Abstract

The purpose of the OpenPOWER Architecture Compliance Definition document is to give a consistent approach to compliance under the guidance of the Compliance Work Group. This version of the document is based on the POWER8™ systems and the POWER9™ systems. It is expected that this document shall be updated for additional POWER9 systems interfaces and for next generation OpenPOWER systems.

This document is a Standard Track, Work Group Specification work product owned by the Compliance Workgroup and handled in compliance with the requirements outlined in the OpenPOWER Foundation Work Group (WG) Process document. It was created using the Master Template Guide version 1.0.0. Comments, questions, etc. can be submitted to the public mailing list for this document at <openpower-arch-comp-def@mailinglist.openpowerfoundation.org>.

Acknowledgement to members of the workgroup for their contributions
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Preface

1. Conventions

The OpenPOWER Foundation documentation uses several typesetting conventions.

Notices

Notices take these forms:

- **Note**
  A handy tip or reminder.

- **Important**
  Something you must be aware of before proceeding.

- **Warning**
  Critical information about the risk of data loss or security issues.

Changes

At certain points in the document lifecycle, knowing what changed in a document is important. In these situations, the following conventions will be used.

- **New text will appear like this.** Text marked in this way is completely new.

- **Deleted text will appear like this.** Text marked in this way was removed from the previous version and will not appear in the final, published document.

- **Changed text will appear like this.** Text marked in this way appeared in previous versions but has been modified.

Command prompts

In general, examples use commands from the Linux operating system. Many of these are also common with Mac OS, but may differ greatly from the Windows operating system equivalents.

For the Linux-based commands referenced, the following conventions will be followed:

- **$ prompt** Any user, including the root user, can run commands that are prefixed with the $ prompt.

- **# prompt** The root user must run commands that are prefixed with the # prompt. You can also prefix these commands with the sudo command, if available, to run them.
Document links

Document links frequently appear throughout the documents. Generally, these links include a text for the link, followed by a page number in parenthesis. For example, this link, Preface [iv], references the Preface chapter on page iv.

2. Document change history

This version of the guide replaces and obsoletes all earlier versions.

The following table describes the most recent changes:

<table>
<thead>
<tr>
<th>Revision Date</th>
<th>Summary of Changes</th>
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<tbody>
<tr>
<td>July 8, 2019</td>
<td>• Revision 1.1.0 - Architecture Compliance Definition Rev 1.1.0 - Approved Specification</td>
</tr>
<tr>
<td>April 11, 2019</td>
<td>• Revision 1.1.0-PRD2 - Architecture Compliance Definition Rev 1.1.0 - Public Review Draft for second review</td>
</tr>
<tr>
<td>April 5, 2019</td>
<td>• Revision 1.1.0_pre12 - Throughout document updated to indicate that no future compliance documents are planned for POWER8 systems. Split OPMB sections into two sections (one document for POWER8 systems and the compliance document is not planned, and one document for POWER9 systems).</td>
</tr>
<tr>
<td>April 2, 2019</td>
<td>• Revision 1.1.0_pre11 - Added abstract and pulled in updated Docs-Master with corrected links</td>
</tr>
<tr>
<td>December 10, 2018</td>
<td>• Revision 1.1.0-PRD - Architecture Compliance Definition Rev 1.1.0 - Public Review Draft</td>
</tr>
<tr>
<td>November 30, 2018</td>
<td>• Revision 1.1.0_pre10 - Removed the mark-ups agreed at Nov 29, 2018 Compliance Work Group meeting</td>
</tr>
<tr>
<td>November 28, 2018</td>
<td>• Revision 1.1.0_pre9 - Updated pom file to revision 1.1.0</td>
</tr>
<tr>
<td>November 28, 2018</td>
<td>• Revision 1.1.0_pre8 - Minor updates including update to revision 1.1.0</td>
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<tr>
<td>November 14, 2018</td>
<td>• Revision 1.0.1_pre7 - Updates from Nov 7, 2018 Compliance Work Group meeting</td>
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<tr>
<td>November 2, 2018</td>
<td>• Revision 1.0.1_pre6 - Updates from Oct 30, 2018 Compliance Work Group meeting</td>
</tr>
<tr>
<td>October 16, 2018</td>
<td>• Revision 1.0.1_pre5 - Added ISA Profile Rev 2 and IODA3 in Chapters 1, 2, 3; added FSI Spec in Chapter 2; other cleanup</td>
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<tr>
<td>October 11, 2018</td>
<td>• Revision 1.0.1_pre4 - Updates from Oct 11, 2018 Compliance Work Group meeting</td>
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<tr>
<td>October 9, 2018</td>
<td>• Revision 1.0.1_pre3 - Continuing to update to make current with existing documents (updated Chapters 1, 2, and 3)</td>
</tr>
<tr>
<td>September 20, 2018</td>
<td>• Revision 1.0.1_pre2 - Beginning to update to make current with existing documents (updated Chapters 1 and 2 with some additional changes, but did not update Chapters 3 and 4 yet)</td>
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<tr>
<td>September 18, 2018</td>
<td>• Revision 1.0.1_pre1 - Beginning to update to make current with existing documents (updated Chapters 1 and 2, but did not update Chapters 3 and 4 yet)</td>
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<tr>
<td>January 12, 2016</td>
<td>• Revision 1.0.0 - Work Group Specification</td>
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<tr>
<td>November 4, 2015</td>
<td>• Revision 0.93 - Updated with comments from Public Review of revision 0.92</td>
</tr>
<tr>
<td>September 9, 2015</td>
<td>• Correction of identified conversion errors</td>
</tr>
<tr>
<td>September 4, 2015</td>
<td>• Conversion to approved template and release for public review</td>
</tr>
<tr>
<td>February 4, 2015</td>
<td>• Initial Draft - revision 0.8b</td>
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1. Introduction

