



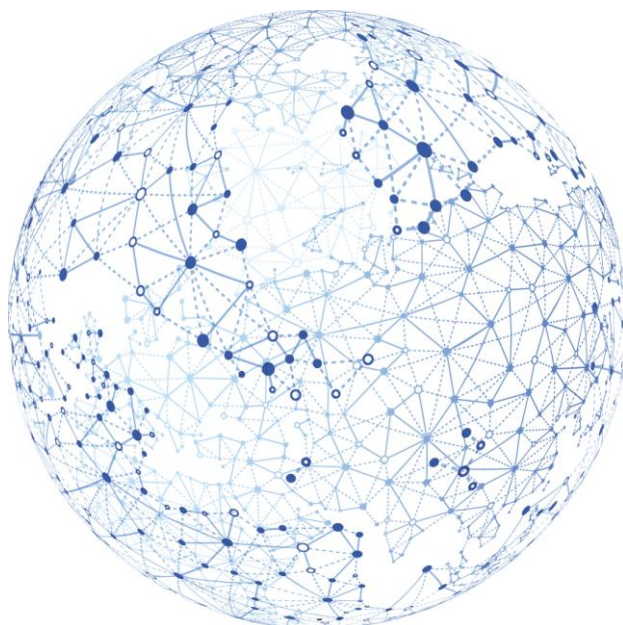
Fundamental, Incisive,
Thematic, Thought-leading

Industry
**Thematic Ideas
Piece**

Date
10 March 2017

North America
United States

TMT
Data Networking



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F.I.T.T. for investors

New Infrastructure Themes and Top Ideas

We are calling for a +\$100B TAM for our New Infra Themes

In this Ideas piece, we double click into New Infra Themes and recommend Ideas levered to these themes for FY17+. 1) Global 5000 “Hybrid Cloud” buildouts, leveraging Analytics, Artificial Intelligence, Automation (AAA), driving new revenue streams for CSCO, ANET, AKAM ; 2) “Optical Super Cycle” heading to Terabit scale: CSCO, ACIA, CIEN our Ideas (albeit with volatility) ; 3) 5G and Internet of Things as a Long Tailed Theme: CSCO, GLW, COMM as top beneficiaries. A core contribution of this FITT is mapping our Themes to an FY20 Earnings Power View: \$3.25 for CSCO; \$6 for ANET; \$4 for COMM; \$5 for ACIA and AKAM; ~\$2.25 for GLW and CIEN.



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Core Contribution: Earnings Power View for Ideas levered to Infra Themes

We are calling for +\$100B of addressable market opportunity (TAM) for our New Infra Themes by 2020. Our Proprietary Scenario Analysis suggests thematic upside to the consensus FY20 EPS view, for our Ideas:

- CSCO is our "Top Mega Cap Value Idea" for FY18+. The stock is attractive at ~10x P/E on our \$3.25 FY20 Earnings Power View. CSCO is levered to all of the New Infra Themes we highlight in this FITT, plus we note "mid teens" growth in Recurring Revenues: core basis for our "rerating" thesis.
- We highlight \$6.00 Earnings Power View for ANET – our Mid Cap Growth Idea on Cloud Scale Networking and \$5.00 for AKAM – our Large Cap GARP Idea on Over the Top Video and the AAA Theme.
- On the Terabit Optical and 5G Internet of Things Themes, we highlight \$4.00 in Earnings Power for COMM – our Mid Cap Idea, and \$2.25 for GLW – Our Large Cap Value Idea. GLW and COMM are levered to the "Optical Super Cycle" at major Carriers and Clouds; COMM additionally is levered to a long tail of carrier spending for 5G Small Cells, etc.
- **Theme #1: Hybrid Clouds and AAA (Analytics, AI, Automation):** Building On Premises Clouds with fast on/off ramps to Public Clouds is a top IT spending priority for the Global 2000. We are bullish on the Infrastructure AAA (Analytics, AI and Automation) Theme which is increasingly relevant for automating and managing complex Cloud networks.
Ideas: CSCO, AKAM, ANET
- **Theme #2: Terabit Optical:** We are in "Early Days" an Optical Super Cycle - the most "cost efficient" approach to handle rapid growth in Broadband Internet traffic.
Ideas: CSCO, ACIA, CIEN (albeit with volatility in spending patterns)
- **Theme #3: 5G and Internet of Things:** 5G buildouts for "Gigabit Speed" wireless access and for interconnecting +20B Internet of Things devices is a top priority for major Carriers and Enterprises (T, VZ, NTT, etc).
Ideas: CSCO, GLW, COMM

Private Companies: Versa, Viptela, AVI, Cumulus, Barefoot, among others.

Companies Featured

Cisco Systems (CSCO.OQ),USD34.07	Buy
Corning Inc (GLW.N),USD27.57	Buy
Akamai Technologies (AKAM.OQ),USD64.20	Buy
Juniper Networks (JNPR.N),USD27.81	Sell
Commscope (COMM.OQ),USD38.93	Buy
Arista Networks (ANET.N),USD123.09	Buy
Keysight Technologies (KEYS.N),USD38.02	
Ciena Corp (CIEN.N),USD23.69	Buy
Acacia Communications (ACIA.OQ),USD52.63	Buy
Infinera (INFN.OQ),USD10.49	Buy

Source: Deutsche Bank

Sector Valuation

Our primary valuation method is DCF analysis. That said, stocks in our Networking sector trade at ~16-17x P/E DB CY18E – a slight premium to the market; given above average growth rate trends of the Networking peers.

Key Sector Risks

- 1) Unanticipated shifts in Enterprise and Carrier IT Spending;
- 2) Share shifts among peers driven by Technology Transitions;
- 3) Global macro uncertainties.



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Executive Summary

In this Ideas piece, we double click into New Infra Themes and recommend Ideas levered to these themes for FY17+:

- **Theme #1:** Global 2000 Hybrid Cloud buildouts, leveraging Analytics, AI, Automation (AAA); driving new revenue streams for CSCO, AKAM, ANET;
- **Theme #2:** “Optical Super Cycle” accelerating to “Terabit Scale”: CSCO, ACIA, CIEN our Ideas (albeit with volatility in spending patterns);
- **Theme #3:** 5G and Internet of Things as a Mega Theme: CSCO, GLW, COMM among the top beneficiaries.

Core Contribution of this FITT report

We are calling for +\$100B of addressable market opportunity (TAM) for our New Infra Themes by 2020. A core contribution of this FITT is mapping our Themes to an FY20 Earnings Power View: \$3.25 for CSCO; \$6 for ANET; \$4 for COMM; \$5 for ACIA and AKAM; ~\$2.25 for GLW and CIEN.

Our Proprietary Scenario Analysis suggests thematic upside to the consensus FY20 EPS view, for our Ideas:

- CSCO is our “Top Mega Cap Value Idea” for FY18+. The stock is attractive at ~10x P/E on our \$3.25 FY20 Earnings Power View. CSCO is levered to all of the New Infra Themes we highlight in this FITT, plus we note “mid teens” growth in Recurring Revenues – which is the core basis for our “rerating” thesis on CSCO.
- We highlight \$6.00 Earnings Power View for ANET – our Mid Cap Growth Idea on Cloud Scale Networking and \$5.00 for AKAM – our Large Cap GARP Idea on Over the Top Video and the AAA Theme.
- On the Terabit Optical and 5G Internet of Things Themes, we highlight \$4.00 in Earnings Power for COMM – our Mid Cap Idea, and \$2.25 for GLW – Our Large Cap Value Idea. GLW and COMM are levered to the “Optical Super Cycle” at major Carriers and Clouds; COMM additionally is levered to a long tail carrier spending for 5G Small Cells, etc.

A related contribution is highlighting key catalysts over the next few years for each of our themes – giving clients an “incremental view” on how the New Infra Themes would play out on a year over year basis: FY17-20.

A core insight in our theme report is the meaningful shift in spending priorities that our primary research notes at Hyperscale Clouds, Enterprises, and Service Providers. In particular, we highlight +50% Y/Y capex intensity at major Clouds for Terabit Scale Optical Interconnects; required for running Web Scale Applications such as Google Maps, Azure Cloud, AWS, GCP, etc.

A corollary insight is the accelerating IT demand for Software and SaaS based tools for Network and Application Analytics, AI and Machine Learning, and Automation tools – for “structurally lowering” the costs of running complex IT infrastructures at Hyperscale Clouds, Large Enterprises, and Carriers.

A case in point is CSCO “doubling down” on Security, Analytics, AI/ML, and Automation Software capabilities (Meraki, AppDynamics, Jasper, Tetration, etc) to drive incremental Top Line and EPS growth through a “recurring revenue” model – laddering upon CSCO’s +250B networking installed base.



The Buy rated Ideas we recommend in this report have attractive risk/reward profiles – and fit a wide range of market caps and strategies – as we discuss below:

Big Picture View: New Infra Themes and Ideas

Theme #1 - Hybrid Clouds and AAA (Analytics, AI, Automation): Building “On Premises Clouds” with fast on/off ramps to Public Clouds is a top IT spending priority for the Global 2000 Corporates. Building out these Hybrid Clouds requires 100G+ scale Switches, Routers, Optical Transport, etc.

We are bullish on the Infrastructure AAA Theme. Top Corporates are increasingly leveraging Analytics, AI and Automation to build “Hybrid Clouds”. High priority IT use cases include Network Visibility and Forensics, Trouble Ticket Processing, Mitigating Complex Security Threat Vectors, etc. We would highlight Security as the major use case for the AAA Theme.

Ideas: CSCO, AKAM, ANET

Theme #2 - Terabit Optical: We are in “Early Days” an Optical Super Cycle. Hyperscale Clouds, Carriers, and Enterprises are rolling out 100G+ Metro, Long-haul, and Subsea Optical Networks as the most “cost efficient” approach to handle rapid growth in Broadband Internet traffic.

Ideas: CSCO, ACIA, CIEN

Theme #3 - 5G and Internet of Things: 5G buildouts for “Gigabit Speed” wireless access and for interconnecting +20B Internet of Things devices is a priority for Tier-1 Telcos and Enterprises (T, VZ, NTT, etc).

Industrial IoT is a core focus for Top Corporates – e.g. WMT, BA, HON, ROK, etc – requiring “Cloud Scale” Networking hardware and software assets. CSCO’s Edge and Data Center Cloud solutions and ruggedized Enterprise Networking Routers and WiFi access points, are a case in point.

Ideas: CSCO, GLW, COMM



New Infra Themes: Market Opportunity and Growth Rates [DB View]

We are calling for +\$100B of addressable market opportunity (TAM) for our New Infra Themes by 2020.

