



Inside Track
Research Note



NVMe - The State of Play

Is the new protocol ready to take the storage
world by storm?

in association with

Western Digital®

Introduction

After decades when little has fundamentally changed, the last five years have seen a veritable storm of storage systems innovation, with All-Flash Arrays, SSDs and even Non-Volatile Memory (NVM) all gaining much attention. However, without architectural changes to the protocols that connect storage to servers, the overall benefits, while significant, were not as great as the hardware could deliver.

Enter NVMe, a lightweight but full-function connectivity protocol built from the ground up to replace SAS and SATA. It was created to allow IT systems to access and write data quicker and far more efficiently. And, it was not just written for the hardware deployed today, but rather, NVMe was designed from scratch, to integrate with new storage technologies that might be created and commercialized in the foreseeable future.

Thus, we asked IT professionals to take part in an online survey to tell us what’s actually happening with NVMe adoption in organizations. Do people know enough about it? Do they trust NVMe as a protocol and are storage suppliers ready to deliver reliable solutions? Where is NVMe deployed in production systems today? Well, 152 IT professionals from organizations of all sizes gave us their answers.

Taking stock

To get some perspective, we asked about the current state of play. The answers show that the majority of respondents believe that their existing storage infrastructures are efficient, reliable and able to support current requirements. There are question marks over the suitability for future needs, however, and there is clearly an opportunity to make things better across the board (figure 1).

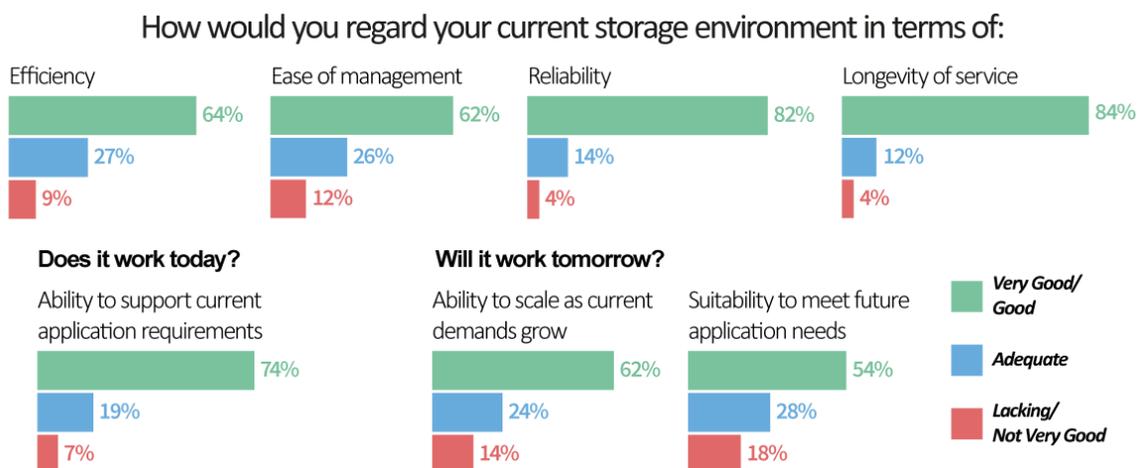


Figure 1

NVMe understanding and awareness

If things are in reasonable shape inside most organizations, clearly most IT systems are suited to the workloads they face today. Given this background, how much knowledge have IT professionals picked up about NVMe? A majority of survey respondents say that they are well informed regarding NVMe, but the nature of a self-selecting online survey means that respondents are likely to be skewed towards those with an interest in the topic. Thus, it is fair to assume that the levels of understanding in the broader IT community will probably be lower.

It is interesting to note that despite the marketing around the protocol 8% of respondents say that they do not have good knowledge of NVMe or, say they do not understand where to best utilize NVMe and 13% cannot make a convincing business case for investment. Add in the fact that over one-third of respondents are not convinced that NVMe storage is mainstream-ready, and it is clear that educating the community is essential (figure 2).

