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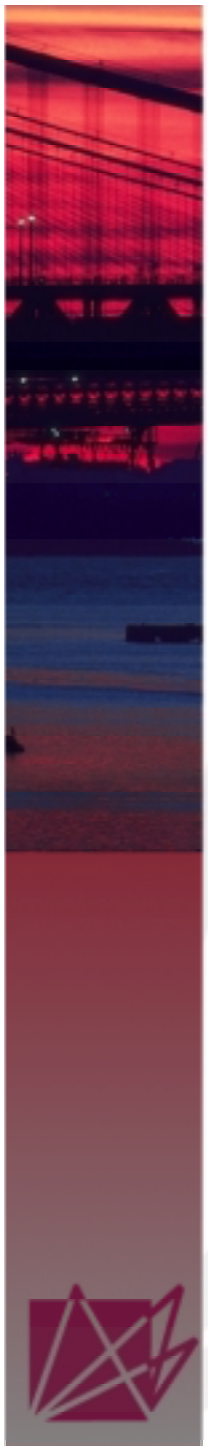
StarFabric
Control Planes

Scalable & Redundant



Control Plane Applications

- **High End Communication Equipment**
  - **Optical switches/routers**
  - **Core switches/routers**
  - **DWDM transport systems**
- **High End Industrial Control**
- **Any application requiring >100 Mbps or more in the control plane!**

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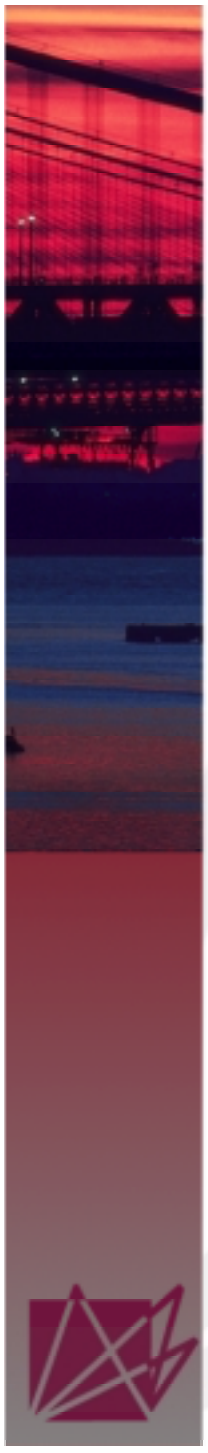
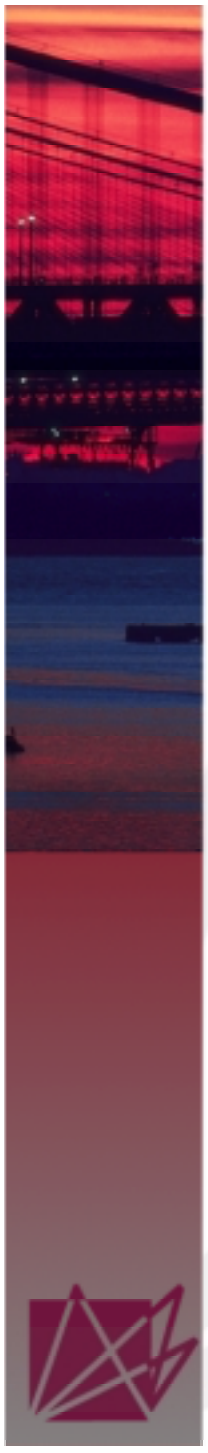


Control Plane: Today's Issues

- Customers are demanding highly available communication and embedded systems.
- Many systems today provide redundant switch blades and data planes but don't provide redundant control planes.
- Ethernet based control plane are difficult to scale
  - Moving to GigE is proving to be problematic due to protocol processing overhead, cost, power and board space
- PCI based control planes difficult to scale
  - PCI-to-PCI bridges are problematic since they create a single point of failure, are a shared bus architecture and increase latency.



Typical Communication Application

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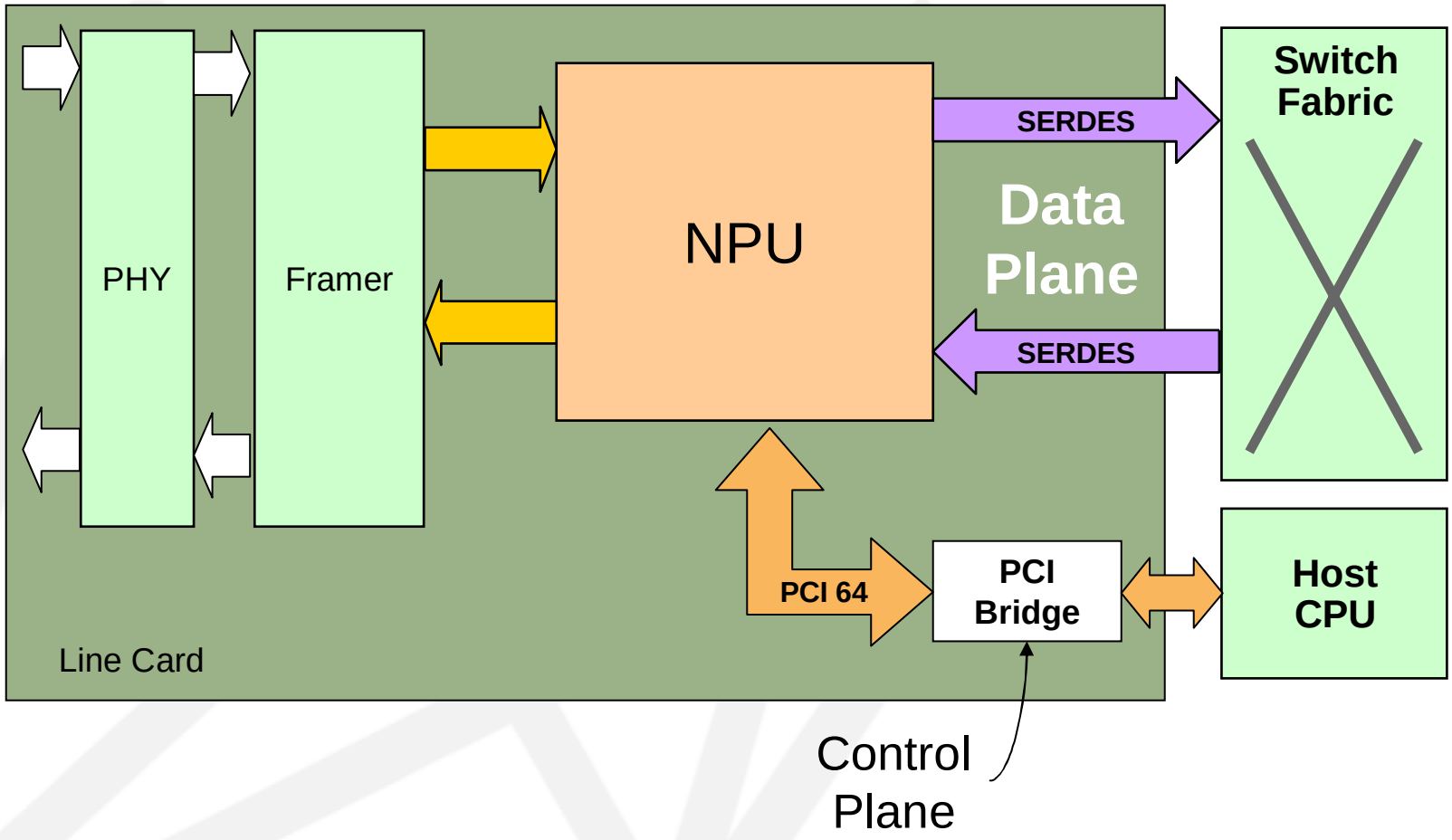
Network processor based line card →PCI as control plane



