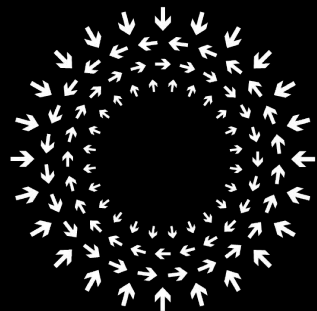




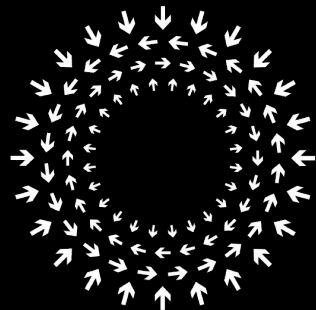
The OCP Members and Community Projects and Contribution Review Supply and Marketplace



OPEN

Compute Project®

**Thank you to Yamaguchi-San for organizing this event.
Thank you to Microsoft for hosting OCP.**



OPEN
Compute Project®

The OCP Members and Community

Archna Haylock
Community Director
Archna@opencompute.org

Foundation Staff



Rocky Bullock
Chief Executive Officer



Archana Haylock
Director, Community



Steve Helvie
VP, Channel Development



Bill Carter
Chief Technology Officer



Dirk Van Slyke
Director, Marketing & Communications



Michael Schill
Membership Community Specialist



John Laban
Representative, Europe



Rajeev Sharma
Director, Software & Technologies



Kali Burdette
Manager, Meeting & Events



Nick Bullock
Director, Finance

Foundation Board



Mark Roenigk
Chairman/President
Facebook



Joshua
Matheus
Goldman Sachs



Jason Waxman
Intel Corporation



Bill Laing
Microsoft Corporation



Brian Stein
Rackspace



Andy Bechtolsheim
Individual



Rocky Bullock
Non-Voting

OCP Membership Facts

- ~200 Corporate Members
 - Adopters
 - Suppliers (HW and SW)
 - Solution Providers
- 6000 participants in our community
 - Technical (HW and SW)
 - Sales/Business Development
 - Executives
 - Manufacturing/Process
 - Facilities
 - Academia
- Member Companies from all over the world

OCP Membership Directory:

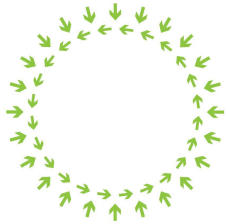
<https://www.opencompute.org/membership/membership-organizational-directory>

LinkedIn Joins OCP, Continues Open19 Deployment in Its Data Centers

LinkedIn has joined the Open Compute Project, the Facebook-led open source data center initiative • OCP has lots of answers to LinkedIn's questions about scaling its infrastructure to support exponential traffic growth • LinkedIn continues charging ahead with its own open source data center standard, Open19 • While there is

source data center standard, Open19 • While there is LinkedIn continues charging ahead with its own open its infrastructure to support exponential traffic growth • has lots of answers to LinkedIn's questions about scaling

OCP Corporate Membership



OPENTM
COMMUNITY



OPENTM
SILVER



OPENTM
GOLD



OPENTM
PLATINUM

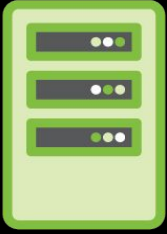
Features	Community	Silver	Gold	Platinum
Sponsorship	—	1 event	2 events	3 events
Eligible for becoming a SP/Reseller	✓ *	✓ *	✓ *	✓ *
Summit sponsorship discount	—	10%	15%	20%
Speaking engagements	—	1	2	3
PL or IC position eligibility	1 PL position	1 PL or IC position	2 PL or IC positions	3 PL or IC positions
Voting keys	—	1	2	3
OCP Accepted™ product recognition	✓	✓	✓	✓
OCP Inspired™ product recognition	—	✓	✓	✓
Contributions	—	—	1	2
Cost	\$2,500	\$60,000	\$50,000	\$40,000

* There is an additional fee to becoming a SP/Reseller.

OCP Membership Benefits

- Connect with other Industry leaders and innovators
- Get access to new industry trends
- Collaborate with like-minded participants to create leading edge solutions to industry challenges.
- Become part of a global community
- Participate in projects that are paving the way and addressing real time concerns of the community.
- Contribute your subject matter expertise while retaining control of your IP
- Showcase your OCP recognized products to potential adopters
- Join the “open” movement to achieve efficiency and growth and make an impact