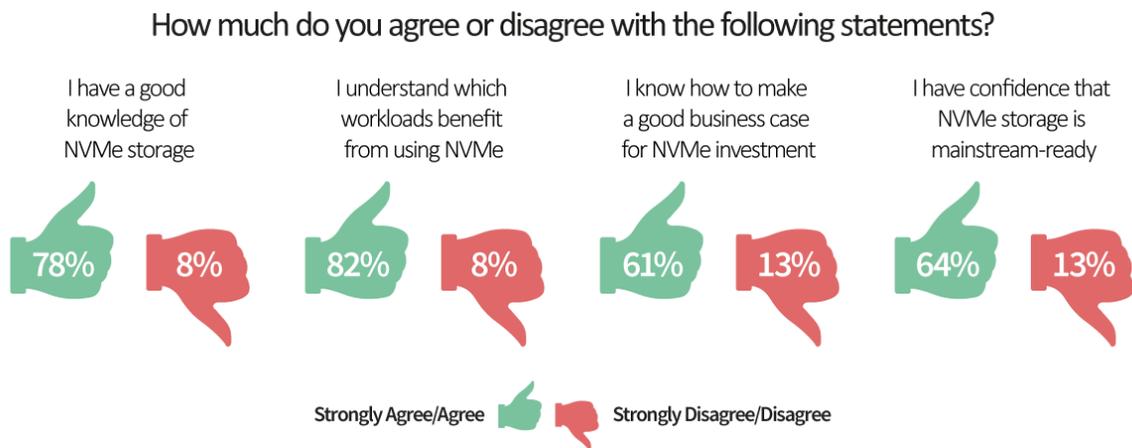


Figure 2

Where is NVMe already deployed?

It is of little surprise that deployment is broadest in those areas we might consider are “the usual suspects” for early adoption - the workloads that vendors often use as references for the effectiveness of NVMe because business benefits are easy to show. For example, very low latency-sensitive transaction systems, real-time analytics of business critical systems, and demanding analytical workloads.

Alongside those workloads, vendors have promoted others as being well-suited to NVMe solutions. In particular, NVMe usage is gaining traction supporting large virtual machine and desktop virtualization platforms, and in data-intensive modeling and engineering systems. This makes sense, given the very large data volumes used by such systems and the responsiveness users demand of them (figure 3).

How far have you deployed NVMe to support workloads in the following areas?

