

ASI Technology Summit Q3 2021
Blast Off – Exploring Micron’s Recently Launched Storage Solutions!

0:04

Well, good afternoon, everyone. This is Kent Tibbils with ASI. I want to thank you all for joining us for day two of our Technology Summit.

0:14

Today, we have joining us, the whole crew from Micron to go over their product line, Though in just a minute here, I'm going to introduce Micron and let them get things kicked off. But there was a couple of things I wanted to go over from yesterday.

0:30

And just kind of cover a few housekeeping items, though.

0:33

First off from yesterday, we heard from Intel and they covered all things client. And one of the things we had to do from that session was to give away the prize that they had to Rappel off, which is an Intel notebook.

0:49

But attendance was really, really good yesterday, and I'm always really happy with the turnout we had, and so, we have some additional prizes that we're gonna give away today.

1:00

So, in addition to the Notebook, I'm gonna go ahead and wrap a lot, some \$50 gift cards. Go ahead and take care of that now. Let me first start by announcing the \$50 gift card winners.

1:15

We have Andrew Madrid, Melissa, Novice, Michael Sparks, Shannon Wallace, Andrew Whittemore and Derek. Congratulations to everyone without a \$50 gift card for you.

1:32

I'll connect with you guys through e-mail to get all the arrangement for that and for the notebook. we have Prize winner from yesterday is Paul Hsu Meyer.

1:42

So, congratulations, Paul, and I'll connect with people there, and make arrangements for getting you that notebook.

1:48

So, for today, we have Micron, and Micron is raffling off two pairs of PowerBeats Pro and I might have that name wrong, but they're wireless power beats, headphones.

2:01

Really cool.

2:02

We're going to be actually raffling off two pair those, to two lucky attendees from today's session.

2:09

So before, I kick everything off to David, and that's kinda, David's heads up that this thing is coming his way, so I'll give it a minute here to unmute. But before we kick everything off with David, and get started with the micron presentation, I want to remind everybody that are questions.

2:26

You can submit your questions through the question chat, all see the questions, and be able to ask him micron the questions as you guys submit them. So, I encourage you to go ahead and submit the questions as we go through the presentation.

2:40

We'll cover some questions as we go through. We'll get to the rest of them at the end. And if there's anything that we don't get a chance to answer, we'll follow up with you guys afterwards. So, definitely submit your questions.

2:54

Don't hold back on anything there. We want to make sure that we get all those gathered in and get as many answered as we can.

3:01

So, with all that said, I want to turn everything over to Micron and first let me introduce our ASI account manager.

3:10

So, David, take it away.

3:14

Awesome, thank you Kent, thank you Shelly. Thank you ASI. Good afternoon, everybody. Like Kent said, my name is David ... and I work at Micron, and I am a distribution account manager for ASI.

3:27

And We love these events with you guys. We hope you guys are doing well. We hope 2021 has been OK for you, all. We, obviously are, we missing you, guys, and we appreciate the time today. To kind of get in front of you guys. Let us know what's an exciting A new for us and I'm very excited to have with me two of our leading experts on our micron branded client, SSDS, his, name's Andrew, and obviously we'll be going through our microloan portfolio and some new products. And then also we have Brian Barton who is going to be leading our crucial SSD side.

4:02

So, again, thank you to ASI. Like Kent said, we very much appreciate the dialog. So, feel free to chat in the chat box, can, can have, you know, some, some dialog therewith questions, and if you have anything that you need after the fact, we're happy to help. So, without further ado, thank you very much, Andrew.

4:21

Excited to have you all, you.

4:23

Alright, thanks everybody for attending. Once again, my name is Andrew ..., I'm a product marketing manager through our CPG group and I work with our micron branded SSDS through the commercial channel, and so what I wanted to do is spend a little bit of time talking about our brands, our products, and some of the competition that we see out in the industry and how we stack up.

4:47

So, starting off, you know, hopefully, everybody has heard of Micron, and but maybe if you haven't, you know, hopefully you've heard of our crucial Brand. one of the things we get asked a lot is what is the difference between Micron and crucial?

5:00

Well, really, it's two brands, but it's, it's one channel. It's one company crucial is is a brand that is a part of micron, it's not a separate entity. It's not a somebody that we bought years ago.

5:12

It's just a brand and it's mostly focused more towards the consumer side of the house where the micron branded products are more B2B and, you know, integrating those into, you know, other products by our partners and our customers. And so, when we take a look at the SSD side, the way we kind of look at it is that if it's a consumer SSD, it's going to be under our crucial brand. If it's more of a client or a cloud or a data center SSD, it's going to be under our Micron brand.

5:42

So when we take a look at who are the target customers, because sometimes it can be a little bit confusing, on the consumer side, we're looking at consumers, you know?

5:51

People that are doing gaming a little bit into business, while the client and cloud side it's for OEMs, system, integrators in data centers, corporate IT, more of that B2B type of business. And so the target for the brand on the crucial site, it's really, it's, it's things like aftermarket upgrades. And so if you're out there and you're going and you're wanting to build a gaming PC, or you're gonna want to build PCs for small, medium sized businesses.

6:19

And you want to be able to have the latest and greatest SSDS, you would typically start off by taking a look at crucial on the microsite. It's more for integration, or design, in type of solution.

6:31

So, know, if you're designing a product that you're going to want to ship to other customers, and you're going to want to, you know, have very specific requirements, and you want to be notified, If things change on the bomb and you want help with, you know, change notifications, EOL support, things like that, Micron may be the better brand for you.

