



Omar Baldonado

Director, Engineering
Facebook

OPEN. FOR BUSINESS.





2.1 Billion



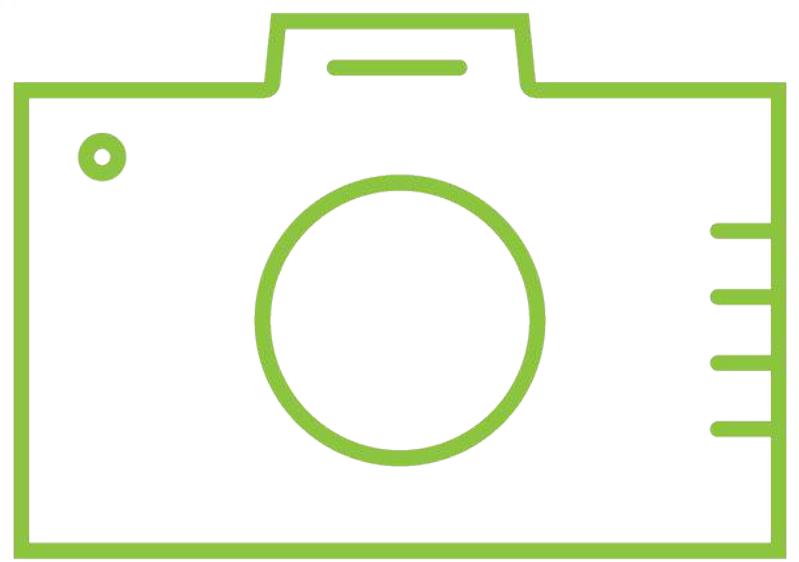
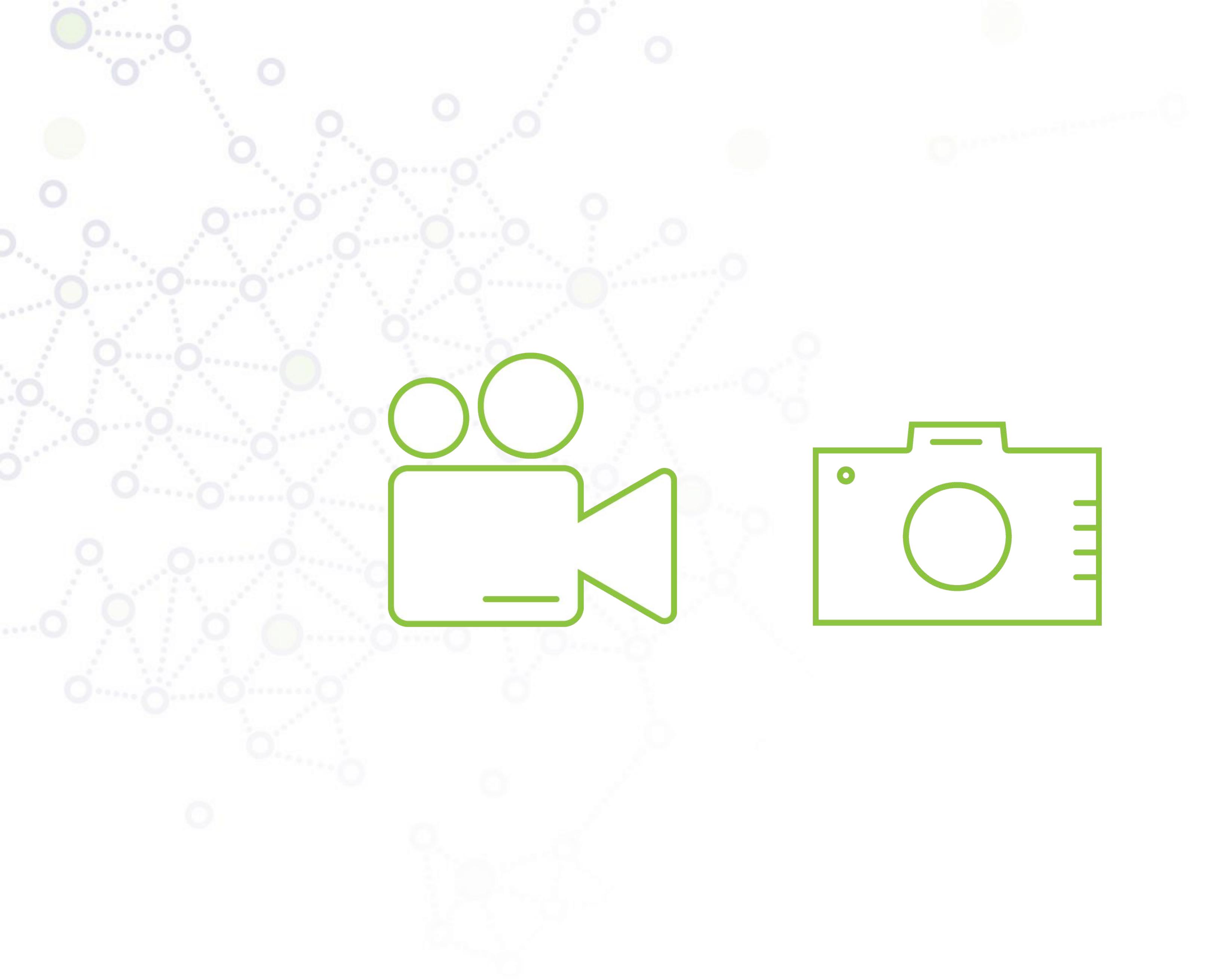
1.5 Billion

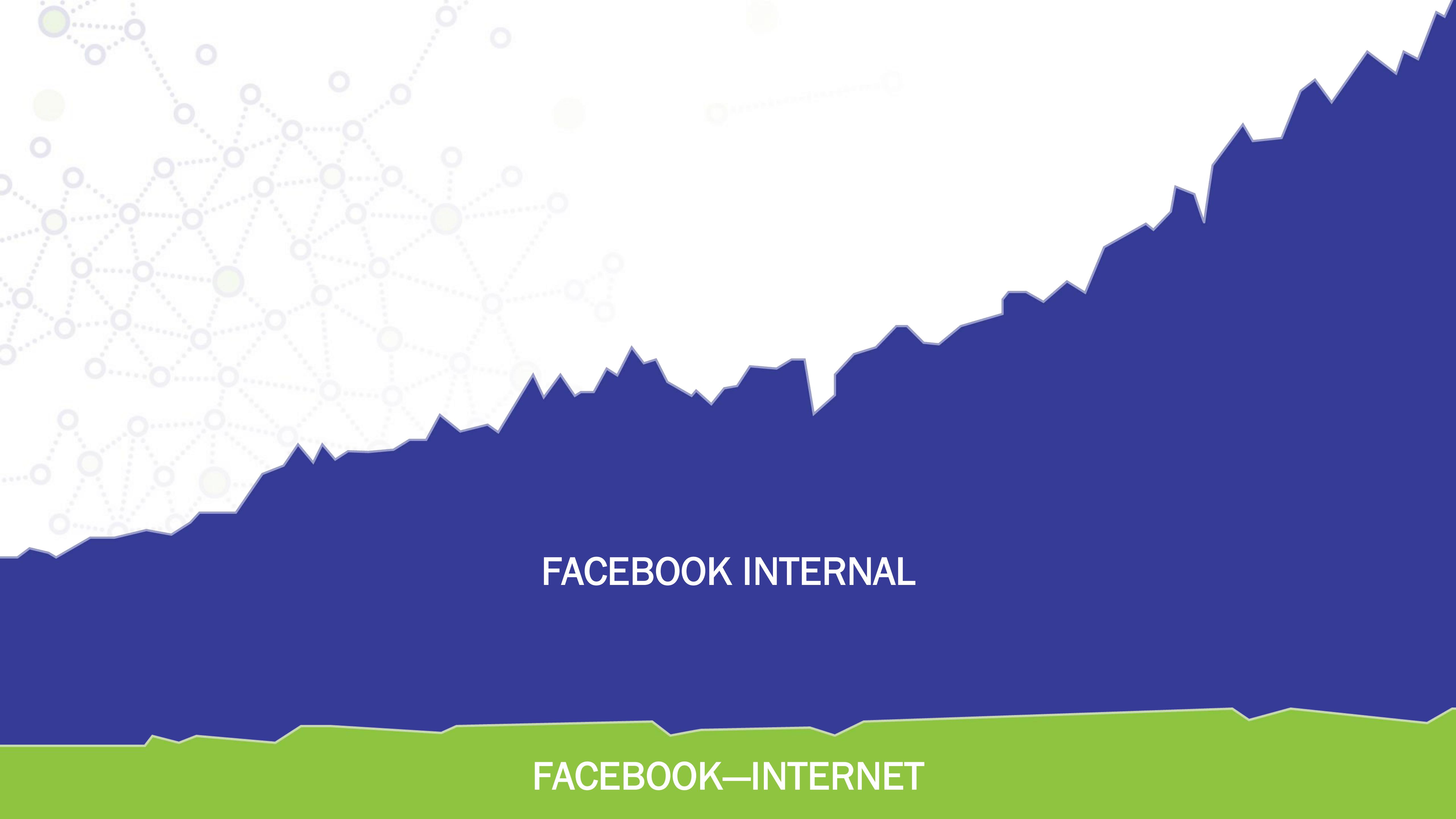


1.3 Billion



800 Million





A history of building for scale

2011



Data Center
Triplet Rack



Battery Cabinet
Freedom Servers



Spitfire
Server (AMD)

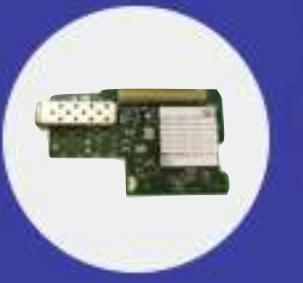
2012



Windmill
(Intel)



Watermark
(AMD)



Mezzanine
Card V1



Group Hug
Micro Server
(Panther)

2013



Knox



Mezzanine
Card V2



Honey
Badger

2014



BluRay



Leopard



Yosemite



Six
Pack

2015



Backpack
Wedge 100S



Lightning



Yosemite
V2

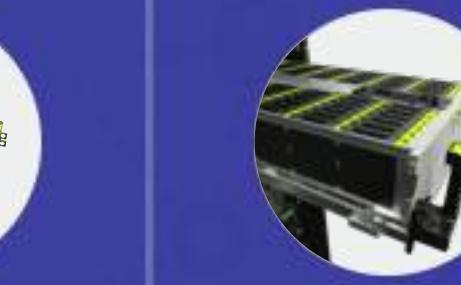


Tioga
Pass

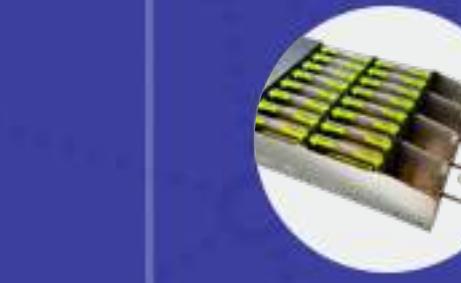
2016



Wedge 100S
Big Basin



Bryce
Canyon



Yosemite
V2

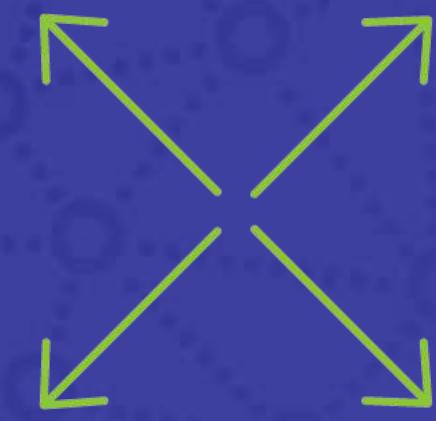
2017



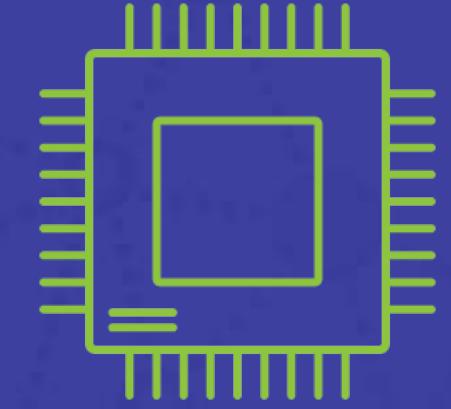
?



