REFINITIV STREETEVENTS

# EDITED TRANSCRIPT

## Harmonic Inc Analyst Day

EVENT DATE/TIME: SEPTEMBER 15, 2022 / 4:30PM GMT

## CORPORATE PARTICIPANTS

**Nimrod Ben-Natan** *Harmonic Inc. - Senior VP & GM of Cable Access Business*
**Patrick J. Harshman** *Harmonic Inc. - President, CEO & Director*
**Sanjay Kalra** *Harmonic Inc. - Senior VP & CFO*
**Shahar Bar** *Harmonic Inc. - SVP of Video Products & Corporate Development*

## CONFERENCE CALL PARTICIPANTS

**George Charles Notter** *Jefferies LLC, Research Division - MD & Equity Research Analyst*
**Ryan Boyer Koontz** *Needham & Company, LLC, Research Division - MD*
**Simon Matthew Leopold** *Raymond James & Associates, Inc., Research Division - Research Analyst*
**Steven Bruce Frankel** *Rosenblatt Securities Inc., Research Division - Senior Analyst*
**Timothy Patrick Long** *Barclays Bank PLC, Research Division - MD and Senior Technology Hardware & Networking Analyst*
**Timothy Paul Savageaux** *Northland Capital Markets, Research Division - MD & Senior Research Analyst*

## PRESENTATION

**Sanjay Kalra** ***Harmonic Inc. - Senior VP & CFO***

Good morning, good afternoon. I'm Sanjay Kalra, Chief Financial Officer of Harmonic. Welcome to Harmonic's 2022 Virtual Analyst Day. It's great to have you with us today.

I want to briefly review the agenda for today's event. Our President and CEO, Patrick Harshman, will kick things off and provide an overall company introduction. We will then first discuss our video segment and Patrick reviewing investment highlights. Senior Vice President, Video Products and Corporate Development, Shahar Bar, presenting our video segment's business growth strategy, market trends and technology. And then I will walk through the video segment's long-term financial model. We will next review our broadband segment with Patrick reviewing investment highlights, Senior Vice President and General Manager, Broadband business, Nimrod Ben-Natan, will review our broadband business growth strategy, market trends and technology. After which, I will walk through the broadband segment's long-term financial model. We will then open the meeting for questions.

Before we continue, I must mention that today's presentation will include forward-looking statements. Actual results may differ materially from forward-looking statements. I refer you to our most recent Forms 10-K, 10-Q and 8-K as filed with the SEC for more information on risk factors. Please review the cautionary language here on the slide.

I will now hand it over to Patrick. Patrick?

---

**Patrick J. Harshman** ***Harmonic Inc. - President, CEO & Director***

All right. Well, thank you very much, Sanjay. And let me add my welcome and thanks to all of you for joining us today. By way of introduction, for those -- particularly for those who are less familiar with the company, I want to provide just a high level at a glance overview. We operate two related but distinct and largely autonomous business segments, business units, broadband and video. And as Sanjay just indicated, the structure of our presentation today will be really focused on first video and then broadband.

We're Silicon Valley-based company, revenue guidance for this year, just over $620 million, up 22% year-over-year. Market cap of just over $1.1 billion. And as we'll discuss in some detail really what's powering the transformation and the growth of the company, and the opportunities we see ahead of us is the tremendous investment we've made over the last several years in cloud native technologies in both the streaming video as well as the broadband areas. These technologies are really revolutionizing the way our customers do business deliver advanced services. And indeed, it's no surprise that market-leading customers around the globe have a (inaudible) Harmonic as a strategic partner in these areas, and we'll be discussing all of that in more detail as we go forward.

At a high level, the opportunities that the company is facing are related, but distinct, streaming video, particularly of live, live events and delivery of ever increasing speed broadband services, gigabit, multiple gigabit services. These are intertwined. And the importance of these -- and the consumer value of the services that our technologies enable have certainly come to even greater prominence through the pandemic. We think both of these areas are exciting areas that are strongly growing as we'll explain to you, and Harmonic is uniquely positioned to take advantage, not only to take advantage, but to lead in these areas. And in fact, one of the things we're quite proud about is the strong execution we've delivered over the past 12 months since we -- or 12 or 14 months since we last spoke with you.

We laid out largely the same strategy as we'll talk about today, and we talked about what I think many saw is fairly aggressive execution targets. Well, I'm happy to be with you a year plus later saying that we have more than executed on what we saw in front of us a year ago, and we are as confident as ever in our ability to continue to execute and lead in each of these areas.

So with that, let's now move in and talk about our video business in some more detail. And before I turn it over to Shahar Bar to really walk us through the substance of the market dynamics, and how we are benefiting from and taking advantage of those dynamics, let me start out with the following really key investment highlights, key takeaways from Shahar's presentation. We're targeting a cloud SaaS market, which is growing from a very small base in which we think will be approximately a little north of $1.3 billion in 2025. Associated with that, we see our sales being above $110 million of SaaS only revenue by 2025, a compounded annual growth rate of over 45%. And associated with this, we see increasing operating leverage. We're targeting greater than 14% EBITDA margin by 2025, again, strongly growing from 2022.

Powering all of this is industry-leading technology. And as I mentioned a moment ago, particularly around live programming, and we're finding particularly residents with live sports as Shahar will talk about in some detail. And our confidence in our ability to continue to execute in this area is bolstered by several very significant Tier 1 wins on premium sporting events, in particular, that have happened over the last year and have really driven the strong SaaS growth that we've been reporting to over the last several quarters.

With that introduction, let me turn it over to you, Shahar, to talk about the video market and our business.

**Shahar Bar** ***Harmonic Inc. - SVP of Video Products & Corporate Development***

Thanks, Patrick. So let's dive into the video segment. First, let's take a look at a quick recap of the industry. over the years and how it's evolved. We started out with traditional broadcast television, which has evolved over the years to a very significant and material kind of pay-TV industry. A little over 10 years ago, subscription VOD streaming services were introduced into the market. Those evolved into TV Everywhere services as well as recently sports streaming premium sports, particularly associated with targeted ads and free ad-supported television. So quite a lot of developments in the industry over the years.

Still, when we look at the industry today, you can really categorize it as two separate tech stacks. You've got one stack, which is the broadcast industry, which is really founded around the 24/7 linear channel and a unified signal sent to everybody, which is identical. On the other side of the fence, we've got kind of a different stack, the streaming stack, which is basically a dedicated stream for user and with the exception of live sports, pretty much users and viewers watch it at their convenience whenever they want to. And that has really led to a difference in infrastructure, which is where we participate in, in providing video infrastructure technology to our customers.

On the broadcast side, from the heritage and just the way it has evolved, you pretty much have private facilities, broadcast centers, pay-TV facilities where they place appliances, software, hardware appliances, and they operate them themselves, and that's one side of the market. On the other side of the market, which you evolve from the streaming side, is basically taking advantage of the flexibility and the dynamism of the public cloud and using that to power streaming services, which are variable by nature. You've got a lot of viewers. You need a lot of compute and traffic and during other times nonpeak times, you have lower, so the cloud is really the foundation of that. And that's where the industry stands today with two kind of separate segments. You've got basically an appliance market and you've got a cloud SaaS market, and we'll dive into each of those right now.

