OPEN
Compute Project

<Title>

<Revision>

<Version>
Design Specification Template
Effective XXXX, 2023

Author: <Primary>
Author: <Secondary. Delete if unnecessary>

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1. License

PLEASE PICK EITHER THE OCP CLA OPTION OR THE OWF OPTION. ONLY ONE CAN BE USED. DELETE THE ONE NOT USED.

☐ OPTION A: OCP CLA
☐ OPTION B: Open Web Foundation (OWF) CLA

1.1. OPTION A: OCP CLA OR

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1.2 Acknowledgements

The Contributors of this Specification would like to acknowledge the following companies for their feedback:

List all companies or individuals who may have assisted you with the specification by providing feedback and suggestions but did not provide any IP.

2. Compliance with OCP Tenets

Please describe how this Specification complies to the following OCP tenets. Compliance is required for at least four of the five tenets (Sustainability is a required tenet). The ideals behind open sourcing stipulate that everyone benefits when we share and work together. Any open source project is designed to promote sharing of design elements with peers and to help them understand and adopt those contributions. There is no purpose in sharing if all parties aren't aligned with that philosophy. The OCP Incubation Committee will look beyond the contribution for evidence that the contributor is aligned with this philosophy. The contributor actions, past and present, are evidence of alignment and conviction to all the tenets.

A full explanation of the OCP core tenets can be seen [here](#).

2.1. Openness

The measure of openness is the ability of a third party to build, modify, or personalize the device or platform from the contribution. OCP strives to achieve completely open platforms, inclusive of all programmable devices, firmware, software, and all mechanical and electrical design elements, including ancillary, external components or tools such as software utilities necessary to modify or use design contributions. Barriers to achieving this goal should be constantly addressed and actions taken to remove anything that prevents an open platform. Openness can also be demonstrated through collaboration and willingness to share, seek feedback, and accept changes to design and specification contributions under consideration. Ensure this contribution can be extended and enhanced by others.

2.2. Efficiency

Continuous improvement has been a fundamental value of the industry. New contributions (and updates to existing contributions) shall be more efficient than existing or prior generation contributions.   Efficiency can be measured in many ways - OpEx and CapEx reduction, performance, modularity, capacity, power or water consumption, raw materials, utilization, size or floorspace are some examples. The goal is to express efficiency with clear metrics, valued by end-users, when the contribution is proposed.

2.3. Impact

OCP contributions should have a transformative impact on the industry. This impact can come from introducing new technology, time-to-market advantage of technology, and/or enabling technology through supply chains that deliver to many customers in many regions of the world. New technologies are impactful when such technology is enabled through a global supply channel. One example is the NIC 3.0 specification which achieved global impact by having over

12 companies author, adopt, and supply products that conformed to the specification. Another example is emerging and open security features that establish and verify trust of a product

2.4. Scale

OCP contributions should be designed such that end products may be easily implemented and/or deployed, irrespective of quantity, with minimal intervention. Ensure all necessary tools, such as supporting documentation, etc., are included in the final contribution.

2.5. Sustainability

OCP contributions must be sustainable. Submissions should maximize transparency of environmental impacts of the contribution, with the aspiration of improvement over time. Other focuses:
- Responsible use of our natural resources (land, air, power, water and materials)
- Positively impact society
- Reduced Costs (Energy, Water, materials)

Practically this can be realized in a base specification as high level design requirements, or architectural decisions, for example, that reflect this intent.

3. Change Log

Date	Version #	Author	Description

4. Scope

This document defines a Hardware Design Specification.

The Design Specification captures customer requirements for finer alignment by building on the Base Specification (Spec). One or more parties may join to develop detailed design specs. Compared to the Base Specification, this effort typically contains significantly more detail such as future roadmaps and IP-related information. This group may have a multi-party NDA on their own (outside of the OCP umbrella) for the normal practice of developing products.

Design Specifications can be reused! I.e., if one contributor uses an indoor design specification, another team could reuse and make an outdoor specification. Having the same Base Specification for several Design Specifications will help increase the commonality of physical and logical interfaces to meet a set of common infrastructure hw/sw/fw requirements while allowing gen-to-gen variations or product differentiation.

Please see the presentation and recording on the Modular Contribution Process from the OCP Global Summit 2022 for more information.

This document defines the technical details for one of the following types of specifications:
- Design Specification for an intended physical <hardware product type>
- modification of an existing specification (state which existing spec is being modified)
  - either a complete revision update or
  - a minor version update

Note: Any supplier seeking OCP recognition for a hardware product, must be using a product spec that is 100% compliant with the preceding Base requirements and these Design requirements as described.

Examples are provided for reference only and can be found in the OCP Contribution Portal:
De-facto Standard -
Cooling Environments:
Server - DC-MHS Modular Specs *
Network -
Rack -
Storage -
Cards -
Revision Update -

Version Update -

* Note: Few Design Specifications were submitted prior to the final approved template.