OCP Community : Projects and SubProjects



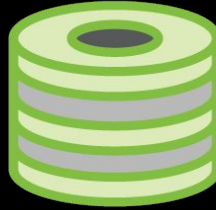
SERVER

PCI 3.0 Mezz



NETWORKING

ONL, ONIE, SAI, SONiC,
Campus Branch Wireless



STORAGE

JDA Project



RACK & POWER

Adv Cooling Solutions, Power
Shelf Interoperability



HW MGMT



HPC

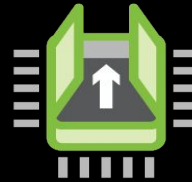


TELCO



DC Facility

Modular DC



Open Sys FW

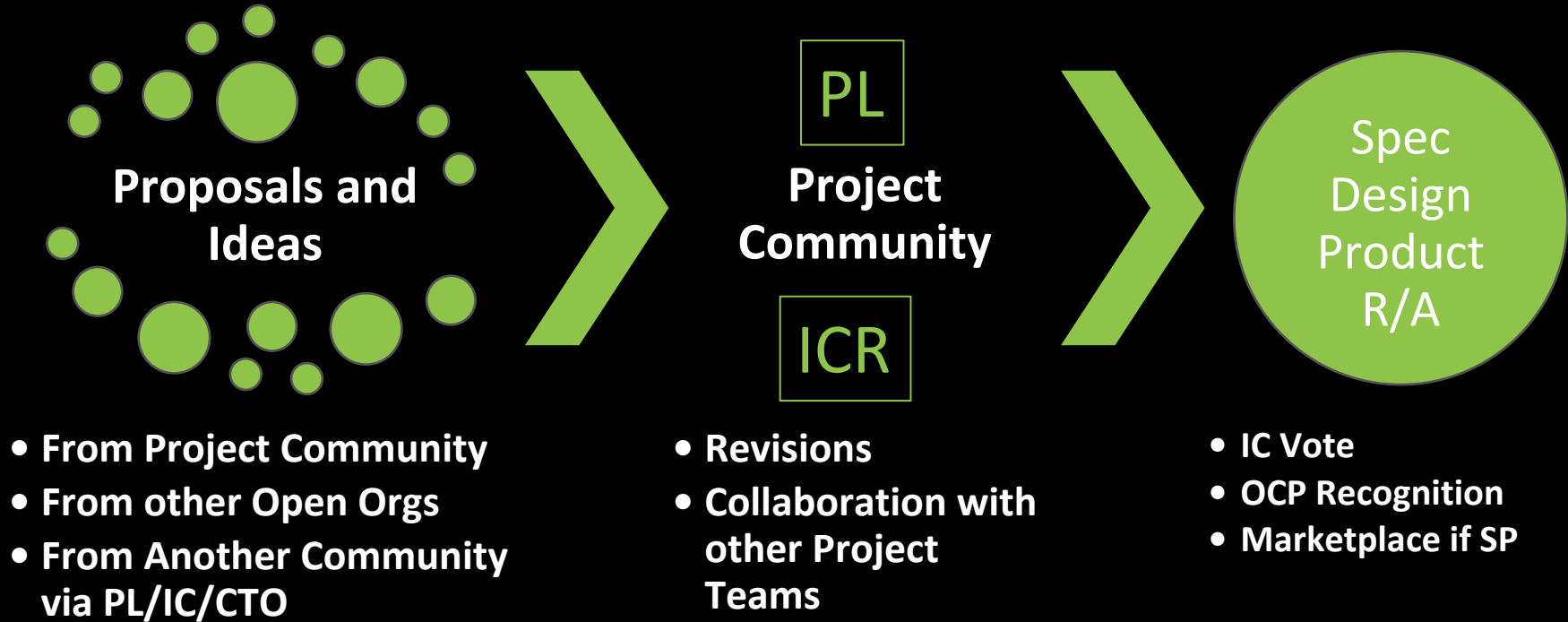


SECURITY

OCP Projects - GET INVOLVED

- Each Project has a charter - READ IT
- Each Project has volunteer leaders - 1 or 2 Project Leads and 1 Tech Steering Committee Rep - INTRODUCE YOURSELF
- Some Projects have 1 or more sub-projects.
- Each Project has a WIKI page. Sub-projects have their own WIKI. - READ IT
- Each Project/sub-project has a mailing list. - JOIN THE LIST
- Each Project/sub-project meets separately for their calls - some are monthly, some are weekly. - ATTEND THE CALLS
- All calls are recorded. - LISTEN IF YOU CAN NOT ATTEND LIVE
- Projects have workshops. - REGISTER FOR WORKSHOPS

From Concepts to Contributions....



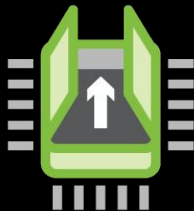
What is OPEN hardware?



Specifications



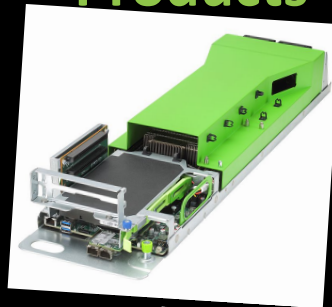
Design Packages



Embedded SW

Contributed with a **Royalty-free, non-assert** License (CLA)

Products

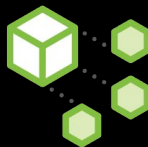


IP retained by
OEM/ODM

How this Community Contributes, Collaborates, & Consumes



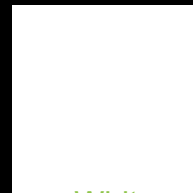
Specifications



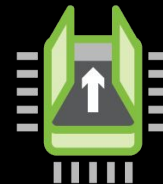
**Reference
Architecture**



**Tested
Configurations**



**White
Papers**



**Embedded
Software**



**Design
Files**



**Product
Recognition**



Case Studies



**Workshops
Summits**



**Testimonials
Seminars**



Videos

OCP Upcoming Events

- Rack and Power Engr Workshop - July 24th Fremont, CA @ Delta Electronics US HQ – Workshop will be video-taped and will be available on OCP Past Events Page 1 week after.
- Networking Engr Workshop – Target late Aug, San Jose, CA @ TBD. More info on OCP Events Page.
- IC Meetings occur every 6 weeks – to vote on any upcoming contributions and discuss strategic direction of the projects.
- OCP Regional Summit – Oct 1-2 Amsterdam, The Netherlands. Sponsorships still available and membership discounts are applied (20% for Platinum, 15% for Gold, 10% for Silver, 5% for Community).
- OCP Summit – March 14-15, 2019 San Jose, CA. Bundle Discounts are available if interested in both Europe and US Summits.



OPEN
Compute Project®

[ABOUT ▾](#)

[MARKETPLACE](#)

[SP ▾](#)

[CONTRIBUTIONS ▾](#)

[PROJECTS ▾](#)

[EVENTS ▾](#)

[MEMBERSHIP ▾](#)

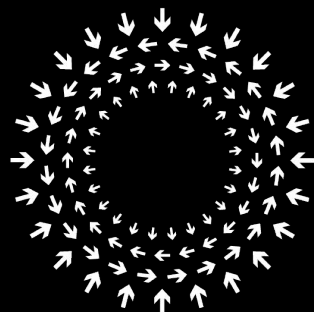
[BLOG ▾](#)

Regional Summit

2018 OCP Regional Summit

Amsterdam, Netherlands

October 1-2, 2018

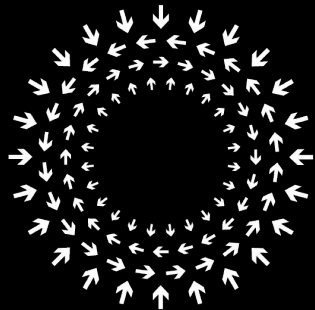


OPEN
Compute Project®

Bill Carter

Chief Technology Officer
bill@opencompute.org

OPEN. FOR BUSINESS.



OPEN

Compute Project®

New Projects, Contributions, and a Look Ahead

Open Compute Project

A collaborative community focused on redesigning hardware technology to efficiently support the growing demands on compute infrastructure.

