
BUILDING COST-EFFECTIVE
DATA DENSITY IN THE
PRE-DNA-STORAGE ERA
Quantum

Abstract

Building cost-effective data density in the pre-DNA-storage Era

The previous session discussed DNA as a storage medium. Its appeal is extreme density, very low cost, and ease of replication.

- While we are waiting for the commercialization of DNA storage, what is the best option today for durable, exabyte scale storage?
- What storage technology is dominant for these use cases?
- What trends are we seeing today related to use cases, and advances in high-capacity storage such as density, low cost, performance, durability and integration with high performance storage?

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Quantum: Storage for Demanding Workflows

Who Quantum Is

A leading expert in highly scalable storage and data protection focused on the most demanding workflow challenges

What We Do

Enable customers to capture, share and preserve digital assets over their entire lifecycle, creating new opportunities to maximize data's business value

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Scale-Out Storage Portfolio

StorNext
Advanced Data Management

WORKFLOW STORAGE | **FLASH & HYBRID FLASH STORAGE** | **OBJECT STORAGE** | **CLOUD STORAGE** | **TAPE STORAGE**

CUSTOMER CHALLENGES

Customers' business needs increasingly centered on capturing, sharing, protecting, and maximizing value of their data

QUANTUM SOLUTIONS

Quantum offers unique and compelling combination of high performance, low cost, and shared access across multiple storage tiers

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StorNext's Rich Media: Unstructured Data Growth Markets

MEDIA & ENTERTAINMENT	SURVEILLANCE & SECURITY	TECHNICAL WORKFLOW	UNSTRUCTURED DATA ARCHIVE
POST PRODUCTION	LAW ENFORCEMENT	SATELLITE & TELESCOPE IMAGERY	MANUFACTURING
ANIMATION	CRITICAL INFRASTRUCTURE	ENERGY RESEARCH	AUTOMOTIVE
SPORTS VIDEO	RETAIL	ARTIFICIAL INTELLIGENCE	LIFE SCIENCES
CORP VIDEO	HIGHER EDUCATION	UNIVERSITY RESEARCH	ECAD
AD AGENCIES			

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Some Industry Observations Related to Data Growth

Industry	Data Growth Drivers	Scale
Media and Entertainment	• Production: 8K, 16k, 3D, Immersive… • Mostly ground based. • More AI for search, repurpose, monetization, compliance.	Petabyte workflows. Exabyte Archives.
IoT, Smart Cities	• More deployments, higher res, longer retention. • Mixed cloud based (IoT), ground based (security). • Lots of data feeds; developing use cases and business models.	Exabyte accumulation.
Autonomous Vehicle Development	• More cameras & sensors, higher resolution, more players. • Mostly ground based. • Drive for increased AI precision, accuracy.	Petabyte workflows. Exabyte archives.
Life Sciences	• Genomics workflow cost reductions fueling more deployments. Higher resolution, more powerful microscopy. • Mostly ground based (clinics, capture); cloud for standard datasets and common analysis tasks.	Terabyte to PB workflows. Petabyte to Exabyte archives.

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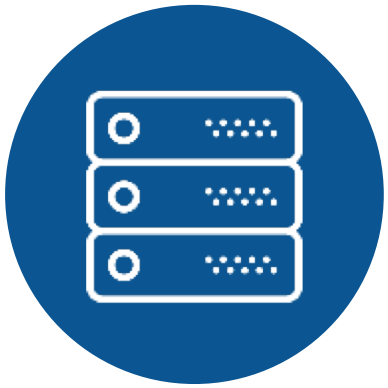
CLOUD IS BOOMING
from nascent data growth use cases, and from traditional use cases where resources and workflows can be cloud resident.



EXABYTE ARCHIVE
focus is heavily weighted to Archive use cases, some in Cloud and some On-premise.

HYBRID WORKFLOWS
are typically challenged by ground-to-cloud bandwidth/cost for petabyte scale workflows.