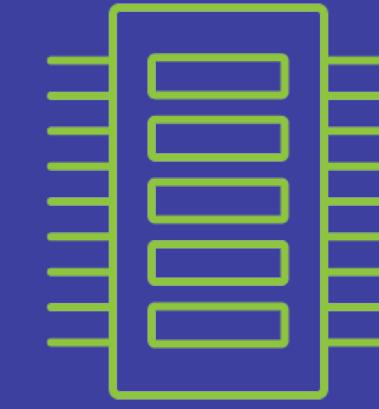
What worked in the past is not enough for the future



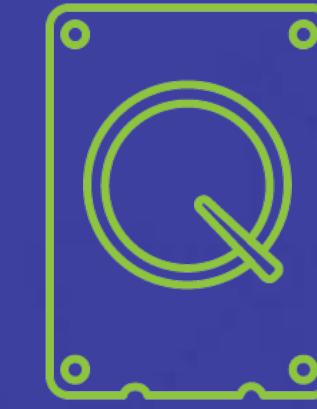
Server
Growth



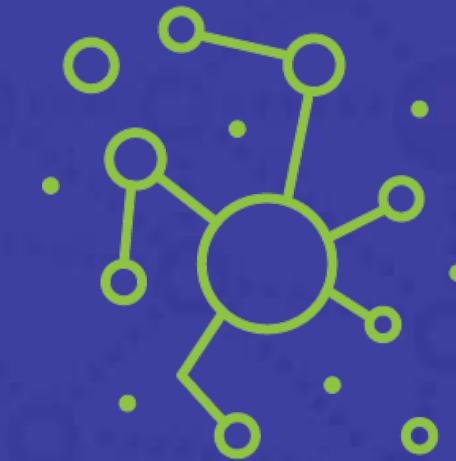
CPU
Cores



DRAM
Capacity

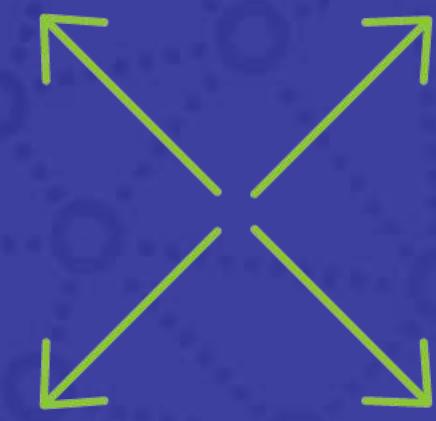


HDD
Growth

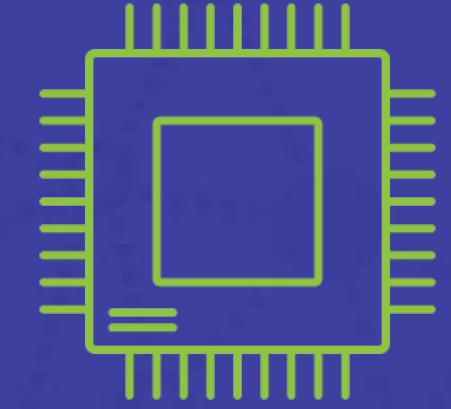


**Network
Growth**

What worked in the past is not enough for the future



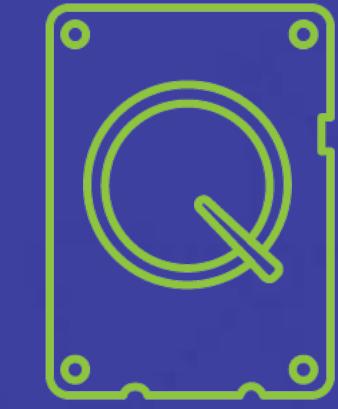
Server
Growth



CPU
Cores



DRAM
Capacity



HDD
Growth



Network
Growth



Partner



Scale



Innovate



Partner



Scale



Innovate



Network



A blurred background image of a server room, showing rows of server racks and equipment in a dark, industrial setting.

Network

Software

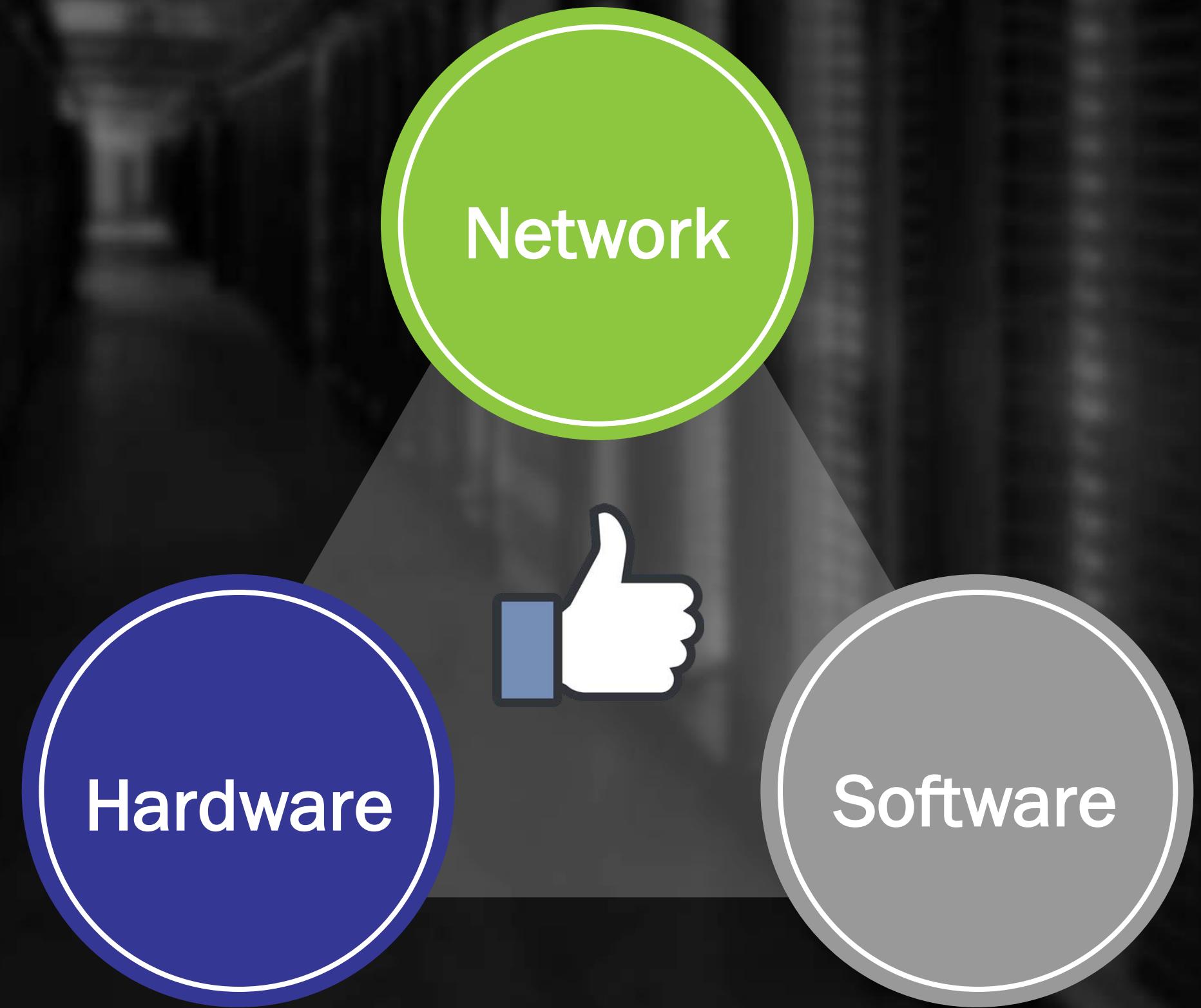


A blurred background image of a server room, showing rows of server racks and network equipment.