Figure 1: New Infra Themes: Addressable Market Opportunity View

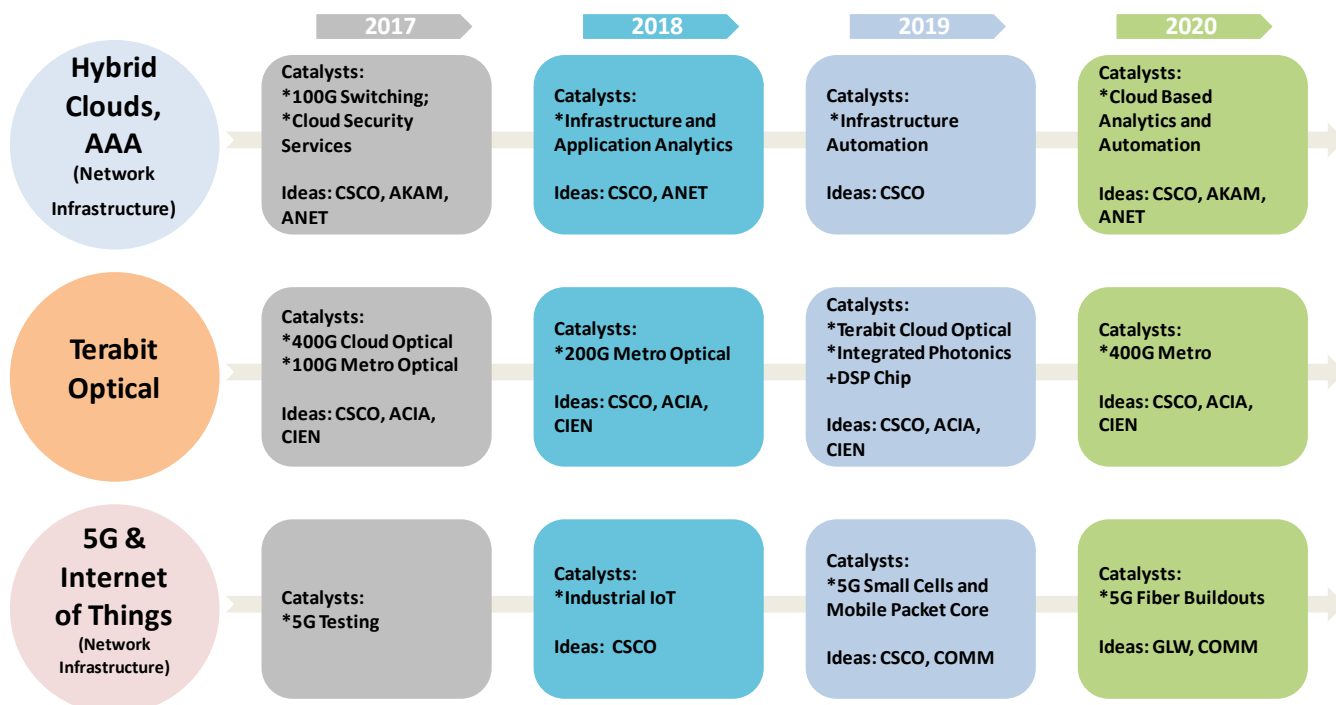
New Infra Themes	DB View of Market Opportunity (CY17)	DB View of TAM Growth (CY17-20 CAGR)	Top Ideas
Hybrid Clouds and Analytics, AI, Automation (Network Infrastructure)	+\$25B	+20%	CSCO, AKAM, ANET
Terabit Optical	+\$15B	+30%	CSCO, ACIA, CIEN
5G and IoT (Network Infrastructure)	+\$15B	+25%	GLW, COMM, CSCO, ANET, KEYS

Source: Deutsche Bank, baseline industry data from IHS and company filings

Upcoming Catalysts [DB View]

We highlight the most important catalysts for each New Infra Theme and best positioned ideas:

Figure 2: New Infra Themes Upcoming Catalysts



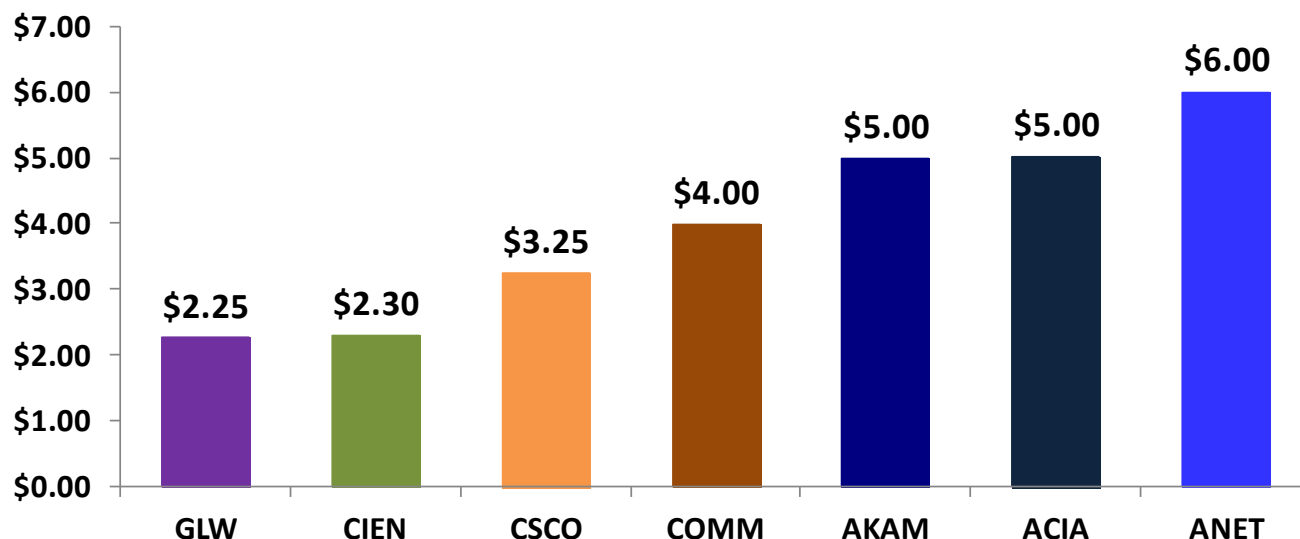
Source: Deutsche Bank



DB View on Earnings Progression

We model the FY20 Earnings Power View for our Ideas based on their incremental exposure to the New Infra Themes we highlight in this FITT:

Figure 3: FY20 Earnings Power View for our Ideas, based on Proprietary DB Scenario Model



Source: Deutsche Bank
Note: FY20E reflects DB Earnings Power View

CSCO: We model \$2.37 in FY17E growing to \$3.25 in FY20E [DB Earnings Power View].

GLW: We model \$1.66 in FY17E growing to \$2.25 in FY20E

AKAM: We model \$2.81 in FY17E growing to \$5.00 in FY20E

COMM: We model \$2.96 in FY17E growing to \$4.00 in FY20E

ANET: We model \$3.66 in FY17E growing to \$6.00 in FY20E

ACIA: We model \$3.36 in FY17E growing to \$5.00 in FY20E

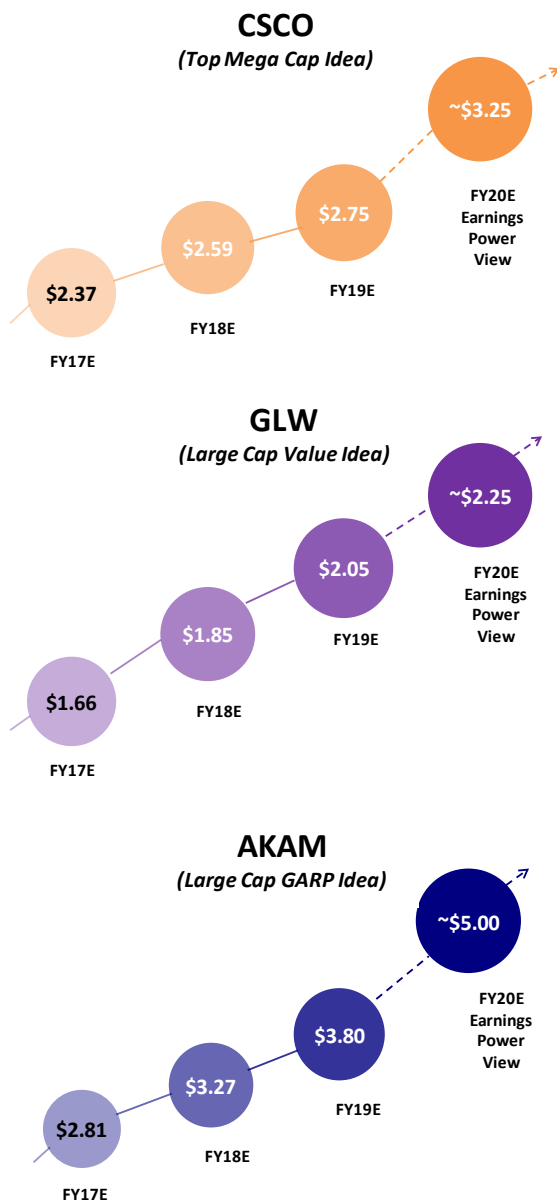
CIEN: We model \$1.74 in FY17E growing to \$2.30 in FY20E

In Figures 4 and 5, we highlight, via our Proprietary Scenario Analysis Model, an FY20 Earnings Power View for the Buy rated Ideas we recommend for our New Infra Themes. The baseline for our FY20 EPS view is our current published earnings estimates for FY17-19.

It is instructive to note that our Sell rated Idea JNPR shows a marginal earnings growth trajectory from FY17-19 through FY20 (further color on page 57).



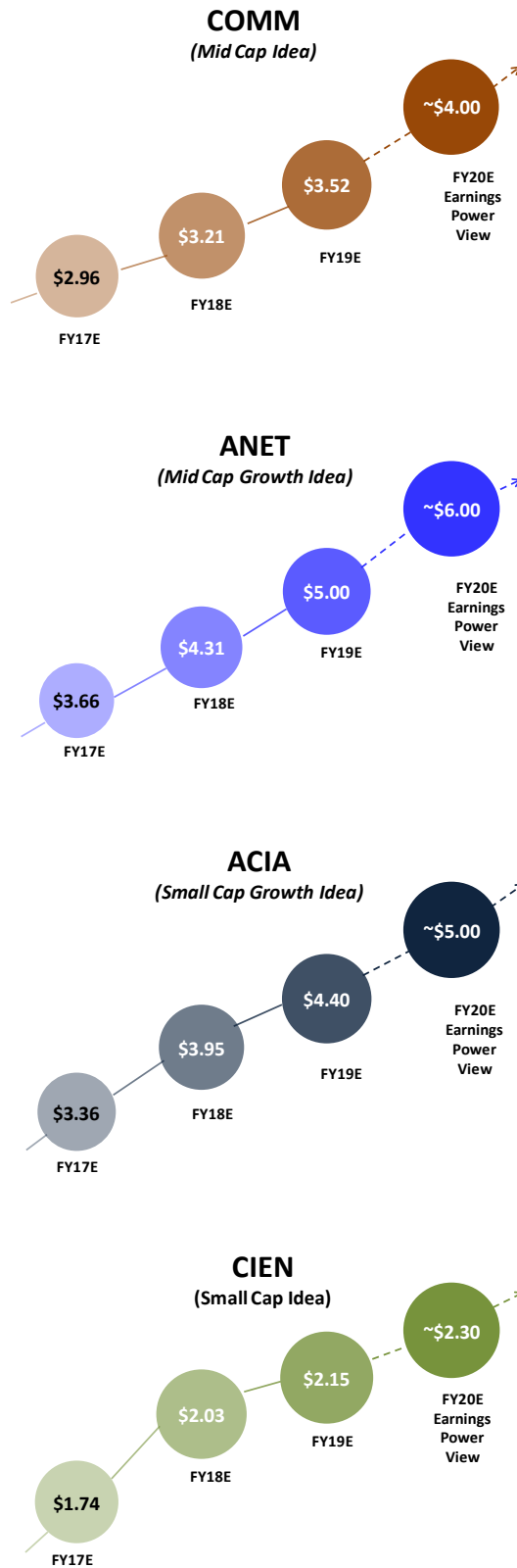
Figure 4: DB Scenario Model for Earnings Power View: FY17-20E (Mega and Large Cap Ideas)



Source: Deutsche Bank
Note: FY17-19E reflect DB published estimates; FY20E reflects DB Earnings Power View



Figure 5: DB Scenario Model for Earnings Power View: FY17-20E (Mid and Small Cap Ideas)



Source: Deutsche Bank
 Note: FY17-19E reflect DB published estimates; FY20E reflects DB Earnings Power View



Figure 6: DB Scenario Model for SELL Rated JNPR: DB Earnings Power View; FY17-20E versus consensus

