IT Hardware Industry

Expert Call Series Takeaways: HDD LTA dynamics & thoughts on Toshiba

Industry Overview

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Featured Mr. Ian Beresford, former Director at Seagate

As part of our 2026 BofA Hardware Expert Call Series, we hosted Mr. Ian Beresford to discuss HDD supply, long-term agreements, and the reported Toshiba capacity expansion. Mr. Beresford views Toshiba's proposed investment as a sign of healthy demand but believes its potential addition to industry supply is too small, and its execution too uncertain, to materially change the near-term LTA outlook. This is in line with our take on the Toshiba news published last week. We expect demand to continue to outpace supply and view WDC and STX as beneficiaries of sustained HDD demand and persistent market tightness.

Toshiba expansion unlikely to quickly alter industry supply

Mr. Beresford believes Toshiba could reactivate existing equipment and add targeted component and testing capacity rather than build an entirely new HDD manufacturing base. Its reliance on outside suppliers for heads, media, and substrates means a delay in any one component could constrain finished-drive output. New high-capacity drives would also require customer qualification. Mr. Beresford expects Toshiba to prioritize higher-margin, higher-capacity drives, so an increase in exabyte capacity may translate into a smaller increase in drive units than the headline suggests. Mr. Beresford characterized the reported 30% market share ambition as aspirational, particularly as Seagate and Western Digital continue to increase capacity per drive. He questioned whether the announced investment alone by Toshiba could support that target. In his view, Toshiba doubling a relatively small production base would not equate to taking a large share of industry exabytes.

LTAs are about securing the right drives, not just EBs

Mr. Beresford argued that current HDD LTAs differ from earlier, shorter-lived agreements because customers want predictable access to specific high-capacity drives, compatible product roadmaps, and the ability to request incremental supply at agreed pricing. Large customers value consistency in drive performance, power requirements, and deployment across their data centers, rather than treating all exabytes as interchangeable. For manufacturers, that visibility can support investment in capacity per drive instead of simply more drive units, limiting the risk of building excess unit capacity. He also noted that exabyte figures can obscure differences in drive mix and profitability as factories plan around units and components, while the economics depend on the capacity and pricing of the drives shipped.

Growth from AI supports HDD demand outlook

Mr. Beresford sees inference and AI-generated images, video, code, and other content adding to existing storage and archival needs. He cited ~28% EB growth as his modeled view, vs. ~10% before AI. He also discussed drive replacements as a potential source of demand, while noting that replacement timing varies by customer and use case.

See glossary of abbreviations on page 17

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Transcript

Wamsi Mohan: Good afternoon, everyone. Thank you for joining us today. It's the 31st call of the BofA Hardware Expert Call Series. A quick disclaimer before we dive in. Conflict disclosures relating to the individual companies and the securities discussed on the call today can be found on the call invitation.

So today we have a timely topic. We're going to be looking at HDDs. We were originally planning on digging deeper into long-term supply agreements, how they work in practice, and also how these commitments flow through component procurement, manufacturing capacity. But given the news today around Toshiba, it's actually kind of timely to dig into that as well. So, joining us today is Ian Beresford, who's worked for 16 years at Seagate, most recently as Director of Engineering and Operations. I think he left the company in 2018 but has stayed very current with overall AI space and storage. So, Ian, thank you so much for joining us today.

If you don't mind, maybe just walk us a little bit through your background here, just to give some context to the audience, and then we'll jump into questions.

Ian Beresford: Sure. Just a correction. I actually worked for 23 years at Seagate. I just did go all the way back. So, I started as an R&D manager, worked my way through R&D to operations, and then started in the HAMR scope 20 years before the product was launched basically in glass substrates and every other area in the substrate market. I handled the specifications, product launches, product mix of 27 different functions at the same time, as well as outside suppliers.

The interesting thing about the substrate when I took over that role as the lead on that, even though I was a director, I reported all the way up to the Executive VP and CTO because there was nobody there in between. It's kind of like its own division. It's a billion substrates a quarter, and my boss would say you basically are in charge of this thing, it doesn't matter, and you have to attend everything.

So, the reason I understand the HAMR scope and understand what happens in HDDs is there was only about 60 people running into the HAMR product design. So, every person that was in charge of a large component had to attend all the meetings with the customers to be able to understand is this going to be ready? So, everybody had to raise their hand and say yes, I have that, I don't have this, in every meeting, so I was always exposed from the back end to the front end, and understood what's happening, and I was involved in those contracts. And just to close that, my company specified that you have to have a technical person in the meeting room to understand that.

My background is in nuclear physics; that's my engineering side. I have an MBA and I put those to practice quite well, and done extensive modeling in this industry, financial modeling, and in some of the questions you can ask today I'll explain that through those experiences.

Wamsi Mohan: Excellent. Welcome. We're delighted you could join us today. This is very timely.

So, before we dive into all the questions, I'd love to get just an initial reaction from you on seeing this Toshiba news out today by Nikkei, suggesting that Toshiba is looking to double its capacity in fiscal '27, and then also looking to add production lines and increase capacity through aerial density increases. Then expanding this in the Philippines by spending about ¥60 billion. Those are the facts that have come to light today. So, I would love an initial take. How does that pass the smell test for you, and what do you think?

Ian Beresford: It's reasonable. It's really not a huge impact. It shows that the market's healthy, that they're willing to invest money, that there's still capacity, there's still demand constraint. Their supply needs to catch up. So Toshiba, which has been winding

down operations ever since they bought the IBM stuff, and then they merged with ABD, wanted to go into the SSD market, has been closing down lines, mostly dependent on suppliers like Showa Denko, which is now Resonac, TDK for the heads, and other things for spindles and stuff. So, $380 million, ¥60 billion is about the size of a factory. It could be a substrate factory, it could be a head factory, a PE component. So that spread across expanding is just telling me that they already have some legacy equipment and supplier bases, and they're just going to flow down some money to close the gaps. In perspective of volume, you have two major companies: you have WD and you have Seagate, and you have Toshiba as a third wheel. Right now, there like 2.1 volume. One is Seagate, one is WD, and 0.1, which is Toshiba. Now they're going to go to 2.2 volume. So, this is a huge market overreaction to basically see like WD and Seagate.

I think people think it's going to impact the LTAs, but that's not the reason the LTAs are there. The LTAs are there for obviously control price, but I'll explain that when we answer questions. So I think it's an overreaction. They're going to incrementally improve the supply. They're not the technology leader. They're not the aerial density leader. They're using 11 platters, they're going to try to catch up on HAMR.

It's easier said than done that they're going to build these hard drives and actually deploy HAMR. They're so far behind. It's one thing to be deploying capital and try to get these drives out, but you're also still designing your HAMR. So, what is your specification and how are those two are going to intersect timely in the market to actually deliver in 2027?

Wamsi Mohan: Okay. So you said a lot of things that I want to dig into, so maybe we'll just start off. So, when you say this $380 million that's being deployed, do we have a sense of how fast that's getting deployed, or is this over a multi-year time frame? Do you think that this is just over fiscal '27 in one year? What exactly can they ramp here? Are we ramping clean room assembly or test? Is it more production lines? You mentioned some spare equipment that have been there. What was their capacity utilization? Anything that you can help us bring these things together?

