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CISCO'S THREE-PRONGED ARSENAL FOR THE
SOFTWARE GIANTS' WAR

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Abstract

This report is part 1 of 2 of an Equity Research of Cisco, and contains a company overview, where Cisco strategy and drivers are analyzed and an industry overview, detailing industry trends, threats, and opportunities as well as the company's competitive landscape. It was conducted under the supervision of Professor Rosário André.

Keywords

Finance; Technology; Software; Network Infrastructure

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Company Overview

Cisco Systems (CSCO), founded in 1984 is one of the world's largest software companies, designing and selling a broad range of products related to software and hardware products. Cisco was founded with the purpose of enabling communications and connecting devices, establishing themselves in the market by selling routers and switches. Although the company name comes from San Francisco, California, where it was first headquartered, the company relocated to San Jose in 1994.

In 1990 the company first went public and started growing rapidly, mainly through acquiring other companies which possessed expertise in telephones and internet. Throughout the years they continued adding products to their portfolio and, in 2006, pioneered the video conferencing technology - Cisco Teleconference. Throughout this period the company was mainly known due to their hardware products, especially routers and ethernet switches, but in recent years has broaden their portfolio to cyber-security, applications, cloud computing and conferencing.

They currently operate in three geographic segments: Americas (58.5%); Europe, Middle East, and Africa (EMEA) (26%); and Asia Pacific, Japan, and China (APJC) (15.5%). The company does not disclose the geographical presence per business segment, so we assumed similar values to all geographies.

The company's products and technologies are grouped into five different categories: Infrastructure Platforms (54%); Applications (11%); Security (7%); Other Products (<1%) and Services (28%).

As of December 2021, it operated in more than 115 countries and employed approximately 79 500 workers.

Cisco's Strategy

Cisco, operating in the technology industry, has a complex business model, with different revenue streams which can be broken down into: Infrastructure Platforms, Applications and Security. Services revenues are driven through support and maintenance of the main business areas, and other products constitute all the offerings that are not entailed in the main units. The company started in 2015 a transition of their revenue model from a network equipment seller to a service and software subscription company aiming at generating recurring revenues. The company relies on acquisition of smaller companies, usually start-ups, that provide access to new technologies, having acquired 51 companies since 2016 (13 in 2021). Of the 6 main acquisitions since 2018, all are related to either Applications or Security, and we estimate they account for around 5% of total revenues of the combined segments. The aforementioned acquisitions were headquartered in the United States, which support our assumption that the company has no interest in changing their geographical portfolio.

In 2017, their software revenues constituted 20% of the total sales, from which subscriptions accounted for 52%. In 2021, software revenues reached 30% of the total business sales, with 79% of these coming from subscriptions.

Infrastructure Platforms – The Good

Infrastructure Platforms sales are mostly derived from routers (14% of BU sales) and ethernet

switches (27% of BU sales) to enterprises but include wireless and data centre products. This is the largest segment of Cisco, accounting for 54% of the total revenues, with the main sales driver being their Catalyst 9000 series of switches (priced on average \$20 000), with around 30% of total customers owning the product. Cisco are market leaders in all offerings of this segment (44% market share) but have been decreasing their market share since 2015 (65% market share), the year their new strategy kicked off. This was the most impacted business unit by their business model change since it comprises most of the network equipment offerings. We estimate this industry will grow at a 4% CAGR till 2026.

Applications – The Better

Applications (11% of total revenues, up from 9% in 2015) is constituted by communications and conferencing (60% of the business unit) as well as cloud computing and software-as-a-service (SaaS) offerings (40%). The main communications growth driver in this business unit has been Cisco Webex, a video conferencing solution that in March 2020 had 325 million users (we estimate Zoom had around 1,500 million in the same period). The monthly subscription for enterprise plans is on average \$25 (Zoom: \$20; Microsoft Teams: \$12,50), which has been one channel to consolidate the recurring subscription revenues approach. We believe that, although WeBex has been registering high growth, Cisco might have missed an opportunity to become the market leaders amid pandemic (Zoom has a market share of 50%). Regarding cloud computing, Cisco's most notable SaaS products include AppDynamics and ThousandEyes which allow for real time monitoring performance of a company business operations and Intersight, that enables companies to control everything from their operations from suppliers to customers from a single platform.

