# ALL-FLASH STORAGE - SEPARATING FACT FROM FICTION

*An independent study of the expected enterprise adoption of all-flash storage arrays by UK businesses during 2013 and beyond.*

## ABOUT THIS SURVEY

This survey of IT managers at 100 large enterprises across the UK paints a picture of the myths about enterprise-class all-flash arrays, many of which persist despite evidence to the contrary.

It also shows where the market is educated about the promise of all-flash arrays and where it is misinformed.

Most of all, it shows that users are no longer completely naive and are more likely to have a well evaluated look before taking a risk with new technology.

*Research undertaken by Vanson Bourne and commissioned by X-IO.*

## What is All Flash Storage?

The IT industry has for some time admitted the existence of "The Storage Gap" which is the performance differential between CPU speed and storage speed. Due to Moore's law, the consolidation delivery of sever hypervisors combined with the requirement for access to more data, faster, the storage industry has been delivering technology solutions at a slower pace than business need.

For a long time, everyone has considered that a new technology is required, one that can deliver low latency, high I/O performance. With the falling cost of NAND flash media, a new category of enterprise storage has burst on to the market, "All-flash Arrays" (often referred to as "AFAs"). These storage arrays have been built using either purpose-built flash modules or solid state disk (SSD) and are designed and manufactured to address this market gap.

This in turn brings around a change in pricing analysis for storage buyers. Whereas Enterprise Storage was historically usually measured purely by £/GB, the advent of flash media has meant that increasingly, customers have been looking to £/IOP as a measure of cost. However it is crucial that these two measurements are not considered mutually exclusive.
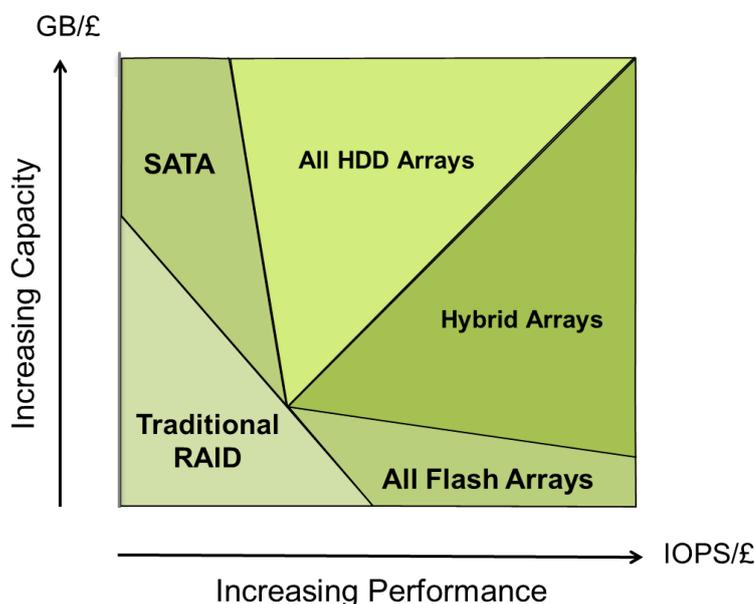
Throughout 2012 and the first quarter of 2013, the IT marketplace has seen a plethora of storage arrays appear on the market which solely use flash media in order to solve data management challenges. Whilst undoubtedly they have their place, many vendors are trying to convince customers and resellers alike that hard disks are outdated technology and that flash alone is the most appropriate media for all use cases.

This study questions that assertion and asks a sample of IT managers for their views on all flash arrays, particularly when compared to adopting a balanced hybrid approach of deploying both hard disk drive and flash media.

## Executive Overview

Gaining and maintaining a competitive advantage in business today is often linked to an organisation's ability to take advantage of the very latest innovations in technology. However, when it comes to adopting new technologies, caution usually prevails for UK enterprises. This is not just because innovation typically comes with a large price tag.

Until it has proven itself in the real world, premature use of new and unproven technology carries a degree of risk for any organisation.

Despite the caution, users are not immune to the excitement and hype that builds around the latest must-have technology. Over the past few years innovations in enterprise storage – thin provisioning, automated tiered storage and de-duplication to name a few – have been marketed to multi-billion dollar success. What these innovations share in common is their inherent ability to drive traditional costs out of storage through vastly superior efficiency. In this respect, they have bucked the high price tag usually associated with innovation by delivering significant, demonstrable and tangible long term cost savings.