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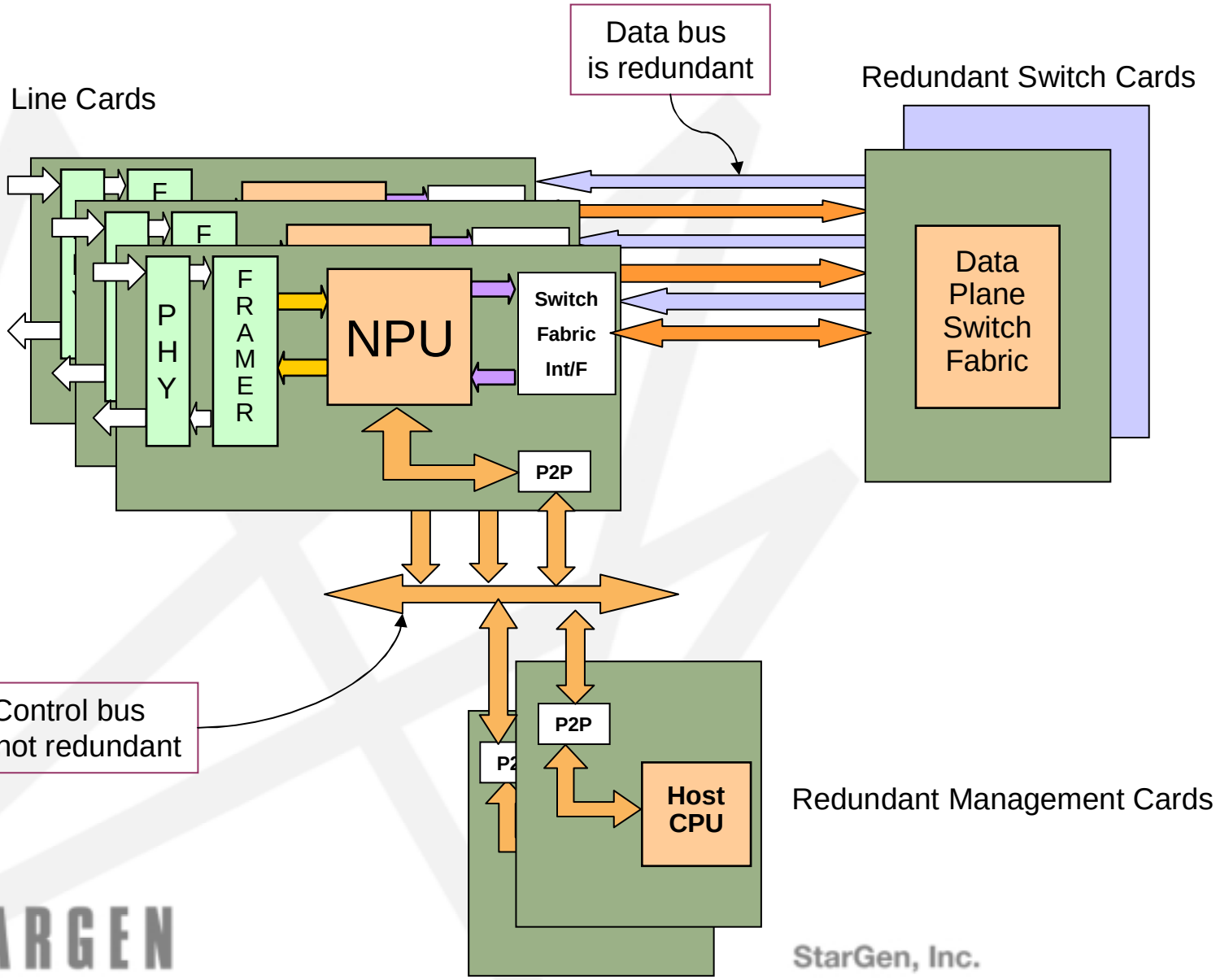
System Implementation