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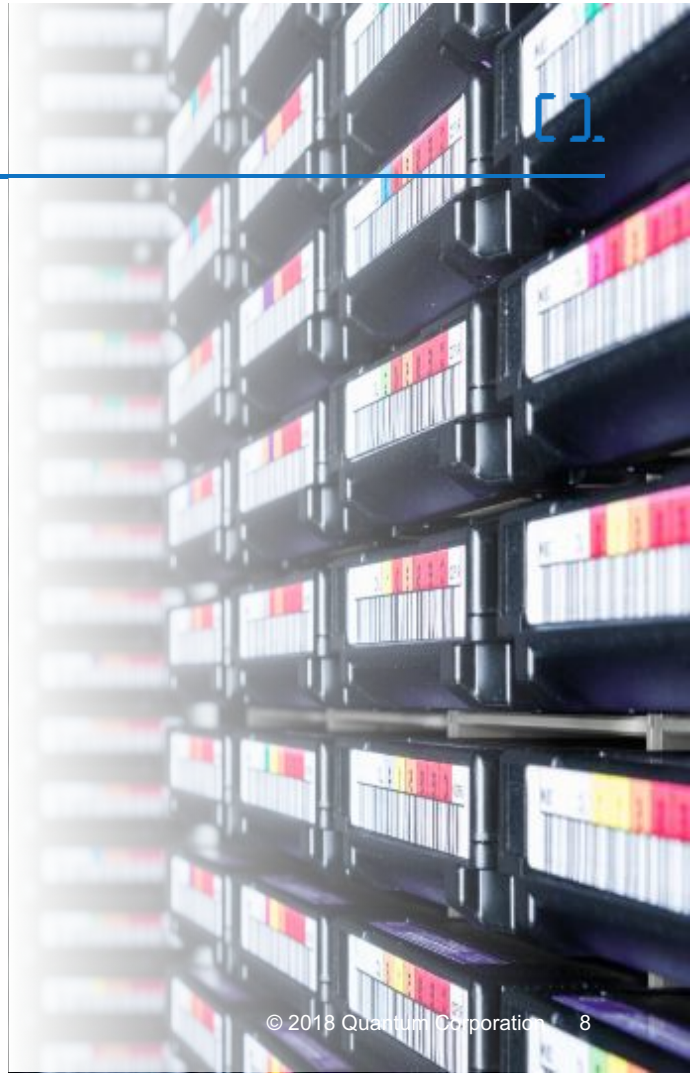
Ergo…

PETABYTE AND EXABYTE SCALE STORAGE IS NEEDED FOR BOTH CLOUD AND ENTERPRISE ENVIRONMENTS.

Most environments have common requirement…	And some differ…
Low Cost	High resource pool to design and manage infrastructure
Protection	Low resource pool
Reliability	
Longevity	
Access	



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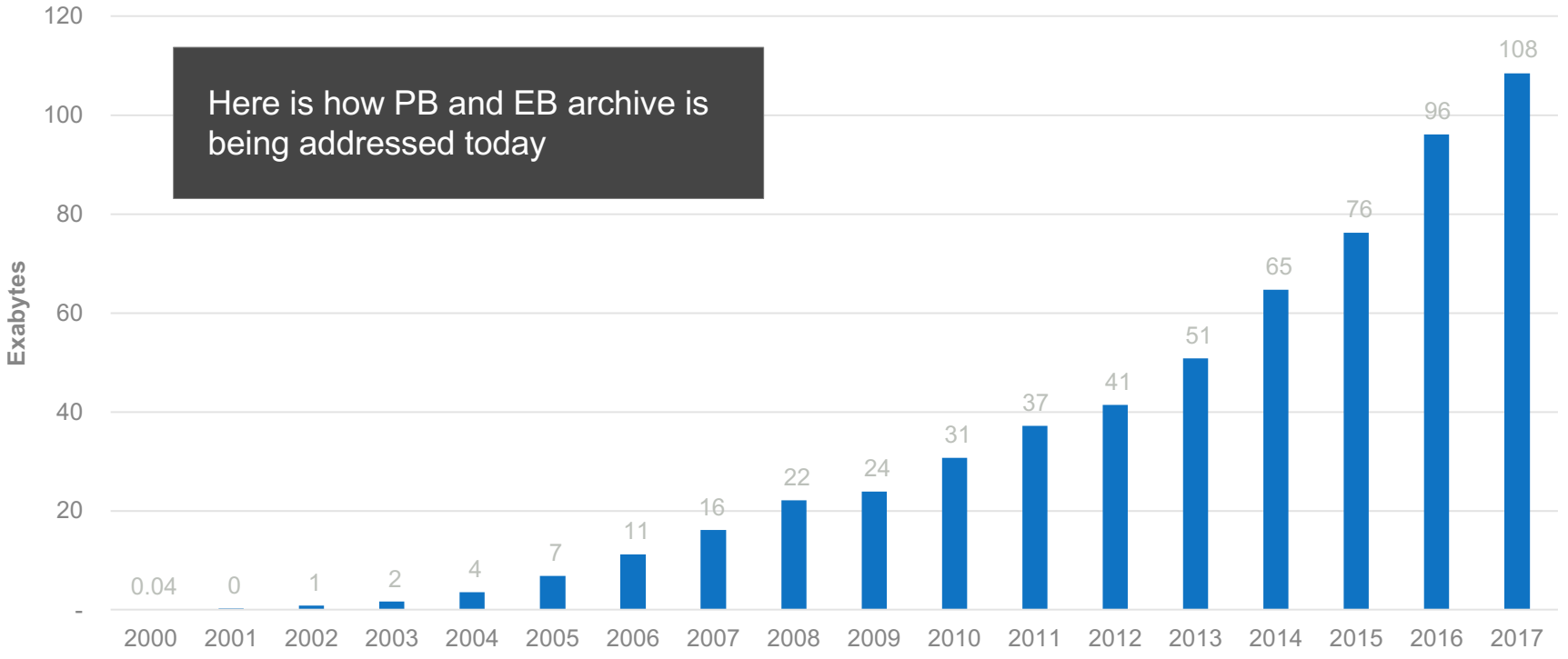
LTO Tape Capacity Shipments