6:56

And so, you know, depending on the type of support that you want, is really going to help decide which of these two brands you're gonna wanna go after because when we talk about consumer and client SSDS, what you'll see throughout the rest of the presentation is, is at a technical level, at a product level, they're going to be very, very similar and what we're offering, it's just what sort of support you want and what sort of customers are you targeting.

7:23

Just to be honest, if I go into a data center account, they're definitely going to want to look at the Micron brand. That is, it's a known quantity, specifically because of our large presence on the DRAM side, But if you're going into into a market that's more end customers more gamers, they may not have even heard of micron, but they've definitely heard of crucial. So, those are really kind of the different areas, and the different types of customers that that we target with RSS feeds. And so, I'm going to spend the next few minutes talking about the micron side of the house, and then I'll pass it over to Brian to talk about crucial.

7:58

So, when we talk about client, what is client? So, client is really any any sort of boots solution is kinda the way we define it.

8:05

So whether it's in a laptop or desktop workstation or even the boot device in a server, that's really where client can fit in.

8:13

And for us over the last couple of years, it's taken a little bit of time to really get PCIE gen for adoption because there's a lot of different things that had to happen at the same time that, in some, respect, her out outside of microns control. So, we need ecosystem adoption. We market adoption, and we have to have the sort of price and availability to match. And, so, while on the consumer side, Gen four has been around a little bit longer, when it comes to the client side of the house. It's taken a little bit longer. So, if you were to buy a laptop, or a desktop from one of the Big OEMs like like Dell, Lenovo, you're just now starting to see more Jen for adoption.

8:52

Where, if you are building a gaming PC two years ago, you would have already won it. You want to be on Gen four. And so, we think on the client side, you know, now's the right time to jump in on that.

9:04

And so when you take a look at both client and consumer combine, you can see a huge transition over to PCIE, Gen four. And so, 2021, we've seen some massive gains over the previous year, but take a look between this year and next year.

9:20

A lot of this is due not only to just, you know, the need for for bigger and better and faster products, but also, you know, obviously, Intel has a huge part of this. And they're supportive.

9:30

Gen four is going to help, you know, accelerate the adoption on the client. And consumer side, and so, really, if you're not in the PCA gen four game today, you're gonna start to get left behind that, wasn't necessarily true, maybe 6 to 12 months ago.

9:49

And so, on the micron branded sites, our client necessity that we just release is a micron 3400.

9:56

So, we'll talk about some of the specifics here coming up, A couple of the big things here and really, the major one is the NAND that we have in here. And so, you know, if you're talking to an end customer, they may not care about what the actual components are that are used in any of these SSDS. But for micron, we're at 176 layer, three-d., TLC, NAND. and if. If, if you don't know anything about that, that's fine. What it means, though, is that we're an entire generation ahead of our competition.

10:27

Were anywhere from about 9 to 15 months ahead of everybody else. And what that means is you're sure you're going to be able to get the micron 3400 with very similar performance at a lower cost.

10:38

And really, when you talk about clients and boot solutions, cost is obviously a very important piece of that equation. It's not just performance, it's not just reliability. Those things are immensely important.

10:50

The price absolutely plays, plays a big part of that. And with us having the latest and greatest man technology, it means that we can get to a lower price point than than our competitors. So it's a big deal.

11:03

Now, like I said, where would we use the 3400? that?

11:06

You know, I kinda talked a little bit about, you know, it would be in a laptop, desktop workstation, those types of environments. But what what are the sort of applications that you would actually use this on? So, 1, 1 of the major pieces we have is for, for content creation, whether it's, it's 4 K 6 K 8 K video, You're going to need a lot of that raw speed to be able to edit that video in real time.

11:33

Also works great at a corporate level. So, if you have, if you have customers that are doing software development and where they're needing to compile a large amount of code, you know, into into a working executable, that can take a lot of times in time and it can be very resource intensive, including on the SSD on the storage. medium.

11:54

We also have any sort of digital workflow, post-processing, stuff like that. And then as I said earlier, you know, any type of corporate computing where you're really having to do a little more design in.

12:07

Meaning that that you're your requirements are maybe beyond just a size and cost point.

12:14

Maybe there are some very specific things that, that, in terms of performance, reliability features, that you're going to want to be able to lock in for a longer period of time.

12:25

So, that's a 3400.

12:29

You know, taking a look a little more in detail. You know, we already talked about the 176 layer. Not only is it gets you to a lower cost point, but, as nanotechnology progress, as you get a lot of other benefits, we've got 85% higher, right? throughput are, random, reads are faster, are random, writes, are faster. So, So, really, it's, it's one of those things in the storage industry. Typically, when you move from one NAND technology doesn't exits. It's a win-win situation. You get a faster product at a lower cost, So, you know, everybody loves to hear that. We have capacities up to two terabytes.

13:04

So when you, when you take a look at those, those, you know, content creation workflows, and you start talking about, you know, dozens or hundreds of gigabytes that you need to be able to store and process. Whether it's a video or whatnot, we are going to be able to meet that with a high capacity. And then finally, power efficiency.

13:24

So, um, power efficiency affects end customers in two ways, one is that if you're in a system that requires battery backup, so say a laptop or something like that, obviously having lower, a lower power draw is going to be able to extend that life.

13:41

But if you're not doing laptop, say you're doing a desktop, What the lower power draw also does is it lessens the amount of airflow that you need in that system. So these drives run very, very fast and they generate a lot of heat. And so if you can reduce that, what you can do is, is not have nearly as much cooling, or you don't have your components that are going to be heating up nearly as much. And so power efficiency is definitely a big thing, regardless of whether you're on a desktop or a laptop.