The purpose of the OpenPOWER Architecture Compliance Definition document is to give a consistent approach to compliance under the guidance of the Compliance Work Group. It contains the following:

- Document the OpenPOWER specifications that contain the interfaces that are required to be OpenPOWER compliant
  - These OpenPOWER specifications are work products of other OpenPOWER Work Groups. Each specification defines certain OpenPOWER architecture features, interfaces and facilities. Each specification further defines required and optional elements for compliance.

  **Note**

  Each Work Group owns what is required for compliance through their Work Group Specifications each of which contains a *Conformance to the Specification* section.

  **Note**

  This document will add more sections for other specifications as other OpenPOWER Work Groups have OpenPOWER specifications as work products that require compliance.

  **Note**

  Revisions to this document will be maintained by the Compliance Work Group. Changes to the list of documents may be submitted to the Compliance Work Group by the pertinent Work Group.

- Document an overview of the Compliance Test Harness and Test Suite Specifications that have been developed in the Compliance Work Group, and an outline of the contents expected in each specification
  - For each compliance specification, at least one member of the Work Group providing the input specification shall join the Compliance Work Group to contribute and review the development of the compliance specification.

- Document procedures on how to measure and document compliance and where to submit the report for compliance

This version of the document is based on the POWER8™ systems and the POWER9™ systems. It is expected that this document shall be updated for additional POWER9 systems interfaces and for next generation OpenPOWER systems.

1.1. Conformance to this Specification

The following lists a set of numbered conformance clauses to which any implementation of this specification must adhere in order to claim conformance to this specification (or any optional portion thereof):
1. The **POWER® Instruction Set Architecture (ISA™) – OpenPOWER Profile Specification, Revision 1.0** and the **IBM® POWER ISA Version 2.07 B** are input to the **OpenPOWER ISA Compliance Definition Specification, Revision 1.0 (POWER ISA - OpenPOWER Profile Compliance Test Harness and Test Suite (TH/TS) Specification, Revision 1.0)** which is used to demonstrate OpenPOWER ISA Profile Revision 1.0 Compliance for POWER8 systems.

2. The POWER Instruction Set Architecture (ISA) – OpenPOWER Profile Specification, Revision 2.0 (which has not yet been developed) and the **IBM POWER ISA Version 3.0 B** are input to the **OpenPOWER ISA Compliance Definition Specification, Revision 2.0 (POWER ISA - OpenPOWER Profile Compliance Test Harness and Test Suite (TH/TS) Specification, Revision 2.0)** which is used to demonstrate OpenPOWER ISA Profile Revision 2.0 Compliance for POWER9 systems.

**Note**

This document has not been developed by the Compliance Work Group yet.

3. The **Coherent Accelerator Interface Architecture (CAIA): OpenPOWER Version 1 Specification** and the **PSL / AFU Interface Specification, Revision 1.0** are input to the **OpenPOWER CAPI 1.0 Accelerator Compliance: Test Specification (OpenPOWER CAPI 1.0 Accelerator Compliance Test Harness and Test Suite (TH/TS) Specification)** which is used to demonstrate OpenPOWER CAPI 1.0 Accelerator compliance for POWER8 systems.

4. The **Coherent Accelerator Interface Architecture Version 2 (CAIA2) Specification** and the **PSL / AFU Interface: CAPI 2.0 Specification** are input to the **OpenPOWER CAPI 2.0 Accelerator Compliance: Test Specification (OpenPOWER CAPI 2.0 Accelerator Compliance Test Harness and Test Suite (TH/TS) Specification)** which is used to demonstrate OpenPOWER CAPI 2.0 Accelerator compliance for POWER9 systems.

