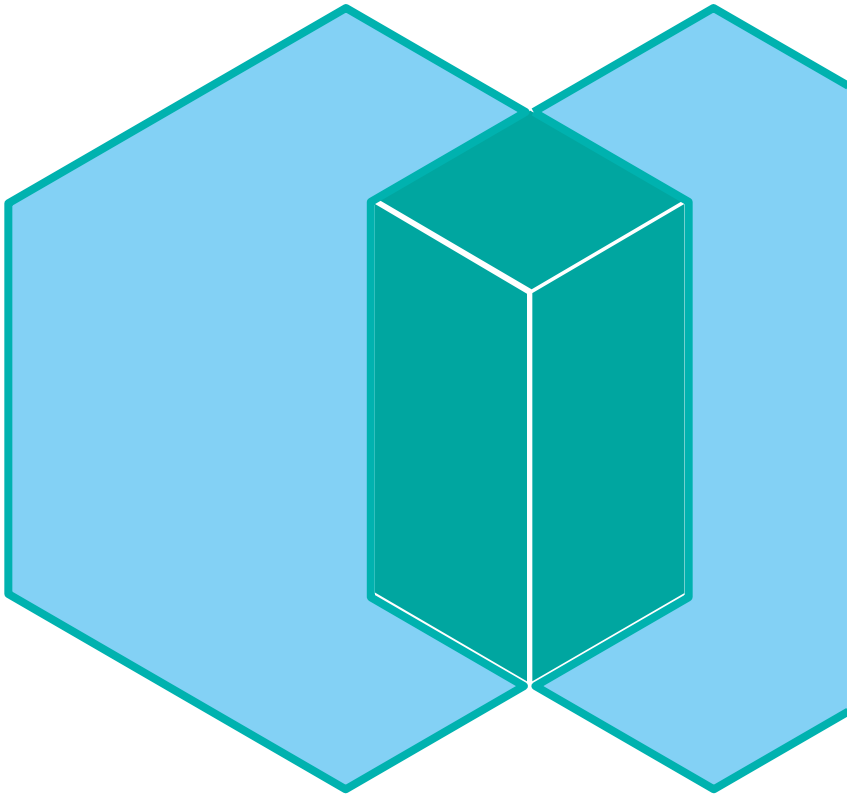
SNIA™

Next generation Ethernet connect to All FLASH: iSER and NVMeF



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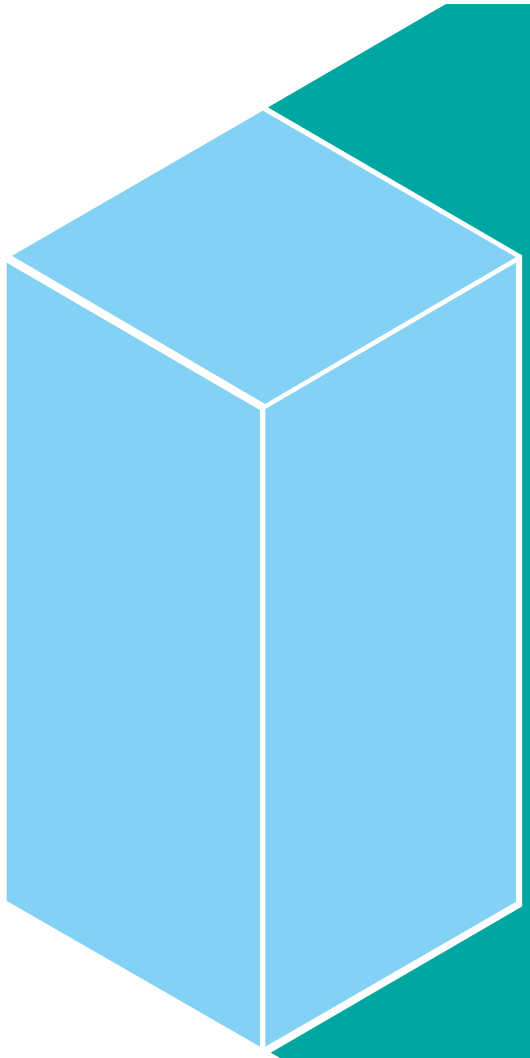
Agenda

- Flash growth and dimensions of change
- Shared SAN storage requirements
- What is iSER?
- What is NVMeF?
- All FLASH on SAN – roadmap
- What are we doing at IBM?