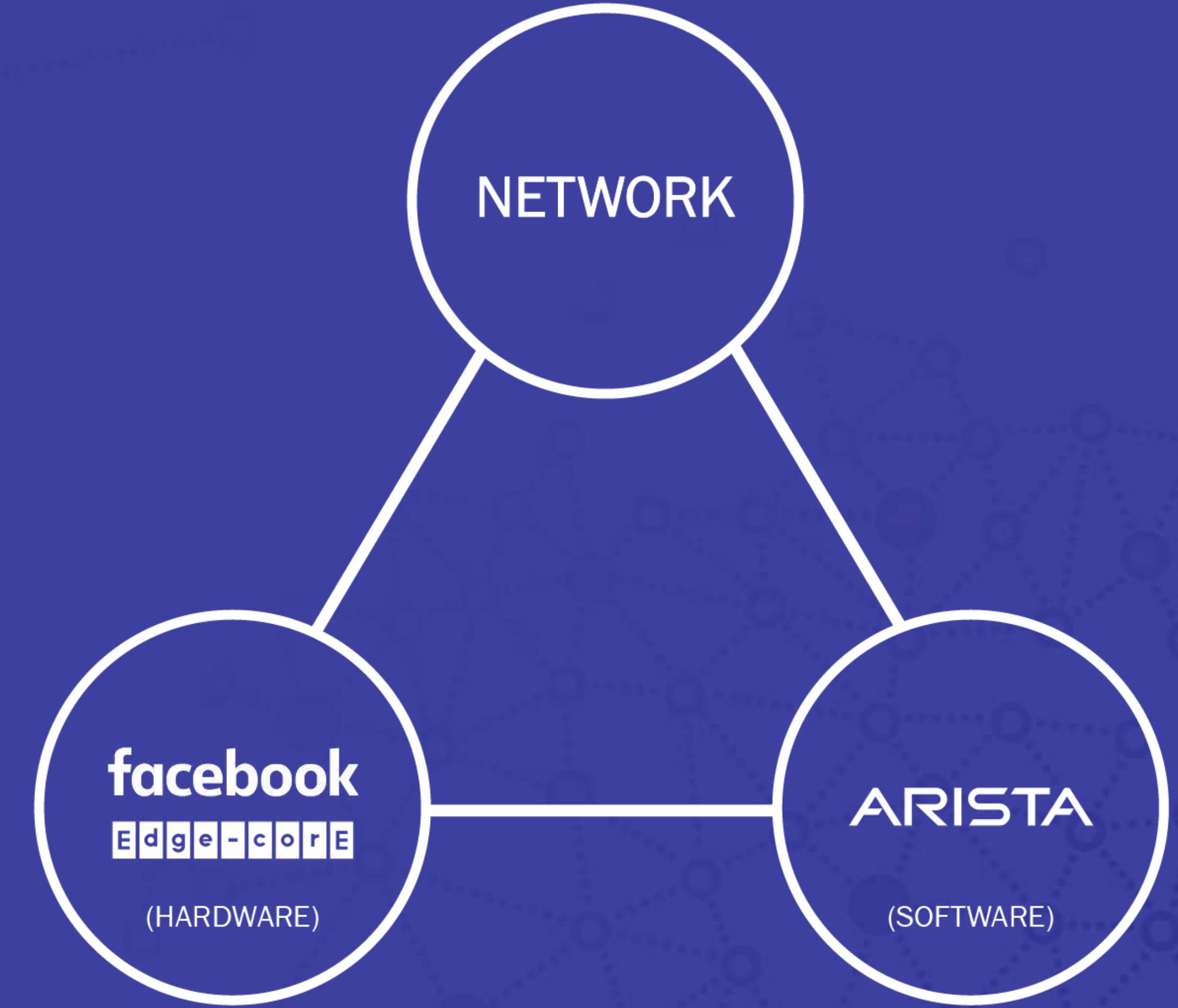
Network

Hardware

Software

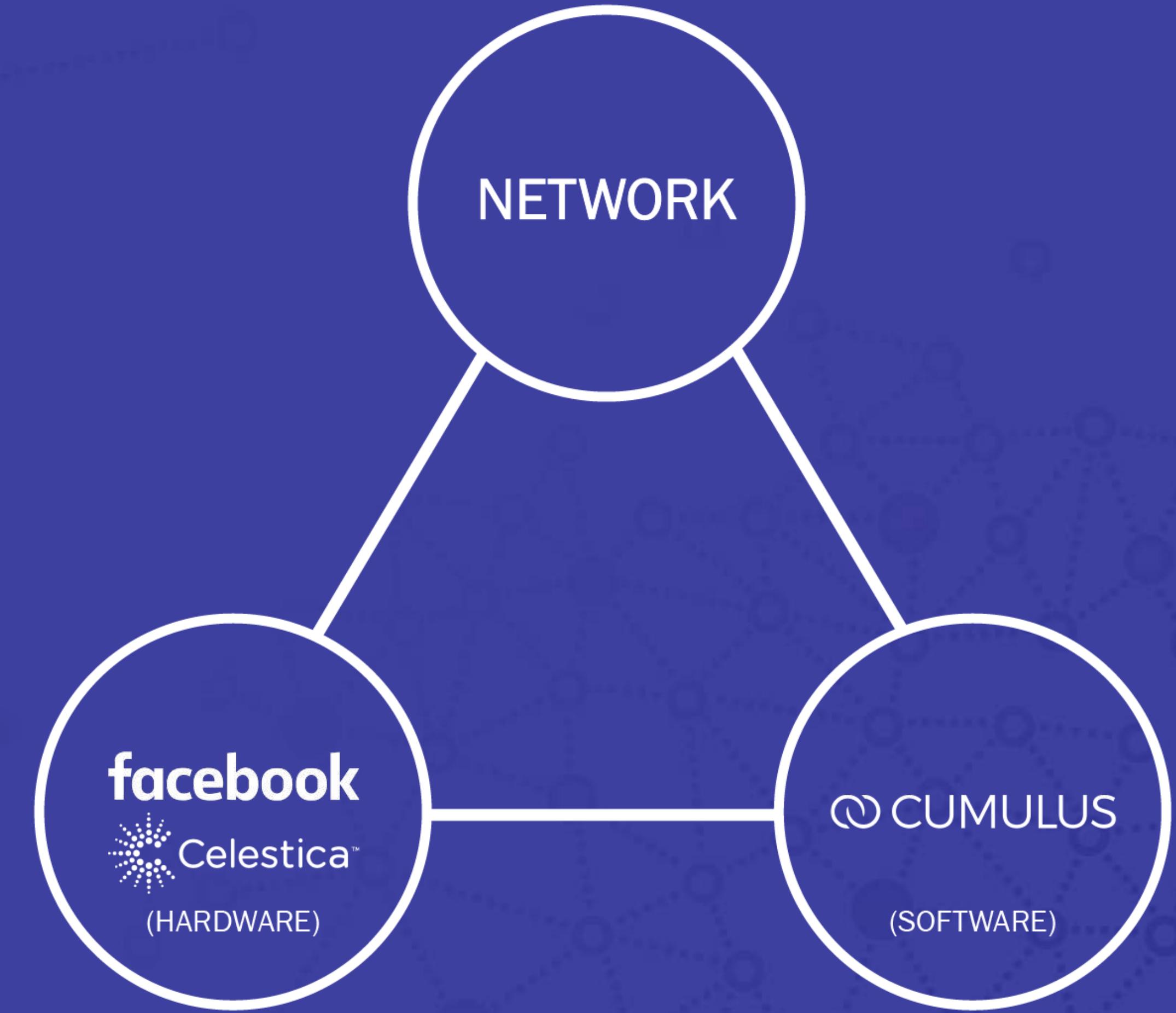


Wedge 100 + Arista EOS



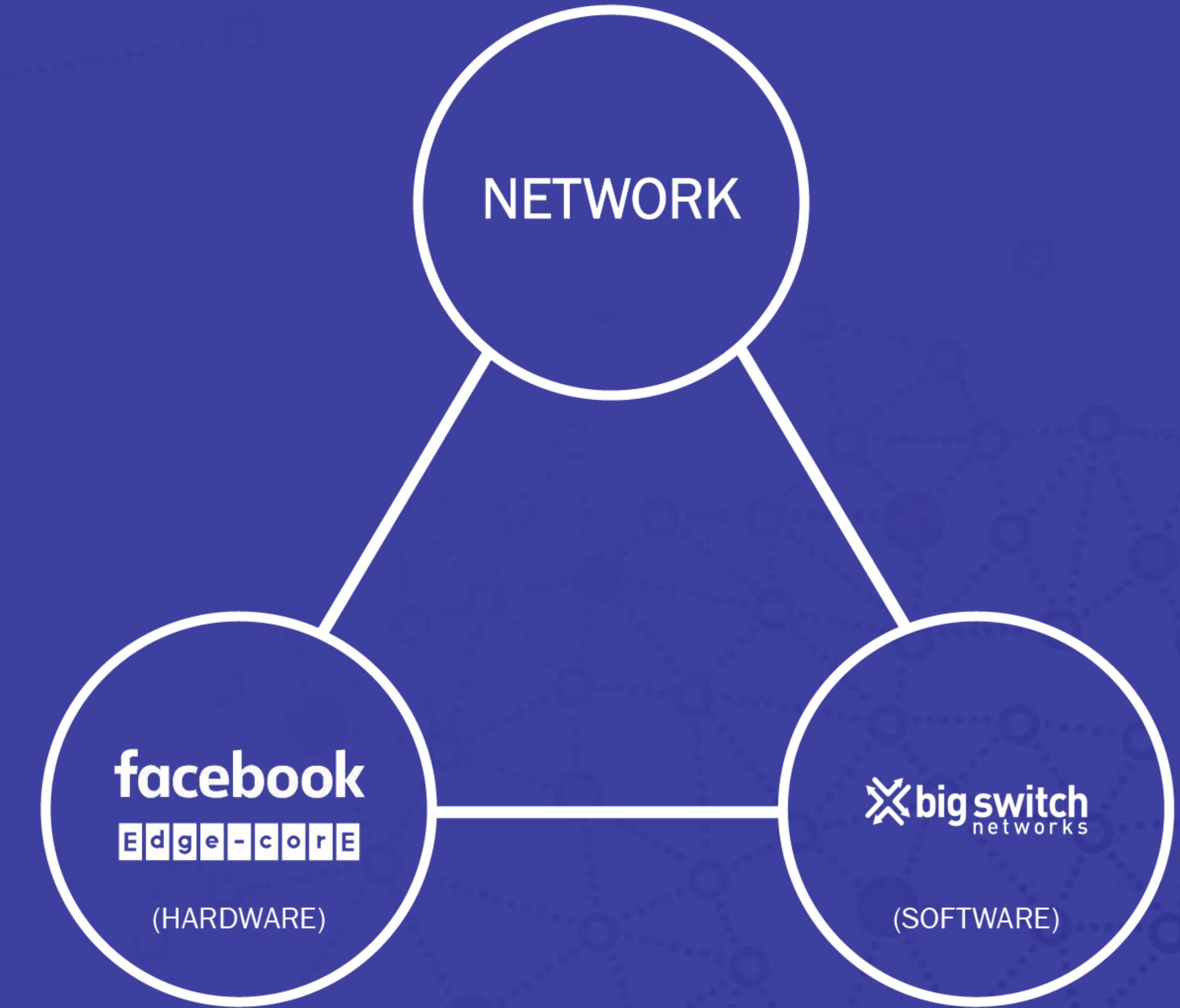
- Arista EOS available for Wedge 100 hardware - disaggregation
- Proven, familiar software

