LOKAD
Quantitative Supply Chain

TERABYTE BLOCKS
FOR BITCOIN CASH

| JOANNES VERMOREL - CEO OF LOKAD |

WHY ONE TERABYTE?

50 TRANSACTIONS PER DAY

PER HUMAN X 10 BILLION HUMANS

NO LAYER 2 INVOLVED!

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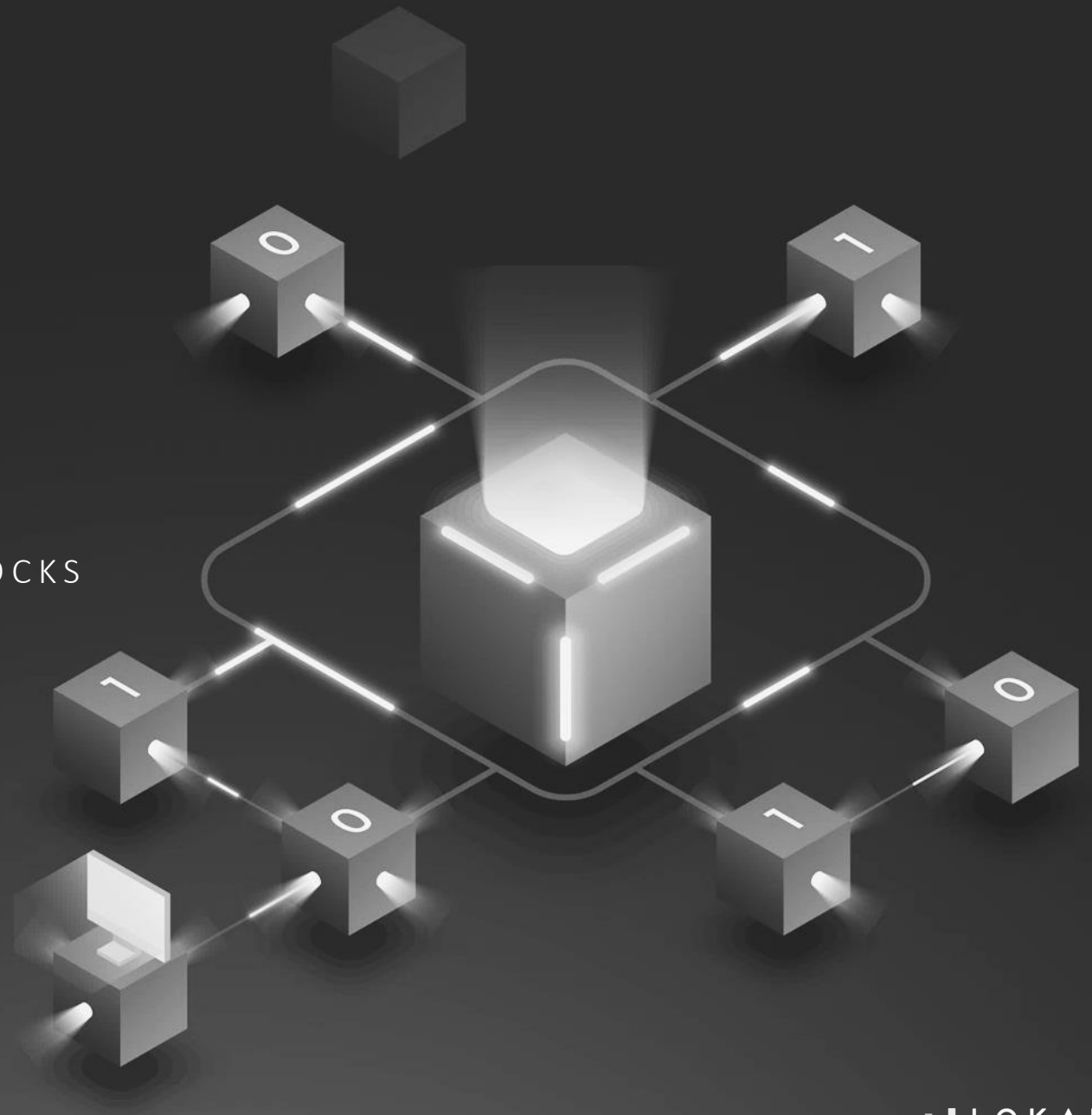
THE TERABYTE BLOCK MINING RIG

