DATA IN MOTION

Activating Humanity's Greatest Resource

SEAGATE | LYVE LABS™

WITH DATA, ANYTHING IS POSSIBLE™

Welcome to Seagate.

The digital world is seeing incredible growth in data, exploding to 175ZB of data generated per year by 2025. We are only storing a fraction of that data, but as the data being generating greatly increases more use cases for data are being discovered. This growth means more complexity, creating new challenges and opportunities. It means a whole new set of questions that enterprises are asking. It means new ways of activating data, and new ways of deriving value from data.

Seagate Technology has been a global leader of innovation in the data storage and management industry for over 40 years now. We're a partner to companies, institutions, and entrepreneurs that are driving value from the massive opportunity in big data analytics, artificial intelligence, smart cities, machine learning, and other cloud- and edge-based architectures. We both care about and understand the questions that industries are asking. And we are actively at work figuring out solutions to these dilemmas.

We want to make it easier for you, either as a large enterprise with capable resources and reach or as hungry startup impassioned mainly by new ideas, to harness the power of data. As the flow of data brings us together, today's world is more deeply interconnected than ever. What I know for certain is that none of us can figure out these solutions on our own. That's why we've come to Israel.

I want to extend a warm Seagate welcome to our partners. Let's talk data in motion, and how activating it efficiently can advance the human potential.

Dave Mosley, CEO
Seagate Technology

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Data generated by the year 2025 will be an astounding 175 zetabytes, a tenfold increase from 2016 levels. The need to manage this staggering volume of data is going to be a key driver of distributed architecture.

— DATA AT THE EDGE: Managing and Activating Data in a Distributed World, a 2019 Seagate report

ANNUAL SIZE OF THE GLOBAL DATASPHERE

175 ZB

180

90

Zetabytes

0

2010   2025
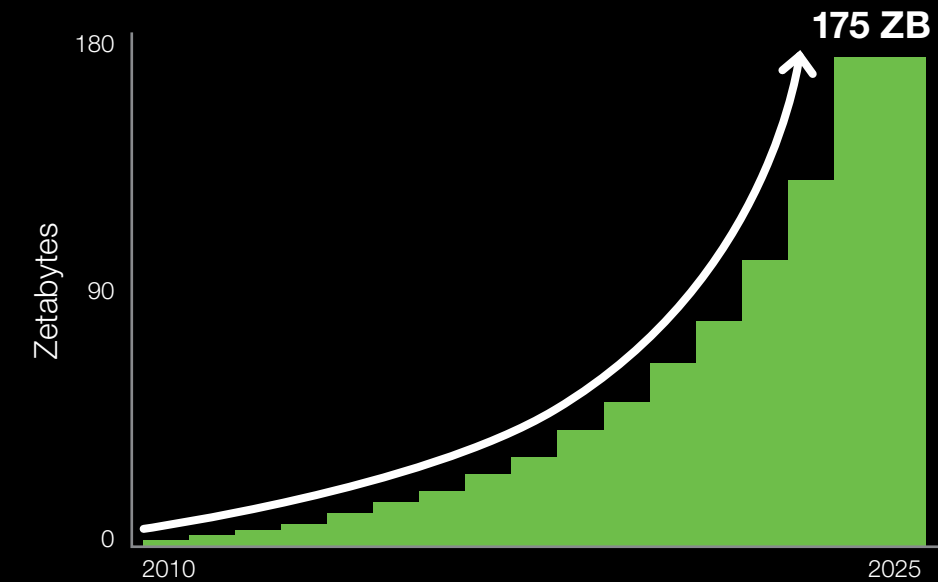
Source: Data Age 2025, sponsored by Seagate with data from IDC Global DataSphere, Nov 2108