Cisco's AppDynamics and Thousandeyes, are also main growth drivers for the business unit, used by all top 10 U.S. banks. We estimate this business unit has a market share of 3,5% (with 6% in the communications market, and <1% in the cloud market. We estimate that till 2026 cloud computing industry will grow at a 12% CAGR, and communications market at 16% CAGR.

Security – The Best

The security category (7% of total revenues, was 4% in 2015) consists of their network, cloud, and email security as well as advanced threat protection products.

This Cisco segment has by far experienced the largest growth in the company in the past few years, with Cisco being market leader (18% market share) with a CAGR of 4% since 2015. Its main products are SecureX, Cisco Duo and Cisco Umbrella. Cisco already reached around 300,000 customers, including 100% of the Fortune 100 list. Since Cisco offers various security products, they aggregate them in an offering called enterprise agreements, to provide end-to-end security for their customers, which have grown from 1,317 in 2018 to 4,581. To put that into perspective, the average customer purchases 1.4 security products, while the enterprise agreement customer owns 4.1. One license of a Cisco security product is on average \$2,500 a year. This business unit suits best the new business model of the company, capturing the most part of subscription revenues. Cyber-security market is expected to grow at an 8% CAGR till 2026.

Dynamic Overview

Revenues: Cisco's revenues have been flat since 2016, where they plateaued at \$49 billion, despite of strong industry growth, with internet traffic growing at a CAGR of 25% since 2014.

Cisco has a much higher revenue stream than its peers, with 10 times as much as the second in line, Juniper Networks (\$4.5 billion). In the last decade, no single customer has accounted for more than 10% of Cisco's revenues, which helps mitigate risk. We think this plateau can be misleading, as the company not being able to grow its revenues is justified by their business model shift. In their former model, the company would receive bigger upfront payments and a small fee charged for maintenance of the products (for example the Catalyst 9k switch, which costs \$20,000), whereas now, price paid per customer upfront is smaller but the customer is contractually obliged to make recurring payments over the life of the contract, thus yielding a stream of recurring revenue (for example a Webex license monthly fee is \$25). Other reason that may be halting revenue growth, is the logistical problems with supply chain shortages in chips and power supplies, with Cisco not being able to deliver the products to all their customers, despite a 33% growth in demand from 2020 to 2021. In 2018 the net income was \$0.1 billion due to a mandatory one-time transition tax on accumulated earnings of foreign subsidiaries.

Subscriptions: From 2017 to 2021, software subscription revenues grew at a CAGR of around 11%, reaching 79% of revenues coming from software in 2021, while total subscription rose from 30% of total revenue to 44% in the same period. During this period, the revenues remain constant as the decrease in network equipment, verified mainly in the decrease of Infrastructure Platforms revenues, from almost \$29 billion to 27\$ billion, was offset by the increase in Applications and Security, especially the latter, with growth from less than \$2 billion to \$3. 4 billion.

RPO: The company has been able to make its revenue stream more predictable with the increase in recurring subscriptions, that can be verified when looking at Remaining Performance Obligations (RPO), which we considered a good metric for future revenue. RPO is comprised of deferred revenue (the revenues from subscription contracts Cisco has already received) and unbilled revenues (the revenues customers are obliged to pay due to their contract affiliation, but will only do in the future, on a yearly basis). The unbilled contract revenue has been increasing and reached \$8.0 billion in 2021, which will translate to future revenues that are already contractually granted. An increase in the RPO shows the company is successfully implementing their subscription model revenue, as it is establishing more contracts, thus increasing unbilled contract revenue for future years. This increase in turn, will represent the predictability in revenues the company intended to get. Deferred revenues have been particularly high in the last 2 years, increasing 8% from 2020 to 2021, reaching \$20 billion dollars. This can be due to Cisco's subscriptions that were particularly high, for example with the WebEx growth in the pandemic, and with enterprise agreements reaching 4,581.