14:13

So let's take a look at a few more of the features of the 30, 400. I'm not going to dig in to all of these. But you can see the different speeds and feeds at the different capacities.

14:23

With performance up to 6.6 gigabytes per second, we have sequential reads that are over five, that are at five gigabytes per second. Random reads that are 700,000. Same thing with the writes.

14:35

And then on the left, you can see a host of other things on, here, know, you may not know what every single one of these are.

14:44

But, you know, you, one of the things here that's, that is interesting that may or may not concern you guys, but it's something that maybe, you know, since you had Intel, I believe yesterday, we actually meet the Intel's project, Athena open lab test requirements.

14:58

What that means is that you can put this into an Intel project, Athena system, and the Power Draw and the power characteristics. And being able to go into stand-by, and all the asleep states, hit a certain requirement.

15:12

So that any Project essence capable product to go into one of those systems and you're not gonna see any weirdness in terms of performance and power drawn, things like that.

15:25

So, lots of different things here that, you know, that we support, but probably the big thing for your customers.

15:31

It's, you know, what's, what, what's the word has the capacity is available, what is the performance, or what is the cost?

15:39

So, last little section that I had is on the competition. So, the competition is, is near and dear to me. I was in charge of all of our competitive intelligence and analysis for about six years, before I went into this role.

15:56

And so, I always, I always like to talk about competition because it's really important, especially if you're not an SSD expert. If you don't pay attention to the market constantly, it can be pretty confusing to be fair. You know, we have a certain way of speaking about our products. Intel, Samsung, WD, they all talk about. We all talk about products in a similar way, but not always quite the exact same way, and it can. It can absolutely get confusing.

16:20

And so, you know, one of the things that, that, I've produced over the years, just this competitive overview.

16:27

So, the first thing, if you're comparing two products to see the most important thing, that, that seems simple, but isn't always, is making sure you're comparing an apples to apples product. And so, micron, this is kinda the way we slice and dice the storage market in terms of enterprise data center, client, and consumer.

16:48

And then, you can see, from left to right, you can see my Cronan, Baloo, and are what we consider our tier one competitors on to the right. And so what's really important here, for us is that we're comparing like products, because if you start comparing things that aren't quite the same in the SST industry, you can very quickly start making some bad comparisons, and you can you can end up picking the wrong product. So for us, everything on the same row left to right is what we consider apples to apples. As you move diagonally, things change really quickly.

17:20

Things such as performance endurance, absolutely cost, Even form factors, and capacities can change. And so, you always want to make sure you have that comparison.

17:31

The other thing that I always want to call out here, too, is the difference between client and consumer, because it can be a little different depending on the company, so micron which we try to make it really easy. If it's client, it's a micron branded product, and we have that sales and support structure that I mentioned earlier. And then you have the consumer side.

17:50

With some of our competitors specifically Samsung it can it can get a little dicey because if you've seen you know if you've been around SSD for awhile you've probably heard of products like the 980 Pro or the 970 Evo and Evo plus and things like that. Those are actually their consumer brands.

18:09

Well, you may not have heard of this things like the PM 9 A 1.

18:12

So that's one that's typically not, it's, it's harder to get through the channel, Samsung doesn't necessarily like to Play Will play nicely in the channel. They'd like to sell to the OEMs.

18:22

So you're more likely to get that sort of product out of a laptop from HP or Dell or one of those OEM's rather than you can in the channel.

18:33

And so if you go to consumer that, that's fine, because obviously we have the crucial brand. We, and Brian's going to talk about how we compare with our P five plus against the 980 Pro and the WD Black, and those sort of sort of

products. But if you need us, if you need things like bomb control, and product notification, and EOL support, you're typically not going to get those from our competitors under their consumer brand.

18:57

So, when I jump to the next slide here, what you're gonna see is our 3400, when we compare to Samsung, we're not comparing to the 980 Pro.

19:04

We're not comparing to the WD. Black *** and 8 50. Those are consumer drives, and Brian will show that. But when you take a look at just the client ones that have very similar sales and support structure, what you're gonna see is where we're pretty well positioned.

19:19

WD surprisingly enough, does not have a Gen four client drive at this time.

19:25

Samsung's drive is a really, really high performer, but like I said, it's harder to get into the channel.

19:29

It's harder to, to procure that, as opposed to, you know, the micron and crucial branded products.

19:36

Which are where, you know, it's, it's definitely easy to work with, with ... and get these, get these products, But you can see here that, you know, Samsung, maybe a little bit higher performer but because of our 176 layer NAND, we definitely come in at a more competitive price.

19:53

And that's kinda what you get with you know, where we're at on the client side.

19:57

Is that, know, this performance just a couple of years ago, not even a couple of years ago. These would be some of the highest performing SSDS, you know, regardless of whether it was consumer or a data center and now this is kind of table stakes. You know, 5, 6, gigabytes per second and we're starting to get to the point of diminishing returns. In terms of performance. You know, even though I can call it out here, that, that Samsung has, you know, a million random read i-ops and we quote only has 720,000.

20:27

These are not actually Metrics that a normal, everyday user would be able to tell.

20:35

You know, they're gonna have a very hard time telling the difference between any, you know, of these Gen four drives and so when, When?

20:44

The difference in performance, if, once, once the customers stop seeing those differences, then it has to shift to other things like, you know, do they offer the right capacity, and do they offer it at a better price point?

20:56

And so, that's kind of our proposition. Here is more of a value play than a pure, You know, let's have the absolute fastest thing out on the market.