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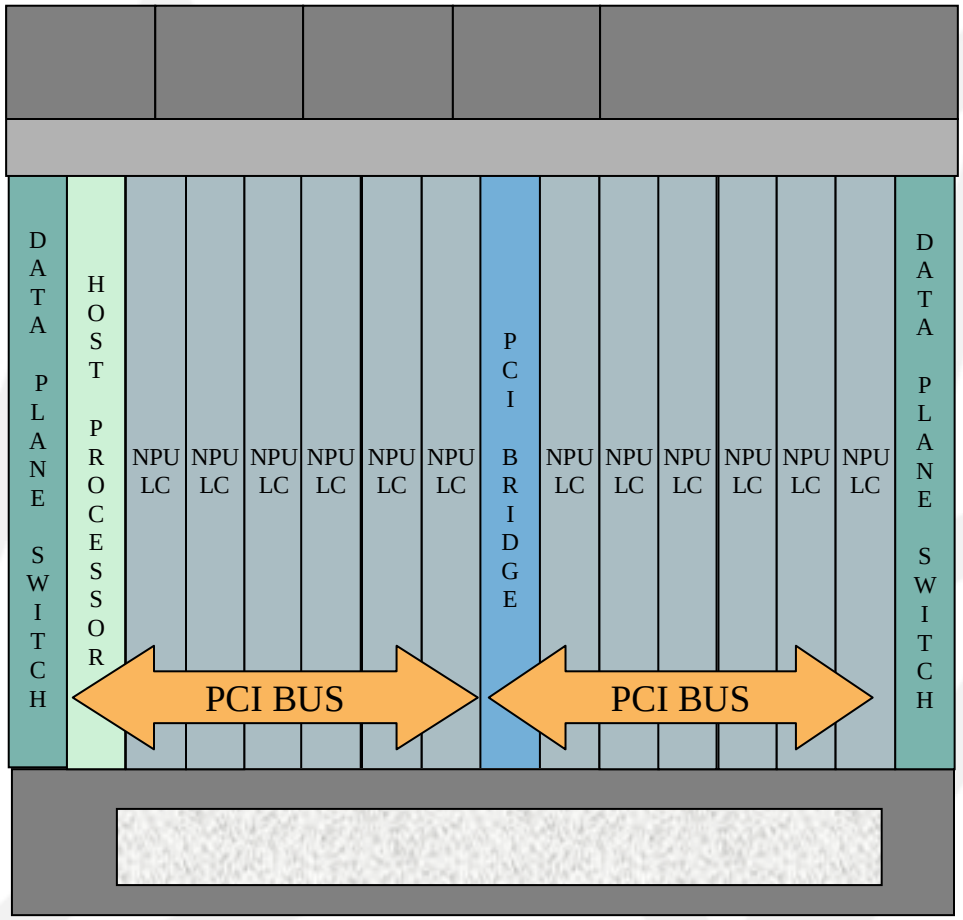
Typical System Today



ISSUES:

- Limited "Hot Swap"
- Limited high availability
  - a single board failure could take down the entire bus segment
- No Redundancy for Control Plane
- Limited scalability
  - each board has a PCI-PCI bridge creating complex hierarchies and high latency.
  - Total bandwidth is fixed.
- Chassis to Chassis communication expensive

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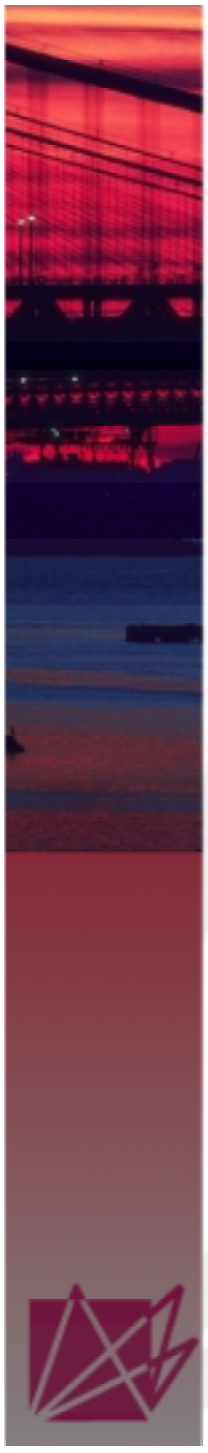

StarFabric Control Plane

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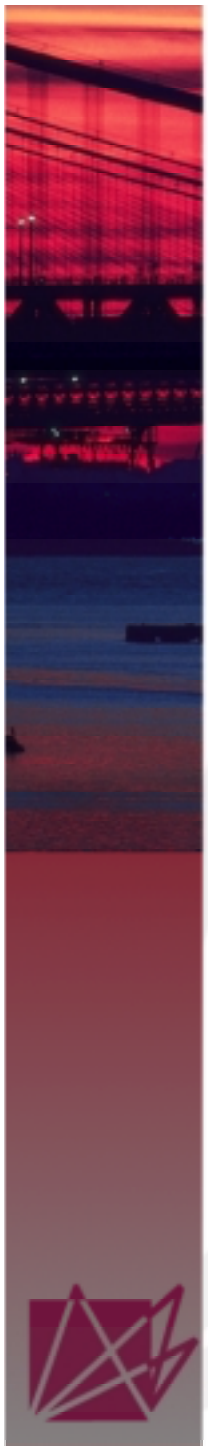
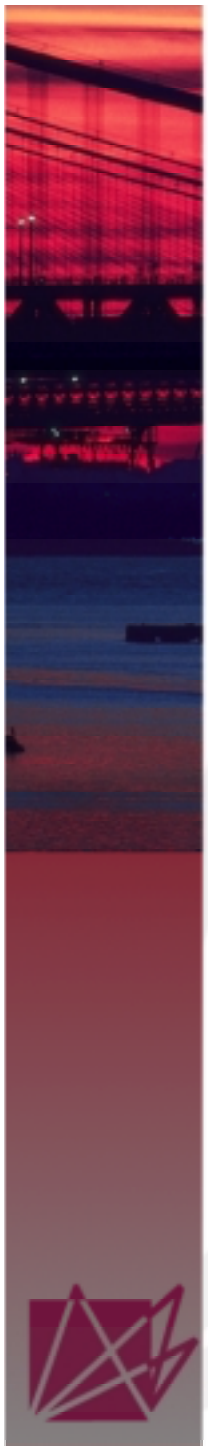