EFFICIENCY
SCALE
IMPACT
OPENNESS

Enabling the industry to *Consume*, *Collaborate*, and *Contribute*

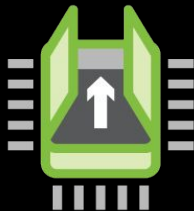
What is OPEN hardware?



Specifications



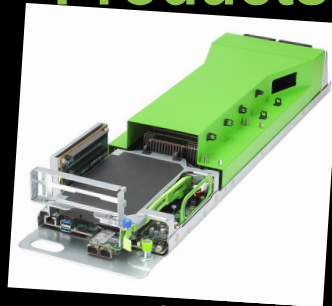
Design Packages



Embedded SW

Contributed with a **Royalty-free, non-assert** License (CLA)

Products



IP retained by
OEM/ODM

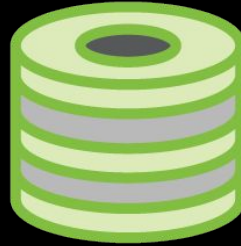
Our Core Projects



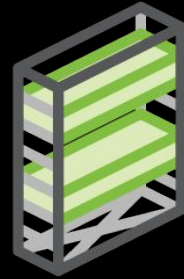
SERVER



NETWORKING



STORAGE

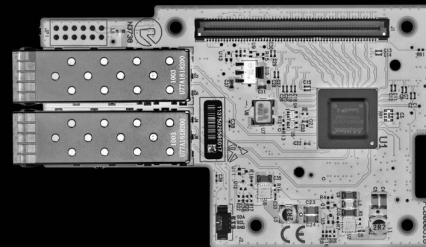
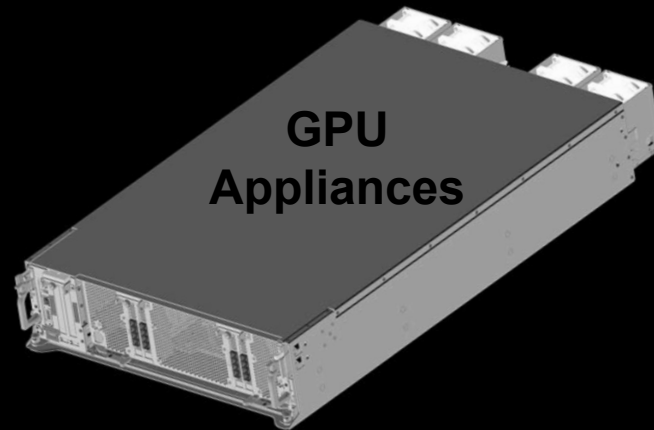
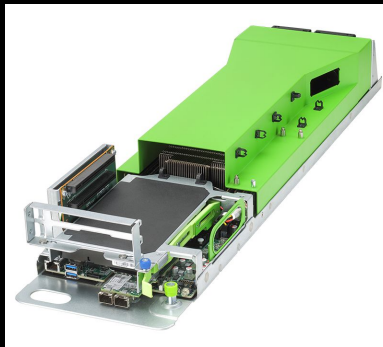


RACK & POWER

OCP Core Projects



SERVERS



OCP Core Projects



NETWORKING

1GbE and PoE
10/25 GbE Switches
100GbE Switches
Optics & Telemetry
CBW, Wireless AP's

ONIE
SAI
SONiC
ONL



OCP Core Projects



STORAGE

Cloud Usage Specs
Fast Fail API
SMR User Specs
Health Monitoring API
M.2



OCP Core Projects



RACK & POWER

21" Open Rack Standard

- 15% more volume
- 17% more efficient
- 12VDC or 48VDC bus bars
- Power & Resiliency options

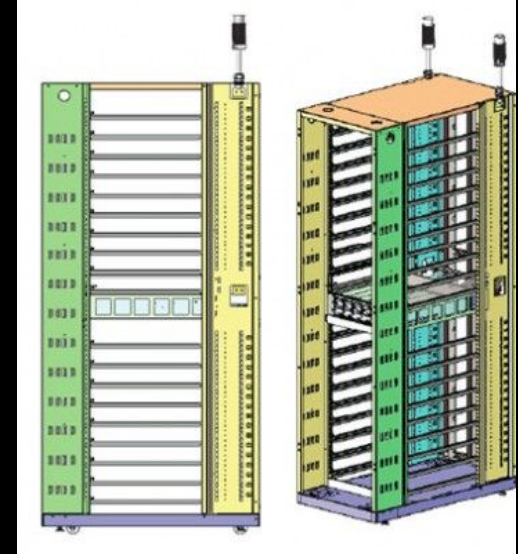
CG-Open Rack 19"

- Front access/pre-wired Optical
- Same efficiency gains
- NEBS/Seismic considerations

EIA-310 Equipment

Power Rectifiers

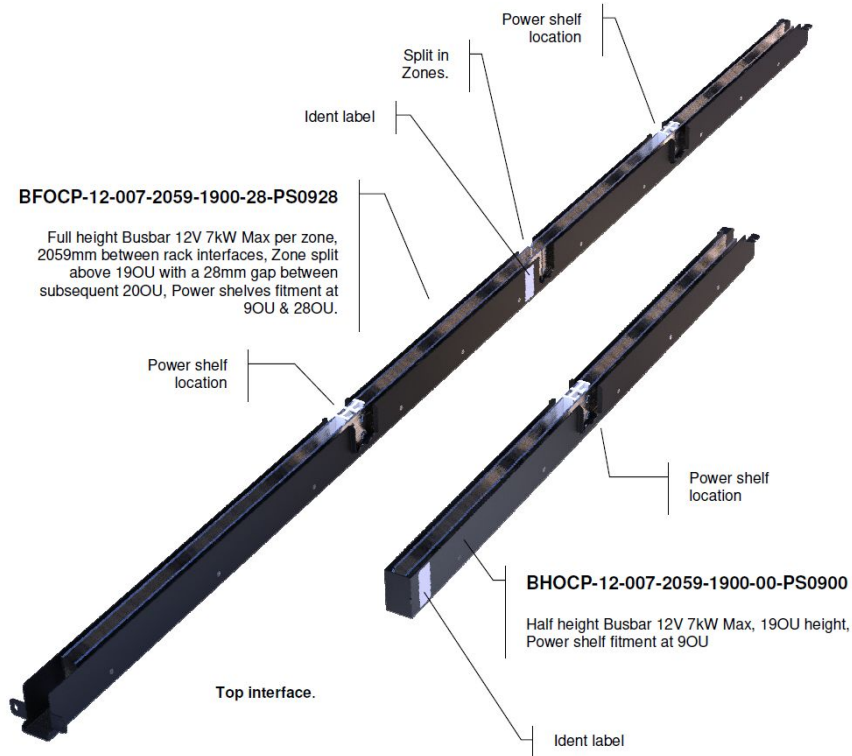
In-Rack Battery Backup



21" ITE Equipment Rack

15% more volume & frontal area
7-21% better power efficiency

Name	Status	Contributor
Open Rack Busbar Interface Specification	Approved!	Rittal