Evolution of The Datasphere

10 million users

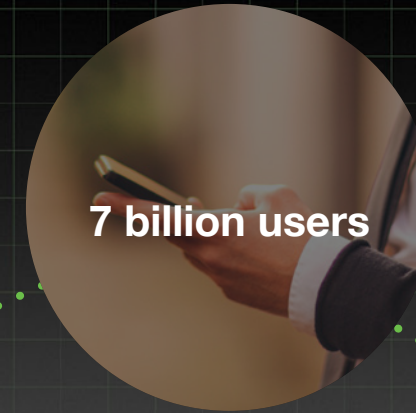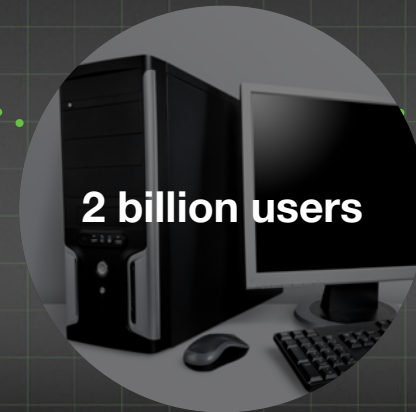**IT 4.0 Rise of the Edge**
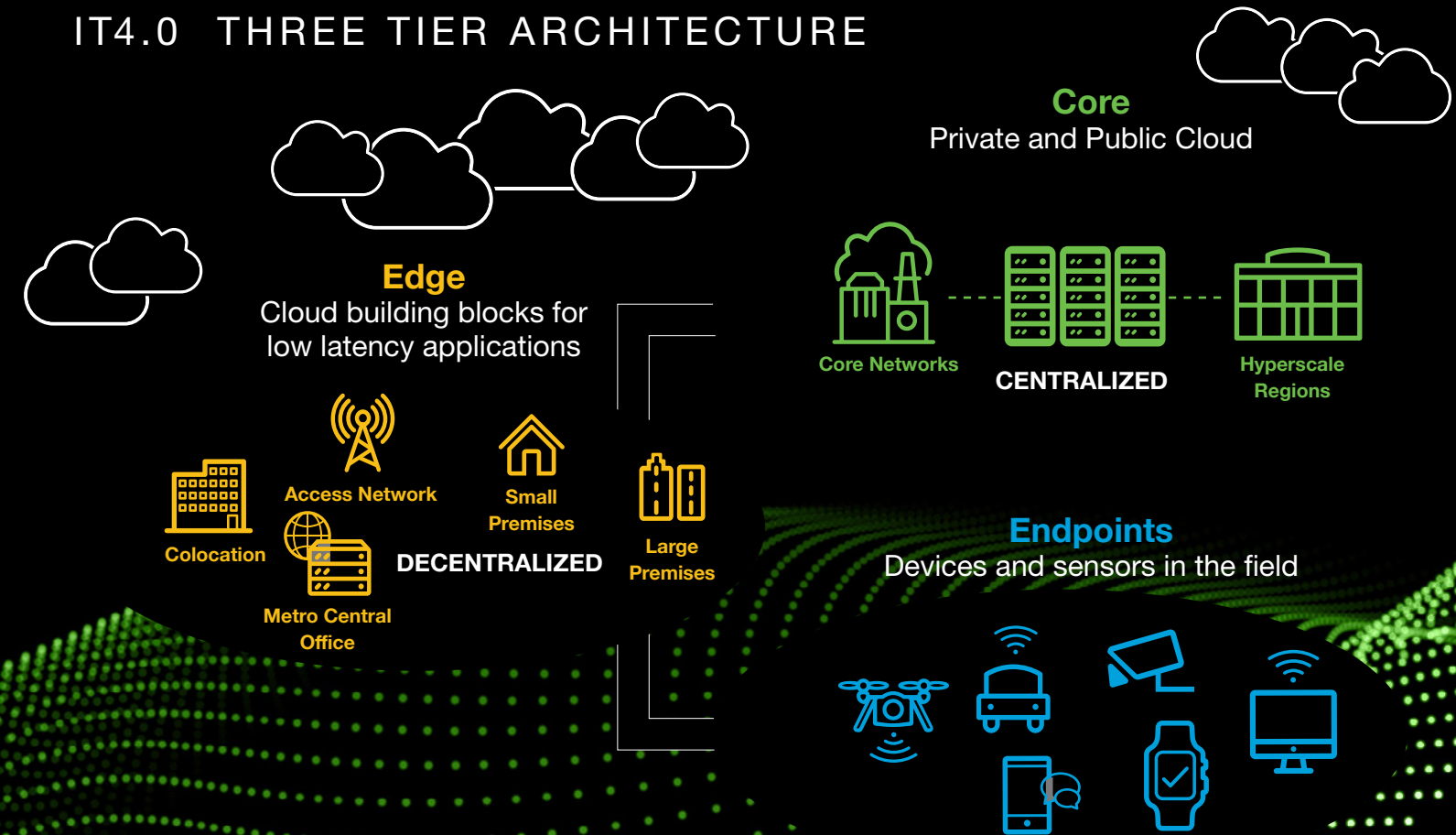We are still living in a cloud world, but this massive growth in data is necessitating faster computing power, giving rise to the Edge