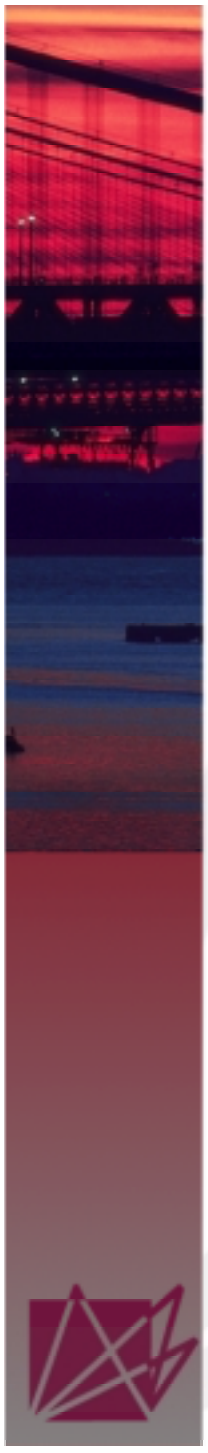
Why use StarFabric as the Control Plane?

- If using 10/100BaseT and need >100Mbps
  - Move to GigE is problematic
    - Protocol Processing, Cost, Power, Real Estate
- If using PCI
  - Limited Scalability
  - High Availability expensive to achieve
- StarFabric Addresses customer needs:
  - Scaling control plane to multiple 100Mbps
  - Increase in high availability
  - Leverage existing investment PCI
  - Avoid processing overhead of Gigabit Ethernet



StarFabric Features

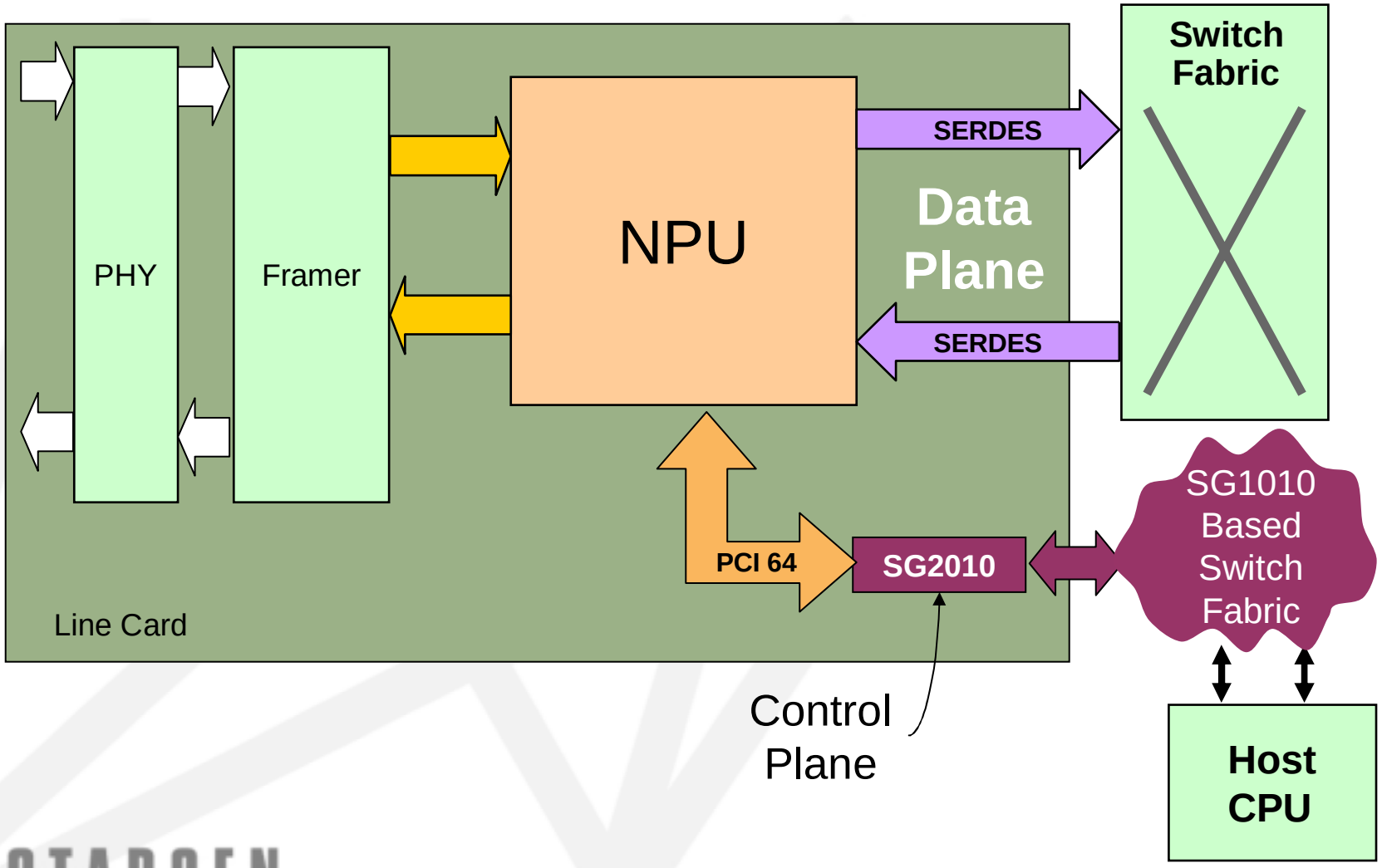
- Speed options of 500 Mbps, 1Gbps, 2 Gbps and 4 Gbps.
- Scalability
  - 100's of line cards can be efficiently supported.
- High Availability in silicon
- 100% PCI compatible
  - Can be implemented with zero software changes
- Low processor overhead
  - Cost of one network message is 20 instructions total vs. GigE's 10,000 instructions plus 10 per byte.
- Multicast Routing
  - When every line card needs same information FAST.