21:06

So, with that said, no, ending up my section, Obviously, if there are any questions, please put those, into the, into the chat, and we'll address those. But, the three big takeaways is that: look for the micron branded products.

21:20

It's OEM's, System, Integrators Data Center, corporate IT, B2B type business on the crucial side. It's definitely consumer, gaming, business, aftermarket upgrades. Things of that sort.

21:33

On the product side are 3400. I did forget to mention that actually just came out about two months ago so. Very, very new product. for us, we're really excited about it. You know, remember, PCIE gen for performance. So the latest and greatest and performance and industry leading NAND, which will which means that we should be very, very competitive on the pricing side of things.

21:56

And then finally, on the competition, 3400, we're really competitive against Samsung and WD, whether it's in performance, cost, features, anything like that.

22:07

So before I hand it off to Brian, Kent, did we have any questions pop up?

22:15

Yeah, we have a couple of questions and one I'm going to save to the end, and this question, I'm not sure if it relates to to your slide deck, or maybe Brian, or maybe, actually both.

22:28

But we have a customer who's asking, are there different solutions that emphasized write heavy platforms and offer longer driveway?

22:40

Absolutely. So, let me just back it up here. So, client and consumer, And this is a really, it's a kind of a technical point, but it is so important. On client and consumer, we radar drives And not just we.

22:54

We we as the industry, so Intel, Samsung, will follow the same path, is that we re client and consumer drives on an on a number of terabytes, you can write over its lifetime, but it's based on a very specific workload, which is client like meaning. You know, right now, I'm giving this presentation. My SSD is idling. It's not doing anything and the vast majority of client and consumer workloads most of the time it's sitting there in Idle. It's it's a it's workload that we call very bursty. You do a whole bunch of work and then you set. If you need something that is, is, has higher endurance, you would move up to the data center line.

23:30

And so, on. the data center line, its endurance is based off of what we call a steady state level.

23:36

Meaning you're hitting the drive 24, 7, like you don't. you don't give it any time to rest, and that's how we rate it. So, it's, it's best case versus kind of worst-case. And so, typically what I would say to customers that are worried about endurance is take a look at some of the read centric drives that we have. in the data center. There is going to be a cost adder because at the end of the day for SSDS, if you want something that either has higher endurance or higher performance, you're typically going to pay for it. Not, nothing in life is free, right?

24:07

And so, take a look at our data center drives, which isn't really the focus of this presentation, but we'd be more than happy to answer any questions on that. But that's that would be my general advice for somebody that's worried about that.

24:20

There, there are certainly some client and consumer drives that may offer slightly better endurance, but like I said, it's tested for a workload that is very light.

24:34

So, we've all become familiar with number of bits impact, the drive's endurance, so the morbidity and purcell the lower endurance. You're going to have, like a Q L C with four bits would have lower endurance than the PLC with three bits per cell.

24:52

What about layer? You're talking about, you know, 176 layer verse 128 layers.

24:58

Do the number of layers do anything to Endurance or that just allows you to have a more dense drive?

25:05

Yeah, that's actually a really, it's actually a really good question.

25:09

Number of layers does not impact the endurance, whether it's ... or anything like that, So, so it's not affected there. Typically, what it does is it allows us to, when we pack and more layers, the actual X Y size of the dye, which is kinda the smallest, the smallest components that we put on a wafer, We typically can shrink that smaller. So, we can put more dye with more layers on the same size wafer. So, what you're doing is you're getting more bits out of a wafer.

25:42

And so when you do that, cost goes down, but you do not affect hinderance.

25:46

The other thing I always want to make very, very clear on in terms of endurance between Q L C, and and TLC.

25:54

Is that we, we absolutely specify our drives in their endurance at a drive level. So, if you have a drive that is specified at 600 terabytes, written over its life, whether it's TLC, Q.I., C, Whatever type of technology it is, SaaS, what it's warranty, and that's what it's designed.

26:14

And so always look at that T B W Number, or on the data center side, drive rights per day. And it's kind of a, it's, it's a leveling metric, right? It doesn't matter what is happening behind the scenes.

26:27

That's what it's rated for because I know, I know, certainly, there's some customers they get, you know, very worked up when they hear Q L C. And I always have to remind people is, that happened 7 or 8 years ago with TLC and it happened to half decade, before that, with SLC. Everybody's always worried about that endurance. And it's something we should all be aware of. But but just understand the, we specify all of our products at a drive level.

26:53

Right, so let me go ahead and I'll ask one more question here. And then we'll, we'll move on. And that doesn't mean that we're not going to ask questions at the end. We just want to make sure we save enough time to get through the presentation.

27:05

And we will ask questions at the end.

27:08

So please continue to send in your questions, and we'll make sure that we get everything answered. But just really quick, before we move on, you talked about PCI again for with the new drive this is backward compatible to gen? Gen three, correct?

27:26

Absolutely, yes.

27:28

View have you. That's a that's a great thing about PCIE from generation to generation, is that you can take a gen for SSD Likes of 3400, put it in an existing system. And what it will do is, as a few of those metrics will max out, because of a bus limitation, but will still absolutely work, And so you can start using that drive. And then all of a sudden, you decide to upgrade to the latest and greatest, you know, Intel platform. That supports Gen four. And you already have a known entity and in the SSD.

28:01

Great. OK, so I lied, I'm gonna actually ask one more question and then we'll move on.

28:07

And I want to ask this question because I, I liked it, because you were talking about the hundreds of 76 layer on the 3400 Drive.

28:16

And I've not really heard this before about how, this also helps lower the power consumption and lower heat.