Flash Growth and Dimensions of Change…

Workloads	Traditional Enterprise Workloads → New age Flash workloads (Tier0: SAP HANA, RT Analytics, Tier1: OLTP, VDI, Social Media Apps)
Storage SW Architecture	Kernel Mode → User Mode (SPDK)
Upper Level Protocols (ULP)	FCP → iSER & NVMeoF (Eth & FC)
Layer2 Interconnect (L2)	FC 8G/16G → Eth 10G → FC32G → Eth RDMA 25/40/50/100G
Storage Media	HDD → SAS SSDs → PCIe NVMe → PM (3DXP)
Storage HW Architecture	AF Server → AF-HyperConverged → AF-Arrays → AF Disaggregated Storage

✓ Flash is driving change

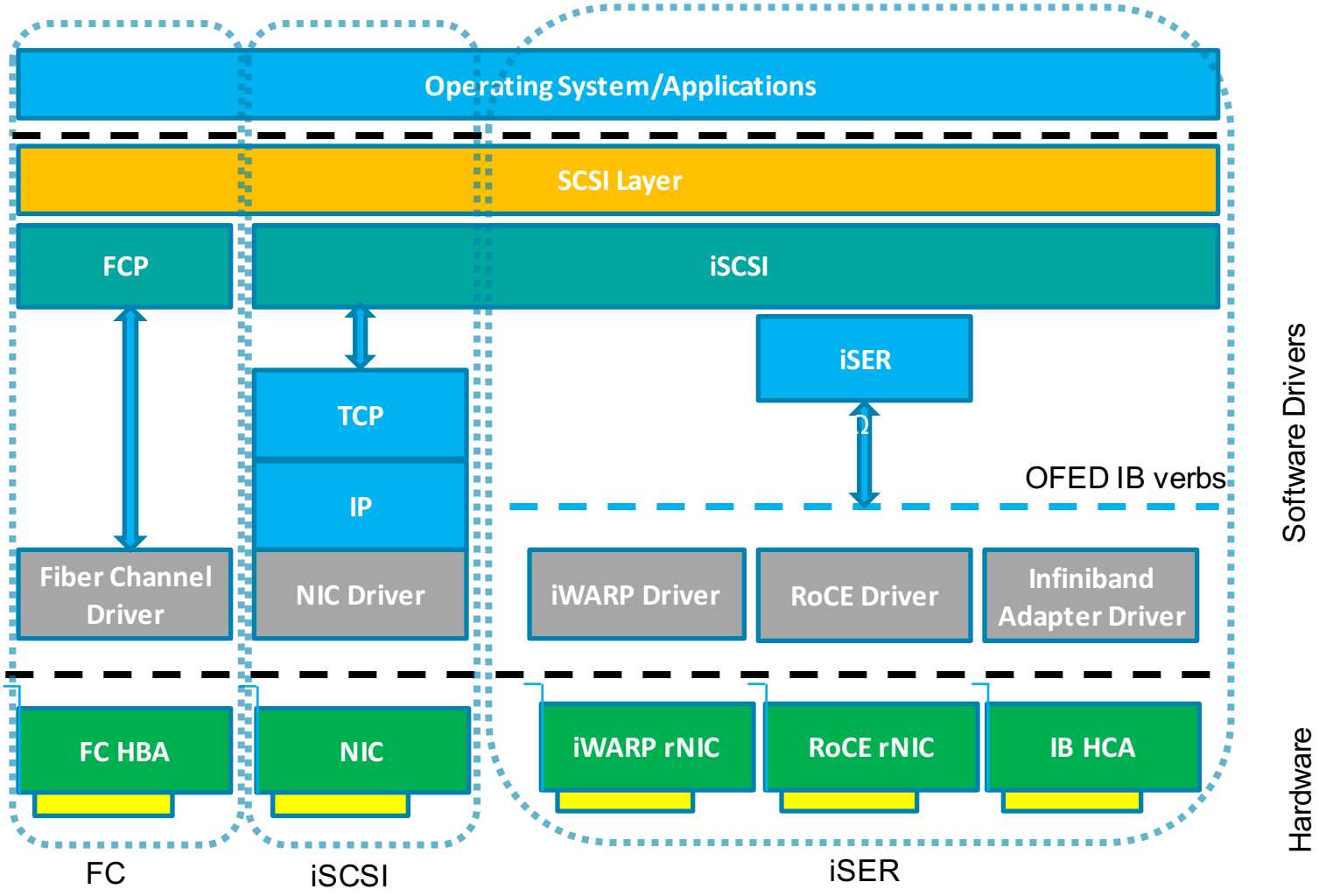
