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OCP SUMMIT

OCP NIC 3.0 Design and Implementation Experiences

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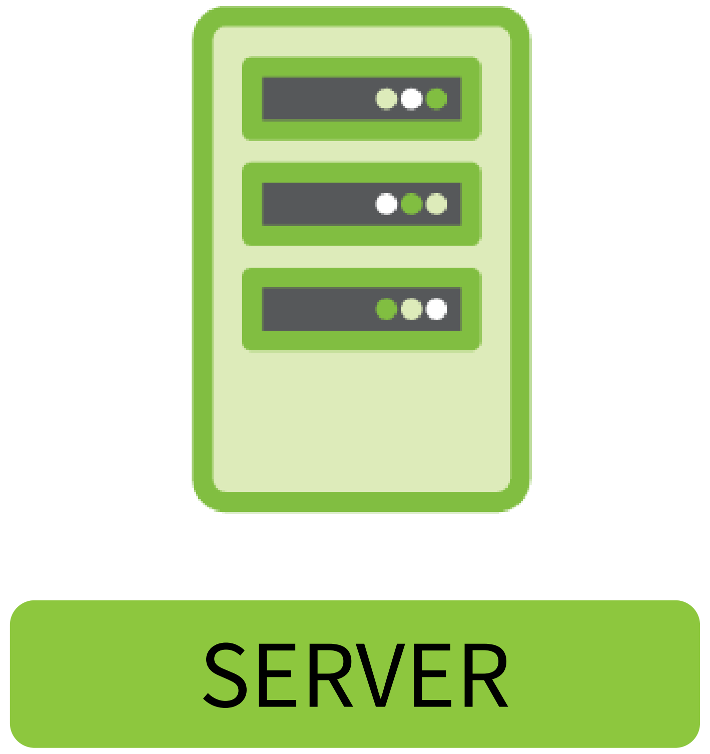
Agenda



- OCP NIC 3.0 Design Specification Overview
- Mechanical Design
- Electrical Design
- Thermal Considerations
- Management
- Firmware Design

OCP NIC 3.0 Design Specification

SERVER

- Third Generation of NIC specification
- Defines two form factors: SFF and LFF
- Supports up to 32 PCIe lanes
- Primary and Secondary connectors
- Covers single host, multi-root, and multi-host environments
- DMTF standards based Manageability
- Security considerations

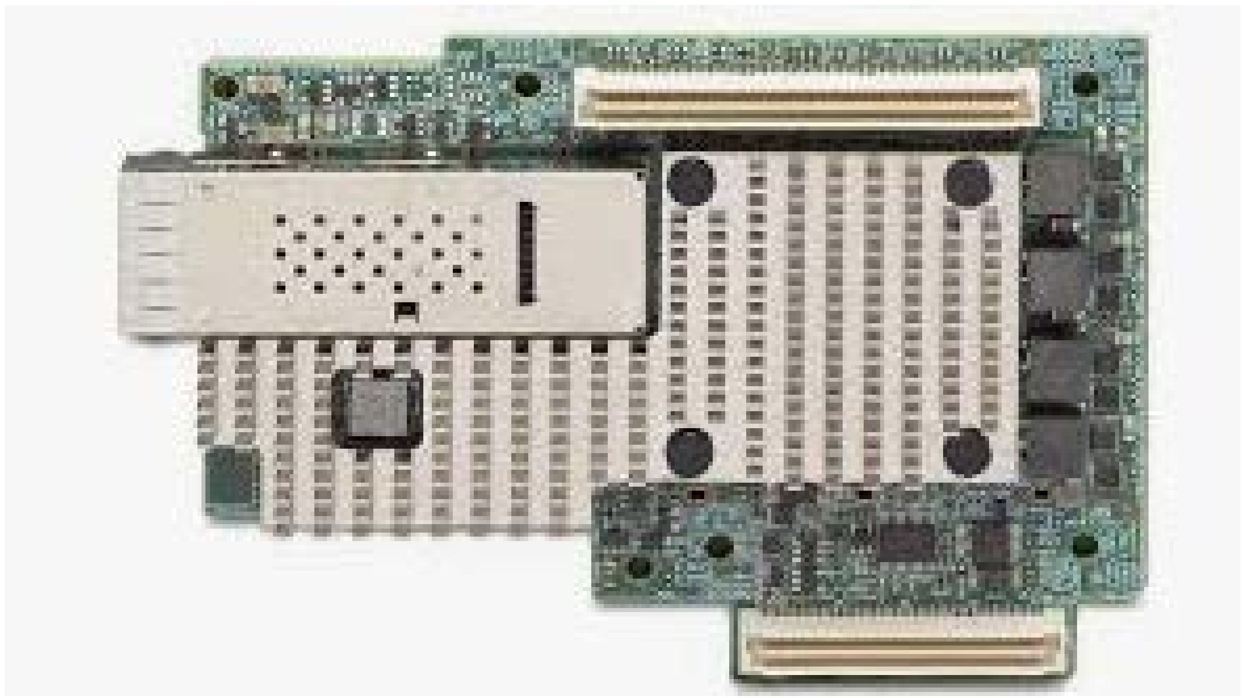
Specifications

Mechanical Design

Evolution of Server NICs

A variety of form factors are available today.