Backpack + Cumulus



- Yahoo! JAPAN
- Engineering workshop tomorrow

Wedge 100S + Big Switch



- Open source package
- Engineering workshop tomorrow

Disaggregation





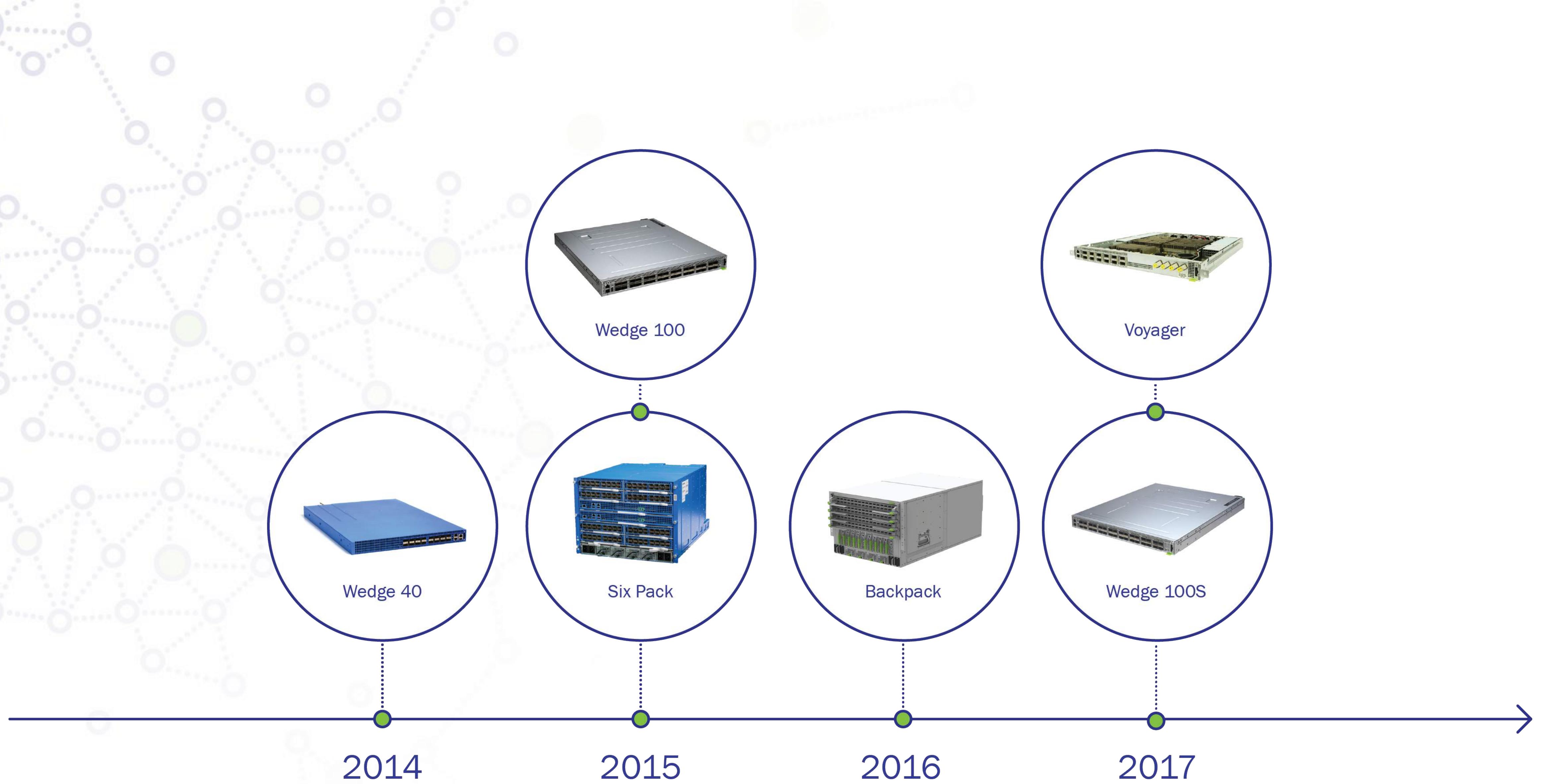
Partner

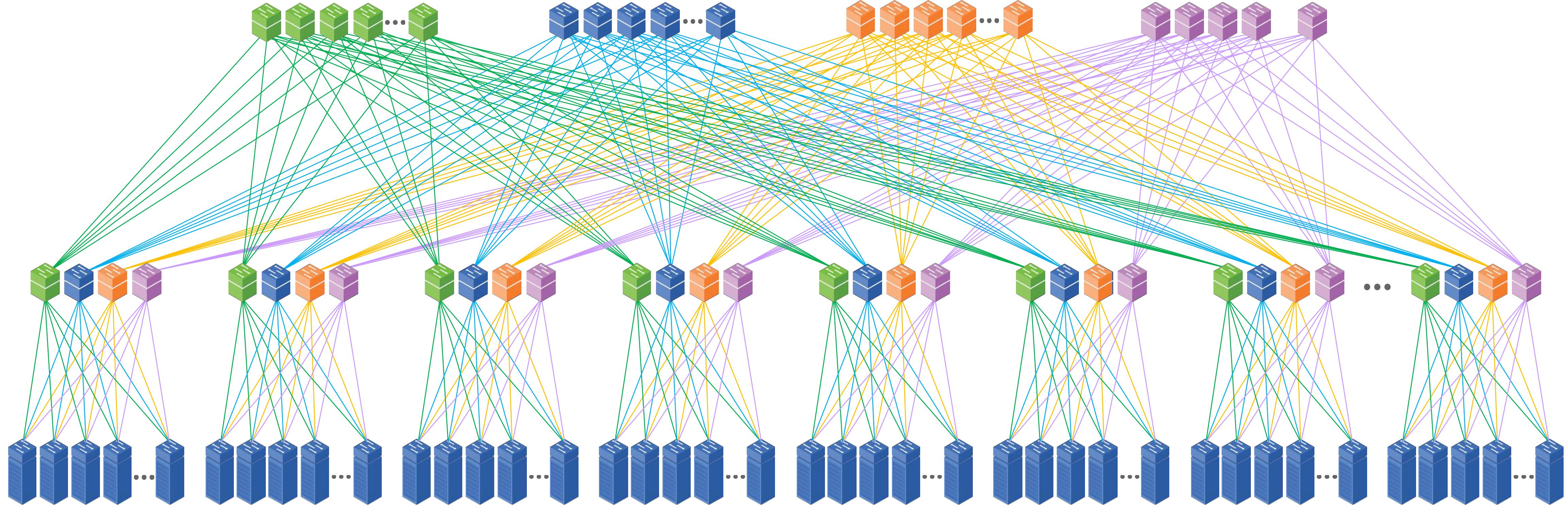


Scale



Innovate





Data centers







Partner



Scale



Innovate



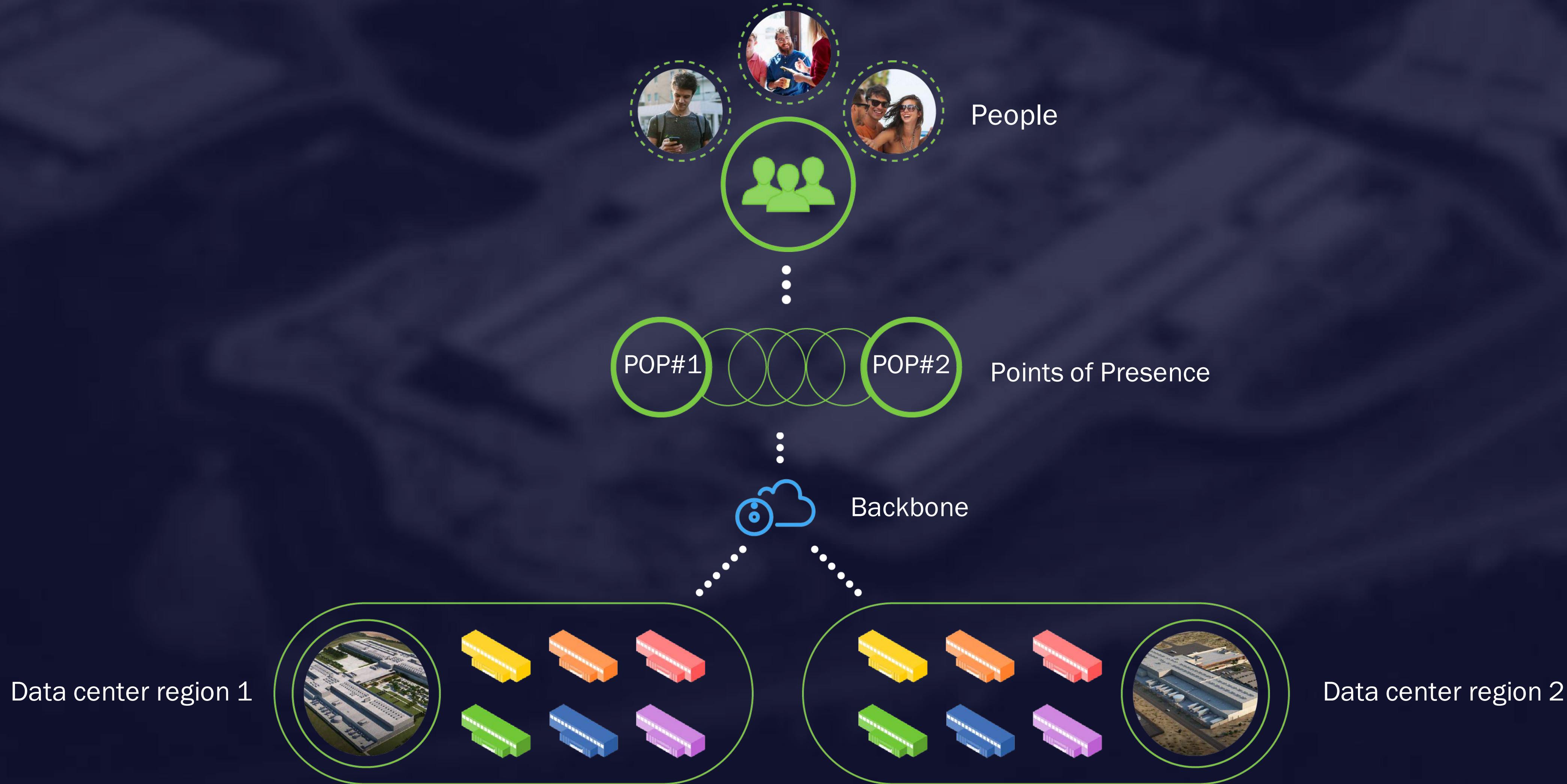
Sree Sankar

Technical Product Manager
Facebook

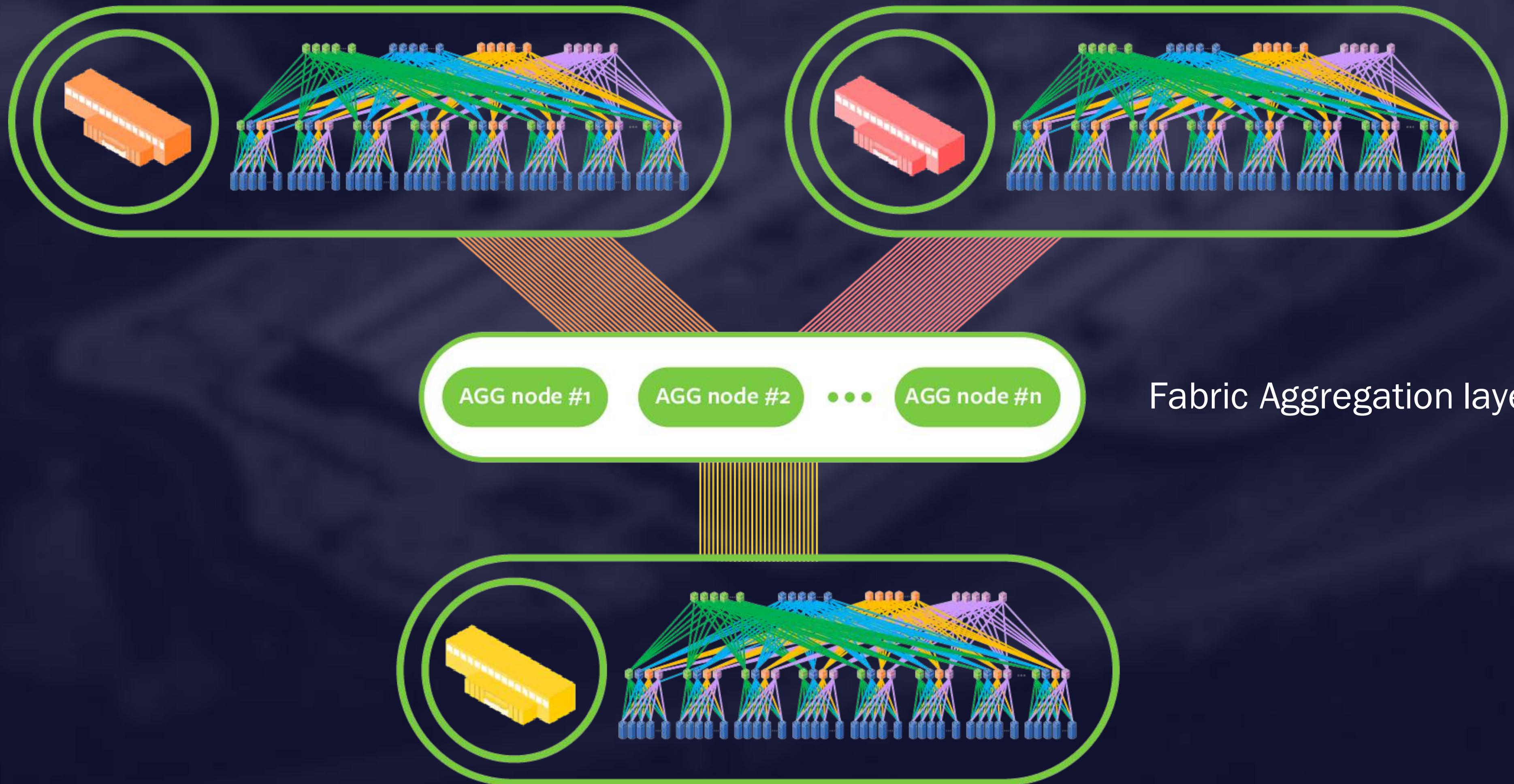
OPEN. FOR BUSINESS.