Well, let's start with the bigger one and the more exciting one, the video cloud SaaS market. Around 2020, this was what I would call a relatively modest market, a little over $400 million. But through 2025, we expect this market to substantially grow with an annual growth rate, compounded annual growth rate of around 25% and reached $1.3 billion. Similar to the foundation of cloud, it is a kind of consumption-based business. So as you use the services on the cloud, you're basically paying for the consumption. It's a usage of base model. There's three major components to this TAM, this growing TAM. And we'll start with the one here colored in light blue, the media processing. That category is the foundational one. And that basically defines all the media that we're ingesting, storing, modifying, manipulating in the public cloud. And that aligns perfectly with the amount of content that is available on the cloud.

The size of the VOD libraries, the amount of channels on and the amount of live sports that are being streamed around the world. So that is growth through to the amount of content that we're going to see over the next few years in the industry moving to the cloud for streaming services mostly.

The other two categories are delivery, also known as traffic and targeted ads. Those are actually not associated so much with the amount of content but associated with the engagement on that content. So the more attractive content you put on the cloud through a streaming platform, the more engagements you're going to get on it, the more popular is, the more you're going to see traffic grow and delivery growth, so feeding the consumers and all the users that are on the platform. And then, of course, when you have a high level of traffic and interest, you are able to stitch or target personalized ads to those consumers. So the kind of the dark blue and the yellow categories here are basically funneling through as content becomes more popular as more viewers and consumers move towards direct-to-consumer streaming services. And that's where you're going to see this rapid growth in the industry over the coming years.

So overall, we expect it to be around $1.3 billion and continuing to grow. And it's worth noting that it's really been kind of accelerating over the last -- in the recent quarters due to the introduction of a lot of premium sports services on the platform.

On the other side, we have the secondary market, which is the appliance market, which I mentioned earlier, kind of which started out from the broadcast industry. This market was around $1.2 billion in 2020, declined by around 15% to this year around just a little over $1 billion. We expect it to fall by another 25% to 30% by 2025. This basically is a more traditional kind of product category. It's appliance. Today, most of the appliances are software-based. They're sold in a capital expenditure with a support contract placed into private facilities, pay-TV facilities, networks, broadcast centers operated by the media companies, which continue to invest and to refresh this equipment because their traditional broadcast workflows and selling their content is still a very, very profitable business. And there's also a very large multibillion-dollar installed base. The focus of the customers in this market is really going to be on efficiency and cost reduction to optimize as much as they can profit from this market as they invest in their digital.

So we've got these two markets going in different directions. But combined in 2025, we see an overall very attractive market for our video segment. We have over a $2 billion market, which is growing. The larger part of the cloud SaaS at around $1.3 billion and growing. And we have a slightly declining here in the appliance market at around $700 million. Overall, a very attractive market for us to go after.

So let's pivot over specifically to our cloud SaaS product and our momentum in this industry and why we're confident in our success in going after this cloud SaaS TAM. First, we look at our own cloud size business. We launched our first kind of customers in 2017, 2018, the early adopters. In 2020, we started to see momentum in our business really take off. We had around $12.8 million of SaaS subscription revenue that year. That grew to $21.3 million last year. And this year, our midpoint of the guidance is expected to be around $34 million. So very nice growth. It's around 63% plus CAGR over the 3 years with a lot of momentum.

Of course, we are driven by the market itself as more consumers go to -- more of our media customers move the cloud, especially for their streaming services. But specifically, our business has been fueled by premium sports streaming, which I'll talk about in more detail. It's also worth mentioning here that not only do we have high growth rate on the top line, our gross margins have been dramatically improving and are getting to be significant levels already on this platform. Even though there's a $34 million you could categorize is relatively modest, we're already well above 50% gross margin. And now with the business growing in several years and having the predictability and the operational expertise of running it, we are very confident that we can reach 75% or higher in the long-term on this business from a gross margin perspective.

There's three major applications that we focus on when we sell our SaaS cloud platform. The first and maybe the fastest-growing one right now for us is the Live Sports streaming. We have a lot of logos on the platform and some very big customers. Some of them are listed here, Bally Sports, Peacock, [beIN] , Sky in Europe, kind of all over the globe, we do a lot of premium sports for our customers. On average, we do anywhere from 4,000 to 5,000 sporting events per month. We have the data here on the average MRR. That's the monthly recurring revenue or equivalent to the invoices we send our customers for running our services on the cloud platform. On average, for our sporting customers, it's around $100,000 per month. Many of our bigger sporting platforms spend more than that per month, but we also have some smaller sporting customers, which run Tier 2 leagues or smaller sporting venues and basically we have a smaller monthly invoices. But on average, we did about $100,000. That's relatively material.

And that goes back to why I explained about the TAM. When you put in very attractive premium content, you're going to get a lot of engagement. So for our sporting systems, you have quite a bit of delivery of traffic and you also have a lot of targeted ads as the CPMs kind of the price per 1,000 impressions is very attractive in the market. Overall, our Live Sports category is around 42% of our total SaaS revenue in 2022 and the fastest growing.

TV Everywhere is where we do kind of VOD libraries or traditional channels, linear channels, but are made available on the digital side. That is actually a slightly bigger part of our overall revenue. It's about 48%. We also have a larger number of customers on this. However, the average MRR is a little bit lower at around $25,000 per month. It's worth noting we have some very large customers doing TV Everywhere services in the hundreds of thousands of dollars per month. However, we also have some customers which are doing a very small investment into their digital, maybe just a small VOD library or maybe just one or two of their channels are available to a small subset or consumers. So overall, on average, we have about $25,000 average MRR in this segment per month, but we have a larger customer base here.

And finally, there's a third and I would say, early-stage application that we're targeting with our SaaS cloud market. And this, it's important to note, this is the only one out of the three here that actually overlaps with our traditional appliance business, which I'll describe in detail later in the presentation. The other two, the streaming, the Live Sports and the TV Everywhere do not overlap with our traditional appliance business.

So this one is the broadcast migration. So this is the same broadcasters or pay-TV providers that are looking to take their traditional broadcast workflows, which were in their private facilities and move them over to the cloud. This migration is in its infancy. We have a few large customers around the world, testing a very small subset of their workflows, moving them to cloud native stacks, looking at the applications, learning how to operate it and so on. Those customers, still, again, very early stages, are generating around average around $30,000 MRR for us. And overall, this business is very modest, about 10% of our SaaS revenue.

The broadcast cloud migration is a long-term transition. It is something that was going to take probably 8 to 10 years to fully kind of run through the system. It's not going to be a quick 1- or 2-year migration. You have enormous investments in facilities and they're going to selectively move certain workflows to the cloud. And we will be involved in many of those transformations. So those are the three major applications that we focus on in our SaaS cloud business.

The question is why do we win and why are we successful with all these logos that I showed in the previous slide. So let's first tackle the streaming side. It's no secret that today, a lot of the streaming happens on the big screens on your 58 [inch] Samsung TVs or so on or LGs. And in that environment, quality, latency, buffering time, start-up time are all very, very critical. And those are areas we outperform other competitors in the market. We invested very, very heavily to provide the best quality of experience for our customers. And that's one of the four major reasons we're being selected for these Live Sports or TV Everywhere services.

