OpenCAPI 3.0 Ready Test Resources
Engineering Note

Version 1.0
20 May 2020—OpenCAPI Confidential

Approved
Approved for Distribution to OpenCAPI Members Only
OpenCAPI 3.0 Ready Test Resources Engineering Note

OpenCAPI Compliance Work Group
OpenCAPI Consortium

Version 1.0 (20 May 2020)

Copyright © OpenCAPI Consortium 2020.

All capitalized terms in the following text have the meanings assigned to them in the OpenCAPI Intellectual Property Rights Policy (the “OpenCAPI IPR Policy”). The full Policy may be found at the OpenCAPI Consortium website.

Use of this document is controlled by the OpenCAPI IPR Policy.

This document and the information contained herein is provided on an "AS IS" basis AND TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, THE OPENCAPI CONSORTIUM AS WELL AS THE AUTHORS AND DEVELOPERS OF THIS DRAFT STANDARD OR OTHER DOCUMENT HEREBY DISCLAIM ALL OTHER WARRANTIES AND CONDITIONS, EITHER EXPRESS, IMPLIED OR STATUTORY, INCLUDING BUT NOT LIMITED TO, ANY IMPLIED WARRANTIES, DUTIES OR CONDITIONS OF MERCHANTABILITY, OF FITNESS FOR A PARTICULAR PURPOSE, OF ACCURACY OR COMPLETENESS OF RESPONSES, OF RESULTS, OF WORKMANLIKE EFFORT, OF LACK OF VIRUSES, OF LACK OF NEGLIGENCE OR NON-INFRINGEMENT.

This document and translations of it may be copied and furnished to others, and derivative works that comment on or otherwise explain it or assist in its implementation may be prepared, copied, published, and distributed, in whole or in part, without restriction of any kind, provided that the above copyright notice and this section are included on all such copies and derivative works. However, this document itself may not be modified in any way, including by removing the copyright notice or references to OpenCAPI, except as needed for the purpose of developing any document or deliverable produced by an OpenCAPI Work Group (in which case the rules applicable to copyrights, as set forth in the OpenCAPI IPR Policy, must be followed) or as required to translate it into languages other than English.

The limited permissions granted above are perpetual and will not be revoked by OpenCAPI or its successors or assigns while the specification in question is the current version. Upon release by the OpenCAPI Consortium of a new version, all the above rights shall automatically cease.

OpenCAPI and the OpenCAPI logo design are trademarks of the OpenCAPI Consortium.

Other company, product, and service names may be trademarks or service marks of others.

Abstract

This document defines the requirements that need to be met to be asserted as an OpenCAPI 3.0 Ready device or OpenCAPI 3.0 Ready host. It is the work product of the OpenCAPI Consortium Compliance Work Group

This document is handled in compliance with the requirements outlined in the OpenCAPI Consortium Work Group (WG) process document. Comments, questions, etc. can be submitted to membership@opencapi.org.
Contents

List of tables .................................................................................................................. 4
Revision log .................................................................................................................... 5
About this document ...................................................................................................... 6
  Conventions .................................................................................................................. 6
  Notes ............................................................................................................................ 6
  Engineering notes ........................................................................................................ 6
  Developer notes ........................................................................................................... 6
Terms .............................................................................................................................. 7
References ...................................................................................................................... 8

1. Introduction .............................................................................................................. 9
   1.1 Interoperable systems .......................................................................................... 9
   1.2 Kernels and operating system distros .................................................................. 10
   1.3 API libraries ....................................................................................................... 10
List of tables

Table 1-1. List of examples of OpenCAPI 3.0 capable host systems that may be used for OpenCAPI Ready testing

Table 1-2. List of examples of OpenCAPI 3.0 capable host processors that may be used for OpenCAPI Ready testing

Table 1-3. List of examples of OpenCAPI 3.0 capable devices that may be used for OpenCAPI Ready testing
Revision log

Each release of this document supersedes all previously released versions. The revision log lists all significant changes made to the document since its initial release.

<table>
<thead>
<tr>
<th>Revision date</th>
<th>Summary of changes</th>
</tr>
</thead>
</table>
About this document

This document defines the requirements that must be met to be asserted as an OpenCAPI 3.0 Ready device or OpenCAPI 3.0 Ready host. It is the work product of the OpenCAPI Consortium OpenCAPI Compliance Work Group.

Conventions

The OpenCAPI Consortium documentation uses several typesetting conventions.

Notes

This section describes Engineering and Developer notices.

Engineering notes

Engineering notes provide additional implementation details and recommendations not found elsewhere. The notes might include architectural compliance requirements. That is, the text might include Architecture compliance terminology. These notes should be read by all implementation and verification teams to ensure architectural compliance.

Developer notes

Developer notes are used to document the reasoning and discussions that led to the current version of the architecture. These notes might also include recommended changes for future versions of the architecture, or warnings of approaches that have failed in the past. These notes should be read by verification teams and contributors to the architecture.
### Terms

The following terms are used in this document.