1980 – 2000

IT 2.0 Client Server
Data centers managed and distributed data across a slow but developing network to end devices

7 billion users

1960 – 1970

IT 1.0 Mainframe
Data resided in purpose-built datacenters and accessed from remote terminals

2 billion users

2005 – 2020

IT 3.0 Mobile-Cloud
Wireless broadband and fast networks moved data into the cloud, enabling the access of data from any screen

1+ trillion users

Making Data Work for You.
At the Source. At the Edge.
At the Core.

Successful enterprises are those that derive the most value from their data at all stages of its flow: from Core to Edge to Endpoints and back.

IT4.0 THREE TIER ARCHITECTURE

Core
Private and Public Cloud

Core Networks   **CENTRALIZED**   Hyperscale Regions

Edge
Cloud building blocks for low latency applications

Access Network

Colocation

Small Premises

Large Premises

DECENTRALIZED

Metro Central Office

Endpoints
Devices and sensors in the field

Innovation and Partnership

If we want to take on the biggest problems and tackle the most severe constraints, then we really cannot further limit ourselves with restrictive methods. When we start with our piece of the puzzle then the notion of convergence or doing things in a self-contained manner makes sense. But when we scale, we need to bring these multiple converged worlds together, make them work cooperatively. When we work together, we get feedback on how to improve our products and offerings, and in turn we help support your data in motion needs.

Leverage a Powerful Ecosystem

At Seagate, we are committed to bringing together technology leaders like you to incubate ideas, accelerate problem solving by learning from each other and creating solutions together, and to leverage our strengths to usher in the next generation of information technology: IT 4.0.

We've developed this guide by leveraging 40 years of expertise in collecting, storing, managing, and harnessing data. Let's collaborate and learn how to put data in motion for the benefit of your business.

Identify How You Use Data

Explore how key industries are using data to drive performance and competitiveness.

Startups: SeismicAI

What is the value to humanity if we can detect earthquakes more accurately, and deliver earlier and faster alerts?

SeismicAI is solving that problem with Artificial Intelligence (AI) and Machine Learning (ML) with data at the Edge. Seagate is helping SeismicAI secure, manage, and activate data at the edge.

See how SeismicAI does it:

www.seismicai.com

The Enterprise: Telecommunications

Telcos are at the forefront of driving next generation applications. As they roll out 5G at scale, Cloud alone can't solve their needs. They are looking for a seamless Endpoint to Edge to Cloud architecture. They cannot wait for data infrastructure to catch-up.

Seagate is helping telcos accelerate time to value by implementing Edge to Cloud solutions.

Independent Software Vendors: Object Storage Software

The strategic imperatives facing the modern enterprise are truly daunting. Digital transformation, big data/analytics, ML, and AI each bring unique challenges.

Each imperative demands a solution that is tailored to its unique computing, networking, and storage requirements. How then does an enterprise design a scalable infrastructure which can bridge these different technology roadmaps?

See how it is done at labs.seagate.com

Understand the Drivers of Data Migration

According to a report by the IT research firm Gartner, 91% of today's data is created and processed inside centralized data centers. But data is rapidly shifting away from the core. The same report predicts that by 2022 about 75% of all data will need analysis and action at the edge. That is a drastic change with implications for every enterprise.