The second one is specifically with sports. We've invested extremely heavily over the last 2 to 3 years with features that are sports-specific. The ability to make replays available very shortly after the event, the ability to jump between different events of the game and many, many other features have a made [withstands] the cloud and has experience with the cloud and it's not basically in its early adoption of the cloud. And because of our work in streaming, we are very, very mature in the cloud. We understand it very well, and we stress the cloud very collaborative with the cloud vendors. So that gives us a very attractive combination where we know the workflows, and we are very experienced in the cloud, which may market, those are targeting the do-it-yourself market. Those companies or start-ups or maybe even a media company that wants to build everything on their own and maybe cherry pick a service from a cloud provider, but not directly competing against us.

And finally, the app and subscriber manager providers, the same ones that I mentioned earlier in the previous slide that are our partners -- some of them have decided to not partner with us and build their own video pipeline stack for the infrastructure. We call that a good enough pipeline. It's not -- it's sufficient for early-stage launches. It's sufficient for trials in the media stage. But if the system becomes a very large scale, if it needs enormous resiliency. If you move into premium sports, it doesn't cut it. And as a result of that, basically, they don't tend to last in the media industry a very long period of time. And we tend to wind up taking some of those customers. But for early stages and trials and stuff, they are very good in the market and they do -- we do compete against them.

Shifting over to the appliance business trends. It's a little bit different. We'll first start with the financials over the last 3 years. You can see in 2020, we had just under $229 million, increased in '21 to $265 million. This year, our midpoint is around $241 million. So it is a very, very stable and consistent business around this range and not just on the top line, but also it's very resilient on the gross margin despite all the supply chain headwinds we've all experienced and have hard in the industry. The margins have been very, very steady at around 60%. Part of that stability comes from our recurring revenue component which is the support contracts which support over $1 billion of installed base and are a material component of the overall revenue of the appliance business. So overall, this business is a very stable business.

Despite the market decline, again, that I showed earlier from $1.2 billion to a little over $1 billion between 2020 and 2022, we actually increased our dollars between those 2 years. So it basically shows that during this decline, we are expecting to continue to grow our market share in the appliance business. There's three applications that we focus on in the appliance business. One is Channel Origination, which is the creation of the linear channel. This is actually a pretty healthy subsegment of the market because whether you're feeding a TV Everywhere service or a traditional cable plant or terrestrial system, you still need to originate your content. And so that is a relatively healthy part of the market, and we do very well in that area.

The second area is to feed into pay-TV providers. There's no doubt that pay-TV in general is a little challenged in the industry. They're getting from direct-to-consumer services from content owners going directly to consumers and from free ad supported television. It still is a big segment. There still is a lot of facilities that are being upgraded and enhanced and refresh but that is an area that is a little bit challenged. That's the second area we focus on in our appliance business.

And the third is content distribution. It's effectively moving the content from these media companies towards their affiliates, whether they are streaming affiliates or whether they are traditional cable, telco or direct-to-home affiliates. That's actually a very attractive market for us. because that industry is in flux. You have a lot of satellite infrastructure that needs to be refreshed or upgraded for efficiency gains that are driven by cost or by government regulatories like C-band. And you've also got a lot of content moving away from satellite altogether moving to the cloud, CDNs or terrestrial distribution. So that is actually a pretty attractive market, and we've done very well during the recent years. So those are the three main segments that we focus on in our appliance business.

Our competitors in our appliance business are a long list of companies. Most of these we've competed against for better part of 10-plus years. they were historically owned by larger communications companies, which have, in recent years, spun them off into private equity ownership. That transition has been helpful for us. We -- not all the acquisitions by the private equities have gone very well, and there's been some disturbance in those acquisitions, which allowed us to take market share, as I showed earlier. Overall, we generally believe that the declining TAM in this industry will help us as customers look for the one bigger player. We are the biggest player in this market by far and with the best technology and the most breadth of solutions. And so we think more customers are going to gravitate towards our platforms and the appliance even if the market is slightly declining.

And then finally, it's important to note that technologically, our appliances are derived from our cloud stack. So they're essentially we take our cloud software we strip off a lot of the cloud specifics. We make effectively a single node cluster, and we place it on HPE or an Intel or a Dell server, and then ship it to our customers. So that gives our customers, our appliance customers a lot of confidence that they're getting the most up-to-date and the most advanced software stack, which is aligned with our cloud vision. So the result of that gives us confidence that we can continue to compete very well against our traditional appliance competitors.

And with that, I'll hand it over to recap the financials for the video segment to Sanjay.

**Sanjay Kalra** ***Harmonic Inc. - Senior VP & CFO***

Thanks, Shahar. Corresponding to the industry and business transformation that Shahar has just outlined, we are driving a transforming financial model for our video business. The baseline for today's discussion is 2022. When our video segment is expected to report $277 million in revenue for our previously stated guidance comprised of $241 million in appliance revenue and $36 million in SaaS revenue. Looking ahead to 2025, we are targeting video revenue of over $290 million, including appliance revenue of over $180 million. Looking more closely at SaaS revenue, taking advantage of both market growth and harmonics differentiated and expanding solution set. We are targeting compounded annual revenue growth of over 45% for this timeframe, leading to over $110 million in SaaS revenue for 2025 representing nearly 40% of 2025 total video segment revenue.

As SaaS revenues continue to scale and SaaS gross margin improves, for 2025, we are targeting non-GAAP video business gross margin of over 62% compared to 58.9% we expect to report in 2022. Our video research and development, marketing and G&A costs are expected to remain relatively flat with our current levels, thereby enabling good operating leverage. We expect video non-GAAP adjusted EBITDA margins to exceed 14% by 2025 compared to approximately 8% expected in 2022 and 3.4% in 2020. Looking beyond 2025, we expect continued gross margin and adjusted EBITDA margin as SaaS revenues continue to grow.

In summary, our video SaaS business continues to scale and expand. We expect to see continued financial transformation to a higher margin and more recurring revenue-based model over the next 3 years middling the market and technology transformations we reviewed with you today.

Now let me turn it over to Patrick and Nimrod who will review our broadband segment.

---

**Patrick J. Harshman** ***Harmonic Inc. - President, CEO & Director***

Okay. Thanks very much, Shahar and Sanjay. As Sanjay just mentioned, I'm going to switch gears and take a look at our broadband business. Before I turn it over to Nimrod for a detailed discussion of market dynamics and our strategy and progress, let's say, review the key investment highlights.

What you'll be hearing from us is that we see the addressable market that we're targeting being over -- approximately $2 billion by 2025. This is growing at a continued good clip. And associated with that, we are now targeting revenue of greater than $800 million in 2025 with growth actually somewhat outpacing the growth of the market. Behind these projections of our revenue growth is powerful transformative technology, particularly the cloud native technology, which remains well ahead of the competition in the broader broadband space.

Evidence of our leadership and the traction we're seeing in the market is offered by a growing number of leading broadband operators domestically in the U.S. as well as around the world who are in pricing and deploying our technology actually with accelerating pace. And lastly, while certainly enabling services over traditional cable infrastructure is home base for us and accounts for the lion's share of the revenue and the growth to date. We're increasingly confident in our new initiatives around fiber, analytics as well as cloud services to create an expanded opportunity for our business.

Nimrod will discuss all of this now in the next several minutes. So with that, Nimrod, let me turn it over to you.