- PCIe NICs, NDC's
- Mezzanine cards.
- OCP Mezz 2.0
- OCP NIC 3.0



1x4 25G SFP28

1x2 10G RJ45

1x4 1G RJ45

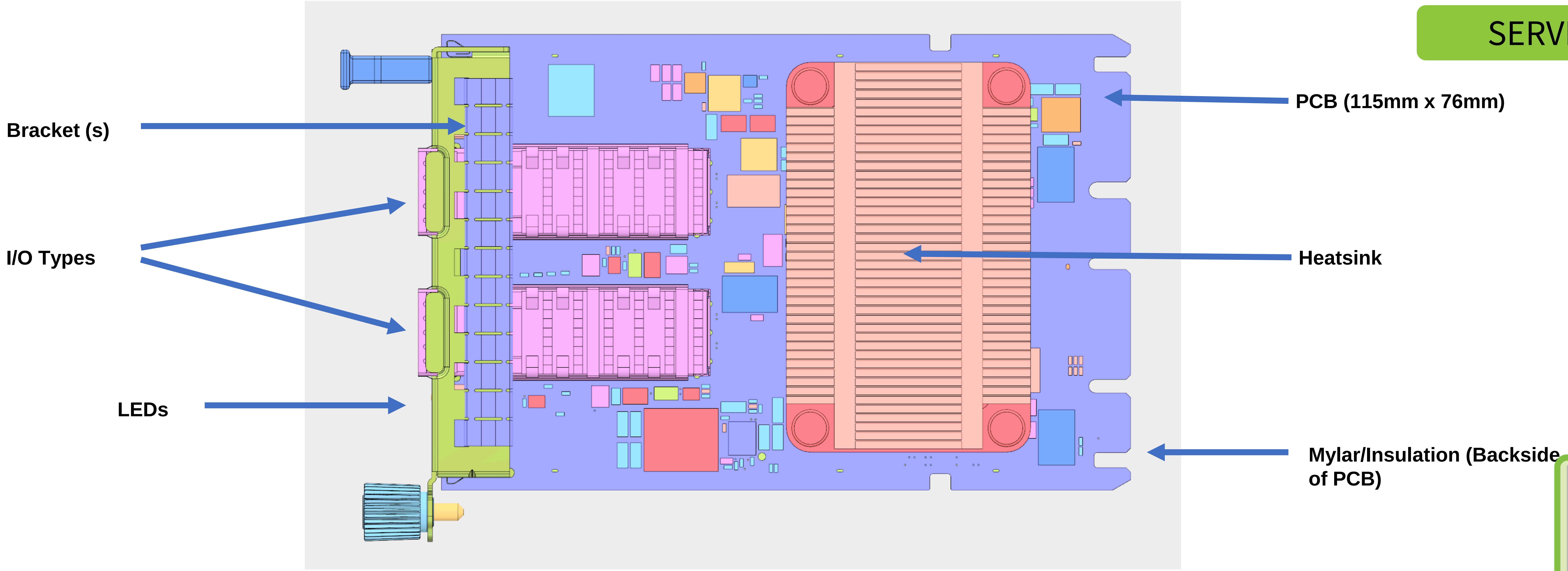
1x2 1G RJ45

1x2 50G QSFP28