5. The **Field Replaceable Unit (FRU) Service Interface (FSI) – OpenFSI Specification** is input to the **OpenPOWER FSI Compliance Test Harness and Test Suite (TH/TS) Specification** which is used to demonstrate OpenPOWER FSI compliance for POWER8 systems and for POWER9 systems.

6. The **OpenPOWER 64-Bit ELF V2 Application Binary Interface (ABI) Specification: Power Architecture (Power Architecture 64-Bit ELFv2 ABI Specification OpenPOWER ABI for Linux Supplement)** is input to the **OpenPOWER ELFv2 Application Binary Interface (ABI) Compliance Test Harness and Test Suite (TH/TS) Specification** which is used to demonstrate OpenPOWER ELFv2 ABI compliance for POWER8 systems and for POWER9 systems.

7. The **OpenPOWER Advanced Accelerator Adapter: Electro-Mechanical Specification** is input to the **OpenPOWER Advanced Accelerator Adapter Compliance: 25G I/O Test Harness and Test Suite (TH/TS) Specification** which is used to demonstrate OpenPOWER Advanced Accelerator Adapter 25G I/O compliance for POWER9 systems.

8. The **OpenPOWER IO Device Architecture (IODA) Version 2 Specification** is input to the **OpenPOWER IO Device Architecture (IODA) Version 2 Compliance TH/TS Specification** which is used to demonstrate OpenPOWER IO Device Architecture (IODA) Version 2 Compliance for POWER8 systems.

**Note**

This document will not be developed by the Compliance Work Group, since no future compliance documents are planned for POWER8 systems.
9. The OpenPOWER IO Device Architecture (IODA) Version 3 Specification (which has not been developed yet) is input to the OpenPOWER IO Device Architecture (IODA) Version 3 Compliance TH/TS Specification which is used to demonstrate OpenPOWER IO Device Architecture (IODA) Version 3 compliance for POWER9 systems.

   **Note**

   This document has not been developed by the Compliance Work Group yet.

10. The *OpenPOWER Processor Memory Bus (OPMB) Specification, Revision 1.0* is input to the OpenPOWER Processor Memory Bus Compliance TH/TS Specification, Revision 1.0 which is used to demonstrate OpenPOWER Processor Memory Bus Compliance for POWER8 systems.

   **Note**

   This document will not be developed by the Compliance Work Group, since no future compliance documents are planned for POWER8 systems.

11. The OpenPOWER Processor Memory Bus (OPMB) Specification, Revision 2.0 (which has not been developed yet) is input to the OpenPOWER Processor Memory Bus Compliance TH/TS Specification, Revision 2.0 which is used to demonstrate OpenPOWER Processor Memory Bus Compliance for POWER9 systems.

   **Note**

   This document has not been developed by the Compliance Work Group yet.
2. Required Compliant Interfaces

The purpose of this chapter is to document the OpenPOWER specifications that contain the interfaces that are required to be OpenPOWER compliant. The inputs to this document are other OpenPOWER Work Group specifications. These input specifications define certain OpenPOWER architecture features, interfaces and facilities. Each specification further defines required and optional elements for compliance. This version of the document is based on the POWER8 systems and the POWER9 systems. It is expected that this specification shall be updated for additional POWER9 systems interfaces and for next generation OpenPOWER systems. The input specifications are documented in the following sections.

2.1. Hardware Architecture Work Group Specifications

The following specifications have been developed by the Hardware Architecture Work Group.

2.1.1. POWER Instruction Set Architecture (ISA) – OpenPOWER Profile Specification, Revision 1.0

The  *POWER Instruction Set Architecture (ISA) – OpenPOWER Profile Specification, Revision 1.0* describes the categories of the POWER ISA Version 2.07B that are required in the OpenPOWER chip architecture for POWER8 systems.

2.1.2. POWER Instruction Set Architecture (ISA) – OpenPOWER Profile Specification, Revision 2.0

The POWER Instruction Set Architecture (ISA) – OpenPOWER Profile Specification, Revision 2.0 describes the categories of the POWER ISA Version 3.0B that are required in the OpenPOWER chip architecture for POWER9 systems.

**Note**

This document has not been developed by the Hardware Architecture Work Group yet.

2.1.3. Coherent Accelerator Interface Architecture (CAIA) Specification: OpenPOWER Version 1

The  *Coherent Accelerator Interface Architecture (CAIA) Specification: OpenPOWER Version 1* describes a coherent accelerator interface structure for coherently attaching accelerators to the POWER8 systems using a standard PCIe® bus.