ROIC and ROE: The returns of Cisco show the company has been efficient in generating revenues from their assets. Cisco's ROIC of 25%, the highest in the last 5 years, is only lower than Fortinet's 41% (Juniper: 5%; Arista: 20%). Cisco's ROIC has been higher than the return that investors require, given by the company's WACC 8,27%. As such, shareholder value is maximized when the company reinvests some of its returns. Their reinvestment rate has varied between 40% and 50% with a healthy dividend payment across the years (\$1.46 in 2021 from \$0.94 in 2016). Cisco's ROE of 30% in 2020, higher than Arista's and Juniper's ROE of 20% and 6% respectively, and lower than Fortinet's 44.4%, positions the company as being able to provide their investors with higher returns than their peers average (24%). Raising capital when needed will be easier for Cisco, ensuring more ability to meet their obligations compared to peers' average.

Liquidity and Profitability: Cisco's current and cash ratio of 1.7 and 0.5 respectively show the

company has enough liquidity to meet their short term obligations. Regarding solvability, in 2020 Cisco has some solvency, but is below their peers' average, with Solvency and Financial autonomy ratios of 0.7 and 0.4 compared with peers' 1.1 and 0.5. Cisco however is in a better position in 2021, improving both their liquidity and solvency ratios.

M&A: Inorganic growth has played a small part in Cisco strategic growth, as the company has pursued an aggressive strategy of M&A, acquiring 30 start-ups since 2017, and a total of 229 over the company's life. The main reason is to get expertise and keep up with the latest technology, as the technology industry has the highest propensity to patent, according to OCDE, so acquiring companies can be cheaper than spending more on R&D. We estimate that Cisco acquisitions contribute to 5% of total Applications and Security revenues – this number was obtained by considering the average revenues per year of the main acquisitions (which usually represent ~50% of cash allocation for M&A) prior to acquisition since 2018, which were then multiplied by 2 (to represent the remaining 50% of cash allocated to M&A). All the acquired companies since 2016 were in the domain of these BU activity. The company bought 13 companies in 2021 (Juniper: 0, Arista: 1, Fortinet: 2), the most in the last decade, spending almost \$7.5 billion, compared with \$0.35 billion in 2020. We estimate that the unusual employment of cash in M&A was in pursue of higher market share especially in the Security segment, where subscription offerings opportunities fit best. Cisco seems to do a good job integrating the acquired companies, for example Kenna securities was acquired in 2021 and was already part of their core security offerings in the same year. Compared to its peers, it has an advantage from: higher flexibility in pursuing deals because of its cash available (in 2020 it had \$9 billion, while Juniper and Arista had respectively \$1.3 and \$0.8 billion); more experience and know-how in the screening process of deals, having made their first acquisition in 1993 while their main peers were all founded after that. Value creation analysis of the acquisitions is difficult to make since most acquisitions are start-up companies that are rapidly integrated within Cisco and sold as product offerings, with no further disclosure of their sales.

A closer look into two case studies of Cisco's acquisitions (Meraki in 2012 and SourceFire in 2013) indicates that Cisco might be overpaying for these deals. These companies were acquired for \$1.2 billion and \$2.7 billion, respectively and our estimates suggest Cisco might be destroying value in both scenarios. Nonetheless, these values should not be taken blunt. Cisco's acquisitions are not solely intended to create value but rather for predatory activity. By acquiring emerging businesses Cisco can protect its market share and scare off competition. Further below we discuss the ability of Cisco to overpay for such deals.