OCP NIC 3.0 CARDS

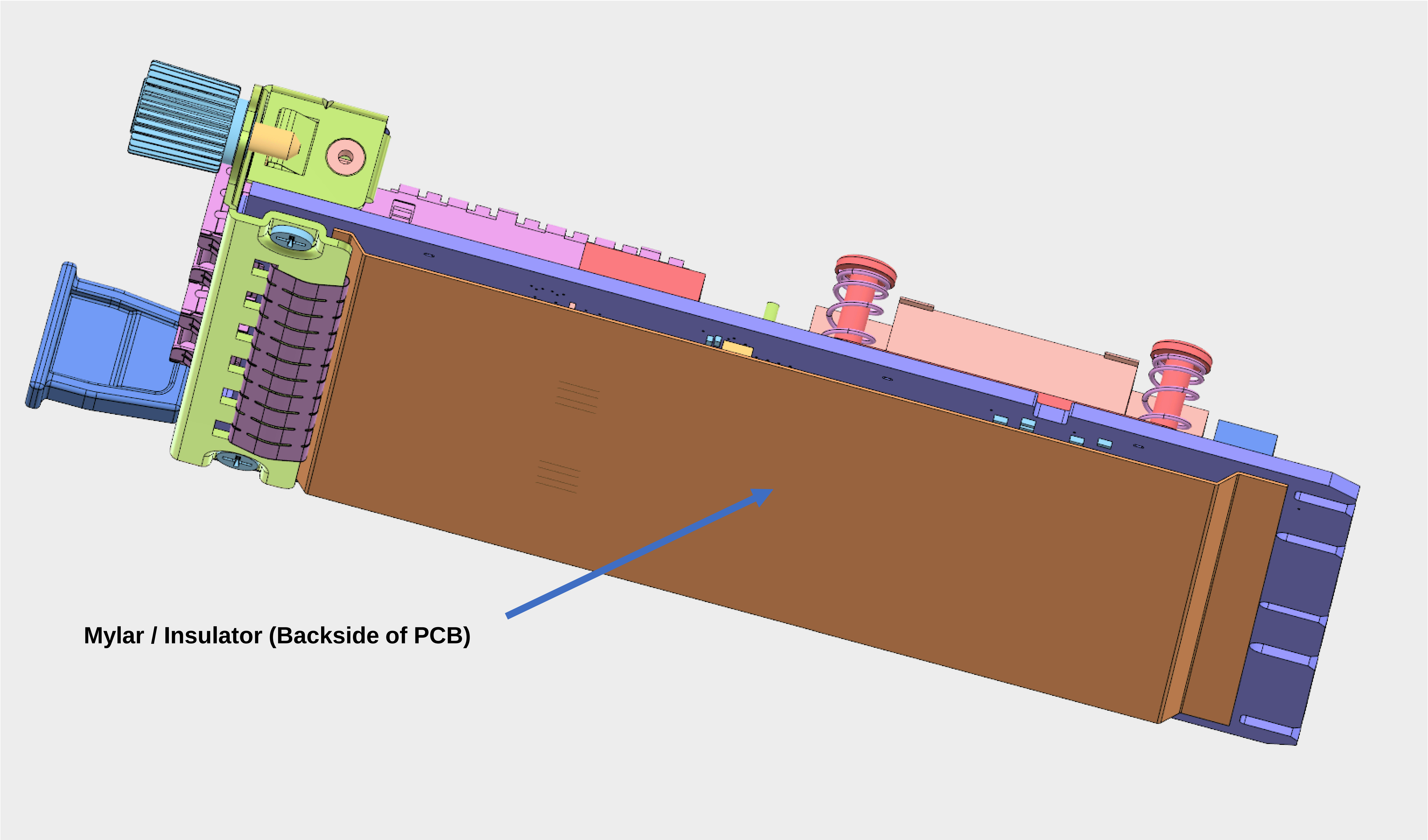
Mechanical Design (cont'd)

SERVER



Specifications

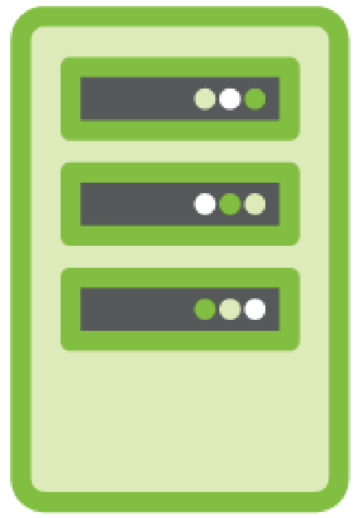
Mechanical Design (cont'd)