Defines the technical specifications between the:

- Busbar assembly
- Open Rack
- Power Shelves

Name	Status	Contributor
Indicator Specification	Community Review	Facebook

Table 4. OCP indicator legends

Meaning	Preferred	Alternate
Power On/Good		PWR
AC Good		AC OK
DC Good		DC OK
Fault		FAULT
Status		STS
Fan		FAN
Over Temperature		OVER TEMP
Drive #		DRIVE #
End of Life Reached (BBU)	EOL	N/A

Provide standards for OCP:

- Icons
- LED color
- LED behavior
- Indicator Placement

Name	Status	Contributor
Seismic Kit for Open Rack	Approved!	Nokia



This specification defines Optional Seismic kit for Open Rack V2 to fulfill the Zone 4 criteria defined by Telcordia GR-63-CORE

Name	Status	Contributor
True Three Phase 380 – 480 Vac to 48Vdc Power Shelf	Community Review	GE Industrial Solutions/ ABB



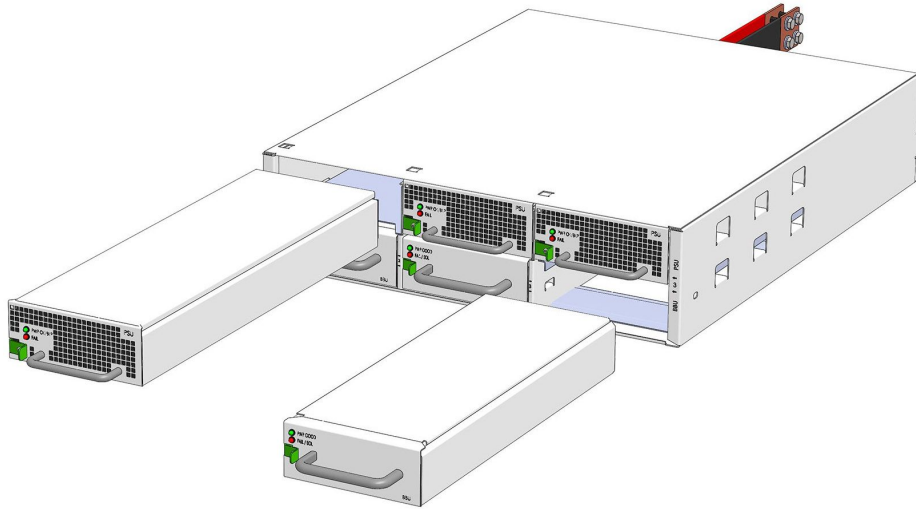
SNMP Ethernet Connection
with power MIB as template

LEDs

Four 6 kW
Rectifiers

This True Three Phase 380-480Vac to 48Vdc Power Shelf powers 24kW of load equipment from a single 50A whip.

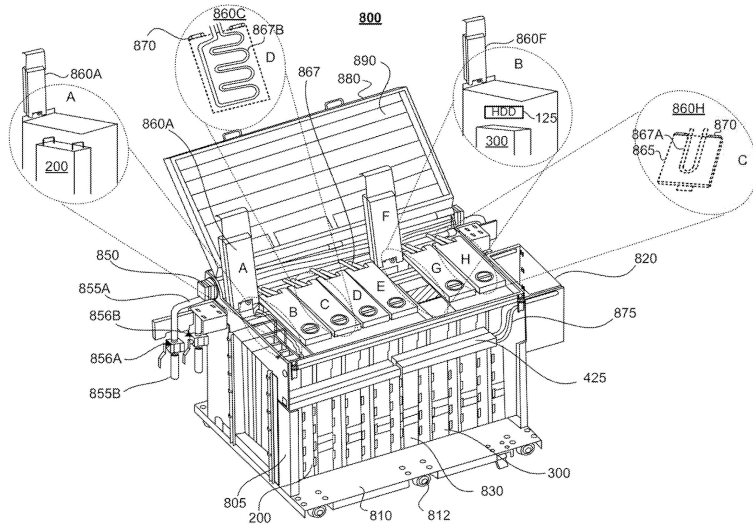
Name	Status	Contributor
Power Shelf Interoperability Specification	In Development	Shared



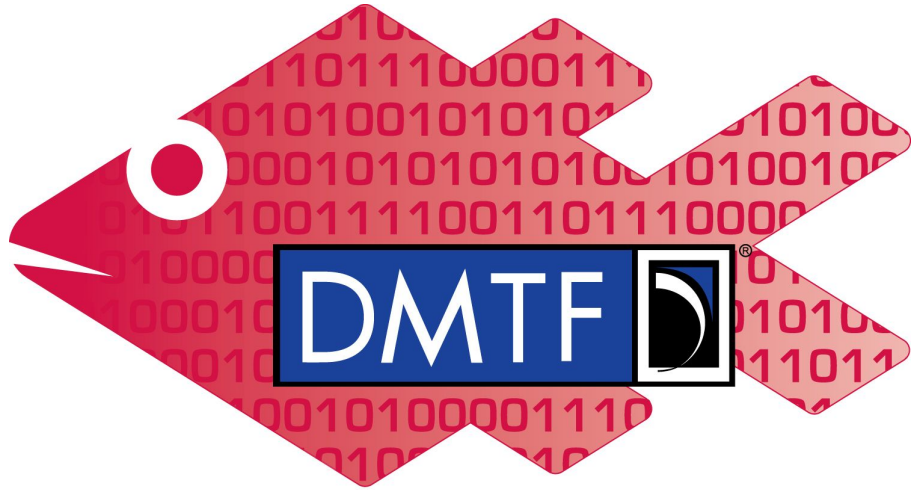
Enable multi-vendor sourcing of power components such as PSUs, Power Shelves, and BBUs, by ensuring interoperable functions.

