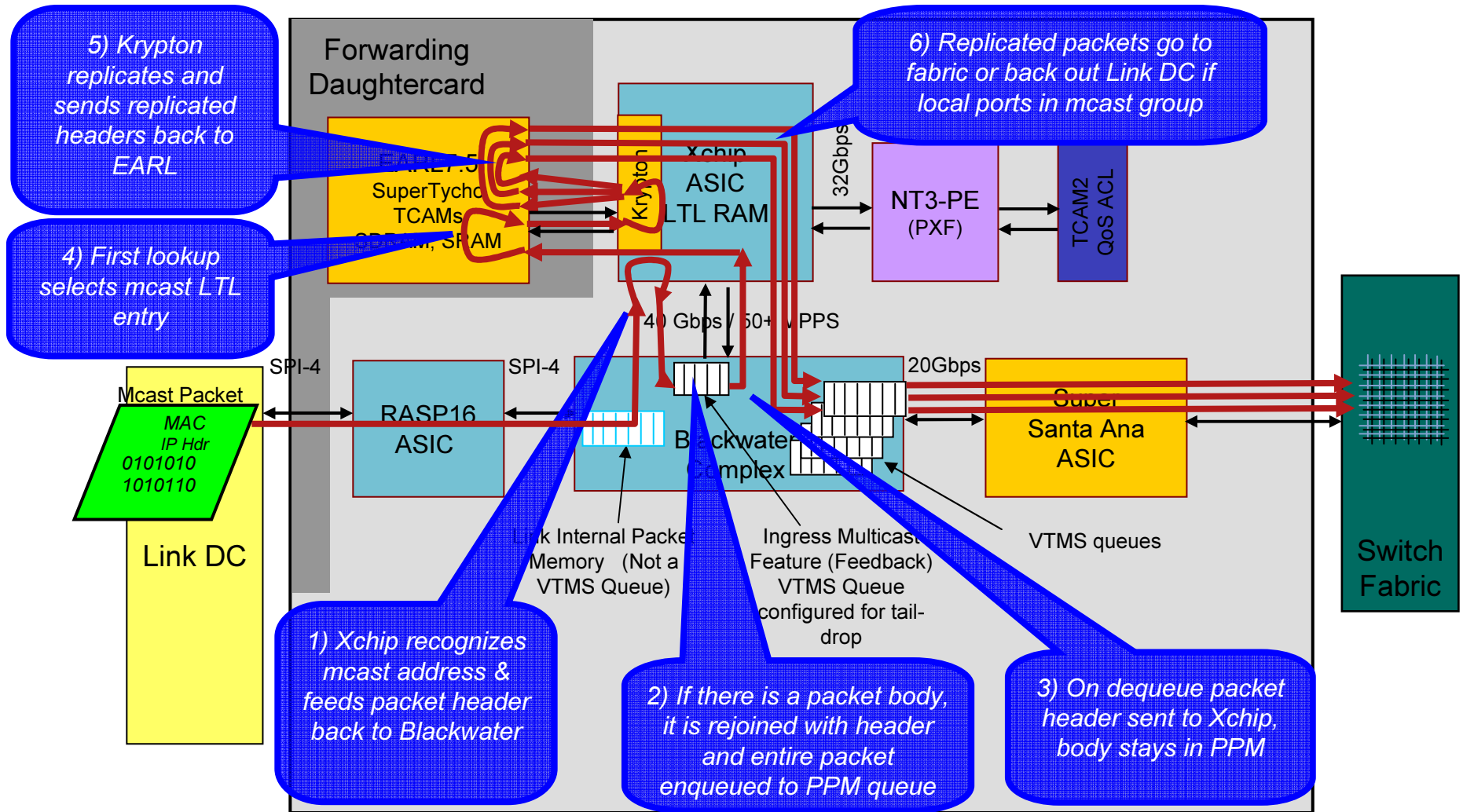
7600-ES20 Egress Packet Processing



7600-ES20 Data Path for Packet Hairpin

