

Open Domain Specific Architecture(ODSA)

CREATING OPEN CHIPLET ECOSYSTEM UNDER OPEN COMPUTE PROJECT

June 19th
HiPChips ISCA Workshop 2022

Dharmesh Jani (“DJ”)
Open Ecosystem Lead, Meta
Co-Chair OCP Incubation Committee

Bapi Vinnakota
ODSA Project Lead, Broadcom



OPEN DOMAIN
SPECIFIC
ARCHITECTURE



SERVER

Agenda

- Overview: Community, charter
- Progress towards a fully open, practical D2D stack
- How to participate

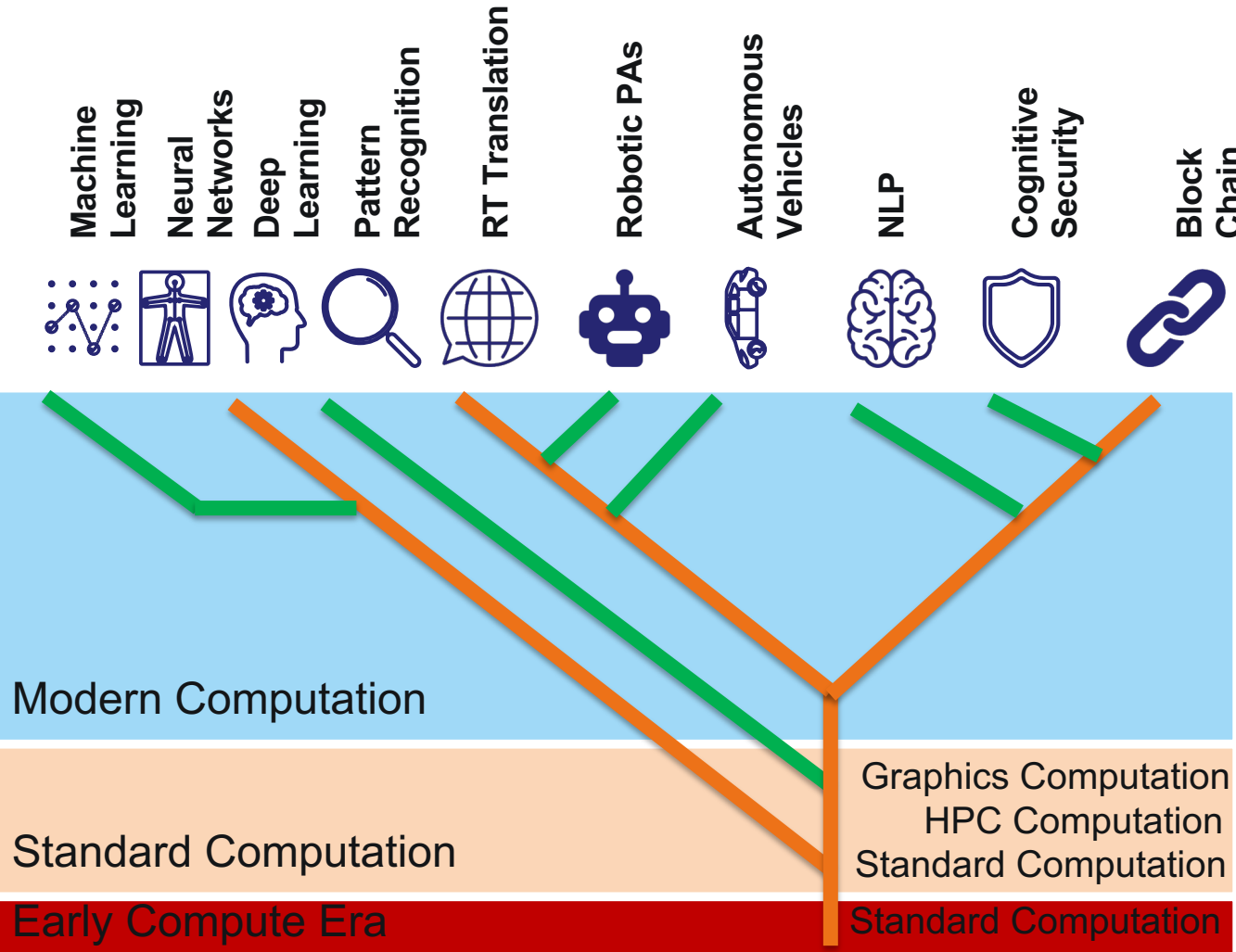
**Everything presented is the result of
active and significant community collaboration**



DSA: Accelerators and Chiplets

Domain-specific architectures (DSAs)
to accelerate targeted compute-
intensive workloads.

Chiplet: Die designed to be used with
other die in a package, usually with
proprietary interfaces.



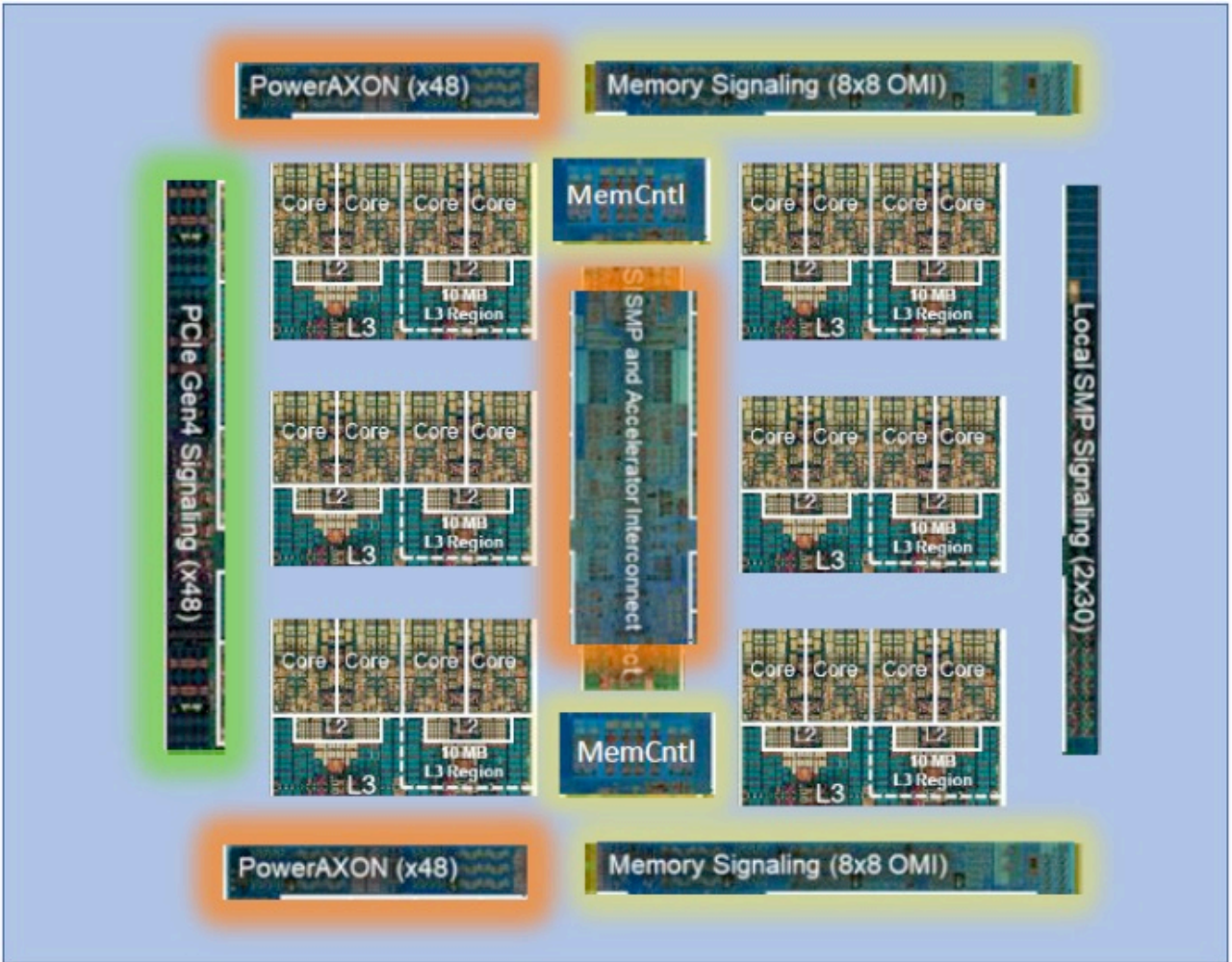
AI/ML/data workload explosion needs DSAs