---

**Nimrod Ben-Natan** ***Harmonic Inc. - Senior VP & GM of Cable Access Business***

Thanks, Patrick, and great to be here again. Very similar market dynamics to those we discussed last year with a couple of changes. The demand for broadband consumption is keep growing for different applications. But what we see this year is headed up competition between service providers. Fiber has become a foundational priority for a lot of the telcos, and we see more and more fixed wireless services. And in fact, in some markets, we even see cable competing with both fiber at the top end and fixed wireless, which is going very competitive on pricing. In addition to that, we see more and more government money being allocated. And more specifically, we also see established bigger operators going after government money and putting it to work.

Looking at the addressable market. As Patrick said, close to a $2 billion and growing addressable market. The foundation of that is our DOCSIS market, about $900 million where we exclude the legacy eroding [CCAP] market and we're very focused on the virtuous CMTS and the distributed architecture. On top of that, with great synergy as we're going to discuss in more detail, we see the fiber market at about $800 million. This is really a subset of the total addressable market of fiber infrastructure, which is higher than $3 billion globally, even excluding China. However, to be conservative and for the next 3 years, we really focus on a subset of that market, which is very focused on cable MSOs and additional alternative providers where our technology is a great fit for.

On the cloud services, this is a smaller modest but very important component. This is really the analytics and insights that we provide on our customers' network and subscribers to really help them with operational excellence and better customer satisfaction. You may remember last year, we also presented in our [term] an edge cloud opportunity. This year, again, to be conservative, we took it out. We're still very excited about that opportunity. It's developing slower than the time line going into 2025. This is really the opportunity to host at the edge of the network applications, which are latency sensitive and really take advantage of the growing footprint and penetration we have with cloud native infrastructure at the edge of the network.

The major issue is the deployed cable broadband infrastructure today, which is really the Achilles heel for cable is really the upstream and the inability to provide symmetric services, which are being promoted by the competition. And in fact, this is what's being deployed in more than 80% of the market today. So most of the cable MSOs are still running on an infrastructure that is not really well on the downstream. As you know, cable have introduced gigabit services a while ago and really took the market away from DSL with higher download speeds, but it's lagging behind on upload speeds. And this is really where the focus of the industry, and that's the good news. Despite of the situation in the market today, they really have a great 10G strategy for the next couple of years. And in fact, multiple options to modernize the network while expanding Upstream as well as Downstream, again, to be competitive with higher speeds and symmetric speeds.

So the modernization starts with a cloud-native platform that can provide the services can help the architecture to migrate away from analog optics into digital optics, put the so-called digital nodes into the network, increase the split of the network such that you can go from 100 megabit per second to about 1.7 gigabits on the upstream. And this is a lot of what's driving our business today. There is an interesting add-on optionality for that architecture, which is really surgically overlay fiber-to-the-home on top of this architecture. We'll talk more about that. That's part of our strategy to enable what we call fiber islands for customers to really put fiber to the home where they really need, whether it's an MDU or a competitive neighborhood, so instead of doing a complete network upgrade, they can do it surgically.

And then we see a couple of other interesting cases, combination of DOCSIS 3.1 with advanced CPEs, 4 [OCPs]. In fact, can take the cable industry to 8 gigabit per second on the downstream even on technology that exists today, they can push fiber deeper. Again, it's an investment that they will have to make regardless over time as they go to fiber to the home. And obviously, DOCSIS 4.0 that will push the limits of the cable infrastructure. And we'll talk more about that, and we recently heard about some MSOs that will start deploying this technology as early as '23. And obviously, fiber-to-the-home is something that some of the customers are doing definitely for a greenfield. We see that as the choice in the world markets or as they edge out of the geography of their network.

So similar to other technologies, we're now seeing the virtualization and distributed architecture technology. Adoption going basically crossing the chasm and becoming a mainstream. It's been a journey we have pioneered back in 2017 and 2022, going into 2023, we definitely see the market adopting that and this technology becoming mainstream. Just to get a context for what we have captured over the last couple of years with 85 operators and a footprint that covers about 60 million connected subscribers. Our technology or the virtual CMTS and DAA technology have only been deployed in front of 20% of that of that footprint.

So obviously, that will grow over the next couple of years. But certainly, with competition on the service provider side, as well as success of the early adopters of the virtualization technology along with the fact that this technology is in fact something that you have to do as you go to DOCSIS 4.0 and fiber. So very exciting for us after years of pioneering this space to see this going mainstream. And in fact, we see a very interesting multiple waves of upgrades and some of them are going in parallel, either for the same operators or different operators. And basically, to successfully navigate this transition of technologies, expanding the upstream with DOCSIS 3.1 or putting fiber, as we said, into MDU or [rural] areas as well as going to DOCSIS 4.0. So we see all of that happening in between now and the next couple of years. Fiber is happening now. It's not only a future thing. And as we said, DOCSIS 4.0 will begin deployments in 2023.

And as we said, we believe that to successfully do that, operators will need a broadband platform that will help them to go through the increase of the speed tiers, different options going higher split or splitting the nodes, 4.0 or fiber-to-the-home. They will move away from analog optics into digital nodes with digital transport and they will need a strong foundation of core virtual CMTS and virtual BNG for fiber-to-the-home as well as tools to manage that expanding network with advanced telemetry and analytics automation. And again, all of that was the focus on operational excellence and customer satisfaction.

So our success in this market over the last couple of years, and as you're going to see our projected growth into the next couple of years, was driven by two, I would say, foundational differentiation that we have built over the years. The first one is our -- a true virtualized cloud-native software platform. We truly believe that this is unique, the way we took very complex network functions such as CMTS, who was traditionally implemented as a hardware into software. And we did it by following the spirit of a cloud-native something that you can scale out horizontally with micro services rather than taking a monolithic implementation in software. So that's the first thing. And this is all in production at amazingly high scale and great customer satisfaction.

The second thing that we've done is the multi-tenancy by developing something that enables DOCSIS and fiber within the same implementation such that customers do not have to put separate platforms to do that and they can add on top of any DOCSIS implementation surgically, as we discussed previously, which is very CapEx efficient fiber-to-the-home. And of course, the analytics, which is all modern implementation of cloud native architecture, again, this is giving our customers instant visibility into their networks itself -- minutes and hours to understand changes in the network and the trends that are impacting their customers, they can instantly see that and of course, automate that to create a customer that gives them operational excellence.

An interesting side effect that was not our main focus, but this new architecture gives our customers a huge space and power saving. This today more than ever before, is becoming very important. And perhaps one other factor moving into commodity compute infrastructure with software has sold for us, the supply chain program. That's one of the reasons that we could keep up with demand without much of supply chain problems. So that was the first one. The software, the cloud native architecture.

The second one is the is the hardware. This is the outdoor units that we distribute into the network. And a couple of very important differentiation factors that we have. Number one, from the very beginning, we made our architecture modular and expandable, basically giving our customers flexibility and optionality where they could start with one module and expand to more capacity or they could add fiber-to-the-home without forklifting or over kind of duplicating the infrastructure, they can piggyback on what they put for DOCSIS for fiber-to-the-home.

The same way, supporting all the flavors of DOCSIS, starting from DOCSIS 3.1, 4.0, extended spectrum, full duplex, the XGS for 10G fiber or the 10G-PON, all of that is expandable within the same platform. We also focused on creating the smallest to enable that modularity. We came up with the smallest form factor and lowest power design in the industry, which also, by the way, helped us to put our technology into existing third-party outdoor nodes. We've announced support for the Cisco node, which is widely deployed in the market. Again, this is helping our customers to migrate more quickly into this architecture.