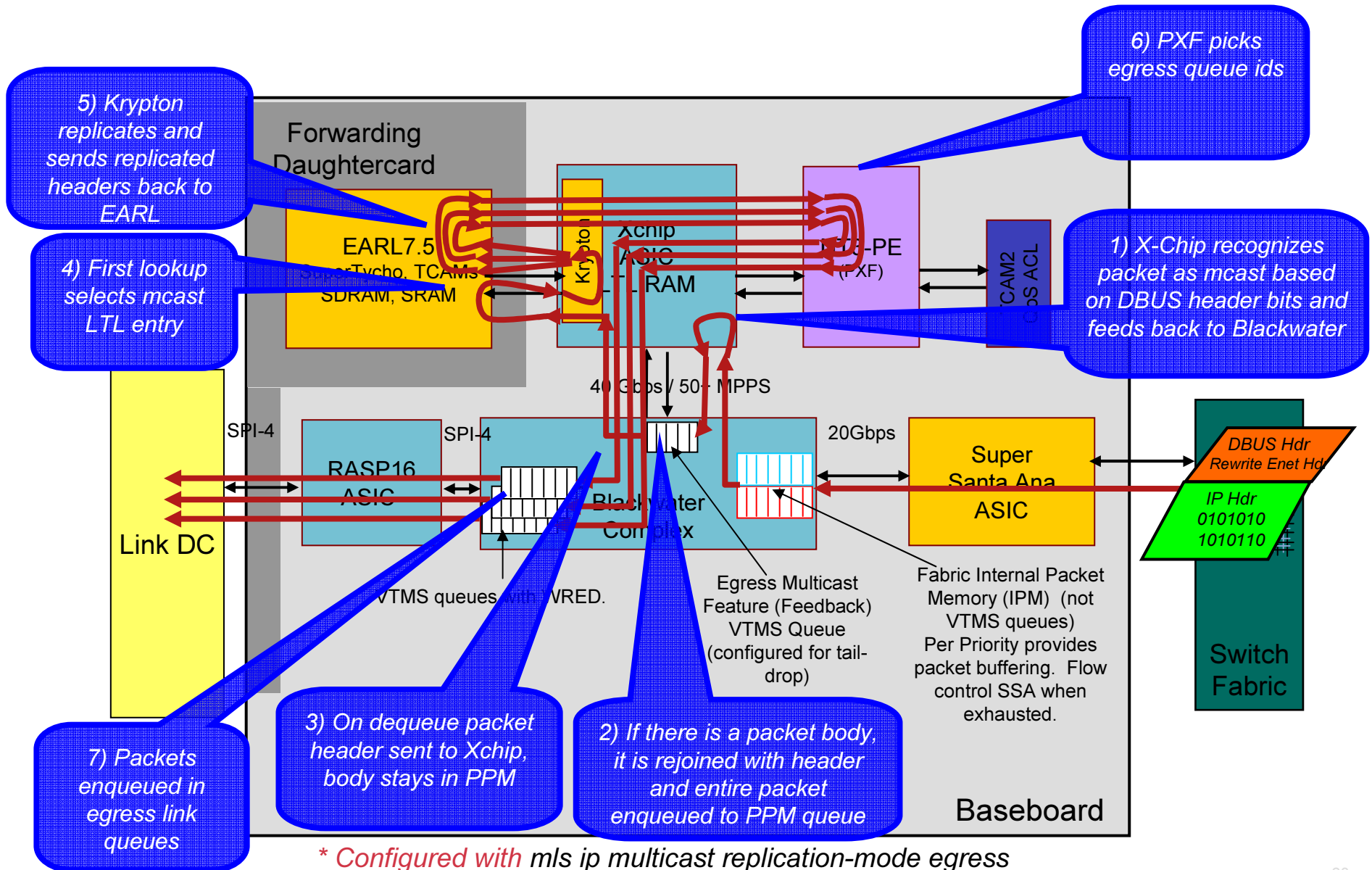


Multicast Data Path with Ingress replication *

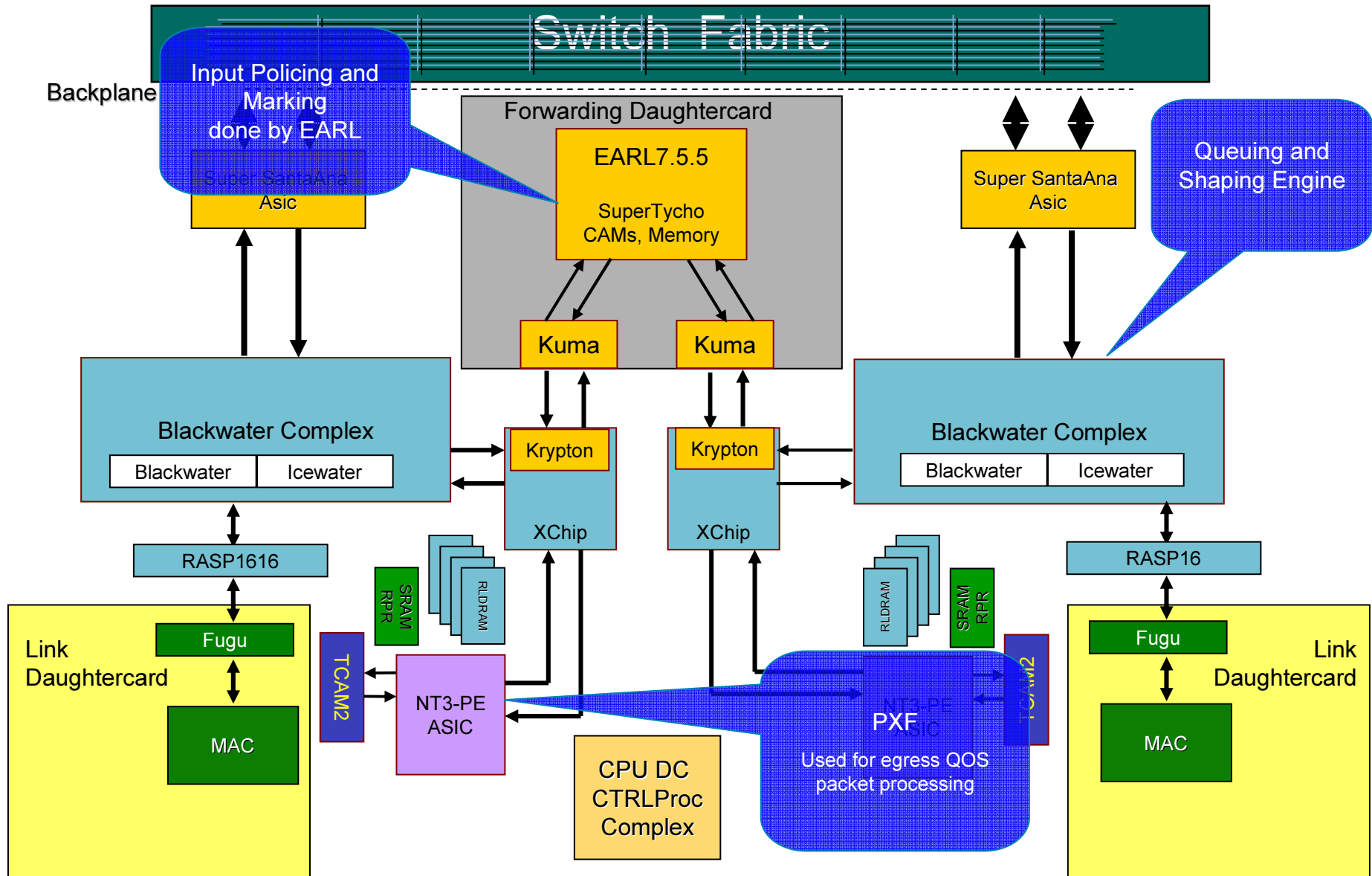


* Note that packets take this path on the Ingress card independent of mls ip multicast replication-mode