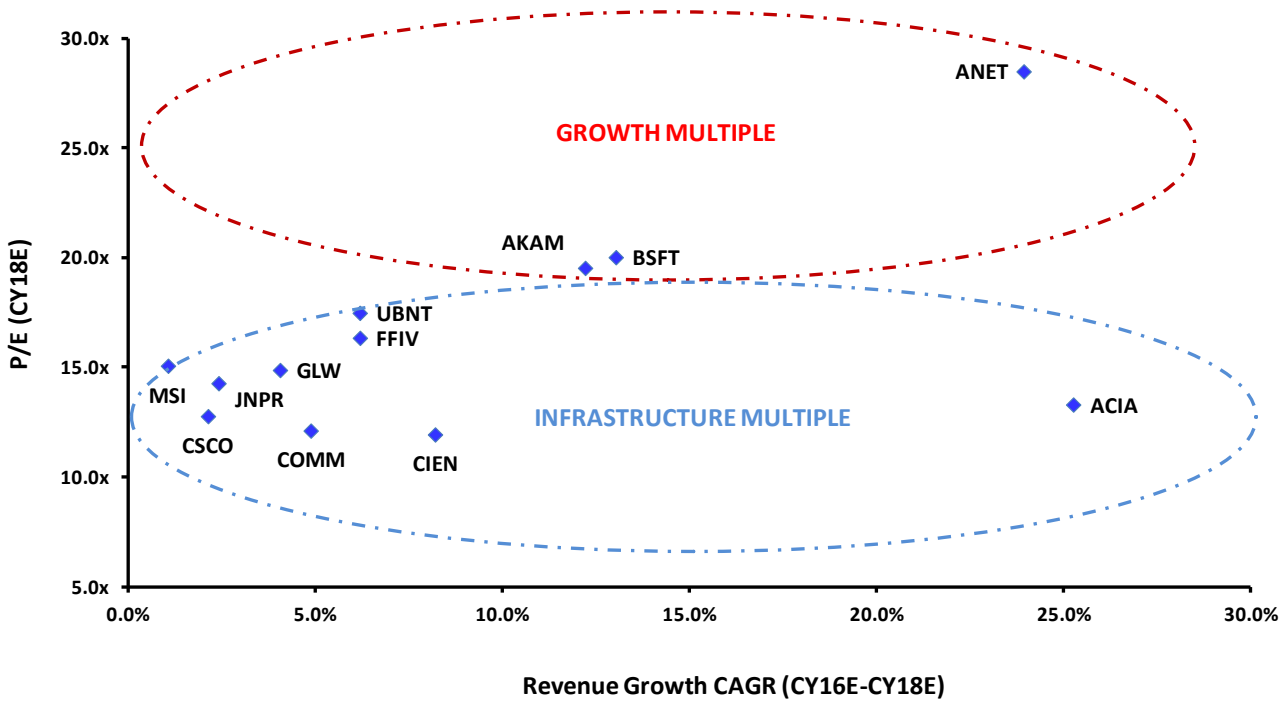


Source: Deutsche Bank and FactSet
 Note: FY17-19E reflect DB published estimates; FY20E reflects DB Earnings Power View

Sector Valuation

Our primary valuation method is DCF analysis. That said, stocks in our Networking sector trade at ~16-17x P/E DB CY18E – a slight premium to the market; given above average growth rate trends of the Networking peers.

Figure 7: DB CY18E P/E vs. CY16E-18E Revenue Growth CAGR



Source: Deutsche Bank and FactSet
 Prices as of 3/9/17

Key Sector Risks

- 1) Unanticipated shifts in Enterprise and Carrier IT Spending;
- 2) Share shifts among peers driven by Technology Transitions;
- 3) Global macro uncertainties.



Theme #1: Hybrid Clouds and AAA (Analytics, AI, Automation)

Portfolio Manager Summary

Building “On Premises Clouds” with fast on/off ramps to Public Clouds is a top IT spending priority for the Global 2000 Corporates. Building out these Hybrid Clouds requires 100G+ Switches, Routers, Optical Transport, etc.

IT is also ramping up spending for Cloud Services for managing a wide range of Enterprise Networking gear – from WiFi access and Campus Switches to Routers, video conferencing, and firewalls. Case in point is CSCO’s Meraki Cloud Service; +\$1.5B bookings run rate and growing +50% [DB CY17 view].

We are bullish on the Infrastructure AAA Theme because Top Corporates are increasingly leveraging Analytics, AI and Automation (AAA) to build “Hybrid Clouds”. High priority IT use cases include Network Visibility and Forensics, Trouble Ticket Processing, Mitigating Complex Security Threat Vectors, etc.

We highlight Security as a major use case for the AAA Theme. According to our conversations with Global 2000 IT architects, Security is thematically transitioning from “gatekeeper boxes” to a “Zero Trust” Security model.

For example: DDoS, Web Application, and DNS Security are increasingly purchased as “Cloud Security Services” or as “Subscription Software”. A “Cloud based” Security approach is well suited to defend Corporate Networks against an increasing sophistication and volume of the attack vectors.

Ideas:

CSCO: Our Top Megacap idea on a multi-quarter 100G+ Data Center Switching refresh cycle at Global 2000 Enterprise and Service Provider Clouds. CSCO is disrupting the Data Center Routing landscape as well (e.g. CSCO’s NCS product line).

Further, CSCO is well positioned to capitalize on the AAA Theme. Case in point, CSCO’s Next Gen Security business (which leverages Analytics, AI and Automation; potentially Tetration, AppDynamics, etc), is currently +\$2B a year run rate, growing +30% in product deferred revenues, and is seeing strength in Subscription Software and Cloud Security Services.

AKAM: AKAM’s Cloud Security Services, currently +\$400M a year run rate and growing 30-40% Y/Y, is longer-term disruptive for the Enterprise Security landscape and an attractive optionality in the stock.

ANET: Our Midcap Growth Idea on the 100G+ Data Center Switching and Routing refresh cycle at major Cloud and Content Providers. Unlike CSCO, ANET solely utilizes Merchant Silicon platforms – e.g. XPliant, Jericho, Tomahawk, Trident2, etc.



Color on the Hybrid Clouds and AAA Investment Landscape and Ideas

Enterprises today are implementing more Hybrid Cloud Networks. Hybrid Clouds consist of two or more segments – typically Private Cloud Networks that handle mission critical and core Enterprise workloads, and Public Cloud Networks that handle non-mission critical tasks such as workload demand spikes, media delivery, backup and archiving, etc.

Evolving Data Center architectures require Enterprises to streamline compute, storage, and Network resources to scale workloads across Public, Private, and Hybrid Clouds. Next Gen Switches and Routers are a key building block enabling Hybrid Network architectures.

Case in point: CSCO’s Cloud Services Router (CSR) 1000V is a virtual form factor Router designed for Cloud Data Center deployments (see “CSCO CSR 1000V Color” section for more details).

Enterprises are turning to Real Time Data Analytics, AI and Automation (AAA Theme) to increase Network and Cloud Security, business efficiency, etc. We would note that Security is a prevailing Theme among all Enterprises given the rapid growth and sophistication of Network threats (e.g. Mirai botnet).

The companies in our Data Networking Universe address these demands through hardware and software offerings (see Figure 8 for DB TAM View).

Figure 8: Hybrid Clouds and AAA TAM and CAGR [DB View]

Hybrid Clouds and Analytics, AI, Automation (Network Infrastructure)	DB View of Market Opportunity (CY17)	DB View of TAM Growth (CY17-20 CAGR)
Data Center Switching	+\$10B	High Single Digits
Cloud Security (DDoS, Web App, etc)	+\$4B	+40%
Analytics, AI and Automation	+\$15B	High Single Digits

Source: Deutsche Bank, baseline industry data from IHS and company filings

Network Security is a High Priority Use case for Hybrid Clouds and AAA:

According to CSCO, Network Security is the number one conversation the company has with customers today. This is because modern hackers are more sophisticated, pervasive, and persistent at disrupting legacy security infrastructures versus prior years.

For example, Deep Analytics could be extracted from traffic flowing through Switches and Routers, and subsequently Machine Learned. Deep Analytics can identify anomalous traffic patterns, malware infestations, etc – and build “Zero Trust Security” architectures (e.g. CSCO’s Tetration Analytics) at Hyperscale Clouds, Enterprises, and Carriers.

We note that +75% of IT spending is “opex” [DB View]. Modest savings in IT troubleshooting costs and reduction in the costs of implementing a “Zero Trust



Security” Network could be a key catalyst for IT Buyers to invest in Analytics, Learning, and AI enabled Switching, Routing, and Next Gen Security platforms.

CSCO

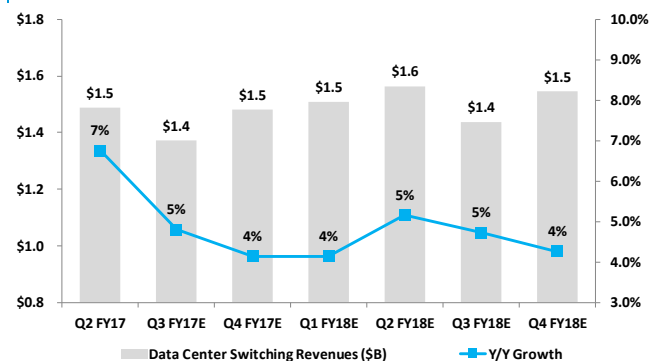
CSCO is our Top Idea on the Hybrid Clouds and AAA Theme (Please refer to our note “A Three Year+ Top Line Growth View for CSCO: DB Ideas Piece” for a deep analysis of CSCO’s Growth Portfolio).

We see setup for a multi-quarter 100G+ Data Center Switching refresh cycle at Global 2000 Enterprises, starting FY17+, primarily for running mission critical and compliance workloads in on premises Clouds.

For example, CSCO’s Network Convergence System (NCS 5500) is based on Merchant Silicon (Jericho) and is designed to efficiently scale between Data Centers, large Enterprises, Hyperscale Cloud and Service Provider Networks (WAN and aggregation). The NCS 5500 provides +250 100G ports, enabling +20 Terabits of capacity on only 1/3 of a rack. CSCO’s IOS XR software enables segment Routing, advanced forwarding, and programmability.

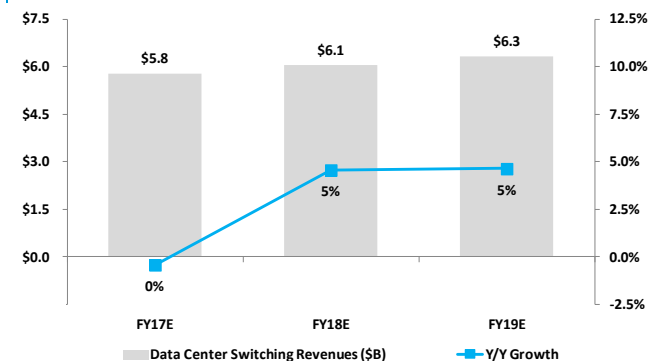
We are modeling CSCO’s Data Center Switching business flat in FY17E and growing ~5% in FY18E (see Figure 9 and 10).

Figure 9: CSCO Quarterly Data Center Switching Revenues [DB View]



Source: Deutsche Bank and company filings
 Note: Data Center Switching Revenues (Historical and Forecasts) reflect DB estimates

Figure 10: CSCO FY17-FY19E Data Center Switching Revenues [DB View]



Source: Deutsche Bank and company filings
 Note: Data Center Switching Revenues (Historical and Forecasts) reflect DB estimates

Further, our channel research notes that major Web 2.0 and Cloud/SaaS portals are currently deploying CSCO’s 100G Top of Rack Switches.

Web 2.0 and Cloud IT find it cost-competitive to utilize 100G Top of Rack Switches (using a 4 x 25G breakout cable) to connect to their INTC 25G capable servers. Price points for 100G Top of Rack Switches are in the +\$800/port range, which equates to \$200 for a 25G port (more economical versus a \$100 price point for a 10G Switch port).

Aside from the ASP/port arguments, we note that CSCO’s latest gen Nexus Switches offer higher traffic non-blocking and Routing performance - which could be a basis for “share gains” versus the whitebox ecosystem and potentially versus subscale peers at the major Web 2.0 and Cloud/SaaS portals.