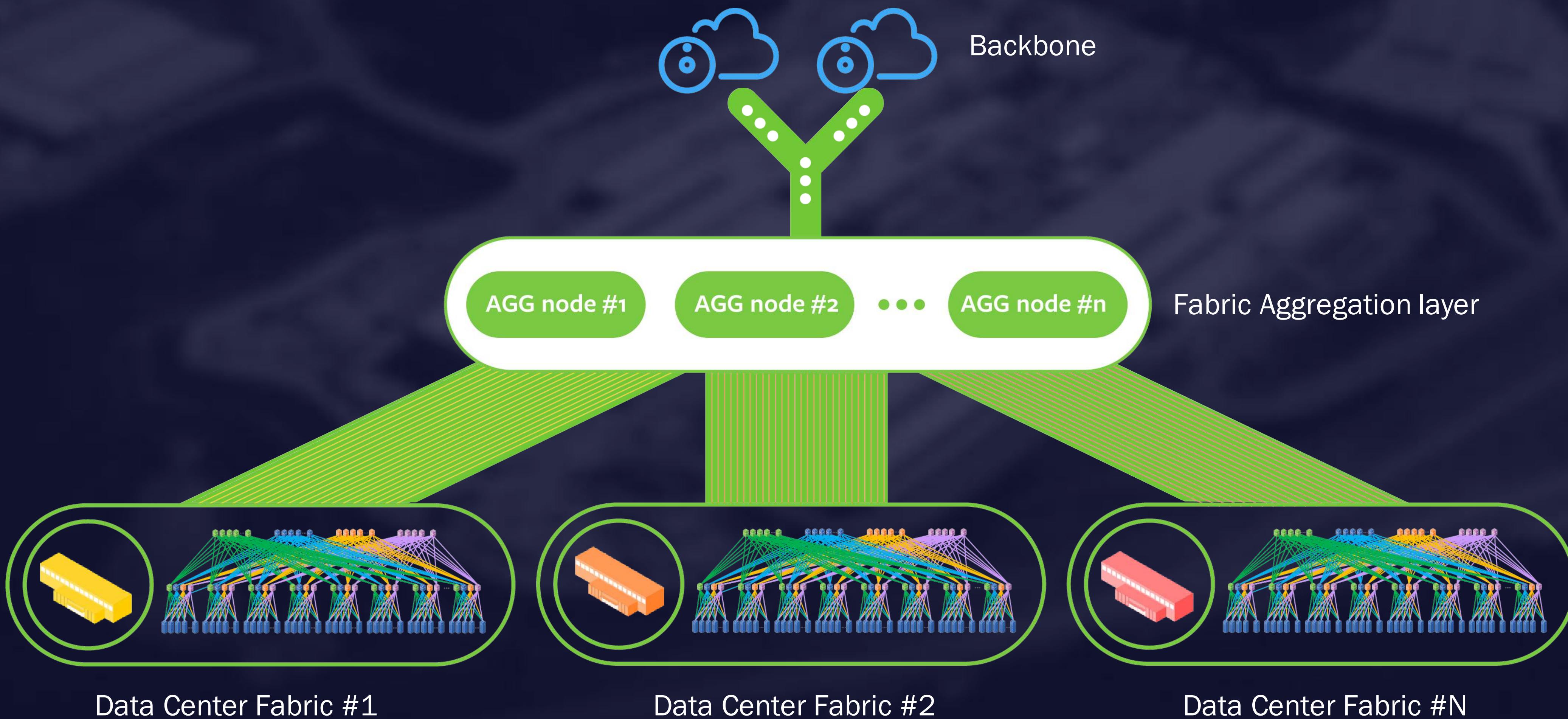
Traffic flow in to network



Zoom into a region



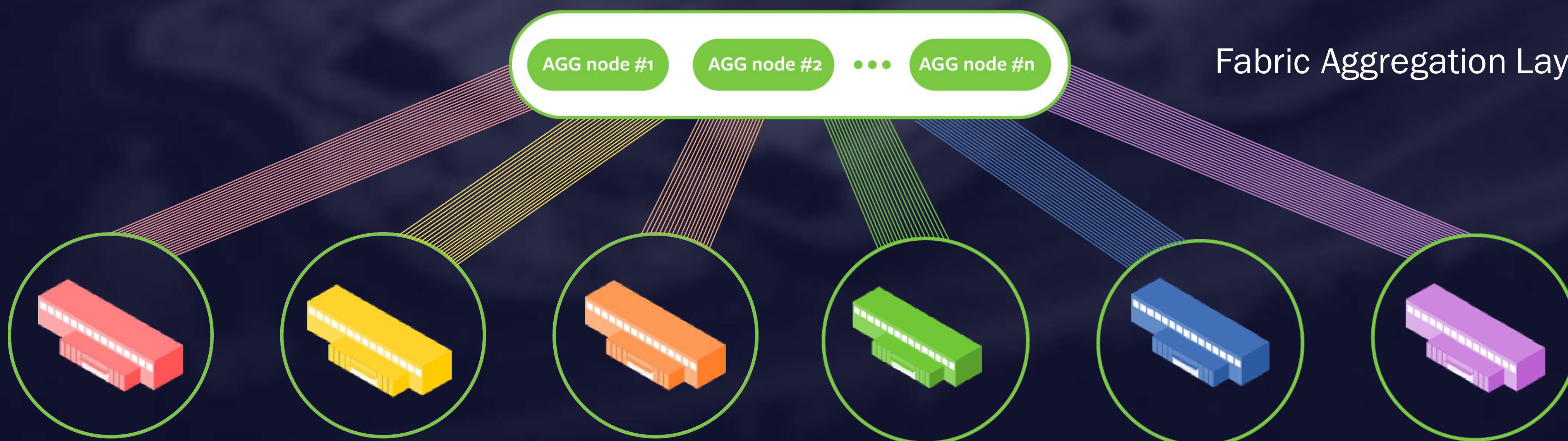
Role of fabric aggregation layer





AGG node #1 AGG node #2 ... AGG node #n

Fabric Aggregation Layer



We had to innovate

Design considerations



At least
3X more ports



Power efficiency



Flexible and
adaptable design



To be solved in short
duration of time

The solution:
Fabric Aggregator



Integrating disaggregated building blocks



Wedge 100S

Integrating disaggregated building blocks

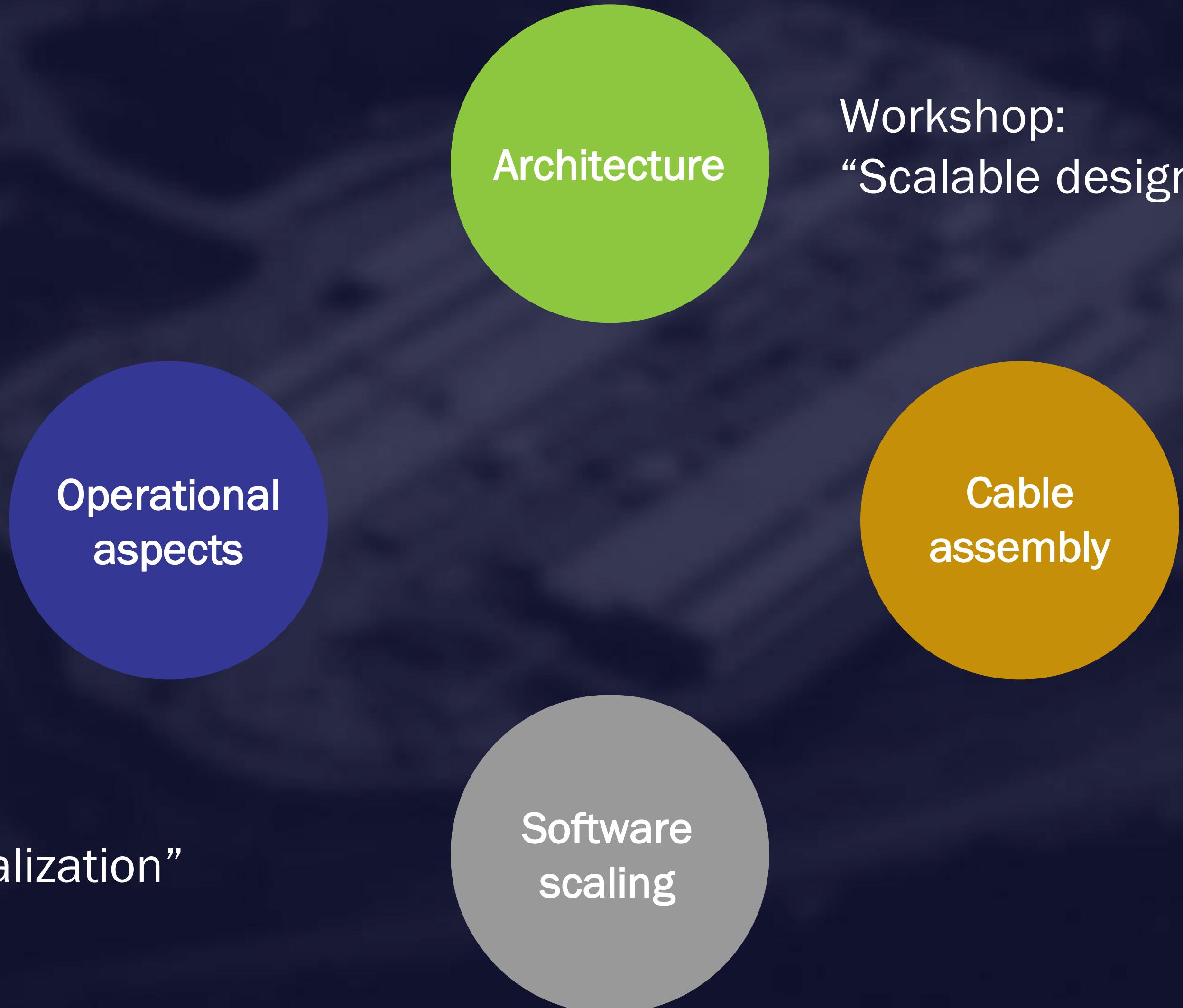


+ *Flow* =

Wedge 100S



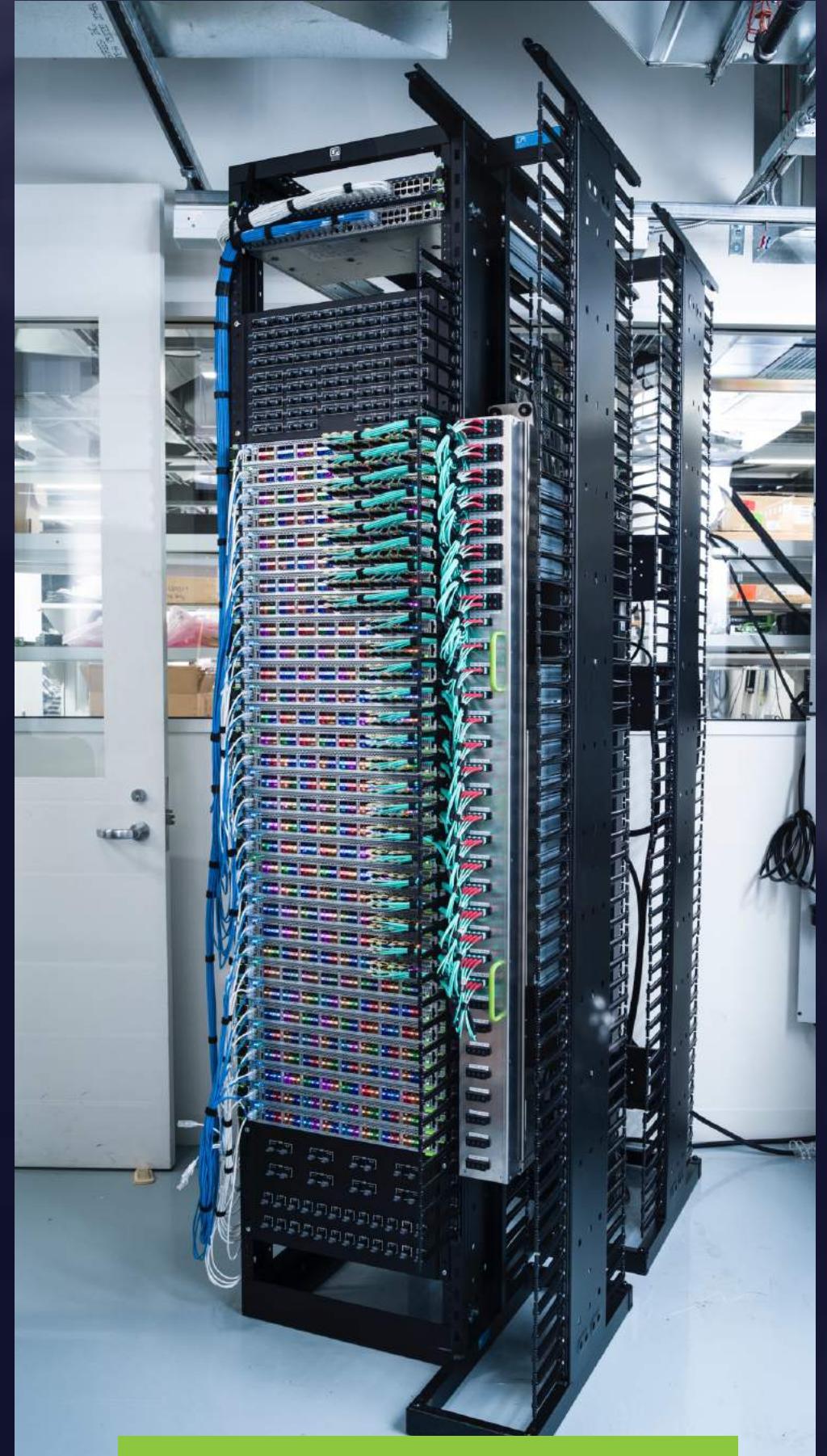
Design elements



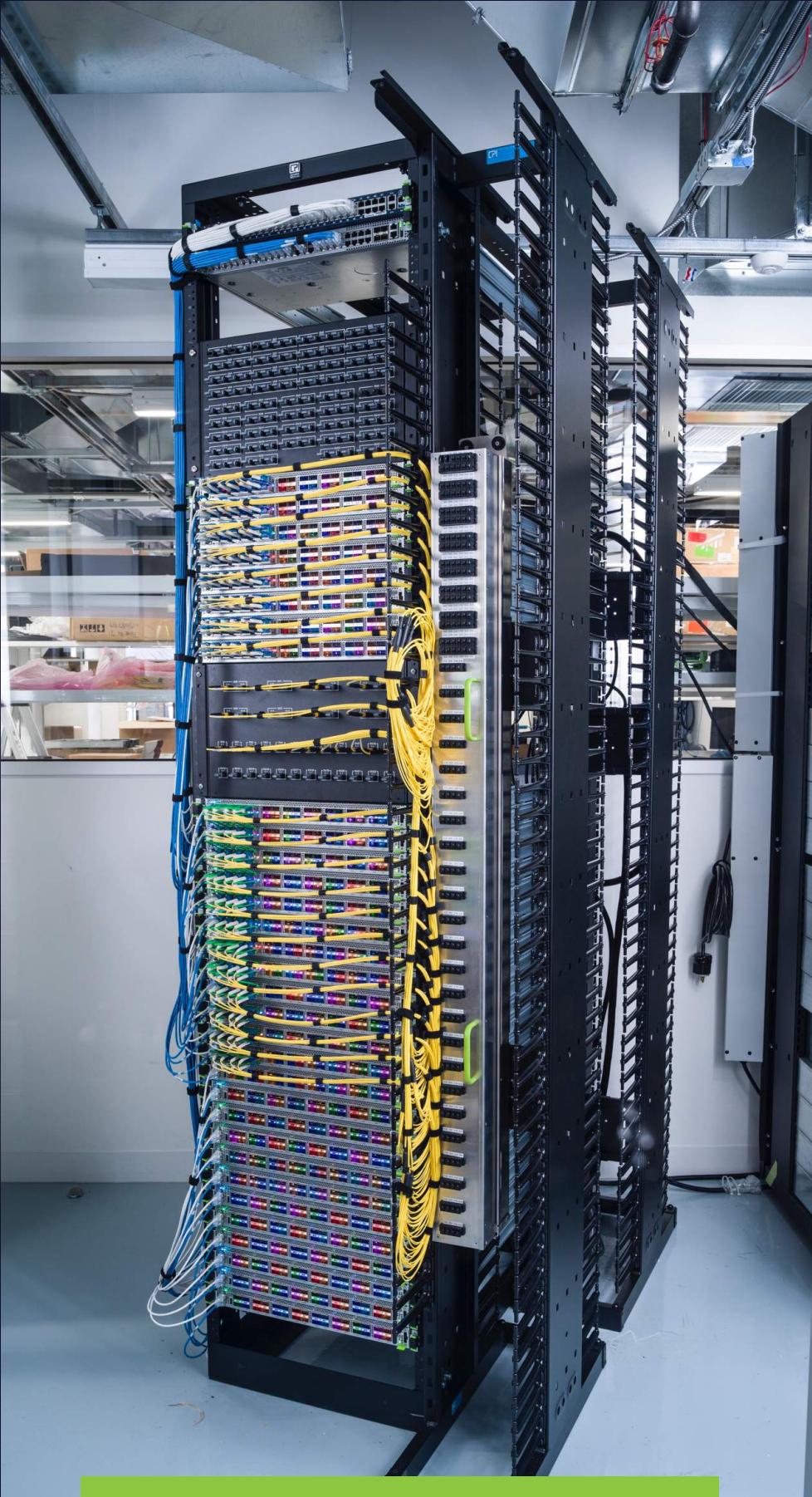
Workshop:
“FBOSS Operationalization”

Workshop:
“Scalable designs for DC: Fabric aggregator”