Dharmesh Jani, Meta:
ODSA Workshop, Regional Summit, Amsterdam, Sep. 2019



OPEN DOMAIN
SPECIFIC
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DSAs built using
chiplets with open
standard D2D
interfaces



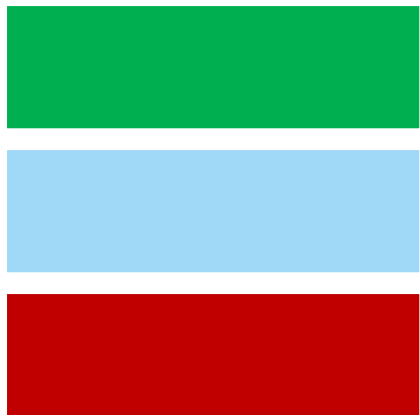
IBM Power 9: potential modularity

Jeff Stuechli, Josh Friedrich, IB:
ODSA Workshop, IBM, San Jose, Sep. 2019

Chiplet Based Domain-Specific Architectures

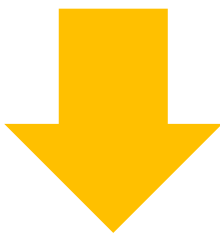
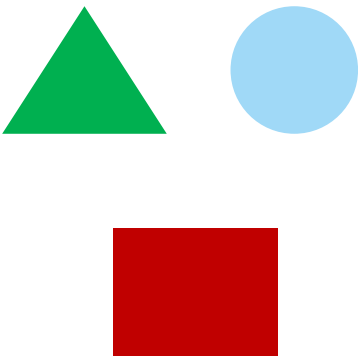
2018 Turing lecture by John Hennessy and David Patterson talked about coming age of DSAs

Logic Disaggregation



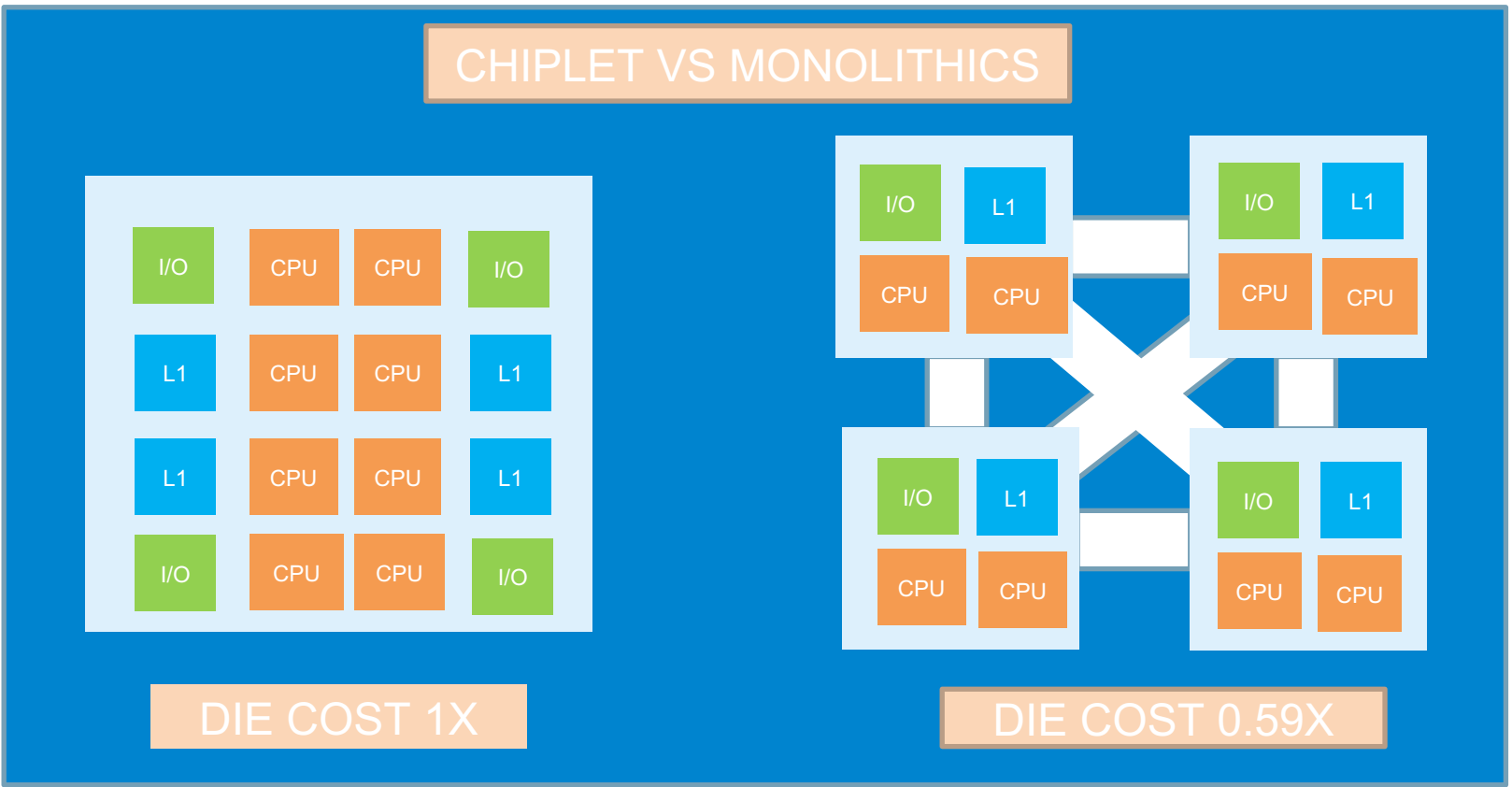
Improve yield and simplify/relax design requirements