One of the early decisions we made early on was to standardize on a Broadcom silicon, which we have mastered along with this unified design that really helped us to more agile, move faster and support all the use cases of our customers. And of course, this standardized design is very efficient from a supply chain. Again, that was not the main reason back then to go with this, but going through the pandemic, it was very beneficial. So this is really what helped us to become #1 in this DAA space, the most advanced features for these outdoor nodes, the highest density and the most efficient power. And again, everything we do is supporting boxes and fiber simultaneously.

So with this kind of thanks to the market demand that we talked about earlier and the unique technology that I presented, along with very focused execution our momentum in the market continues. We can see increase relative to what we presented to you a year ago. We're up to 85 global operators, up from 59 a year ago and 10 Tier 1 in the last quarter, we were at 9. We added another one during the course of the last quarter. We have crossed -- and this was an exciting milestone for us, more than 100,000 of those remote devices, remote neighborhoods and we're up to 10 million cable modems. As you could see, there is close to 180 million, 190 million modems. So there is a long way to go. But with the fact that this technology is going into mainstream, we're confident with our ability to keep growing in the next couple of years.

So with that, I will turn it over to Sanjay to give you the financials of the next 3 years.

**Sanjay Kalra** ***Harmonic Inc. - Senior VP & CFO***

Thanks, Nimrod. Over the past 3 years, the broadband business has delivered strong revenue and gross profit growth from 2019 through the end of this year at the midpoint of our 2022 guidance, which we are forecasting a revenue CAGR of greater than 55%. Gross profit is expected to grow greater than 65% over the same period. These 2019 to the end of 2022 CAGRs exclude the benefit of onetime upfront software revenue of $37.5 million we recognized in 2019. Related to the software license agreement that we closed with Comcast that year.

This slide summarizes our broadband segment's 2025 target operating model, corresponding to our growing addressable market and multidimensional growth plan, we see an increasingly attractive financial model taking shape. Using 2022 as a baseline, when our cable segment is expected to deliver approximately $340 million in revenue, our revenue target of over $825 million for 2025 translates to a go-forward CAGR of over 34%. For DOCSIS, we are modeling at least 72% market share by 2025, resulting in revenue of approximately $645 million. For the subset of fiber, we are targeting, we are modeling a market share of at least 20%, resulting in approximately $160 million in revenue for 2025. Our cloud services offering could garner a market share of at least 13% generating approximately $20 million in revenue for that year.

Further, retargeting a non-GAAP gross margin of at least 50% compared to 42.8% we expect to report for 2022. And adjusted EBITDA margin in excess of 28% by 2025 versus a 16% expected in 2022. We expect to achieve these results even as we continue to strategically invest in R&D to more fully open up the fiber and cloud services opportunities that will be available to us. Looking beyond 2025 and considering these newer R&D initiatives, we expect to position ourselves to achieve even higher adjusted EBITDA margin in succeeding years as multiproduct revenue growth eventually outpaces technology investment growth. Please note, these blended margin targets are based on our current market share expectations. If these should change, we would expect them to gross margins to change accordingly.

Our organization is uniquely positioned and absolutely committed to achieving the objectives we laid out here today for both of our business segments. We look forward to executing on our growth plans and keeping you updated on our progress.

We will now open up the meeting for questions.

## QUESTIONS AND ANSWERS

**Operator**

(Operator Instructions) Our first question will come from Steven Frankel of Rosenblatt Securities.

**Steven Bruce Frankel** ***Rosenblatt Securities Inc., Research Division - Senior Analyst***

This was a really interesting presentation. And you changed the way you've laid out for the Cable Access business. And I just wanted to dig in the numbers a little bit. The last time, one of the open questions was how big would new business be and its impact on gross margins and profit margins. So in this new scenario for '25, what kind of share are you assuming here?

**Patrick J. Harshman** ***Harmonic Inc. - President, CEO & Director***

Nimrod, perhaps you could speak to that.

**Nimrod Ben-Natan** ***Harmonic Inc. - Senior VP & GM of Cable Access Business***

Sorry, my connection is having a problem here at the office. I could not follow.

**Patrick J. Harshman** ***Harmonic Inc. - President, CEO & Director***

Okay. Well, I'll jump in. First, can everybody hear me? Can you hear me, Steve?

**Steven Bruce Frankel** ***Rosenblatt Securities Inc., Research Division - Senior Analyst***

Yes.

**Patrick J. Harshman** ***Harmonic Inc. - President, CEO & Director***

A year ago, I think we estimated about 30% market share for hardware. What we've seen since then is we were garnering significantly more than that. And while I think today, we don't want to quote a specific market share. Let me say what has become more apparent is that increasingly, customers large and smaller, looking at what we do from a full end-to-end system sale point of view. So from that perspective, I think that we think that our hardware market share probably won't differ too materially from our overall market share.

And as Nimrod laid out, in the end, we think that's a good thing. It's a good thing in terms of the end-to-end competitive advantages that we have. And as you can see from the financial model, it's also a good thing in terms of expanding the earnings potential and leverage of the business. So you see a higher implied market share that is more or less along the lines, maybe only modestly below the software -- core software market share that we see. And corresponding to that, we're still targeting a 50% plus blended gross margin, which is -- we think is reasonable and attractive in the context of an end-to-end communication services offering.

**Steven Bruce Frankel** ***Rosenblatt Securities Inc., Research Division - Senior Analyst***

That's helpful. And then as a follow-up, Nimrod laid out kind of multiple pathways that the customer can take to get to this next generation network. Is there a particular architecture choice that gives you unique advantages where do you want to see the market go a certain way? Or does it not match to you how that develops?

**Nimrod Ben-Natan** ***Harmonic Inc. - Senior VP & GM of Cable Access Business***

It doesn't really matter to us. It's also a matter of availability and a fit for the customer architecture. But from our point of view, and this is really key to our strategy, that to be able to support them all. Obviously, DOCSIS 4.0 is not fully ready, but (inaudible) of the 3.1 as long as the fiber already. And our goal is to entertain the customer desire, whether it's this architecture or that.

**Steven Bruce Frankel** ***Rosenblatt Securities Inc., Research Division - Senior Analyst***

Okay. And then that's the same in terms of Remote PHY versus Remote MAC-PHY?

**Nimrod Ben-Natan** ***Harmonic Inc. - Senior VP & GM of Cable Access Business***

Yes. We -- you may remember, a year ago, we announced our MAC Anywhere architecture, which is really our unique software architecture. And we don't really care whether that runs on input compute infrastructure or it runs embedded on Broadcom silicon, we support both. I think from a customer point of view, they've got their own choices, and there's also availability of the technology. At least the reality so far is that Remote PHY is the majority of what has been deployed in the market.

I think the key factor is that both technologies are getting the same service. I can run symmetric [vis-à-vis] it was both. You guys may come to next week to see our [SVD] demonstration where we show a 2.3 gigabits and 1.5 gigabit on the upstream and it works on both the same way. And it's really about the urgency. And we can see -- we talked about our fiber competition and we talked about the fixed wireless. So for many of them, it feels like urgency of availability of technologies becoming as we [thought].

**Operator**

(Operator Instructions) Our next question will come from Simon Leopold of Raymond James.