Multicast Data Path with Egress replication



7600-ES20 Block Diagram for QoS Functions





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7600 Router Architecture



7600-SIP-600 Card Architecture

7600-SIP-600 Architecture

1. Conceptually identical to 7600-ES20 with a single datapath
2. Instead of fixed Ethernet ports, it can take up to 4 Half-Height Shared Port Adapters (HH SPA)



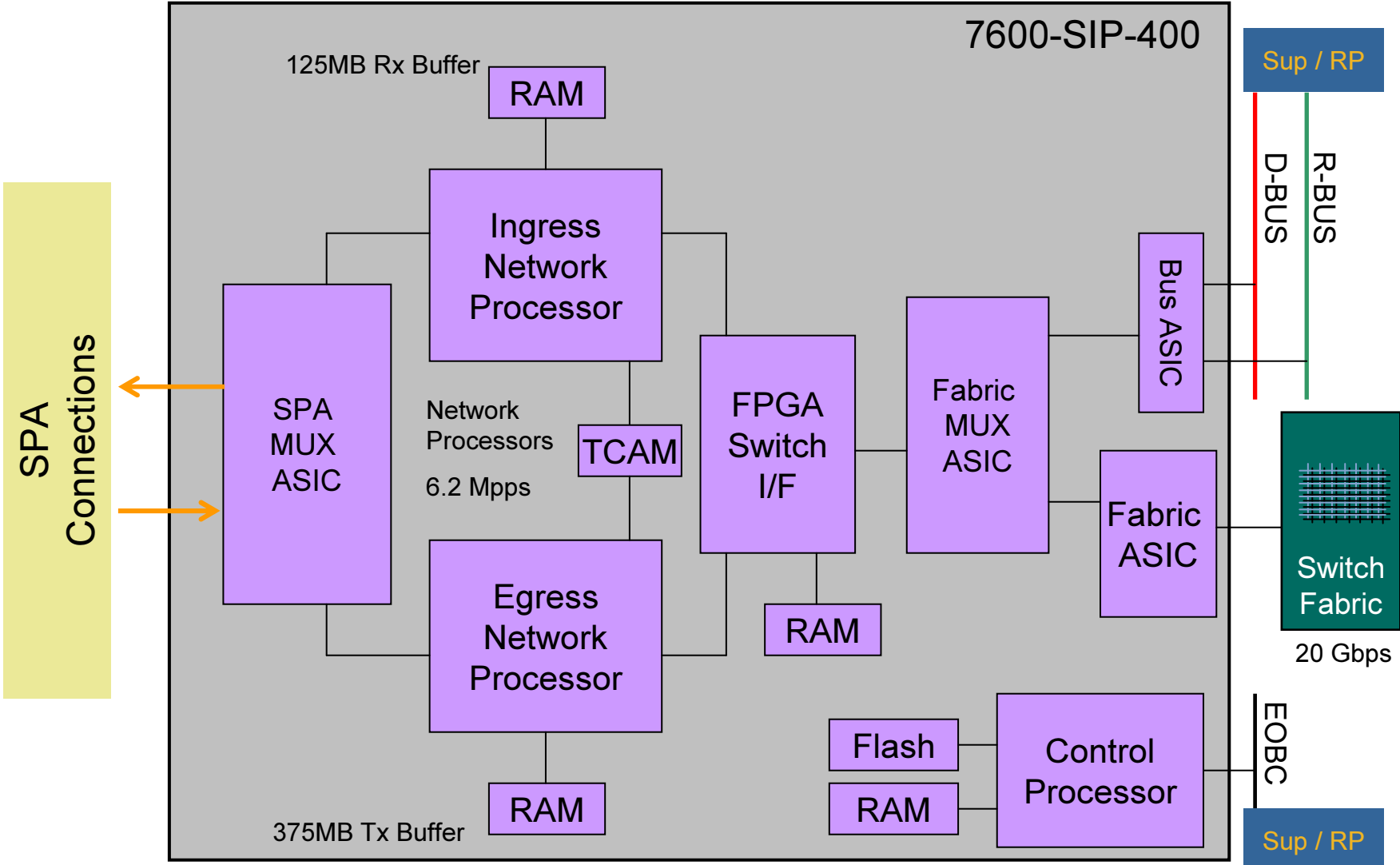
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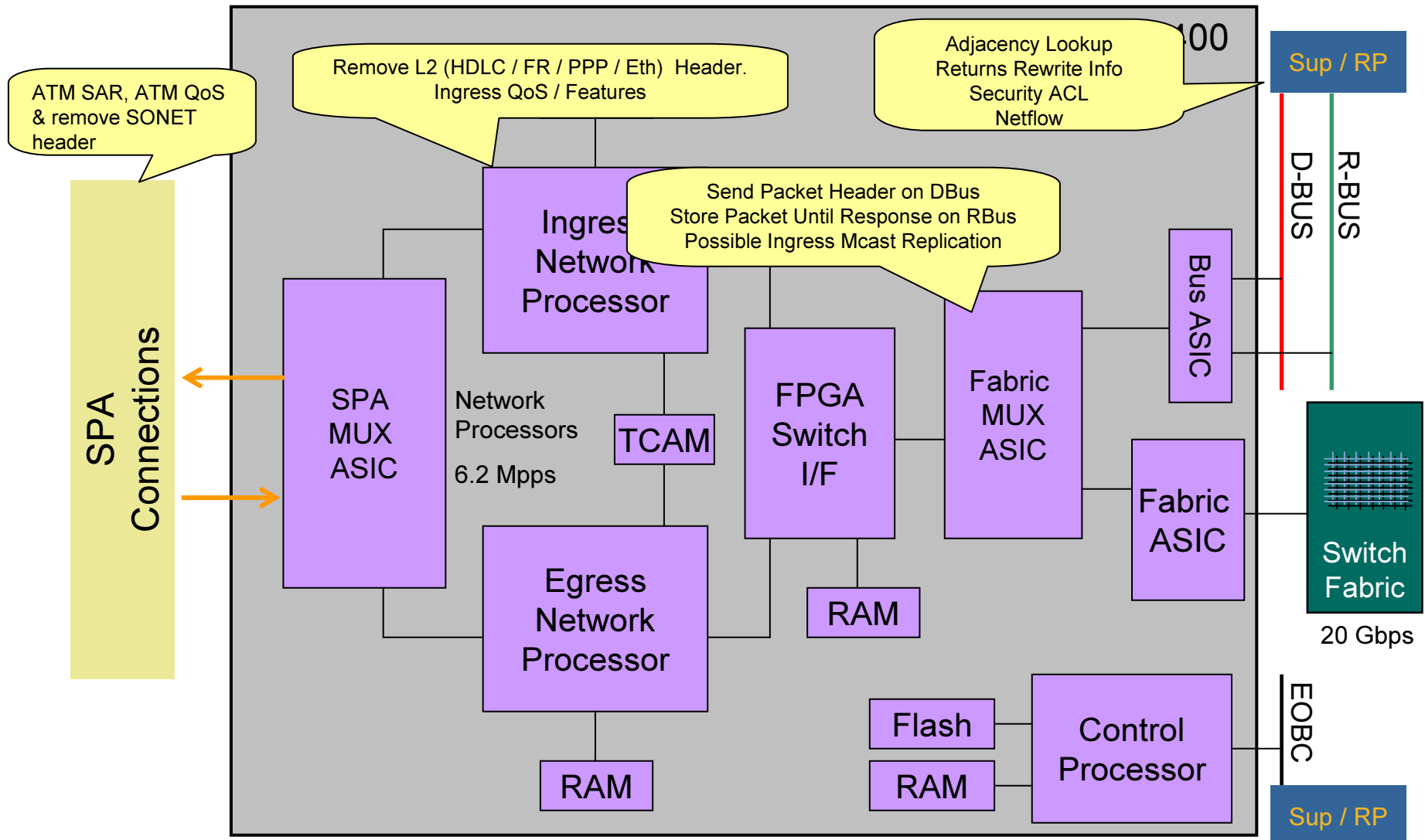