The current enterprise storage technology being hyped this way is flash, particularly all-flash arrays. While no one is arguing flash isn't super-fast, it's either expensive or risky (sometimes both) and aside from extensively boosted performance under certain workloads it can be difficult to see demonstrable or tangible cost savings.

All-flash array vendors have become acutely aware that their supreme speed is inextricably linked to perceptions of enormous cost, so they're spending millions of marketing dollars to convince the market to think otherwise.

The goal is to convince users that once everything is optimised, streamlined and cheapened to the nth degree, an all-flash array will eventually cost much the same, TB for TB, as a traditional hard disk drive-based array. While that argument deals neatly with the CAPEX concerns for all-flash in some use cases, power consumption and cooling costs are two other key areas where the all-flash OPEX argument is aggressively gaining a foothold. Playing on the fact flash storage has no moving parts, many assume it must naturally use less energy to run, and run cooler than a spinning disk. Subsequently, the logic goes, it must cost less to power and keep cool. Based on these messages the all-flash market is currently promoting the following claims:

1. HDD-based arrays are history – the future is all-flash
2. All-flash is faster than hybrid storage
3. All-flash always runs cooler and requires less power than hybrid storage
4. All-flash is more reliable than hybrid storage
5. All-flash costs the same as hybrid storage
6. Using consumer-grade flash is acceptable for most enterprises
7. Most businesses need the performance benefit all-flash offers

However, it is important to determine whether these claims are reality or just myths. At first glance these arguments appear compelling. The marketing dollars seem to be working and, if what is said is true, all-flash arrays sound like a straightforward decision for nearly every business. With hundreds of millions of VC marketing dollars pumped into all-flash start-ups and several early acquisitions making headlines, the wind is certainly in the sails of the all-flash array vendors. Never has so much been spent by so few to drive the hype-cycle as loud and as high as it will go and, along with it, eye-poppingly high company valuations.

But behind the hype, it has become apparent that the claims being made by all-flash storage array vendors are not entirely accurate. Real-life users have found all-flash arrays are not necessarily faster, cheaper or better than existing hybrid based arrays. In fact, some HDD-only arrays can give all-flash arrays a run for their money in certain real-life configurations.

As the pressure is mounting on some emerging vendors to grab users, any users, to demonstrate market penetration and traction, some all-flash vendors are resorting to 30-day, no questions asked, money-back guarantees. Only time will tell whether such moves are strategic or desperate, but some users will exploit this brief moment in time to their advantage and negotiate loss-leading deals for the vendors.

In time, storage architects and buyers will realise flash is a tool rather than a solution. But in the meantime, it won't stop some users getting their fingers burnt in the ultra-aggressive world of storage sales, a place where people push hard to close deals that often fail to offer the best solution for a customer's needs.

# Part 1: Key findings: the seven deadly myths

Despite the current hype and buzz around all-flash storage arrays, the survey demonstrated UK enterprises are in no rush to spend their dwindling budgets on all-flash storage.

## Cost:

As might be expected, the high cost associated with all-flash arrays was cited by three-quarters (75%) of those surveyed as the single biggest barrier to deployment, should they consider it in the first place.

## Risk

Over half (56%) had concerns about all-flash arrays being new and unproven, but a far bigger concern was around the risks of consumer-grade flash being used in their business. Using consumer-grade flash in enterprise arrays has become one method for getting list prices into the same ball-park as enterprise HDD and hybrid arrays. This approach is too high a risk for most organisations, regardless of the use of clever software to apparently protect and cushion this approach. Nearly all of those surveyed (99%) said they would not permit an all-flash array using consumer-grade flash in their organisation.

## Need

Aside from the cost and risks of deploying all-flash storage, the vast majority (90%) believed their organisation did not need the levels of performance promised by all-flash array vendors to justify the investment. In fact, the survey found that the average most-intensive application peak was 54,000 IOPS, with just 10 percent of businesses peaking above 100,000 IOPS.