IO Disaggregation



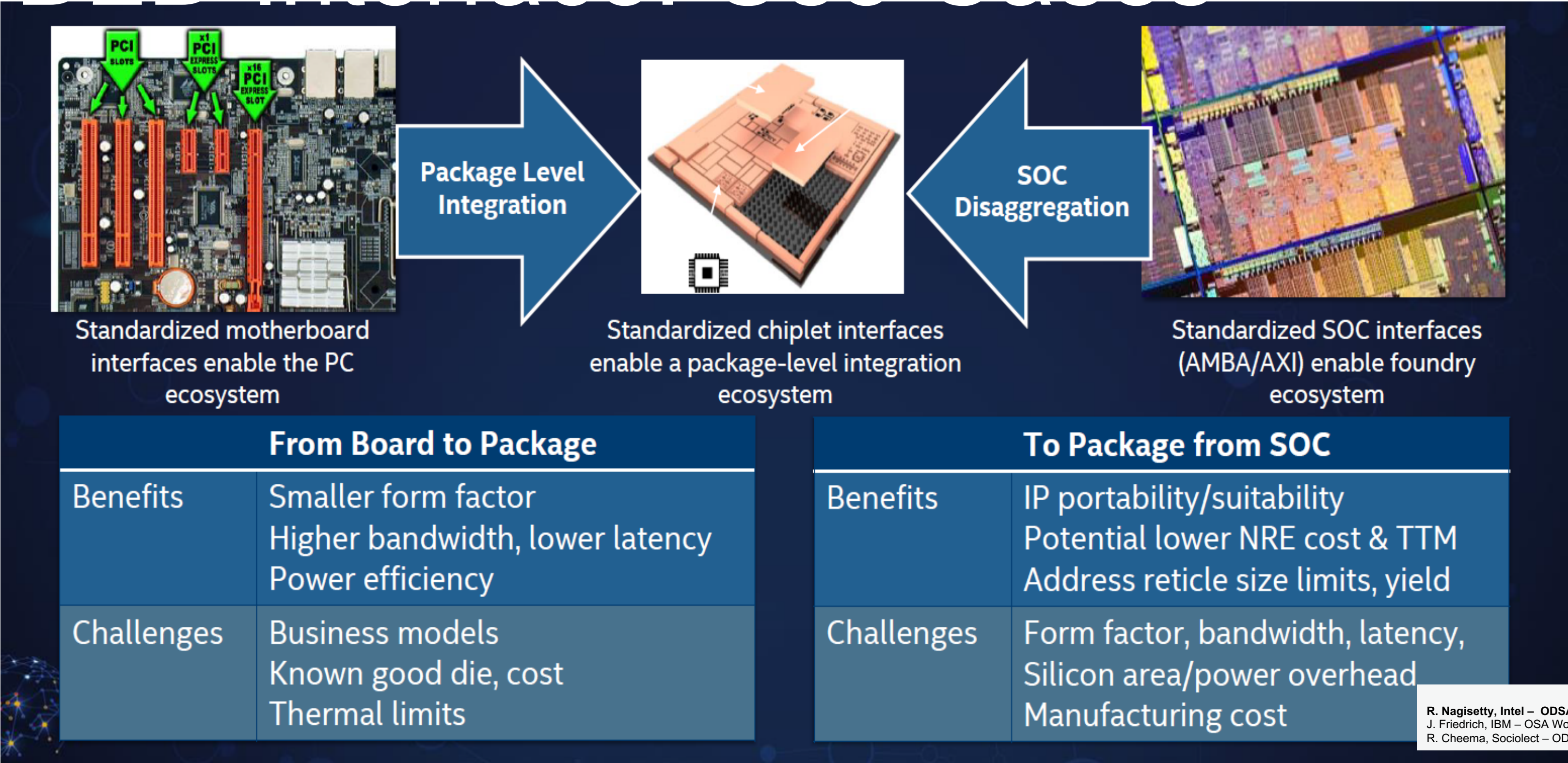
Right functionality in right silicon node

PROVEN EXISTING BUSINESS MODELS



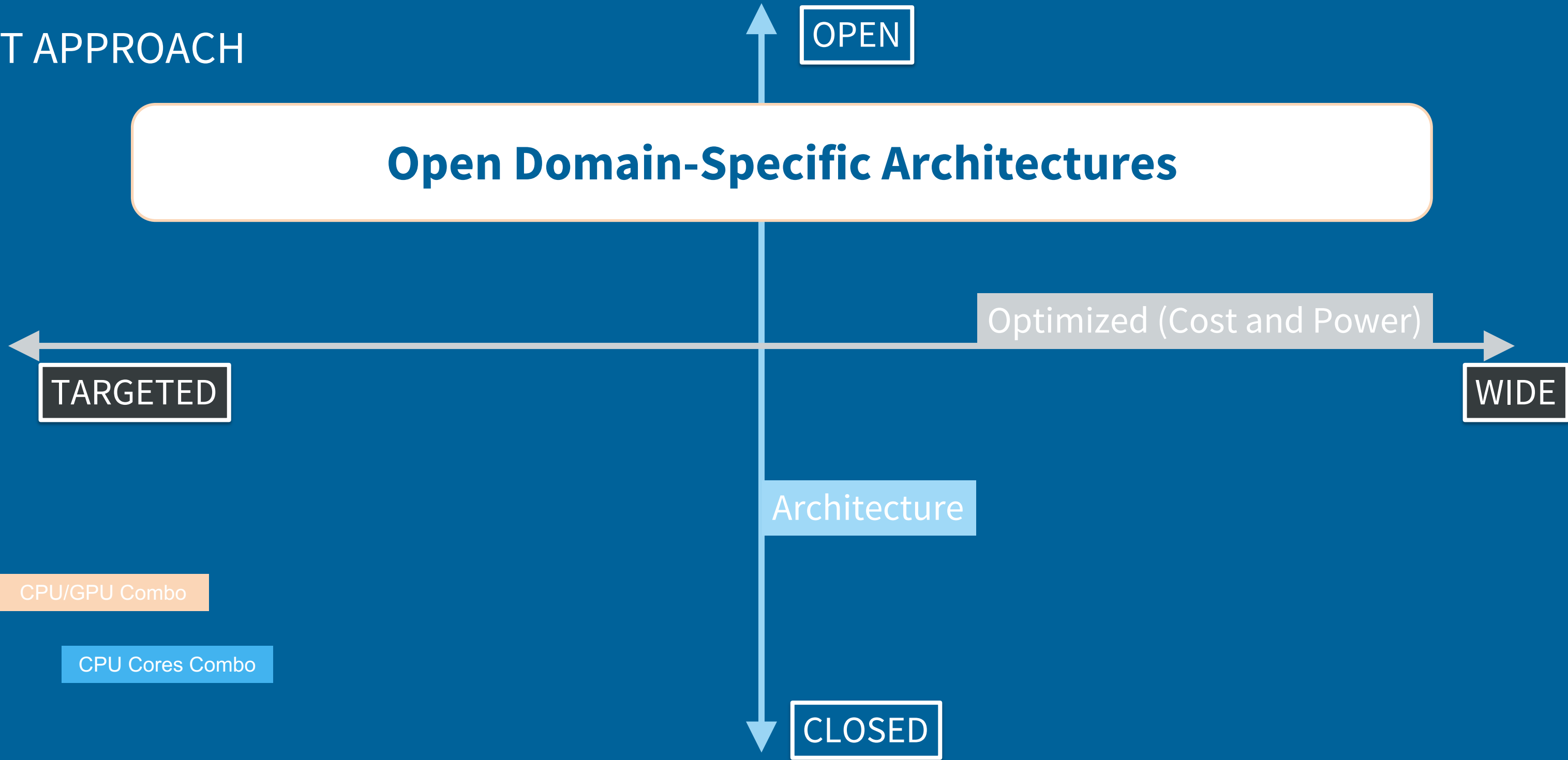
[L. Su, IEDM'17]