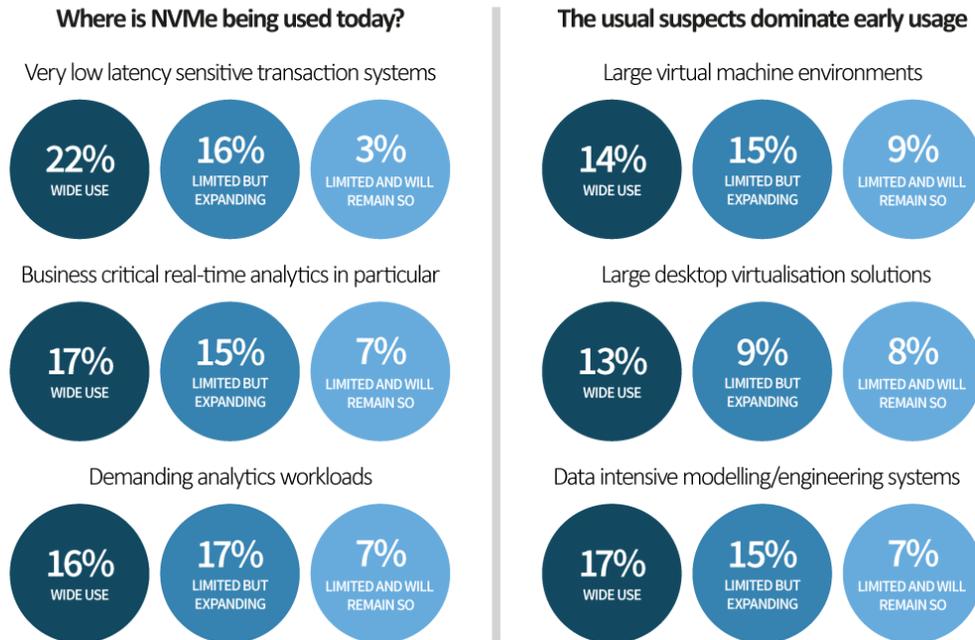


Figure 3

The results show that in addition to those “mature” workloads that are good targets for NVMe use, some workloads still early in their life cycles are also attracting attention (figure 4). It is unsurprising that AI and ML workloads are already used with NVMe platforms given the large volumes of data that may need to be processed in training and running models. Similarly, the use of NVMe for container deployment may indicate that containers are often used in environments where parallel data access is important.

How far have you deployed NVMe to support workloads in the following areas?

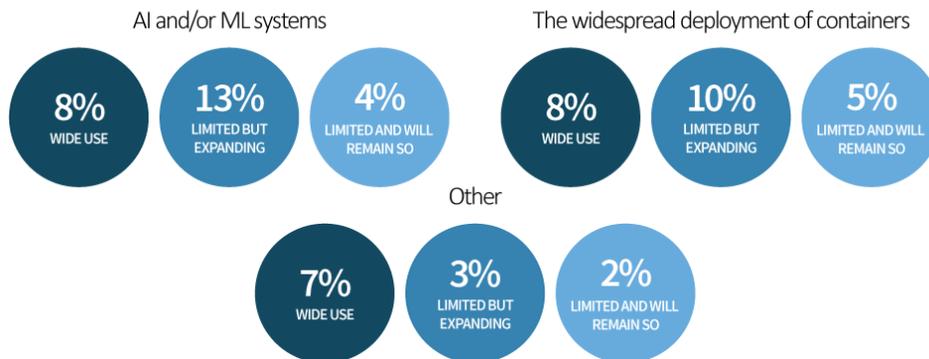


Figure 4

Perhaps a more surprising result is that even general-purpose business workloads are already gaining traction. Add the fact that a considerable fraction of respondents also report the

potential for broad usage across all workloads, and it is clear that NVMe looks well set to increase its adoption (figure 5).

How far have you deployed NVMe to support workloads in the following areas?

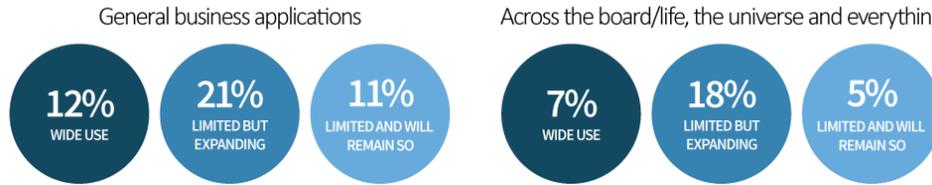


Figure 5

But, there is a significant factor we need to consider as we look at the results of this survey. As mentioned earlier, it is likely that those choosing to respond to an online survey have an established interest in the area. This means that respondents may be closer to the leading edge than the general population. It is therefore quite likely that overall usage rates are not yet at the levels shown in these results.

Potential inhibitors to broader adoption of NVMe

Many factors, such as concerns that existing IT infrastructure and systems may not be ready for NVMe, have the potential to delay adoption of a new development. A sizeable minority simply do not know if their networking infrastructure is ready for NVMe and, especially, NVMe-oF. Also, around 40% of respondents are not yet convinced that NVMe solutions are mature enough for mainstream deployments. Once again, market and channel education may be required (figure 6).

How much do the following stand in the way of NVMe?

