

# #VNANDgoesFurther

## V-NAND Reshapes Storage for the Crowded "Digital Universe"

The digital universe is growing 40% annually



**6 BILLION**  
HOURS OF YOUTUBE  
PER MONTH<sup>1</sup>



**35.6 MILLION**  
TWEETS DURING  
#BRAVSGER<sup>2</sup>

2020

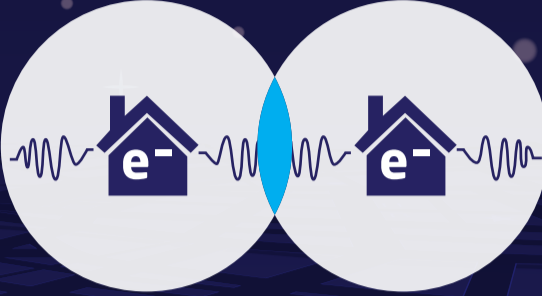
**44**  
ZETTABYTES  
OF DATA<sup>3</sup>

**2016**  
1 ZETTABYTE  
OF NETWORK  
TRAFFIC<sup>4</sup>

NOT-SO-  
INCREDIBLE  
SHRINKING  
FLASH

Once quiet, the flat NAND suburbs are becoming crowded

**30nm**  
ROOMY, QUIET,  
STABLE



UNDER 20nm

**10nm**  
CRAMPED,  
NOISY,  
WEARING OUT

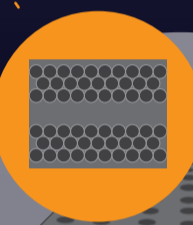
## RESHAPING MEMORY IN A NEW, UPWARD DIRECTION



2D PLANAR  
NAND FLASH



3D VERTICAL NAND  
FLASH, OR V-NAND



2.5 BILLION HOLES -  
ON A FINGERTIP

## BEYOND PLANAR FLASH LIMITS A MORE EFFICIENT MEMORY METROPOLIS



**ENDURANCE**

Up to 2x improvement<sup>5</sup>



**PERFORMANCE**

Faster writes,  
half as many steps<sup>5</sup>



**POWER**

Lower programming  
voltage



**VOLUME**

65.2% of flash  
shipments in 2017<sup>6</sup>

**CAPACITY**

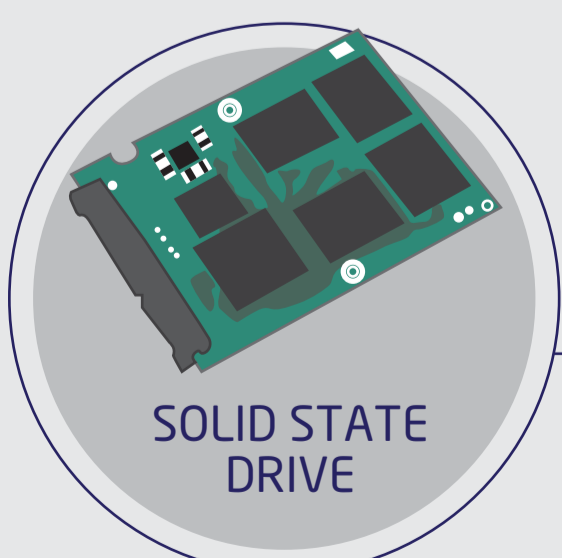
Up to 1Tb CHIP by 2017



## SSDs WITH V-NAND

Keep up with growing high-value data  
Perform well on both reads and writes  
Deliver better quality-of-service (QoS)  
Extend lifespan with more endurance  
Continue evolving for even greater value

[www.samsung.com/enterprisessd](http://www.samsung.com/enterprisessd)



SOLID STATE  
DRIVE

1. YouTube Statistics, Google, <http://www.youtube.com/yt/press/statistics.html>  
2. Tweet from @TwitterData (official statistics of Twitter), July 8, 2014  
3. EMC Digital Universe Study, IDC, <http://www.emc.com/leadership/digital-universe/index.htm>

4. "Cisco Visual Networking Index: Forecast and Methodology, 2013-2018", June 2014  
5. Samsung performance comparison against planar NAND-based SSDs  
6. "NAND Flash Moves Into the Next Dimension", IHS Technology, October 2013