D2D Interface: Use Case



Open Domain-Specific Architecture (ODSA)

CHIPLET APPROACH



OCP Evolution

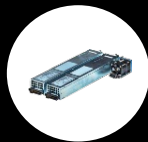
MODULES

SUB-SYSTEMS

SYSTEMS

DATA CENTERS

2011



Power Supply



Spitfire Server (AMD)



Freedom Servers



Battery Cabinet



Triplet Rack



Data Center

2012



Mezzanine Card V1



Watermark (AMD)



Windmill (Intel)

2013



Knox



Winterfell



Group Hug



Open Rack V1

2014



Mezzanine Card V2



Micro Server (Panther)



Cold Storage



Open Rack V2

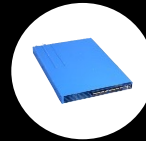
2015



Honey Badger



Leopard



Wedge



BluRay

2016



Wedge 100



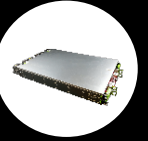
Big Sur



Backpack



Yosemite



Lightning



Six Pack

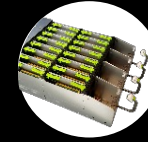
2017



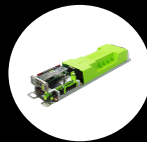
CWD4-OCP



Bryce Canyon



Yosemite V2



Tioga Pass

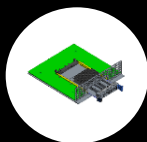


Wedge 100S



Big Basin

2018



OCP NIC3.0



Twin Lake

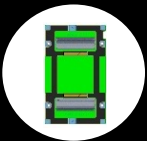


Big Basin V2



FAV3

2019



Open Accelerator Module



Minilake



Minipack

2020

ODSA is the next step...

SUB-MODULES
COMPONENTS

MODULES

SUB-SYSTEMS

SYSTEMS

DATA CENTERS

2011

2012

2013

2014

2015

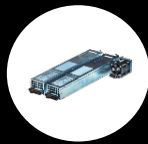
2016

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2019

2020



Power Supply



Mezzanine Card V1



Knox



Mezzanine Card V2



Honey Badger



Leopard



Wedge 100



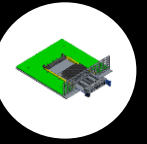
Yosemite



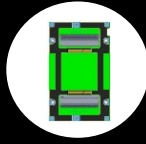
CWD44-OC



Tioga Pass



OCP NIC3.0



Open Accelerator Module



Spitfire Server (AMD)



Freedom Servers



Watermark (AMD)



Winterfell



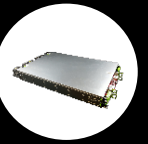
Micro Server (Panther)



Wedge



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Lightning



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Twin Lake



Minilake



Battery Cabinet



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Windmill (Intel)