Almost three-quarters (73%) said they would still select a traditional hard disk drive (HDD) with SSD cache or hybrid (flash and HDD) storage solutions over a flash-only array. In fact, just 15 percent of those surveyed believed an all-flash array was ideal for their business needs today, suggesting hybrid and HDD with cache arrays were almost five times more popular than all-flash.

One might conclude from this summary that the widespread adoption of all-flash storage in the enterprise, especially consumer-grade all-flash arrays, appears highly unlikely anytime soon. But it's not quite as straight forward as that.

In fact, despite broad misgivings about cost, risk and general lack of need for all-flash arrays, the market still has a positive view on the subject. There is high confidence in knowledge about all-flash too, with almost three-quarters (74%) believing they are pretty clear on the benefits offered.

However, confidence in knowledge is one thing, knowledge itself is another. When questioned on the myths being generated by the all-flash vendor community, it became clear that some of the marketing messages resonated more readily than others. The result of the constant stream of all-flash messaging is that several of the seven main myths are potentially on the way to becoming believed as fact, despite practical evidence and common-sense arguments to the contrary.

For each of the seven deadly myths, data from the survey provides us with a reality-check to actual views and gives a guideline to whether the market is getting it right or if it has fallen for the marketing hype.

## Myth #1: HDD-based arrays are history – the future is all-flash

With all-flash arrays becoming the hot topic du jour, it's easy to presume users are clamouring to buy into the new technology. Not true, according to the survey, which found hybrid and HDD with cache arrays almost five times (73% vs 15%) more ideal than all-flash arrays and the most ideal storage for their business. Even on its own, hybrid storage (notably with the crucial addition of real-time tiering) was the single most popular option (44%), three times more preferable than all-flash (15%).

### Which of the following is the most ideal storage solution for your business?
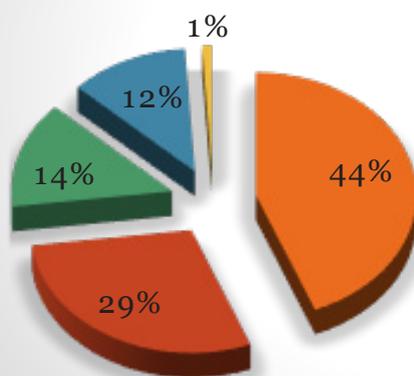


- 44% — Mix of hard disk & enterprise grade flash with real-time tiering of data
- 29% — All hard disk based, with SSD cache
- 14% — All flash based, enterprise grade
- 12% — All hard disk based
- 1% — All flash based, consumer grade

**Level of belief:** Low
**Reality:** Myth – Users clearly favour a "right tool for the job" approach

## Myth #2: All-flash is faster than hybrid storage

The survey found that the faster speed of all-flash over hybrid arrays was believed to be the main difference (76%) between the two technologies. However, while there are many factors to consider when looking at the performance capabilities of a particular storage system, all-flash arrays and hybrid systems are often equal in performance.

Flash can undoubtedly assist with lowering latency for random reads, but under some workloads, particularly sequential writes, flash can often be the same or even slower than well designed hard disk arrays. When looking at performance analysis, real-world workloads should be tested and measured rather than simple marketing benchmarks which are designed to flatter only that vendor's technology.

In addition, many prospects are rating storage performance by IOPs alone.  A crucial factor to take into account is the total available bandwidth in addition to IOPs as this can greatly affect workloads such as file systems and video streaming.

**Level of belief:** High

**Reality:** Myth – Different media types provide varying benefits

## Myth #3: All-flash always runs cooler and requires less power than hybrid storage

All-flash again beats hybrid when it comes to perceptions about using less power and cooling, the second most cited difference (75%) after speed. But real-life testing by users has found that hybrid arrays use half the power of all-flash arrays in like-for-like evaluations.

The reason for this is simple. Flash modules/SSDs draw less power as raw components than hard disk drives, but enterprise storage arrays are not just raw storage. Processors are needed and, in some designs, cache memory is needed, sometimes in large quantities. All of these additions draw power and the reality is that, on average, all-flash arrays draw double the amount of power and consequently require more cooling than true hybrid arrays.

**Level of belief:** High

**Reality:** Myth – Real life customer tests have proven this

## Myth #4: All-flash is more reliable than hybrid storage

40% of respondents felt all-flash arrays provided a higher degree of reliability than hybrid arrays. While this isn't a majority, it shows a large number of people believe some of the accusations that hard drives are essentially unreliable.

