Company Name: Broadcom
Company Ticker: AVGO US
Date: 2017-03-01
Event Description: Q1 2017 Earnings Call

Market Cap: 125,245.57
Current PX: 316.40
YTD Change($): +62.12
YTD Change(%): +24.430

Bloomberg Estimates - EPS
Current Quarter: 5.179
Current Year: 22.932
Bloomberg Estimates - Sales
Current Quarter: 5687.458
Current Year: 24406.481

Q1 2017 Earnings Call

Company Participants

- Ashish Saran
- Hock E. Tan
- Thomas Krause

Other Participants

- Ross C. Seymore
- Blayne Curtis
- Harlan Sur
- William Stein
- Vinayak Rao
- Stacy Aaron Rasgon
- Vivek Arya
- Toshiya Hari
- John William Pitzer

MANAGEMENT DISCUSSION SECTION

Ashish Saran

GAAP and Non-GAAP Financial Measures

In addition to U.S. GAAP reporting, Broadcom reports certain financial measures on a non-GAAP basis

A reconciliation between GAAP and non-GAAP measures is included in the tables attached to today's press release

Comments made during today's call will primarily refer to our non-GAAP financial results

Hock E. Tan

Q1 Highlights

Revenues, Gross Margins and EPS

- Well, we delivered strong financial results for Q1 with revenue of $4.15B and gross margin at 62.4%, both at the very top end of our guidance
- EPS of $3.63 grew by 5% sequentially, while net revenue was essentially flat
- Revenue was better than expected in all four segments
- The benefits we achieved through business diversification clearly came through this quarter with growth in wired, enterprise storage, and industrial completely offsetting the typical negative seasonality from wireless

Integration of classic Broadcom

- The integration of classic Broadcom has gone very well, and it's now mostly complete
- We remain focused on driving financial performance towards our long-term operating margin and FCF targets

Wired

Revenues, Demand and Growth

- Let me now turn to a discussion of our segment results, starting with wired, our largest segment
- In Q1, wired revenue came in $2.09B, better than expected, and represented 50% of our total revenue
  - Revenue for this segment was up slightly on sequential basis
- We benefitted from strong demand for our Ethernet switching and routing product from cloud data center operators
  - This growth was partially offset by the continuing seasonal decline in demand for our broadband carrier access and set-top box products, which we expect to bottom in this first quarter

Q2

- Turning to second fiscal quarter, we forecast wired revenue to experience seasonal growth, a little bit stronger than what we saw in the prior quarter
- We expect the momentum from cloud data center demand to sustain and expect the seasonal increase in demand for our broadband access and set-top box products

Wireless

Revenues

- Now, moving on to wireless
- In Q1, wireless revenue came in at about $1.18B, better than expected; and wireless segment represented 28% of our total revenue
  - Revenue for this core segment was down 13% sequentially, driven by the expected seasonal decline in demand from a major North American customer

Projection for Q2

- Turning now to our projection for Q2 FY2017
- We expect to hit the bottom of the annual product cycle transition at a major North American customer
- However, we expect to offset the significant portion of this decline in wireless from the ramp of the next-generation phone at our large Korean smartphone customer
  - This phone comes with an increase in Broadcom's RF and Wi-Fi connectivity content
- As a result, we expect our wireless revenue in Q2 FY2017 to be still sequentially down, but in the high-single digits, better than the more difficult double-digit declines we have experienced in prior years

Enterprise Storage

- Let me now turn to enterprise storage, which continues to be strong
- In Q1, enterprise storage revenue came in at $707mm, and this segment represented 17% of our total revenue
  - Segment revenue grew 26% sequentially, came in better than expected, driven by stronger shipments of SaaS, RAID and fiber channel products
- As you foresaw, our hard disk drive and custom solid-state drive controllers also had a very strong quarter

Q2

- And looking into Q2, however, we believe this resurgence of enterprise storage has to taper off and hence flatten out
  - Having said that, backlog for enterprise storage product continues up to today to be very strong, but we foresee seasonality to start slowing demand in Q3, if not in this late – in Q2