28:25

So, I'm really was really intrigued by that, and we have some customers asking a similar question about the heat and does the added heat or any temperature affect the speed or endurance of the drive.

28:41

Yes, that is actually a really good question.

28:43

And so, in general on, on, the SSDS is that just, and, and really, SSDS are, if you've ever if you've ever dealt with CPUs you have, the exact same thing is you will hit a temperature, typically slightly above the rate attempts.

28:58

So for us, we're 0 to 70, C is our operating temp, If you go beyond that, there will be a certain level that you will start to get degraded performance, and so it'll start thermal, throttling.

29:12

And so, what happens is that on SSDS performance is directly related to power.

29:17

And so, if you go faster, you generate more heat, just think, you know, the engine in your car, the CPU and your system, the faster it goes, the more heated generates. And so, once you hit that certain level, the SSD will start throttling itself back and that lower for performance, you get after throttling will pull the temperature down. Now, obviously, if you hit a certain point, it'll go into third trip, just like a CPU would, and it will say, all right, we're done here. But that's, you know, well above 70 C outs outside, where any of these drive should be deployed, and so, yes. Absolutely.

29:54

There is some performance outside of, you know, once you get past the operating temperature, So, at 70, see, it doesn't automatically shut down, there is, you know, a curve at ... that, where it will start, thermal throttling.

30:11

Was there a second part of that question?

30:12

I got the first. Well, I guess I was kind of asking that the the 176 because consumes less power. So, does that mean it would do less throttling?

30:26

Think of it. Think of it more.

30:27

This way is that if I had a peak, if I If I had an SSD, if I had an SSD that could do four gigabytes per second, then I say one I I had an SSD. Yes, it did three gigabytes per second. And I wanted the same SSD to do six. You would almost have to double your power.

30:48

So, what you get here is, it's not so much thermal, throttling what'll happen is that you can run it at a higher rate at, at, at, at that lower power draw. And so typically that's what happens. So, on our data center side, where we're less constrained in terms of thermals, we actually set certain limits, so you can have data as data. Center SSD is where you set a power limit.

31:11

You can say I want it to operate at 15 or 20 or 25 watts, and as you get higher, you get more performance. So, that's kind of what happens here, is, on the client side, where typically we typically have a, a certain power limit that we

have to hit, and it's just how much performance can I get before I hit that power number, which in turn equates to a thermal level?

31:35

So, we can we, we try and make it so that the SSD does not go fast enough to jump beyond that limit.

31:44

That makes sense. It's complicated. They're all very much tied together, performance and power and temperature.

31:51

Yeah, we'll have the design class later, but that was a that was a great explanation. So, thank you very much! Why don't we go ahead and move forward. So others, remind everybody online?

32:04

If you have a question, go ahead and type it into the question box. And we'll make sure that we get that asked and answered.

32:11

So, type in the questions, keep them coming and let's go ahead and continue.

32:19

All right, hi everybody. My name is Brian Barton. I am the Product Marketing Manager for Internal Consumer SSDS at Crucial.

32:27

So I'm going to touch on some marketing insights here for the first few slides, on the consumer side of the business, So a little bit of a shift from what Andrew just spoke to, and then kind of go over our portfolio and concentrate more on our, on our new products, and where they sit against our portfolio and also against competition.

32:44

So, I'll jump in here. So just just a couple of market insights to make sure we're all on the same page here with what the market is headed.

32:51

I was first one is about the shift from started a PCIe, so we're expecting the worldwide gigabyte 50, 50 split to hit the first quarter of 2022.

33:01

So, in North America, that's that's already shifted by every word and past 50%. zero point.

33:05

For PCIe, It's it's closer to 60% in some of our major partners, especially on the ETL retail side of the business.

33:15

But even, even worldwide, that that shift is happening, it's happening pretty quickly.

33:20

With that, shifts PCE, our shift up in capacity happens as well.

33:24

We're seeing satisfies, you know, shipped up in capacity, But the, the more popular strategized worldwide. A lot of them are still in the 250 to 500 gigabytes in some emerging markets, but on MDV sweet spot seems to be those higher capacities. So that below split is both Senate and PCIE. And it is on the consumer side of stuff and it's a unit metric from NPD. So this is specific to the United States.

33:49

But right now, the two terabytes, making up 13% of the cells, that once terabytes, at 34%, 500 gigabyte is 20%, and the 250 gig is 18%.

33:59

Kinda more, more telling is the chart below where the two terabytes of high in the red there, one terabyte triple, though in purple.

34:06

And you can see over the last few years, that grows in popularity, but those bigger drives, The blue bars are the 500 gigs and stayed relatively flat. You know, it's kinda been hanging out in that 30, 35 syringe for quite awhile.

34:19

And then the green and the light green are the 250 and lower specs. And you can see those ones kind of subsiding as we go through time.

34:27

So, the takeaway here is just, you know, we're shifting from Saturday PCE. And with that, comes a shift in capacities of two, goes to 1, 2 terabytes, and if you look really closely above the red, you can start to see greater than two terabytes with a four terabyte there in the tank, And there's a little sliver of a terabyte in the brown.

34:43

So, really starting to move up there, even on the consumer side of the business.

34:49

Next slide, Andrew.

34:51

This one's a market share data. So, just to kind of concentrate on the three key players. I think it's no secret that Samsung is the market leader.

34:58

On the consumer side of the business there, they kind of hover around the mid 30 percentile depending on the quarter, WD right. Behind them. Around 20%, and the crucial that, you know, kind of between 10 and 13%, depending on the quarter. Obviously, our goal is to, to grow that, and still some share with them, from W Dean and Samsung, and kind of fight for that second spot.