Ian Beresford: So my belief is that they took some capacity offline with equipment that they already owned, like Anelva's and sputtering equipment, and they probably got access to some of the expansion of allocated HAMR substrates, glass substrates from Hoya through Resonac. So, by getting a few of these components, some share of the market, they realized we could repurpose our equipment that we already have, bring things back online, and then fill the gaps with new technology, like you said, in the testing. So, I think that $380 million, there's no mention today of the velocity of that money, how it's going to be deployed.

I think it's going to be spread out over suppliers, some equipment upgrades that they can get their hands on, testing equipment, servo writing, HAMR equipment, and they're just going to take what they already have into existing facilities and plug and play these in. And building out in the Philippines is just component stuff. I don't see it again. If they actually double their capacity, there's still a very small impact. It's a fraction of a percentage.

So, it's a deployment of the money in many different places. It's not a brand new factory. We're just going to say we're going to copy exactly and build this hard drive factory. It's just taking things that they think that they're far enough ahead that they're going to get some piece of the pie here. And especially since the announcements in WD and Seagate are saying we don't really want to increase units, and some of that's also because the customer doesn't want them to increase units, but I'll get to that later. It's an interesting interpretation.

Wamsi Mohan: Okay, so maybe it'd be helpful for people on the call if there is any rule of thumb on how much exabyte, how many millions of dollars it takes to ramp up, how much exabyte capacity, if there's any rule of thumb, like a rough map that someone

could do and say, oh well, okay, $380 million is that equivalent really to 200 exabytes? Is that reasonable, or is it more like 100 exabytes? I mean, we're just trying to calibrate what is the right ratio of CapEx spend to exabyte output?

Ian Beresford: That's a strange one for me. I know the market's always done exabytes, and I think they do that because of the mix of drives that sometimes in the past would be 20 different versions of drives, and they don't really want to get into the fact that some of those drives are lower margin, and only a fraction of those are higher margin. So, they talk about exabytes and make it sound like they're all equal. They're not. But in the hard drive industry and the customer industry, there isn't really a dollar per exabyte price. You could throw that out there, but it really is a dollar per unit.

They work in units. They don't work in exabytes. They present that to the market again to make it sound like all exabytes are equal, but some of those drives just barely break even. Some lose money, and then you have the higher end driving margin, so that pacifies the market when they make announcements. But units is where they worked in because that's how you deploy the parts, that's how they calculate how many units actually go into a factory, they calculate how many units actually go into a server. So I don't have a number on that one because it's an odd one for me.

Wamsi Mohan: So maybe approaching it a little bit differently, the highest capacity drives, and correct me if I'm wrong here, but from Toshiba, the MG11 drives, I think 44TB drives is what they're shipping currently as their largest size drives, which are significantly smaller than what Seagate and Western Digital are shipping today. So, when we talk about doubling capacity from that perspective, if we thought about it in terms of those units specifically, if we say whatever percentage nearline is of aggregate total Toshiba capacity, would you think that this is geared towards explicitly doubling the nearline capacity, would they be interested in increasing capacity, anything outside of nearline drives?

Ian Beresford: No, I believe they're going to target just the high margin drives, which is interesting because they're going to double capacity, but they're probably only going to make about 60% of the units because they're going to be higher capacity drives. So, the reality is, who controls the unit really controls the ecosystem there because when you build a large data center, it's fungible. You can move data around, right? But if you own the units and someone else can't get the units, they have to rent from you, they have to lease. This is how AWS and Microsoft made the money. So, because they're going to probably target something all the way up to by time they deploy this 36, maybe 38 terabytes, it's going to not equal exactly the amount of number of drives that you're going to get at 24 terabytes. You're going to end up maybe 60% in number ratio. So, if you look at the exabytes then, those are going to be higher margin drives. It's actually going to end up being a higher dollar per exabyte.

They're only going after the big margin. That makes sense. It's worth the investment of $380 million to really lock into this market they see floating until at least 2032, and then there's probably a good chance it keeps going.

Wamsi Mohan: So I think you made the comment earlier that this is 2.1 going to 2.2, to use your analogy, of capacity. So, what is the motivation for them to be doing this other than basically saying, and why is this the timing for them to do this? In your mind, why are they trying to do this now as opposed to at any other point in time?

Ian Beresford: There's so much money on the table right now for the taking, and they have some equipment. Probably 50% of it already capitalized, dormant. They can reactivate it. They can get the substrates from Hoya. They can get the media through Resonac, they can get the heads. Everybody's ramping up, and they're going to pay a premium for those because those are at excess capacity. But they've done the math, and it's worth it for them. The margin on these drives and only the high end drives, and the customers wanting to give them LTAs, and Toshiba hasn't disclosed any information on

those, so they're pretty vague, but that money comes up front sometimes and flows right through. So they could be investing money already that's already going to be allocated to them in these contracts because they are an established player.

Wamsi Mohan: So in your view, as capacity comes online, and we're talking about larger cap drives, those will need to be qualified. It will take them some time, and then HAMR is even further down the road, which obviously even WD used to ramp up HAMR meaningfully, and then we've got Toshiba probably no earlier than 4049 would be my guess, but I would love to get your thoughts around is there any meaningful qual time that would be restricting them at least through '27/'28, and then is HAMR '29 the right timing to think about it?

Ian Beresford: This is going to be a tough challenge for them. They're not going to be able to deploy this on their schedule that they came out. So, they have to basically just be designing technology that they don't have, and if you're coming in the HAMR in 2029, you're late to the party. The money's still on the table, though. They're still going to make money off this, because I think this is going to have a long run life. This is not like 2011 when you can't buy anything, I just need some drives, and then you're going to overcapacity, and then we're going to shut you down. So, there's just money on the table. They are probably going to have a problem deploying that. I think everything you just said, add a year to it.

Wamsi Mohan: Okay. And this is just execution from their standpoint. It's just historically how they operated. It's basically the time it takes them to really get all their ducks in a row to be able to ship product.

Ian Beresford: Yes, and they're very, very disciplined about it. But one thing that's missing in that equation is all of their suppliers. If you take the top 10 BOM of this stuff, they're not vertically integrated. Everybody has to execute flawlessly, everybody has to promise that they're going to deliver on time, and that never happens. So you're going to have problems getting this out.

Everybody's probably already maxed out, figuring out how to get more. They're doing the same thing. The supply chain is saying, "I'm going to have more business with Hitachi now that I didn't have, and we're going to try to capture it. But we have an announcement, we have a framework, we don't really have an execution plan on day one, and we're going to build it now.

Wamsi Mohan: Maybe just to follow up on that, so let's say that the supply chain and they're clearly not fully vertically integrated, so they're depending on head media, spindle motors. So, as we think about these components and the suppliers, the ramping that's happening at those suppliers, whether it's heads at TDK, whether it's media at Resonac, how much of that incremental ramp do you think will actually be just siphoned away from them potentially by a Seagate or Western Digital relative to what would be available for Toshiba?

Ian Beresford: I think the market forces are big enough that they've done the math that they know that there'll be some of that demand siphoned off. Seagate and WD is going to try to soak up as much as they can get in there. Seagate's a technology leader; they are. That's why it's called Seagate Technology. They invest in this, they have less platters per unit, and WD is the manufacturing lead. They're low cost, that's the way they operate. That's why they haven't invested in HAMR.