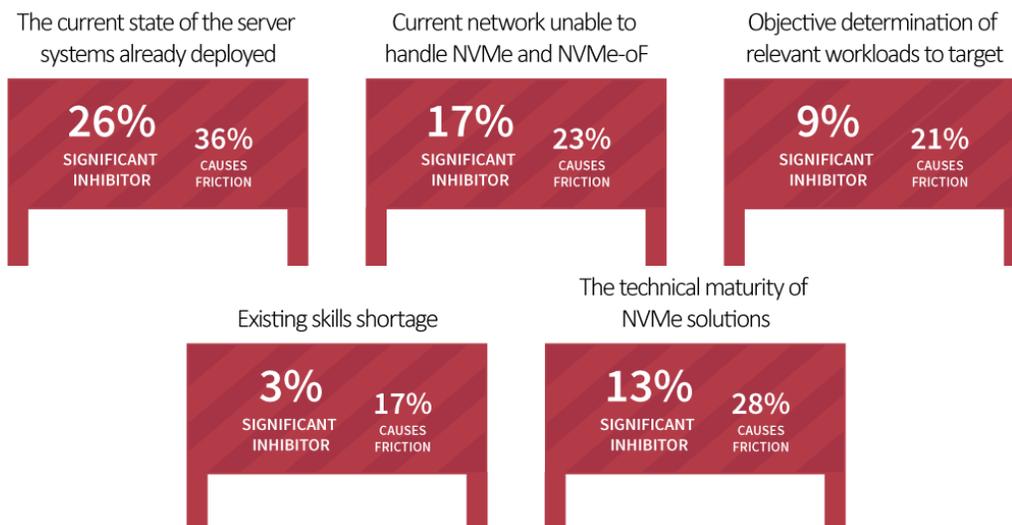


Figure 6

And then there are financial challenges that need to be addressed. More than half of respondents report the additional cost of NVMe solutions, compared with traditional platforms, can generate substantial resistance from Procurement and Finance. IT professionals clearly need help to make the business case for investment, especially in the broader user community where financial resistance may be even higher than in our sample set of users (figure 7).

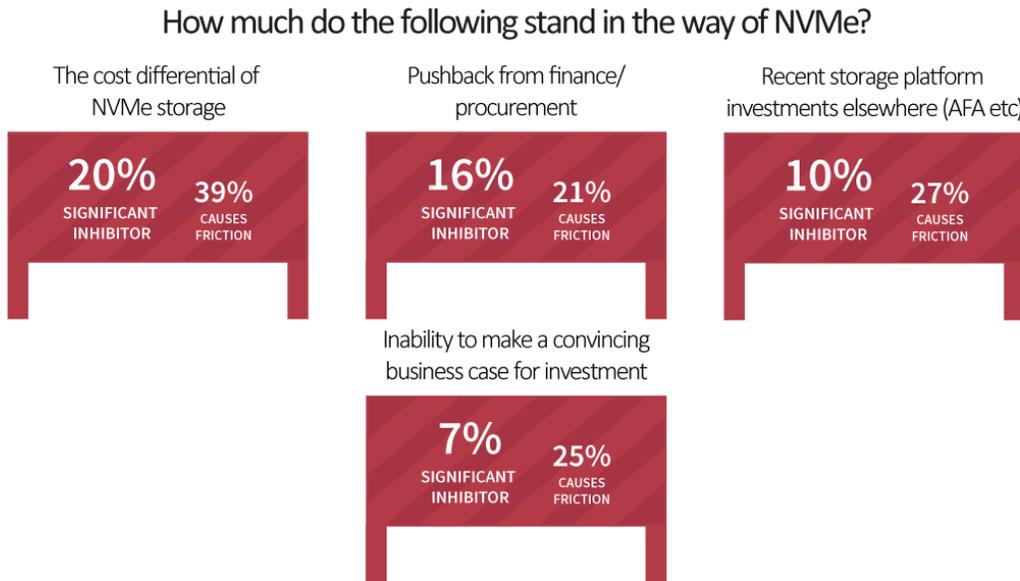


Figure 7

These challenges are neatly summarized in some of the comments left by survey respondents when asked if they could justify an NVMe investment to their boss:

- *“I don’t see a business need for NVMe right now.”*
- *“Only if it comes at absolutely zero cost differential to our current AFA systems.”*
- *“We’ve already had the conversation, but the problem is price and position on the roadmap.”*

People and skills

The survey results show that, for once in IT, most organizations do not see a skills shortage as a significant challenge. That said, it is clear that some organizations believe they do not have enough skills to exploit NVMe effectively, perhaps indicating a need for the storage industry to provide effective education (figure 8).

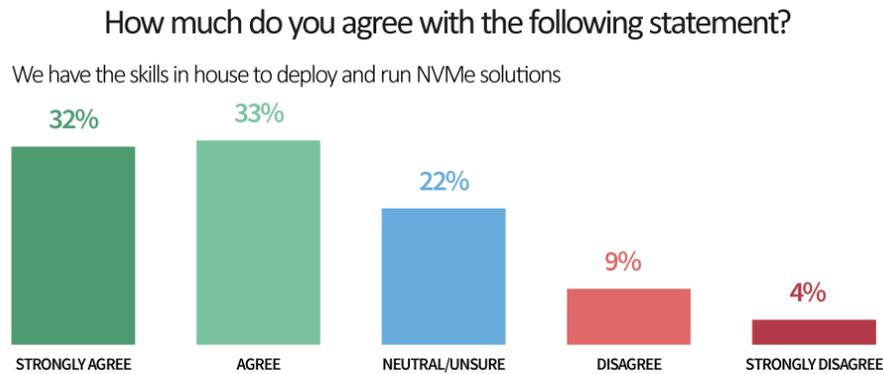


Figure 8

Are storage vendors stepping up?

Given the potential inhibitors highlighted in the survey, we need to ask how effective storage vendors are at getting new NVMe solutions into play. The response of those taking part in the survey appears to indicate that many vendors may need to make greater efforts getting NVMe into the hands of their customers (figure 9).

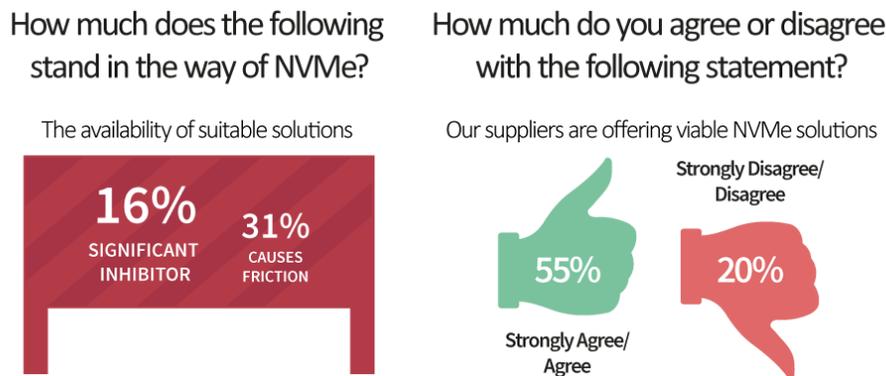


Figure 9

When half of respondents report experiencing friction, at the very least, when discussing the availability of suitable NVMe solutions, the vendors and influencers clearly need to change how NVMe is communicated. One survey respondent captured a major challenge, or maybe perceived challenge, vendors face:

→ *“It’s great tech, but it’s trying to fix a problem we don’t have.”*

While another, who clearly works for an organization selling storage solutions, put it:

→ “Well boss, we sell this shiny NVMe kit to paying customers, maybe we ought to use it ourselves here and there. But he said, ‘No, it’s too expensive.’”