Four big technology drivers underlie the massive shift of data from the public cloud to the private cloud and the edge:

1. AI has become cost-effective and practical;

2. Billions of Internet of Things (IoT) devices are being deployed;

3. Wireless operators are upgrading their networks to the fifth generation of cellular mobile communications (5G); and

4. Innovations in edge data centers are solving for the complexities of distributed facilities and unit cost economics.
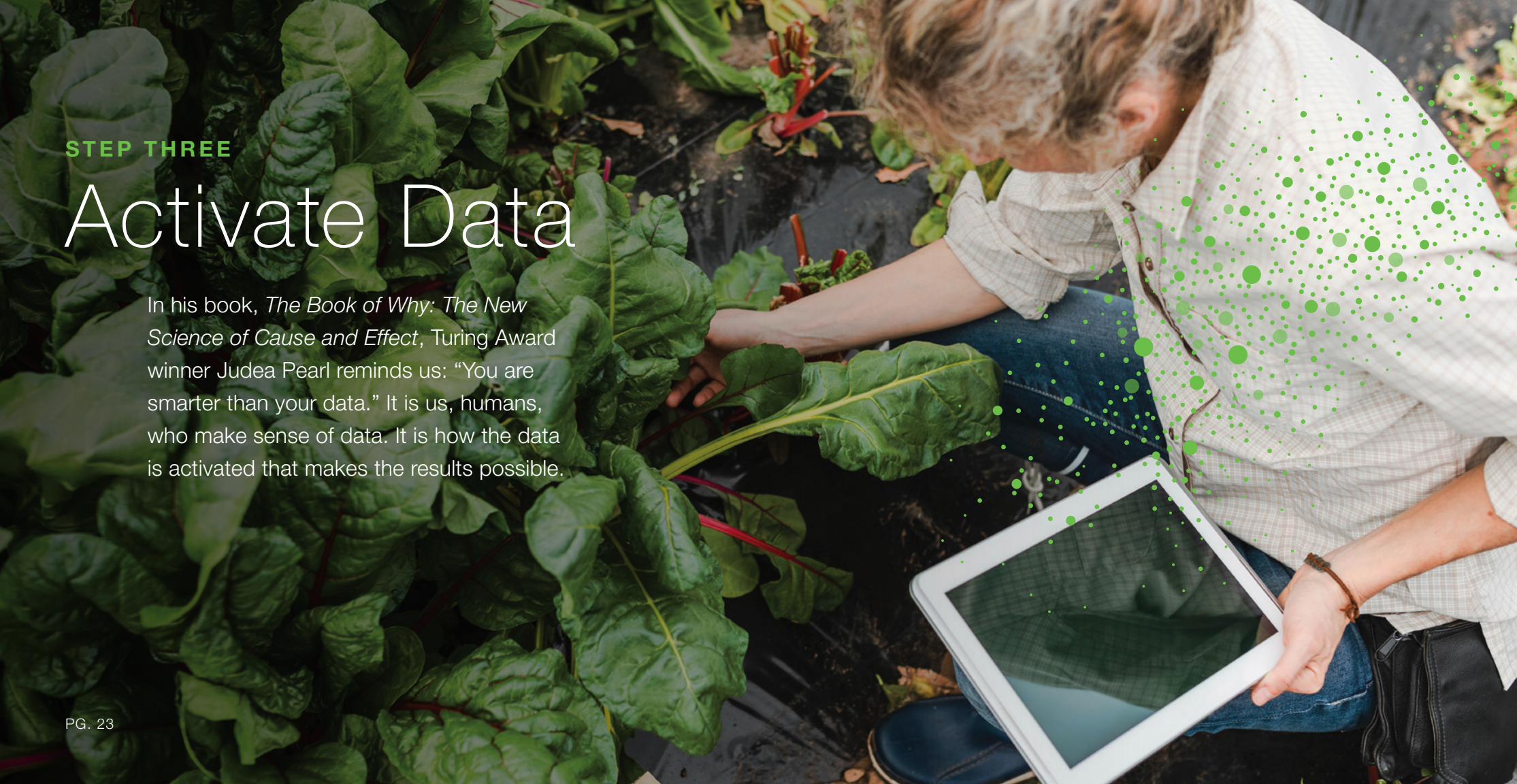
Each of these trends on its own will drive demand for edge processing, but all four combined makes edge computing inevitable.

Excerpt adapted from Seagate's Data at the Edge report.

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The right question is not, *Will edge or cloud prevail?* The right question is, *Where is the best place for my data?* Or, *How will the public cloud, private cloud, and the edge work together?*

Activate Data

In his book, *The Book of Why: The New Science of Cause and Effect,* Turing Award winner Judea Pearl reminds us: "You are smarter than your data." It is us, humans, who make sense of data. It is how the data is activated that makes the results possible.