Operating cash and cash flows: Cisco had in 2021 almost \$9 billion in cash and cash equivalents, and \$15 billion in investments giving them the flexibility to keep a sustainable M&A activity, with an average employment of cash for Capex and acquisitions of 5%-7% in the last 5 years, as well as a strong share buyback program, (employing about 15% of cash in share repurchases in 2021), and dividends payment (31% of cash).

Cisco investments decreased from \$58 billion in 2017 to \$17 billion in 2020, especially in government securities, since they were used to settle the company's long-term debt maturing in 2019 and 2020, which constituted a large portion of total long-term debt.

Costs and Margins: Cisco EBITDA margin (28% in 2020) performance enables a competitive advantage, as the company is more profitable than most of its peers (only Arista outperforms with 36%). In Gross margin (64%) Cisco outperforms every company, apart from Fortinet (78%) mostly

because this company operates with software offerings while the rest is in the network equipment market, having much higher COGS as a % of sales. Cisco has had some margin growth since 2017, where its EBITDA margin was 25%, Gross margin 63%, and Net margin 20% (reached 23% in 2020). having much less variance than its peers: we believe this can be due to the higher number of suppliers (Cisco has 250+, Juniper: 50; Arista: 21) avoiding supply chain constraints. We estimate there are four main channels that give Cisco the upper hand on margins:

- 1) Cisco's size in comparison to its peers allows them to benefit from economies of scale, which allow them to save on personnel costs, as a % of revenues. Their revenue per employee is of \$620 thousand, compared with Juniper's \$473 thousand and Fortinet's \$315 thousand, with only Arista outperforming on \$891 thousand, which in part is biased towards their smaller size (only 2,600 employees compared to Cisco's nearly 80,000).
- 2) Cisco's presence in multiple markets in comparison to peers allows them to cross-sell some of their offerings. As mentioned before, Cisco enterprise agreements allow companies to purchase all subscriptions under a single contract. All the other three peers mentioned operate in only 1 of the 3 markets we consider Cisco is competing at.
- 3) Cisco's transition to a software subscription-based model has allowed the company to improve its operational margins, as margins from software offerings are higher on average than margins in hardware offerings.
- 4) Cisco invests strongly in R&D due to the high technology turnover inherent to the industries it operates in. R&D expenses as a % of sales are 13%, with only Juniper's 23% being higher. Cisco's more intense competitive landscape when compared to peers, due to competing in multiple markets, forces them to spend more in organic growth. R&D has been flat at around \$6 billion since 2015, but currently is more oriented to developing and enhancing their subscription offerings, stated by the company in all reports since 2015. Unfortunately, there was no available data regarding R&D % spent in software subscriptions, but we estimate it follows a similar trend to M&A software-oriented deals as a % of total M&A deals.

Invested Capital: Cisco's **goodwill and intangible assets** is particularly high when compared to its peers (39% of total assets vs. Arista: 4%, Juniper: 39%, Fortinet: 2%) which indicates higher M&A activity. Goodwill has increased 13% from the previous year, mainly due to the acquisition of Acacia Communications (\$4.9 billion).

In **Cash Flow management** Cisco's cash conversion cycle in 2020 of 21 days is well positioned when compared to Juniper, Arista and Fortinet (68, 212 and 100 days respectively). The main reason for this metric's outperformance is the company's efficient supply chain (excluding 2021 due to supply chain constraints, further analysed in trends and threats), as Cisco acquires from 250+ suppliers (Juniper: 50, Arista: 21, Fortinet: 30), with only one of them accounting for more than 10% of Cisco's COGS, which gives the company higher bargaining power compared to its peers. As for customers, none of the 300+ accounts constitute more than 10% of sales. This fast inventory-to-sales pipeline sustains the high cash generation of the company to pursue M&A deals and R&D expenditures.

Cisco **PP&E** as a % of sales has been decreasing from 7% to 5%, mostly due to production equipment and factory costs, which is justified by the company shifting its business model, as the decrease in hardware equipment production decreased the number of Cisco's offices. Juniper has a PP&E as % of sales of 49% because the company is more hardware oriented, with computer equipment costs justifying the high value, while the other peers are more in line with

Cisco's values.