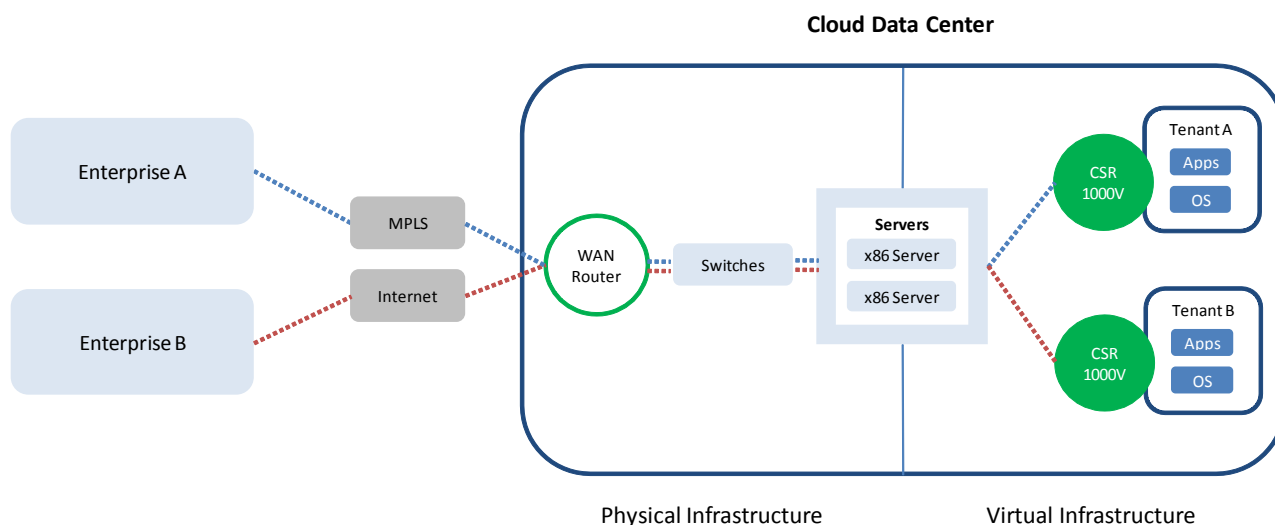


We see CSCO as a potential "share gainer" in the faster growing Data Center Switching segment, based on the "architectural moats" created by the new platform announcements.

Additionally, Meraki (Cloud based Enterprise Network Management) is likely to see meaningful product penetration beyond Wireless LANs, e.g. in Campus Switching, Security, etc. We see Meraki as a +\$1.5B booking run rate business for CSCO in CY17-CY19 and likely to grow at a ~50% CAGR.

CSCO CSR 1000V Color: CSCO's Cloud Services Router (CSR) 1000V is a virtual form factor Router designed for Cloud Data Center deployments (essentially a software router that an Enterprise or Cloud Provider can deploy as a virtual machine in a hosted Cloud; see Figure 11).

Figure 11: CSCO CSR 1000V Positioned as a WAN Gateway in a Cloud Environment



Source: Deutsche Bank and company filings

The CSR 1000V serves as a single tenant or multitenant WAN gateway and when paired with CSCO's IOS Software and Security, enables Enterprises to extend their WANs to offer their tenants Enterprise grade networking capabilities.

The CSR 1000V is infrastructure agnostic and works with AWS, MSFT Azure and Hyper-V, VMware (VMW) ESXi, Red Hat (RHT) KVM and Citrix (CTXS) Xen. Primary use cases include Secure VPN, Multiprotocol Label Switching (MPLS) Extension, IP Mobility, VM Migration, Traffic Control and Redirection, and Network Function Virtualization (NFV).

CSR 1000V Use Case Example

A popular CSCO 1000V use case is for Network and Security services in AMZN AWS Cloud.

Popular deployments include: Branch-Office, Campus and Data Center VPN aggregation, Inter-VPC connectivity, and application performance control and monitoring.



CSCO Cloud Automation Color: The growth of virtual overlays on top of physical layers has increased complexity by adding more policies, services and devices to the modern IT Network.

Automation Software tools are becoming an increasing priority for Cloud IT Data Centers, given the mostly “zero touch” operation and meaningful opex efficiencies that Cloud IT are looking to derive from “automating” the provisioning of IT gear such as Servers, Switches, Routers, Storage, etc.

CSCO’s Cloud Automation enables business efficiency through automation, management, and visibility of physical and virtual environments.

CSCO’s Application Centric Infrastructure (ACI) delivers policy automation, management and visibility of both physical and virtual environments in a single system. This leads to increased business agility and quicker application deployments (see Figure 13).

ACI is made up of CSCO’s portfolio of Nexus 9K Switches, NX-OS operating system, and the Application Policy Infrastructure Controller (APIC).

What is CSCO’s APIC? The Application Policy Infrastructure Controller (APIC) is a single point of policy and management of CSCO’s Application Centric Infrastructure (ACI).

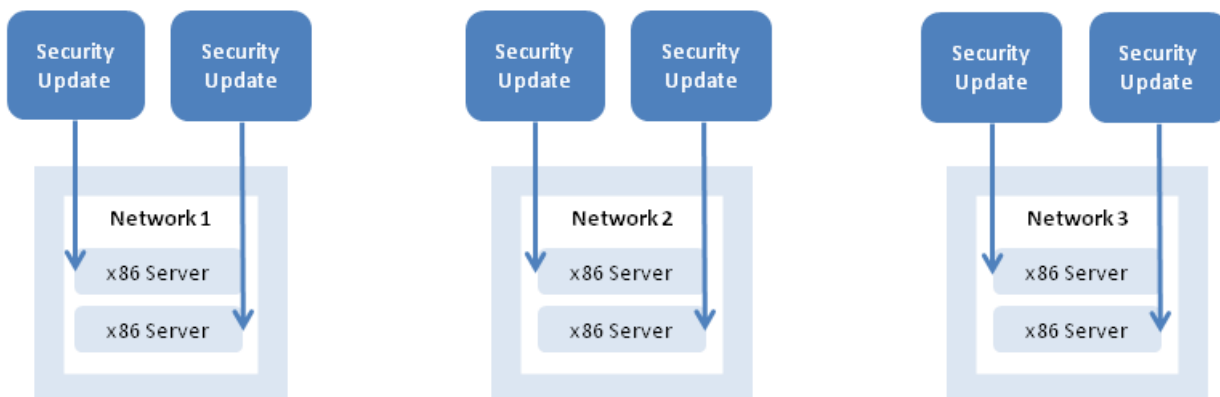
In legacy Networks, each node is managed independently, which is repetitive, time consuming, and error prone. In ACI Networks, Network administrators use the APIC to manage the entire Network through a single access point.

For example, CSCO’s APIC-EM (Enterprise Module) enables corporates to build more agile IT departments by reducing Network complexity and taking an SDN approach to automating Enterprise Networks. We highlight various CSCO APIC-EM use cases below:

- **Network Configuration:** When Enterprises introduce new applications, Network configurations were previously applied manually, box by box. With APIC-EM, Network configurations are carried out automatically across the entire Network. The APIC communicates with every Network device, enabling Network automation.
- **Network Security:** When legacy Networks detect a security threat, the IT department typically deploys manual fixes box by box. This is an inefficient and time consuming way to secure the Network. CSCO’s APIC-EM enables Enterprises to rapidly deploy security policies from a single point to all devices on the Network (see Figure 12 and 13).

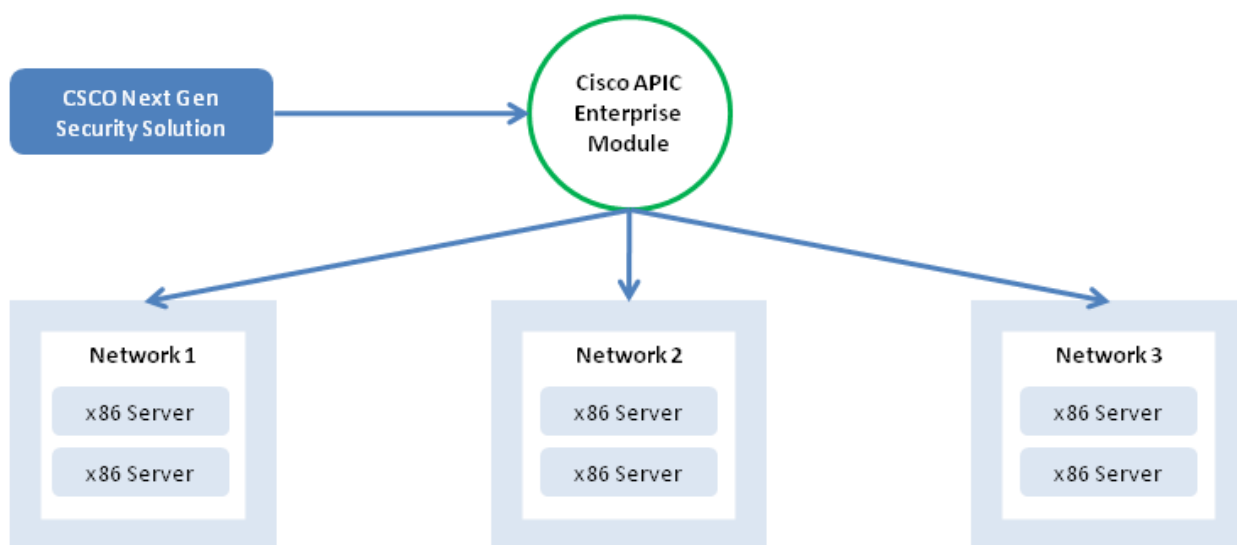


Figure 12: Legacy Network Security Rollout



Source: Deutsche Bank

Figure 13: CSCO APIC-EM Security Rollout



Source: Deutsche Bank

We believe CSCO is solidly positioned to capitalize on the IT industry shift to Software Defined Networking (SDN) due to their ability to combine application-specific integrated circuits (ASICs), hardware, and software pieces to meet customer needs (cost of ownership, quality, Security, scalability, etc).

Further, CSCO's +\$180B current footprint in Switching and Routing is a large-scale worldwide installed base for the company to "up-sell" a broad range of Analytics and Machine Learning offerings.

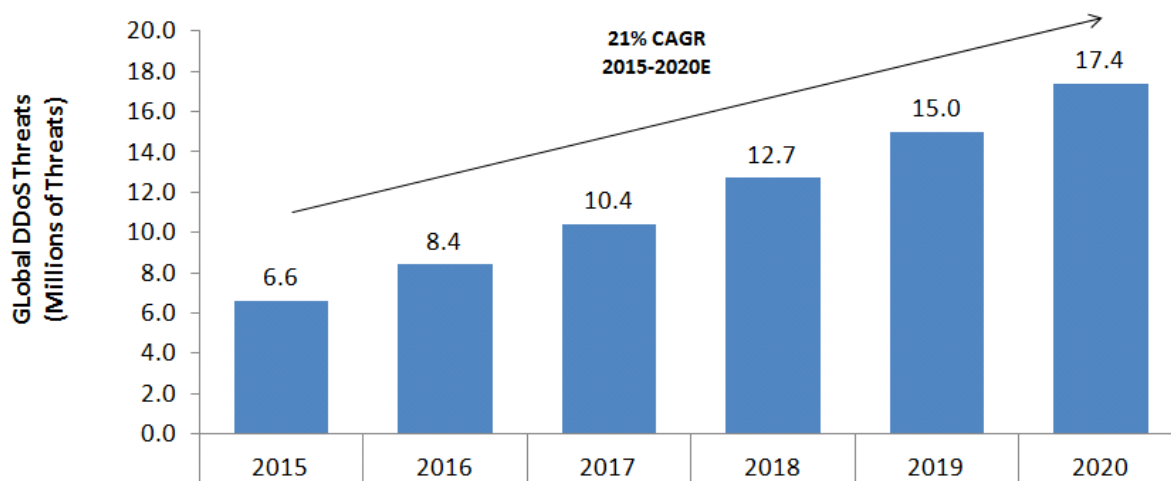


CSCO Security Color: We would highlight Security as a major use case for the AAA Theme. CSCO's moat in Next Gen Security is driven by scale of the company's +400K Channel footprint and +\$200B networking installed base – a core differentiator in a highly fragmented Security market.

A meaningful footprint and channel is core to CSCO's "double digit" Security growth; achieved mainly via ramping "new customer logos" (CSCO's AppDynamics acquisition was based on this premise; see "AppDynamics Color" for more details).

According to CSCO, the frequency of distributed denial-of-service (DDoS) threats is expected to double in volume by 2020 (see Figure 14). As a result, CSCO Switches and Routers are starting to be leveraged for "Zero Trust Security" in Large Enterprises and Carriers.