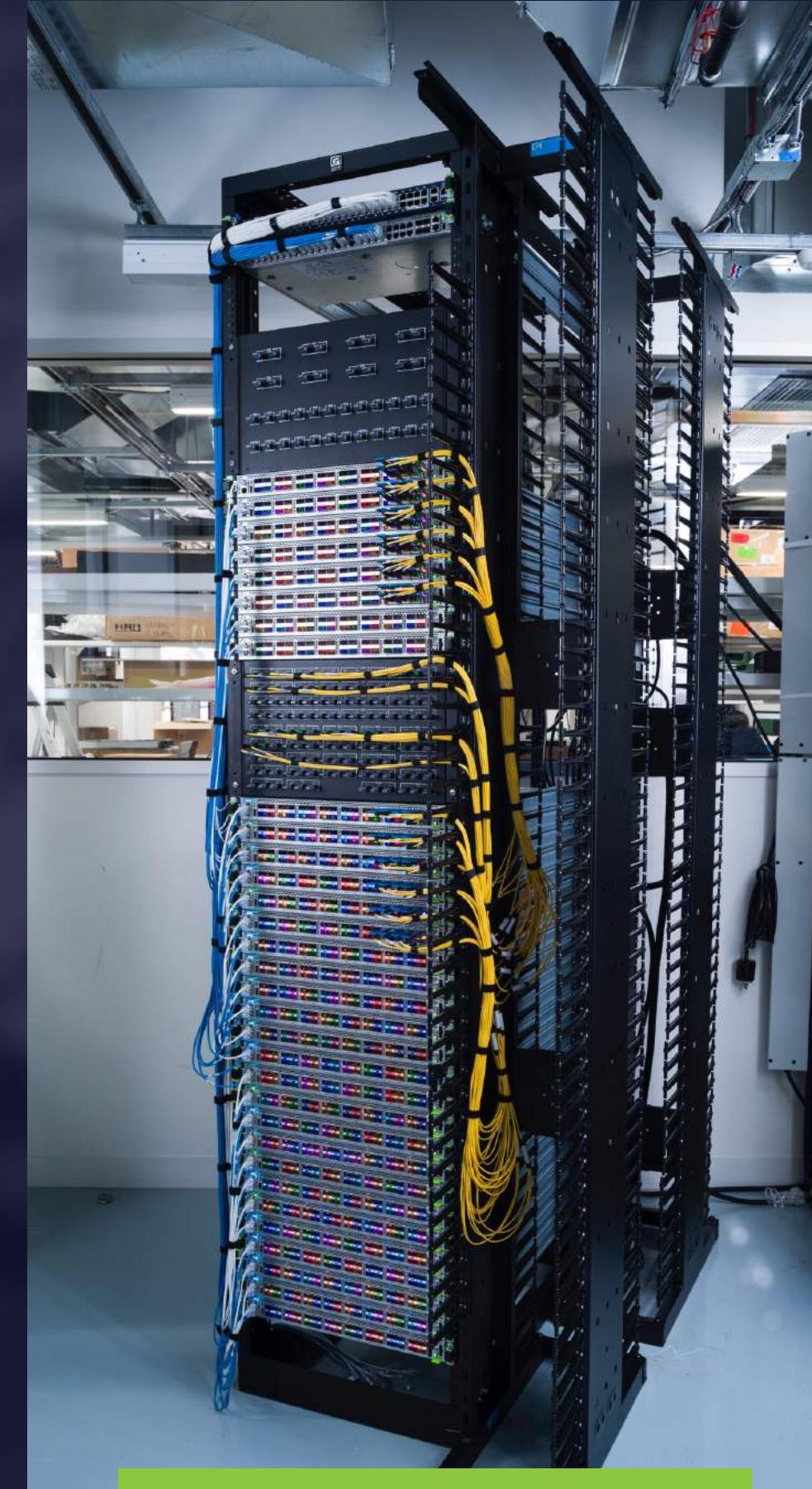
Cable backplane options



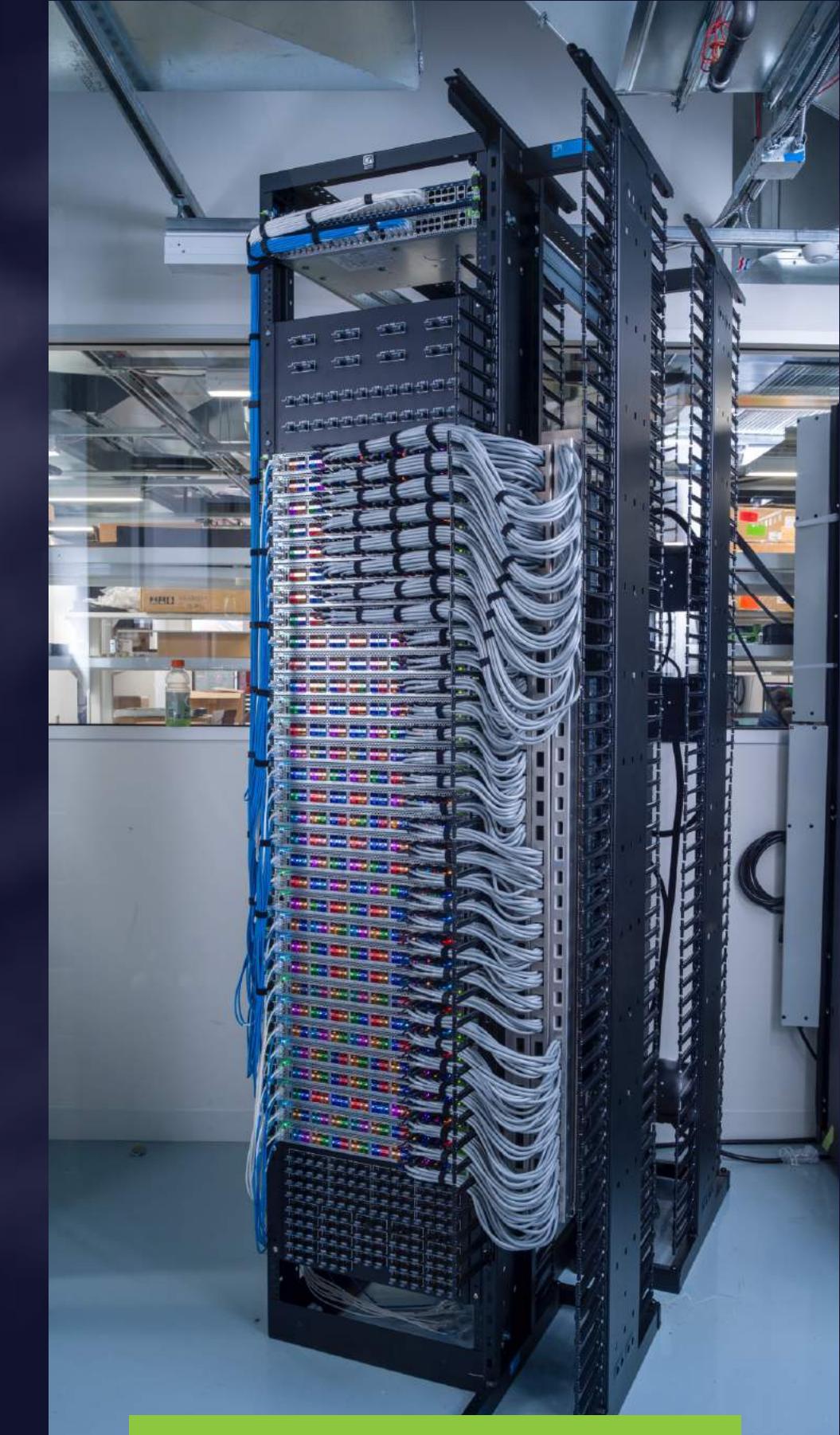
PIG-TAIL AOC



CWDM4



PSM4



DAC

Monolithic vs Disaggregated

Operational efficiency



- Re-use of building blocks minimizes the # of SKUS
- Significant reduction in technical and process overhead

Power & design efficiency



- FA provides **higher port density**
- 60% more power efficiency

Smaller fault domains



- Inherent property of distributed architecture

Move Fast

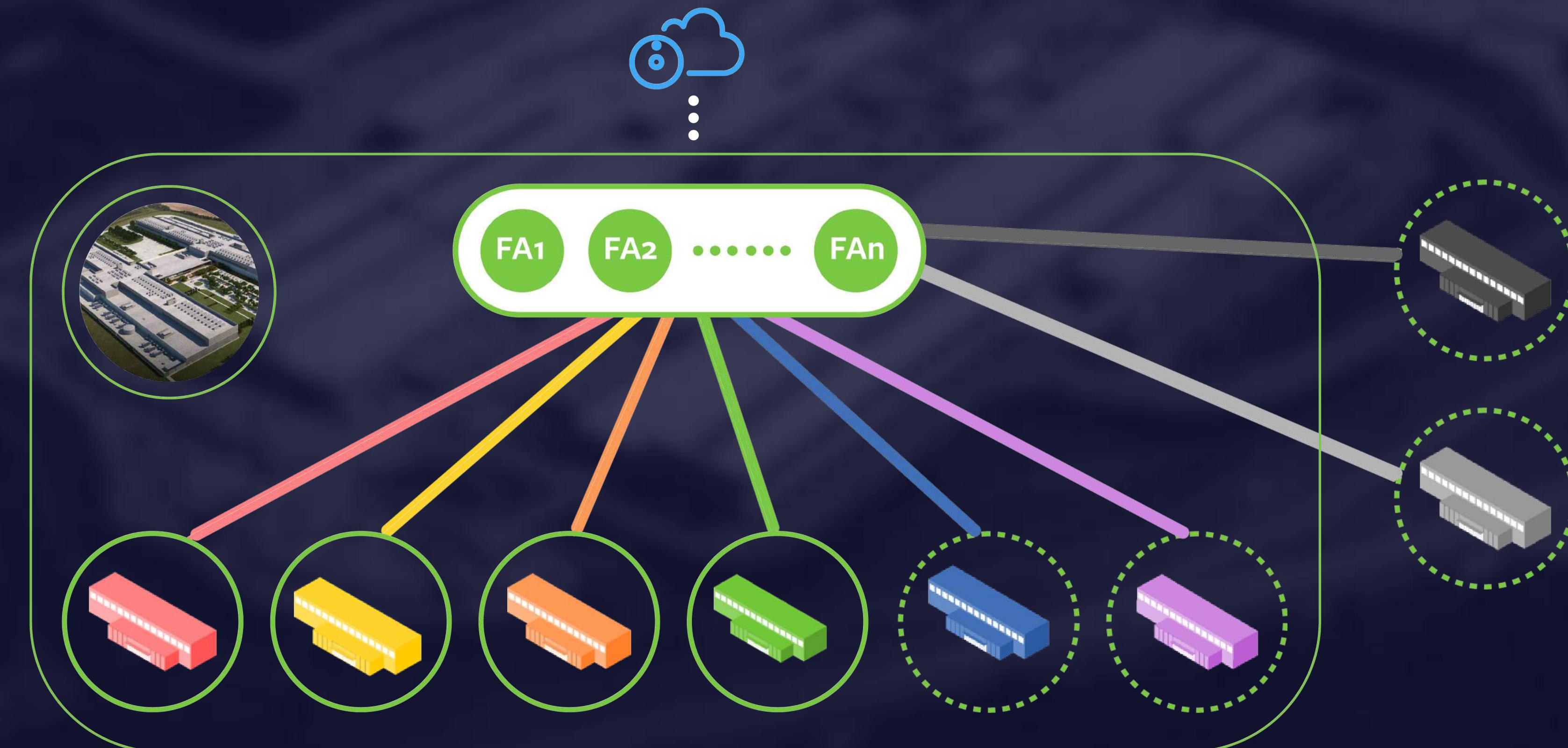


- Ideation -> Production in **5 months**
- Doubled the capacity in **9 months**

Flexible and adaptable design



- Flexible capacity allocation
- Disaggregation allows for adoption of new building blocks



What next?