The **deferred revenues** as a % of sales of Cisco (42%) are higher than all its competitors (average of 17%). The main reason for this is the subscription sales high growth in recent years, as the company has recorded pre-payments for software licenses or cybersecurity subscriptions. This is a good metric to show the company is successfully transitioning their business model.

Shares and Repurchases: Cisco first went public in 1990 with a market capitalization of \$224 million and has been classified with an AA- rating by S&P since 2013. They have an institutional ownership of 74%. Currently, the company is a part of the S&P 500 and Fortune 100 list, with a market capitalization of \$250 billion, growing from \$189 billion in 2017. The earnings per share grew from \$1.92 in 2017 to \$2.50 in 2021. The main two drivers of market capitalization growth since 2017 are Cisco's net margin which improved by 6%, and the 15% decrease of shares outstanding.

Cisco has spent more than \$44.0 billion in their share repurchase program over 2017-2020, buying back over 15% of their shares outstanding since 2018, more than any of its peers. The strong cash conversion ability (21 days cash conversion cycle) and strong cash flow generation (\$24 billion in cash and investments in 2021) gives the company leverage in their capital allocation strategy. This has boosted the earnings per share, compensating Cisco's investors. In 2021 the payout ratio was 58%, the highest in the last 5 years, and a similar share repurchase activity.

Capital Structure: In 2020 Cisco's debt-to-equity ratio was 38%, a middle ground value compared to all their different peers. Juniper, Microsoft, Amazon had higher D/E ratios, with only Arista, Fortinet and Zoom having lower values. The company paid \$434 million in interest expense in 2021, at an average 2.44% interest rate (long-term debt interest), obtaining a tax shield of \$91 million. The interest coverage ratio is 32, meaning the company is in a solid position to meet all their debt obligation. The value double since 2017, as the company had a large portion of their long-term debt maturing in 2019 and 2020.

On a market price basis, Cisco has a debt-to-equity value of 5% - we performed a sensitivity analysis to assess how much the share price would change if Cisco were to review its capital structure policy. For demonstration purposes, we changed the values of share repurchases to target a specific capital structure and calculated the share price on 5 different levels of debt (0%, 2.5%, 5%, 10% and 20%). This simplified view yields the highest share prices for the least amount of debt however, lowering debt encompasses losses not predicted by our model, such as tax shield losses. Therefore, we estimate the company will not change its target capital structure for the time being.

Customers: Customers are comprised by Enterprise: large businesses employing 1,000 employees or more; Commercial: Businesses with less than 1,000 employees; Service providers: wireline carriers, webscale operators and Internet, cable, broadcast and wireless providers; Public sector: local, federal and state governments as well as educational institutions.

Management: Chuck Robbins, Cisco's CEO since 2015, joined the group in 1997. He was appointed CEO as he was seen as the best option to start the shift in direction of the company's business model. The total compensation of the CEO is \$23 million as of 2021, higher than the US average CEO compensation of \$21 million. Cisco was elected the 4th best company to work at by Fortune 100 in 2020, with 95% of its employees saying they felt happy and safe in the workplace.

ESG: Cisco has improved its position since 2017 in all Environmental, Social and Governance factors. When compared to its peers (Fortinet, Arista, Ciena and F5), subject to available data, they are similar in Governance and Social but worse in Environmental. We estimate the main drivers for their worse performance are the huge Total Greenhouse Gas Emissions (tons) and Total Energy use (Megawatt hours) per million revenues, that were higher than their peers average by 6.9 and 22.6 respectively. The company must improve their energy spending, as they committed in 2021 to reach net zero for greenhouse gas (GHG) emissions across all scopes by 2040.