Figure 14: DDoS Threat Landscape



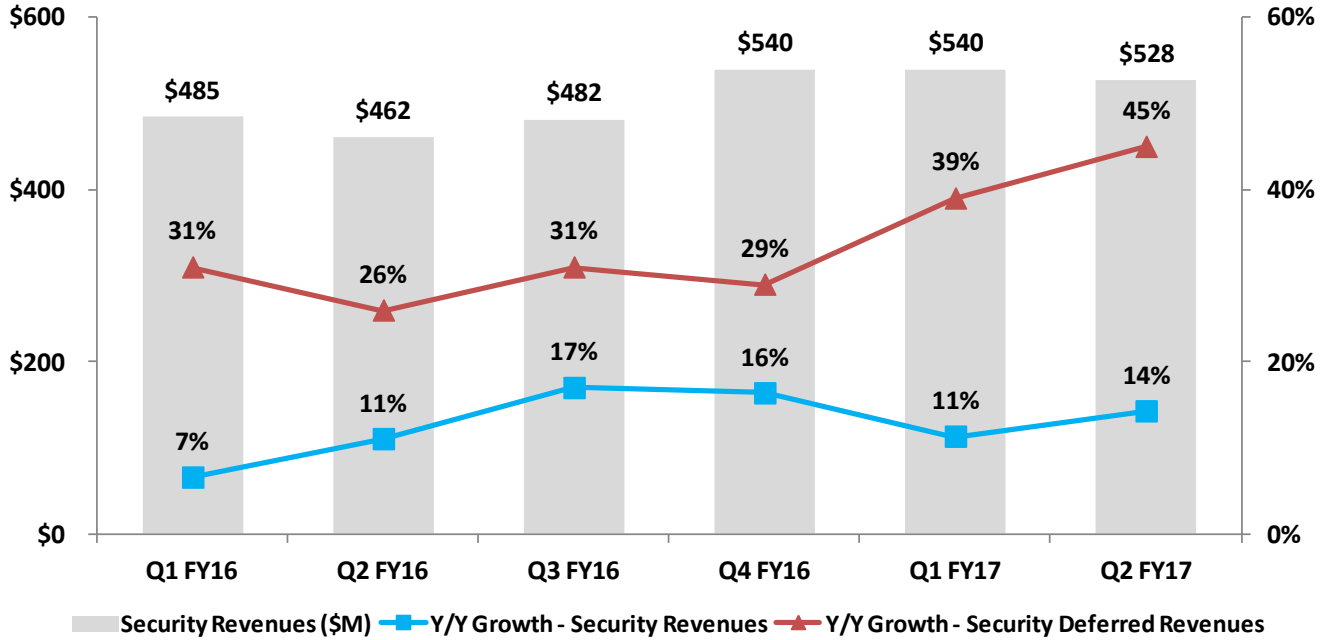
Source: Deutsche Bank and baseline data from Cisco Visual Networking Index (VNI): 2015–2020
Note: Refer to www.cisco.com for Cisco VNI data

Switches and Routers are effective for blocking DDoS attacks and for isolating infected devices and workloads inside Enterprises. "Zero Trust Security" is a disruptive transition from the current "Firewall Gatekeeper" model (which has +7% false positives).

CSCO has +30% Y/Y deferred revenue growth in Security (see Figure 15), mainly due to the company's focus on leveraging its +400K worldwide channel partners to up-sell a broad catalog of Next Gen Security portfolio (Next Gen Firewalls, Advanced Malware, Threat Analytics, etc) using a "Subscription Software", i.e. Recurring Revenue model.



Figure 15: CSCO Security Revenues (Reported)



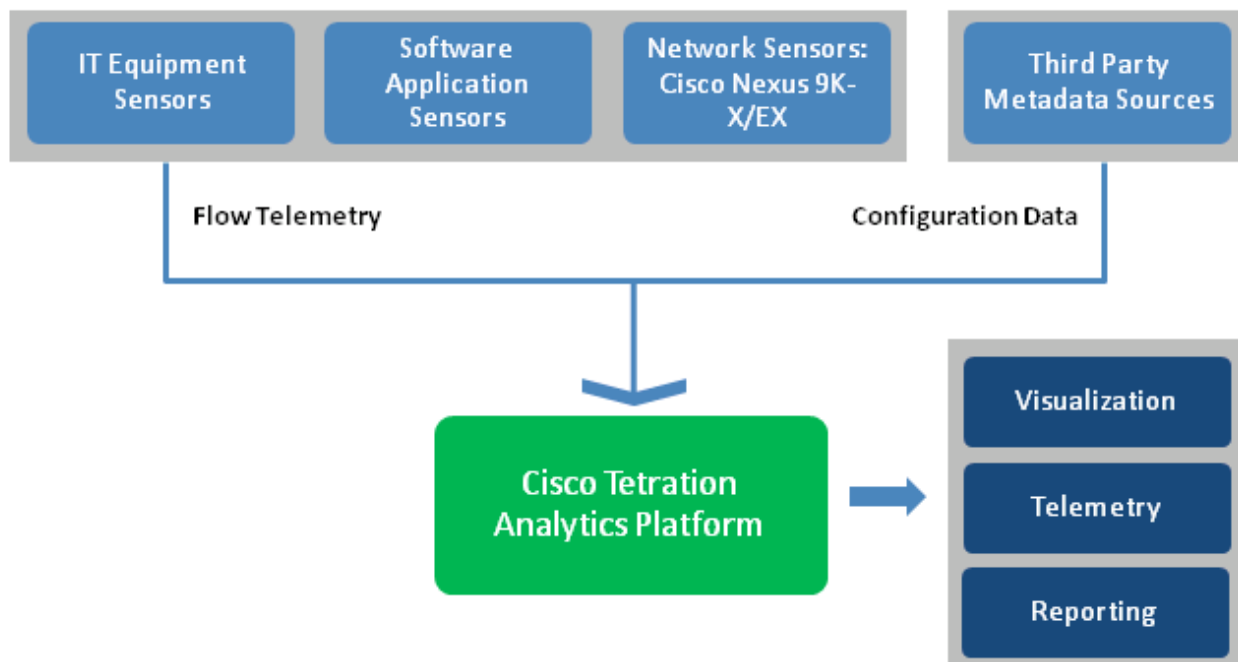
Source: Deutsche Bank and company filings

CSCO's Tetration Analytics (launched July 2016) is an early proof point of the value-add that Analytics and Machine Learning could offer to Hyperscale Clouds, Enterprises and Carriers to improve Cloud Security (see Figure 16).

Tetration leverages the entire Network as a sensor, and allows Enterprises to see granular activity (every flow and packet of information) within a Data Center. By leveraging machine learning, behavior analysis and algorithmic approaches, Tetration provides "pervasive visibility" to Enterprises.



Figure 16: CSCO Tetration Analytics Platform Architecture



Source: Deutsche Bank

Deep Analytics can identify anomalous traffic patterns, malware infestations, etc – and build “Zero Trust Security” architectures at Hyperscale Clouds, Enterprises, and Carriers.

We think CSCO could “double down” on new product introductions and inorganic strategies – in “Subscription Software” and in “Cloud based” offerings in Next Gen Security in FY17+.

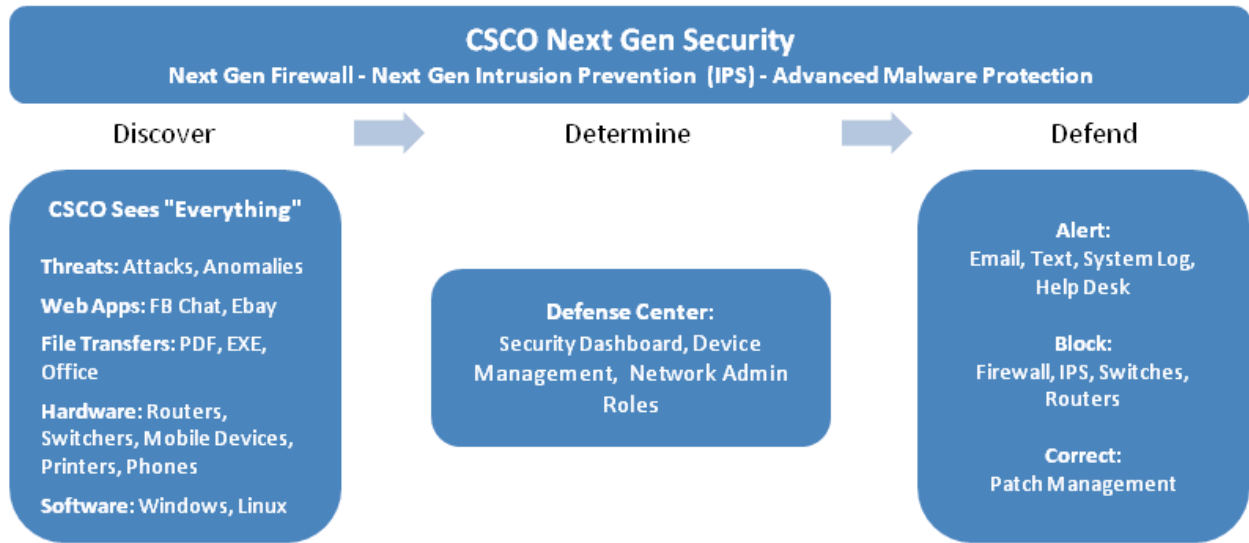
A Cloud-based approach is ideal for delivering Next Gen Security services such as DDoS Mitigation, Web Application Security, DNS Security, etc – which by definition of the threat scenarios require a “Cloud Scale Data Center” to filter the high volume threat vectors at a geographic location that is distinct from the end customer’s IT infrastructure.

Complementing the Cloud-based Security approach is a “Software Platform Container” for on premises workloads, devices, and Network infrastructure, to implement an extensible set of Next Gen Security capabilities – purchased and consumed by the IT buyer using a “Pay as you Go” Recurring Revenue model.

For example, CSCO’s Next Gen Security Portfolio (Sourcefire) delivers automated Security and threat detection through its Next Gen intrusion prevention systems, Next Gen firewalls and advanced malware protection (see Figure 17 and 18).

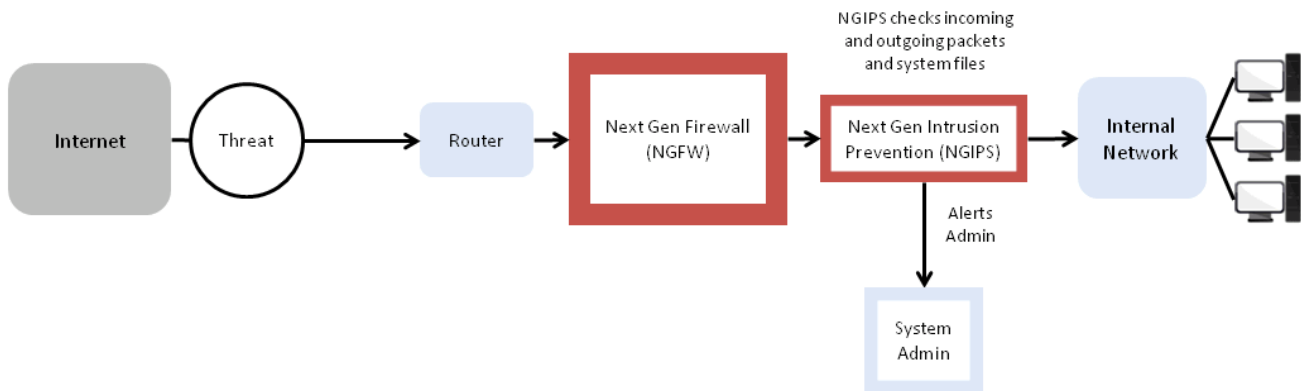


Figure 17: CSCO Next Gen Security Portfolio



Source: Deutsche Bank and company filings

Figure 18: CSCO Next Gen Security Solutions Scenario



Source: Deutsche Bank and company filings



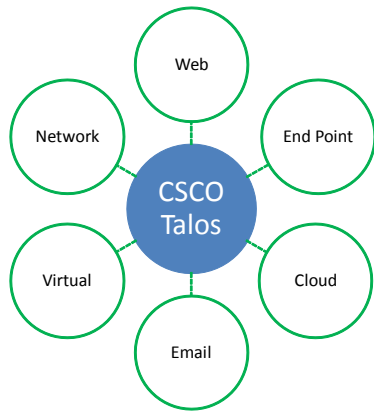
CSCO Talos Color: A new insight from RSA 2017 was CSCO building “stickiness” in its Security portfolio via Talos. CSCO Talos tracks threats across corporate End Points, Networks, Cloud and Virtual Environments, Web and Email (see Figure 19).