5. Overview

Describe your contribution and the modularity of this spec within the framework of modular specification process (this might be the openness tenet too) Include the problems it addresses. Explain its utility within the Open Compute Project ecosystem.

5.1 Base Specification

List the base specification(s) this document complies to.

6. Environmental Regulatory Compliance And Requirements

Please describe any environmental regulations or requirements for any platform boards and full system, if applicable. IF nothing changes from the base specification updating this section is optional, else please add any modifications and it's always best practice to add references.

Note to author of this specification: This section can include the following but is not limited to the below items:

- *UL/CE/NRTL/FCC/IEC/EN/etc Certification*
- *RoHS/WEE directives, REACH regulations*
- *NEBS compliance requirements*
- *Gaseous Contamination*
- *Operating temperature range*
- *Storage temperature range*
- *Transportation temperature range*
- *Shock and Vibration requirements*
- *Operating Altitude*

7. Physical Specifications

Please describe the physical design specifications for your contribution. This may include the limitations of the physical envelope.

If this specification defines a chassis type system, be sure to include the description of the chassis and associated modules, midplane, backplanes etc….

Note to author of this specification: This section can include the following but is not limited to the below items:

- *Block Diagrams*

- *Placement and Form Factor*
- *CPU and Memory*
- *Platform Controller Hub (PCH)*
- *PCIe*
- *PCB Stack Up*
- *Figures & Illustrations*

7.1 Mechanical

Please describe any key mechanical features of your contribution.

Note to author of this specification: This section can include the following but is not limited to the below items:
- *Chassis*
- *Single sled/double sled*
- *Rack Attachment details*
- *Fixed location*
- *Handles on motherboards*
- *levers or arms*

7.2 Rack Compatibility

Please describe if your contribution will be used in a rack installation. If the contribution is rack mountable, the specification must be compliant with one of the following OCP approved rack types: OpenRack (V2.X and beyond), EIA-310, OpenEdge.

8. Electrical Requirements

Please describe electrical power specifications. Example: Power Input +48VDC, 110VAC, peak power, etc…

9. Thermal Design Requirements

Please describe the thermal design specifications for your contribution and any CFD and/or thermal models etc...

Note to author of this specification: Examples include:
- *Cooling Media*
- *Flow Management*
- *Fan Controls*

10. Interfaces

Please describe the design details of the I/O System of the contribution, be sure to delineate the control and data planes.

10.1 Signal List

Note to author of this specification: Examples only
- *Power and Ground*
- *Synchronization/Clocks*
- *PCIe*
- *i2C/i3C*
- *GPIO*
- *USB 3.0*

10.2 Rear Side Power, I/O, Expansion Board and Midplane Subsystems

Please describe any modular implementation design details of the contribution.

Note to author of this specification: This section can include the following but is not limited to the below items:

- *Overview of Footprint and Population Options*
- *Rear Side Connectivity*
- *Midplane*
- *Expansion*
- *Fixed, redundant, modular, pluggable, adapter?*
- *AC or DC Power*
- *Use of any Blind Mate Connectors*

11. Onboard Power System

Please describe the design details of the main power system in your contribution.

Note to author of this specification: This section can include the following but is not limited to the below items:
- *Voltage Regulators (CPU/Dimm/Multi-core)*
- *Power Management*
- *Input voltages*
- *Hot swap controller circuit*
- *Hard drive power*
- *Power Tree*
- *Power Policy*

- *Power Budget*
- *Platform Budget*
- *Capacitive Load*

12. Prescribed Materials

Please list any prescribed, disallowed or derated materials in your contribution. This should include any recommended components that are being referenced but not contributed.

Note to author of this specification: This section can include the following but is not limited to the below items:
- *Disallowed components*
- *FETs, Capacitors and Inductors*
- *De-rated materials*

13. System Firmware

Please document firmware function, features and implementation including documentation package, a firmware image, licensing and distribution rights, explanation of ownership rights, system build utilities, test regime explanations, standards compliance, options for changing firmware configurations, and how firmware upgrades can be accomplished.

Note to author of this specification: This section can include the following but is not limited to the below items:

- *BIOS Chip*
- *BIOS Source Code*
- *BIOS Feature Requirements*
- *Firmware Feature Plan of Record*

14. Hardware Management

Please document the hardware management implementation of your contribution.