2.1.5. OpenPOWER I/O Design Architecture Version 2 Specification

The OpenPOWER IO Device Architecture (IODA) Version 2 Specification describes the chip architecture for key aspects of PCIe-based host bridge (PHB) designs for IBM POWER8 systems.

2.1.6. OpenPOWER I/O Design Architecture Version 3 Specification

The OpenPOWER IO Device Architecture (IODA) Version 3 Specification describes the chip architecture for key aspects of PCIe-based host bridge (PHB) designs for IBM POWER9 systems.

Note

This document has not been developed by the Hardware Architecture Work Group yet.

2.2. Accelerator Work Group Specifications

The following specifications have been developed by the Accelerator Work Group.

2.2.1. Power Service Layer (PSL) to Accelerator Function Unit (AFU) Specification, Revision 1.0

The PSL / AFU Interface Specification, Revision 1.0 defines the interface to communicate to the acceleration logic running on the FGPA for POWER8 systems.

2.2.2. Power Service Layer (PSL) to Accelerator Function Unit (AFU) Interface: CAPI 2.0 Specification

The PSL / AFU Interface: CAPI 2.0 Specification defines the interface to communicate to the acceleration logic running on the FGPA for POWER9 systems.

2.3. FSI Work Group Specifications

The following specifications have been developed by the FSI Work Group.
2.3.1. Field Replaceable Unit (FRU) Service Interface (FSI) – OpenFSI Specification

The Field Replaceable Unit (FRU) Service Interface (FSI) – OpenFSI Specification describes the FSI Protocol in detail, including the timing and electrical specification for POWER8 systems and for POWER9 systems.

2.4. System Software Work Group Specifications

The following specifications have been developed by the System Software Work Group.

2.4.1. OpenPOWER 64-Bit ELF V2 Application Binary Interface (ABI) Specification: Power Architecture

The OpenPOWER 64-Bit ELF V2 Application Binary Interface (ABI) Specification: Power Architecture (Power Architecture 64-Bit ELFv2 ABI Specification OpenPOWER ABI for Linux Supplement) defines aspects of the platform that are required to enable interoperability of binary object files for POWER8 systems and for POWER9 systems.

2.5. 25G IO Interoperability Mode Work Group Specifications

The following specifications have been developed by the 25G IO Interoperability Mode Work Group.

2.5.1. OpenPOWER Advanced Accelerator Adapter: Electro-Mechanical Specification

The OpenPOWER Advanced Accelerator Adapter: Electro-Mechanical Specification defines an electro-mechanical specification for advanced accelerator adapters within the OpenPOWER ecosystem supported by IBM POWER9.

2.6. Memory Work Group Specifications

The following specifications have been developed by the Memory Work Group.

2.6.1. OpenPOWER Memory Bus (OPMB) Specification, Revision 1.0

The OpenPOWER Memory Bus (OPMB) Specification, Revision 1.0 defines the OpenPOWER Memory Bus Architecture for the development of Memory Function Units (MFU) and the integration of those MFUs into the OpenPOWER system structure for POWER8 systems. A MFU is a logic block developed by a member of the OpenPOWER eco-system to enable the integration of specialized memory technology and functional processing for data stored in that memory technology.
2.6.2. OpenPOWER Memory Bus (OPMB) Specification, Revision 2.0

The OpenPOWER Memory Bus (OPMB) Specification, Revision 2.0 defines the OpenPOWER Memory Bus Architecture for the development of Memory Function Units (MFU) and the integration of those MFUs into the OpenPOWER system structure for POWER9 systems. A MFU is a logic block developed by a member of the OpenPOWER eco-system to enable the integration of specialized memory technology and functional processing for data stored in that memory technology.

Note

This document has not been developed by the Memory Work Group yet.
3. Compliance Test Harness and Test Suite (TH/TS) Specifications

The purpose of this chapter is to document an overview of the Compliance Test Harness and Test Suite Specifications. These specifications have a consistent outline of contents as specified in this chapter. The initial versions of the Compliance TH/TS Specifications are based on the POWER8 systems and the POWER9 systems. It is expected that these specification shall be updated for next generation OpenPOWER systems. The following specifications have been developed in the Compliance Work Group.

3.1. OpenPOWER ISA Compliance Definition Specification, Revision 1.0

The OpenPOWER ISA Compliance Definition Specification, Revision 1.0 (POWER ISA - OpenPOWER Profile Compliance Test Harness and Test Suite (TH/TS) Specification, Revision 1.0) was developed by the Compliance Work Group. At least one member of the Hardware Architecture Work Group joined the Compliance Work Group to contribute and review the development of the compliance specification.