OCP Announces Advanced Cooling Solutions Sub Project

The new sub-project will focus on standardization and definition of critical interfaces, operational parameters, and environmental conditions that enables a non-proprietary, multi-vendor supply chain for 'warm water' cooling.



Name	Status	Contributor
Rack and Power Redfish Profile	In Development	Shared



Redfish

Create and publish an open industry standard specification and schema that meets the expectations of end users for simple, modern and secure management of scalable platform hardware



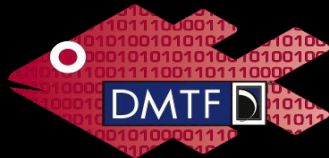
OCP HW Management Strategy

Describe →

Prescribe →

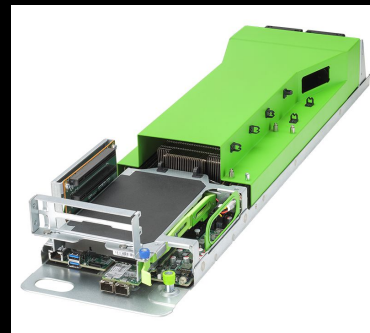
Test →

OCP Recognized
Products



OCP
Redfish
Profiles

Redfish
Interop
Validator





OCP Strategy for HW Management

Open Source DCIM



BASELINE PROFILE

Server Profile

Network Profile

Storage Profile

POWER Profile

EDGE Profile

Pwr API

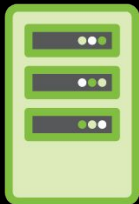
HDD Health



OCF Strategy for HW Management

Open Source DCIM

CALL to ACTION



BASELINE PROFILE

Server Profile

Network Profile

Storage Profile

POWER Profile

EDGE Profile

Pwr API

HDD Health

Technology & Segments



MANAGEMENT



HPC



TELCO



DC Facility



OSF



SECURITY

Data Center Facilities Project



Colocation Facility Guidelines
for Deployment of
Open Compute Project Racks

OCP Guidelines for Colos - Checklist

File Edit View Insert Format Data Tools Add-ons Help Last edit was made on May 16 by Brevan Reyher

100% 123 Calibri 12 B I U

Data Center Subsystems

	A	B	C	D	E
1	Data Center Subsystems	Attribute	Acceptable	Optimum	
27	Data Center Access	nice-to-have			
28	Data Center Access	Pallet ramp		Available	
29	Data Center Access	Goods In Area	Sufficiently sized to accommodate 24 crated cabinets (add size in sq. m/ sq. ft.)	Sufficiently sized to accommodate 50 crated cabinets (add size in sq. m/ sq. ft.)	
30	Data Center Access	Secure storage area	Sufficiently sized to accommodate 24 crated or uncrated racks	Sufficiently sized to accommodate 50 crated or uncrated racks	
31	Electrical Systems	must-have			
32	Electrical Systems	In Rack Power shelf	2+1 redundancy	5+1 redundancy	
33	Electrical Systems	Number of independent circuits to the rack	1N (A)	2N (A+B)	
34	Electrical Systems	Circuit Capacity	3φ 16A	3φ 32A	
35	Electrical Systems	Power receptacle / WIP type	IEC60309-2 5 wire or IEC-309 16A	IEC60309-2 5 wire or IEC-309 32A	
36	Electrical Systems	Voltage (single phase)	180 – 264 VAC	180 – 264 VAC	
37	Electrical Systems	Frequency	47-63 Hz	47 – 63 Hz	
38	Electrical Systems	Central, upstream UPS	Yes - if no BBU	No- with BBU	
39	Electrical Systems	considerations			
40	Electrical Systems	In Rack Battery Backup Unit (BBU)	Li-ion	Li-ion or LiFePO4	
41	Electrical Systems	BBU Autonomy time	90 Seconds	>3 minutes	
42	Electrical Systems	Central, upstream UPS	None	None	
43	Electrical Systems	Generator Start-up time (if using rack BBU)	< 1 minute	< 1 minute	
45	Cooling System	must-have			
46	Cooling System	Rack airflow direction	Front to Back	Front to Back	
47	Cooling System	Air containment methods	Containment hot/cold applicable	Hot aisle containment	

+ Revision, Licence & Use Checklist - Simple Checklist - Detailed Recognition Scorecard



Mark Dansie,
Alan Keizer,
Keith Sullivan,
Michael J Bailey,
Stijn de Kruijf,
Robert Bunger,

Inflectiontech
AFL Hyperscale
CS Squared
Fidelity Investments
Royal Haskoning DHV
Schneider Electric

Robert Bunger,
Jason Schafer,
John Laban,
George Cvetanovski,
David Hall,
Menno Kortekaas,

Schneider Electric
Google
Open Compute Project
Hyperscalers
Equinix
Circle B

Data Center Facilities Project

CALL to ACTION



Colocation Facility Guidelines
for Deployment of
Open Compute Project Racks

OCP Guidelines for Colos - Checklist				
Data Center Subsystems				
	A	B	C	D
1	Data Center Subsystems	Attribute	Acceptable	Optimum
27	Data Center Access	nice-to-have		
28	Data Center Access	Pallet ramp		Available
29	Data Center Access	Goods In Area	Sufficiently sized to accommodate 24 crated cabinets (add size in sq. m/ sq. ft.)	Sufficiently sized to accommodate 50 crated cabinets (add size in sq. m/ sq. ft.)
30	Data Center Access	Secure storage area	Sufficiently sized to accommodate 24 crated or uncrated racks	Sufficiently sized to accommodate 50 crated or uncrated racks
31	Electrical Systems	must-have		
32	Electrical Systems	In Rack Power shelf	2+1 redundancy	5+1 redundancy
33	Electrical Systems	Number of independent circuits to the rack	1N (A)	2N (A+B)
34	Electrical Systems	Circuit Capacity	3φ 16A	3φ 32A
35	Electrical Systems	Power receptacle / WIP type	IEC60309-2 5 wire or IEC-309 16A	IEC60309-2 5 wire or IEC-309 32A
36	Electrical Systems	Voltage (single phase)	180 – 264 VAC	180 – 264 VAC
37	Electrical Systems	Frequency	47-63 Hz	47- 63 Hz
38	Electrical Systems	Central, upstream UPS	Yes - if no BBU	No- with BBU
39	Electrical Systems	considerations		
40	Electrical Systems	In Rack Battery Backup Unit (BBU)	Li-ion	Li-ion or LiFePO4
41	Electrical Systems	BBU Autonomy time	90 Seconds	>3 minutes
42	Electrical Systems	Central, upstream UPS	None	None
43	Electrical Systems	Generator Start-up time (if using rack BBU)	< 1 minute	< 1 minute
45	Cooling System	must-have		
46	Cooling System	Rack airflow direction	Front to Back	Front to Back
47	Cooling System	Air containment methods	Containment hot/cold applicable	Hot aisle containment