Future plans

Having assessed the current use of NVMe and its perceived potential, the survey asked what plans organizations have to bring NVMe into their infrastructure. Significant acceptance is already visible, with more than half of respondents agreeing they are committed to deploying NVMe (figure 10). As one respondent put it:

→ “For anything under a couple of hundred Terabytes, it makes zero sense to use rotating media. The only reason there hasn’t been an immediate switchover [to NVMe] is you have to depreciate (existing platforms) which have a 7-10 year lifetime.”

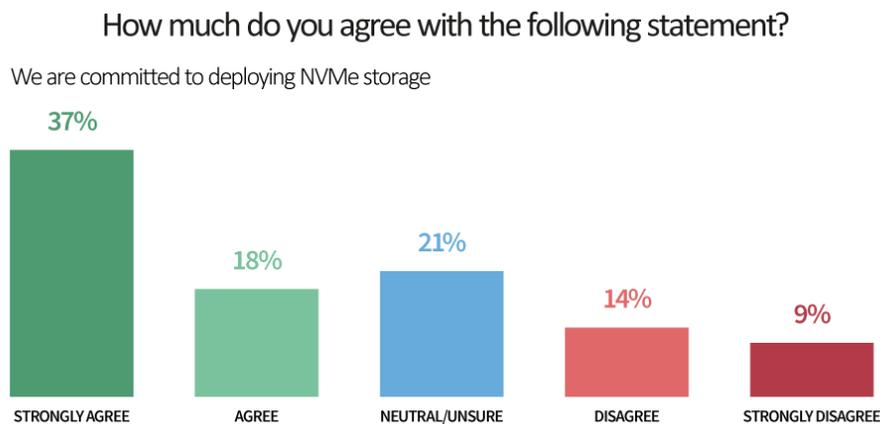


Figure 10

Therefore it’s fair to say that the future for NVMe looks good. However, the fact that almost one in four respondents disagree, while another one in five are unsure, means that vendors, media and analysts must do a better job of helping potential users understand the business value of NVMe solutions.

Then again, we are still in the very early days for NVMe, and some respondents may not have had time to even think about it. Others may be waiting to see the results of early adopters, or for evidence that the protocol, and the solutions built using it, have matured enough to convince them it’s ready for them to deploy in production. Of course, given the results in figure 9, some may also be waiting for vendors to step up.

What will trigger investment in NVMe?

As in almost every IT technology acquisition decision, infrastructure refresh projects are likely to remain the main triggers for investment in NVMe. This is not surprising unless there is a very obvious business need where faster storage makes a critical difference or a product is facing

end-of-life. Strategic infrastructure refreshments will likely always remain the main reason to buy IT systems at scale. This is reflected nicely in some quotes from the survey:

- *“I’m not sure the company is ready for the investment required, but let’s get the team together and talk about our 6-24 month storage capabilities and the resilience of our current suppliers.”*
- *“We are not there yet. We did some major upgrades a few years back and it will be a few years until we do a refresh.”*

Note too, that while business competitive threats are often claimed as a major cause of IT change, and hence infrastructure refresh, the survey shows they are some of the least important direct triggers for infrastructure acquisition. This could be because many organizations, even today, do not recognize IT’s importance to the delivery of core business services, especially at a time when many are creating new services or dramatically modifying existing solutions (figure 11).

How likely are the following business or IT events to trigger the acquisition of NVMe Solutions?