The purpose of the POWER ISA - OpenPOWER Profile Compliance Test Harness and Test Suite (TH/TS) Specification, Revision 1.0 is to provide the test suite requirements to be able to demonstrate OpenPOWER ISA Profile Revision 1.0 compliance for POWER8 systems.

The input to this specification are the following specifications:

1. POWER Instruction Set Architecture (ISA) – OpenPOWER Profile Specification, Revision 1.0 which describes the categories of the IBM POWER ISA Version 2.07 B that are required in the OpenPOWER processor chip architecture.

2. IBM POWER ISA Version 2.07 B

The testing of a processor implementation's compliance against the POWER ISA - OpenPOWER Profile, Revision 1.0 is to ensure that software shown to execute properly on one compliant processor implementation will execute properly on a different also compliant processor implementation.

The testing is not intended to show that the processor implementation under test is robust under all possible operating conditions, inputs, or event time interactions. It is intended to show that the processor implementation under test implemented the ISA as specified and the specification was interpreted by the processor developers as intended by the specification authors.

3.2. OpenPOWER ISA Compliance Definition Specification, Revision 2.0

Note

This document has not been developed by the Compliance Work Group yet.
The OpenPOWER ISA Compliance Definition Specification, Revision 2.0 (POWER ISA - OpenPOWER Profile Compliance Test Harness and Test Suite (TH/TS) Specification, Revision 2.0) will be developed by the Compliance Work Group. At least one member of the Hardware Architecture Work Group will join the Compliance Work Group to contribute and review the development of the compliance specification.

The purpose of the POWER ISA - OpenPOWER Profile Compliance Test Harness and Test Suite (TH/TS) Specification, Revision 2.0 is to provide the test suite requirements to be able to demonstrate OpenPOWER ISA Profile Revision 2.0 compliance for POWER9 systems.

The input to this specification are the following specifications:

1. POWER Instruction Set Architecture (ISA) – OpenPOWER Profile Specification, Revision 2.0 which describes the categories of the IBM POWER ISA Version 3.0 B that are required in the OpenPOWER processor chip architecture.

   Note
   
   This document has not been developed by the Hardware Architecture Work Group yet.

2. IBM POWER ISA Version 3.0 B

3.3. OpenPOWER CAPI 1.0 Accelerator Compliance: Test Specification

The OpenPOWER CAPI 1.0 Accelerator Compliance: Test Specification (OpenPOWER CAPI 1.0 Accelerator Compliance Test Harness and Test Suite (TH/TS) Specification) was developed by the Compliance Work Group. At least one member of the Hardware Architecture Work Group and at least one member of the Accelerator Work Group joined the Compliance Work Group to contribute and review the development of the compliance specification.

The purpose of the OpenPOWER CAPI 1.0 Accelerator Compliance Test Harness and Test Suite (TH/TS) Specification is to provide the test suite requirements to be able to demonstrate OpenPOWER CAPI 1.0 Accelerator compliance for POWER8 systems.

The input to this specification are the following two specifications which define the hardware interfaces which are the subject of this OpenPOWER CAPI 1.0 Accelerator Compliance document:

1. OpenPOWER Coherent Accelerator Interface Architecture Version 1 (CAIA V1) Specification which describes a coherent accelerator interface structure for coherently attaching accelerators to the POWER8 systems using a standard PCIe bus

2. OpenPOWER Power Service Layer (PSL) to Accelerator Function Unit (AFU) Interface Specification, Revision 1.0 which describes the interface to communicate to the acceleration logic running on the FGPA.
3.4. OpenPOWER CAPI 2.0 Accelerator Compliance: Test Specification

The OpenPOWER CAPI 2.0 Accelerator Compliance: Test Specification (OpenPOWER CAPI 2.0 Accelerator Compliance Test Harness and Test Suite (TH/TS) Specification) was developed by the Compliance Work Group. At least one member of the Hardware Architecture Work Group and at least one member of the Accelerator Work Group joined the Compliance Work Group to contribute and review the development of the compliance specification.

The purpose of the OpenPOWER CAPI 2.0 Accelerator Compliance Test Harness and Test Suite (TH/TS) Specification is to provide the test suite requirements to be able to demonstrate OpenPOWER CAPI 2.0 Accelerator compliance for POWER9 systems.

The input to this specification are the following specifications which define the hardware interfaces which are the subject of this OpenPOWER CAPI 2.0 Accelerator Compliance document:

1. OpenPOWER Coherent Accelerator Interface Architecture Version 2 (CAIA V2) Specification which describes a coherent accelerator interface structure for coherently attaching accelerators to the POWER9 systems using a standard PCIe bus.