✓ Change is multidimensional

✓ Change would not be all at once. One dimension at a time

Shared SAN storage requirements

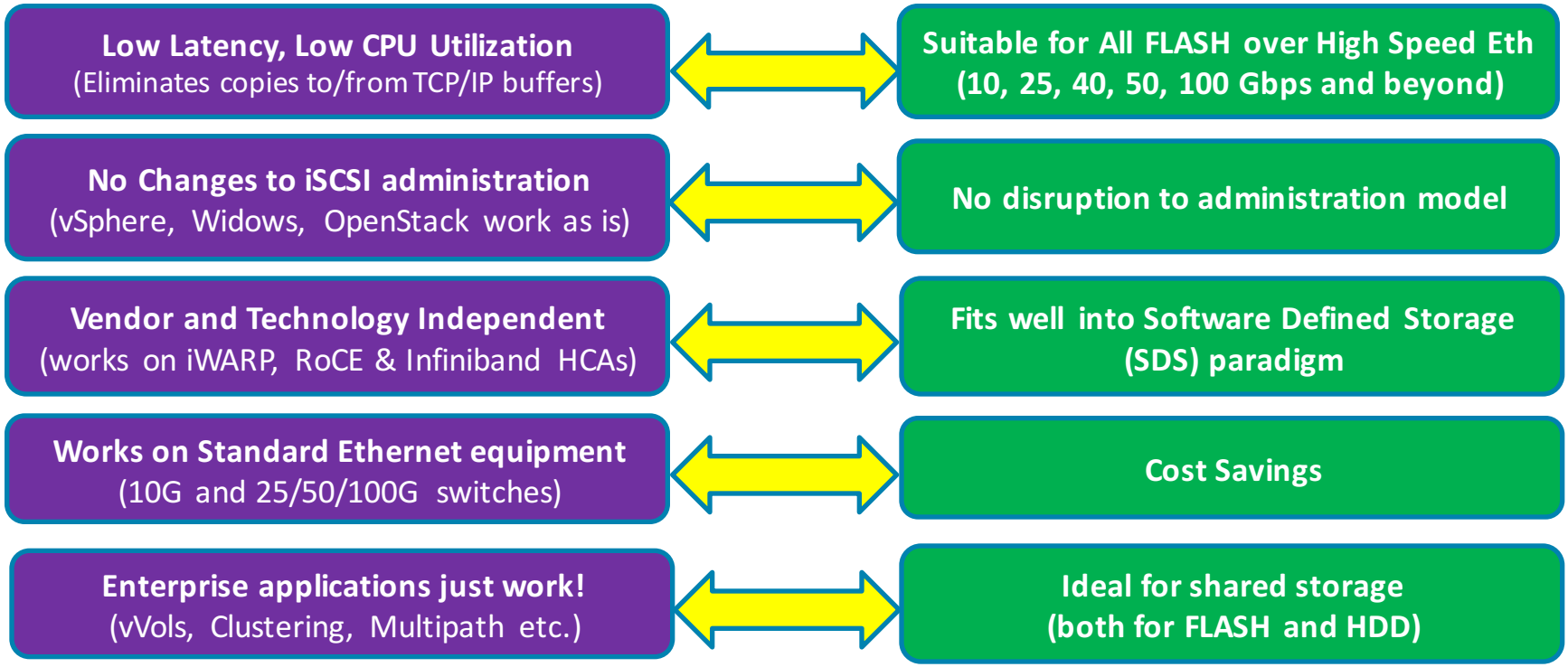
- Multipath (for high availability)
- Reservation (SCSI Persistent Group Reservation)
- vVols (offload Copy Services to Storage Controller)
- Data movement/migration without involving host CPU (XCOPY, ODX)
- Unmap: Optimize space deallocation on Thin Provisioned storage
- Atomic Compare And Write (CAW): Alternative to SCSI3 Reservations
- Error Handling: Abort Task, Abort Task Set, LUN Reset, Target Reset etc.