A number of enterprise storage vendors have cut supply chain costs by misrepresenting consumer grade SATA drives which is causing hard disk drives to often be seen as the "weak link" in data centre design when it is actually a case of using the wrong tool for the job.

When design flaws such as poor vibration dampening and inadequate cooling are dealt with and techniques such as self-healing technology are taken into account, failure rates in hard disk drives can drop to as low as 0.1% per annum. When issues with flash media are taken into account, particularly with cell failure on NAND silicon, flash arrays usually have shorter duty cycles than hybrid storage.

**Level of belief:** Medium

**Reality:** Myth – Hybrid arrays can deliver true "zero touch" duty cycles of over 7 years

## Myth #5: All-flash costs the same as hybrid storage

Several all-flash vendors claim they can achieve cost parity with HDD array pricing, but this isn't believed by the market. Less than one in 20 (4%) of those surveyed agreed that all-flash arrays cost the same as HDD-based arrays today. Almost two-thirds (60%) did not expect to see price parity between the two technologies before the middle of 2015.

Furthermore, the high costs associated with all-flash arrays was cited by three-quarters (75%) of those surveyed as the single biggest barrier to deployment, should they consider it in the first place.

Part of the reasoning behind this claim is the use of post de-duplication and compression techniques to lower the amount of raw storage required for data sets. While some workloads (ironically, usually low performance ones) may indeed benefit from such techniques, again it depends on the real-life use case. Some storage buyers may initially fall for this sales technique, but when analysing their own particular need, it's clear the truth is different.
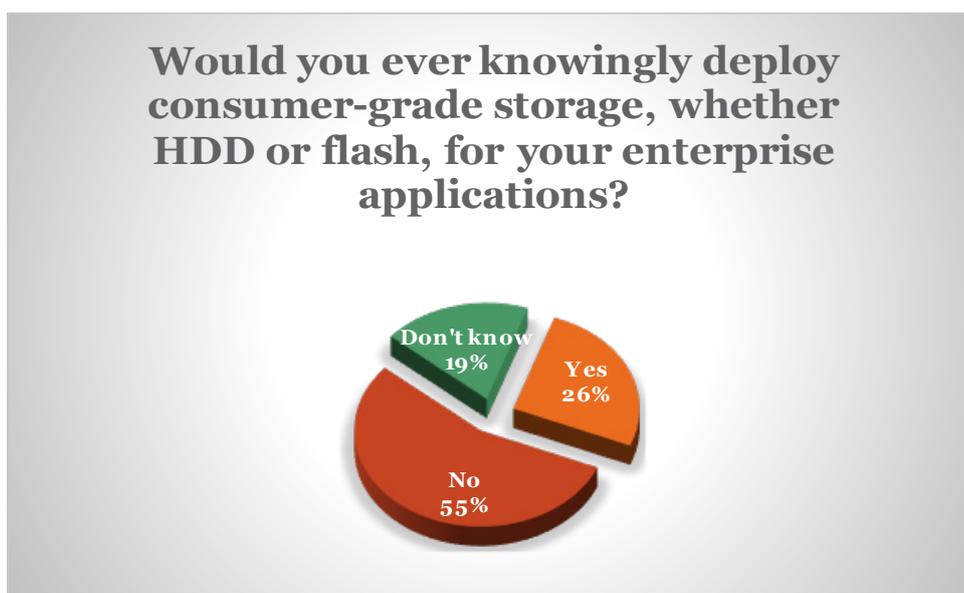
**Level of belief:** Low

**Reality:** Myth – Customers should look at real-life workloads and 5 year TCO

## Myth #6: Using consumer-grade flash is acceptable for most enterprises

According to those surveyed, this choice simply is not an option, whichever way you look at it.

Using consumer-grade flash in enterprise arrays has become one method for getting list prices into the same ball-park as enterprise HDD and hybrid arrays. This approach is too high a risk for most organisations – an overwhelming 99% of those surveyed said they would not permit an all-flash array using consumer-grade flash in their organisation.

Interestingly, while some vendors are being open about the use of consumer grade flash in their products (albeit claiming the use of software in an attempt to offset the risk), they are being deliberately vague in the underlying architectures. The huge risks this presents need to be highlighted more prominently for businesses across the UK.