SERVER

Specifications

Mechanical Design Experience



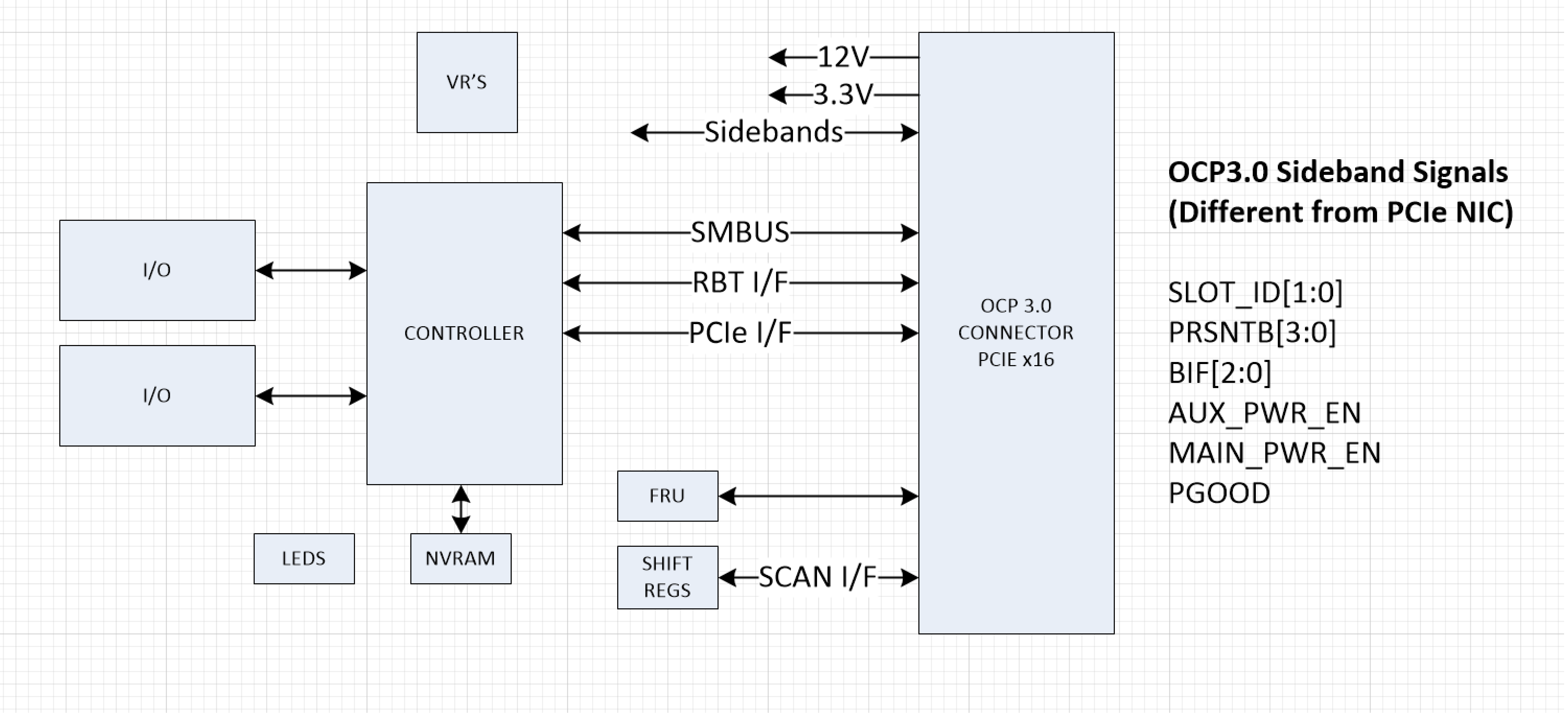
SERVER

- PCB Form Factor
  - Easy to implement; Similar to PCIe NIC
- Bracket(s)
  - Good design but a ‘little’ challenging; Involve more parts; Hard to procure offshore parts.
  - Good to have different bracket options to choose from.
  - Challenging to add air vents some cases.
- Heatsink Design
  - More space than 2.0; Single height restriction makes life much easier ☺.
- Mylar/Insulator
  - Provides good insulation on back side;

Specifications

Electrical Design

Typical Block Diagram of an OCP NIC 3.0



OCP3.0 Sideband Signals
(Different from PCIe NIC)