They're going to both go after this market share, but I think they just can't meet the demand. And we'll get into later with AI, but AI by nature creates content. Large language models are actually content creators, and they create content faster than humans can process them. So, when we talk about that, you'll see why we're six months behind in the entire AI industry because everybody missed a boat on memory and storage, from solid state storage to what's needed to process the GPUs to get stuff out to where do you put all the stuff and how you're going to build out these large servers

on time on these large data centers? So I think there's plenty of demand for them. It's just a small player. There's not top tier technology. They haven't deployed the technology. It remains to be seen if all ten of their outside suppliers can actually come together, because it only takes one or two to be short, and you just don't have the drives.

Wamsi Mohan: I'm getting some questions around what's the time frame to bring new capacity online? To build some greenfield capacity, how long does it take?

Ian Beresford: Greenfield's difficult, and it depends on what you're building. We're going to start with heads. That's the most difficult design, especially if you're dealing with HAMR and laser sources, and if you're maybe patent constrained. So, you're looking at least building is nine months, and then you've got to get that thing operating for another three months. That alone, if you're building a large head drive, a large head building, greenfield or even substrate, each one of those would be like $300 million. So a Hoya factory takes $300 million. So the $380 million really means that there's small capacity, probably in existing units. I don't know if they're going to greenfield. So, if they do greenfield, one of the components is much smaller, so you can really realistically be looking at year and a half to get components out the door.

Wamsi Mohan: Okay.

Ian Beresford: The building alone is difficult. The specifications, the cleanliness, the clean rooms, the water infrastructure, the amount of cleaning you have to do, cleaning drama is huge in the hard drive industry. That alone is just going to, assuming you're going to get all that because you're building a fab that's using a lot of semiconductor type building components. You're really looking at the type of resources you need in the clean rooms is basically like a semiconductor. So everybody's building all these out, and they've been using data centers, so I don't even know how you're going to secure that. That still remains to be seen. That wasn't clear at all. So now all these details aren't clear, but I think they're challenging.

Wamsi Mohan: Okay. Now maybe just to pivot a little bit into the customer base, do you see a point of view where we know that, for example, Google helped ramp HAMR for Seagate to begin with and so is there a chance that we see given how tight the HDD market is that some of these hyperscalers would be interested in putting some real capital behind helping Toshiba get there because it's in their own interest to make sure that they have a more competitive market?

Ian Beresford: Oh yes. Oftentimes if there is an LTA agreement, there's money up front. There's capital invested up front, and then you secure that. So, I would not be surprised. I know for a fact that Toshiba has to be giving some money up front to their supply base. There are these smaller players. This Hoya doesn't start building substrates unless they have excess capacity. They won't build any new production lines unless you start paying them, they don't take that risk. Then they'll credit you back by a lower cost, 10 cents, 20 cents off a unit until you get your money back. But guarantee you that supply at current quality, which is critical, and they know how to do this.

I think the same thing is going to happen with heads. TDK is a veteran in this space, so they are going to get help, and it does help a market that only has two major players right now, and that's raising the LTA prices long term, and they want to have that third player. And it's not just the top seven. There's enough pull and demand from all the other guys who can't get this allocated supply, they've already realized I can't get Seagate, I can't get WD, so three or four of us smaller customers who are startups trying to launch, and we don't want exabytes, we want units. We want our own units, so we're not putting our proprietary models on Microsoft server or an AWS server and being held hostage by that, just like anybody gets held hostage by their iCloud when it's full, and they end up putting it on there forever.

So, there's enough interest in other customers to really get them come into market, even if their drives aren't going to be the top of the mix. They still have a good reputation.

Wamsi Mohan: Yeah. Okay. Do you think that from a hyperscaler standpoint, given this announcement, that it could impact some of the discussions around pricing around these LTAs in the future?

Ian Beresford: I think the magnitude of it's too small. I think it's an overreaction. I don't think that that small of volume is really going to matter and the top tier hyperscalers don't want those drives. They want the Mosaic 4 and Mosaic 5 that's going to come out. And they're really looking to see if a WD.

One thing that's going to happen in these AI data centers, which hasn't happened earlier is that you need drives that play well with each other. They need to be like-minded drives. They need to have the right firmware, server right. They need to have the right type of drive, same power, same connections. They can be a 32 and then a 34, but they got to be plug-and-play. And you're building out the top tier data centers now, you want the best drives because three years, two years later, when you finally finish the building, you're already 10 terabytes per platter behind whatever per drive behind. And right now, what's happened is we don't have optimized data centers that are AI because they just took everything they could find when they ran into a memory shortage. So they got a mix/match of different SSD components and NAND memory, HBMs on GPUs, and a lot of different fragmented stuff.

They try to keep the scale up, which is one rack, the same, and then some of the scale out. But it's tough when you didn't have all of this type of drive that is a mix and match. So, Seagate, for example, with a roadmap of Mosaic three plus four plus five plus, that's all going to be interchangeable and work really well. The new AI data centers, you have to build your own power supply. So whether you're using like an environmentally closed circuit natural gas like Bloom Energy or whatever, GE Vernova, you're going to have this power set up in a certain amount of water, and you have permits for this. And then three years down the road, five years down the road, there's a warranty starts running out and you have to replace all these drives. And by the way, we need to talk about that because that's going to happen. You're going to have to replace these drives, and the ones allocated in 2023 and '24 are halfway done. They take these drives out and they sell them to someone else. But they got to be able to plug and play, use the same power, have the same server right, so that it's doing what you want to. If it's an LLM module, it's doing that. If it's a data center, AWS doing shopping or whatever, it's that, but almost everything is using AI right now. So that's a lot to absorb right there. I'm sorry.

Wamsi Mohan: So I guess like your point fundamentally is that Toshiba's drives are just lower aerial density drives, and so the largest hyperscalers get better TCO by putting the highest capacity drives in there. So, the motivation to necessarily change these LTAs or really it doesn't impact it because that's not the type of drive necessarily that you first want to procure.

Ian Beresford: Yes, you're not going to want to put in some Seagate drives and mix and match some Toshiba drives over here just because it's cheaper. The big guys investing the money, the large billions of dollars going in, they can afford it. They want this specific drive at this specific price point delivered on this time and ability to flex upside if you can maintain those prices. The LTA says if I want 10% more, can I get the same pricing? They want to have like-minded drives in there, and they don't want somebody else to have them.

So that's where the unit restriction comes in and works for both. It helps the hard drive manufacturers not get into the same loop that the SSE manufacturers you see, like Micron and Sandoz, they have to allocate their LTA money into manufacturing, because if you don't expand as fast as your competitor, you lose market share just by virtue of not having as much capacity to match them, and then later on it's hard to get it back

Well, in this case, these guys aren't collaborating, they're not at all. They don't need to. They don't like each other. But if I'm not going to add more units because it's so expensive, and I don't want to get in the trap of three years down the road I'm over capacity and I'm holding the bag, which is what happened in the previous LTAs, I want to constrain my units. And the customer loves this because they're going to get the top tier drives, and you don't. You will need to rent or lease from them. They can monetize this, this is going to be a permanent revenue source that you can't get. This is how AWS and Azure got very rich off this. This is where their huge revenue is you're beholden to them. So they don't want other people having units.

Because inside the data center, it's fungible. It's just like at my house. I got an extra car outside. Whoever's going to go somewhere just grabs my car and takes off and goes to the store. But my neighbor can't use it. They're going to have to get their own car or Uber it. So I have my data center, I get to have the top tier best LLMs, I'm Microsoft, I'm going to jam away, and get the market. And oh, if you want a startup, you're probably going to either pay the outside pricing, which is exorbitant. You're either going to get drives from Toshiba, which maybe that's your path. I think Toshiba just has smaller customers, a different variation of customers looking for smaller volumes, and they have an outlet picking up some slack. But the top tier customers want to have these units, and then they would like it if nobody else has the units.