2. OpenPOWER Power Service Layer (PSL) to Accelerator Function Unit (AFU) Interface CAPI 2.0 Specification, Revision 1.0 which describes the interface to communicate to the acceleration logic running on the FPGA.

3.5. OpenPOWER FSI Compliance Specification – TH/TS Specification

The OpenPOWER FSI Compliance Specification – TH/TS Specification was developed by the Compliance Work Group. At least one member of the FSI Work Group joined the Compliance Work Group to contribute and review the development of the compliance specification.

The purpose of the OpenPOWER FSI Compliance Test Harness and Test Suite (TH/TS) Specification is to provide the test suite requirements to be able to demonstrate OpenPOWER FSI compliance for POWER8 systems and for POWER9 systems.

The input to this specification is the following specification:

- Field Replaceable Unit (FRU) Service Interface (FSI) – OpenFSI Specification which describes the FSI Protocol in detail, including the timing and electrical specification.

3.6. OpenPOWER ELFv2 Application Binary Interface (ABI) Compliance TH/TS Specification

The OpenPOWER ELFv2 Application Binary Interface (ABI) Compliance Test Harness and Test Suite (TH/TS) Specification was developed by the Compliance Work Group. At least one member of the System Software Work Group joined the Compliance Work Group to contribute and review the development of the compliance specification.
The purpose of the OpenPOWER ELFv2 Application Binary Interface (ABI) Compliance Test Harness and Test Suite (TH/TS) Specification is to provide the test suite requirements to be able to demonstrate OpenPOWER ELFv2 ABI compliance for POWER8 systems and for POWER9 systems.

The input to this specification is the following specification:

- **Power Architecture 64-Bit ELFv2 ABI Specification OpenPOWER ABI for Linux Supplement** which describes the application binary interface for OpenPOWER systems.

The ABI specification defines aspects of the platform that are required to enable interoperability of binary object files.

### 3.7. OpenPOWER Advanced Accelerator Adapter Compliance: 25G I/O TH/TS Specification

The **OpenPOWER Advanced Accelerator Adapter Compliance: 25G I/O Test Harness and Test Suite (TH/TS) Specification** was developed by the Compliance Work Group. At least one member of the 25G I/O Interoperability Mode Work Group joined the Compliance Work Group to contribute and review the development of the compliance specification.

The purpose of the OpenPOWER Advanced Accelerator Adapter Compliance: 25G I/O Test Harness and Test Suite (TH/TS) Specification is to provide the test suite requirements to be able to demonstrate OpenPOWER AAA 25G I/O compliance for POWER9 systems.

The input to this specification is the following specification:

- **OpenPOWER Advanced Accelerator Adapter: Electro-Mechanical Specification** which describes electro-mechanical specification for advanced accelerator adapters within the OpenPOWER ecosystem supported by IBM POWER9.

There are two accelerator approaches for the 25Gbit/sec interface and the compliance for each approach is defined in this document. The first approach is a Mezzanine Adapter Card which is attached to the system planar via two connectors. The Mezzanine Adapter Card for OpenPOWER systems based on the POWER9 processor attaches to the 25Gbit/sec interface native to the POWER9 and plugs into the mezzanine card connectors.

The second approach is a Cabled Interface Extension to an adapter card. It uses a PCIe card as an example but the cabled extension does not require the adapter card be PCIe. POWER9 platforms support the optional cabling of the 25Gbit/sec Advanced Accelerator Interface to the advanced accelerator adapter in a riser card plugged into a PCIe slot in the same system. In addition, the adapter could be located in different drawer of the rack.
3.8. OpenPOWER IODA2 Compliance TH/TS Specification

**Note**

This document will not be developed by the Compliance Work Group, since no future compliance documents are planned for POWER8 systems.

The purpose of the OpenPOWER IODA2 Compliance Test Harness and Test Suite (TH/TS) Specification is to provide the test suite requirements to be able to demonstrate OpenPOWER IODA2 compliance for POWER8 systems.

The input to this specification is the following specification:

- *OpenPOWER IO Device Architecture (IODA) Version 2 Specification* which describes the chip architecture for key aspects of PCIe-based host bridge (PHB) designs for IBM POWER8 systems.

3.9. OpenPOWER IODA3 Compliance TH/TS Specification

**Note**

This document has not been developed by the Compliance Work Group yet.

The OpenPOWER IODA3 Compliance TH/TS Specification has not been developed yet by the Compliance Work Group. At least one member of the Hardware Architecture Work Group shall join the Compliance Work Group to contribute and review the development of the compliance specification.

The purpose of the OpenPOWER IODA3 Compliance Test Harness and Test Suite (TH/TS) Specification is to provide the test suite requirements to be able to demonstrate OpenPOWER IODA3 compliance for POWER9 systems.