Group Hug



Cold Storage



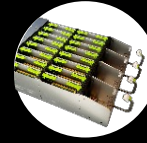
BluRay



Backpack



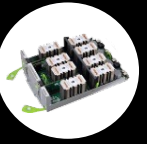
Six Pack



Yosemite V2



Big Basin



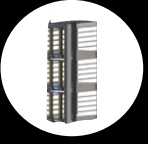
Big Basin V2



Minipack



Data Center



Open Rack V1



Open Rack V2

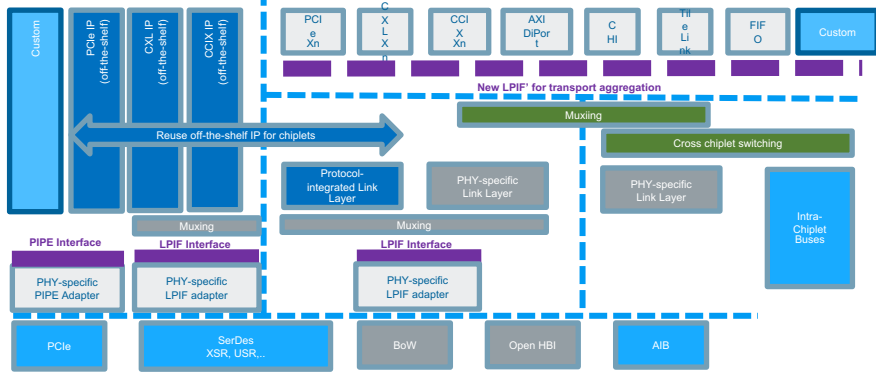
ODSA



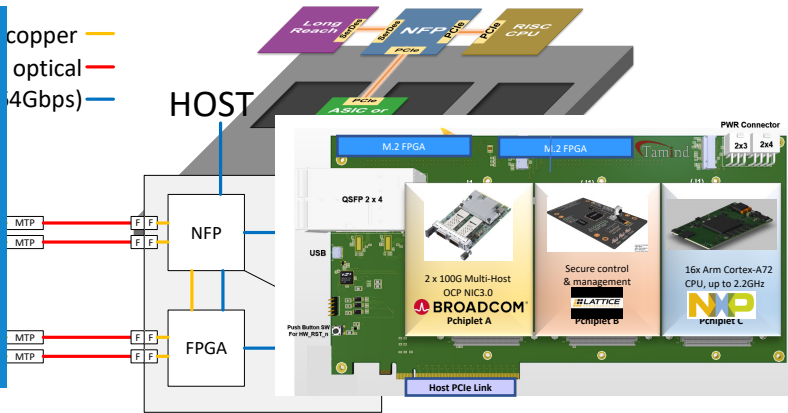
ODSA Charter

ODSA Activities

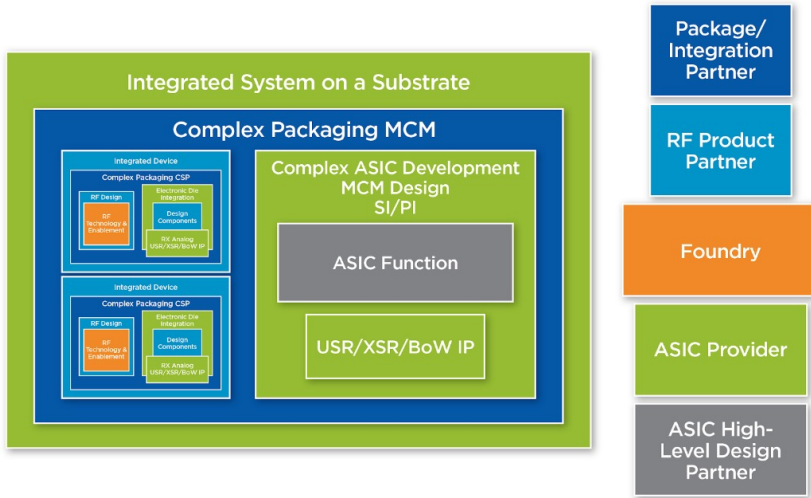
Open D2D Interface
Reduce barrier to interoperation



Reference Designs
Starting point for new designs



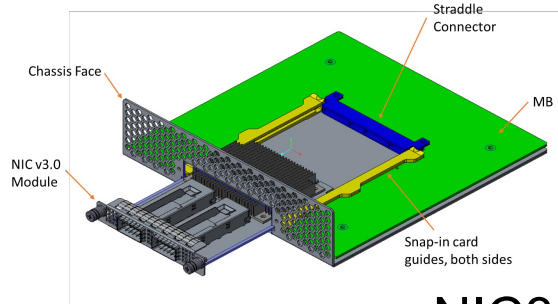
Reference Workflows
Reusable, open practices



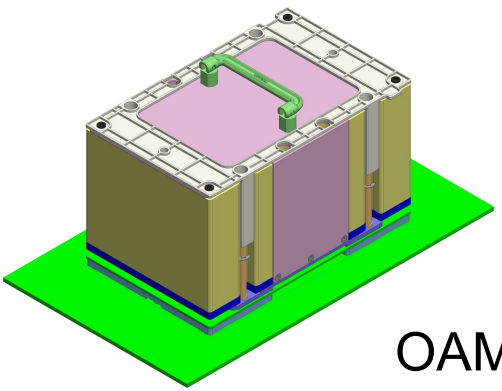
Chiplet Marketplace

Integrate best-in-class chiplets from multiple vendors through open interfaces

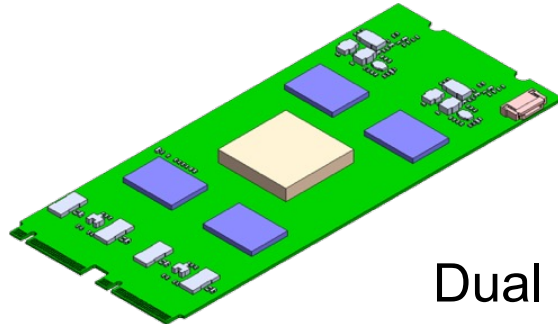
OCP modular form factors



NIC3.0



OAM

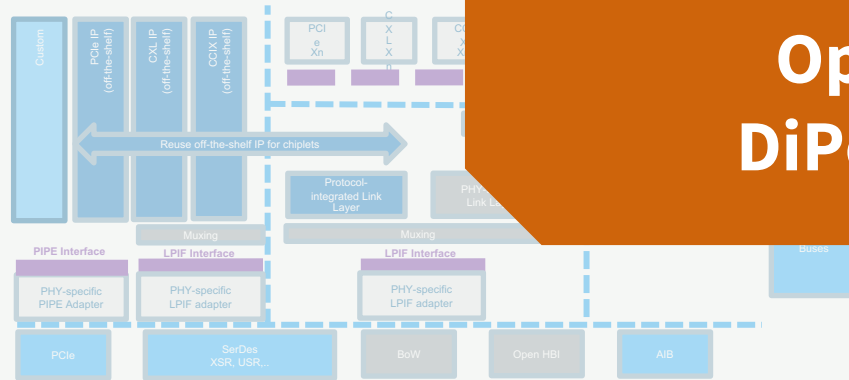


Dual M.2

ODSA Charter

Open D2D Interface

Reduce barrier to interoperability



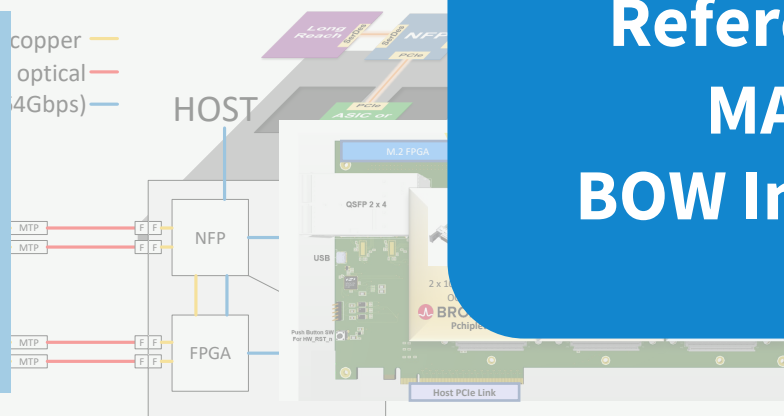
Specifications

- BOW
- OpenHBI
- DiPort etc..