- Power levels stretched for 100G
- Unsustainable for 400G
- Limited by packaging

- Lower power consumption
- Enables higher density
- Requires new standards



PLUGGABLE OPTICS



CO-PACKAGING OPTICS AND ASIC WITH
MODIFIED I/O



Partner



Scale



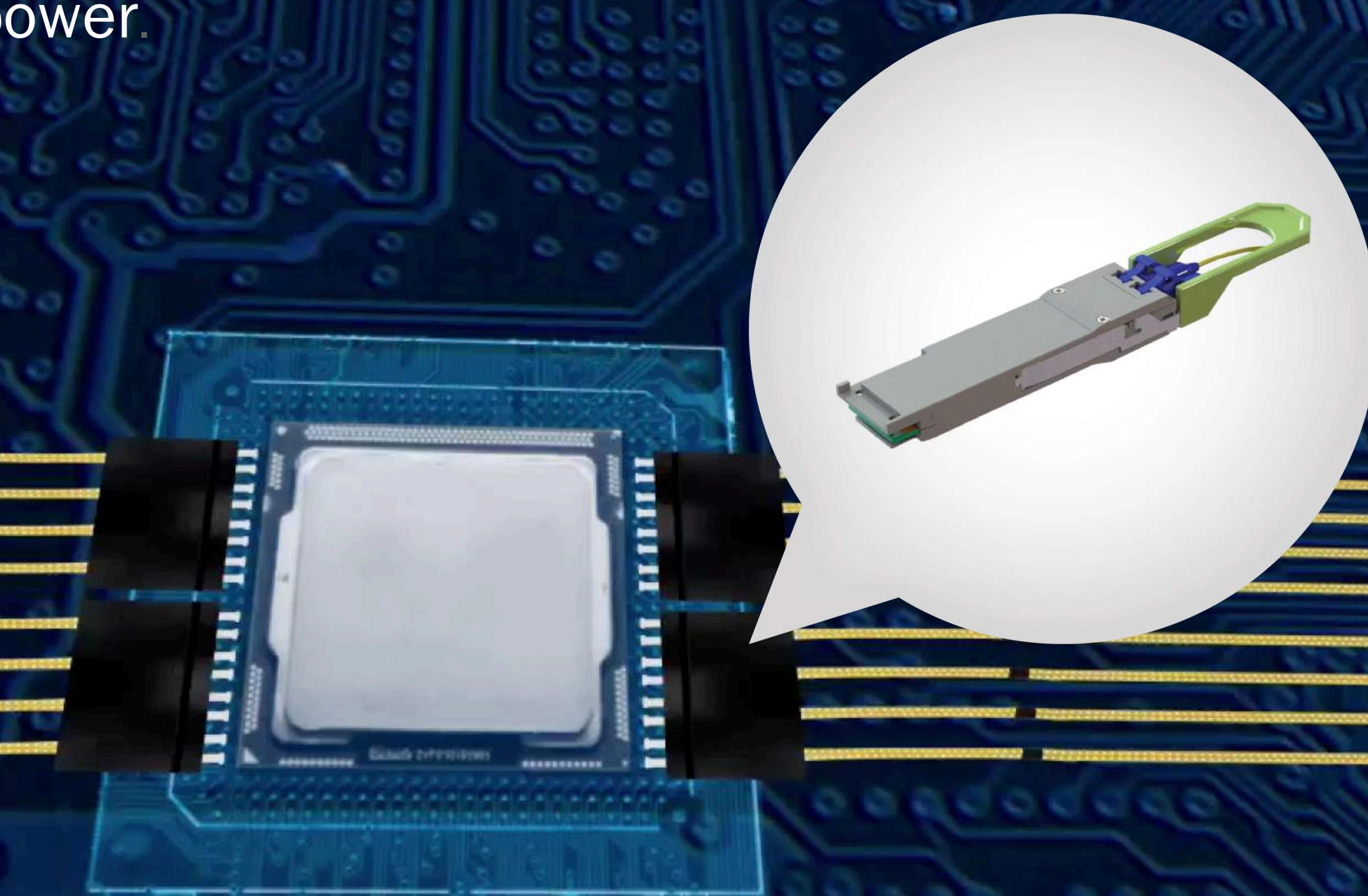
Innovate

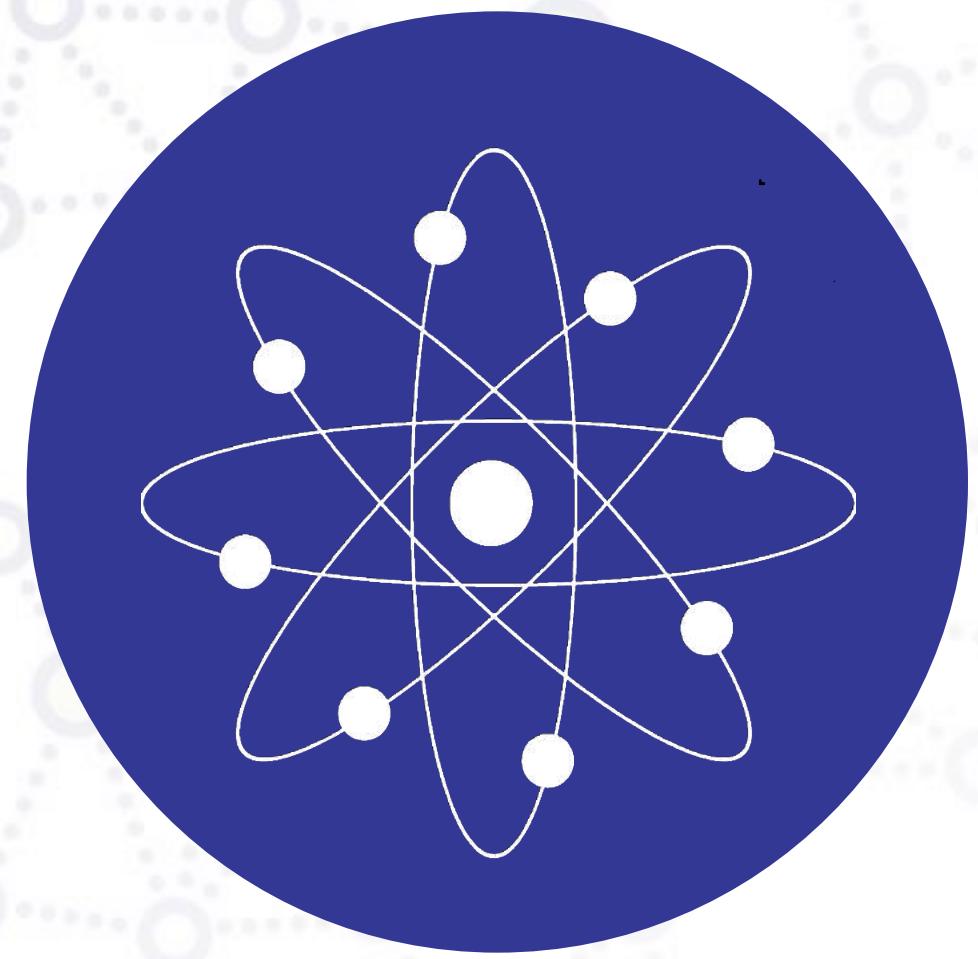


Looking
ahead

Co-packaged optics

Enables higher density, lower power.