DECEMBER 17TH, 2017

HTTP://BLOG.VERMOREL.COM/TERABLOCKS



$25.6M TOTAL OVER 20 YEARS

[A HASTY ESTIMATE!]

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BANDWIDTH COST FOR 50 GBPS

DEC 2017

$6M OVER 20 YEARS
"RETAIL" PRICE

MAR 2018

$200K OVER 20 YEARS
"PACIFIC LIGHT CABLE NETWORK" PRICE
(Facebook invests $400M for 120Tbps)

25,650,000 - 6,000,000 + 200,000 = $19,800,000

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THE FUTURE OF BANDWIDTH

255 TBPS SINGLE STRAND 1 KM FIBER LINK

ULTRA-HIGH-DENSITY SPATIAL DIVISION MULTIPLEXING WITH A FEW-MODE MULTICORE FIBRE

Nature Photonics Volume 8,
Pages 865–870 (2014)

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CPU COST FOR 7M TRANSACTIONS / SEC

DEC 2017

- 2ms PER TRANSACTION (OLD CODE)
- 512 INTEL XEON PHI
- $2,900,000 (HARDWARE+ENERGY)

MAR 2018

- 100µs PER TRANSACTION (CURRENT CODE)
- 25 INTEL XEON PHI
- $150,000 (HARDWARE+ENERGY)

19,800,000 - 2,900,000 + 150,000 = $17,050,000

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THE FUTURE OF CPU

FAST HARDWARE IMPLEMENTATION OF ECDSA SIGNATURE SCHEME

INTERNATIONAL SYMPOSIUM ON SIGNAL, IMAGE, VIDEO AND COMMUNICATIONS (ISIVC), 2016

ASIC (40nm)
0.257mm2 of area cell
64mW
1.5µs per signature

A single card connected through PCIe 5.0 (like a GPU) validates +7 million transaction per second.

NO MOORE'S LAW INVOLVED!