Talos provides a comprehensive, real-time view of cyber threats, root causes, and outbreaks by leveraging a wide range of CSCO Security Solutions: Next Gen IPS, Next Gen Firewall, Advanced Malware Analysis and Protection, Email and Web Security Appliances, ThreatGrid, etc.

CSCO Talos Use Case Example

During the 2016 Rio Olympics, CSCO deployed +5K Access Points, +113K LAN ports, 440 UCS Routers, and 177 Security Devices in the event network. In the first 2 weeks, CSCO Talos detected “600x” higher level of attacks at Rio versus a typical corporate environment.

Figure 19: CSCO Talos Architecture



Email Security: Inspects +300B emails, blocks ~200B emails daily (2.3M blocks per second)

Web Visibility: Insight into +17B web requests daily

IPS Vulnerability-based Protection: For the past +7 years Talos led NSS Labs Network IPS test in Detection Rate

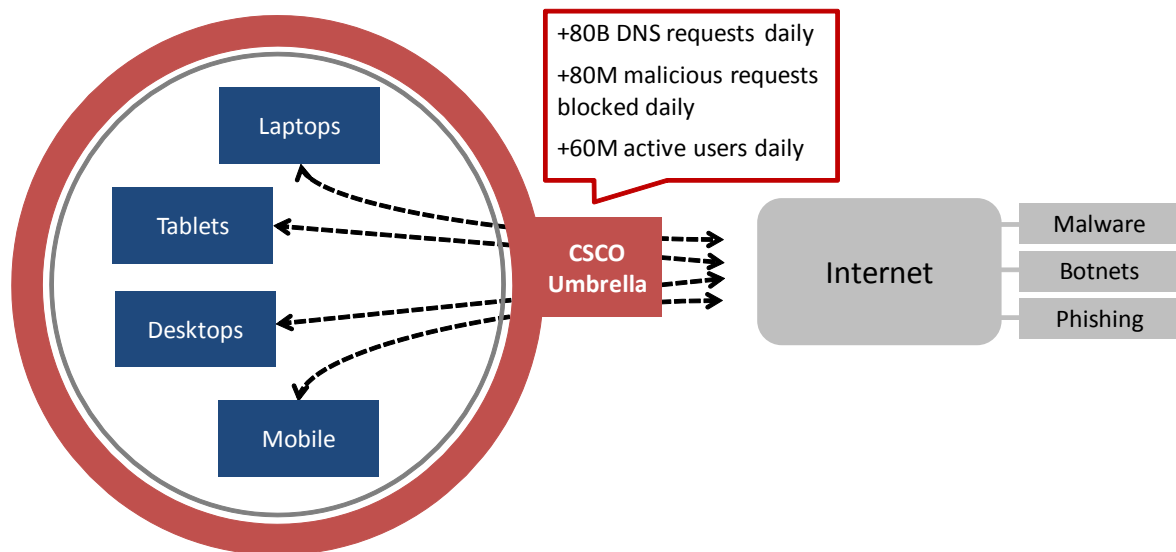
Advanced Malware Protection: Protects hosts, mail gateways, and network assets from ongoing threats

Real-time Malware Intelligence: Collects +1.1M unique malicious software samples per day

Source: Deutsche Bank and company filings

CSCO Umbrella Color: CSCO Umbrella is a Cloud Security Platform that acts as the first line of defense against Internet threats (previously OpenDNS). Umbrella Threat Intelligence automatically detects and identifies network vulnerabilities for current and emergent threats (see Figure 20).

Figure 20: CSCO Umbrella Overview



Source: Deutsche Bank and company filings



CSCO extended Umbrella to their Mobile Service Provider customers at MWC 2017. Umbrella Security integrates with CSCO’s Evolved Packet Core (EPC), and runs on CSCO’s Ultra Services Platform or ASR 5500 Series Routers.

We highlight a few other notable mobile network solution introductions from MWC 2017:

- **Network Security:** CSCO introduced its Next Gen physical and virtual Security Gateway (SecGW) solutions which protects mobile backhaul from attacks against the core Network. The new solutions are powered by CSCO’s Firepower 9300 and 4100 Series firewall, ASR 900 Series Routers and Adaptive Security Virtual Appliance (ASAv).
- **Device Security:** CSCO Device Security extends visibility and device level protection to Enterprises and Service Providers. CSCO is partnering with Samsung to deliver endpoint visibility and data intelligence to customers via Samsung Knox, CSCO AnyConnect and Stealthwatch.

AppDynamics Color: CSCO announced in early 2017 the acquisition of AppDynamics - a privately held Application Intelligence Software company.

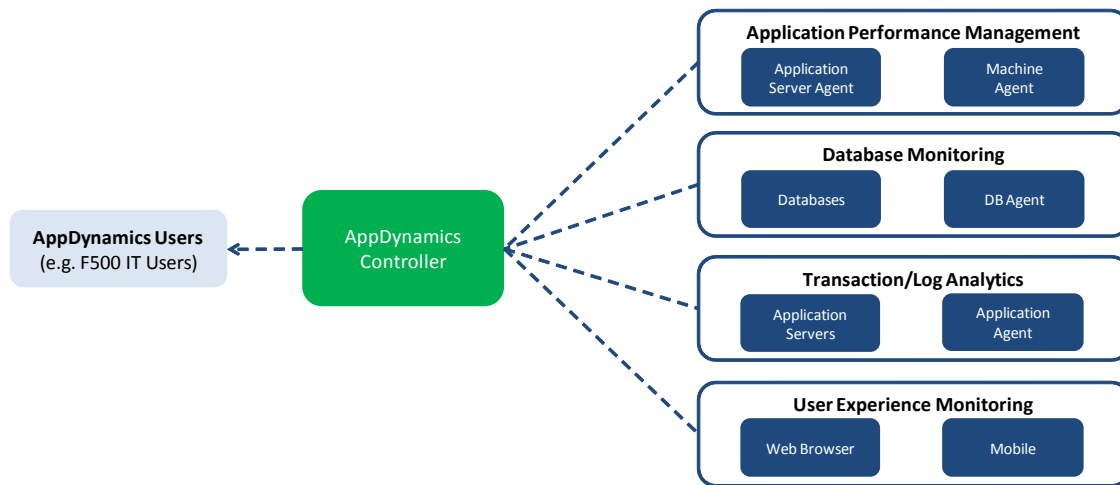
A core capability that AppDynamics brings to CSCO’s IT customer base is real time analytics, monitoring, and visibility at the Infrastructure and Application layers and “correlating” IT metrics with business transactions (see Figure 21).

CSCO Umbrella Use Case Example

AVGO deployed CSCO Umbrella to +17K employees globally to strengthen their IT infrastructure, protect IP capital, and enable safe internet browsing. Traditional firewalls often overlook aspects of the evolving threat landscape (BOYD, etc).

CSCO Umbrella’s Threat Intelligence and Next Gen architecture is built for the new threat landscape. According to AVGO, zero ransom ware incidents have been recorded with CSCO Umbrella deployed.

Figure 21: AppDynamics Platform Overview



Source: Deutsche Bank and company filings

For example, AppDynamics would correlate the performance of an Application or Network Switch with everyday transactions such as flight bookings, mobile payments, supply chain management, etc.

Another example would be gaining deep visibility into Servers, Databases, Security Platforms, and Applications – for improving business process and IT operations performance.



AppDynamics notes a TAM in the \$12B range (source: S1 filing, 12/28/16).

AppDynamics reminds us of Meraki (CSCO's CY12 deal; currently +\$1.5B bookings; +50% CAGR; DB View). We see AppDynamics as a solid fit for CSCO – given the meaningful Global 2000 customer overlap and CSCO's ability to accelerate AppDynamics' run-rate by leveraging the CSCO's global IT franchise: +\$200B Networking footprint and +400K Channel Partners.

Bigger Picture: Heading into FY18+, we see CSCO likely to be active on the deal front, looking to grow through inorganic and new product launch strategies: Tetration, etc – to “double down” on the AAA (Analytics, AI, Automation) Theme.

While CSCO in prior decades focused on building a meaningful +\$200B global Networking footprint and +400K Channel, CSCO over next few years is likely to emphasize “actioning” the global footprint via Analytics, AI and Automation Software and Digitization integrated into the company's Networking Platforms.

Global 2000, Cloud, and Carrier IT, coincidentally is prioritizing Business Intelligence, Security, and Automation – which fits well into the AAA Theme.

AppDynamics Use Case Example

CSCO Cloud Web Security (CWS) first implemented AppDynamics in May 2013. CWS rolled out a proof-of-concept across its main security scanners in order to locate and analyze infrastructure performance issues.

CSCO (CW) receives +90K Security alerts per year from standard monitoring tools, of which only ~3K are viable threats that require remedial action (+95% false positives).

Through the use of AppDynamics, CSCO has been able to meaningfully reduce the number of false positives, which leads to improved resource utilization and lower costs (an employee spending ~5 minutes on each alert is ~7,000 man hours per year), and increased performance through deeper Network/application visibility.

After a successful trial, CSCO deployed AppDynamics globally - across 23 Data Centers (+2,000 physical servers, ~5,000 VMs serving +200 applications). AppDynamics rolled out ~15K agents in a single week, all reporting to a single SaaS controller.

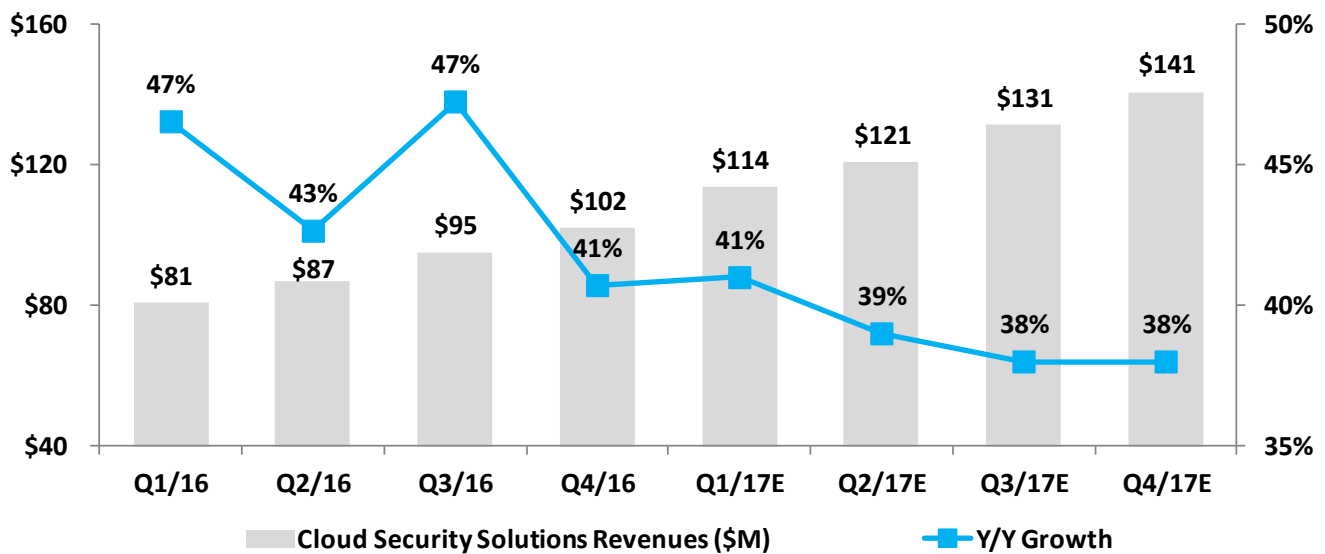


AKAM

AKAM is our Large Cap Growth Idea on gradual reacceleration we anticipate in Media Delivery growth (Internet Video traffic growing +35%; -15% cost declines; DB view), conviction on 30-40% CAGR for Cloud Security, and Enterprise Security + Video as FY17+ growth drivers.