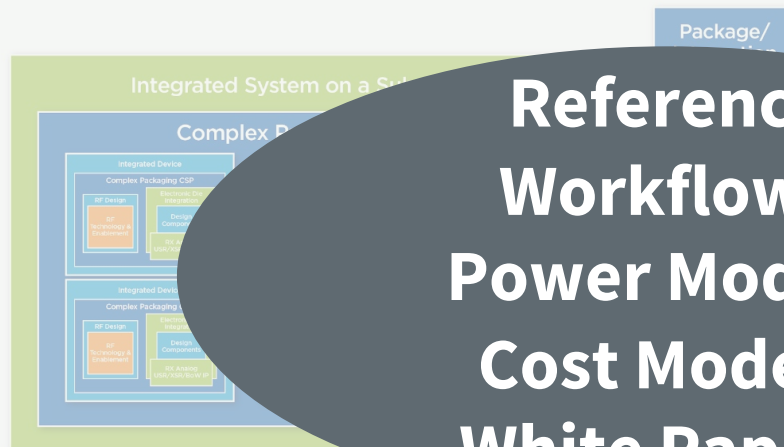
Reference Designs

MARA Board

BOW Interop Vehicle



Reference
Workflows
Power Models
Cost Models
White Papers



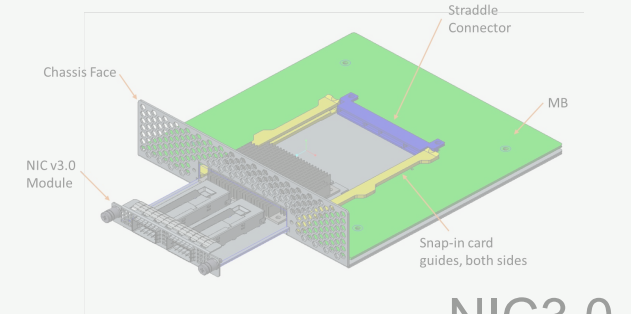
Reference Workflows

Reusable, open
practices

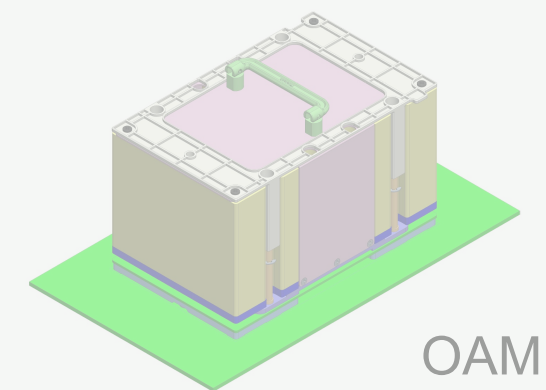
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Integrate best-in-class
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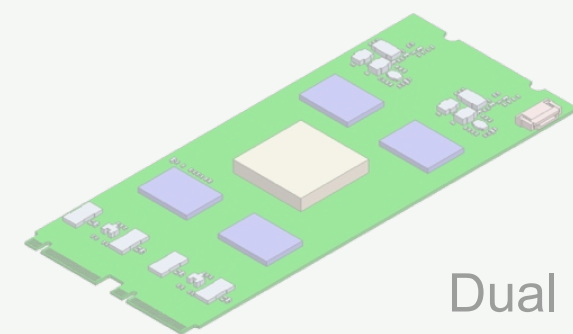
OCP modular form factors