**Would you ever knowingly deploy consumer-grade storage, whether HDD or flash, for your enterprise applications?**

Don't know 19%
Yes 26%
No 55%

**Level of belief:** Low

**Reality:** Myth – Customers clearly see the risk of such technologies

## Myth #7: Most businesses need the performance benefit all-flash offers

Even aside from the cost and risks of deploying all-flash storage, the vast majority (90%) of those surveyed stated their organisation did not actually need the high performance promised by all-flash array vendors to justify the investment. The survey found that the average most-intensive application peak was 54,000 IOPS, while just 10% of businesses peaked above 100,000 IOPS in the realm where all-flash begins to be a viable option.

**Level of belief:** Low

**Reality:** Myth - For most organisations, all flash arrays are complete overkill for their requirements

## Seven deadly myths: a conclusion of sorts

Deploying any new storage technology into the enterprise is a major endeavour that requires due diligence.

The survey demonstrates that sentiment among the vast majority of large UK organisations does not map to the whipped up frenzy seen in the media. It's clear the adoption of all-flash by UK enterprises will be a gradual affair that will take several years rather than months – and it won't be for everyone.

One of the most significant findings is based around the actual need for vast amounts of storage performance. With average peak performance of the most intensive applications at 54,000 IOPS, one could argue that even if these peaks were to double every year (which itself is highly unlikely), it would take around five years before the average user would definitively need the million IOPS or more being touted as available today from many performance-centric all-flash brands.

To summarise the survey findings in 140 characters or less might not do it justice, but a Tweet could read like this:

*"All-flash arrays: most UK enterprises don't need them; don't want the risk, and few can justify the cost."*

For now, cool heads and cold pragmatism rule the day. If the buzz and hype around all-flash kicks into a higher gear, maybe things will change.

# Part 2: Additional findings

## Lack of trust in all-flash

The newness of any technology innovation is often a hurdle to early adoption. After cost (75%), the next biggest barrier to all-flash deployment was the fact it was new, unproven and vendors were generally unknown (63%). Over a quarter (27%) doubted the validity of claims made by all-flash vendors which was more than the still significant number (24%) who cited complexity as a barrier.

## It's not all about speed

Unsurprisingly, users didn't share the all-flash vendor's tunnel-vision for speed. When buying high-performance storage of any type, the highest requirement was reliability (55%), followed by price (41%). Around one third (36%) cited speed.

## Warranty, longevity mismatch

There was also a mismatch in terms of how the finance department thinks compared to the IT department. On average, finance departments expect an investment in IT equipment to only last, on average slightly more than three and a half years. Close to a third (29%) want to see IT equipment last five years or more.

However, to the IT buyer, long warranties were the very last thing they (5%) were thinking about, after reliability, price, speed, OPEX, availability and support. With many all-flash array vendors unable to confidently offer much more than a 12 month warranty, this mismatch could prove a further hurdle to overcome, assuming the user knows to check this point of detail.

## Financial sector findings

In terms of significant differences across key vertical segments, the survey identified the financial sector as the most likely to select a traditional hard disk drive (HDD) with SSD cache or hybrid (flash and HDD) storage solutions over a flash-only array. In fact, with just 12 percent of financial sector respondents surveyed believing that an all-flash array is ideal for their business needs today, hybrid and HDD with cache arrays appear to be seven times (84% vs 12%)) more popular than all-flash.

The financial sector was also more than twice as likely (28% vs 60%) to cite reliability ahead of speed as the key thing they look for when buying high-performance. These figures suggest the financial sector seems even less enthused about all-flash than the industry average.

# Survey format and methodology

The following survey data was collected via an online survey completed by a nationally representative sample of 100 IT Managers from key industry sectors such as financial services, manufacturing, retail, distribution and transport and the commercial sector from across the United Kingdom. These companies employed either 1,000-3,000 staff, or more than 3,000 employees.

The survey was prepared and conducted by independent research firm Vanson Bourne in February 2013. The identity of the 100 respondents are confidential, in accordance with the Vanson Bourne Code of Conduct. The X-IO brand was not revealed during the interview to ensure the data remained unbiased.