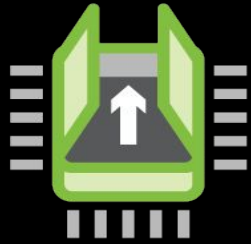
Mark Dansie,
Alan Keizer,
Keith Sullivan,
Michael J Bailey,
Stijn de Kruijf,
Robert Bunger,

Inflectiontech
AFL Hyperscale
CS Squared
Fidelity Investments
Royal Haskoning DHV
Schneider Electric

Robert Bunger,
Jason Schafer,
John Laban,
George Cvetanovski,
David Hall,
Menno Kortekaas,

Schneider Electric
Google
Open Compute Project
Hyperscalers
Equinix
Circle B

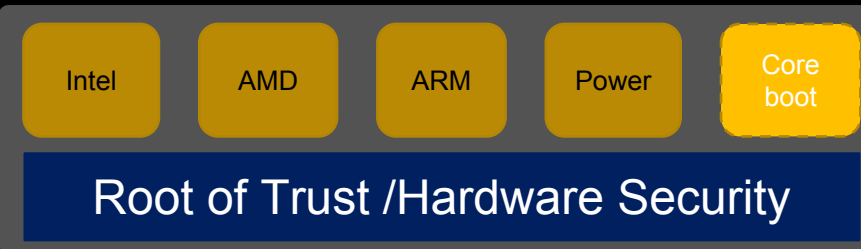
Open Systems Firmware



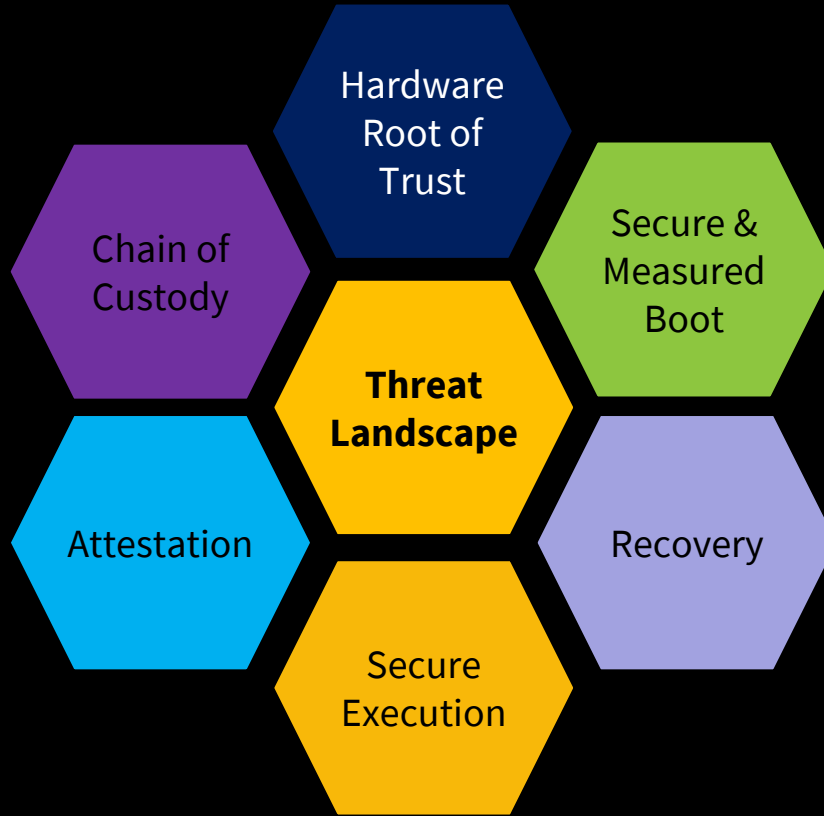
Boot Loaders Support



Silicon Interface Support



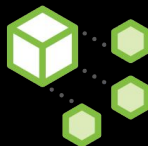
Security Project



How this Community Contributes, Collaborates, & Consumes



Specifications



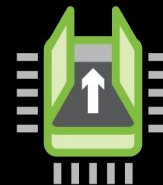
**Reference
Architecture**



**Tested
Configurations**



**White
Papers**



**Embedded
Software**



**Design
Files**



**Product
Recognition**



Case Studies



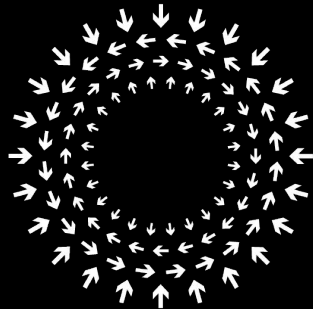
**Workshops
Summits**



**Testimonials
Seminars**



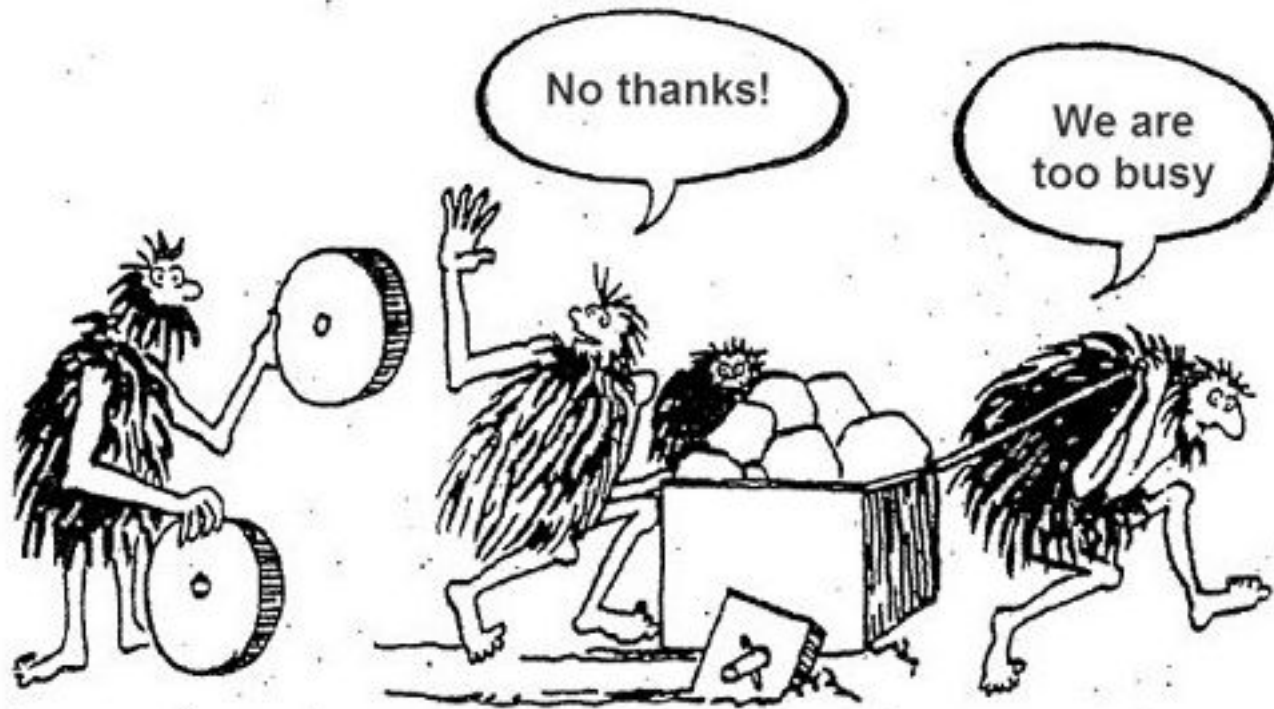
Videos



OPEN
Compute Project®

Steve Helvie
VP of Channel Development
steve@opencompute.org

OPEN. FOR BUSINESS.



The OCP Market



Open Compute Project Has
Billion Dollar Impact on Server
Market