Industrial Segment

Revenues

- Finally, turning to our last segment, industrial
- In Q1, industrial revenue came in at $180mm, up 11% sequentially, better than expected, as we rebuild depleted channel inventory consistent with stronger product receipts
- The industrial segment represented 5% of our total revenue
- And as we look into Q2, we are anticipating industrial activity to continue to improve seasonally
  - And accordingly, we are expecting industrial segment revenue to increase by high-single digits sequentially

Summary

- With all that, to simply sum up, this first quarter was strong
- We were revenue flat from the seasonally high Q4 the preceding year
- As we now look into Q2, we expect this demand environment for our products to continue to be very healthy and our outlook for this quarter's revenue to be virtually flat to that of the prior quarter

Product Portfolio and Integration of Classic Broadcom

- It is becoming evident that our broader and more diversified product portfolio has largely mitigated seasonal impacts to consolidated revenue during H1
  - This is certainly an intrinsic goal of our business model, just that we did not expect to achieve this so soon
- The integration of classic Broadcom is clearly going well, and we continue to invest across all our franchise products
  - We are sustaining our technology leadership, and our products are very well received by our customers

H1 FY2017

Revenues, Growth and Operating Model

- Our revenue trajectory from H1 FY2017 could possibly extend into H2
- Nonetheless, we do not expect that the approximate 15% level of year-on-year growth we're guiding for Q2 to really be sustainable in the long-term
- Our long-term operating model will continue to assume mid-single digit annual revenue growth for the consolidated business

Thomas Krause

Financial Highlights

GAAP and Non-GAAP Financial Measures

- My comments today will focus primarily on our non-GAAP results from continuing operations, unless otherwise specifically noted
- A reconciliation of our GAAP and non-GAAP data is included with the earnings release issued today, and is also available on our website at broadcom.com

Operating Margins, Net Revenue and a FCF

- Let me first start out by saying that we're very pleased with the execution this quarter, and specifically the progress we've made towards our long-term target model, which remains an operating margin target of 45% of net revenue and a FCF margin above 35% of net revenue
- Further to what Hock was saying, we also believe that we can achieve these long-term operating targets based on a sustainable long-term revenue growth rate of mid-single digits

Q1 Results

Revenues and Gross Margins

- Now, let me review Q1 results
- Revenue for Q1 came in at $4.15B, approximately flat sequentially
- Foxconn was a greater than 10% direct customer in the first fiscal quarter
- Our first quarter gross margin from continuing operations was 62.4%, about 90BPS above the midpoint of guidance primarily due to revenue at the top end of guidance and a slightly better product mix
- This quarter's gross margin also benefited from the impact of approximately $60mm of revenue related to the assignment of certain manufacturing rights to a customer in our wired segment, which is included in our original guidance

Operating Expenses, R&D and SG&A Expenses

- Turning to our operating expenses
- R&D expenses were $664mm and SG&A expenses were $120mm
    - This resulted in total operating expenses for Q1 $784mm or 18.9% of net revenue

Integration of Classic Broadcom

- As Hock mentioned, we have now largely completed the integration of classic Broadcom
- And I would reiterate that we feel comfortable at this level of operating expenses relative to net revenue
- Operating income from continuing operations for the quarter was $1.8B and represented 43.5% of net revenue

Taxes, Net Income, Share-Based Compensation Expenses

- Provision for taxes came in at $77mm, slightly above our guidance
- This is primarily due to higher-than-expected net income, first quarter interest expense of $110mm, and other income net was $8mm
- First quarter net income was $1.63B and earnings per diluted share were $3.63
- Our share-based compensation expense in Q1 was $201mm

Balance Sheet Items

Moving on to the balance sheet, our DSO were 43 days, a decrease of 5 days from the prior quarter due to better linearity of revenue in the quarter

Our inventory ended at $1.34B, a decrease of $64mm from the beginning of the quarter

We generated $1.35B in operational cash flow, which reflected the impact of approximately $313mm for annual employee bonus payments for FY2016, and approximately $80mm of cash expended on classic Broadcom restructuring and integration activities, including discontinued operations

FCF

- I'm very pleased that in Q1 the business already demonstrated the ability to generate FCF close to our long-term target model of 35%
- While FCF in Q1 was $1B approximately or only 25% of net revenue, this does include, I want to highlight, the impact from the annual employee cash bonus payment as well as cash restructuring expenses and CapExs that as we discussed before are running higher than our long-term targets
- Looking forward, we expect classic Broadcom related restructuring expenses to continue to decrease as we finish this integration