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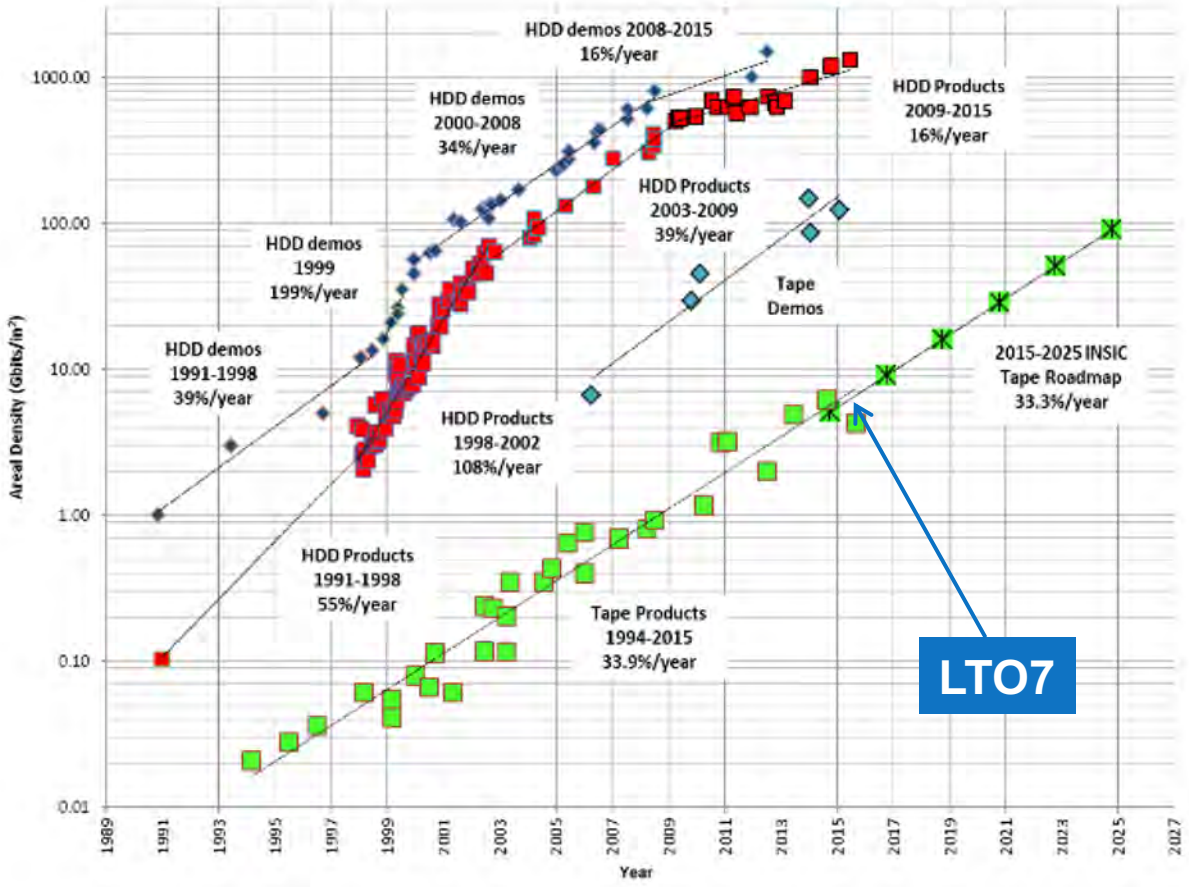
THE NATURE AND STATE OF TAPE YIELDS SUBSTANTIAL OPPORTUNITY FOR FURTHER ROAD MAP DEVELOPMENT.