Wamsi Mohan: Yeah. Okay, that makes sense. I got a follow up question here just around your comment about Mosaic three plus four plus five plus and all those play well with each other. Can you mix and match across like the HDDs like between Seagate and WD at same capacity points?

Ian Beresford: You can if they have the same interface and the firmware, the servo write is built around what it is. If you're looking for fast interactions, drives are built at the factory for what the job desired. So, if it's using the same PCIe connections and you won't really mix and match within the server stack, it's more scale out. It's going to be maybe campus to campus or a section of one of the buildings is running on these different drives. But those sections, whether it's 24 towers or 50 towers, those sections got to sit. It's better to have WD drives in there, and then you have your Seagate drives over here. Maybe those are allocated to hands free automotive or aerospace or DoD stuff, and then over here is your banking, and over here is your financials and hospitals, so it really depends on the speed in the roadmap. But they do work well when you plug and play those drives.

Another thing to get into is when you look at these drives and you see how it's like 38, 36, 34, the way they manage these yields, because you have a lot of questions in here, you can build 34 terabyte hard drives it gets in your LTA. The reason they talk about exabytes is because if some of them don't yield as much, you can block out those sectors and just fly over them, not use them. And you can downgrade the exact same drive, operates the same, same power, same interaction with the GPU, but it's a 32. And basically, you say, "Look, I gave you this many of 34, and this many 32. We set exabytes, so I've met my exabyte goal." But those are going to work together, and the customer is going to be happy because they perform well. They're optimized.

So you could do it. I mean, these smart guys, they can put all the different drives together, but there's a limit. You're not going to put CMR stuff with the EPMR and totally different power usage, and one's going much faster, and the other one is having like two high performance wheels on your car and two low performance wheels. You go at the speed of the lowest performance.

Wamsi Mohan: Right, right. That makes sense. So I got more follow up questions over here. So, one of the points that the Nikkei article made this morning was that Toshiba wanted to target 30% market share ambition. That was kind of the goal that they were targeting according to the article. Do you expect to see more capacity edition

announcements for them to get to that target, or is that an aspirational target that they've aspired to for a long time and just not being able to get there?

Ian Beresford: Yes, that's the aspirational target for sure. I don't know if they can get there. I don't know if they have enough drive power and aerial density to even get to that 30% of the exabyte territory if they're talking about units, but the math doesn't add up there. So this announcement, there's a lot more has to come out here. So yes, they would have to add on top of that, but now we're talking about where you're going to get the components for [indiscernible 30:56] Greenfield, and $380 million US is not enough to pay for your heads, pay for your media, but those are the two highest components.

So you're going to have to, again, hopefully that you've made enough mark, and maybe this announcement is to really spark the industry that people want to get behind them and have them grow, but basically be counterbalanced to WD and Seagate. Maybe this is like they're going to try this as a steppingstone, but I don't really understand where they think it's 30% of the market share.

Wamsi Mohan: Right. Because it's not like Seagate and WD are standing still either. Plus, they've got arial density improvements that are much further ahead relative to Toshiba.

Ian Beresford: And even within their framework their built out factory base, they still have some capacity that's still being put in. They're still taking delivery, and maybe by this year they're going to figure out how to get those units out. They're still adding something, and they're adding exabytes. Because, again, the customer wants them to build more advanced drives, better drives, so that we still have a roadmap of improvement, but don't send out units. I don't see the units there, so they're going to expand while everybody else is still growing. So, it's really hard to say everybody's going to stand still when they've got more capital, more know how, and then you're going to suddenly get 30% market share. You don't have the supply base. You're not making your components, so that's rich. That's a rich aspiration.

Wamsi Mohan: No, that makes sense. Maybe stepping back a little bit from this announcement from today, thinking through how tight supply demand is today, and what are some of the drivers around that? I know you do a lot of work around AI, so it would be helpful to get your context on what would have been the growth rate, exabyte growth rate that was sustainable pre AI, and how has AI kind of changed the exabyte growth rate?

Ian Beresford: So I think pre AI was something at 10% or something like this. It was just the natural progression of the drives getting better every year, a little more optimized where you're going by terabyte per platter, where it used to be like half a terabyte per platter or whatever. So, the drives themselves were just improving, the media was improving, the heads are improving, so that was the pace of the exabyte growth. But the market wasn't. You had big players like Amazon, and then they were so fragmented. You have drives that perform for DoD, drives that perform for banking and enterprise and nearline, and mission critical, and then different form factors. So it was really fragmented. And drives perform different. So, for example, I'll give you just this is why it matters that out of the factory how you do these, why you want like-minded drives. You can have a drive, a server that just models a mine. It just has a gold mine and has every facet of the mine and every ounce of gold and where you're going to go next. And it's just a huge data model, so it loads that way really quick. The other one is like a super Walmart where there's 100 million SKUs of stuff, different colors, whatever, and you're tracking everything going out of the store, in the store and what's shipping in and what people are ordering. So, you're on really fast seek search, whatever, and updating something. So, you have a mix of these that you do. You have SSDs right behind the HBM with high bandwidth memory. Then you have SSDs, the different allocation, and then you're going to the first tier hard drives, which are probably just the catalog that's telling you everything's at, and then the long range where you're going to put stuff on because the data doesn't go away.

AI is a natural content creator. For everything we're going out there and answering questions about what is your doctor's test results, and what's this movie and what's this song, these are small details, but people are getting into this. And you'll see ChatGPT every week come out and say turn your pictures into the 1980s, and load your pictures up, and people go, okay, and they take a picture real quick. They load it up. They get their 80s hairstyle. They pass it around, and then they move on. And then you come back and you click on your right side of your module, and it's still there. So, all the questions you asked were still there, and people didn't realize this. And most people don't realize this also, if you don't go to a project base, if you don't tell like Grok or ChatGPT, start a new project, and you focus on like say this topic, it goes through all that stuff. That's what takes so long, and it just goes through all that stuff, and then you get a mix of why does my foot hurt, and what happened on this day, whatever. What's Lincoln's birthday, right? So it goes through all that stuff, and you have to trim that down when they go into these hyperscalers.

But my niece would take 10 hours to film an eight-minute movie after you edit it, and nobody want to watch it. And now she takes eight minutes, films a movie, and then puts a whole bunch of prompts together and there's an hour's worth of movie that sits somewhere that no one's going to watch, and it's got a whole bunch of interference inside, inference inside that. But you can keep this person is dancing, and someone's walking, whatever. So you create songs. People create songs and laugh them off and leave them there. They create images. They create kids doing this. They create models in charts. And every time you use Claude, it asks if you want to make a spreadsheet, right? So those things just don't disappear until someone deletes them, and the amount of data that AI is creating worldwide, especially at the company level, is just being compounded, and that's what it's being built for. There's more modules out there to do visual, voiceovers and entertainment content than there is just basic scratching the surface, just asking ChatGPT questions.

So again, AI by nature is going to get faster. It's going to record all the self-driving cars, what robots are doing, it's just not Netflix anymore. It's just way more intensive.