StarFabric Features

- **Cost effective, easy to implement method of providing redundancy on the control plane**
- **Provides glueless interface to PCI interfaces on NPU as well as connection to host processors**
- **Scalable serial switch interconnect for flexible backplane and chassis to chassis implementation**
- **Efficient intra-system communication (unlike Ethernet does not require SW communication stack)**
- **Architectural Options**
  - Heterogeneous Computing
  - Independent and Global processor domains
  - Distributed Computing
  - Distributed Control

Line Card with StarFabric



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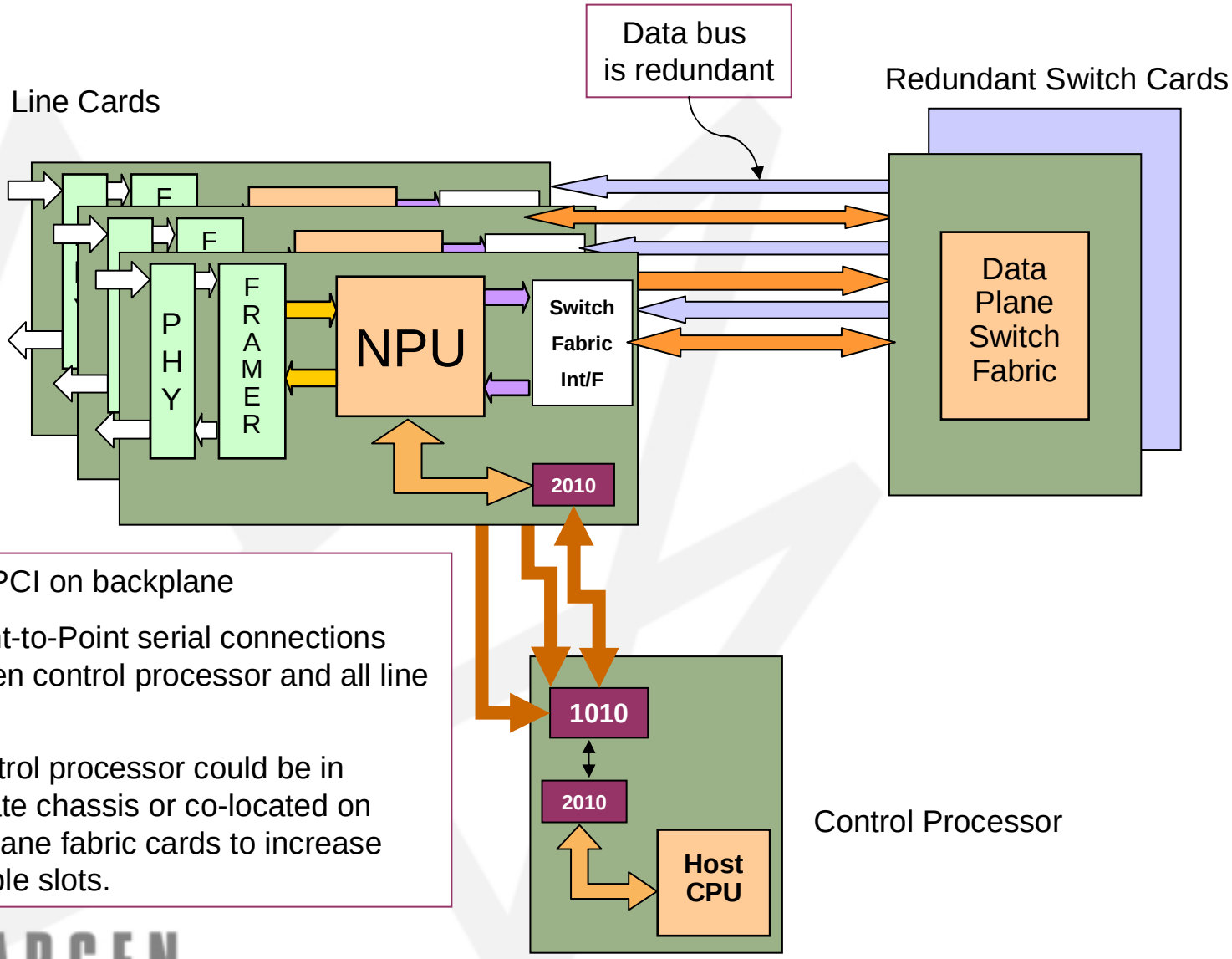
System Implementation



- No PCI on backplane
- Point-to-Point serial connections between control processor and all line cards
- Control processor could be in separate chassis or co-located on data plane fabric cards to increase available slots.