NIC3.0

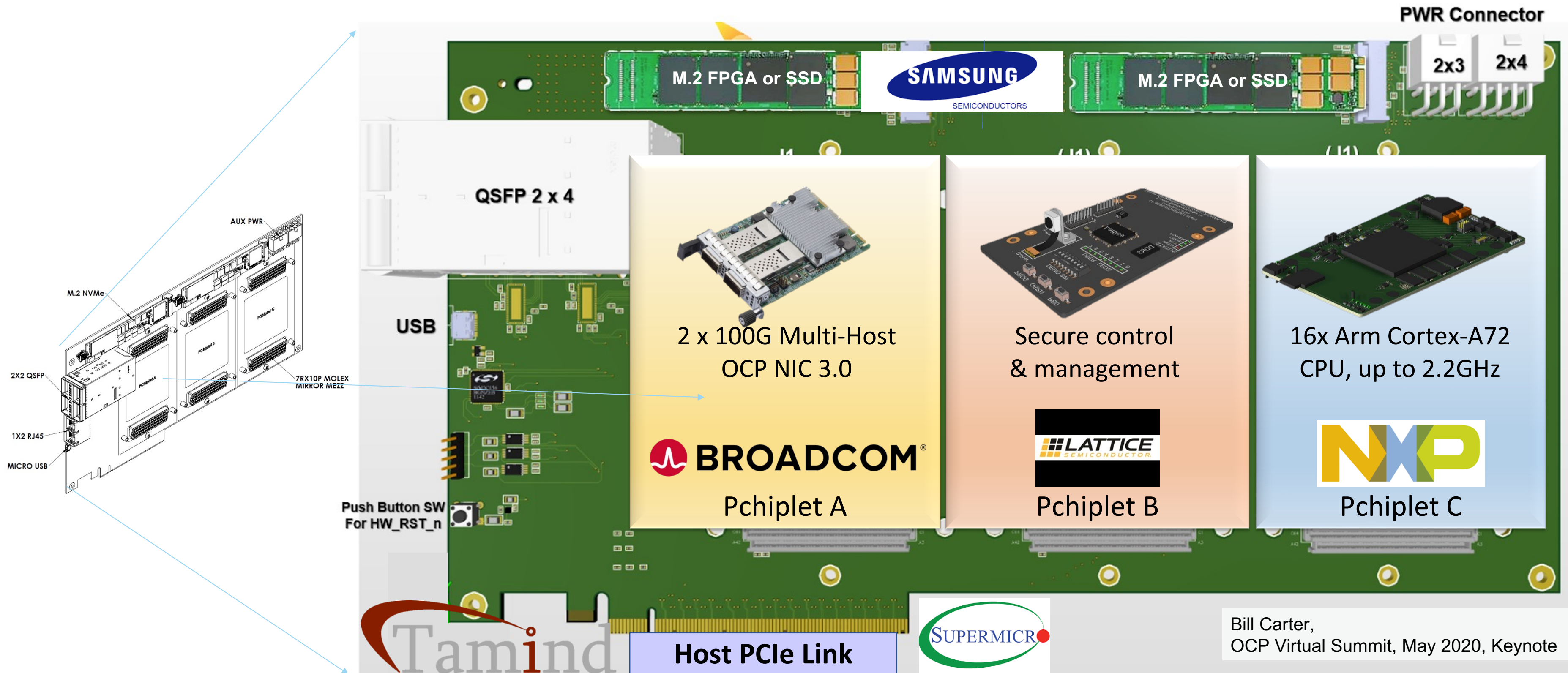


OAM



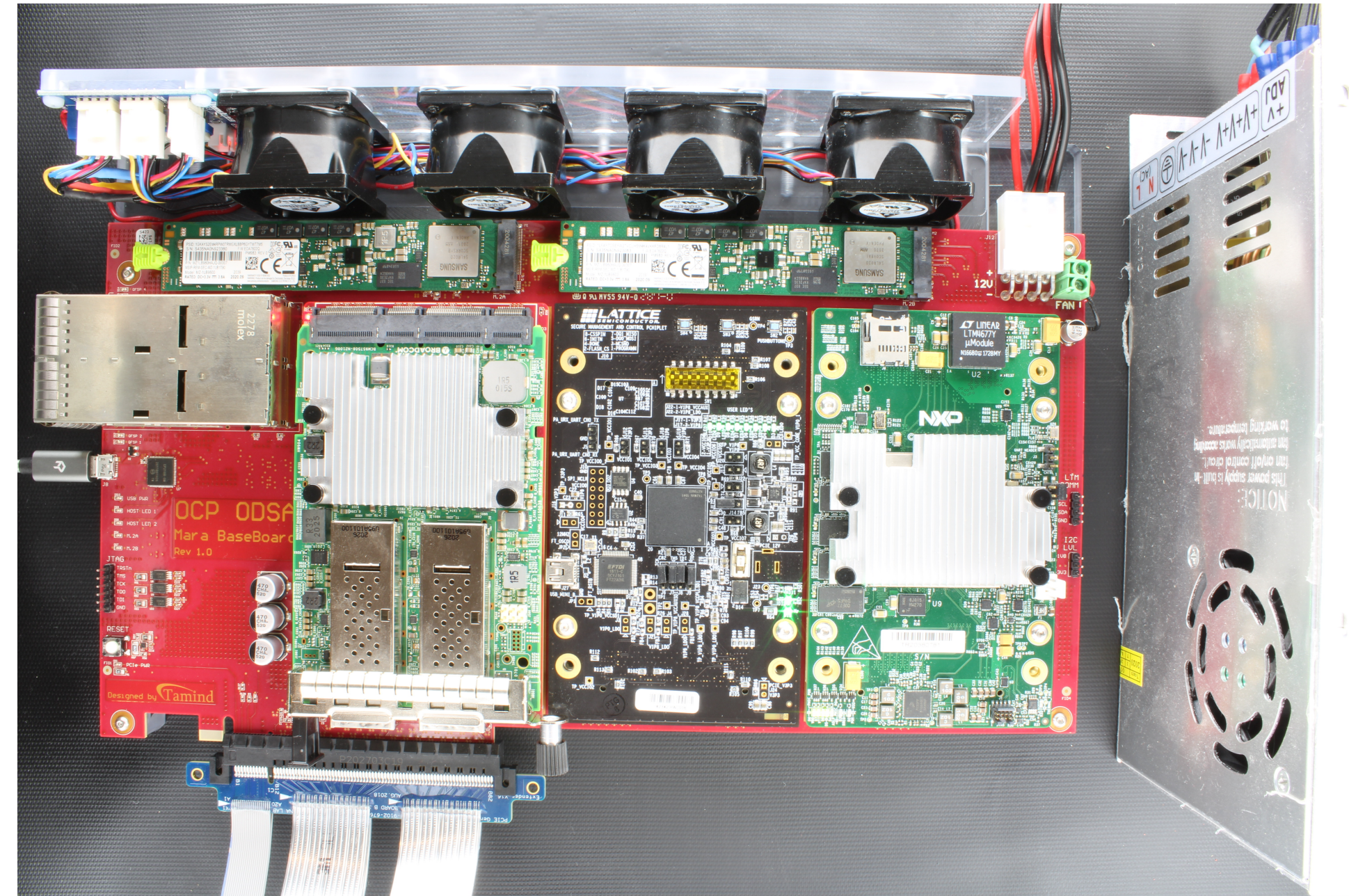
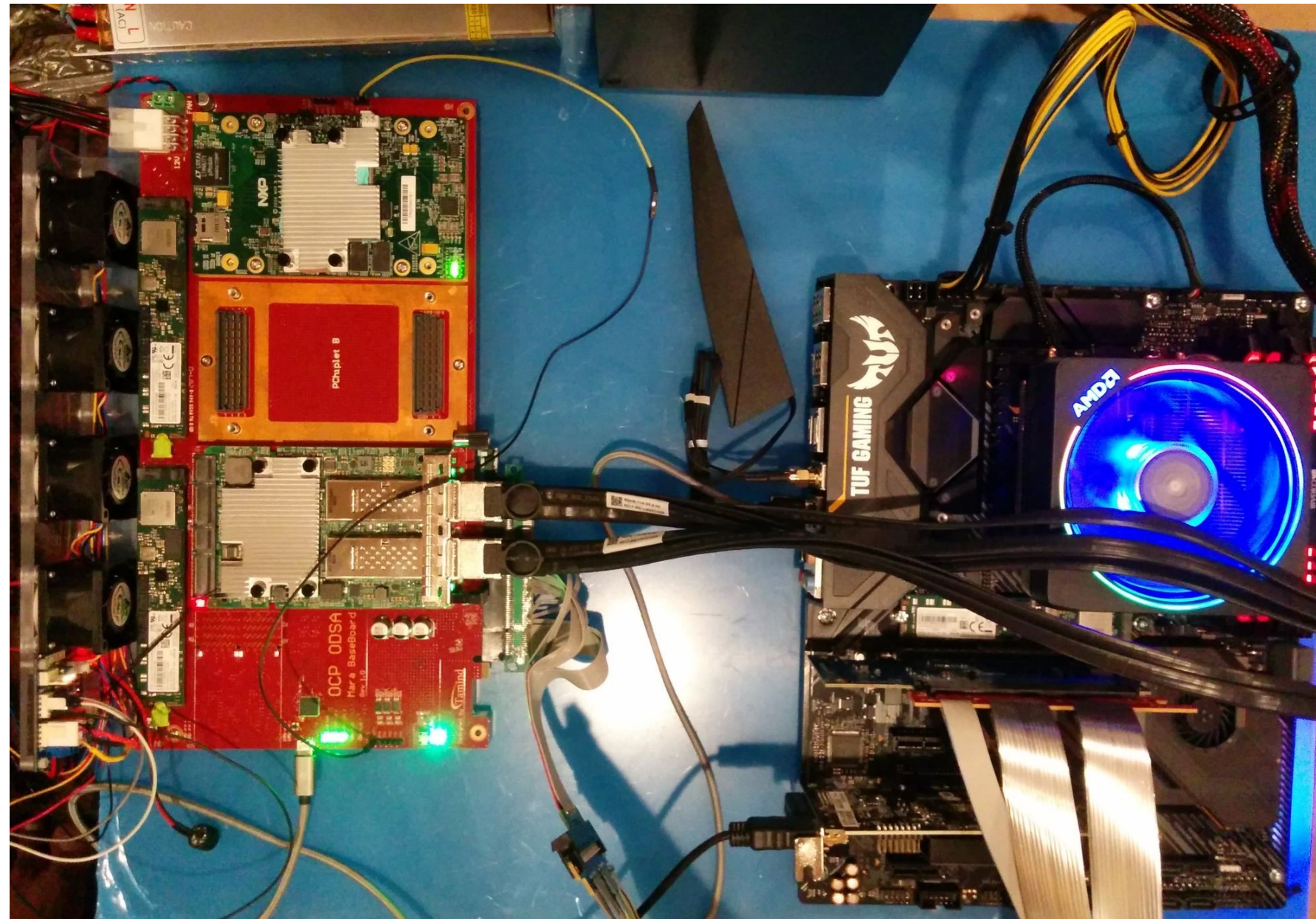
Dual M.2