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>AFU</td>
<td>Attached functional unit. Architecturally, AFU refers to an end-point unit or resource. Communication from the processor to the AFU goes through a protocol stack, transaction layer (TL), data link layer (DL), and physical medium layer (PHY). Command and data packets at the AFU interface are specified by the AFU command/data interface, which is the interface between the AFU protocol stack and the AFU.</td>
</tr>
<tr>
<td>DL</td>
<td>OpenCAPI data link layer found on the host processor.</td>
</tr>
<tr>
<td>DLx</td>
<td>OpenCAPI data link layer found on the external OpenCAPI device.</td>
</tr>
<tr>
<td>DUT</td>
<td>Device under test.</td>
</tr>
<tr>
<td>OpenCAPI Ready™</td>
<td>The term defined in this document that asserts a minimum set of characteristics has been met to show a product should be interoperable with other OpenCAPI products.</td>
</tr>
<tr>
<td>OS</td>
<td>Operating system.</td>
</tr>
<tr>
<td>PHY</td>
<td>Physical medium layer. The PHY layer interfaces to the DL and the network.</td>
</tr>
<tr>
<td>TL</td>
<td>OpenCAPI transaction layer found on the host processor.</td>
</tr>
<tr>
<td>TLx</td>
<td>OpenCAPI transaction layer found on the external OpenCAPI device.</td>
</tr>
<tr>
<td>TMLA</td>
<td>Trademark license agreement.</td>
</tr>
</tbody>
</table>
References

The following documents can be helpful when reading this specification.

*OpenCAPI 3.0 Transaction Layer Specification*

*25 Gbps Physical Signaling Specification*

*25 Gbps Interface Mechanical Specification*

*OpenCAPI 3.0 Certified Definition*

*OpenCAPI 3.0 Ready Definition*

The following information is located on the [OpenCAPI Consortium website](#):

- OpenCAPI Ready trademark
- OpenCAPI Ready mark (Logo)
- OpenCAPI Ready list
- OpenCAPI Ready request form
- TMLA links/references/options
1. Introduction

The OpenCAPI Ready™ program is used by the OpenCAPI Consortium to enable OpenCAPI ecosystem product developers to indicate that a product has been shown/demonstrated to meet a minimum set of characteristics and should be interoperable with other OpenCAPI Ready products. This document serves as a reference for systems, processors, devices, and software that may service as interoperable partners when performing OpenCAPI Ready testing.

1.1 Interoperable systems

Table 1-1. List of examples of OpenCAPI 3.0 capable host systems that may be used for OpenCAPI Ready testing

<table>
<thead>
<tr>
<th>Company</th>
<th>Product Name</th>
<th>Link</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM</td>
<td>Power System IC922</td>
<td>IC922</td>
<td></td>
</tr>
<tr>
<td>IBM</td>
<td>Power System AC922</td>
<td>AC922</td>
<td></td>
</tr>
</tbody>
</table>

Note: For other host systems, check the OpenCAPI Ready List on OpenCAPI.org.

Table 1-2. List of examples of OpenCAPI 3.0 capable host processors that may be used for OpenCAPI Ready testing

<table>
<thead>
<tr>
<th>Company</th>
<th>Processor Name</th>
<th>Link</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM</td>
<td>POWER9 Monza</td>
<td>Monza</td>
<td></td>
</tr>
<tr>
<td>IBM</td>
<td>POWER9 LaGrange</td>
<td>LaGrange</td>
<td></td>
</tr>
</tbody>
</table>

Note: For other host processors, check the OpenCAPI Ready List on OpenCAPI.org.

Table 1-3. List of examples of OpenCAPI 3.0 capable devices that may be used for OpenCAPI Ready testing

<table>
<thead>
<tr>
<th>Company</th>
<th>Device Name</th>
<th>Link</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alpha Data</td>
<td>ADM-PCIE-9H7</td>
<td>9H7</td>
<td></td>
</tr>
<tr>
<td>Alpha Data</td>
<td>ADM-PCIE-9H3</td>
<td>9H3</td>
<td></td>
</tr>
<tr>
<td>Alpha Data</td>
<td>ADM-PCIE-9V3</td>
<td>9V3</td>
<td></td>
</tr>
<tr>
<td>Bittware</td>
<td>250-SoC</td>
<td>250-SoC</td>
<td></td>
</tr>
</tbody>
</table>

Note: For other devices check the OpenCAPI Ready List on OpenCAPI.org.
1.2 Kernels and operating system distros

An OpenCAPI-capable host kernel that may be used is the Linux Kernel, version 4.18 or greater: https://www.kernel.org/

The following Linux distros may also be used:

- Ubuntu 18.10 – comes with libocxl 1.1
- Ubuntu 18.04 LTS – must update to at least libocxl 1.1 using the link in Section 1.3 API libraries.
- RHEL 7.6-ALT – must install libocxl
- RHEL 8.0 – comes with accepted libocxl version.

1.3 API libraries

An OpenCAPI capable host API library that may be used for OpenCAPI Ready assertion is the libocxl driver, at least version 1.1 or greater, located here: https://github.com/OpenCAPI/libocxl.