- Bit aspect ratio
- Track density
- Linear density
- Particle size
- Scatter heads
- Substrates
- And more



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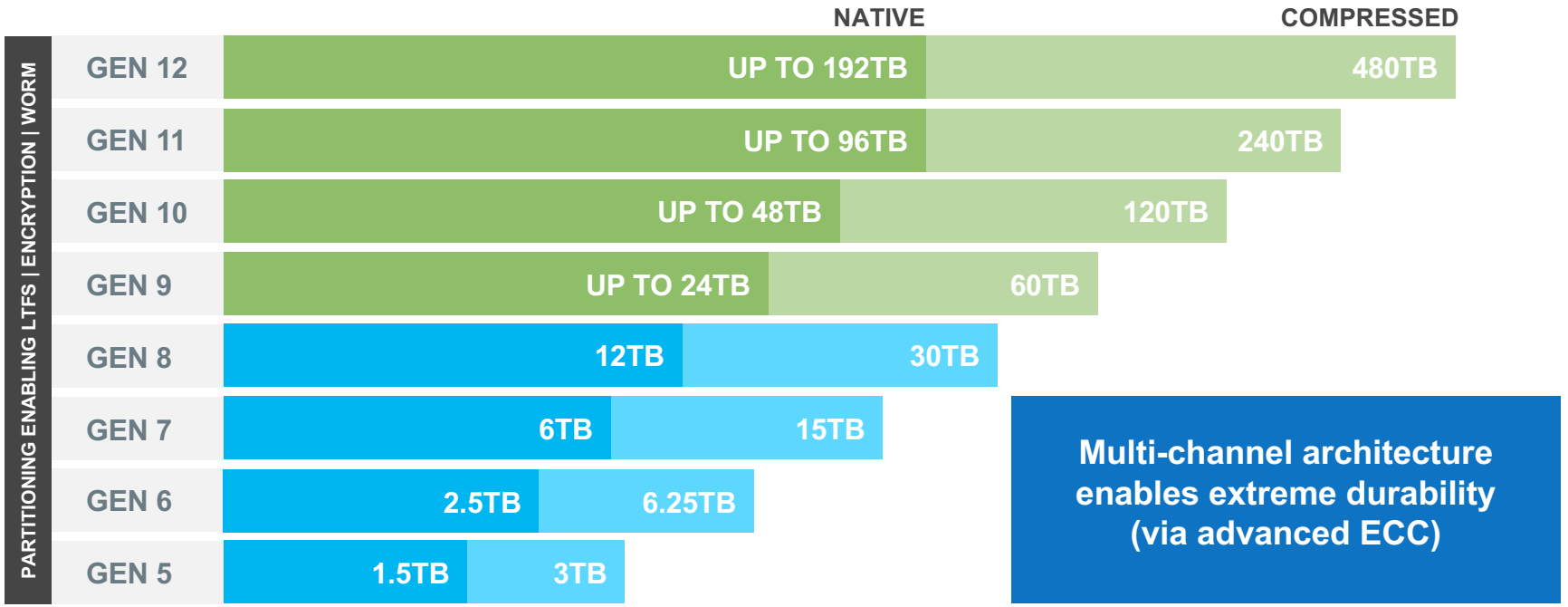
LTO Ultrium Roadmap



NOTE: Compressed capacity for generation 5 assumes 2:1 compression. Compressed capacities for generations 6-12 assume 2.5:1 compression (archived with larger compression history buffer)

SOURCE: The LTO Program. The LTO Ultrium roadmap is subject to change without notice and represents goals and objectives only. Linear Tape-Open, LTO, the LTO logo, Ultrium, and the Ultrium logo are registered trademarks of Hewlett Packard Enterprise, IBM and Quantum in the US and other countries.