Small or big, data is brimming with stories to tell and answers we seek to the pressing questions, be it adding the right amount of fertilizer to a cornfield in Iowa or detecting anomalies in a smart city from streetlight camera feeds. To get to that point, data must be primed and ready at a moment's notice for humans to act upon it—to ask questions and hear the answers.

That is data activation: making sense of the available data. It's about putting data to work, and about extracting the maximum value from it. Data offers endless potential—to save lives, to increase revenue, to protect assets. Data activation is the unlocking of that potential.

Capturing, storing, securing, and managing data means we have the ability to ask not just bigger questions, but more nuanced ones. For example:

- How can I reduce my investments in new machinery?

- Is there a way to cut days from the production process?

- Is this widget going to fail in customers' hands?

Humans have a penchant for asking questions, and making decisions based on the answers. That's how we find meaning; and it's how data earns its meaning too. Activating data at the edge allows us to ask better questions and get more timely answers.

Excerpt adapted from Seagate's Data at the Edge report.

Ensure Your Infrastructure Is Ready

Are we ready for the changing data requirements? During the second and third Eras of IT, businesses began building their own data centers or moving to the cloud. But most on-premises data centers are typically rigid and not flexible for scaling up or integration of new technology. The public cloud promised reduced cost, simplified architectures, better data security, and ease of use, but the immense growth in data has in reality made the public cloud slower and more expensive.

This is driving the workload migration. Some workloads are repatriating from the public cloud, back to on-premises data centers and private clouds. Other workloads are migrating closer to the consumer at the edge, giving rise to edge data centers. There is no one-size-fits-all solution.

We can't predict the amount of data we'll have to store, but it's bound to be even bigger than we think. With this in mind, we have conducted customer interviews to understand what the industry needs to move forward. Partnership has come up with a common denominator. Let us work together to take on this challenge.

Partner

Partnering with other leading companies helps organizations solve complex data challenges at scale in science, engineering, space exploration, medical research, and so much more.

Lyve Labs

At Seagate, data is in our DNA.

That's why we implemented Lyve Labs, where together with our partners, we're delivering data solutions that work. Our partners bring their domain expertise and data processing knowledge, and we bring tools to remove various barriers to innovation. Together, we work in an open ecosystem to quickly build and deploy complete solutions.

From managing multiple clouds with a high volume of data that needs to be accessible for AI to activating data at the edge, let's push the boundaries of possible.

Find us and engage with us at labs.seagate.com

Shared Success with Trusted Partnerships

Challenge: Our reality today is that data transfer capabilities have not kept up with the rate that useful data is being generated.

What's the solution? Seagate has partnered with shipping companies to innovate a cheaper and more secure way to move data. Here's how it works:

Lyve Drive Cards fit into a Lyve Drive Card Reader.

Our reader and cartridges can fit into a Lyve Drive Cartridge Mount, a Lyve Drive Cartridge Shipper, or a Lyve Drive Modular Array.

Both our mobile and modular arrays have the same form factor, and can be inserted into a Lyve Drive Array Mount, Lyve Drive Array Shipper, or Lyve Drive Rackmount Receiver.

(Lyve Drive Card Reader)

(Lyve Drive Cartridge)

(Lyve Drive Cards)

(Lyve Drive Mobile Array)

(Lyve Drive Cartridge Mount)

(Lyve Drive Cartridge Shipper)

(Lyve Drive Array Mount)

(Lyve Drive Array Shipper)

(Lyve Drive Modular Array)
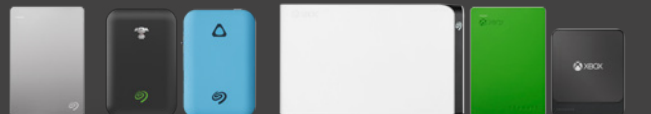
(Lyve Drive Rackmount Receiver)