Industry Overview

Cisco is usually classified as operating in the Network Infrastructure industry. However, we consider this classification disregards the shift in business model of the company, so we consider Cisco as operating in the following industries: hardware infrastructure (main competitors: Juniper Networks; Arista Networks); Cloud intelligence and video communications (main competitors: Zoom; Microsoft; Amazon) and Cyber-security (main competitor: Fortinet).

Industry Trends

- Opportunities

The technology industry is highly powered by the growth in internet traffic worldwide. In 2020, because of the pandemic, internet traffic (Exabyte/month) spiked around 25% and 45% worldwide, with 1.2 billion children having online classes. Internet traffic continues to grow at a rate of 35% annually. In 2018 there were 3.9 billion users, who are projected to grow to 5.3 in 2023, representing a CAGR of 6%. This growth has led to some trends Cisco can profit from.

Hybrid Work: One major trend catalysed by the pandemic is hybrid work. During the first two months of the pandemic, the conferencing industry grew by 500%. In 2021, 77% of employees have embraced a hybrid workstyle and by the next year, it is estimated that 98% of meetings will have at least one remote participant. The videoconferencing market is expected to surpass \$50 billion by 2026, with a 16% CAGR. This presents a huge opportunity for Cisco to enhance their communications growth within their Applications BU. During the pandemic, WebEx grew its customer base from 10 million users to almost 600 in the end of 2020. Cisco's main edge in this domain is the stronger security their application provides when compared to Zoom or Microsoft Teams, indicating its customer base may be more reliant on large enterprises who value security. However, we believe Cisco could have benefited more from this trend, as Zoom dominated the teleconferencing industry, with a 50% market share in 2021.

5G, Hybrid Cloud and Internet of things: Mobile network is about to evolve to 5G, delivering more data speed, reliability and a massive network capacity. In 2021, there are 0.55 billion 5G mobile subscribers, but it is expected that this number reaches \$3 billion by 2025. The new 5G infrastructures will inevitably require a great amount of investment in infrastructure costs, such as new towers for coverage of 5G cells and upgrades to the networks as they will require to handle more data and higher speeds. Currently, half of the entire traffic in the U.S. is generated by a few hyperscalers (AWS, Azure, Google GPC, IBM) spending a total of \$6 billion in 2021. It is expected that by 2025, the spending will amount to \$10 billion. This represents a huge opportunity for Cisco to offset some of the decreasing momentum of Infrastructure Platforms as 4 of these hyperscalers use Cisco Silicon One and Cisco 8000 systems (service provider and router respectively).

Cloud computing services are growing fast, particularly SaaS offerings (customer-tailored applications hosted by a service provider, available for customers via the internet). This market is projected to grow to \$307 billion by 2026, from \$158 billion in 2020 (12% CAGR). The artificial intelligence inherent to these offerings allows companies to achieve greater value through automation of their processes. Cisco seems to be on board with the industry momentum, as AppDynamics is used in all top 10 financial institutions globally and top 5 telecommunications firms worldwide; 175+ of the Fortune 500 companies already use ThousandEyes, as well as the top 10 US Banks; and 63% of Fortune 100 companies are Intersight customers.

Hybrid cloud is also increasing significantly, with 61% of companies already using hybrid cloud services, and by 2025 this number will reach 70%. Cisco launched Cisco Plus in 2021, their first hybrid cloud offering.

Cybersecurity: The ever-increasing cyber-attack world brings some serious concerns to the overall software world, but also presents opportunities to thrive in cybersecurity solutions and construct a solid customer base. In 2021, the average cost of a data breach reached the highest value of the decade, with companies reporting \$4.24 million per incident. The total number of cyber-attacks is up 27% compared to 2020. Cisco has a huge opportunity in this market, as they are leading the industry with a 18% market share, with more than 840 thousand networks protected, and 100% of Fortune 100 companies being customers of Cisco's security offerings. This market is expected to grow at an 8% CAGR.