*Note to author of this specification: This section **should** include the following below items:*
- *Statement on whether the contribution supports out-of-band manageability.*
- *Statement on the modularity of the manageability architecture. (i.e. is an OCP management module used?)*

*Note to author of this specification: This section **can** include the following but is not limited to the below items:*
- *Out-of-band management*

- ○ *Dedicated or shared NIC*
- ○ *In which power state is the OOB management enabled*
- ○ *Details about the BMC (size, memory, storage)*
- ● *A list of on-platform manageability interfaces and implementation details:*
  - ○ *Connections: I2C/I3C, SMBus, RMII,*
  - ○ *Transport Protocol: MCTP, IPMI (KCS, BT, etc)*
  - ○ *Commands constructs: PLDM …, IPMI, SPDM, CPER*
- ● *A list of components whose firmware which can updated programmatically*
  - ○ *Which support failover/rollback mechanisms*
- ● *A list of diagnostic or management LEDs*
- ● *A list of HW telemetry/sensors*
- ● *A list of HW controls*
- ● *Whether conformance to OCP Profiles has been tested*
- ● *For Arm-based Servers, whether conformance to Arm Server Base Manageability Requirements Specification has been followed. If so, please also indicate the conformance level (e.g., M2)*

15. Security

*Please briefly describe security functionality that **your specification is designed for**.*
Details as listed below should only apply to implementation specific information (differs in some way to the base specification). Omit items that do not apply and add items that are missing.

- ● *For cryptography, key derivation, key agreement, and hashing, identify*
  - o *Required algorithms, modes, strengths, and usage*
  - o *Required compliance with national or international standards*
  - o *Acceptable sources of entropy*
  - o *Acceptable certifications of algorithm implementations*
  - o *Recommended certifications of cryptographic modules*
  - o *Recommended safeguards against cryptanalysis by quantum computers*

- ● *Required flow of Secure Boot starting from hardware root(s) of trust*
- ● *Required measurements from hardware reset through firmware*
- ● *Required attestation protocols*

- ● *Acceptable environments and processes for provisioning keys and device secrets*
- ● *Acceptable processes for identifying CVEs and distributing field updates to address them*
- ● *Acceptable Secure Boot and Attestation key lifecycle management (from generation through*
- ● *revocation)*

- ● *Recommended standards for software bills of materials*
- ● *Recommended firmware recovery mechanisms*

Note to author of this specification:
Required = Required now
Acceptable = Required now and chosen from a list of acceptable alternatives

Recommended = Recommended now, but required by a specified future date

Please find guidance and examples in the OCP Security Project documents on [Secure Boot](#), [Attestation of System Components](#), [Common Security Threats](#), and the [CSIS document on Secure Firmware Development Best Practices](#).

16. Software Support (recommended)

Please document any software and/or tools used to validate the hardware design and include test and validation using virtual simulation, design decisions based upon digital models, or proof of manufacturability via 3-D tools.

17. Arm SystemReady (only for Arm-based Systems)

Please document the full Arm SystemReady certificate information: Company, System, SoC Family, Firmware Version, Date Issued.

For Server Sleds, Open Edge Sleds and Monolithic Servers, the certification of either SystemReady SR or LS certification is required.

For Storage and Networking, the certification of SystemReady SR, LS, ES, or IR is recommended.

For Systems that are SystemReady SR, ES or IR certified, SystemReady Security Interface Extension (SIE) certification is recommended.

More details on Arm SystemReady can be found at https://www.arm.com/architecture/system-architectures/systemready-certification-program.

18. References (recommended)

1. "Title", publication year, publication journal/conference/standard, volume, pages, link to publication if available

Appendix A - Checklist for IC approval of this Specification (to be completed by contributor(s) of this Spec)

Complete all the checklist items in the table with links to the section where it is described in this spec or an external document .

Item	Status	Link to detailed explanation
Has this contribution been presented to an OCP Project group during a project call or engineering workshop?	Yes or No	If "No", please state the reason.
Approval by Project Leads	Yes or No	If "No", please state the reason.
Is this contribution entered into the OCP Contribution Portal?	Yes or No	If "No", please state the reason.
Was it approved in the OCP Contribution Portal?	Yes or No	If "No", please state the reason.

Appendix B - Contribution Process FAQs

As a contributor to a hardware specification, here are some questions that often come up.

Q1. What type of specification am I contributing to OCP?
  a. **The Design Specification** for a de-facto standard (ex: interface type)
  b. The Design Specification for a new product <product type>
  c. Modification of an existing <type> specification (state which existing spec is being modified) resulting in a revised specification.
  d. **Design specification** (based on an existing Design Specification) with more refined design details
  e. If none of the above, please contact OCP Staff for better direction.

Q2. How do I know if what I am contributing will be accepted by OCP?
  a. Before contributing any specifications, please contact either OCP Staff (Rob Coyle, Michael Schill) or the Project Lead for the Project that best represents your contribution. They will guide you as to what's the best form for your contribution. Project List here.

Q3. What is the contribution process for my hardware spec?
  a. Follow the flow for your spec type here.

Q4. What if my spec is not developed yet and I want to collaborate with other companies?
  a. Please contact either OCP Staff (Rob Coyle or Michael Schill) or the Project Lead for the Project that best represents your contribution. They will help you find other collaborators and help you with the contribution process for a multi-party contribution.

Q5. I have a question about the Contribution License Agreement (CLA).
  a. Please contact OCP Staff and we can help you with questions.