What is iSER?


Operating System/Applications
SCSI Layer
FCP
iSCSI
iSER
TCP
IP
OFED IB verbs
Fiber Channel Driver
NIC Driver
iWARP Driver
RoCE Driver
Infiniband Adapter Driver
FC HBA
NIC
iWARP rNIC
RoCE rNIC
IB HCA
Software Drivers
Hardware
FC
iSCSI
iSER

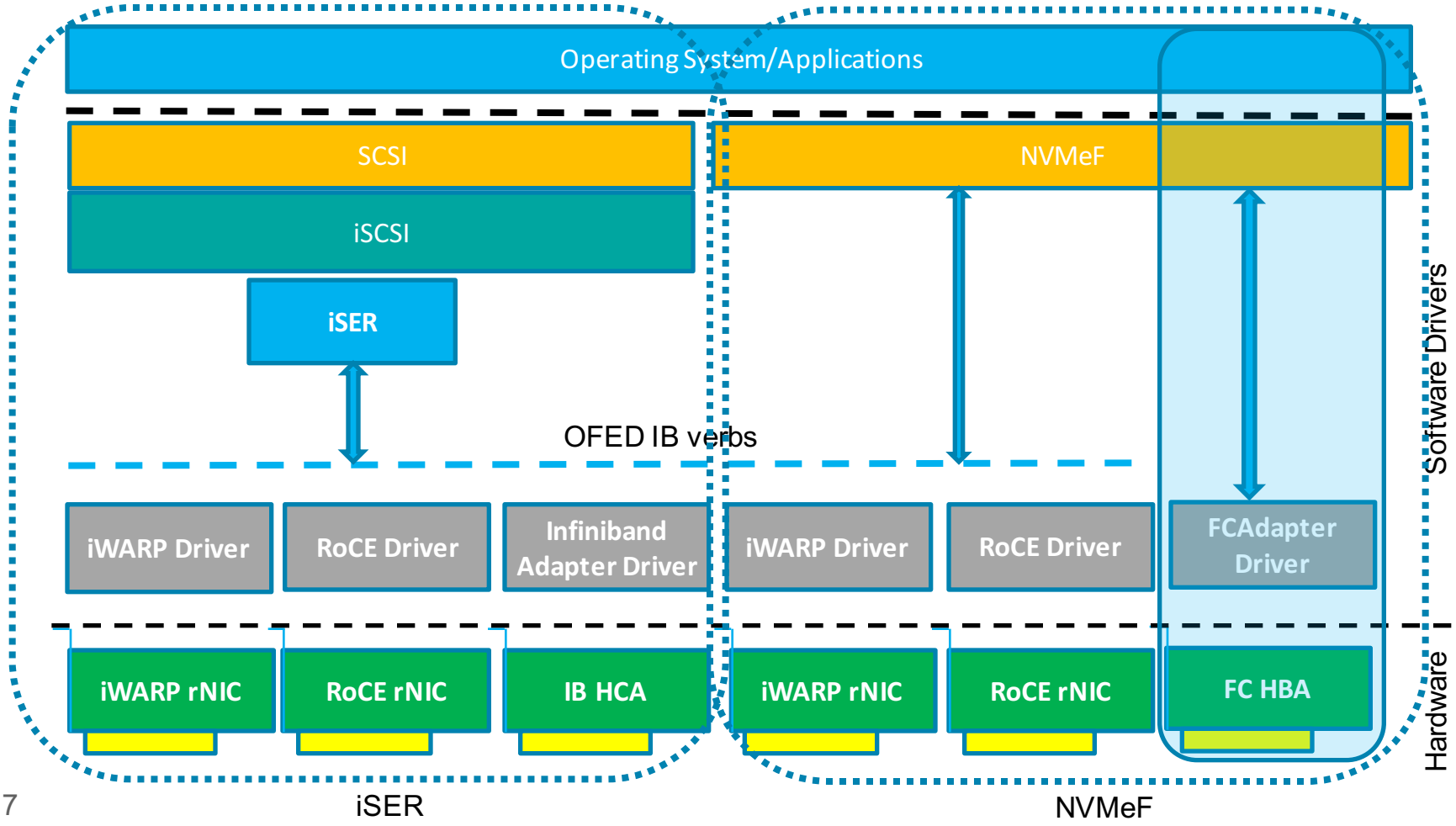
iSER: Current state of affairs

iSER is iSCSI with RDMA Data path

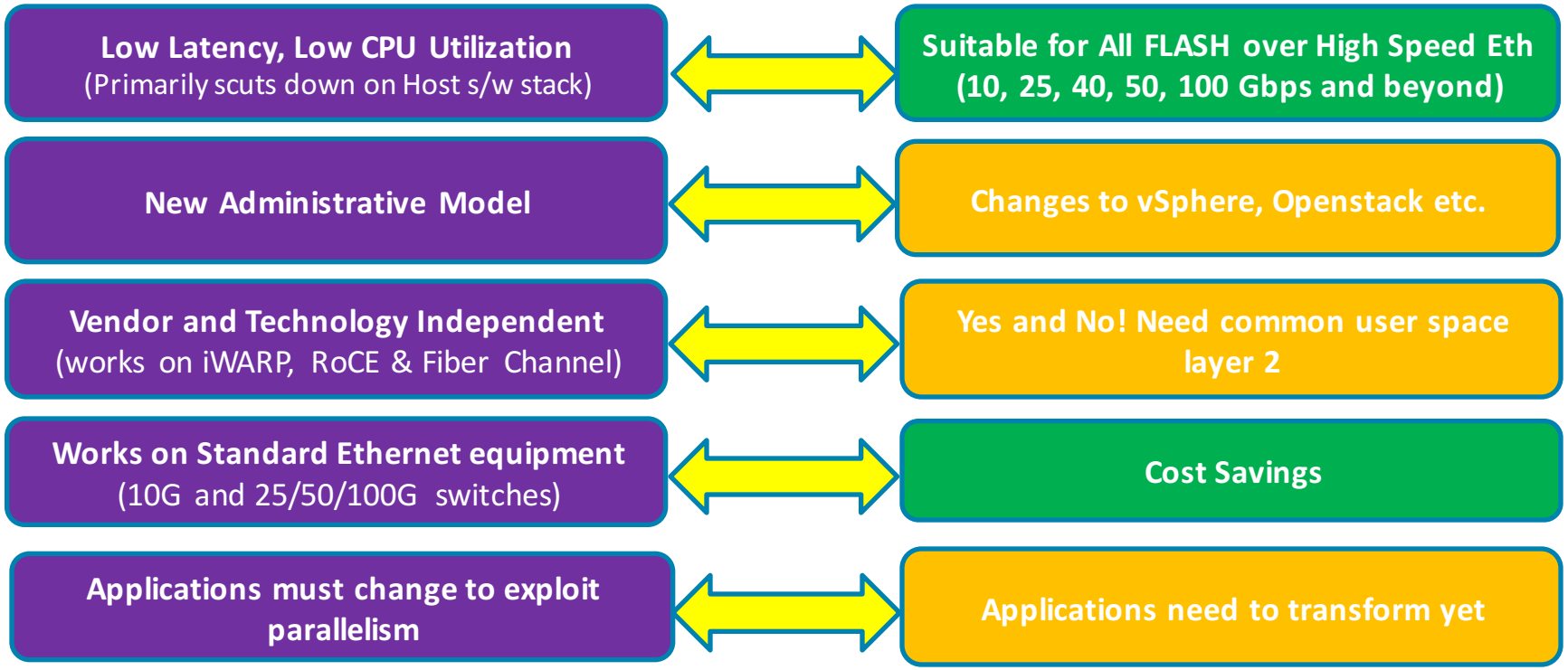


iSER is ready for Shared All FLASH SAN storage today!

What is NVMeF?

