



Flash Memory Summit

Creating SSD Designs That Can Readily Be Migrated Between Form Factors

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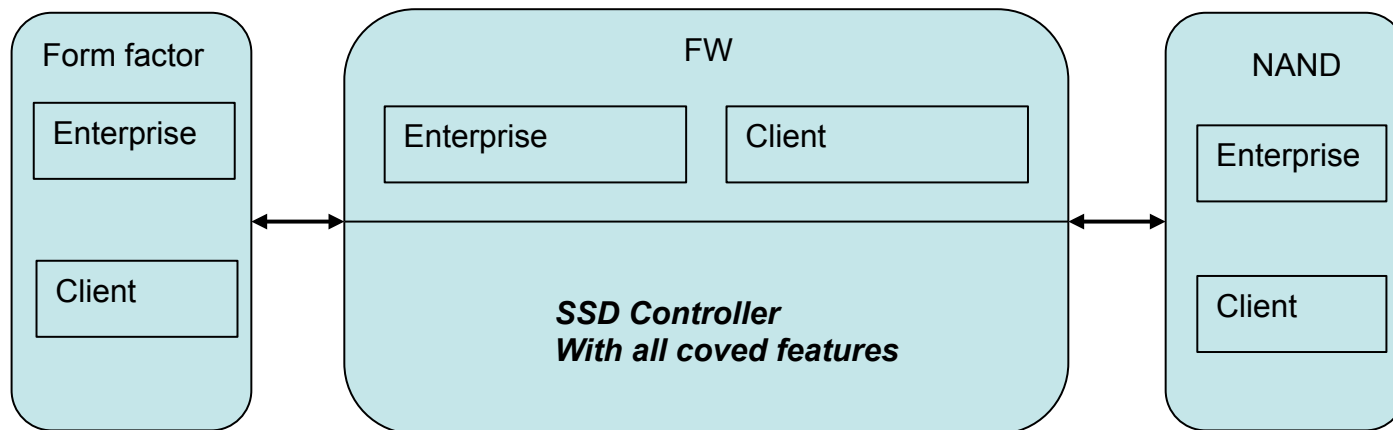
Flash Memory Summit 2017
Santa Clara, CA



Enterprise VS Client SSD

	Enterprise	Client
Performance	Random sensitive	Sequential sensitive
Lifetime	1-5(DWPD)	500 TWD
Capacity	0.6T-8T	64GB-1T
Endurance(UBER)	10*E-16	10*E-15
Power consumption(controller)	5-10W	< 5mW < 2.5W

One Controller Cover Both?





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Performance

- Enterprise SSD now use U.2 and M.2 form factors
 - GEN3*8(AIC) → GEN3*4(U.2 or M.2)
 - IOPS
 - Consistency & latency
- Client SSD now has higher performance
 - SATA → GEN3*4



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Lifetime

- NAND
 - Enterprise use 3D eTLC (6000-10000 PE)
 - Client use 3D cTLC (1000-3000 PE)
 - OP
- ECC engine inside SOC
 - LDPC
 - RAID



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Capacity

- NAND Controllers(include ECC engines)
 - 8 NAND Channels, each support 0 - 32 dies
 - 256Gb/die, capacity is 0 - 8TB

- CPU MMU
 - Support up to 8GB address access



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Endurance

- NAND ECC engine
 - LDPC cover both client and enterprise demands
- RAID
 - Enterprise use die RAID
 - 3D TLC, Client SSD need RAID too
- Memory ECC
 - Enterprise need full path memory ECC
 - Not big deal for Controller to support



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Power Consumption

- **NAND**
 - Power rise when multi dies in programming
- **Controller**
 - Low power design is must for client
- **Thermal throating**
 - U.2 is better than M.2 for thermal control
 - Both Enterprise and client need thermal throating

One Controller Cover Both?

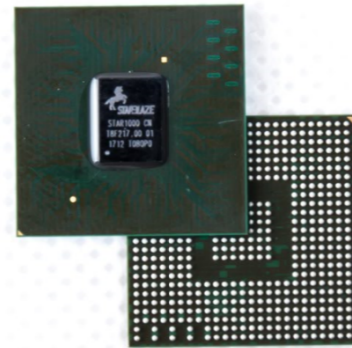




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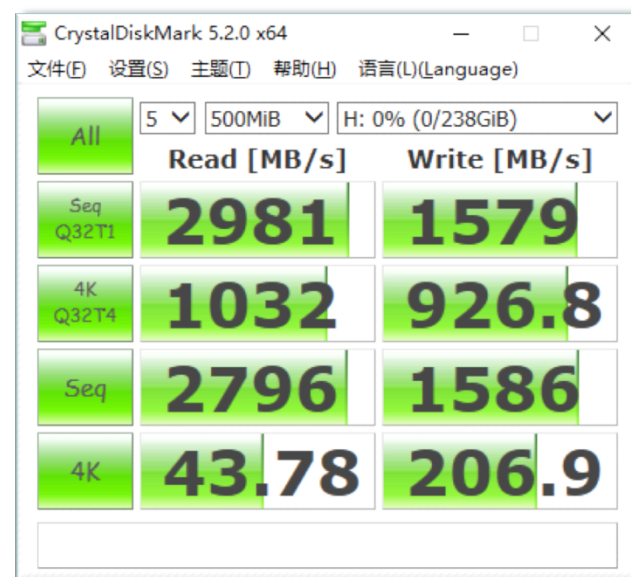
STAR1000 FROM STARBLAZE

- PCIe GEN3*4
- 8CH NAND controller, up to 16luns per CH
- LDPC/ RAID5,6
 - 120-130 bits/2KB; 250-260 bits/2KB(CR=0.89)
- FULL data path memory ECC
- Low power design(28nm ASIC)
- SMP dual CPU architecture, up to 16GB address access
- TCG support





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Q & A

- Starblaze Booth: #647

Invitation	Thursday, August 8 ^h , 3:40-6:00pm Forum C-21: Enterprise SSDs (SSDs Track)
Topic	How Suspending Duplicate Flash Requests Benefits Enterprise Apps Performance
Presenter	Debin Wu, Senior Staff Engineer