35:23

And the last one here on market insights is just how, how vital SSDS are as far as demand drivers for, for flash, right.

35:30

So you see smartphones over there on time, We're gonna become 27% of the demand, but SSG are still pushing 57%.

35:38

So, they're used, as you can see in all the different, in the legend, they're all the different ways, but there's SSD or a big, big driver. So, we're gonna continue to obviously push those and caution on our SSD business.

35:52

So, with that, we'll jump into our newest, latest and greatest product here. So, this is gonna look very, very repetitive and familiar as the P five plus, and the 3400, the.

36:03

Andrew just spoke to R R, one of the same sort of phrase, this is our consumer twist on the 3400.

36:11

It launched, with the same 176 layer NAND, and launched at the same controller is a 3400.

36:17

Therefore, the specs, as far as Read and Write, are the same rights for getting up. Those, 6600 megabytes per second on the raise, 5000 on the rights for those higher capacities.

36:27

Um, it's engineered for the professionals and gamers and creatives who need that high performance computing.

36:33

Um, like I said, Sam silicone with Micron, right R, NAND our controller.

36:38

And then, as Andrew mentioned, our mean time to failure exceeds that two million hours, So it's a very, very reliable drive.

36:46

And then, as always, our jive comes with our SSD management software for optimizing performance and data security, and the firmware updates that you need throughout its life span, and then comes with that 5, 5 year, limited warranty as well.

37:00

So this jive is again, very, very similar to the 3400, just with that consumer twist, if you go to the next slide here.

37:09

This is where it's going to sit in our current NVME line.

37:12

So we have some spec comparison here are pictures on the left, and we'll get into that a little bit further in, just a minute. A, current P five is in the center, there, and then our latest, five plus, the gen four drives on the right.

37:25

So you can see if your cache on the P 5 or 65, plus, we kind of stuck with that same file naming convention, because the drives look and feel the same.

37:33

They're essentially are the same except for you get that obvious Gen four perk of extra performance rights, very varied, obvious performance boost here between the two drives.

37:45

And that's, that's the main difference.

37:48

And the P 5 plus 1 will replace the P five here in the next quarter or so.

37:55

The next slide here is going to show you where it fits against competition. So Angie had kind of a higher level, you know, where it sat against competition just kinda breaks down the specs and why we are kind of price in the market where we are.

38:08

So as we compare the P five plus to the Samsung ... Pro and WD Black, ... 50, kinda market leaders there, you can see that the benchmark specs, as far as sequential reads and writes, are pretty comparable. Right. How's this be a little bit, but very, very comparable. We have them beat on the meantime to failure, so very comparable giants.

38:29

I put some dollar signs below each change, kinda indicates price in the market. And Samsung, though it is the market leader is also the most expensive.

38:38

Almost always WD Black. I kinda know the price themselves, usually a little bit below Samsung, and then we try to stick.

38:45

No. three or so percentage points below WD.

38:49

That changes how, often, as the retail and retail market changes quite a bit. But our goal is to kinda opinion, right below there to make, for some of those benchmarks, facts that were slightly, slightly lower on, but there's tremendous value. They're given that, you know, these are a good benchmark specs, right? You have to have your system very, very dialed in, with the latest and greatest to meet those specs and they're not necessarily what you're going to get on the on the average rig or QC.

39:15

So, we know we feel that as long as we're priced competitively, the value there is, it's very, very solid.

39:25

Got one more slide here, Andrew. I wanted to show this toms Harborview. Alright? So this is a third party doing a PC mark 10 storage test.

39:33

PC Martin is testing more the the leisure or more basic office work, right? So what you do, kinda throughout the course of a regular day, and where does Jive's land.

39:45

So again versus benchmark specs when you're trying to max out your system that we saw on the previous slide.

39:50

You can see the crucial P five plus here is right below, WD and right above Samsung, as far as Performance goes for everyday use.

39:57

So, this, sort of, a metric would be a key one when talking to any, sort of, any sort of consumer is trying to get a real feel for, you know, which Drive is worth the money. Again, it really depends and touch on as to what you're going to use the Drive for, but day in and day out use this time is extremely solid, not Gnostic away from its capability of being an awesome gaming Drive. Because it absolutely is.

40:24

It performs very well, and in consoles and PCs for gaming. And it was built and designed with. That's the fable. And that's kind of simple to look good inside your rig. So, that's not saying, and all that. It's not agree to Jamie Drive, but it is an extremely solid drive when you look at actual kind of real-world use testing.

40:43

You know, it's right there at the top top couple of drives.

40:48

It's going to go next one, I kind of shifting down to the PH. You, I wanted to make sure we touched on this drive. It's more of a value play here and that is kind of designed for any sort of consumer who is looking to shift from a hard drives. If I'm gonna skip over sada and go Straight to NVME is a great drive, but more designed for folks shifting from Saturday NVME and they don't really need to break the bank by getting the highest in drive.

41:14

You're still going to, you know, four times the performance of the highest instead of Drive, very, very comparable price, honestly, as current sanitize. So if you have an babies thought, this drive is as an amazing value, compared to even, you know, I didn't press pretty close to set of prices on a capacity by capacity basis. So, very, very solid drive to, kind of, shift into NVME.

41:39

And I didn't, I did not talk about our set of jobs. We do have our B X 500 and MX 500. Those guys have been in the market for quite awhile, so I wanted to concentrate more on the NVME is we are shifting into the gen for market and as as, as the market shifts from data to India, me. So I didn't want to take up too much time with those standards, but we do absolutely concentrate on those drives, and then do our MX 500 is, has been our bread and butter for quite some time.