**Simon Matthew Leopold** ***Raymond James & Associates, Inc., Research Division - Research Analyst***

I first wanted to see if you could maybe clarify one of the slides, I think it was Slide #29, in Nimrod's presentation showing the growth rates for DOCSIS. I'm not quite sure whether that was something I understood what you were trying to show. Maybe that was just the market for virtualized solutions and not all DOCSIS because I believe the revenue for net was probably higher. I just want to clarify what you're showing on that particular slide. Is that something you can answer?

**Nimrod Ben-Natan** ***Harmonic Inc. - Senior VP & GM of Cable Access Business***

Yes. So specifically, the DOCSIS that we show here is excluding the legacy CCAP. This is only the virtual CMTS and the DAA architecture.

**Simon Matthew Leopold** ***Raymond James & Associates, Inc., Research Division - Research Analyst***

Great. Okay. Yes, that's what I suspected it was. So that makes sense to me then. And then as a follow-up, I wanted to see if it was possible to maybe get a bridge between last year's high-level presentation for the segment that went out to 2024 and this year's financial targets which go out to 2025. So I appreciate it's a 1-year difference. But it looks to me that the video segment declined a little bit in terms of revenue, but the cable segment is substantially larger in terms of revenue. And I suspect part of it is the inclusion of fiber, but I want to get a better understanding of how to draw the connection between the 2024 targets. We showed this last year and the new targets this year.

**Sanjay Kalra** ***Harmonic Inc. - Senior VP & CFO***

Yes, Simon. So the connection is exactly, as you mentioned, for video, we've seen a decline on appliances, but we are seeing very strong growth in a SaaS. So -- but from a bottom line perspective, we are on track and actually we are performing better for 2025. That said, for cable, our revenues for '24, the top line and the bottom line are better where we are for '24. And hence, '25 is the right target to look at, which eventually includes not only fiber growth, which I shared today, but also an increasing market share on DOCSIS.

**Simon Matthew Leopold** ***Raymond James & Associates, Inc., Research Division - Research Analyst***

And just to clarify, in the last year's presentation, was fiber not included in your assumption?

**Sanjay Kalra** ***Harmonic Inc. - Senior VP & CFO***

It was, but we have seen a significant increase there now. We are seeing much more traction than what we envisioned last year.

**Simon Matthew Leopold** ***Raymond James & Associates, Inc., Research Division - Research Analyst***

Great. No, I appreciate that. And then just one last one, if I might. Last week, Comcast, which is a customer for you, announced efforts to deploy DOCSIS 4.0 in 2023. What, if any, are the implications for your business with Comcast?

**Nimrod Ben-Natan** ***Harmonic Inc. - Senior VP & GM of Cable Access Business***

It's all part of the plan. So the assumptions for fiber, as we just discussed as well as flavors of DOCSIS 4.0 and the timeline starting in '23 going into '24, '25 and beyond, is all baked into our assumptions that we presented to you.

**Simon Matthew Leopold** ***Raymond James & Associates, Inc., Research Division - Research Analyst***

So it's not a displacement, you continue to do business with them in 4.0 world, correct?

**Nimrod Ben-Natan** ***Harmonic Inc. - Senior VP & GM of Cable Access Business***

Yes. I mean, I think they -- if you go back to their announcement, they were talking about what they do for increased speed with mid split and virtualized architecture and all the benefits of that. And they were talking about continuing that into '25 as well as there was a comment about symmetric gigabit services with their choice of DOCSIS 4.0 starting in '23.

**Patrick J. Harshman** ***Harmonic Inc. - President, CEO & Director***

And if I could just add on to Simon's question. I mean I think it's -- I want to be very clear that the foundational advantages of what we're doing in virtualization and cloud native as well as the overall DAA architecture, they are not in any way specific to DOCSIS 3.1. They extend and or at least as impactful in the context of DOCSIS 4.0 and indeed, in the context of fiber and converged or hybrid fiber and DOCSIS networks. We expect to be at least as strong from a market share and technology competitive position in a DOCSIS 4.0 world and in a converged fiber DOCSIS world as we are in today's cable infrastructure.

**Operator**

(Operator Instructions) our next question will come from Tim Long of Barclays.

**Timothy Patrick Long** ***Barclays Bank PLC, Research Division - MD and Senior Technology Hardware & Networking Analyst***

Two, if I could, one on each business. First, on the video side, particularly on the sports side, there's obviously been a lot of high-profile fighting for content there, a lot of big tech and media companies getting involved. What's the risk there that there's further consolidation among players that maybe do it themselves as far as that business? And is there any opportunity for Harmonic to supply into that channel?

And then secondly, on the broadband side, I'm just curious with the pretty big ramps in fiber in the next few years and cloud shown up in the forecast. Anything you could tell us about kind of visibility into those businesses and the OpEx move on that side of the house is a little bit more dramatic than on video. So is that really to fueling these newer higher-growth businesses?

**Shahar Bar** ***Harmonic Inc. - SVP of Video Products & Corporate Development***

Okay. I'll take the video question first. Look, in general, I mean we see sports as becoming a very high focus for a lot of our customers. [Big] tech is no different, frankly. They're also going to be focused on sports. We can't specifically mention names, but we definitely do a lot of premium sports for a lot of big companies and some of them are in the tech industry (inaudible). And we just expect that to remain the same. Our efforts and our investment over the last few years in that area have given us a significant lead in the market and do-it-yourself is not always a valid option to be able to reach the performance and the scale that is needed and the reliability for a sport system. So we continue to do very well in sports. We continue to win more and more wins, and our brand and our strength in that area will only get bigger in the coming months and quarters.

**Nimrod Ben-Natan** ***Harmonic Inc. - Senior VP & GM of Cable Access Business***

For the fiber question. So yes, we certainly see that growth in fiber and specifically for cable for most of them, it's not one or the other, and we see a lot of projects where it's both and one piggyback on the other. That's why we design our architecture this way. And certainly, as Sanjay said, it's part of our addressable opportunity. Obviously, the market share in fiber is not as high as in cable, but certainly growing. In terms of our investment, then absolutely. Part of the growth is our investment in fiber, which by the way started a couple of years ago. We were incubating that and kind of developing that into the market. But certainly, it's one of the reasons for the OpEx growth. I can also say that majority of our customer engagements have both discussions of DOCSIS and fiber.

**Sanjay Kalra** ***Harmonic Inc. - Senior VP & CFO***

So Tim, I'll just add that OpEx is going up, our OpEx is going up. But at the same time, if you look at adjusted EBITDA, the CAGR is more than 60%. I just wanted to highlight is a very good operating leverage.

**Operator**

(Operator Instructions) Our next question will come from George Notter of Jefferies.

**George Charles Notter** ***Jefferies LLC, Research Division - MD & Equity Research Analyst***

Could you refresh me on the timing of your CableOS product in terms of its support for DOCSIS 4.0, whether it's full duplex or the extended spectrum DOCSIS version? And then also same question on the node portfolio. Just Obviously, I think you guys are going to deliver in 2023, but can you just remind me like what the -- when those products are specifically available?

**Nimrod Ben-Natan** ***Harmonic Inc. - Senior VP & GM of Cable Access Business***

So at least on one flavor, which is the full duplex you heard, if customers or customer will start doing that in '23. That certainly means that this is the availability window. What I can generally say for DOCSIS 4.0, our piece is going to be ready sooner than other elements in the network that you really need in order to deploy that. Since you asked on the extended spectrum we have to [correct] the network with new amplifiers, upgrade passives and taps. This is a multiyear investment cycle. And then what we expect customers to do is at some point, transition and upgrade the transmission infrastructure to be 4.0 ready or 4.0 upgradable such that by the time they will have the rest of the infrastructure ready, they will be able to enable that.