The image shows a video player interface for the "OCPUS18 - OCP Market Impact Assessment" video. The video player has a green border. The video content includes a title slide with the IHS Markit logo, the text "Open Compute Project Market Impact Assessment", and the name "Cliff Grossner, Ph.D., Sr. Research Director & Advisor, Cloud & Data Center Research Practice, IHS Markit". Below this is a green banner with the text "OPEN. FOR BUSINESS." and the "OCP SUMMIT" logo. The video player also shows a video thumbnail of a stage event, a progress bar at 2:18 / 51:14, and a video title "OCPUS18 - OCP Market Impact Assessment". The video player interface includes standard controls like play, pause, and volume.

IHS Markit

Open Compute Project
Market Impact Assessment

Cliff Grossner, Ph.D.
Sr. Research Director & Advisor
Cloud & Data Center Research Practice
IHS Markit

OPEN. FOR BUSINESS. OCP SUMMIT

OCP SUMMIT March 20-21 2018 San Jose, CA

OPEN. FOR BUSINESS. CC

OCPUS18 - OCP Market Impact Assessment

OCP Market Impact Assessment



<https://www.youtube.com/watch?v=pdpPKAo-HUY&feature=youtu.be>

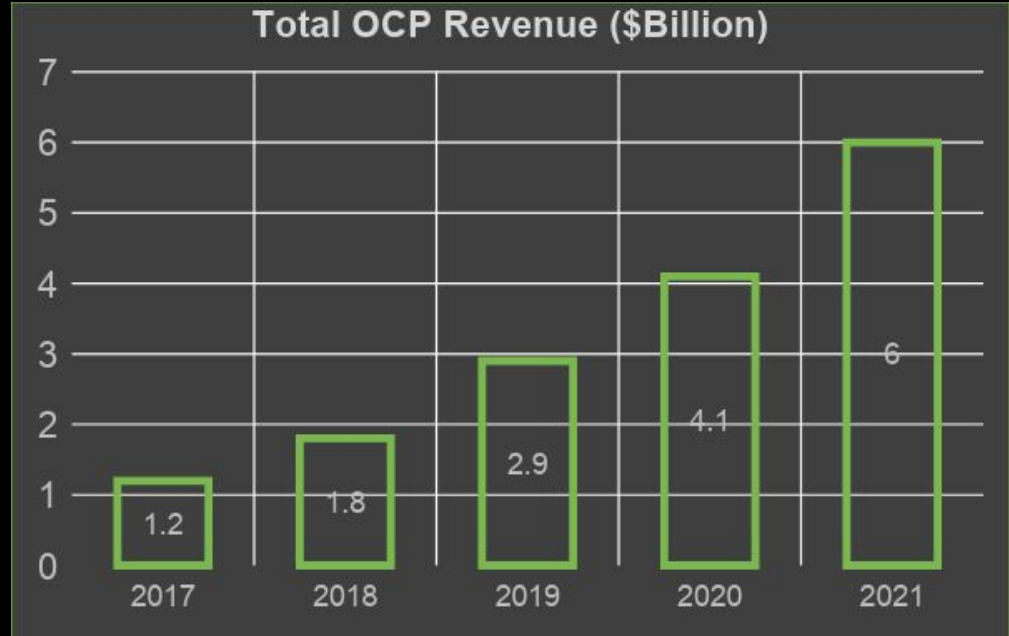
Growth of OCP (for non-board member companies)

Double Digit Growth thru 2021

Americas' CAGR = 47%

APAC CAGR = 103%

EMEA CAGR = 70%



Growth of OCP (for non-board member companies)