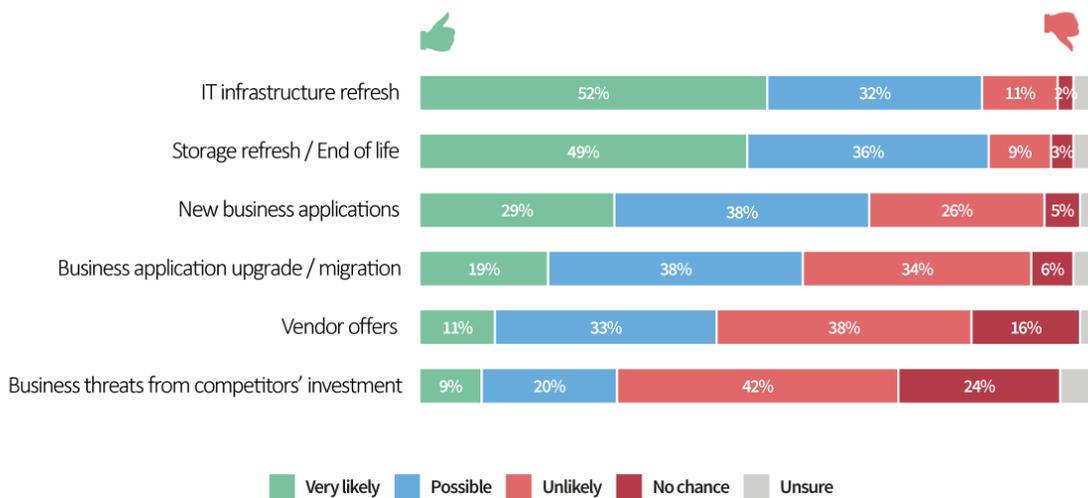


Figure 11

But, new applications or their upgrades do offer another route to NVMe for some:

- *“Sure we can make the case for NVMe. It’s the only way to go, due to bandwidth and low latency increasing productivity. Its use in intensive transactional systems makes sense, but for more mundane processes it needs to show clear technical and business benefits over existing systems. It’s finding the correct examples where I/O improvements make a big difference.”*

NVMe-oF shows promise

It is also worth noting that while NVMe is still very early in its journey, some advanced developments in NVMe, most particularly NVMe-oF, have already garnered attention. But while the potential of NVMe-oF is already recognized by over one third of respondents, the question being asked is are vendors ready to deliver viable solutions (figure 12).

How much do you agree or disagree with the following statements?

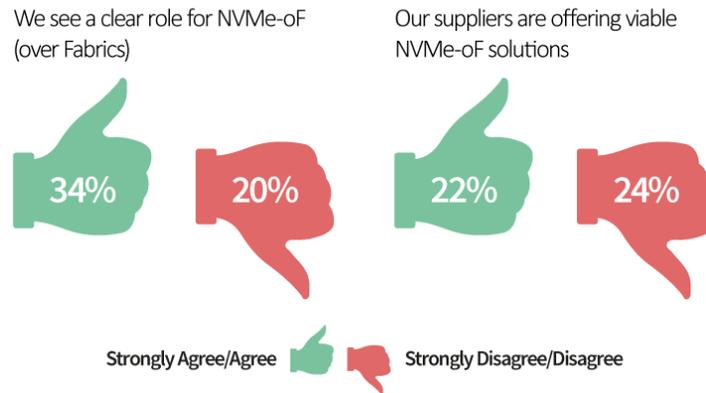


Figure 12

In summary

There is little doubt that NVMe will become the storage protocol utilized most widely across IT systems in the coming years. NVMe has the potential to replace most, if not all, others in the not too distant future. The challenge for potential users is likely to revolve around when to make investments in such solutions, and which workloads to bring on board first.

As ever, each organization will have its own investment plans and general IT infrastructure refresh cycles in which to fit NVMe investment. Looking at early opportunities to use the technology can have significant business benefits. One thing though is clear, as the volume of NVMe based solutions that are brought to market increase, the cost differential will narrow, and may eventually disappear. And, as a result, NVMe usage will likely expand quite quickly.

But, while NVMe has some market education challenges, NVMe-oF has even more work to do. Although NVMe-oF is even younger in its technological development lifecycle, vendors need to get clear messages to IT professionals on where NVMe-oF fits and what network changes may be required to enable its deployment. Vendors also have to show they have viable solutions to deploy.

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