We also see a spectrum of options with DOCSIS 4.0. It's not all or nothing. I also presented an interesting flavor as soon as you have a DOCSIS 4.0 ready cable modem, you can get much more out of the DOCSIS 3.1 network because it's not limited to what 3.1 was limited. You can do 8 gigabit like almost what you do over fiber. So -- and the other important factor because our architecture is largely based on a cloud-native software architecture. We're moving much faster with that, and we can evolve rather than kind of step function progress with hardware. I mentioned that we're standardized on Broadcom technology. And we'll basically be ready with the '23 milestone first and then in the out years for the rest of the flavors.

**Operator**

(Operator Instructions) The next question will come from Tim Savageaux of Northland Capital Markets.

**Timothy Paul Savageaux** ***Northland Capital Markets, Research Division - MD & Senior Research Analyst***

Some really impressive targets for cable access, in particular. But I wanted to follow up on some of the discussion kind of new customer additions. It looks like it was $79 million last quarter, it sounds like you've added 6 at least to date, including a new Tier 1. I know if I've seen Telefonica's logo up there before, so that's it. But could you talk to the size of that new Tier 1 win. It doesn't seem to have materially impacted your footprint estimate of about $60 million. But in any way you'd like to give some more color there. And then maybe as part of this discussion, is there a way to start to break out what's happening on the fiber side in terms of wins? I assume that would be captured somewhere in those numbers. But could you give us a little separate color on sort of the pipeline there in terms of opportunities and wins to date?

**Patrick J. Harshman** ***Harmonic Inc. - President, CEO & Director***

Well, maybe I'll start, and Nimrod you can then pick it up. Thanks, first, Tim, for the question. Indeed, your math is correct on the number of customers. Tier 1, the additional one that we have secured quarter-to-date is an international customer. And it does actually increase the addressable number of subscribers, but we elected at this point not to -- we don't have liberty to communicate who that customer is, and we have not upgraded -- updated the subscriber number associated with that. At quarter end in our earnings release, we'll have an updated -- total universe of a direct subscriber win for you.

For those maybe newer to the discussion, we define Tier 1 as top 10 in major geographies, North America, Latin America, Europe, Asia Pacific. So it's a new international top 10 customer that we've secured.

On the fiber side of things, as Nimrod mentioned a moment ago, virtually every one of our conversations now involve fiber. And it's become actually part of the real value proposition. And it's one of the reasons why we're increasingly excited and confident about a lot of opportunities specifically in fiber and more generally about our competitive advantages going forward. Your question about maybe breaking that out going forward, fiber is definitely noted. I will remind everybody that last quarter, we did call out that we had booked over $10 million of new fiber business for the first time in the second quarter. And we'll think about how to best give you indication of the fiber specific pipeline creation and in closed business going forward, although I again emphasize that really particularly for cable and international hybrid operators from a strategic and go-to-market point of view, part of the beauty here is that they -- the two opportunities are very much intertwined. Nimrod, is there anything else that you would add to augment that?

**Nimrod Ben-Natan** ***Harmonic Inc. - Senior VP & GM of Cable Access Business***

No, I think you covered both topics.

**Timothy Paul Savageaux** ***Northland Capital Markets, Research Division - MD & Senior Research Analyst***

Great. If I could follow up maybe a little bit back to Simon's question, which is, as you look at the TAM estimate for '25, I imagine there's an assumption in there about the percentage of the overall market that has -- will have moved to kind of next-generation technology. So implicit in that TAM, is there -- do you assume -- I don't know whether it's an equal amount or what sort of, let's call it, legacy infrastructure assumption is sort of behind those numbers? Or what percentage do you think will be next gen by that point? I think you're assuming there's still a piece of the market that you're not addressing for operators who haven't moved in that direction or at least not yet.

**Nimrod Ben-Natan** ***Harmonic Inc. - Senior VP & GM of Cable Access Business***

Correct. So the $900 million of 2025 excludes legacy. Legacy Is a volatile $150 million to $200 million on top of that. So call it, 20-or-so percent of the market (inaudible) was to be the legacy and we expect that to be mostly maintenance related, we don't see anyone investing in new projects at that point in time, again in [2025.]

**Patrick J. Harshman** ***Harmonic Inc. - President, CEO & Director***

Perhaps, Nimrod, we should also explain that as much as possible, we've tried to adhere to third-party research. And in this case, we're really taking the lead of the Dell'Oro report, which historically has been quite good. And so it's -- I'd say it's as much the other assumption, Tim, is that is ours about the split between legacy business and a next-generation business.

**Timothy Paul Savageaux** ***Northland Capital Markets, Research Division - MD & Senior Research Analyst***

Okay. Last question for me kind of decent segue at least when we look at operators kind of classified into early movers versus relatively slow movers in terms of next-gen adoption. Charter would fall into that category. You had an interesting announcement a few months ago. about kind of retrofitting legacy Cisco nodes to Remote PHY. I wonder if you can give us kind of an update on how that program is going and what sort of traction you're seeing with Charter or anybody else?

**Nimrod Ben-Natan** ***Harmonic Inc. - Senior VP & GM of Cable Access Business***

So obviously, we cannot talk any customer specifics on this, but I can say a couple of things. First of all, these are not the movers. This is simply becoming the mainstream market. The early adopters just like any other technology for certain people, and it's not always easy, but there could be a great reward for that. The specific adopter, we call it (inaudible) for the Cisco node market, it is something that we've introduced. And since the introduction, I think we already have 6 or 7 customers that have actually tested that. And this is high-volume customers. This is not only in the U.S., a couple of international customers, Latin America more specifically.

I think that the Cisco node was very popular in North America, as well as in Latin America, and we see great engagement with that. As we present that, this gives these customers a faster [upgrade cycle] with a much smaller OpEx (inaudible) impact to go to a new architecture. And for that reason and obviously, for the reason that we still have affect as we exited that market, we see great traction.

**Operator**

(Operator Instructions) Our next question will come from Ryan Koontz of Needham & Company.

**Ryan Boyer Koontz** ***Needham & Company, LLC, Research Division - MD***

Most of my have been answered, but I want to circle back to George's question about DOCSIS 4 and implication -- sorry, the different approaches to ban splits and upgrading the upstream capacity that the different operators have. And can you speak a little more explicitly about where your products are focused today, maybe around the Comcast full duplex approach as opposed to other approaches, maybe a little bit more explicit about your near-term product capabilities and what's on your roadmap?

**Nimrod Ben-Natan** ***Harmonic Inc. - Senior VP & GM of Cable Access Business***

So the answer is that we focus on both. And in fact, some architecture decisions we took a while ago is giving us a great synergy between everything we do DOCSIS. For full duplex, it requires extra layer of software on our cloud-native architecture, which we have been working on. And it's available certainly for lab and field activities and we'll be ready for deployment. DOCSIS 4.0 in many ways from a software point of view is extended virgin of what DOCSIS 3.1. It's more of the same. Again, easy for us to expand with the cloud-native architecture. So there is no specific preference for one versus the other in terms of our readiness. We've got an architecture that enables both, and we are working with customers in both categories.