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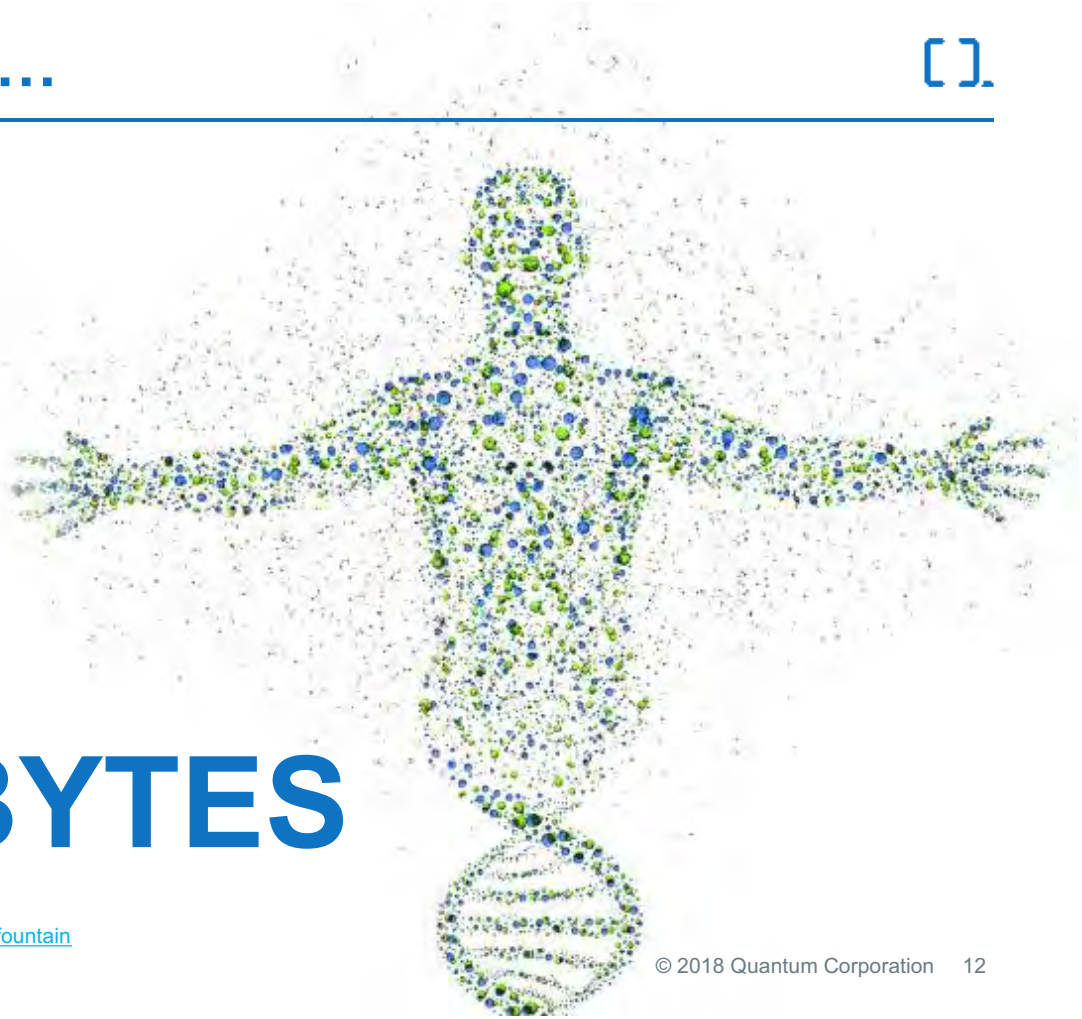
While we are waiting for…



The DNA in **one**
human body stores…

150 ZETTABYTES

Source: https://twistbioscience.com/company/blog/twistbiosiencednastoragefountain

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An Example of Today's Tape Solutions

NOT YOUR GRANDFATHER'S TAPE

- High density
- Intelligent UI
- Open standards
- Encryption
- WORM
- Hands-off operation
- Automated data integrity assurance
- Integrated Offline Vault
- Web services API
- Capacity on Demand

Quantum i6000 Library		Soon…
Over 12,000 Cartridges	144 PB Native	1.4 EB (LTO-10)
12TB/Cartridge (LTO-8)	360 PB Compressed	

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What is Best Storage in Pre-DNA Era?

TAPE

- Active Archive
- Cold Archive
- Air Gap Protection
- Easy Replication
- Self describing packages
- Extremely durable
- Lowest cost

Integrated as a tier for active workflows

Achievable with many HSM solutions

Including Quantum StorNext

Now easily mounted via NAS or S3

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