7600-SIP-400 Card Architecture

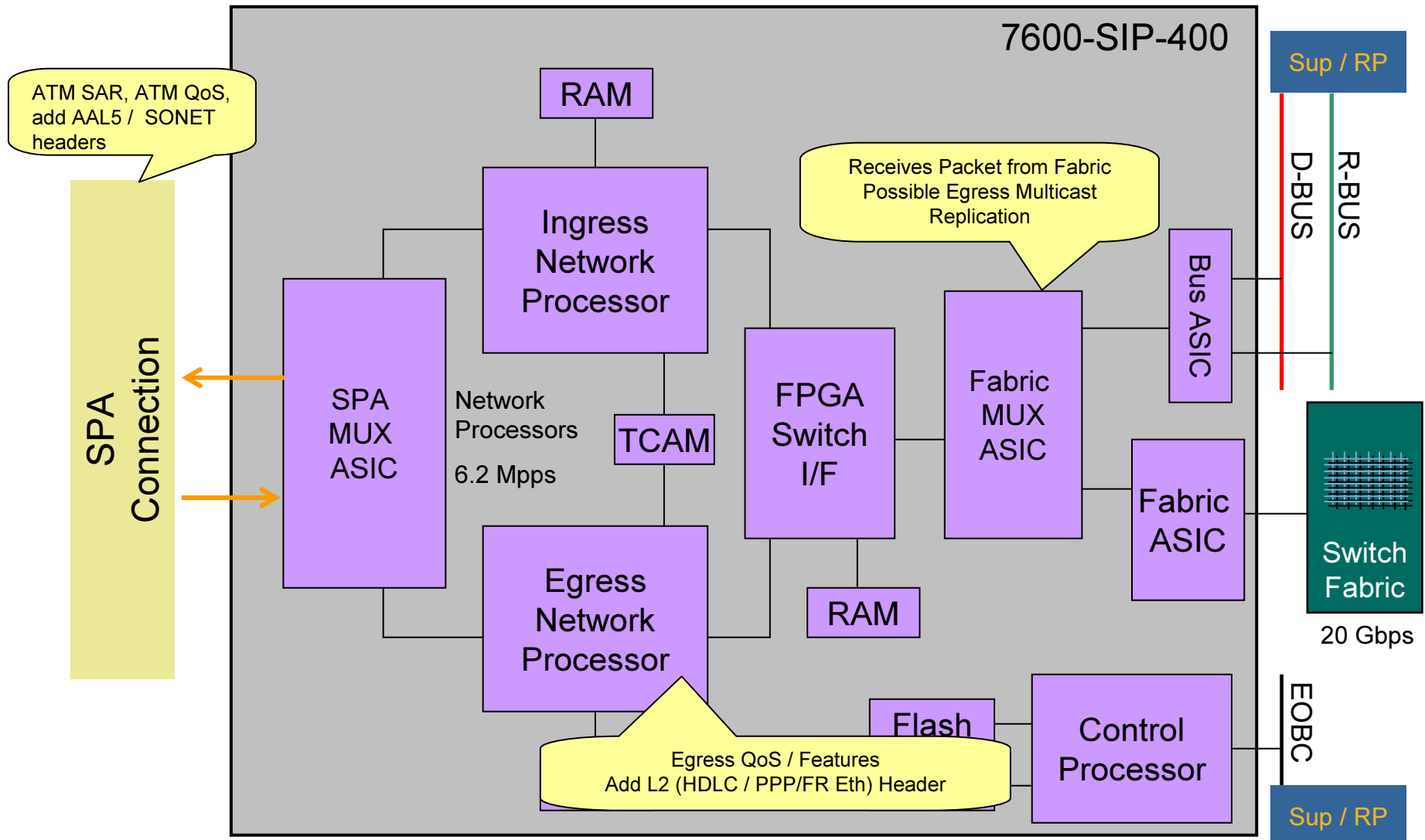
7600-SIP-400 Architecture



7600-SIP-400 Ingress Packet Processing



7600-SIP-400 Egress Packet Processing





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