Consumer

| Backup Plus Slim (Silver) 1TB-2TB | Backup Plus Slim (Blue) 1TB-2TB | Backup Plus Portable (Black) 4TB-5TB | Backup Plus Ultra Touch (White) 1TB-2TB | Backup Plus Ultra Touch (Black) 1TB-2TB | Expansion Portable 1TB-4TB | Seagate Duet 1TB | DJI Fly Drive 2TB |

| Fast SSD 250GB-2TB | Backup Plus Hub 4TB-10TB | Expansion Desktop 2TB-8TB | Backup Plus Hub for Mac 4TB-8TB |

| Backup Plus for Mac 1TB-4TB | Joy Drive 1TB | VR Power Drive 1TB | Game Drive Hub for Xbox 8TB | Game Drive for Xbox HDD 2TB-4TB | Game Drive for Xbox SSD 500GB-2TB |

| Game Drive for PS4 1TB-4TB | LaCie Rugged 500GB-5TB | LaCie 6big 12TB-60TB | LaCie 2big Dock 8TB-20TB |

Devices

THE GUARDIAN SERIES:

| BarraCuda Pro (Mobula) 12TB-14TB | BarraCuda Pro (Tatsu) 8TB-10TB | BarraCuda Pro (Makara Plus) 6TB-8TB | BarraCuda Pro (Makara BP) 4TB-6TB | BarraCuda Pro (Nemo) 2TB-4TB | BarraCuda Pro (Rosewood) 1TB-2TB | BarraCuda (V11) 2TB-8TB | BarraCuda (Grenada BP2) 2TB-4TB | BarraCuda (Pharoah Oasis) 500GB-1TB | BarraCuda (M11P) 3TB-5TB | BarraCuda (Rosewood) 500GB-2TB | BarraCuda SSD 250GB-2TB | BarraCuda 510 SSD 256GB-512GB |

| IronWolf Pro (Mobula) 12TB-14TB | IronWolf Pro (Makara Plus) 6TB-8TB | IronWolf Pro (Makara BP) 4TB-6TB | IronWolf Pro (Grenada BP) 2TB | IronWolf Pro (Nemo) 4TB | IronWolf (Mobula) 12TB-14TB | IronWolf (Makara Plus) 6TB-8TB | IronWolf (Grenada BP2) 1TB-4TB | IronWolf (Pharoah Oasis) 1TB | IronWolf 110 SSD 240GB-3.84TB |

| FireCuda (Grenada BP2) 2TB-4TB | FireCuda (Rosewood) 500GB-2TB | FireCuda 510 SSD 1TB-2TB | SkyHawk AI (Mobula) 12TB-14TB | SkyHawk AI (Tatsu) 8TB-10TB | SkyHawk (Mobula) 12TB-14TB | SkyHawk (Mobula) 8TB-10TB | SkyHawk (Makara Plus) 8TB | SkyHawk (Makara BP) 6TB | SkyHawk (Grenada BP) 1TB-4TB | SkyHawk (Pharoah Oasis) 1TB | SkyHawk (Rosewood) 1TB-2TB |

THE DATASPHERE FLEET:

| Exos X14 (Mobula) 12TB-14TB | Exos 7E8 (Makara Plus) 6TB-8TB | Exos 7E2 (Nemo) 1TB-2TB | Exos 5E8 (V11) 8TB | Exos 7E2000 (Avenger) 1TB-2TB | Exos 10E2400 (Skybolt) 600GB-2.4TB | Exos 15E900 (Kestrel) 300GB-900GB |

| Nytro 3000 SAS SSDs (Jofa) 400GB-15TB | Nytro 1200.2 SAS SSDs (Koho) 400GB-3.8TB | Nytro 1000 SATA SSDs (Haden) 3.8TB | Nytro XF1230 SATA SSDs (Fargo) 240GB-1.9TB | Nytro 5000 NVMe SSDs (Jaguar) 800GB-1.9TB | Nytro 5000 NVME SSD (Jaguar M.2) 400GB-1.9TB |

Systems

Exos X 2U12
Exos E 2U12

Exos X 2U24
Exos E 2U24
Nytro X 2U24
Nytro E 2U24

Exos X 5U84
Exos E 5U84

Exos E 4U106

Lyve Drive Mobile Systems

Lyve Drive Mobile Array

Lyve Drive Thunderbolt 3 Connector

Lyve Drive Modular Array

Lyve Drive Array Shipper

Lyve Drive Cartridge Shipper

Lyve Drive Rackmount Receiver

Lyve Drive Mobile Array

Lyve Drive Cartridge Mount

Lyve Drive Card Reader

Lyve Drive Cartridge

Lyve Drive Cards

No matter the challenge, we will
partner with you to find the solution.