SLOT_ID[1:0]
PRSNTB[3:0]
BIF[2:0]
AUX_PWR_EN
MAIN_PWR_EN
PGOOD

SERVER

Specifications

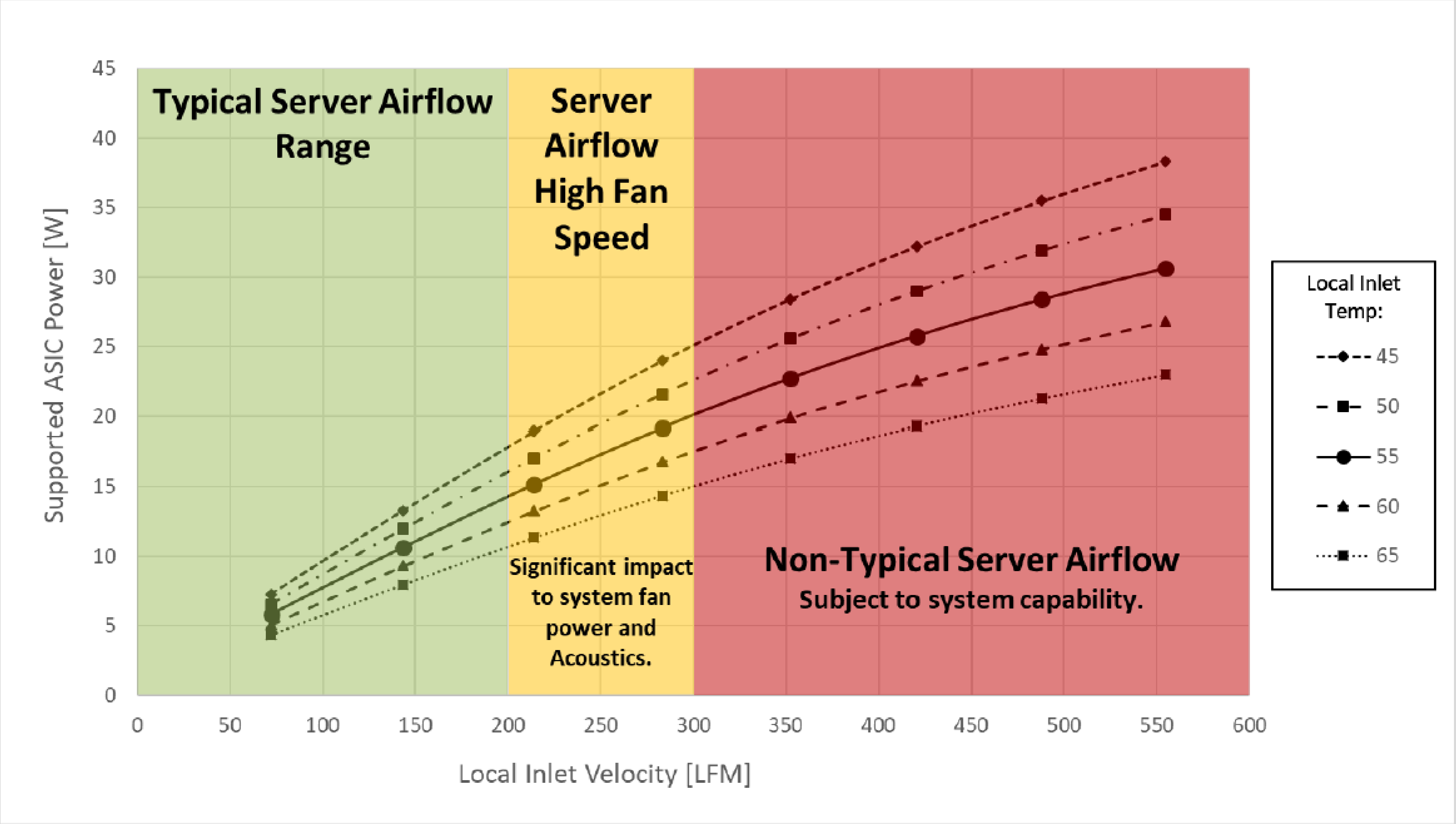
Electrical Design - Experience

SERVER

- Similar to PCIe NIC design with a few new signals.
- Pay attention to BIF and SLOT_ID signals.
- FRU Write Protection is a requirement.
- RBT signals timing (Spec is TBD)
  - Hard to meet max trace lengths (timing); Clock routing;
  - Will be difficult to meet timing for LFF’s.
- Bus isolation requirements on a few signals.
- Shift registers (New)
  - LED status; Board power and temperature status.
- New LED wavelengths requirements (Higher Vf !)
  - Difficult to place LEDs and not blocking airflow!

Specifications

Thermal Design



***From OCP v0.85 Spec

- Challenging to meet "Typical Server Airflow" for high power cards
  - → Stay under 200LFM for ~20W card.

SERVER

Specifications

Thermal Considerations (Simulation)