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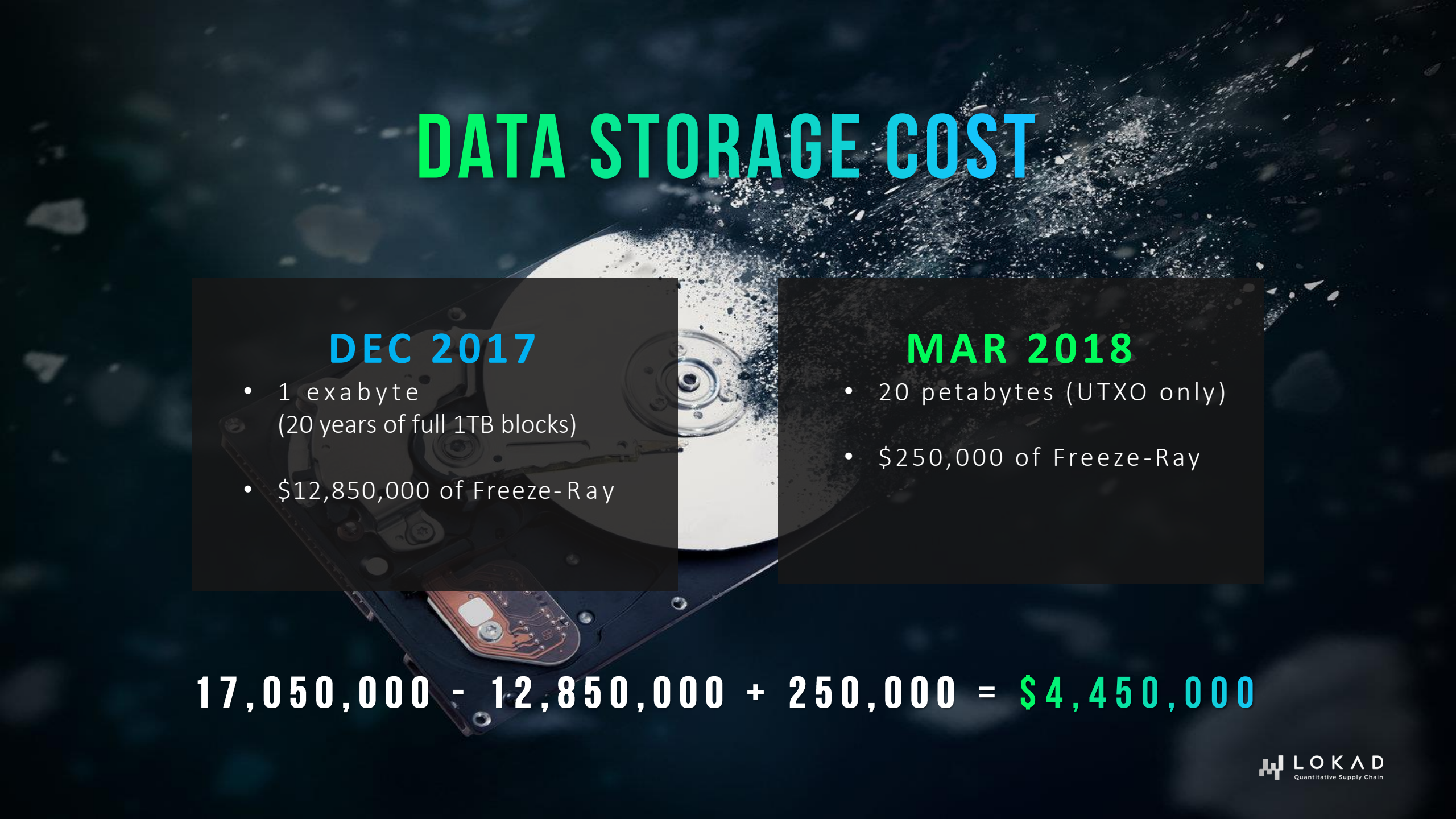
DATA STORAGE COST