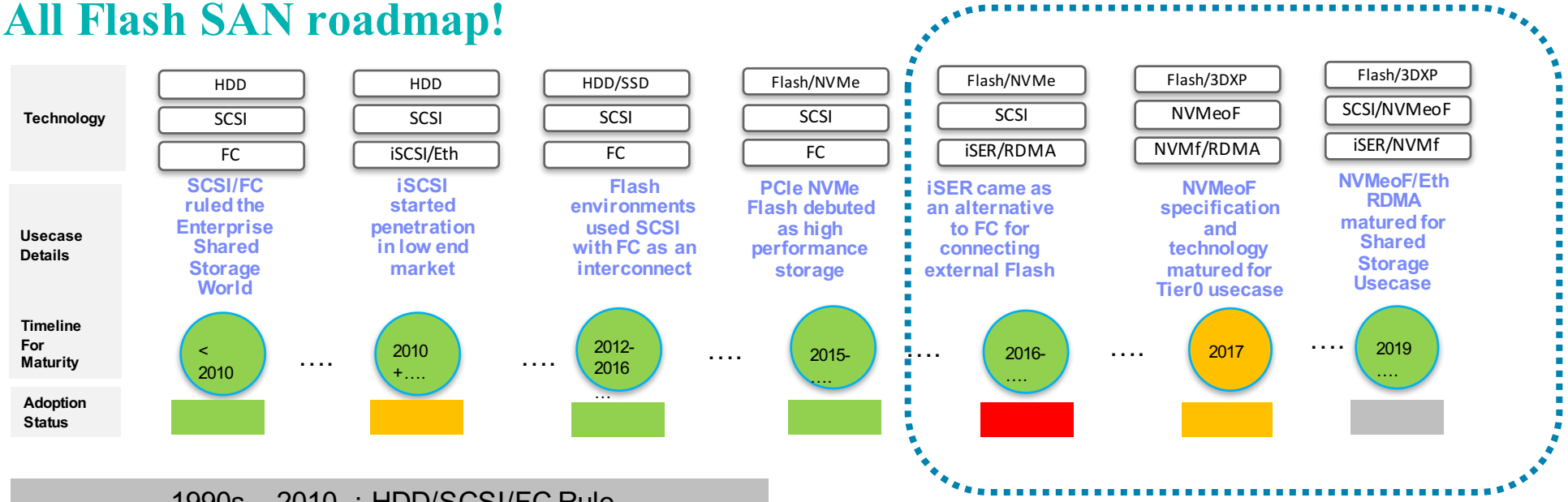


NVMeF: Current state of affairs



NVMeF is still evolving to adapt to Shared Storage Applications!

All Flash SAN roadmap!