OCP 3.0 Thermal Test Fixture

Figure 118: Thermal Test Fixture Airflow Direction

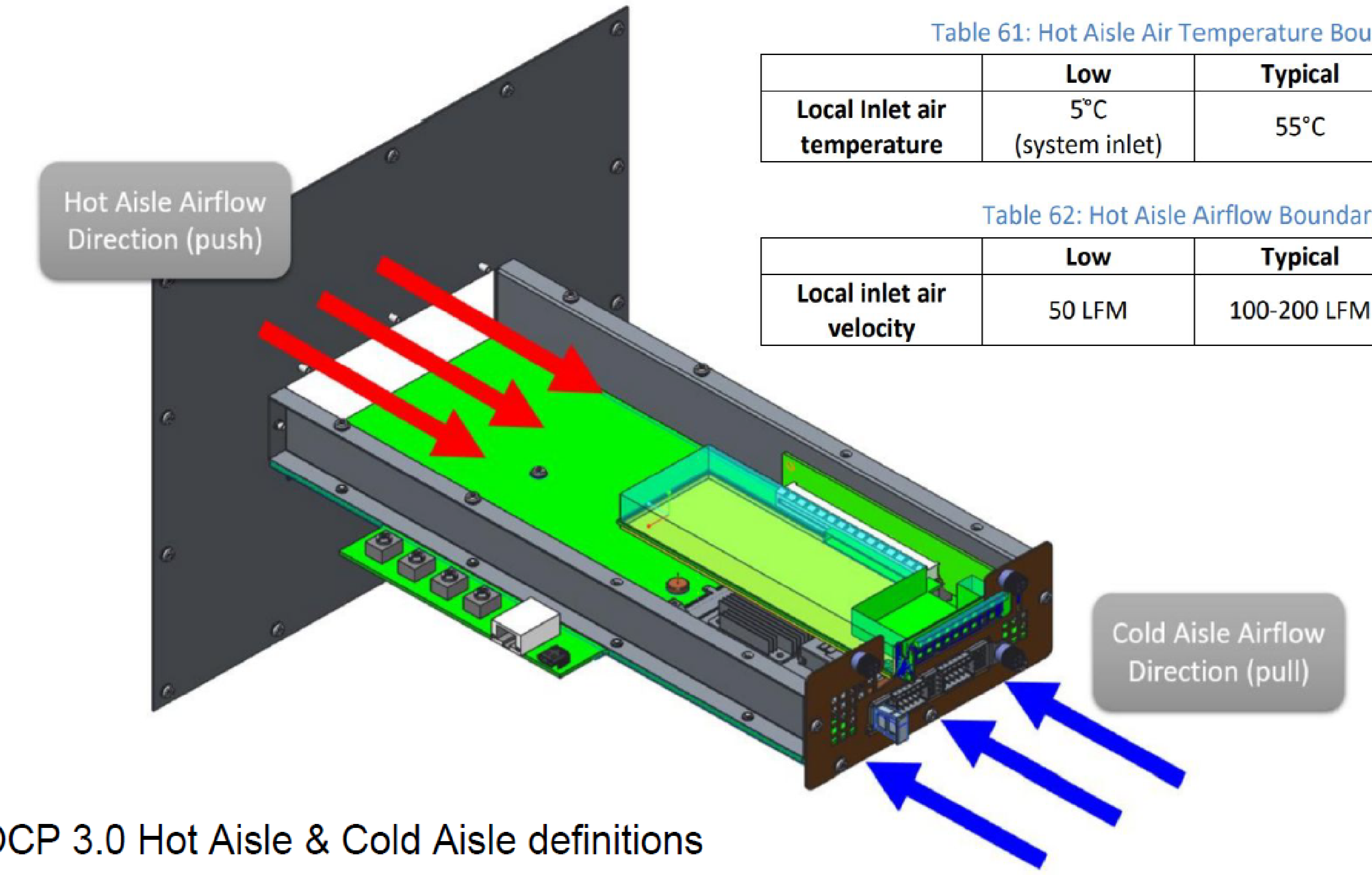


Table 61: Hot Aisle Air Temperature Boundary Conditions

	Low	Typical	High	Max
Local Inlet air temperature	5°C (system inlet)	55°C	60°C	65°C