The input to this specification is the following specification:

- *OpenPOWER IO Device Architecture (IODA) Version 3 Specification* which describes the chip architecture for key aspects of PCIe-based host bridge (PHB) designs for IBM POWER9 systems.

**Note**

This document has not been developed by the Hardware Architecture Work Group yet.
3.10. OpenPOWER Memory Bus (OPMB) Compliance TH/TS Specification, Revision 1.0

Note

This document will not be developed by the Compliance Work Group, since no future compliance documents are planned for POWER8 systems.

The purpose of the OpenPOWER Memory Bus (OPMB) Compliance TH/TS Specification, Revision 1.0 is to provide the test suite requirements to be able to demonstrate OpenPOWER Memory Bus compliance for POWER8 systems.

The input to this specification is the following specification:

- *OpenPOWER Memory Bus (OPMB) Specification, Revision 1.0* which defines the OpenPOWER Memory Bus Architecture for the development of Memory Function Units (MFU) and the integration of those MFUs into the OpenPOWER system structure for POWER8 systems.

3.11. OpenPOWER Memory Bus (OPMB) Compliance TH/TS Specification, Revision 2.0

Note

This document has not been developed by the Compliance Work Group yet.

The OpenPOWER Memory Bus (OPMB) Compliance TH/TS Specification, Revision 2.0 has not been developed yet by the Compliance Work Group. At least one member of the Memory Work Group shall join the Compliance Work Group to contribute and review the development of the compliance specification.

The purpose of the OpenPOWER Memory Bus (OPMB) Compliance TH/TS Specification, Revision 2.0 is to provide the test suite requirements to be able to demonstrate OpenPOWER Memory Bus compliance for POWER9 systems.

The input to this specification is the following specification:

- *OpenPOWER Memory Bus (OPMB) Specification, Revision 2.0* which defines the OpenPOWER Memory Bus Architecture for the development of Memory Function Units (MFU) and the integration of those MFUs into the OpenPOWER system structure for POWER9 systems.

Note

This document has not been developed by the Memory Work Group yet.


The following shows the outline of the contents of each of the Compliance TH/TS Specifications.

Introduction Chapter
• Section describing the purpose of the document and an overview of the contents of the document

• Separate section which lists a set of numbered conformance clauses to which any implementation of the specification must adhere in order to claim conformance to the specification (or any optional portion thereof)

Test Harness and Test Suite chapter (at least one chapter)

• Section describing the test harness needed to execute the test suite.

• Section describing the tests required to be in the test suite.

• Section (if applicable) describing the optional tests.

• Section describing the successful execution of the required tests.

• Section (if applicable) describing the successful execution of the optional tests.

Note

Test suites that are contributed to the OpenPOWER Foundation need to be licensed under Apache V2 license. Compliance may be measured with test suites that have not been contributed to the OpenPOWER Foundation provided the suites satisfy the Compliance Test Harness/Test Suite specification.
4. Compliance Procedures and Reporting

The purpose of this chapter is to document procedures on how to measure compliance and the reporting of compliance using the OpenPOWER Ready™ process.

4.1. Procedures How to Measure Compliance

To measure and demonstrate compliance, use the appropriate OpenPOWER Compliance TH/TS Specification as a guide. Generate the tests required to be executed in the test suite. Optional tests may also be generated. Run the test suite and analyze the results. If applicable, update any test case errors and fix any design issues and repeat. Document in a Compliance Report the following:

- What specific OpenPOWER Compliance TH/TS Specification is being used? What Version?
- Were all required tests executed?
- Did all required tests complete successfully?
- If applicable, what required tests failed and why?
- What optional tests were executed?
- Did all optional tests complete successfully?
- If applicable, what optional tests failed and why?

4.2. OpenPOWER Compliance and OpenPower Ready

The OpenPOWER Compliance Work Group provides input to the OpenPOWER Ready Work Group to ensure that the Compliance TH/TS Specifications are referenced in the OpenPOWER Ready document.

4.3. Where to Submit the Compliance Report

Submit the Compliance Report with your OpenPOWER Ready submission if you would like the Compliance Work Group to review your results. The Compliance areas include the following:

- OpenPOWER ISA Profile Revision 1.0 Compliance for POWER8 systems

Note

Reference is being added to OpenPOWER Ready Definition and Criteria – V2.0 item 1 of Section 2.1 ISA Profile rev 1.0.0 based systems to refer to the OpenPOWER ISA Compliance Definition Specification, Revision 1.0 (POWER ISA - OpenPOWER Profile Compliance Test Harness and Test Suite (TH/TS) Specification, Revision 1.0).
• OpenPOWER ISA Profile Revision 2.0 Compliance for POWER9 systems (not documented yet)

• OpenPOWER CAPI 1.0 Accelerator Compliance for POWER8 systems

  Note

  See OpenPOWER Ready Definition and Criteria – V2.0 item 3 of Section 5.1.1 CAPI 1.0 for POWER8 Adapters on PCIe Gen3 which refers to the OpenPOWER CAPI 1.0 Accelerator Compliance: Test Specification (OpenPOWER CAPI 1.0 Accelerator Compliance Test Harness and Test Suite (TH/TS) Specification).