1990s – 2010 : HDD/SCSI/FC Rule

2007- 2016 SSD/Flash media evolution, maturity

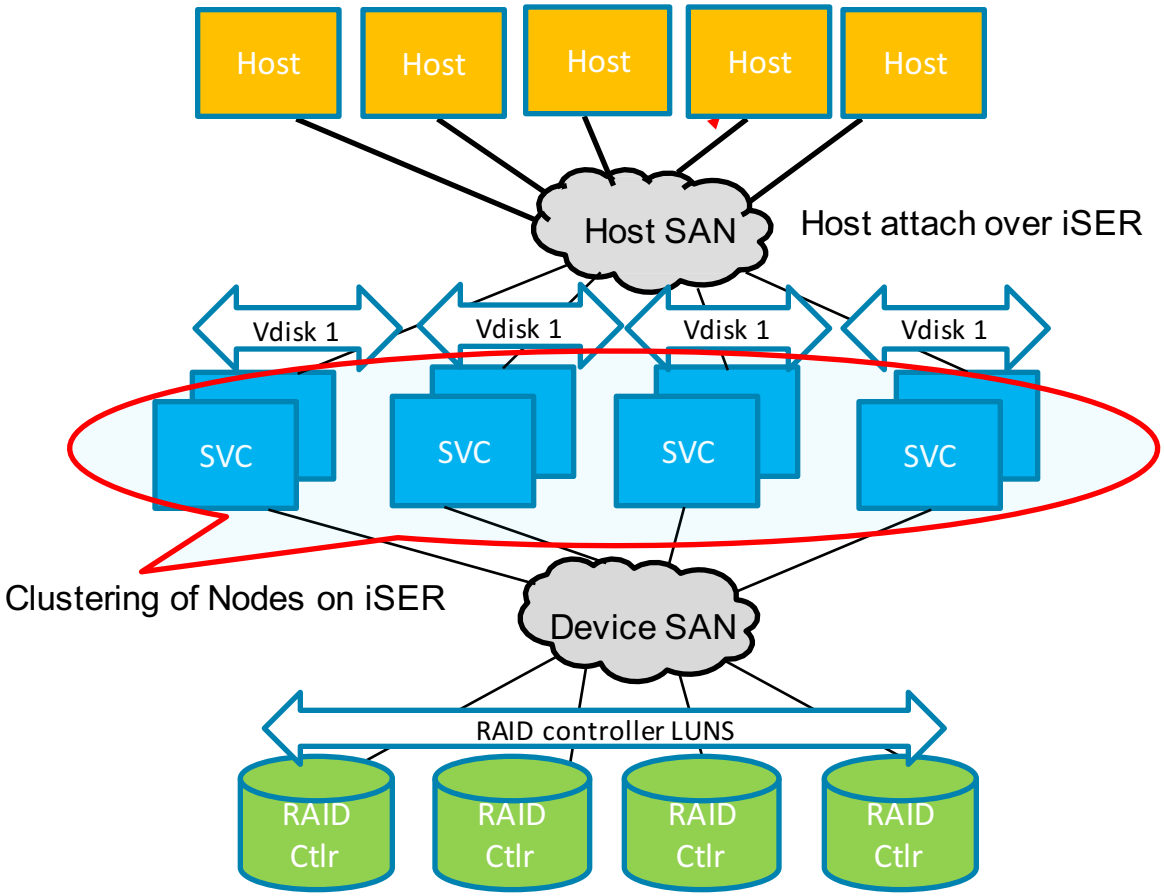
2015 - … NVM evolution

2016 to 2020 – iSER/SCSI

2019/2022 –iSER/NVMeF

What are we doing at IBM?

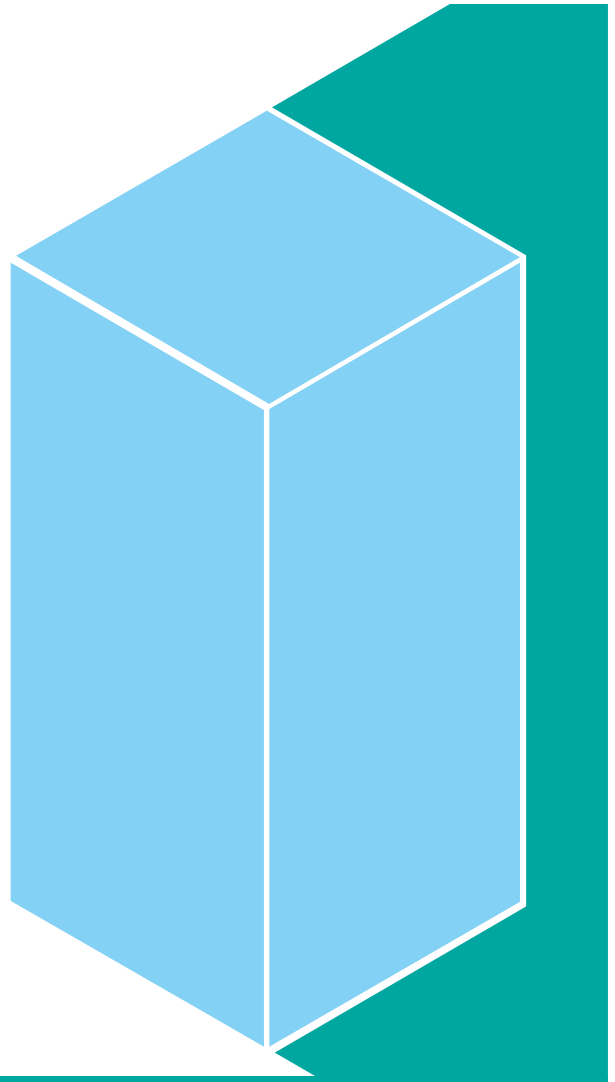
- Host Attach over iSER – Linux, VMWare
- Clustering over iSER



iSER vs Fibre channel

I/O	iSER (40Gb)	Fibre Channel (16Gb)
Read 4KiB	50 (us)	80 (us)
Write 4KiB	139 (us)	195 (us)
Read 64KiB	95 (us)	196 (us)
Write 64KiB	209 (us)	337 (us)

iSER: Fiber Channel benefits minus the additional costs



Thank You!