CapEx and Cash

- CapEx in Q1 was $325mm or 7.8% of net revenue
    - However, we expect long-term CapEx, largely the fabless semiconductor company, to run at about 3% of net revenue consistent with that fabless business model

- As a reminder, for full FY2017, we expect CapEx to run at an elevated level of approximately $1.2B.
  - This includes about $500mm towards campus construction, primarily at our Irvine and San Jose locations; and about $200mm towards purchasing of test equipment for consignment at our CMs
- A total of $431mm in cash was spent on company dividend and partnership distribution payments in Q1
- We ended Q1 with a cash balance of approximately $3.5B.

Guidance

Revenues, Gross Margins, Operating Expenses and Net Interest Expenses

- Now, let me turn to non-GAAP guidance for Q2 FY2017
- This guidance reflects our current assessment of business conditions and we do not intend to update this guidance
  - This guidance is the result from continuing operations only
- Net revenue is expected to be $4.1B, +/- $75mm
- Gross margin is expected to be 62%, +/- 1 percentage point
- Operating expenses are estimated to be approximately $789mm
- Tax provision is forecasted to be approximately $74mm
- Net interest expense and other is expected to be approximately $106mm

Share Count, CapEx and Dividend

- The diluted share count forecast is for 452mm shares
- Share-based compensation expense will be approximately $223mm
- CapEx will be approximately $290mm
- As you all have seen, our board has declared a dividend of $1.02 per share to be paid later in the second fiscal quarter

Acquisition of Brocade

- We're also looking forward to completing the acquisition of Brocade, which is proceeding as planned, and we presently expect to close this transaction in our Q3 FY2017
- I am pleased that we were able to reach an agreement with ARRIS earlier this quarter for the sale of Brocade's network edge business for $800mm in cash, plus the additional cost of unvested employee stock awards
- Following Brocade's recent results, we continue to feel very comfortable that Brocade's Fibre Channel SAN switching business, the key business that we're focused on, will generate approximately $900mm of EBITDA in FY2018

QUESTION AND ANSWER SECTION

<Q - Ross C. Seymore>: The first question is on the wireless side. It's good to see the content rising at other customers besides just your big North American customer. Can you just talk a little bit more detail about what's driving that content up? Is there anything unique or is it basically the same goodness that you've seen in the North America side? And any more color about that goodness continuing in the North American side into H2 this year, would also be helpful? Thanks.

<A - Hock E. Tan>: In fact, it's a phenomenon we've been indicating to you guys for the last several years which is, over the medium-term – long-term, I'd say, our strength, our franchise in cellular – RF in cellular analogue, the front end cellular analogue, which includes FBAR [ph] band (17:24) device and all the circuitry and component that goes in front of the transceiver in the handset for cellular, that's one area. And the other area in Wi-Fi, Bluetooth connectivity.

Those two functionalities, those two features in phones, continue to evolve and with each generation. And as each generation evolves, what it evolves in the case of RF cellular is twofold. One is basically more band as we progress, as more and more countries globally progress into 4G and eventually even further beyond that, more and more band – spectral bandwidth get pulled into the phone.

And number of SKUs of phones get less and less for a major OEM manufacturer simply because of complexity of these phones. And so, because of more band, it requires more filters, more components, like power amplifiers, low noise amplifiers. And because of that, necessary content increases. I should also add the difficulty of engineering those products increased fairly exponentially which, therefore, drives towards better and better content for us into those very high-end flagship smartphones.

In the case of wireless connectivity, the same phenomenon is happening and particularly driven on bandwidth on PO throughput, as we gradually move from what used to be much lower bandwidth in Wi-Fi to today's AC, as we move from single-user to multiple users and as we move next-generation from AC into AX and further.

Obviously, difficulty of doing those products in smartphone become correspondingly more difficult. Content increases, and we benefit from basically content increase. It's a normal phenomenon, and we expect to see that continuing into the medium-term.

<Q - Ross C. Seymore>: For my one follow-up, both you and Tom, Hock, mentioned about the 15% growth not being your long-term assumption. Just wondering why you're bringing that up? Is there something you're seeing now that gives you a pause that things are going to slow down? Or is this just kind of a reminder that the level we are now is not the base assumption in your business model?