**Patrick J. Harshman** ***Harmonic Inc. - President, CEO & Director***

And in fact, Nimrod, as you alluded to earlier, next week's cable trade show, we'll be demonstrating both, right?

**Nimrod Ben-Natan** ***Harmonic Inc. - Senior VP & GM of Cable Access Business***

Absolutely.

**Ryan Boyer Koontz** ***Needham & Company, LLC, Research Division - MD***

Got it. That's real helpful. And then on the -- there was a mention about the virtual BNG capabilities on 1 of your slides. I assume that is in support of fiber-to-the-home deployments, which you're talking up? Is there any kind of specific capabilities there that are incremental to CableOS that are new and being announced now? Or is that is kind of a core part of CableOS from the get-go?

**Nimrod Ben-Natan** ***Harmonic Inc. - Senior VP & GM of Cable Access Business***

It's -- so the beauty of CableOS is a cloud-native platform that supports multi-tenant that we can expand that with new capabilities. With the vision of edge cloud, we will, in fact, host third-party applications. But our focus for now is very much on services that we deliver. The vBNG, as you said, is exactly for supporting our fiber-to-the-home, where we do traffic management, subscriber management provisioning again, very much like what we do on the DOCSIS side, but for the fiber side.

**Ryan Boyer Koontz** ***Needham & Company, LLC, Research Division - MD***

Helpful. And just one last question, if I could, around 4K and kind of how you view that as impacting the market? How much of your assumptions around your video appliance and your SaaS business is built into [business] is based on 4K adoption over the next few years through '25?

**Shahar Bar** ***Harmonic Inc. - SVP of Video Products & Corporate Development***

4K, I would tell you in its infancy in the world of very early days especially in sports. We're going to start to see the point kind of, I would say, premium sports being deployed with 4K in the [mall] probably for some of the new season starting or especially the World Cup. I still think in general, it's very early days. In 4Ks, if we don't have -- they're not as advanced as high definition when it comes to the latency or the targeted ad stitching. So I think there's a lot of room to grow there. Can't really comment about it in our forecast, but I still think there's -- it's definitely a significant boost to our SaaS business 4K, whether it's the media processing or the traffic side. So as it gets adopted, I think in a few premium sports platform, I think we're going to see a wave of a 4K investment, which will probably boost our SaaS business significantly.

**Operator**

(Operator Instructions) And we have a follow-up from George Notter of Jefferies.

**George Charles Notter** ***Jefferies LLC, Research Division - MD & Equity Research Analyst***

Appreciate let me come in for another question here. I wanted to ask about the video business. Obviously, that business is getting a lot of strength right now because of the C-band transition. I was looking at some of your customer data. I think you did about $60 million in sales with Intelsat, for example, over the last few quarters. And you talked about the video appliance business as being kind of stable, but it seems like that C-band transition kind of winds down going forward. How do I think about sort of the step down in the appliance business because of C-band relative to the SaaS business ramping up, is the SaaS business going to be big enough to kind of fill that gap as we go into 2023 and 2024? How do you think about that?

**Shahar Bar** ***Harmonic Inc. - SVP of Video Products & Corporate Development***

Sure. I mean there's a couple of ways to think about the C-band business. I mean, I think there's two parts to the C-band business. There's a specific. U.S. government-led (inaudible) for C-band, which have a very short time frame and a very light deadline to transition a dozen plus or so media companies, all from the C-band frequency. Those projects are effectively [complete]. However, there is dozens and dozens cooperators in the U.S. as well as around the world that look with that. There was a part of that in the original round and they will move to upgrade their infrastructure and the satellite capacity and so on to a more efficient system. So there is follow-on way across that. They're not specifically associated with the C-band government-led project, but it's associated with the outcomes of that.

I would say that there's also a secondary way which is a lot of these companies exiting the satellite altogether and moving towards cloud again, essentially moving their distribution platform through our SaaS business. That's, I would say, a secondary way that will follow on. When you look at the differences, you do have some -- C-band was definitely a boost. We saw that in a bit of '21. Overall, we try to project in '25 what we think the appliance business is going to be, I tried to give a bit more color on the implications. We see distribution C-band was part of a healthy (inaudible) healthy and the softer area in the pay-TV industry, which was challenged quite significantly by fast platforms and direct to consumers. At the same time, the cloud is growing pretty fast.

So we do have a drop in the appliance business from, I think, to [240ish] in '22 to around [180 plus] in '25, (inaudible) $60 million or so drop that we're projecting at the same time, SaaS is expected to grow by around $75 million to $110 million. I also think the dollars are -- not all dollars what we're saying those are recurring dollars versus onetime project, and I think that makes a huge difference longer-term for the business is predictability. So in general, I would say distribution is attractive. The C-band project is over, but the market itself is not over and we're investing heavily there. But SaaS is also -- it's growing quite fast. And those trends are very, very powerful on the SaaS side.

**Operator**

(Operator Instructions) And we have a follow-up from Simon Leopold of Raymond James.

**Simon Matthew Leopold** ***Raymond James & Associates, Inc., Research Division - Research Analyst***

I just wanted to get a sense of how you're thinking about the operating expense trends versus the prior year's meeting. So summing up the 2 segments, it looks like you're forecasting 2025 operating expenses, just shy of $340 million, whereas my notes from last year suggests you're just north of $380 million in 2024. So I'm assuming you're not expecting to see cutting expenses between '24 and '25 rather you just have a more gradual expectation for expense growth from where you stand currently. Could you maybe elaborate on how you're thinking about your investments and what's driving the trend and the change versus last year thinking?

**Sanjay Kalra** ***Harmonic Inc. - Senior VP & CFO***

So Simon, I'll start. The movement of OpEx over the next 2 years, these things will be gradual as we see the revenues increasing and as we see more traction in fiber and more increase in revenue of DOCSIS. With that, the investment relative to last year, where we were considering a significant investment, we don't think that is going to be the case. The OpEx is much less than we originally envisioned last year. So that's on the overall basis, but at the same time, it's gradual every year from where we are right now.

**Simon Matthew Leopold** ***Raymond James & Associates, Inc., Research Division - Research Analyst***

And what's the biggest factor leading you to see lower -- lower OpEx than you did last year?

**Sanjay Kalra** ***Harmonic Inc. - Senior VP & CFO***

Patrick, you're on mute if you're saying something.

**Patrick J. Harshman** ***Harmonic Inc. - President, CEO & Director***

Simon, to be honest or to be transparent, I think in retrospect, our projection last year was over [comfortable]. And it's -- it was more of a top-down conservative view. We've had the opportunity since then to do a more of a bottoms-up appraisal of the initiatives, the requirements, et cetera. And based on that, we have a revised and indeed a more moderate scaling of expenses, along with the initiatives. That being said, it still remains a significant expansion. We actually think we're investing aggressively and somewhat uniquely in the broadband space. and we're confident that the -- our execution plan and the spending plan that sits behind it are sufficient to enable continued and in fact, expanded leadership in the broadband area. And on the video area, there's really no meaningful change there. Our assumptions through more bottoms-up work on that side of validated the view that we had a year ago.

All right. We are at the top of the hour. So I think we need to wrap things up here. I want to thank everybody for joining us. I want to convey again at the top level, our conviction in both the opportunities and our ability to continue to execute and take advantage of those opportunities. We appreciate your support, your attention, and we look forward to speaking with you all again soon. Thank you.