While Cloud Security primarily consists of Web and Media customers, we note that AKAM is meaningfully investing in "Enterprise Security as a Cloud Service" offerings in FY17+, monetized via a Recurring Revenue model. The Cloud Security business is +\$400M run rate (see Figure 22) and selling into a +\$4B TAM for DDoS, Application Security, etc.

Figure 22: AKAM Cloud Security Solutions Revenues [Reported and DB View]



Source: Deutsche Bank and company filings

Next Gen Security problems such as DDoS Mitigation, Web Application Security, Secure Corporate Network Access, etc – are in our view, best delivered as a "Cloud Based" Service, and in a "Recurring Revenue" model, versus a traditional "appliance based" capex model.

Sophisticated threats such as Distributed Denial of Service (DDoS) and Application Layer attacks are cost- and scale efficiently solved in the "Cloud" versus using on premises firewalls. Cloud cost- and scale efficiencies, and the ability to throw low-cost Cloud Computing at security problems mostly explains AKAM's competitive moat in Cloud Security.

Cloud Security Services further differentiate from on premises firewalls in terms of: 1) Pricing Model - i.e. Cloud Security Services from AKAM is typically purchased on a pay as you go "recurring revenue" model, versus as upfront capex, and, 2) Continuous R&D - i.e. a Cloud DDoS Service can be "real-time" updated by AKAM using the latest algos and threat vectors.

AKAM's Cloud Security Services are longer-term disruptive for the Enterprise Security landscape and an attractive optionality in the stock.

What's a DDoS Attack?

A Distributed Denial of Service (DDoS) attack renders an online service unavailable by overwhelming it with traffic from multiple sources.

Due to the rapid growth in IoT devices the threat potential for DDoS attacks has exponentially increased over the past few years. This forces Enterprises to increase Network security by using solutions from security vendors like AKAM, etc.



For example, we see AKAM likely to be competitive versus FFIV in Enterprise Application Access (i.e. versus FFIV's Access Policy Manager features that runs on their BIG IP appliances). Over the next few years, we see AKAM competing increasingly in Enterprise Application Delivery use cases versus FFIV, etc using a Cloud Based "ADC as a Service" approach.

Further, we see AKAM competing disruptively from a "Cloud Security Services" approach for on premises Enterprise VPN platform refresh. Firewall/VPN platforms from vendors such as JNPR, etc are examples of installed base VPN appliance solutions.

Soha Systems Color: We note AKAM recently acquired Soha Systems (October 2016), a "Cloud Based" provider of secure access to Enterprise Applications (i.e. Cloud VPN, Application Delivery and Virtual Desktop as a Service, etc).

The Soha deal adds incremental conviction to our view on AKAM "doubling down" on Cloud Security via organic and inorganic strategies, enhancing the longer-term Enterprise value of AKAM through an architecturally sticky and mid double-digit growth Cloud Security business.

The Soha acquisition complements AKAM's current portfolio of Cloud Security and Networking Solutions, and could help drive incremental growth in FY17+.

AKAM is likely to introduce Enterprise Security solutions such as Corporate DNS Security, etc during FY17+.

Bigger Picture: The Security business is fundamentally undervalued, in our view, given AKAM trading at ~8x EV to adjusted EBIDTA on DB FY18E.

We are calling for AKAM's Cloud Security business likely to scale up to ~30% of revenues in FY19E. A "third / third / third" revenue mix from Media Delivery, Security, and Performance etc for AKAM would be a fundamental basis for modestly expanding AKAM's multiple in FY18+.

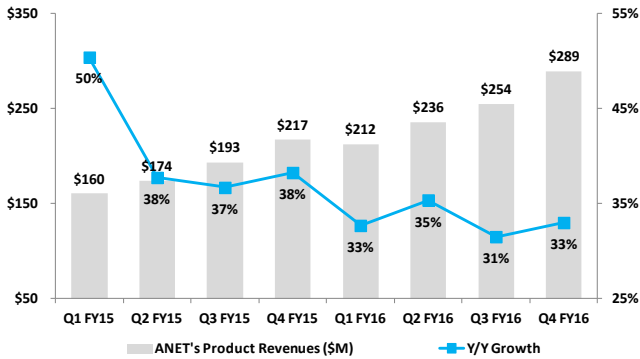


ANET

We see a thematically improving fundamental story in FY17+ based on ANET getting into Tier-1 Carrier and Cloud Provider Routing refresh through Merchant Silicon platforms (e.g. XPliant, Jericho/Qumran chipsets).

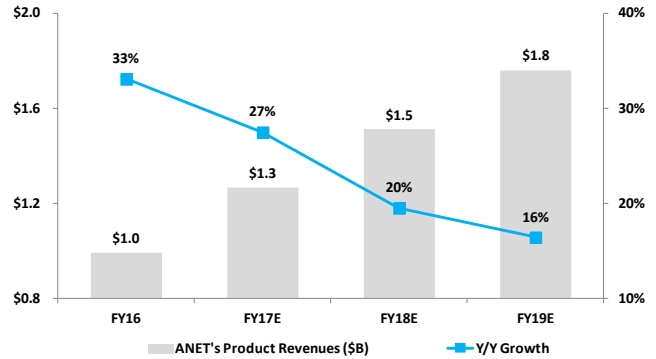
We are modeling ANET's Product Revenues growing at 27% and 20% in FY17E and FY18E (see Figure 23 and 24). Within Products, we estimate Merchant Silicon Routing Revenues growth of +50% Y/Y every quarter though FY18E (see Figure 25).

Figure 23: ANET Product Revenues (Reported)



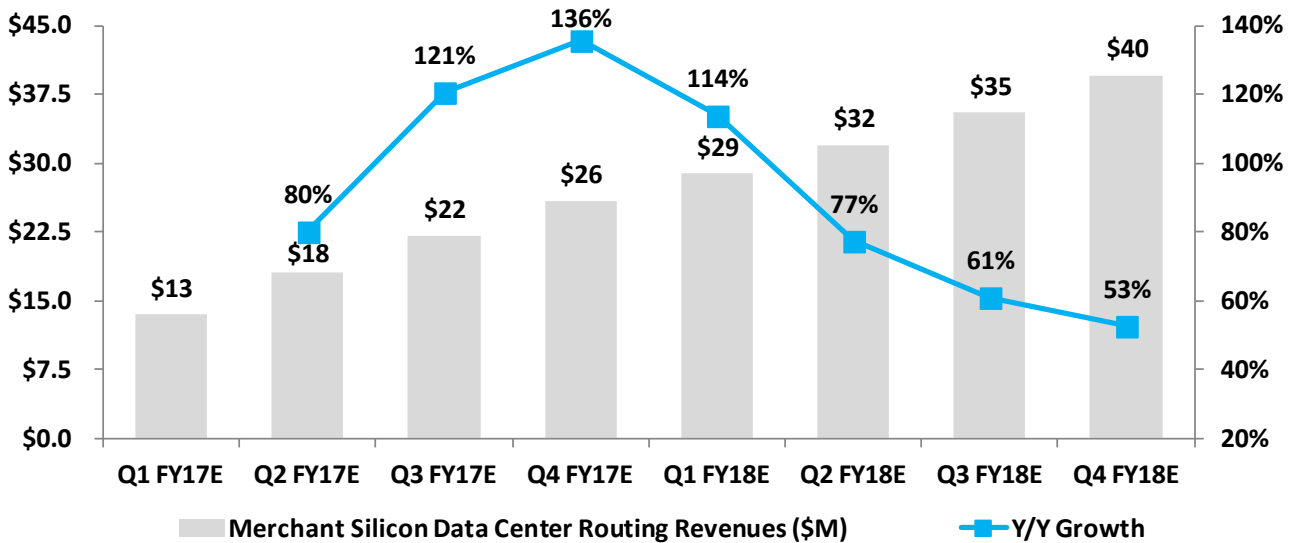
Source: Deutsche Bank and company filings

Figure 24: ANET Product Revenues [DB View]



Source: Deutsche Bank and company filings

Figure 25: ANET 100G Merchant Silicon (Jericho Based) Routing Revenues [DB View]



Source: Deutsche Bank and company filings
 Note: Merchant Silicon Data Center Routing Revenues (Historical and Forecasts) reflect DB estimates



Our mosaic channel color notes competitive design wins versus legacy IP Routers in refresh deals (currently 20+ US Cloud and Content Provider design wins in our view) and ongoing field trials at US Telcos are likely to transition into a multi-year design wins during 2H17+.

Further, we see Cloud IT demand for 100G Switching refresh – i.e. major Hyperscale Clouds moving to an “All 100G” Leaf, Spine, and Core Switching architecture in 2017. ANET is well positioned with their Universal Switches and EOS platform (see “ANET EOS Color” for more details).

In addition, meaningfully improving availability of components such as QSFP28 Optics, etc is likely to increase the velocity of 100G Switching refresh in Cloud Scale Data Centers.

ANET Leaf/Spine Switch Color: ANET introduced a line of Leaf/Spine Switches (7500R) designed for Tier-1 Telcos, Hyperscale Clouds, and large Enterprises in early 2016. ANET’s 7500R platform is based on 100G Merchant Silicon (e.g. Jericho; see Figure 26 for comparison of Legacy IP and Merchant Silicon) and Routing code in ANET’s Extensible Operating System (EOS).

The 7500R features 100G Ethernet density with buffers to support up to 1M internet routes, has over a hundred Terabits of Switching capacity and supports several hundred 100G ports.

Typical use cases vary across Optical transport, carrier Ethernet, edge and core Routers, Hyperscale Cloud, Data Center interconnect and Enterprise Campus Switching.

For example, growth in Hyperscale Cloud Data Centers drive significant demand for faster, more efficient Switches and Routers (larger bandwidth, higher density, tunnels for private and public connectivity, programmability, real time monitoring, etc).

Figure 26: Legacy IP Routing vs. Merchant Silicon Routing

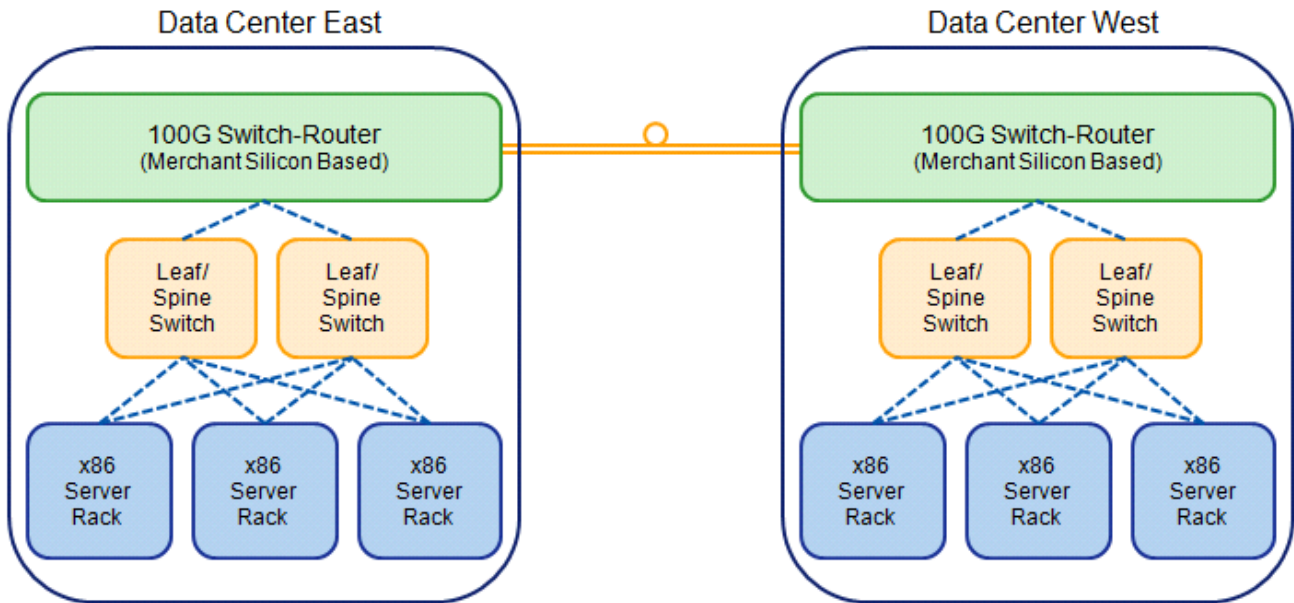
	Legacy IP Routing	Merchant Silicon Routing
Interfaces Supported	Legacy, Ethernet/IP	Ethernet/IP
100G Density	10s of ports	100s of ports
Speeds	10G; 40G; 100G uplinks	10G; 25G; 40G; 50G; 100G
ASP per Box [DB View]	\$300-500K+	\$100-150K
Features Supported	MPLS, Legacy features	Cloud Scale Routing, Programmability