<A - Hock E. Tan>: The fairest way to answer that is, we have articulated last FY very clearly and even a year ago when we acquired Broadcom, as long as a year ago, that with our scale and with our diversification of product portfolio, our long-term model, out five years, 10 years, is the compounded annual growth of 5%. Not every year necessarily, but long-term 5%.

And why we feel the need to mention it is, obviously, you saw the numbers we're guiding for Q2 on the top line, and it's showing 15% year-on-year from a year ago. That's just one quarter, and obviously just one FY; one point in time. So we felt it necessary to just mention it that do not just take it and extrapolate it to say that we have moved away from our broad model guidance of 5% compounded annual growth in the long-term to a 15%; far from it.

<A - Thomas Krause>: And I'll just add – I also want to reiterate we don't believe we need to have this accelerated revenue growth to hit our financial targets, which we remain very focused on, specifically the FCF margins of 35%. We're very comfortable achieving those results based on a more normalized long-term CAGR of mid-single digits.

<Q - Blayne Curtis>: But just following up on just the wireless guide, you've talked in the past sometimes it could be seasonal, down 15%, 20%, to the high-single digits. Just curious, between content and the units, what are you seeing with your two large customers in terms of the seasonality and the timing of the ramp magnitude vs. the content gains you're seeing?

<A - Hock E. Tan>: I don't have specific data between to be able to split up accurately between units and content. But off the cuff, my sense is it's largely content.

<Q - Blayne Curtis>: And you mentioned the strength in switching. I was curious, and obviously you don't want to guide for full year. I was just curious, you talked about some businesses being soft in H2. There's obviously a big upgrade cycle, the 2500G. Just curious your perspective, as you look out at the rest of the year, the trajectory of the switch business?

<A - Hock E. Tan>: And on the switching side, which is a subset obviously of our wired segment, which is our largest segment. But just if you look at our switching and routing side, a fair way to put them together, which is really data center, networking business, we continue to see strength through the rest of the year.

We see a big part of that strength, we see, is simply because of very strong data center buildup by the cloud operators. We're seeing that now and I suspect that phenomenon will still continue, particularly when we start to ramp up newer generation with high bandwidth of Tomahawks and Tridents. And as we go later part in the year, of our DNX router and aggregation switches. So we see that and this momentum to be fairly good based on demand, intrinsic demand out there on data center expansion, especially into the cloud, but also from the fact that we are launching a few very key new products in this year. Okay?

<Q - Harlan Sur>: And it's great to see the diversity in the business playing out here. On the strong growth in the storage business, and I am assuming some of this is your SSD product lines. I believe you guys are supplying enterprise SSD controllers into the top two enterprise and cloud SSD suppliers. And I think your top customer here just grew their enterprise SSD business, I think, 20% sequentially and 20% y-over-y in the December quarter. Wondering if you guys are seeing similar growth trends? And do you expect double-digit in this SSD segment for the full year?

<A - Hock E. Tan>: I will be direct, our visibility in SSDs are not as good as perhaps our customers' are. A big part of it is, there are three parts to our enterprise storage, three broad parts. One, is very related to storage server connectivity, that's the RAID stuff and sometime the fiber channel holds parts of that side of RAID. And then, there is the components we ship into hard disk drives. And hard disk drive has experienced, as you well know, a strong surge over the last several months probably because flash have been in short supply.

And the last and smallest part of our business in enterprise storage is really related to enterprise flash controllers for SSD. And this really is a small part. So we don't get that broad visibility into this SSD market, as a lot of other people would. But you're right. Right now, it's very, very strong, especially in SaaS.

<Q - Harlan Sur>: And then, off of the success of Tomahawk and I also hear that your prior generation Trident is still very strong as well. And the team is ramping into this upgrade cycle. But you started sampling Tomahawk II, I think it was H2 last year. Could you just give us an update on the qualifications, customer feedback and when should we see the adoption curve for T II starting to ramp? Is that going to be kind of 2018 timeframe?