- Threats

Shortage in supply chain: In 2020 the pandemic made the sales for electronic devices spike, which created a surge in demand for semiconductors chips, power supplies and substrates, leading to demand exceeding supply, with production being affected creating a shortage of these supply products. This shortage was further enhanced by the China-US trade war, as many of the suppliers are headquartered in China. This shortage prevented Cisco from expanding their revenues in 2021 albeit product orders increased 33% in 2021 from 2020. Cisco increased its inventory in 2021 to protect against possible future constraints and increased some of its prices to offset the growing air, ocean and trucking freight costs – these changes might take some time to be reflected on accounting perspectives. Cisco has also made new contracts, increasing their supplier base from 230 in 2020 to 250+ in 2021, and has invested in some of their suppliers to boost production. We believe Cisco's rapid action regarding the shortage will stop supply disruption by 2022, but suppliers increasing their prices even more poses a threat.

Rising competition from niche companies: Some innovative niche players have taken market share away from Cisco, such as the case of Arista Networks, which doubled their sales from 2016 to 2018, taking advantage of Cisco's infrastructure platform market share decrease, and increasing their market share from around 3% in 2012 to almost 20% in 2021. In the cybersecurity market, Fortinet has been increasing at a fast rate, with a very competitive gross margin of 78%, as the company was able to take advantage of the increase in cybersecurity threats: their sales went from \$1.8 billion in 2018 to \$2.5 in 2021. These companies have great operational margins and can force Cisco to compete at lower prices (Cisco's prices are on average higher than its peers), which might pose a risk to Cisco's revenues.

Giants fight for the cloud: Cisco first hybrid cloud product, Cisco Plus, was launched in 2021. The 12% CAGR market might be difficult to penetrate as major players already conquered a major portion of total market share. Microsoft Azure and Amazon AWS alone account for more than

50% of industry revenues. Both Microsoft and Amazon are more invested in this market than Cisco – their first move advantage meant that AWS and Azure now account for 12% and 10% of Amazon's and Microsoft's total sales, respectively. Data for Cisco Plus or other cloud services revenues were not available, but the Applications business unit accounts for 11% of Cisco's total sales, from which 60% are communication revenues. With a cloud market share of less than 1%, it will be a challenge to grow. We believe AWS and Azure will supply circa 65% of the market by 2025, as niche players are getting acquired by these companies and the barriers to entry are increasing. One company who has been losing market share is IBM, not being able to compete with the stronger AWS and Azure margins.

Market Instability: While the NASDAQ index is up 22% in 2021, if the 5 biggest companies that compose the index are stripped, the index would be down by more than 20%. This indicates lack of breadth, with the big technological companies hiding the market weakness. New COVID-19 waves can disrupt markets in 2022E, increasing the supply chain disruptions, and reducing companies purchasing power, and, in consequence, Cisco's revenues.

Low exposure to Asian markets: Cisco is operating in over 100 countries, but the company lacks strong influence in the fast-growing Asian market. Asia has the highest CAGR of all the three geographies Cisco operates in, but the company has kept their geographical portfolio distribution unchanged in the last decade, with Asia representing 15% of the company's revenues. We estimate that the geographical distribution of the company will remain unchanged, as none of the M&A deals made in the last 4 years had the acquiree headquartered in Asia. Cisco is losing on a great profitability opportunity, as the markets in the U.S. and Western Europe, where it captures most of its sales, are already reaching mature stages, especially in the Infrastructure Platforms industry (CAGR of 7% and 5% respectively). Huawei dominates the Asian market in network infrastructure, and we estimate it will be the main player in the region for the foreseeable future, with American based companies suffering from the U.S.-China trade war.

Competitive Landscape

Cisco's Infrastructure Platforms and Applications market are all dominated by few larger players, with the three firm concentration ratio in this industries being 70% and 62%. Only the cyber-security market is more fragmented, with only Cisco and Fortinet composing more than 10% of the industry. This industry requires a lot of inhouse expertise to keep up with constant technology innovation, so there is a consolidation trend, with the market share dominant players acquiring smaller firms to consolidate their position.