Wamsi Mohan: So would you say that like that this is basically taking this from a historical like 10% to 15% growth rate to now 25% loss like growth rate in terms of exabytes?

Ian Beresford: I like the number 28%. That's where I'm at.

Wamsi Mohan: Okay.

Ian Beresford: I like that number. I do a lot of calculations. You're going to ask some questions later on, or you were going to, but how do you figure out a certain amount of modeling and figure out how you do this, and then I can get into that. I've done that before. I've done it as a business, just playing them out. But yes, the growth rate is there because content creation is there, and people are going to use it for that.

There's so many security cameras out there. There's so much going on, so much build out that those types of data centers were driving the market, but now AI itself just needs to, it needs computational. There's reasons why they're building these gigantic billion dollar, multi billion dollar AI servers in Texas, and just dealing with like SpaceX and all the Tesla cars that need to drive around. So, the memory has to be there and build on itself. That's how those things progress and get better. And I don't see where it is—

Wamsi Mohan: That's fine. Just finish your time, and I have a separate question.

Ian Beresford: So again, just going back to ChatGPT says turn yourself into a disco ball or get the 1980s haircut, whatever, that never happened before, not even five years ago. So, everybody just logged in and did it. But it's doing that on a large scale. Do you want to just create a program and it'll write tons of code.

Wamsi Mohan: So maybe just so a few questions following up on this, right? So yes, there's a lot of data being generated. Do you think that at some point it makes sense for hyperscalers to just clear out or delete more aggressively, just given that there's a lot of like generated content that might not get used? So that's question one.

Question two is really when you think about how much of this incremental demand is being driven by training versus inference, do you have a view on that?

Ian Beresford: Training is a lot less than actually the inference. The inference is when it's just making us up, and everything's always going to higher density. Nothing's going from 4k to 780P or whatever. So, everything's always going higher density, higher density voiceovers. Basically, the inference is going to be the main driver. The training modules are actually helping to trim down stuff. And then, for the deletion module, it's customer base. So for high tech applications, you can go in and say, "I don't need this stuff anymore. These old versions," but they do keep old versions of all LLMs and storage and software, and everybody creates backups on these things. And then you also got storage and archiving requirements for many things that companies generate.

Wamsi Mohan: Yeah. Okay.

Ian Beresford: So all that stuff hasn't gone away. That's what I mean, all the legacy stuff hasn't gone away, and now you have AI, which is a content creator, on top of all this.

Wamsi Mohan: So I know we started to think about this call as an LTA kind of framework call, so let's spend five minutes on just talking through LTAs and your viewpoint on there, too. So, I mean, maybe to cut to the chase, a lot of people are very skeptical when they hear LTAs because it feels like when you're in an upcycle, people talk about LTAs. When you're in a down cycle, nobody cares about the LTAs. I mean, the customers don't care about the LTAs. So, what's your viewpoint on are these LTAs different from what we have seen in the past? Is there any reason to believe that? From your past experience around LTAs, was there upfront commitment? Does that matter? Does it matter if there are floor and ceilings? Like, how enforceable are these? Just some big picture thoughts first, and then we can get at a couple more specifics.

Ian Beresford: Sure. The previous LTAs, because of environmental factors, floods in Thailand and whatever, they were just kind of a carrot and stick. It made sure that certain companies at that time could get their drives, but they knew they would cause expansion. So it was a short-term equity play, I'd say. It's a good announcement, and you'd say they lasted maybe a year and a half at the most at one customer and less than other ones, but they did have some effect. But because of the demand pull was never there for a long time, it really wasn't till maybe 2020 when AWS really took off with those market forces of online shopping, commerce, and B2B. And then the technical side, companies using Azure. So those were really beneficial, more of an announcement to supply. So, Seagate making the LTA, WD, it was for them a benefit, but they knew that you're going to run out.

These ones are completely different. These are customer driven. They want similar drives, and so instead just R&D'ing your way out of all these new technologies, they want you to keep the same components. They want you to have a roadmap, which is why Seagate's successful with their Mosaic roadmap because they vested so heavily in a HAMR to give themselves a clear roadmap. You know, it's pinpoint laser on a pinpoint grain. It's very accurate. It's a lightning strike versus like a tornado where you're using the EPMR or the ESMR, a huge magnetic force trying to force these grains. That's why the roadmap doesn't show where it goes to 80 or 100 terabytes by 2030.

The LTAs are different. The customers are wanting to have a certain type of AI data center drives, and they prefer that other people don't get those. That's a side note, but it's really the performance of the drive and the type of drive. Then it's pricing, and then it's some of the other logistics around that, so that's what's really going to happen. They want to know if I can get upside, can I still get the pricing? And they do this also with

cabling and other components and the optics and stuff like that in the drive and in the high end with memory.

Those are the two drivers. It's the technology node and similar power usage, similar drive setup. They just want to make sure – And what's beneficial for the suppliers, they just know what to build. If you think about this, they're going to allocate this capital. They're not forced into building more greenfield, so they're going to add technology. And what's good for the supplier, Seagate and WD, is they know what to build because you have one shot at this. You're going to deploy all your capital, and if you're mismatching the market, everybody loses because there's nobody that's going to come back and catch up. You built the wrong drive; they don't work, they're not right for this, and then we're not optimized. And then SSDs are going to come in.

However, building the right drive, the customer wants, you're going to invest all your money in technology, not units, not greenfield. So now you're going to end up having a lot of technology that's going to explode my exabyte capabilities and that's going to help me compete with SSDs down the road.

Wamsi Mohan: Maybe just to think about pricing a little bit. So I appreciate your comments around why this is a little bit different. It's customer driven. It's the fact that they want the stability around and visibility and the suppliers are really benefiting from that visibility as well. But as you think about pricing, so we've seen or at least we've heard that the LTAs are kind of 2028 might start to get negotiated or getting negotiated now, '27 was kind of negotiated last year. So, as you think about these negotiations, what's the framework in which you think that these companies are thinking about how much higher pricing could go within this LTA framework when they go from this year to next year? Then when some of this capacity comes up, you said there's replacement capacity, right? So, when the replacement capacity hits, like what happens to some of these pricing discussion around the replacement capacity?

Ian Beresford: Okay, on the first note there, so you're going to have the technology. Sorry, I lost my train of thought on that one. Can you give the first part of the question again?

Wamsi Mohan: Yes, I'm just thinking about LTA year to year, as you think about this year they're negotiating, let's say, '28. Last year they negotiated '27. So how much of a step up are they able to achieve? And is that step up just because the supply demand is getting even more, maybe further away, because of AI, does that mean we should see larger steps in the future years relative to the steps that we've already seen?

Ian Beresford: I think we will see larger steps because they see the benefit of how it's working out. So Seagate, of course, retains, at least they announced it, I don't know about WD, they retain the right to sell excess drives that they can come up with, whether they clean out the labs or whatever, or any excess capacity that they haven't done yet on the open market. And they were looking at maybe selling 10%, but this quarter they actually made 20%. They really liked that. That's how they used to establish what the market factors and forces will pay to establish the LTA pricing. That's their convincing point saying this could be what's happening, and everybody's chasing each other for the same drive. And it's better if you guys don't. So you tell me what you need and your competitor needs what you need, and everybody is going to have to deliver. It's kind of unspoken.