Table 62: Hot Aisle Airflow Boundary Conditions

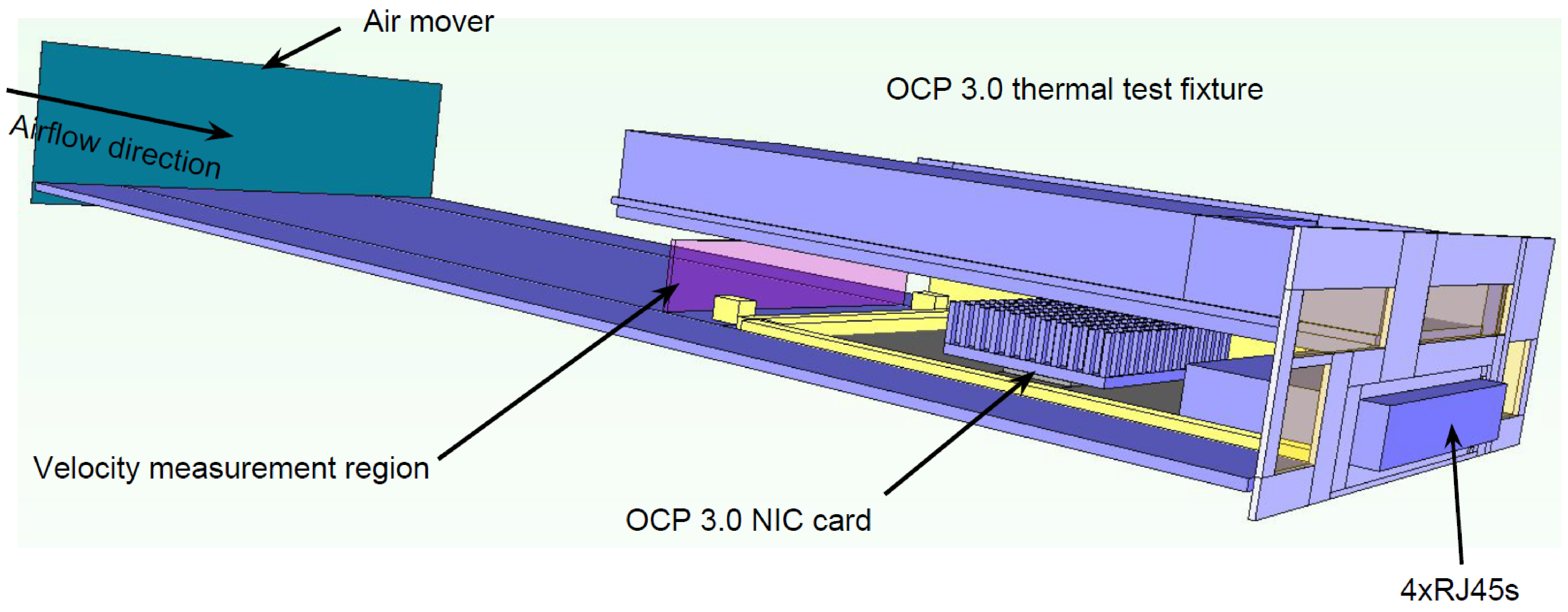
	Low	Typical	High	Max
Local inlet air velocity	50 LFM	100-200 LFM	300 LFM	System Dependent

OCP 3.0 Hot Aisle & Cold Aisle definitions

*****3D CAD Thermal Model from OCP Spec**

System Model

Enclosure dimensions LxWxh = 328x128x40.6mm
Hot Aisle/55C/60C/65C conditions



*****Actual thermal model**

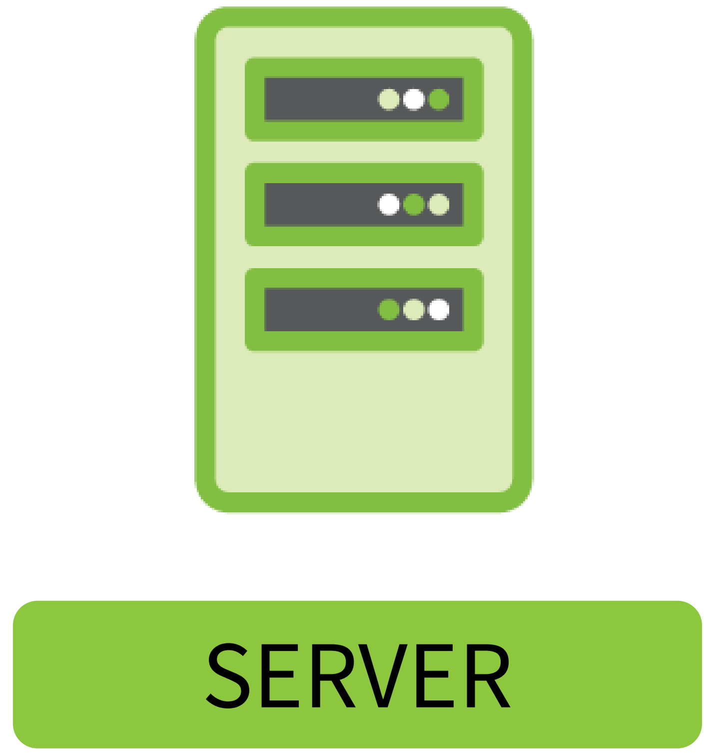
Thermal Considerations (Design)

SERVER

- Definitely need vents on the bracket!
- Require adequate heatsink size.
- Thermal simulation a Must!