<A - Hock E. Tan>: For very competitive reasons, I really hate to give you specifics here. Suffice to say, it's very well received. We have a lot of momentum on our entire switch portfolio. And by the way – and Tomahawk doesn't fully replace Trident. Trident is used in a different segment vs. Tomahawk. And both are going very well, as are the Jericho products which are more aggregation switching and routing.

But broadly, our portfolio from high-end down to even on the low-end range of switching – campus switching [ph] pointers (27:51), those are all going very well. And I suspect it's all largely due to the strength in data center spending that still we see continue, particularly more recently since we had very strong conversion of enterprises into the cloud.

<Q - William Stein>: I wanted to address the FCF margin trajectory. Tom, I think, you referred to some of this in your prepared remarks. But I'd like you to maybe highlight what aside from the restructuring expenses that are still being paid and the temporarily higher CapEx that you're experiencing, what are the other drivers to get you to the 35% FCF margin and what sort of timing should we think about for that?

<A - Thomas Krause>: That's sort of the point of the prepared remarks is, if you look at where we are from an operating margin perspective, you look at the fact we've restructured the balance sheet around now fixed rate debt, if you look at our sustainable tax rate of 4.5% and cash taxes of approximately $100mm a quarter and you take out the restructuring costs which are bleeding off here pretty quickly, you take out the one-time campus initiative, the one-time tester initiative this year which will sort of play itself out here over the next couple of quarters, frankly, we're largely there. And that's probably the real take away. And, of course, that doesn't take into account what we would expect to be H2 seasonally up trends from a revenue perspective.

<Q - William Stein>: Maybe one more, something that came up last quarter was the change in capital allocation strategy. Maybe you can sort of highlight for us your plans on the M&A front from here despite the higher dividend, the significantly higher FCF that you're going to be generating I guess after these temporary expenses fall off would seem to me to continue to support a good M&A pipeline. Maybe you can characterize that for us, please?

<A - Thomas Krause>: There's no real update there other than we outlined very clearly that we're going to continue to drive giving back 50% of FCFs to investors in the form of dividends, which of course at these levels would imply that we're going to have the ability to continue to increase the dividend pretty meaningfully here over the next couple of years certainly.

Beyond that, we've used M&A to drive returns obviously over the last several years pretty effectively. We continue to see opportunities to do that. Brocade is the latest example of our being able to put capital to work in an interesting opportunity that drives better returns than our alternative. And so, we're going to continue to do that. But given our scale, we have the opportunity to do that mostly off of the balance sheet, particularly with most opportunities that arise.

<Q - Vinayak Rao>: Wanted to touch up on carrier aggregation. Like, this is one of the key growth drivers for your RF business. Hock, can you provide us an update on the trends you're seeing by geography for that and what that means for your portfolio?

<A - Hock E. Tan>: Carrier aggregation, as you well know, is the phenomenon of especially benefitting operators who have multiple spectral bandwidths, not necessarily one, but multiple. And in the interest of reducing CapEx in infrastructure, it's the phenomenon of enabling those bandwidths to mux, to combine together into one, which creates much more capacity throughput, and that's not only in infrastructure; it goes into the phone.

And we are probably one of the leading enablers in the phone of making that happen, simply because not just of architectural design of the cellular RF analogue, but also the fact that FBAR filters, which are FBAR, are much better performing and more integral – have been able to integrate the integrated into module to allow that maxing and demaxing of those spectral bands. And that's happening.

It started very aggressively obviously, as you've seen in China; continuing to be very much so in China. It's also happening very aggressively in the U.S. Those are the two biggest geographies where a lot of that is happening. It started with downlink last year, I think. And it's now moving on to uplinking, not just downlinking. Which of course then is part of reason why it's helping create – not the only reason, but one of the reasons – creating increased content in our cellular RF demand. So it's great for us. And we see that phenomenon continuing to grow and expand into other regions of the world.

<Q - Vinayak Rao>: And for my follow-up, I wanted to touch upon gross margins. Pretty good performance in gross margins both in the quarter and the guidance. But I was thinking about how should we think about gross margins for here. And if you can outline, like, what are the top two drivers of gross margin expansion as we look out towards the rest of FY2017?