So, if you look at the LTA, it's like a futures contract is what I call it. Basically, you're going to have somewhere between 20% pricing and zero pricing, and it's going to be just above the midpoint. You're going to get something at say if above 10%, then you're above the midpoint. It means there's pull in the industry. You're between 14% and 16%, then you're getting a better price than on the open market, but there's still pull because you're above the midpoint. Once you start to drop below that midpoint, things start getting scary. You drop below the 10% increase, and the outside market forces are zero

to 20%. The LTAs are going to start becoming worthless. That means that the people buying the futures contract no longer have a belief that they're going to be a supply constraint, whether or not the supplier wants to have that or not. So right now, they're positive. They're above the midpoint. So whatever that is, if that's a zero to 30% increase over year to year, they're way above 15%.

So that locks in that pricing, but it also tells the supplier where I can allocate my spending to make sure that you get those. These guys in the AI sector they're going to not succeed if they don't have the right hard drives, the right chipsets, the right optics modules and everything else in there, the right memory. So, they have a vested stake to make sure you succeed. They don't want you just going off and building more units because you can't stuff more units into the AI server centers. It's just not like, hey, I'm going to make a bunch of one terabyte hard drives. They want really high technology to fit into these constraint boxes, even though they're assumed to be very huge. So that's how I price these LTAs. I think that's how they work for me.

And then your second part of your question?

Wamsi Mohan: So the second part is really as you think about the drives that are coming up for replacement, how would the pricing for those change, or would it be just consistent with whatever else they're pricing at that point in time?

Ian Beresford: It's probably still under the LTA. Depending on when they're going to time out, some are three years, some are five years. Often these will work plenty after that. So, if the AI data center is big enough, if some fail, they'll just swap them out whenever. So they may not just automatically at five years. But if it's government banking and sector and certain sectors, they're mandated to swap these out, they'll have another agreement how to replace those with like type drives, and then they actually will sell those to a partner company or a lower grade company somewhere around the world and reallocate those, or just turn them into B2B commerce, or something, turn it into streaming videos or whatever if it's Amazon, so just reallocate the entire server area.

And the GPUs as well are going to be leapfrogged, so is some of the memory and some of the cabling going to optics from electrical power, that's going to speed everything up, lower the heat intensity of the electrons and all the power usage, so it's going to speed things up just by nature of being higher technology. So that's a question that's going to remain to be seen is what do you do with these legacy data centers? Because at today's speed of technology, five years is going to look totally different.

I haven't got there yet. People have asked me those questions, and I'm still trying to figure out from a multi perspective, not just hard drives, but that's going to be a topic of it is stay the course? I don't think so. You're going to have to reallocate or just sell the whole building to someone else and build a new one because you're the leader.

Wamsi Mohan: Is there a material difference in the way that maybe Seagate and Western Digital think about LTAs, if you have a view on that?

Ian Beresford: Seagate thinks about the technology portion, and now they can basically use that money to enhance the inherent technology of each drive, so that it's better. It's more terabytes per drive. Trying to get to the 60 terabytes, trying to get to the 80 terabytes per drive, that's going to keep the cost per terabyte down, and compete with SSDs, which is constantly getting high tech. That's what they're worried about five years down the road is making sure that we keep outperforming those guys on the cost per terabyte for things that doesn't need to be super high speed. WD looks at it more from a cash flow perspective and how they can invest in their hard drives, but they're a low cost leader in manufacturing, and they're often looking how to deploy the capital in different ways. I mean, I don't know, they make some strange decisions to buy Toshiba's chips business, and then that went nowhere after paying loads on debt. So they're looking at the LTA a little bit differently because I think their technology side is behind, and they want to be a fast follower, so it's not super huge materially difference because there are



customer dictates, and the customer is going to dictate their terms, so that part of it is going to be I want a like-minded drive. I want something that's going to be in this capacity. I want the same power. I want the same utilization, same size, and I want it plug and play. And I want my price to stay fairly stable, so that I come down the road, you're the only supplier that's going to say three years from now I have the same pricing, and I want to flex upside 10% and you're going to deliver that to me because only you can do it and those are terms because I'm expanding. So those are different. And on the supplier side, they are a little different. Seagate has a technology mandate. In WD, I really don't know what they're doing, but they usually try to deploy their capital differently, some other investment.

Wamsi Mohan: I know we're coming up on the top of the hour, so what I want to do is just give an opportunity for our audience to ask questions. And maybe we could do this a little bit lightning round if there are a lot of questions. I'm not sure how many are out there trying to ask a lot that that came my way. But if there are more, feel free to hit me up on Bloomberg too. I'm happy to try to ask on your behalf if you have any more questions. But if not, let's just try to open it up to anyone on the call.

Operator: Certainly. If you are in the event via the Zoom interface and would like to ask a question, simply press the raise hand button and you should see a prompt on your screen to unmute and speak when it's your turn. If you are dialed in via telephone and would like to ask a question, please signal by pressing star one on your telephone keypad. If you are using a speakerphone, please make sure your mute function is turned off to allow your signal to reach our equipment. When it's your turn to speak, you will hear a message saying 'Your line is now open' and you may proceed with your question. Again, press star one to ask a question.

Wamsi Mohan: All right. Let's go ahead with the first question, please.

Operator: Your line is now open.

Participant: Hi. Thank you for taking these questions. I was wondering, Toshiba losing as much share as it has in past years, why has it lost that much share? Just thinking about its ability to re-compete and regain share. Just here's why it lost that much share.

Ian Beresford: Basically, they weren't interested. They were believing that they're going to go invest in their SSD and their NAND space, and then they merged that portion with WD. They really just trimmed down their hard drive side because they're not vertically integrated. So it's buying media from Resonac, it's buying heads from TDK, it's buying components from everyone, and that way they can actually just slow down without affecting them. They're not having idle capacity on a lot of vertically integrated equipment sets. So they just became a company with multitude of different conglomerates in Japan, with we're going to keep a little bit of the HDDs because we're a Japanese company and our government wants us to deploy some of these over there, but we were not a Seagate. That's purely a hard drive play, with some SSD stuff. And then WD, which was somewhere in the middle, they're trying to become an SSD, then a hybrid drives, and then both added the chips and thought they're going to run away with it. But their SSD side couldn't compete with Micron and SanDisk.

So again, I just don't think they were really committed to it, but just had some subsidies there to supply hard drives in Asia if somebody didn't want two American companies doing it.

Wamsi Mohan: I don't see more questions on the line, but I did get a few more over here, so I'm going to just ask the next one. So, I got this from a few people. If Toshiba does somehow start making progress towards 30% market share, what would Seagate and Western Digital do in response? Would there be pressure to expand capacity to maintain market shares?

Ian Beresford: Yes, I think so. If Toshiba has the ability to get to 30%, that makes it sound like you're carnivorously taking someone else's share. You're actually biting into Seagate's share and WD's share, which I think is odd because they have long term agreements. Those are set in stone, so they get that supply. So, you're taking it from them as opposed to just building. I don't see how they do this. I see if they add additional capacity, then Seagate and WD can do what they want if they have some floor space and some equipment still being installed, it takes forever to buy Interfax and Ameldas and whatever. So, how do you get that organic 30%? It's only by taking it away from Seagate and WD to change the ratio. So, I think they're just doubling their capacity. I don't know about the share thing. I'm very skeptical about that.

Wamsi Mohan: Yes, it makes sense. Maybe just to wrap it up because we've only got time for probably one more question, there was a question about, we didn't talk about this, what do you think physical AI and agents will do to demand of HDDs?