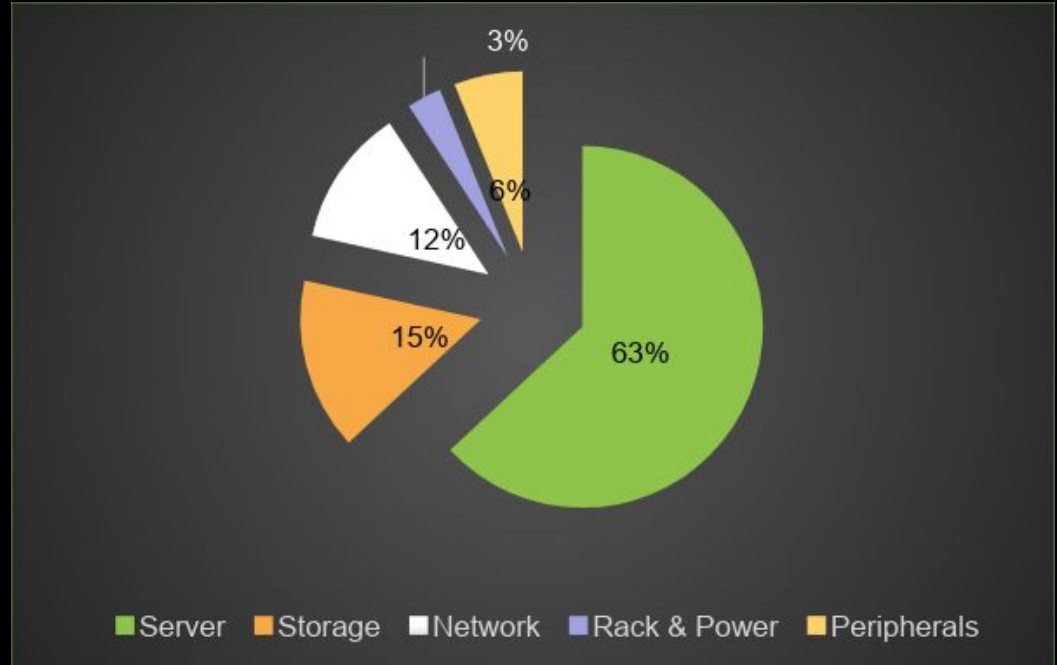
Servers

Storage 🌟

Network ▲

Rack & Power

Peripheral
s 🌟



Vertical Industry (for non-board member companies)



Tier 2 CSPs explored OCP servers in 2016 and start larger deployments in 2017-2019

Telcos increase POCs in 2017, production trials ramp in 2018, scale deployments 2019+



E-commerce and web-based enterprises

Other segments including Retail & Education expected to become largest enterprise switching subsegment in 2021

Use Cases for OCP



Business Models Influence by OCP

CORD

Central Office Re-architected as a Data centre



<https://opencord.org/>

https://opencord.org/wp-content/uploads/2018/01/Day1_Session5_CO_RD_build-17-Telefonica-use-cases.pdf

Telefonica



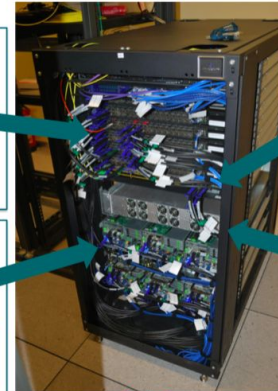
Open Compute based CO for triple play services

Switches OCP:

- 32 x 40 GE
- ONIE



Servers OCP
OpenRack 2.0



OLT GPON OCP
spec by ATT

OLT GPON (up & Running)

OLT XGS-PON

OLT NG-PON2

OCP DC Converter
-48vCC

WE CHOOSE IT ALL

Network Innovation - Customer Centric Networks

CORD build 2017 - Public

Telefonica

Business Models Influence by OCP Edge Computing

AirFrame OpenRack



OpenRack v2
compliant high
density server
and storage
systems (21")



Hyper Scale Efficiency with Open
Compute Project (OCP)

AirFrame open edge server

OCP proposed
architecture for far edge
deployments (fits to 19"
wide, 600mm deep rack)



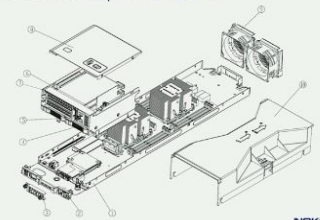
OCP benefits to edge deployments

NOKIA

Mechanical structure of Nokia Open Rack Server

Server sled main
mechanical parts:

1. Bottom mechanics
2. I/O front panel
3. Mezzanine cover
4. HDD carrier
5. PCIe card locking clamp
6. Expansion slots
7. Front assembly
8. Top cover
9. Rear EMI cover
10. Air duct



© 2018 Nokia

NOKIA

OCP
SUMMIT | March 20-21
2018
San Jose, CA

OPEN. FOR BUSINESS.



<https://www.brighttalk.com/webcast/12229/319957>

Business Models Influence by OCP

Large Enterprise



LINX Talks About Open Networking & OcNOS

11/8/2017



RICHARD PETRIE
CTO | LINX

<https://www.lightreading.com/linux-talks-about-open-networking-and-ocnos/v/d-id/738057>

The Booking.com logo, featuring the word "Booking.com" in white sans-serif font on a dark blue rectangular background.

<https://www.youtube.com/watch?v=c0Z32UsB5g0>

Business Models Influence by OCP Colocation



<https://kaodata.com/kao-data-announces-europes-first-data-centre-meet-ocp-design-principles/>



Kao Data Announces
Europe's First Data Centre
to Meet OCP Design
Principles



OCP Recognition Marks

OCP Accepted Specification
Open Sourced Design Files



OCP Accepted Specification



Data Centers that meet OCP
Criteria for efficiency & scale



OCP Marketplace:

<https://www.opencompute.org/products>



Call to Action to OCPJ

- **Join OCP as a Corporate Member**
- **Use the Membership Logo**
- **Use OCP Marketplace**
- **Advertise OCP on your website & collateral**
- **Get on Project Mailing Lists**
- **Collaborate with Community Members**
- **Contribute your knowledge & expertise**
- **Get your products recognized**
- **Take advantage of OCP!**



The OCP Team

Archna Haylock

Community Director

Archna@opencompute.org

Bill Carter

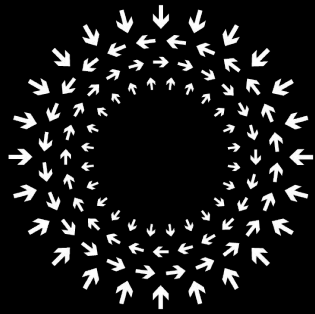
Chief Technology Officer

bill@opencompute.org

Steve Helvie

VP of Channel Development

steve@opencompute.org



OPEN

Compute Project®

**Thank you to Yamaguchi-San for organizing this event.
Thank you to Microsoft for hosting OCP.
Thank you to OCPJ for participating and attending!**