42:03

And it sits right next to the WD Blue, there are very comparable price, specs November, comparable drives.

42:13

This future sits right next to the WD Blue, S&P 550, CC the specs that are very very close. And again we try to stay priced right below WD to, try and capture some more. Market share. their, looks like my last semester, I got cut off, so I apologize for that.

42:28

But know, this is one of those deals where we have a set a goal to, to compete right next to WD start getting some shared from them. So our guys are right there with different price competitive than we're all in on the, on trying to capture that second second spot there, as far as market shares concern.

42:51

I think that's the end of the P two.

42:52

So some takeaways, just as a reminder, you know, when you're out there chatting, and you're looking for where we're headed, we're trying to keep up with the market, Right? So we're shifting of incapacity and cost sharing and those higher 1 and 2 terabyte drive's. We're shifting from Santa to interview me, and as quickly as we can with the market, that 50% of the worldwide petabytes. Again, it will be NVME by the first quarter of 2022, that's still on track for that.

43:20

If you're looking for something to sit right next to Samsung or WGU WD on, that, that high-end Performance Drive, the P five plus. is it, we launched it a month ago, and a half ago. It's, it's price very well and, you know, you just saw that benchmark aspects are comparable and that really respects oftentimes a better, depending where you're using the drive for. So very, very solid jive. So don't hesitate to reach out if you have any questions or want more comparisons on the P five plus versus some of those other leading drives as well.

43:50

And I think that's it for the consumer side, Andrew.

43:55

OK, yeah, so can we can open it back up to any any additional questions? OK, let's let's do that, because I have I do have some questions.

44:03

So, Brian, you're talking about the P five or P five plus, kind of showing a comparison between that and the 3401.

44:14

So I'm just trying to get some clarification, and I know it's the same hundred and 76 man layer, and it's the same.

44:23

No, PCIE, Gen four.

44:25

So, uh, what's the difference between those two drives? And you guys did a great job comparing your drive with competitor vote?

44:33

I'm a little unclear on the difference between that 3400 and the P P five, P five plus, I should say.

44:41

Sure. And NG, you're probably more familiar with the details.

44:44

The firmware is going to talk about different speeds.

44:47

Go ahead.

44:48

No. Go ahead.

44:50

Know, you know, you're, you're, you're the expert there. Go for it.

44:52

Yeah.

44:53

The label, to be honest, at a hardware level, they are exactly the same.

45:00

And, and we can see that across with our competitors to with us. It's just a little more obvious because it's crucial and micron. And so, in terms of key differentiators between the 2, 1 is actually capacity, the 3400 is on binary capacity, So 512 gigabytes 1024, where the P 5 plus 500 and a thousand. But the architecture firm, where control or NAND they're all board layout is all identical. The other major difference is because of where we sell these two. The warranty a slightly different. The P five plus actually has a five year warranty. And the 3400 has a three year. And you might go, will, you know why? Why is that?

45:42

The three or simply to align with the OEMs, the OEMs require a three year warranty, and so that's what we have.

45:51

But other than that, it's just, it goes back to differentiating between the brands of Micron being more business, B2B, and crucial being more consumer.

46:04

OK, so, looking then at the P five versus the P five plus because I think a lot of things can get lost.

46:15

When we're moving from one drive to the next we tend to focus on you know, what was the change in NAND. But there are other things that change within these drives to the controllers can change the firmware can change.

46:28

So is there a difference between P five and P five, plus other than, know, one being gen three, and the other being gen four?

46:38

Is there a follow difference?

46:40

Burn more difference. now.

46:42

Know, there are all Angeles, you know, Definitely, they're all there. It's essentially the same.

46:45

The same drive would be just Kinda like an engine for performance, OK.

46:51

So then if I could a P five plus drive in A Gen three piece IE slot I would see performance on the drive, the same as a pea size because of the limitation of the Gen three.

47:07

Yeah, give or take. Exactly, yes, it's backwards compatible just like a 3400 and yet you're gonna, you're expecting to be very comparable to the grantee five. Exactly.

47:17

OK, great, so I just got some questions on warranty since we kind of hit on that a little bit. Other 30, 405.

47:27

Um, on the warranty for your drives. I know you guys mentioned five year and three year, but are there anything else available? Is their advanced warranty replacement?

47:37

Is there, how does that replacement work?

47:46

Yeah. I don't. I don't know of any advanced warranties stuff.

47:50

So, the terabytes and terabytes written in the end, the time limitation are two key factors I'm not sure about about anything else outside of that, so we could, we could check with our, our team and get back to you on that one.

48:05

On the, on the micro unbranded side, it's, it's a case by case basis, depending on if, if it's, is it, one sales, or was it a compatibility thing in your arm and, you know, 100 or 500 it changes. So you know it, in that, in that case, you know, definitely reach out to your partners, and we can work on that. But the only other piece, just on the warranty is that like, pretty much every other manufacturer are, warranty is, there's two parts of it, one is the time, which is as we stated, 3 and 5 years for micron and crucial. The other one is endurance.

48:49

So, just like, you know, a tire is rated for 30 or 40, or 50,000 miles.

48:56

SSDS are rated by how much you've written to them over time, and if you exceed that maximum, then that would fall outside of warranty regardless of the time.

49:10

OK, OK, great. So, Brian, you were talking about the P two and that that was an excellent entry level drive. I'm interested. Is that a USB based drivers, that appeal?