Ian Beresford: Nobody knows what these physically AI agents are actually going to do. They seem to write their own roadmap. But I believe that they're going to want to keep storing and creating content, by nature of what their job is. So, I think it's going to just stay on the course here. I think that's what's driving it. I think the people behind this, the guys who run these AI data centers, ChatGPT and these guys, they know more than we do, and they know why they're driving this, why they're building these gigantic places in Texas and around the nation, and why they need so many HDDs and GPUs. So they're not coming out explaining why, but they have reasons behind it. I think it's just going to keep driving what is already there. We just don't know all the facts. It's baked into the pie, I believe.

Wamsi Mohan: Yes.

Ian Beresford: Does that make sense? I know we're short on time, but if we need to do this again sometime, or check back in three months or whatever, or get the rest of the questions, I'm available.

Wamsi Mohan: We appreciate that. This was super helpful. Why don't we take that one last question, and then after that, we'll wrap the call up. And thanks everyone for joining.

Operator: Your line is now open. Please unmute.

Participant: Hello. So I'm not sure if you spoke about this, but assuming Toshiba causes STX and WD to add capacity to maintain market share, assume also they double production, do you think there could be an impact to NAND prices because the rally in NAND initially started when there was a shortage in HDD. So, how do you see the NAND market if more supply comes from the hardest dry vendors in a year or two?

Ian Beresford: I don't think it's going to affect the NAND prices much. This is still such a small amount of product coming out. Even announcing the doubling of this, it's not large. And 30% of the market share, that's different. That's not doubling your capacity. That's them going at a huge chunk of the business. I don't know if anybody trusts them to do that. They're not the low cost leader, they're not the technology leader. They're just in the space. So right now, it's hard to really price that. It's vice versa. There's a shortage of hard drives, so they want people buying more SSDs. But SSDs are built on the same foundry wafers that build every chips, so they're always competing for that space, so they have their own issues. I don't think at the hard drive a small amount of increased capacity by Toshiba is going to have a huge effect on that. I wonder if it even matters right now. Again, on today's stock prices, I think it's all just a way over, way over done. It's just an announcement, and people don't understand that this is a small play. And it's likely not to happen in the time frame, and it's likely that there's going to be one of the 10 suppliers has a problem.

Participant: Okay, thank you.

Wamsi Mohan: All right, amazing, Ian. Thank you. This has been very helpful. We really appreciated the conversation. Thank you for taking the time. We'll probably recircle back with you soon enough to arrange a follow up, because we did have a lot of questions we didn't get to so we'll definitely circle back with you. Thank you everyone for joining. If you have any follow ups that we can help with you as well, please reach out.

Ian Beresford: And thank you, everyone. It was a pleasure and I hope you found it valuable.

Operator: Thank you, ladies and gentlemen. This concludes today's webinar. You may now disconnect from the call. Thank you.

Abbreviations

AI: Artificial intelligence

ASP: Average selling price

AWS: Amazon Web Services

B2B: Business-to-business

BofA: Bank of America

BofAS: BofA Securities

BOM: Bill of materials

CapEx: Capital expenditures

CMR: Conventional magnetic recording

CTO: Chief technology officer

DoD: Department of Defense

EB: Exabyte

EPMR: Energy-assisted perpendicular magnetic recording

EPS: Earnings per share

ESMR: Energy-assisted shingled magnetic recording

EVP: Executive vice president

GPU: Graphics processing unit

HAMR: Heat-assisted magnetic recording

HBM: High-bandwidth memory

HDD: Hard disk drive

IBM: International Business Machines

IT: Information technology

LLM: Large language model

LTA: Long-term agreement

MBA: Master of Business Administration

NAND: Not AND, a type of nonvolatile flash memory

PC: Personal computer

PCIe: Peripheral Component Interconnect Express

P/E: Price-to-earnings

PO: Price objective

R&D: Research and development

SKU: Stock-keeping unit

SSD: Solid-state drive

STX: Seagate Technology ticker

TB: Terabyte

TCO: Total cost of ownership

WDC: Western Digital Corporation ticker

WD: Western Digital

Price objective basis & risk

Seagate Technology (STX; C-1-7; $807.57)
Our PO of $1150 is based on 19x our C2028E EPS estimate of $61.42. This multiple compares to the historical P/E range of 6x-28x, with median 10x, and is warranted in our view as demand continues to outpace supply, pricing continues to go higher, and peak earnings can be higher than historical peaks. The multiple balances near-term headwinds against the return of a more rational HDD industry and return to revenue and EPS growth.

Downside risks to our price objective are: (1) any slowdown in cloud/data center spending, (2) worse than expected industry pricing, (3) increased usage of NAND flash vs. hard disk drives, (4) share loss to WDC in the enterprise HDD market, (5) further unit declines in desktops and notebooks, and (6) degradation of cash position and potential violation of credit facility covenants. Upside risks are: (1) higher than expected demand for HAMR drives, (2) better mix of high capacity/nearline HDDs, which could drive ASPs and gross margin higher, (3) improved technological advantage and total cost of ownership benefit over NAND flash so as to reduce SSD penetration, (4) consumer PC refresh cycle driving higher hard drive demand, and (5) improved free cash flow generation.

Western Digital Corporation (WDC; C-1-7; $405.42)
Our PO of $720 is based on 19x C28E EPS of $37.65. This multiple compares the historical range of 5x-27x, with median 8x and is warranted in our view as demand continues to outpace supply, pricing continues to go higher, and peak earnings can be higher than historical peaks. The multiple balances near-term headwinds against the return of a more rational HDD industry and return to revenue and EPS growth.

Downside risks are: (1) any slowdown in cloud/data center spending, (2) slower qualification and launch of HAMR drivers vs. expectations, (3) worse than expected industry pricing, (4) share loss to STX in the enterprise HDD market, (5) further unit declines in desktops and notebooks, (6) degradation of cash position and lower free cash flow and (7) failure of strategic actions to drive incremental value.

Upside risks are: (1) significant pickup in high capacity/nearline HDDs, which could drive ASPs and gross margin higher, (2) share gains in enterprise HDDs, (3) faster than expected launch and ramp of HAMR drives, (4) consumer PC refresh cycle driving higher hard drive demand, and (5) improved free cash flow generation and faster debt pay down.

Analyst Certification

I, Wamsi Mohan, hereby certify that the views expressed in this research report accurately reflect my personal views about the subject securities and issuers. I also certify that no part of my compensation was, is, or will be, directly or indirectly, related to the specific recommendations or view expressed in this research report.