DEC 2017

- 1 exabyte
  (20 years of full 1TB blocks)
- $12,850,000 of Freeze-Ray

MAR 2018

- 20 petabytes (UTXO only)
- $250,000 of Freeze-Ray

17,050,000 - 12,850,000 + 250,000 = $4,450,000

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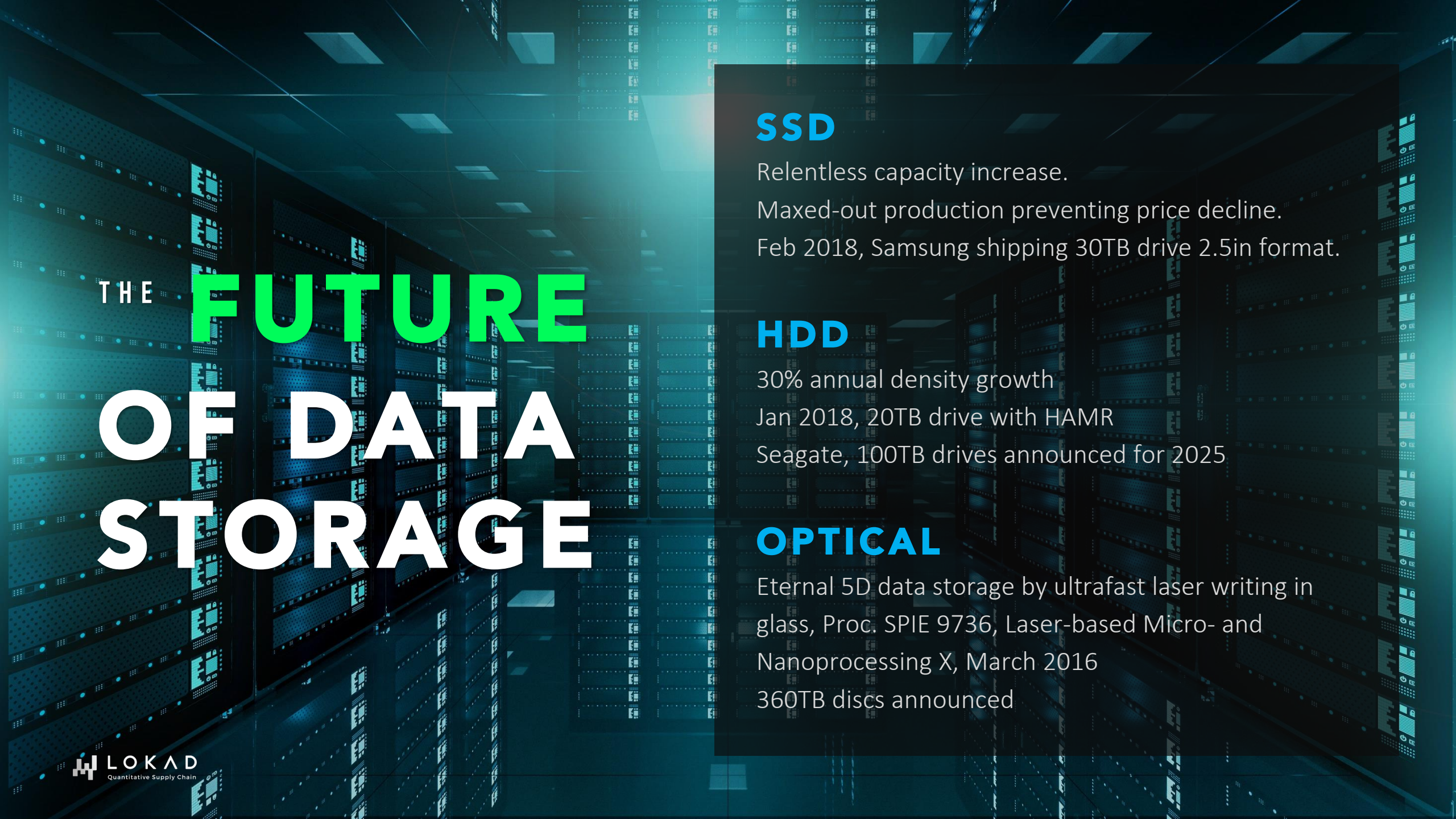

THE FUTURE OF DATA STORAGE

SSD

Relentless capacity increase.

Maxed-out production preventing price decline.

Feb 2018, Samsung shipping 30TB drive 2.5in format.

HDD

30% annual density growth

Jan 2018, 20TB drive with HAMR

Seagate, 100TB drives announced for 2025

OPTICAL

Eternal 5D data storage by ultrafast laser writing in glass, Proc. SPIE 9736, Laser-based Micro- and Nanoprocessing X, March 2016

360TB discs announced

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UTXO MANAGEMENT COST

DEC 2017

- 256 nodes
  (total 32TB of RAM)
- $3,900,000
  (hardware + energy)

MAR 2018

- 32 nodes (total 4TB of RAM)
- RAM used to lower storage IOPS
- $500,000 (hardware + energy)

4,450,000 - 3,900,000 + 500,000 = $1,050,000

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20 YEARS FROM NOW

MARCH 2018

- Better software only
- $52,000 per year
  ($1,050,000 over 20 years)

- 30% price decrease per year
- 1300x improvement over 20 years

MARCH 2038

- Hardware 10x improvement
- $5,200 per year
  ($105,000 over 20 years)

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THANK YOU

HTTPS://TERAB.LOKAD.COM/

PS: WE ARE HIRING!

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