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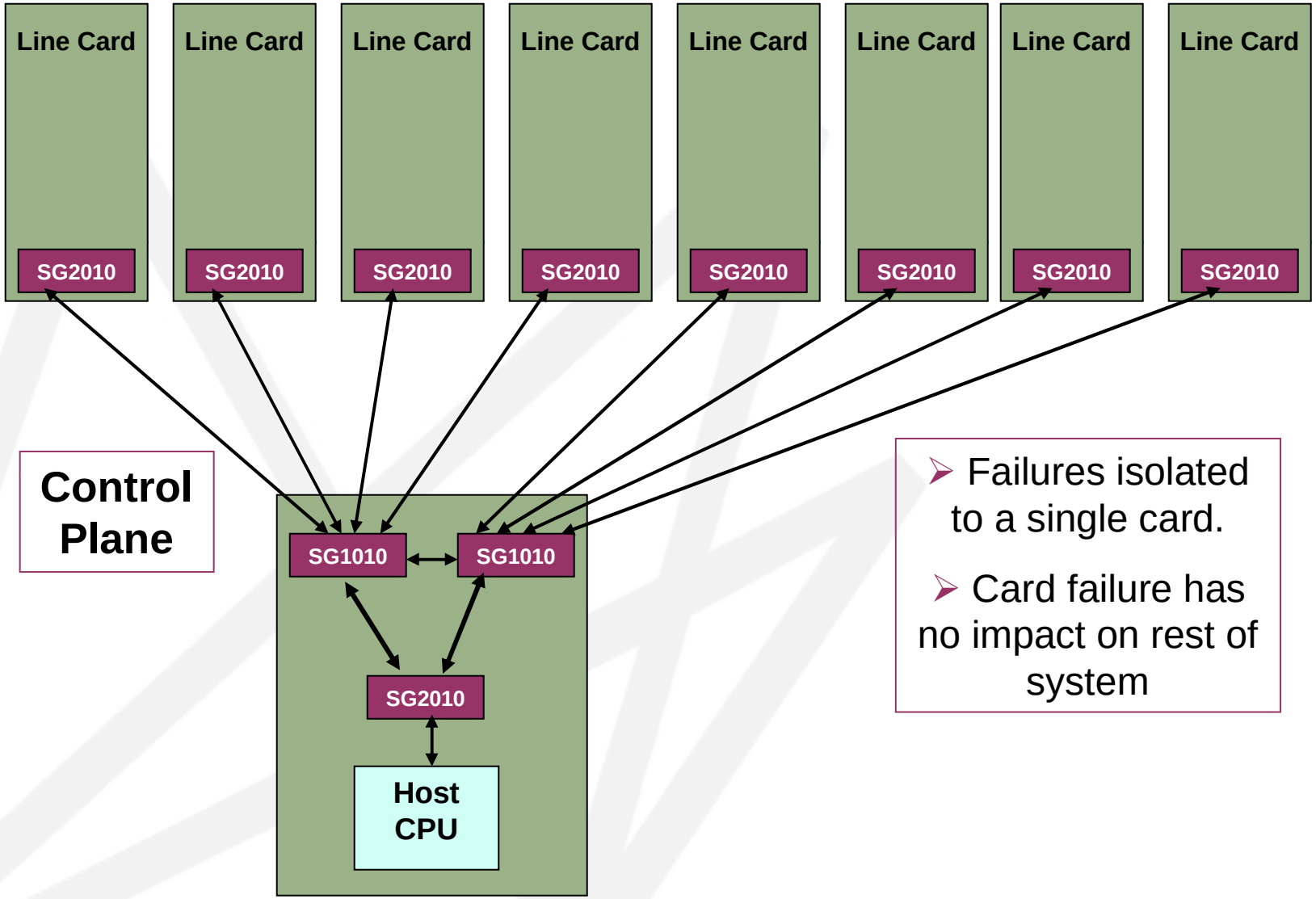
8 Line Card Example



- Failures isolated to a single card.
- Card failure has no impact on rest of system