<A - Hock E. Tan>: And if you look back to a year ago when we just closed the Broadcom transaction, every quarter since then we have been able to expand our gross margin in the range of roughly 40BPS, 50BPS sequentially. A big part of it is, as we settle down the portfolio, as we start to get the benefit of larger scale in purchasing materials and as various specific actions like basically bringing testing very much in-house and consigning testers to contract manufacturers instead of leasing test time for our huge volume of semiconductor chips, all those various actions.

A big part of this expansion of gross margin comes from our scale and ability to leverage on the scale in direct materials. It also helps that our product margin, as we move from one generation to the other, keeps getting richer in terms of the mix. So that's a combination of these two things. And in terms of where would it go from here, frankly, I don't know. Best indicator is probably look at history.

<Q - Stacy Aaron Rasgon>: For my first one, you talked a lot about FCF margins, but I wanted to dig a little bit into the payout ratio. You're paying out right now about a little over 30%. Target is 50%. Should we think about that sort of level going up to 50% in line with the margins going up to 35% or more? Or like how should we think about the trajectory of reaching your target on the payout ratio. That seems like something that's more in your control, maybe even quicker than the margins themselves?

<A - Thomas Krause>: They kind of go hand in hand, Stacy. I think what we're going to do and what we've sort of articulated in the past is we're going to get to the end of the FY. We're going to look back at the FCF trajectory and those margins over the course of that previous year, we're going to look at the business. Obviously, we're very focused on sustainability, and then we're going to pay out 50%.

And so, all you're seeing is the general trajectory improving from where we exited last year to where we are here, exiting Q1 and guiding Q2. And you're right, consistent with that policy, as we get to the EOY we're able to achieve expectations. Then, we're going to have to obviously be in the position to raise that dividend consistent with getting back to the 50% on an LTM basis.

<Q - Stacy Aaron Rasgon>: For my follow-up, I also wanted to dig into gross margins a little bit. And you talked a little bit about the drivers. But I heard you said earlier that you're sort of comfortable with your level of OpEx spending as a percentage of revenue, which implies that the operating margin improvement toward the model from here comes from gross margins. But it's not that much. It's only about 150BPS, maybe 200BPS from where we are. And this is even before you buy Brocade, which comes in at – gross margins in the 70s.

So given all the levers that you just talked about and Brocade coming in, why should 64%, 65%, which is where that would take you, why should that be upper limit? Like, how should we think about this if we're going farther. Like, I don't see any reason why I shouldn't expect the gross margins to go even higher than that, unless there's something else, mix or something else, that ought to be taking it down. Can you talk about that a little bit?

<A - Thomas Krause>: We're going to get into the gross margins where we think we can go. And if I go all the way back to the original Avago gross margins in the 30s, obviously, we're always focused on continuing to improve on our gross margins. I think the insightful part of the question is, we are in our seasonally weak part of the year. And so, when you do look at the general seasonality of the business and where things are, I think you have to take a whole FY approach to looking at where operating margins will land and could land, and apply that to how you're thinking about the model. That's the only guidance I'd give you.

<Q - Vivek Arya>: For my first one, Hock, your wired business has essentially been in this $2B to $2.1B range for the past year on a quarterly basis. Can you give us some puts and takes on what's done well? What's been different than expectations? Because my read is that the switching parts has probably done fairly well with all the cloud opportunities, but your broadband access and set-top box has perhaps not done so well.

But then, on the prepared remarks, you mentioned that you are starting to see a little bit of pick up on the broadband access side. So just if you could give us a look back on what was different than expectations. And then as we look forward to this year, could we see a contribution from both the parts of wired, both the cable side as well as the switching side?

<A - Hock E. Tan>: And let me try to explain it on our wired business. You're right, it's our biggest segment. And in simple terms, broadly they're two groups of products here and markets here. There's switching and routing, you correctly put out. And that comes from various fronts, from Jericho extended switching and routing, as well as ASICs, which is also a part in there, as would be building block products, as well as fiber optics components.

That business is very enterprise-driven directly and has actually done very well, especially on a year-on-year basis, because it's growing. As we move from 10-gigabit a few years ago, a couple of years ago, to increasingly 25-gigabit and 100-gigabit, coming up very fast. As that transition happens very fast, obviously it's driving. And you all hear products like Trident going to Tomahawk especially in the very high end, and Jericho. All this are related to the data center switching. And that's driving growth on infrastructure on a very, very stable basis, but driving growth very nicely and close to high-single digits, even double-digits.