49:25

So, right now, the lower, the lower capacity, the 250 gigabyte is it is TLC base and that 500 gigabyte want to invite you to enter by our kiosk.

49:40

Alright. Let me just take a quick look here.

49:43

I am going to ask the question of the day here, which is, May, and maybe you both need to address this kinda separately, but can you talk a little bit about availability and kind of what's happening on the supply side for both client and enterprise?

50:05

Yeah. It's the question that comes up every 18 months, right?

50:09

So, in terms of the overall market, what we're, what we're seeing on the client, and also, the data center side, is that we're still seeing very robust demand throughout, and we expect that to continue throughout the end of this year.

50:25

And so, supply, on certain products, can be pretty tight, the 34 hundreds and not actually one of those because, as, as, you know, manufacturers, like Micron is.

50:39

When we move to a new NAND node, we start up, you know brand new lines in our fab. And there's actually, at the beginning, there's actually a lot of availability. So, for us, the 33,400, you know, we're not in any sort of real constraint there. Some of the data center products, it's a very different story, but for the 3400, it's good, in terms of the overall market. We do see the start of Calendar 22, is where things are gonna start to soften.

51:08

Specifically on, on the, on the data center, and the client side, I know Brian, Brian has a little bit different message for you, though, on consumer.

51:18

The consumers that were actually on, our guys were looking looking, pretty good, We were able to front load a lot of our supply this quarter. So, on our image, and our P two and P five plus, specifically, we don't have any supply constraints today on those. Some of the set of judge a little bit more hidden, Ms. can just just depend on what an intake. But overall, we're looking pretty good on the consumer side.

51:39

OK, so let me ask a question about the tools that come with Micron and crucial SSD drives.

51:47

Are there any tools that will help the customers identify, potentially how many more life life is left in their drive, how many more rights are left, or, you know, give some notification about when is the drive preparing to potentially fail. Let's say there are, what can talk about your tools are met.

52:11

Yeah, so, so, for any of micron or crucial branded SSDS, there, there are different tools on the data center side, It's storage executive. On the crystal side, what do we still use storage executives now?

52:27

OK, we do, yeah, I'm sure for both of the, for for. For that tool for any of the SSDS, you're going to have a percent lifetime remaining.

52:36

And so you can run that storage executive as a GUI, or you can even run it as a command line.

52:43

So you could, you could run it as part of a manufacturing process.

52:46

You could, you know, IT could, could script it out that every so often it would go and check, and you would see, and it's just a, it's a straight up percentage 100% being meaning 100% of your life left, and as you approach zero, obviously, know, not a lot of life left. And so, yeah, you can go and check that, and there's a ton of other, what we call smart attributes, that you can see that they're under advanced features, smart technology. And so you can see things like power on, hours, power, cycle, current, temperature, maximum, temperature.

53:19

You know that the drives ever seen things like that, and So you, You know, it just depends on how much preventative maintenance or preventative. You know monitoring you want to do with the product.

53:35

And most modern OS is to, once you hit a certain threshold, I believe, for endurance, it's less than 10%.

53:41

The smart attribute will throw a warning and most modern OS's will actually notify you of it to let you know that you have.

53:50

No. Not a lot of endurance left.

53:56

All right, fantastic.

53:57

So we're kind of, we're getting near the end here, so I'm gonna go ahead and wrap things up and just got a couple more announcements that I want to make someone ask everybody online to stay hanging out with us for a few more minutes. Before we disconnect, I just wanted to go over a couple of things really quick. So first, I wanted to remind everyone that we are giving away two prizes today.

54:21

We're given away to power beats and we'll announce the winners of those tomorrow at our session tomorrow.

54:27

So, tomorrow, we have, on day three of our Technology Summit, we have supermicro, and supermicro will be joining us at 11 o'clock. Just like we had today from Micron, and we'll announce the winner of the power beats at that time. In addition to that, I wanted to let everybody know that we decided that on Friday we're actually going to do kind of a follow up session.

54:53

It wasn't originally scheduled but I think there's been a lot of information given out yesterday and today and we would kinda like to be able to give ASI sort of perspective on these things. So on Friday, we're going to have kind of a special just summary, follow up meeting. If you're available to join us, that'd be great.

55:12

We want to talk about things like supply, what sort of affecting the overall supply in a channel. We'll talk a little bit about demand and sort of what ... happening in the next six months.

55:24

Or so, in terms of demand, and where we might want to be focusing some efforts on the market side, just really kind of go over a few other programs.

55:34

So they five will really be ASIS Chance disorder, talk a little bit more about what we're doing and sort of pull a lot of these concepts that we've had during this week together. So I'll send out a special invite for that, since we didn't originally plan to do it. I'll send a special one out. If you're available to register, go ahead and register. And join us on Friday is just kind of a casual, a summary of the event.

56:00

So, we'll be doing that, and I think with all of that said, that pretty much covers all of our wrap up for today. I do want to thank Micron, and everybody on their side for joining us. In closing, You know, is there anything that you guys would like to add? Anything.

56:19

Andrew, Brian, and David, anything you want to provide here at the end, before we close out?

56:30

Thank you, everybody. Great to get in front of you guys. Obviously, can't let us help answer any questions, and thank you ASI, and thank you everyone for joining today.

56:41

Alright, everyone. So, with that said, we're gonna go ahead and give you all back, the rest of your, the rest of your day. I want to wish everyone a great Tuesday, and we will be sending out the recording of this session later today. So, look for getting that, and we look forward to seeing everyone tomorrow for our session with Supermicro.

57:00

Thanks again, everyone, and we will see you tomorrow. Thanks, Micron. Thanks customers.