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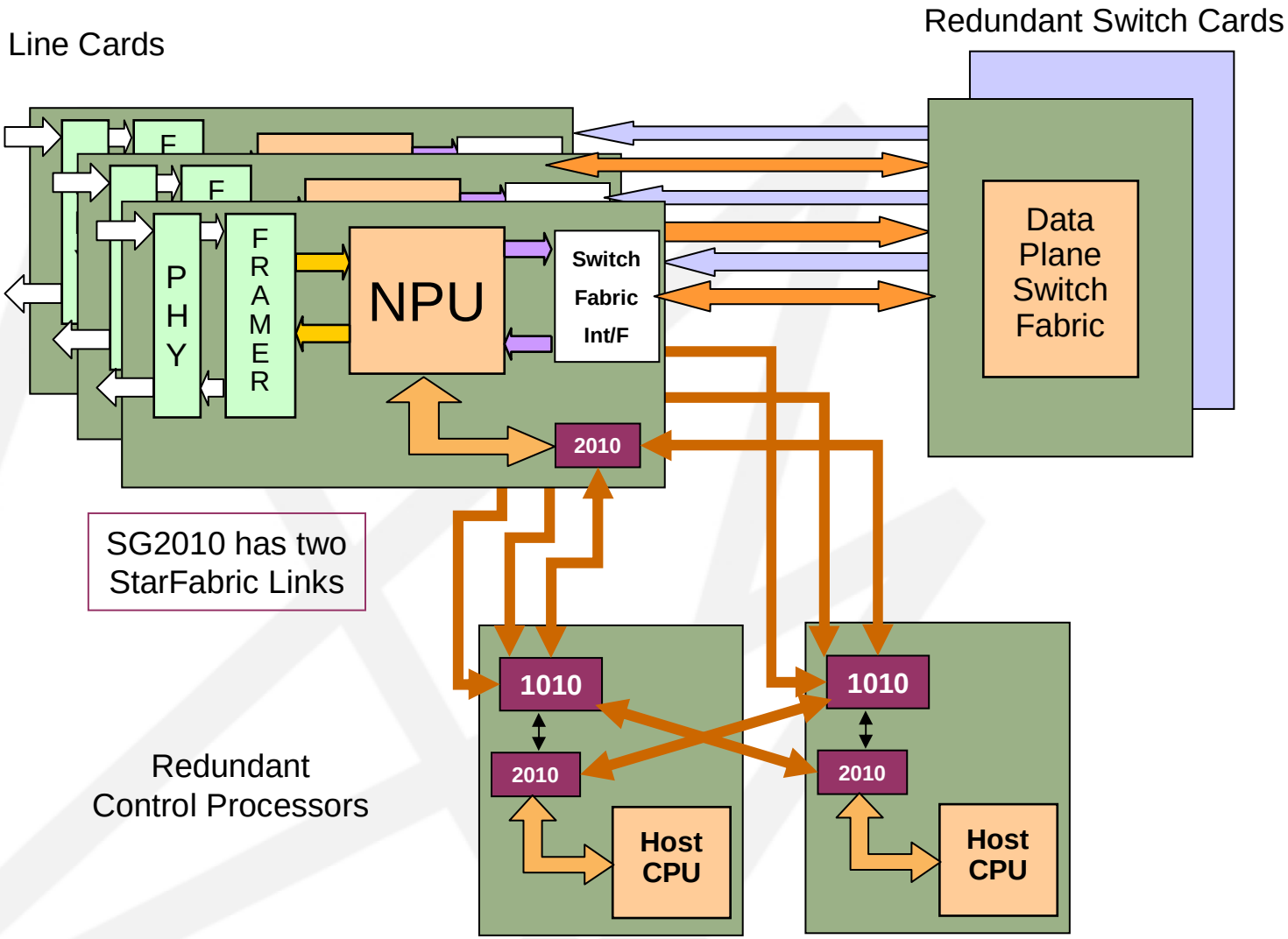
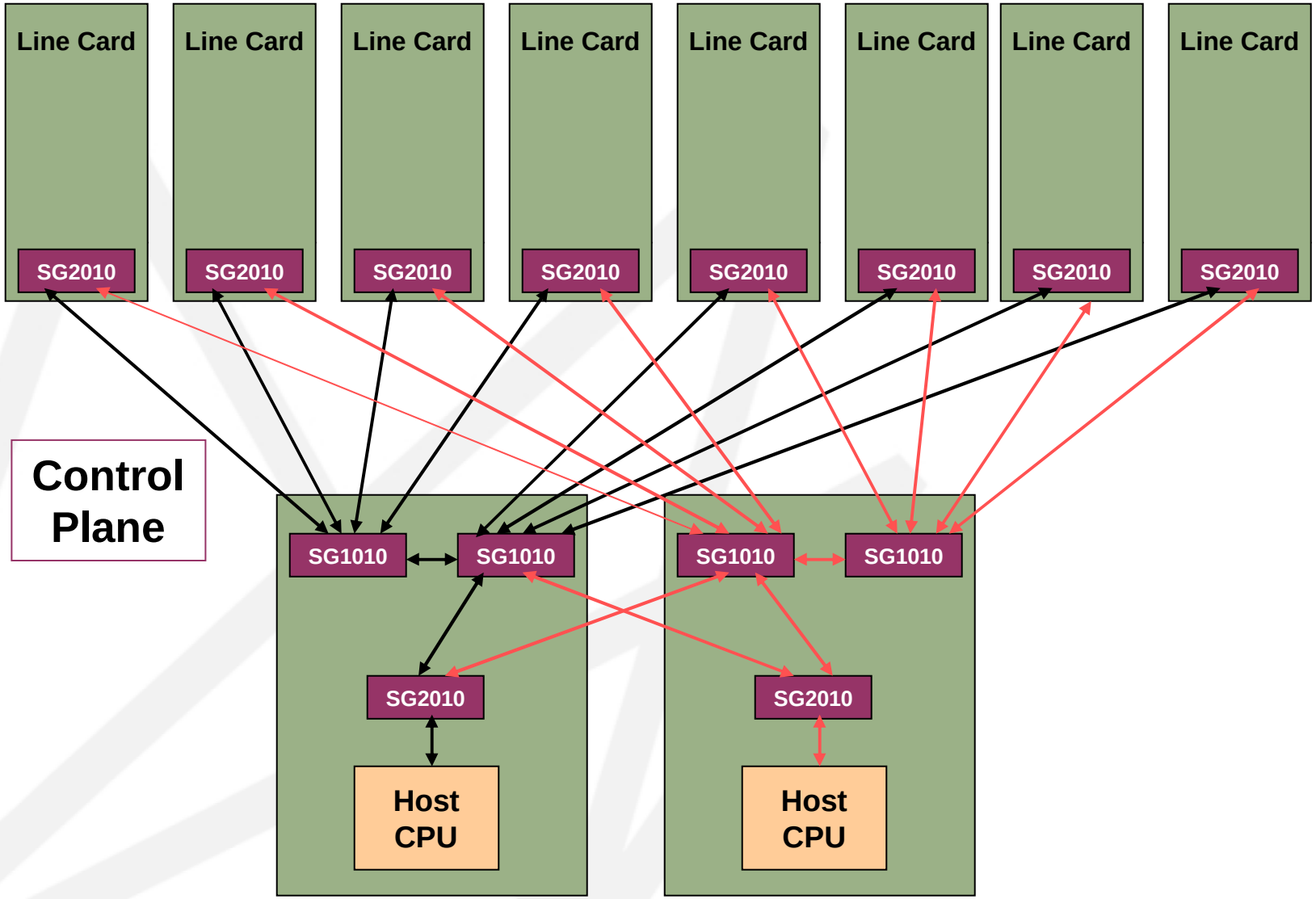
Redundant System Implementation