Then, the other part of the segment, which is pretty big too, is our broadband. And here there's set-top box on the CPE side, and access gateways, like DSL PON on the infrastructure side. And here, the business is stable. It's very stable. It has been stable for the last couple of years – few years and continue to be very stable. And it's also very seasonal. And you will see that the later part of H2 is typically when it drives up and in H1 is when it shows a seasonal decline.

Hence, in my opening remarks I was mentioning that fiscal Q1 is probably very seasonal low point. And it gradually picks up seasonally, later part of Q2, but certainly Q3 and then starts rolling over again. But if you look at it year-on-year, relatively very, very stable. So we have a confluence of two segments mixed together in our wired business, which is what you're seeing. It dilutes basically the strength and growth of switching and routing. But nonetheless, both are very, very franchise product, very franchise business and drives stability in this company.

<Q - Vivek Arya>: And as my follow-up question. It's a somewhat longer term question. You're obviously doing quite well in the wireless business and that can continue for some time. The cloud business is also doing quite well. But when I talk with a lot of your peers and asked them about growth in semis over the next three to five years, they talk about connected cars, or Internet of Things, or machine learning, or 5G. Do you feel Broadcom is investing adequately to pursue those markets? Is it a part of the company that is looking at those longer term areas? Or do you think M&A is the better way to address some of those things as they become real over time? Thank you.

<A - Hock E. Tan>: Using the opportunity to expound a little propaganda here, again, that we've always articulated. The franchise products we are in, we are the technology, we are also the market leader in those areas, in those niches. Some of them are very large niche, but we are the technology leader. And we don't get there by not investing. We invested, as my remarks said and I've said many times, very heavily in those areas we're in.

We develop products that generally, in those franchise areas, before anybody else do it out there. And that's why we can sustain it, that's why our margins are the way it is because we provide products that allow our customers to differentiate and innovate themselves. So we invest very heavily.

And you look at our total R&D, we invest in total $2.7B a year as a company in R&D. We have the best engineers out there, we have the best products in this area. So that's really where we continue to sustain leadership in our existing franchise products. In some of those flights of fantasy somewhat that you talked about earlier, I'm not saying it won't happen. I'll be direct. Let somebody else take another hit [indiscernible] (44:31), and then we'll buy the company if it's successful. Thank you.

<Q - Toshiya Hari>: I had one short-term question and then another longer term question. On the short-term question, with regards to wireless, you talked about trends at your Korean customer offsetting the seasonal trend at your North American customer and, therefore, you're guiding Q2 to be down only high-single digits relative to history being down about 15%, I recall. Is the upside vs. historical seasonality, is that all coming from dynamics at your Korean customer or dynamics in terms of units or content at your North American customer are trending better than history as well?

<A - Hock E. Tan>: You're really trying to parse the data, aren't you? That's all a combination rolling. It is. And you obviously know all that. It's also timing of some of the shipments and purchases by our two largest customers. So there's a few factors involved in it, one of which was there's timing this quarter – differences in timing. There's the fact that, you're right, Korean customer is coming in with a vengeance to try to recover share.

And broadly, we're also talking about content increases as each new generation comes in. And it's not even the Korean customer, it's also the major North American customer. And it's a mix of all these sectors. Have I sat down and broken it out in detail? No. We don't try to analyze that to any degree. But those multiple factors mix all together to basically indicate that the downward seasonality that we saw a year ago is perhaps less pronounced this year.

<Q - Toshiya Hari>: And then, as my follow-up, another question on wireless specifically around China. Obviously, you're tied to the North American customer and the Korean customer in a big way today. But when you think about your wireless business and your RF business, specifically on say a three-year view, how do you think about the opportunity in China today?

<A - Hock E. Tan>: There are opportunities for us in China, but the focus of our success and our product's success in wireless, especially content increases year-on-year, is, as you know, we push the cutting edge on technology, be it wireless Wi-Fi connectivity or RF cellular. We push the envelope. And that tends to go very much largely to the flagship class phones. That top of the pyramid where a big part of it has been our major North American customer and the Korean customer, but a few other guys spread around. That's where our strength is. That's where the demand and value we see in our products coming out.