ODSA Accelerator PoC Kit



Design your own Pchipler, develop an application

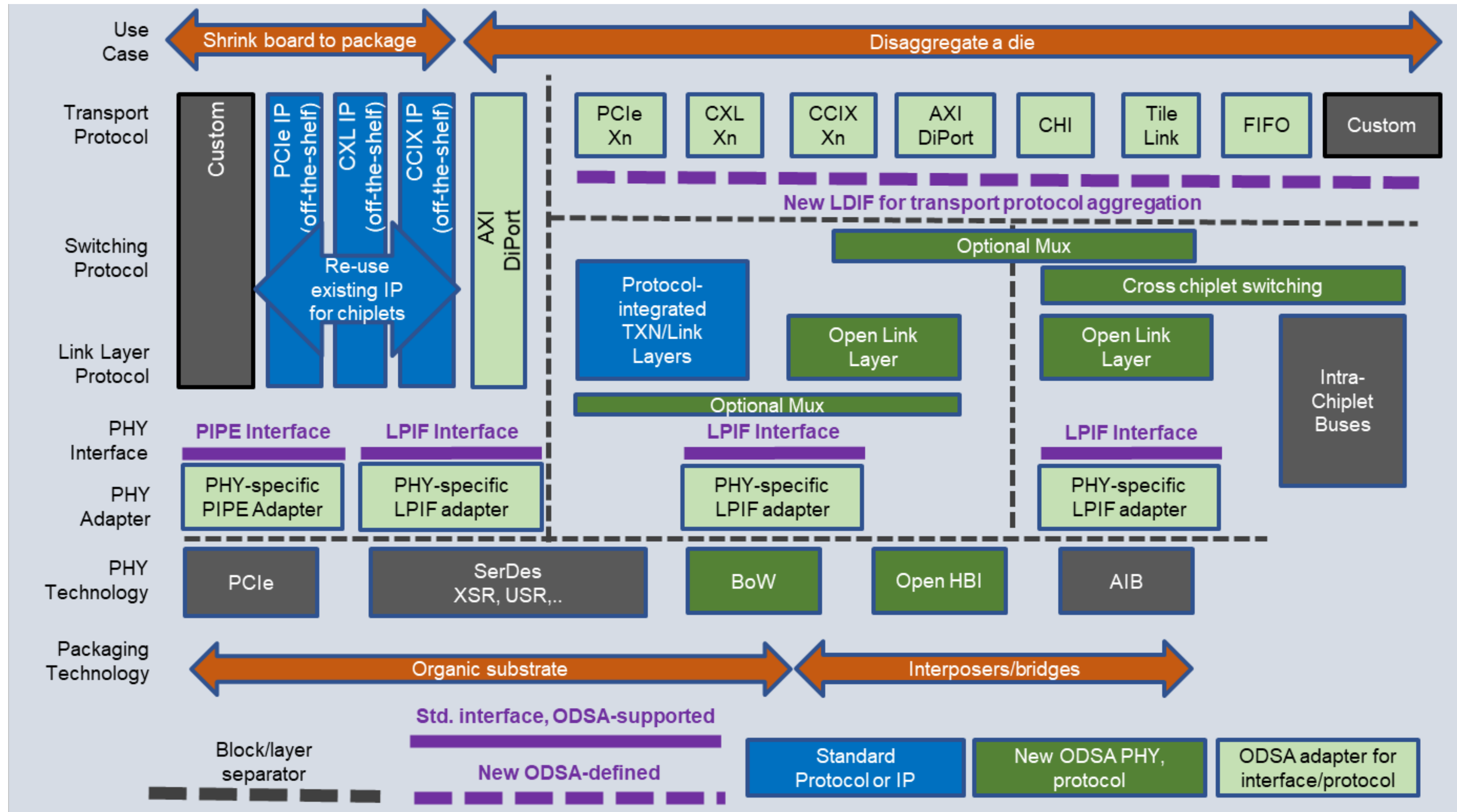
ODSA PoC



Storage Acceleration Workshop in August 2021

ODSA Stack:

A stack for a marketplace to support the most popular data transaction protocols used by system designers on a wide range of packaging options



Attendees and Participants:

Attendance and/or participation do not imply corporate endorsement



Semi Vendors
IP providers, EDA
Service providers

Tools, Manufacture, Design,
Test,
Integration

Systems vendors,
End users, ISVs, Service
Providers



ODSA Community

Workstream	Leader	Value	Output
ODSA	Bapi Vinnakota	First vertical protocol+PHY D2D stack	Specifications, 15+ refereed technical papers
Bunch of Wires	Elad Alon	First cross-technology scalable clock-forwarded PHY	BoW Draft Spec
Business	Ravi Agarwal	Largest ever OCP workshop Chiplet cost model	Chiplet cost model
CDX	David Ratchkov	First cross-industry open workflow models	Design flow white paper
Cross-PHY	Shahab Ardalan	Industry-standard objective metrics to compare D2D PHYs	Cross-PHY spreadsheet
End User	Dharmesh Jani	Structured flow of requirements	HipChips Conference
Link Layer	Open	Lightweight cross-protocol cross-PHY	DiPort controller
OpenHBI	Kenneth Ma	Leverage most popular chiplet technology	OpenHBI specification
Prototyping	JP Balachandran	Fully collaborative open, community-funded effort	BoW Test Chip ODSA Board Prototype

2022 Plans

- **Support industry efforts to advance an open chiplet ecosystem**
 - Collaborate with UCle –
 - e.g., align the second generation of our work - OpenHBI, BoW, DiPort, Link Layer...
 - Some ODSA work is entirely complementary - CDX, Chiplet business model, KGD model
 - Continue to collaborate with the IEEE, Chips Alliance,...
- **Continue the great work we have been doing!**
 - ODSA solutions are the first open industry effort for die disaggregation
 - Ecosystem is geared for all use cases; compute, accelerators,
- **Multiple chips/test-chips are in flight, and an ecosystem is already forming – today's session**

Join ODSA to drive innovation!



OPEN DOMAIN
SPECIFIC
ARCHITECTURE

- Join a work stream, each meets weekly
- Help with the PoC, software, use case dev
- Review, help complete documents in flight
- Need packaging and test definition and work streams
- Make chiplets with, IP for, the open ODSA stack



SERVER

- <https://www.opencompute.org/wiki/Server/ODSA>
- Join us at the OCP Fall Summit in Oct 2022

THE END!