• OpenPOWER CAPI 2.0 Accelerator Compliance for POWER9 systems

  Note

  See OpenPOWER Ready Definition and Criteria – V2.0 item 3 of Section 5.1.2 CAPI 2.0 for POWER9 Adapters on PCIe Gen4 which refers to the OpenPOWER CAPI 2.0 Accelerator Compliance: Test Specification (OpenPOWER CAPI 2.0 Accelerator Compliance Test Harness and Test Suite (TH/TS) Specification).

• OpenPOWER FSI Compliance for POWER8 systems and for POWER9 systems.

  Note

  Reference is being added to OpenPOWER Ready Definition and Criteria – V2.0 Chapter 8 OpenPOWER Ready System Support Components to refer to the OpenPOWER FSI Compliance Specification – TH/TS Specification.

• OpenPOWER ELFv2 ABI Compliance for POWER8 systems and for POWER9 systems

  Note

  See OpenPOWER Ready Definition and Criteria – V2.0 item 1 of Section 3.2 OpenPOWER Ready Criteria for the Toolchains which refers to the OpenPOWER ELFv2 Application Binary Interface (ABI) Compliance Test Harness and Test Suite (TH/TS) Specification.

• OpenPOWER Advanced Accelerator Adapter 25G I/O Compliance for POWER9 systems

  Note

  Reference is being added to OpenPOWER Ready Definition and Criteria – V2.0 item 3 of Section 7.1.1 OpenCAPI 3.0 Adapters for POWER9 to refer to the OpenPOWER Advanced Accelerator Adapter Compliance: 25G I/O Test Harness and Test Suite (TH/TS) Specification.

• OpenPOWER IODA3 Compliance for POWER9 systems (not documented yet)

• OpenPOWER Processor Memory Bus Compliance, Revision 2.0 for POWER9 systems (not documented yet)
Appendix A. OpenPOWER Foundation overview

The OpenPOWER Foundation was founded in 2013 as an open technical membership organization that will enable data centers to rethink their approach to technology. Member companies are enabled to customize POWER CPU processors and system platforms for optimization and innovation for their business needs. These innovations include custom systems for large or warehouse scale data centers, workload acceleration through GPU, FPGA or advanced I/O, platform optimization for SW appliances, or advanced hardware technology exploitation. OpenPOWER members are actively pursuing all of these innovations and more and welcome all parties to join in moving the state of the art of OpenPOWER systems design forward.

To learn more about the OpenPOWER Foundation, visit the organization website at openpowerfoundation.org.

A.1. Foundation documentation

Key foundation documents include:

- Bylaws of OpenPOWER Foundation
- OpenPOWER Foundation Intellectual Property Rights (IPR) Policy
- OpenPOWER Foundation Membership Agreement
- OpenPOWER Anti-Trust Guidelines

More information about the foundation governance can be found at openpowerfoundation.org/about-us/governance.

A.2. Technical resources

Development resources fall into the following general categories:

- Technical Steering Committee
- Foundation work groups
- OpenPOWER Ready documentation, products, and certification criteria
- Resource Catalog

To find all OpenPOWER resources of the following types, select the specified combination of Resource Type/Main Category/Sub-category in the Resource Catalog:

- Specifications
  - Developer Resources/OpenPOWER Documents/Specifications
- Work Group Notes
  - Developer Resources/OpenPOWER Documents/Work Group Notes
Cloud development virtual machines

Developer Resources / Software Developer Cloud Resources / <empty>

Developer Tools

Developer Resources / Developer Tools / <empty>

Note

Use the Search field to focus your search using key words or phrases for specific resources.

A.3. Contact the foundation

To learn more about the OpenPOWER Foundation, please use the following contact points:

- General information -- <info@openpowerfoundation.org>
- Membership -- <membership@openpowerfoundation.org>
- Technical Work Groups and projects -- <tsc-chair@openpowerfoundation.org>
- Events and other activities -- <admin@openpowerfoundation.org>
- Press/Analysts -- <press@openpowerfoundation.org>

More contact information can be found at openpowerfoundation.org/get-involved/contact-us.