As China evolve over time, having said that opportunity exists, they'll move from feature phones, to low-end smartphones, to now some premium phones. And we've begun to get traction on even those premium phones to the extent that those brands in China use it. And that's why they need the technological engineering edge that we provide in our product. Until then, they need less of it, except with exceptions like carrier aggregation when we obviously are the leader in providing solutions for carrier aggregation on a discrete basis.

But on an integrated basis into smartphones, it's really the flagship phones and now increasingly premium phones making its way into flagship phones that we see the demand. And that transition is happening in China, albeit on a very gradual basis. But we're very patient people. We'll wait for it.

<Q - John William Pitzer>: My first question is kind of a follow-up on the enterprise storage side. You rightfully pointed out that today the SSD controller business is the smallest part of that business. I'm kind of curious as you look out over time do you see that market developing similar and potentially getting to be the size of the HDD controller market? Or is there something inherent about the growing complexity of the raw NAND itself which means that there'll always be kind of a large portion of that controller market, which is in-sourced, the guys building the NAND actually building their own controller, or do you think eventually you'll end up in a situation where it's all outsourced?

<A - Hock E. Tan>: And we see the SSD controllers for enterprise to be – a lot of it will be outsourced. Why? Because there's certain IP inherent in those enterprise flash controllers that are very tricky to do. Not dissimilar from the re-channel of hard disk drives. So that will happen. [ph] Kline (50:19), because the nature of [ph] Kline (50:20), it's not so complex technology, IP required is not so extreme. We see that as probably less opportunistic for us, though one never knows. But certainly, on enterprise, which is where we are very focused on, we see a lot of need for intellectual property blocks features that few people can do. And we are one of those few people who can do it very well.

<Q - John William Pitzer>: As my follow-up, I think a lot of us in the investment community understand sort of the wireless, both on the RF and on the connectivity side, the content ASP story. I am wondering if you can talk a little bit about that same dynamic in your wired business, and maybe differentiate between switching and routing vs. set-top box and broadband access. How do we think about sort of the ASP trends in those two segments over time? Or just your content going into the CapEx dollars being spent in the wired market?

<A - Hock E. Tan>: If you talk about switching and routing, it's really more than just chips, or maybe it's a little building blocks of chips. It's really as much an architectural play, especially in the high end top of the rank, in the what you call leaf and the spine side of the data centers. And here is where our model is going beyond just selling pieces of silicon. We sell a lot of firmware and software that goes hand-in-hand to enable those chips to work with multiple OEM customers at the end of the day.

So that's a very interesting model for us. And what is overriding all this is obviously the need for more larger and larger, more and more throughput, especially in data centers and especially in top of the rank and all the way to the spine. So we have big advantages in this area simply because of the strength of the intellectual property we have in making very complex engineering, very complex SoCs, but also very high-speed interfaces or SerDes, as we call it. So all that plays to our advantage being able to do it. And we continue to do that. And we continue to do it as it goes from 10-gigabit, to 25-gigabit, to 50-gigabit, to 100-gigabit and maybe infinite, and going on in the future to 200-gigabit, to 400-gigabit.

We believe we're investing heavily to ensure that we can develop those kind of products and develop it first and better than anybody else. And with that expansion of features, we benefit from content increases simply because you're providing a customer throughput and it's not a one-on-one scaling. It's more and more – it's a lot of value for our customers to be able to go from 10-gigabit to 100-gigabit in the next year or two. And we provide lot of value in that.

And by the way, in broadband, it's not dissimilar, except that maybe it's not evolving as rapidly simply because it's a much more stable market. For instance, you hear about now, 4K TVs or video delivery moving on to high-definition, HD, and eventually moving even to 8K. So it'll be interesting to see how 8K is going to be accepted, since the human eye may not even notice the difference, but people want it. And they want that. We're able to provide that. But it might take a bit longer. That's why I said broadband to us is a much – we look at it as a much more stable, gradually evolving market.

Even as OTT, the hype behind OTT and all that comes into play, which we participate in. But in data centers, it's serious stuff. More and more data are being basically pushed through pipes, start, process as social media keeps expanding. And that's why we're seeing this past quarter and current quarter extraordinarily strength in the demand for switching and routing.