Specifications

Management



- Standards based manageability essential for interop
- Management Type: Recommend RBT+MCTP
- Sideband Interfaces: Support concurrency
- Self-shutdown: Optional but important
- FRU: dual-byte addressing not ubiquitous for small size FRU

Firmware Design Considerations

Hardware Root of Trust (RoT)

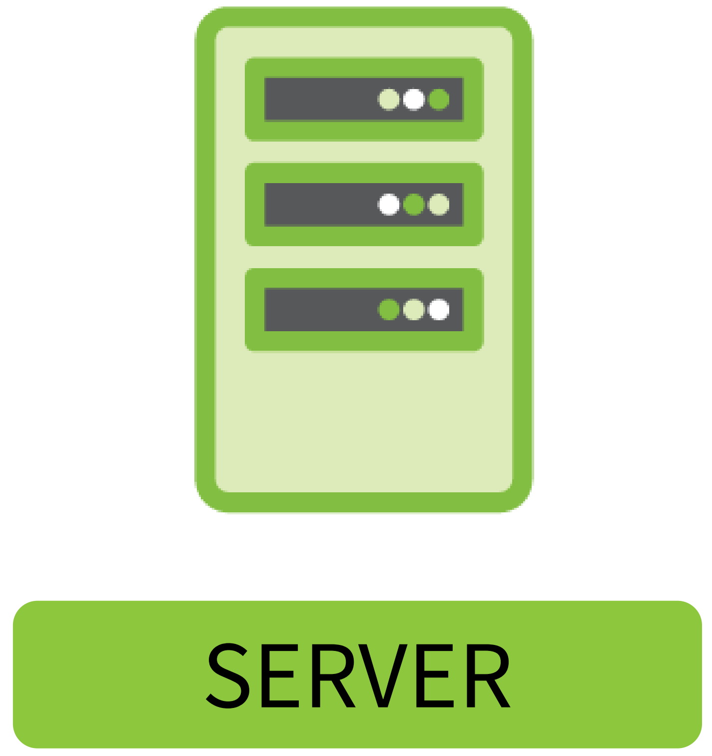
Secure boot

Secure firmware loading

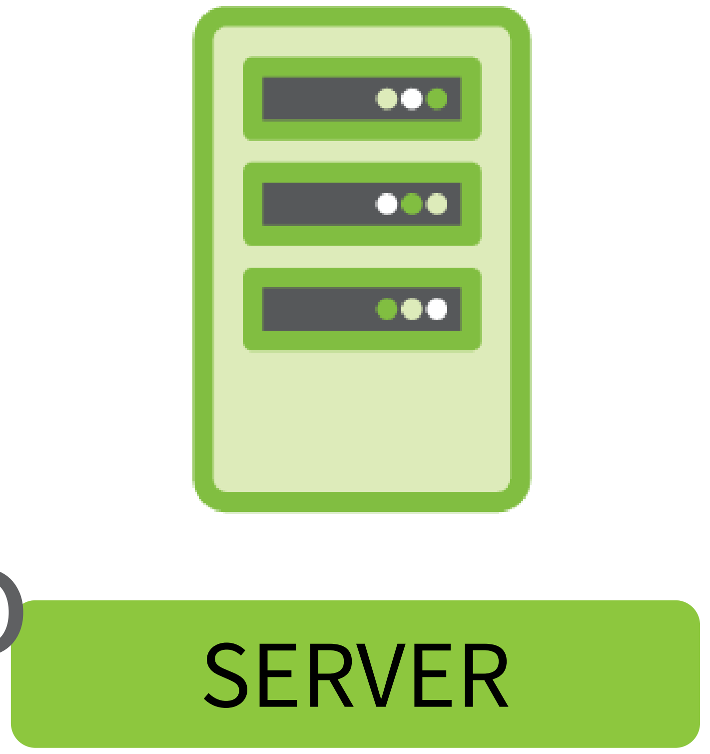
Secure firmware update

Encrypt sensitive NVRAM config data

Built in recovery from HW/FW failures



Summary



OCP NIC 3.0 is good for the industry and enables one to move from proprietary form factors

Broadcom is extending OCP NIC 3.0 from performance NICs to SmartNICs

Broadcom's Contributions to OCP NIC 3.0 Specification

- Manageability, Security, Pin definitions, Electrical, Mechanical, Thermal and Labeling –base requirements

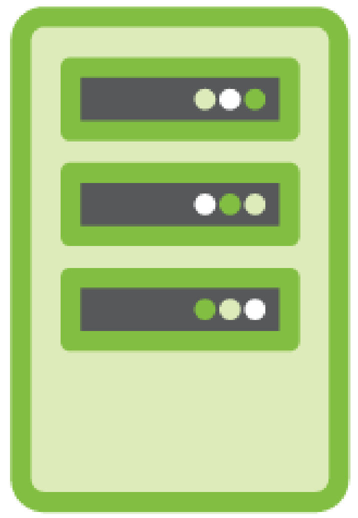
Broadcom's early adoption experience mostly positive

Call to Action

Adopt OCP NIC 3.0 in server designs

Get NIC products recognized as OPC Inspired / OCP accepted

Work with community and share your experiences



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