Redundant Configuration



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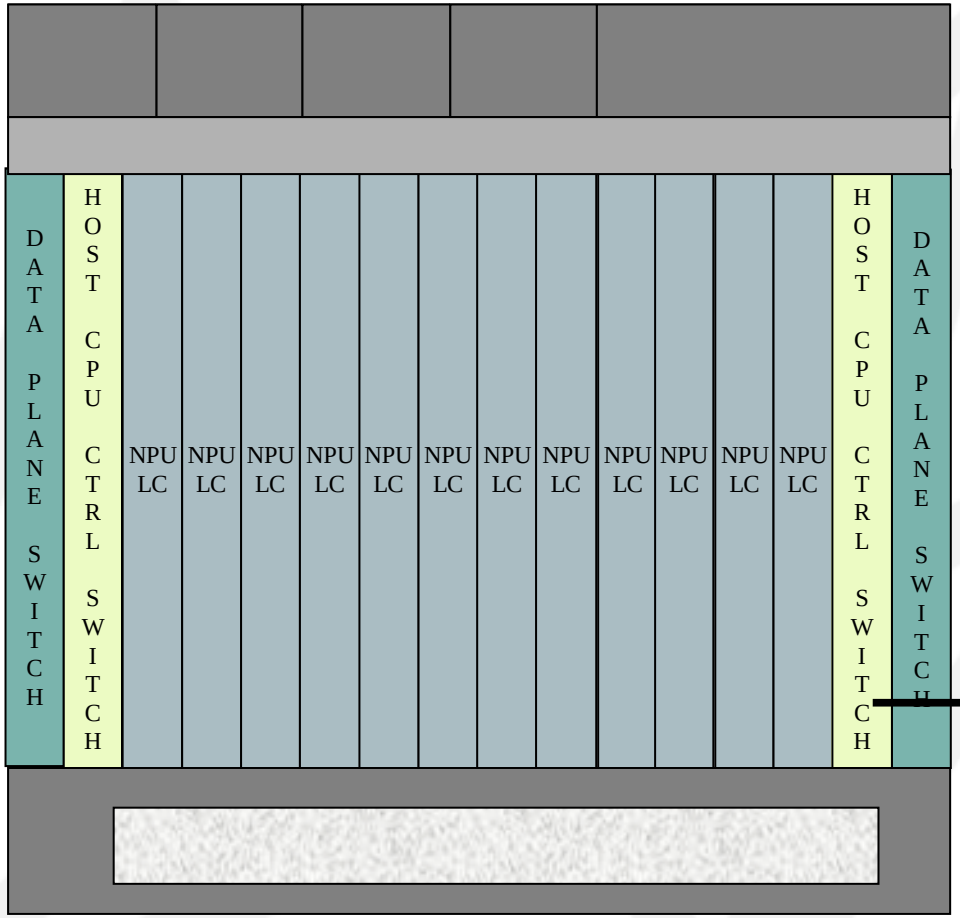
Fully Redundant System Implementation



SOLUTION

- ➔Fully redundant Control Plane
- ➔Enable Host Fail-over
- ➔High availability
- ➔Scalable to multiple chassis
- ➔Low Power
- ➔Low Cost

To another chassis

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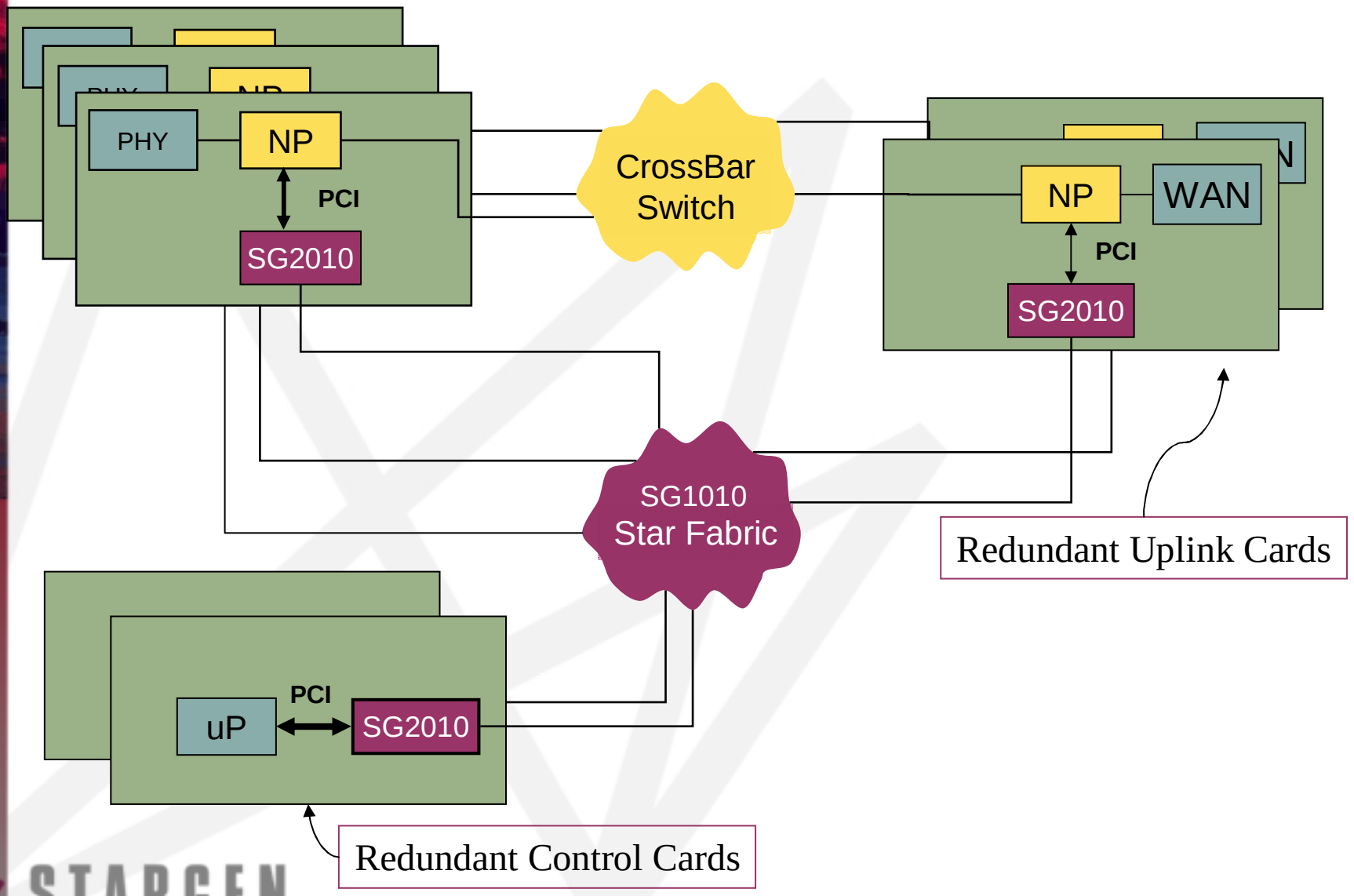
Example:
Core Switch/Router Control Plane



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