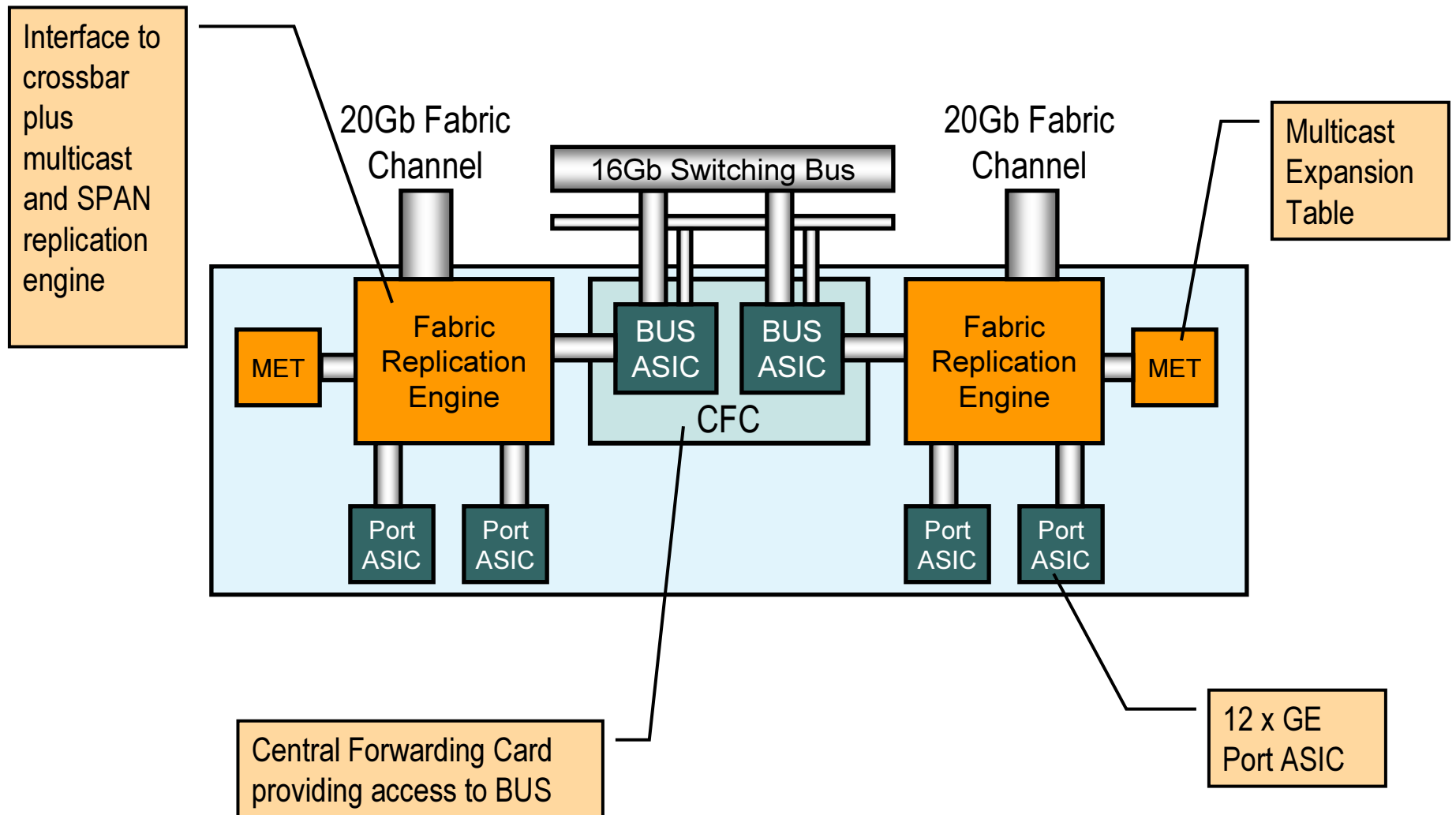
7600 Router Architecture



LAN Card Architecture

LAN Linecard Architecture

CEF720 Linecards (Centralized Forwarding)



LAN Linecard Architecture

CEF720 Linecards (Distributed Forwarding)