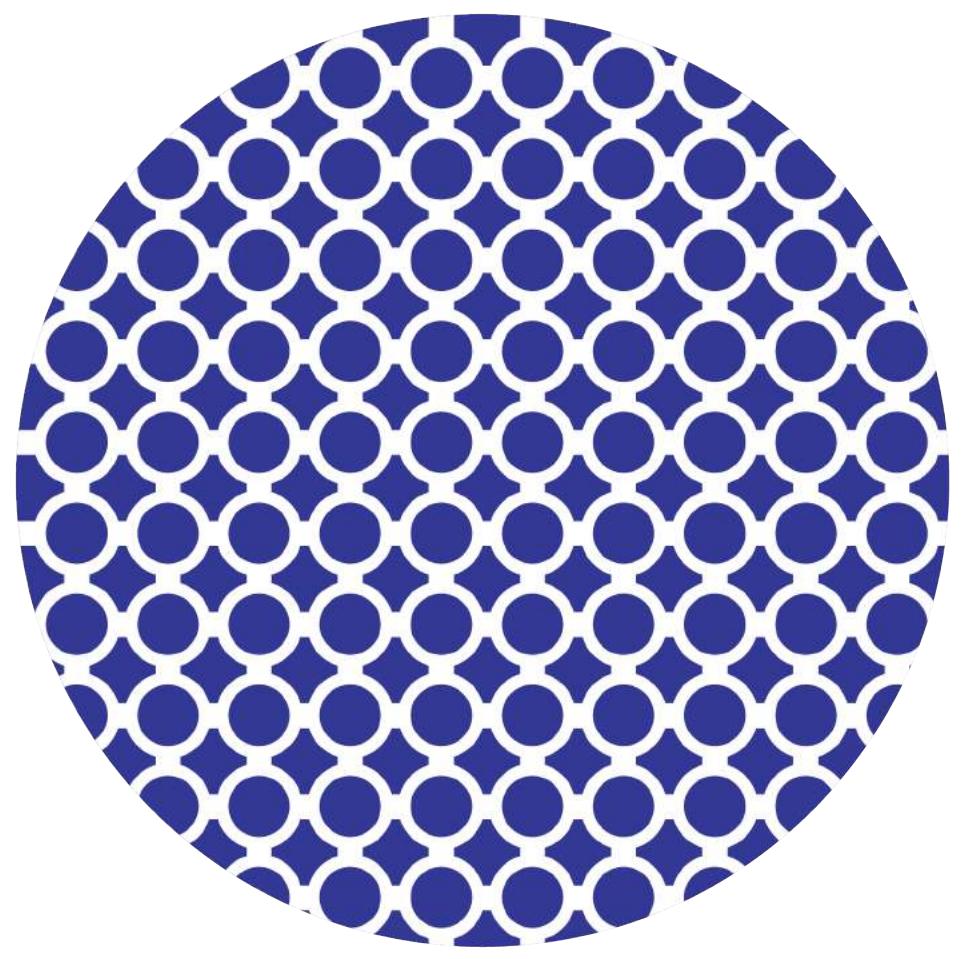
PHOTONS / ELECTRONS



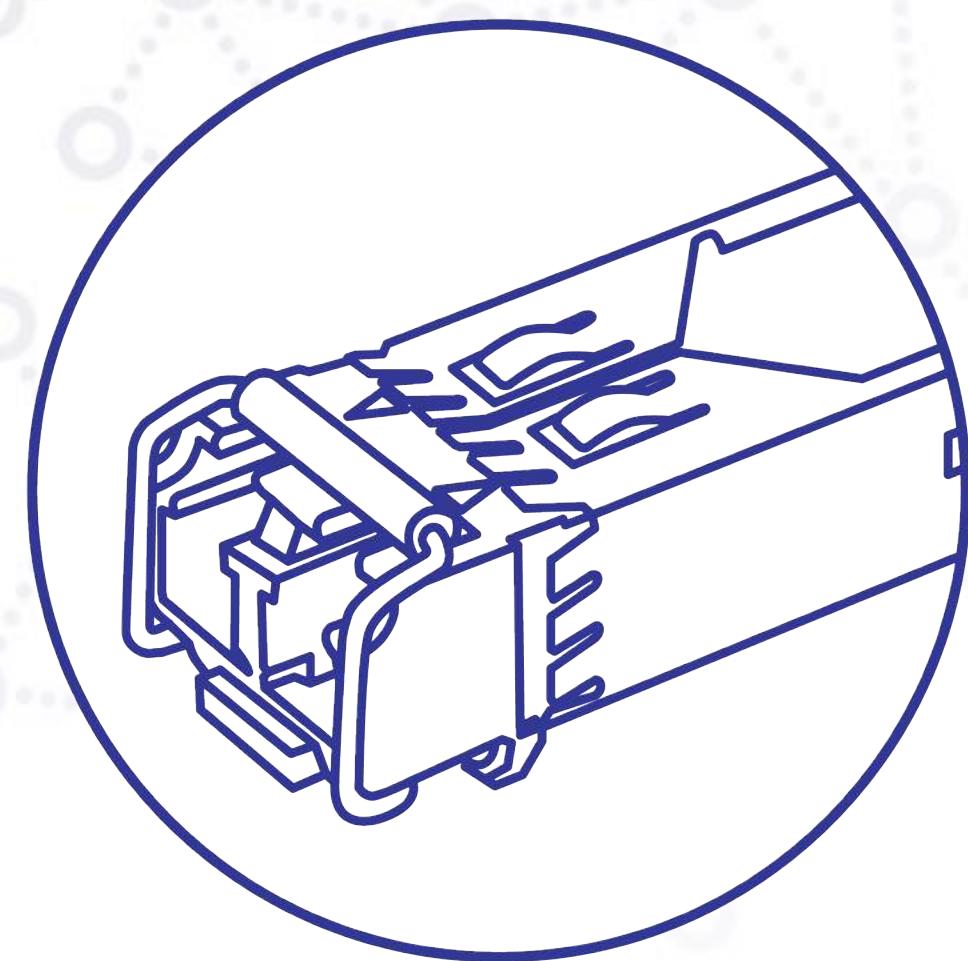
COMPONENT MATERIALS



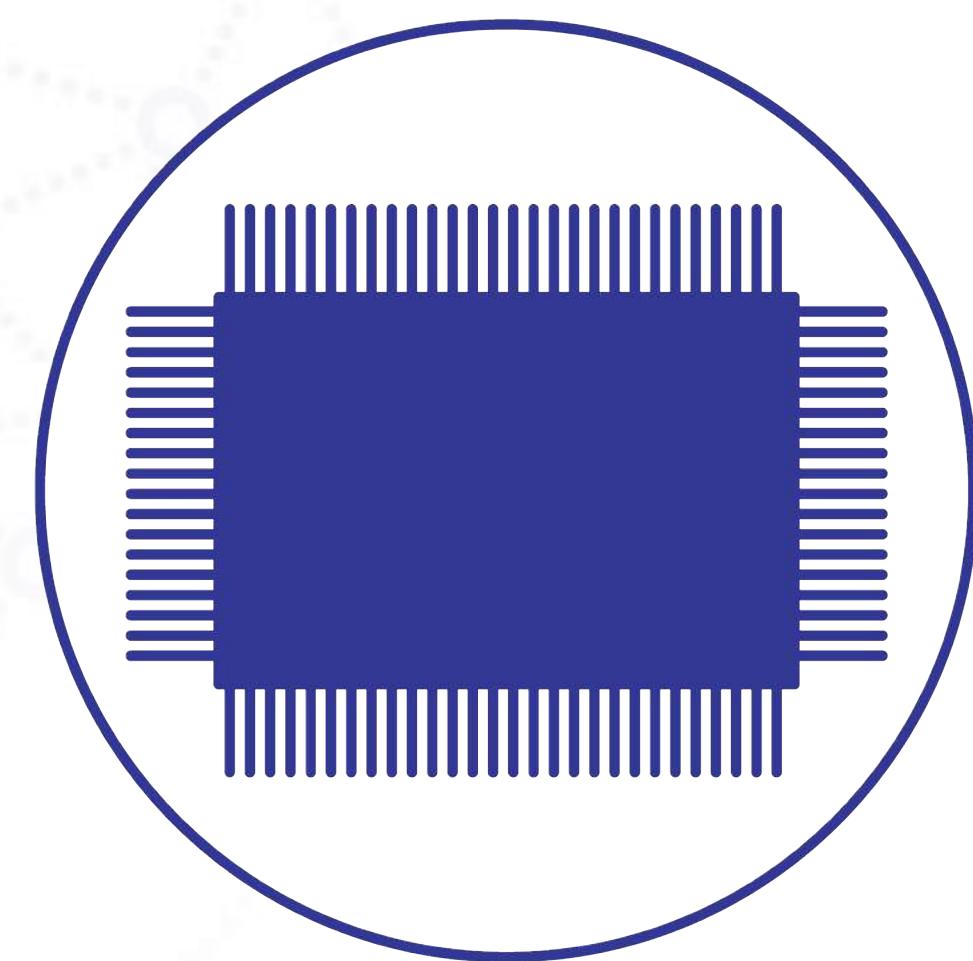
CONTROLS / PROTOCOLS / LOGIC



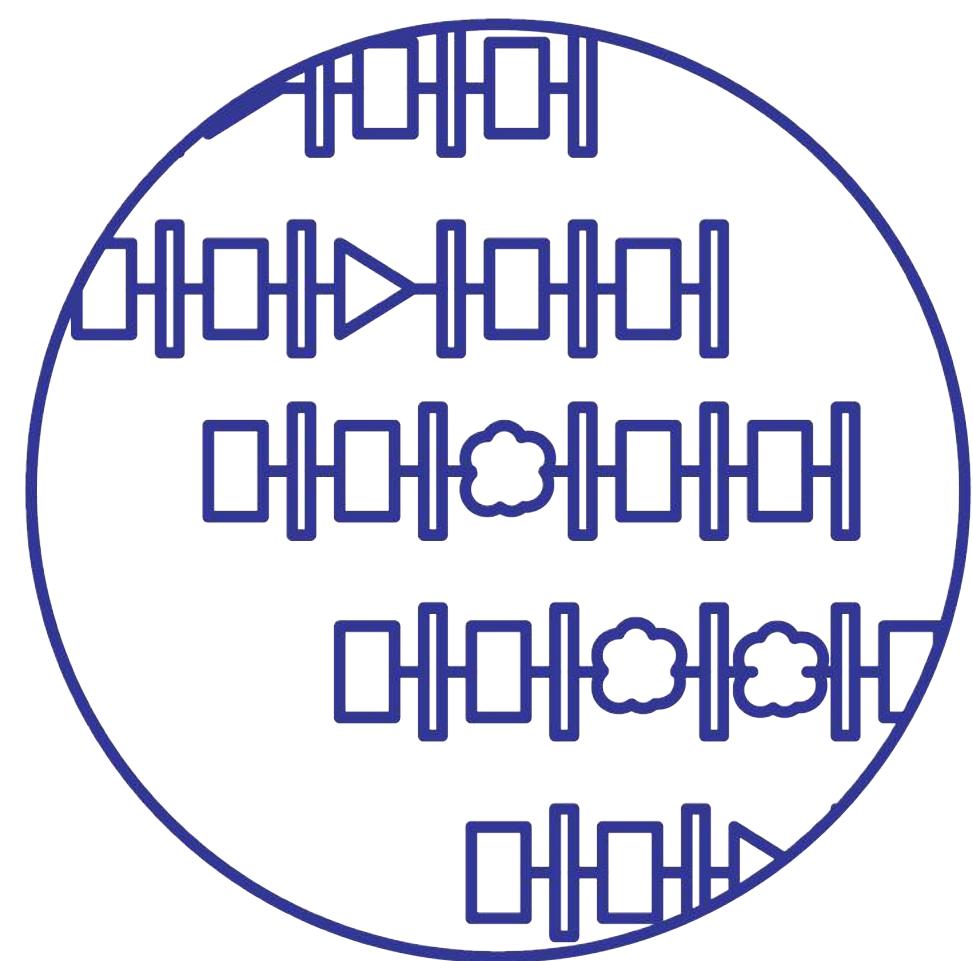
SYSTEM FABRICS



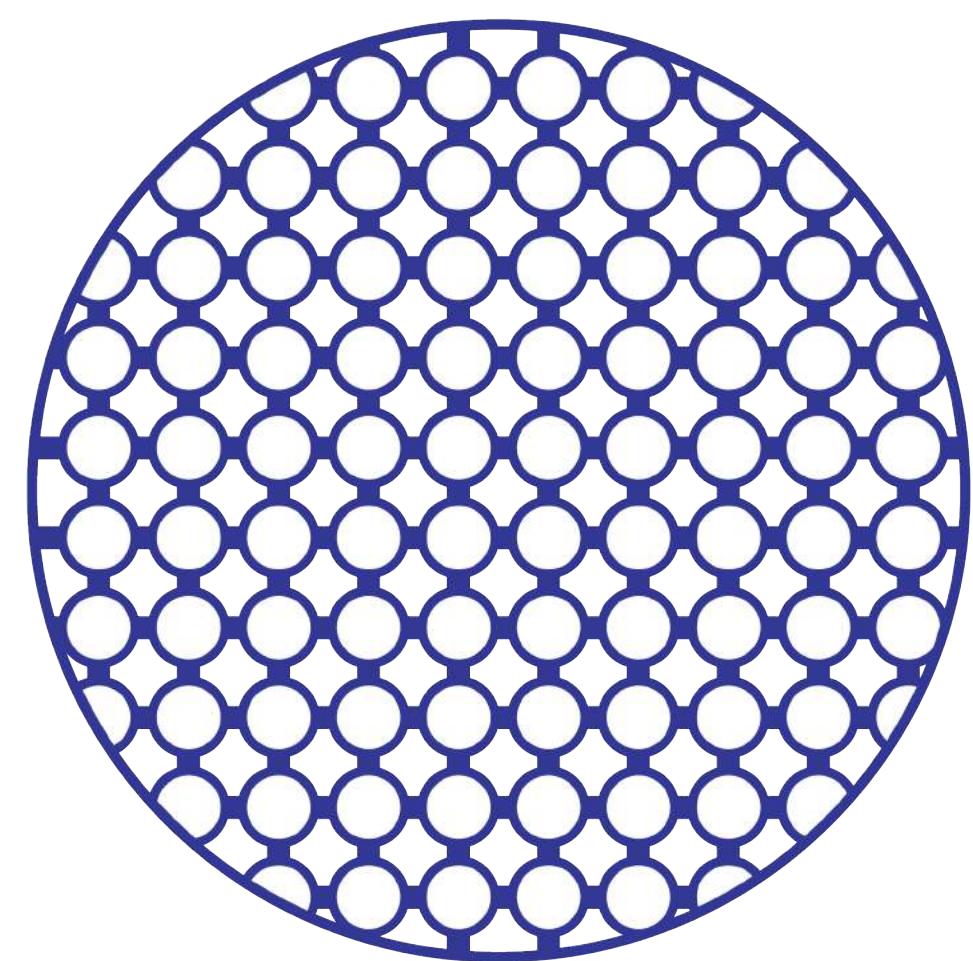
NETWORK TRANSCEIVER



CHIPS & DISKS

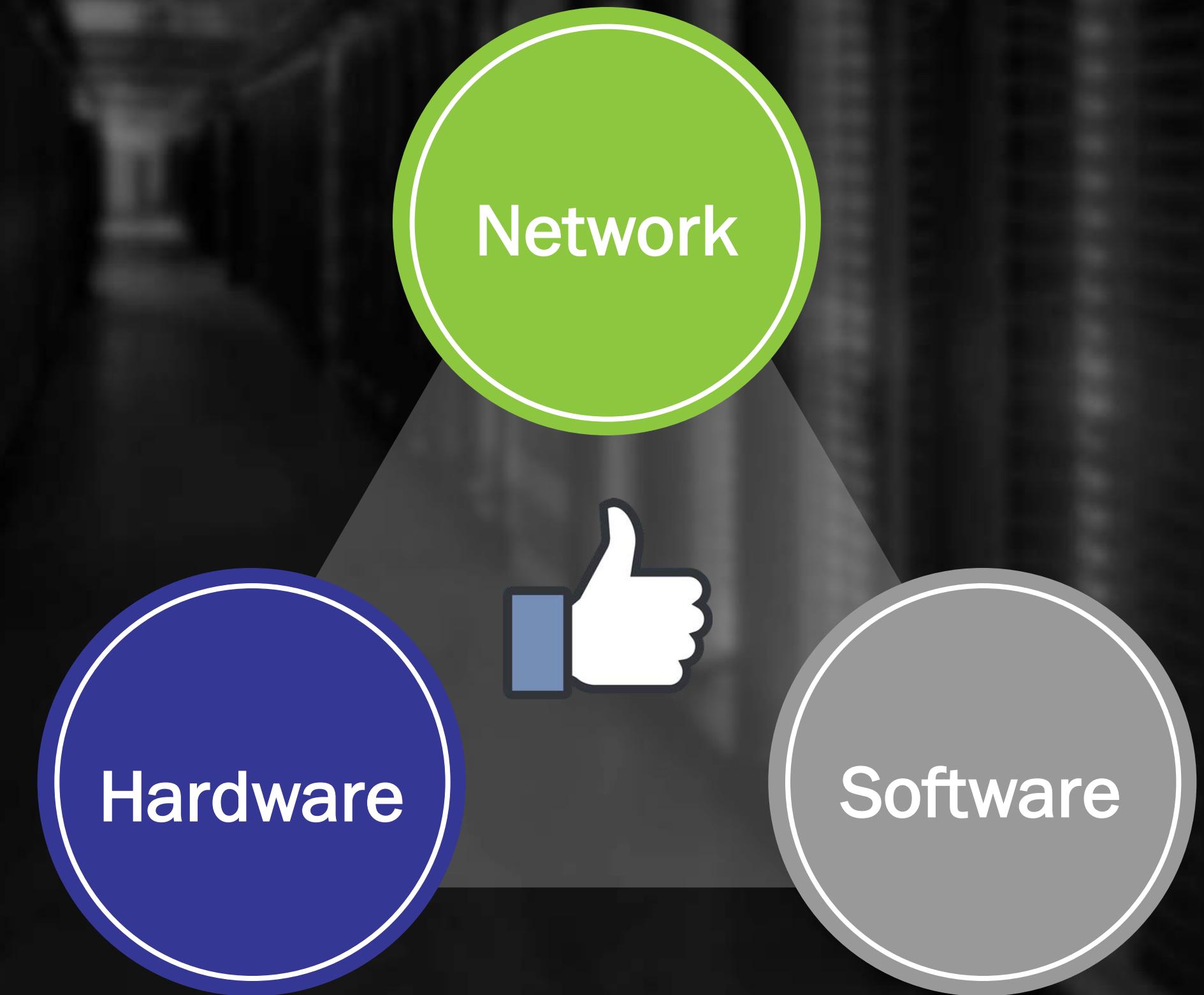


FIRMWARE & LOGIC



SYSTEM FABRIC

Moving faster and innovating as a community





**THIS JOURNEY
1% FINISHED**



OCP SUMMIT

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