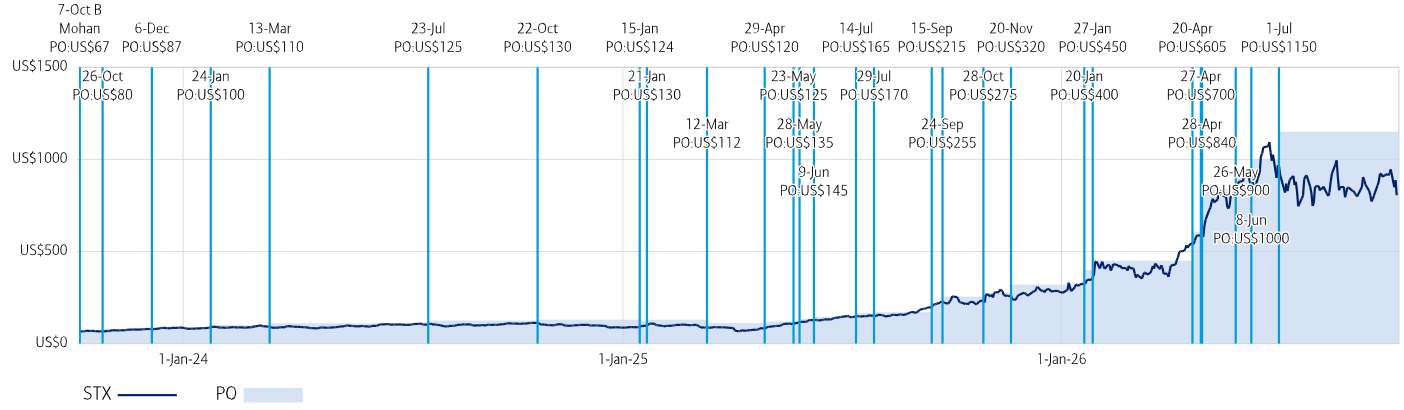
US - IT Hardware and Technology Supply Chain Coverage Cluster

Investment rating	Company	BofA Ticker	Bloomberg symbol	Analyst
BUY				
	Amkor Technology Inc.	AMKR	AMKR US	Ruplu Bhattacharya
	Amphenol	APH	APH US	Wamsi Mohan
	Apple Inc.	AAPL	AAPL US	Wamsi Mohan
	Bel Fuse Inc.	BELFB	BELFB US	Wamsi Mohan
	Celestica Inc.	CLS	CLS US	Ruplu Bhattacharya
	Celestica Inc.	YCLS	CLS CN	Ruplu Bhattacharya
	Corning Inc.	GLW	GLW US	Wamsi Mohan
	Dell Technologies Inc.	DELL	DELL US	Wamsi Mohan
	DigitalOcean	DOCN	DOCN US	Wamsi Mohan
	Everpure Inc	P	P US	Wamsi Mohan
	Flex Ltd.	FLEX	FLEX US	Ruplu Bhattacharya
	Hewlett-Packard Enterprise	HPE	HPE US	Wamsi Mohan
	Ingram Micro Holding Corporation	INGM	INGM US	Ruplu Bhattacharya
	International Business Machines Corp.	IBM	IBM US	Wamsi Mohan
	Jabil Inc.	JBL	JBL US	Ruplu Bhattacharya
	Nutanix Inc	NTNX	NTNX US	Wamsi Mohan
	Sandisk Corporation	SNDK	SNDK US	Wamsi Mohan
	Seagate Technology	STX	STX US	Wamsi Mohan
	TD Synnex Corp	SNX	SNX US	Ruplu Bhattacharya
	TE Connectivity Plc.	TEL	TEL US	Wamsi Mohan
	Western Digital Corporation	WDC	WDC US	Wamsi Mohan
NEUTRAL				
	Arrow Electronics Inc.	ARW	ARW US	Ruplu Bhattacharya
	Avnet Inc.	AVT	AVT US	Ruplu Bhattacharya
	CDW Corp	CDW	CDW US	Ruplu Bhattacharya
	Concentrix Corporation	CNXC	CNXC US	Ruplu Bhattacharya
	Enovix Corporation	ENVX	ENVX US	Ruplu Bhattacharya
	NetApp Inc.	NTAP	NTAP US	Wamsi Mohan
	Sanmina Corporation	SANM	SANM US	Ruplu Bhattacharya
	Sensata Technologies Holdings Plc	ST	ST US	Wamsi Mohan
UNDERPERFORM				
	HP Inc.	HPQ	HPQ US	Wamsi Mohan
	Super Micro Computer Inc.	SMCI	SMCI US	Ruplu Bhattacharya
	Teradata Corporation	TDC	TDC US	Wamsi Mohan
	Vishay Intertechnology, Inc.	VSH	VSH US	Ruplu Bhattacharya

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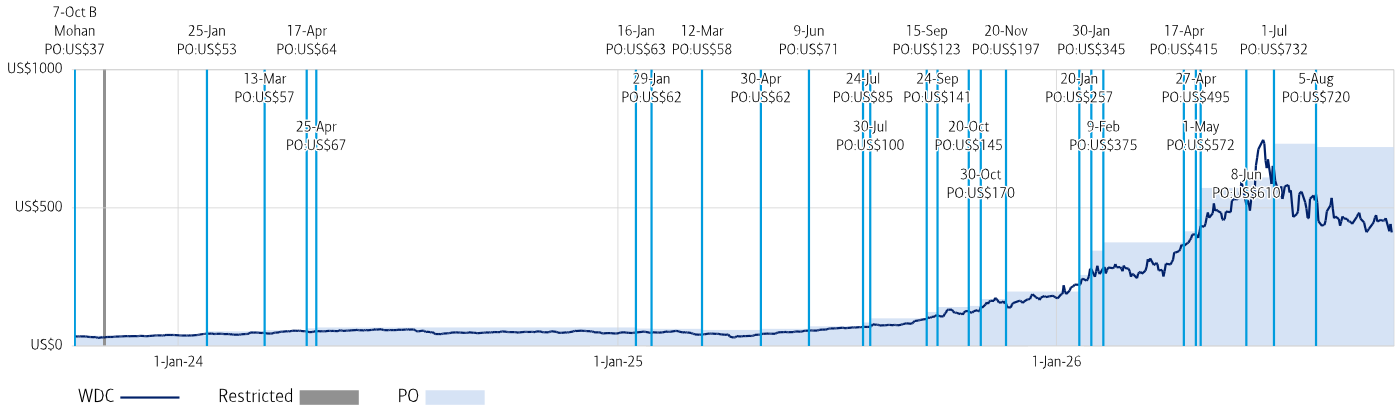
Seagate (STX) Price Chart



B: Buy, N: Neutral, U: Underperform, PO: Price Objective, NA: No longer valid, NR: No Rating

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Western Digital (WDC) Price Chart



B: Buy, N: Neutral, U: Underperform, PO: Price Objective, NA: No longer valid, NR: No Rating

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Equity Investment Rating Distribution: Technology Group (as of 30 Sep 2026)

Coverage Universe	Count	Percent	Inv. Banking Relationships [R1]	Count	Percent
Buy	255	62.04%	Buy	157	61.57%
Hold	82	19.95%	Hold	46	56.10%
Sell	74	18.00%	Sell	31	41.89%

Equity Investment Rating Distribution: Global Group (as of 30 Sep 2026)

Coverage Universe	Count	Percent	Inv. Banking Relationships [R1]	Count	Percent
Buy	2057	57.03%	Buy	1386	67.38%
Hold	806	22.35%	Hold	563	69.85%
Sell	744	20.63%	Sell	446	59.95%

[R1] Issuers that were investment banking clients of BofA Securities or one of its affiliates within the past 12 months. For purposes of this Investment Rating Distribution, the coverage universe includes only stocks. A stock rated Neutral is included as a Hold, and a stock rated Underperform is included as a Sell.

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Investment rating	Total return expectation (within 12-month period of date of initial rating)	Ratings dispersion guidelines for coverage cluster[R2]
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Neutral	≥ 0%	≤ 30%
Underperform	N/A	≥ 20%

[R2]Ratings dispersions may vary from time to time where BofA Global Research believes it better reflects the investment prospects of stocks in a Coverage Cluster.

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