We focused more on the analysis of Arista Networks, Fortinet, Juniper Networks and Zoom, as they represent more comparable and similar businesses to Cisco. The rest of the competitors we mention, all included in the cloud intelligence industry: Microsoft, Amazon, and Alphabet, were not analysed in detail, as their main revenue channels and industries differ from Cisco's (majority of Amazon's revenues come from online retail for example), and results would introduce a bias in overall analysis. Huawei, being a private company, was not considered when analysing revenues due to lack of reliable data

Analysing Cisco's Porter's Five forces, we understand: 1) Bargaining power of the suppliers is usually low, as they are dependent of few big firms to make profit, however it has increased due to spike in demand for semiconductors; 2) As previously mentioned there is strong rivalry between competitors 3) Bargaining power of customers is low, as there are not many players in the industry

and the switching costs are high (companies make contracts with Cisco of usually 4 years for example, and licenses of SaaS applications are substantially high); 4) Moderate threat of substitution, especially in the very competitive Applications sector, only offset by high switching costs; 5) Barriers to entry are high, as switching costs are high, there is high cost of brand development and the players take advantage of economies of scale.

INFRASTRUCTURE PLAFORMS

Juniper Networks: Found in 1996, headquartered in San Francisco, the company has focused on networking equipment products, being number two in market share of the industry till 2017. Since then, revenues have been decreasing, due to a disappointing entrance in cloud computing industry, and brand awareness. We expect this trend to continue, as competitors have broader product portfolios, which enables them to bundle all their network offerings with other information technology products in a way that discourages customers from purchasing Juniper's products.

Arista Networks: The fastest growing company in network equipment industry, almost doubling their market share in the last 10 years from 10% to 19%. Arista has benefited from Cisco's focus departure from the industry, capturing their market share, especially in the United States. We estimate they will increase their market share at a similar growth to Cisco's market share decrease, as they are capturing sales from the company.

Huawei: Huawei is a privately held company, most famous by their telecom equipment but also one of the major players in network infrastructure market. They dominate the Asian market, where the company is based and captures almost 70% of their revenues. They lost influence in the American and European market due to the US-China trade war, which made them be banned in some countries. We expect limited market share increase, since the company is already well established in Asia, and has political ceiling growth in Europe and America.

APPLICATIONS

Zoom: Zoom became the dominant player in video conferencing market in 2020 during the pandemic. Their net profit went from \$22 million in 2020 to \$671 million in 2021. They have a market share of 55% and are likely to remain market leaders and capture most of the industry growth.

Microsoft (Teams and Azure): Microsoft Teams is the third most used conferencing application with a market share of 15%. In cloud computing, Microsoft Azure has a 20% market share. We estimated a market share of 17% for them in 2021. Both products account for 15% of Microsoft's total revenues, which makes us believe in market share growth at a modest rate, as it's not the company's focus.

Amazon (AWS): The Amazon Web Services has been the cloud market leader for the last 5 years, with a market share of 33%. We believe they will keep their position as market leaders, as they have a strong R&D (in 2021 \$42.0 billion), enabling innovation needed as cloud computing evolves and AWS is the most profitable source of revenues (Amazon as whole operating margin is 5%, while AWS is 30%) for the company.

Alphabet (Google cloud and Google Meet): Google Meet has a market share of 20%, losing only to Zoom, and Google Cloud has a minor market share of around 8%, which makes us estimate an Applications market share of 12% in 2021. We estimate a modest market growth for similar reasons to Microsoft.

SECURITY

Fortinet: Fortinet has had the strongest growth in the cybersecurity industry, from a 3% market share in 2015 to 10% as of 2021. We believe they will be Cisco's main competitor in the future because: they only operate in this industry, channelling all their R&D in cybersecurity; and they might benefit from a higher exposure to the growing Asian market, currently representing 20% of their revenues