Source: Deutsche Bank



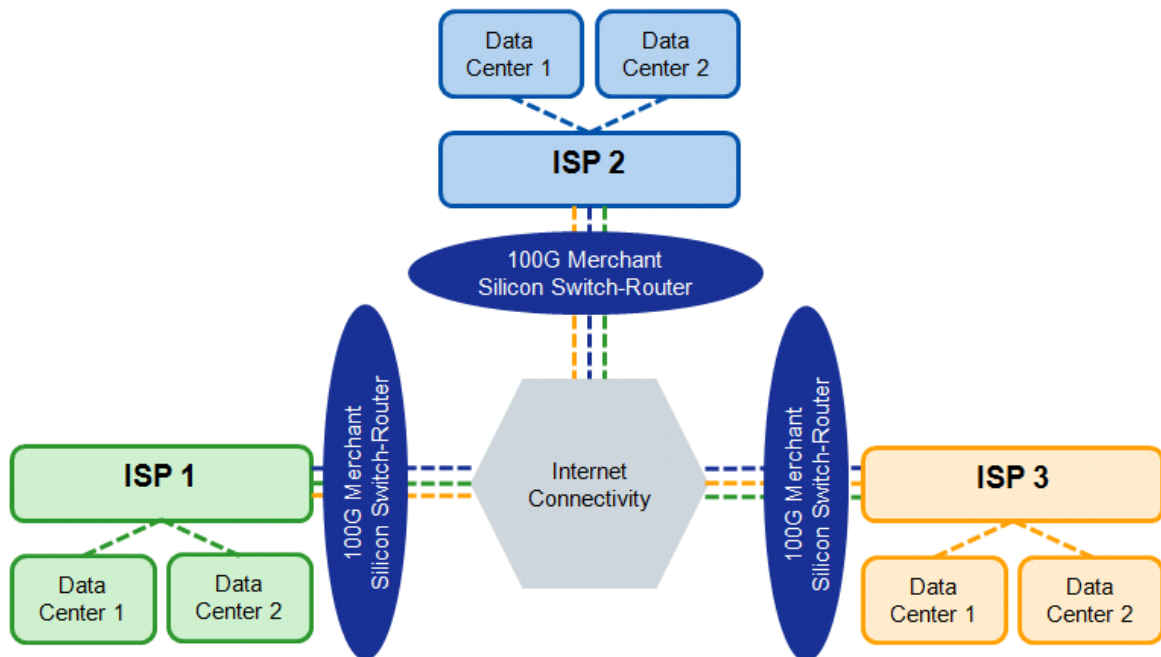
We illustrate Merchant Silicon based use cases in Figure 27 and 28.

Figure 27: 100G Cloud Data Center Interconnection Use Case



Source: Deutsche Bank

Figure 28: 100G Merchant Silicon IP Peering Use Case



Source: Deutsche Bank

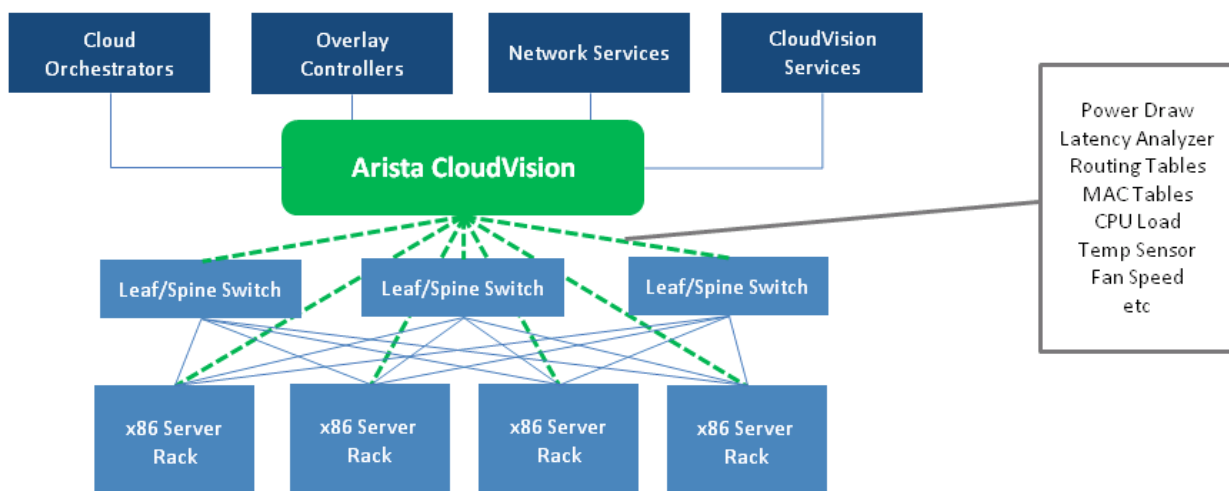


ANET EOS (Extensible Operating System) Color: ANET EOS is a fully programmable, modular, and Linux-based Network operation system which enables multiple Networking functions such as provisioning, telemetry and Routing. The key to ANET's telemetry solution is the "state-based" software architecture of EOS, which stores all real time information in one common database.

EOS enables software applications to deliver workflow automation, high availability, Network visibility and analytics, and integrates with third party applications such as virtualization, management, automation, and orchestration services.

For example, through the use of CloudVision (see Figure 29), ANET offers a modern approach to Network telemetry versus legacy polling mechanisms.

Figure 29: ANET CloudVision Overview



Source: Deutsche Bank and company filings

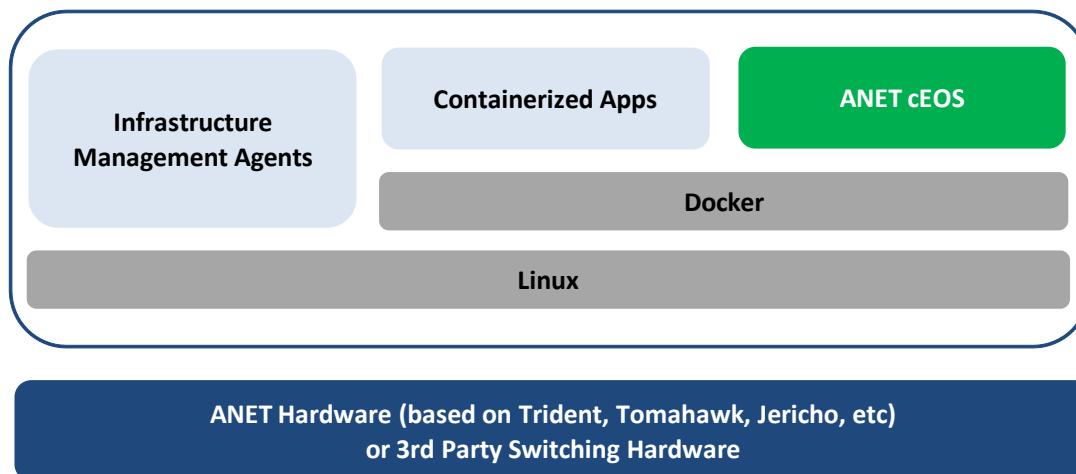
CloudVision provides customers with deep visibility into Network workloads and workflows, aggregates the Network state, and acts as the single point of access for 3rd party ecosystem integration.

Further, CloudVision allows customers to move to Cloud-class automation without significant internal development ("turnkey" automation), which is an attractive proposition driving potential adoption, in our view.



ANET cEOS Switching Software Color: ANET recently introduced its containerized EOS (cEOS). cEOS supports alternative models for packaging and deploying ANET's Extensible Operating System (EOS) across Hyperscale Clouds, Enterprises and Services Providers (see Figure 30). cEOS extends the "DevOps" process down to the Network level.

Figure 30: ANET cEOS Switching Software Architecture



Source: Deutsche Bank and company filings

The near-term opportunity for cEOS is for Cloud and Content Providers such as MSFT Azure, NFLX, etc to utilize ANET's cEOS to "stage" and "test" a Large Scale IT environment, so as to rapidly deploy new Cloud Applications and Automation features on "branded" and "whitebox" platforms.

Further, our research notes strength in ANET's backlog for 100G Switching, Routing. INTC's new Skylake Server refresh is a + catalyst.

cEOS reduces Network complexity through "containerization" which enables IT departments to efficiently scale Network automation, increase customization and improve visibility. cEOS runs on both ANET and third party hardware (see Figure 31; initial ecosystem partners include AVGO, HPE, and MSFT).



Figure 31: Differences between White Box (Gen OS), Commodity Hardware (cEOS) and ANET Hardware (cEOS)

	Generic OS on White Box	cEOS on Any HW	cEOS on ANET HW
Management	-	CloudVision	CloudVision
Programmability	Limited OS	EOS SDK	EOS SDK
JSON APIs	-	eAPI	eAPI
Network OS	Limited OS	Full EOS	Full EOS
Containers	No	Yes	Yes
Base OS	Modified Linux	Any Linux	Unmodified Linux
Silicon	T2 / TH	T2 / TH	12 To Date

Source: Deutsche Bank and company filings

ANET is planning early customer trials in 2H17, with plans for commercialization in FY18+. cEOS will initially target single chip TOR deployments.

What is “Containerization”? Containerization is a virtualization method for deploying and running distributed applications on isolated systems (called containers) on a single control host and single kernel.

Containers enable application software to run reliably when moved from one computing environment to another (i.e. developer’s laptop to a test environment, staging environment into production, physical machine in Data Center to virtual machine in the Cloud).

Containerization gained popularity when Docker (open source software) developed a way to make containers more portable, allowing movement between systems without requiring code changes. This is important for DevOps environments (primarily at Hyperscale Clouds; more recently interest from Enterprises and Services Providers) where agility, modularity and reliability are mission critical to business operations.



JNPR

JNPR is our Large Cap Sell Idea. This is given our fundamental caution on weak Product Revenue Growth, consensus expectations for Top Line and Earnings Growth sponsored mainly by lower quality Services Revenues, and downward revisions we anticipate to current elevated consensus earnings estimates.

- We highlight potential for structural headwinds ahead – i.e. directional ASP deflation, margin erosion, and potential share loss for JNPR’s Custom Silicon Routers and Switches from “Merchant Silicon” Switch-Routers from ANET, CSCO, etc (e.g. Jericho, Qumran chip based).

The Merchant Silicon platforms are likely priced up to 50% lower versus JNPR offerings, according to our channel checks, and have high 100G density, chip-level programmability, Virtual Networking, etc.

Our IT channel checks suggest major Hyperscale Clouds and Telcos: AWS, MSFT Azure, GOOGL, NFLX, FB, T, NTT, VZ, Telstra, etc are likely to deploy the significantly lower cost Merchant Silicon Switch-Routers, in production Networks from 2017+.

- We see limited EPS accretion from JNPR’s operating metrics and from the ongoing buybacks.

We note potential for continuing gross margin compression in FY17+ (JNPR’s sales teams are likely to offer higher than usual discounts to be price competitive versus 100G Jericho and Qumran silicon based Switch-Routers at major Clouds and Telcos).

Additionally, we see limited opex efficiencies in FY17/18. JNPR is not likely to scale down R&D or Sales opex, so as to stay competitive versus CSCO and ANET in the US, and Huawei, NOK, ZTE in Europe and Asia.



Private Companies

Versa Networks is a SD-WAN and SD-Security vendor. Versa's solutions enable Service Providers and large Enterprises to run virtual Network functions on premises, in Data Centers or in the Cloud. Versa Networks was founded in 2012 and is headquartered in Santa Clara, CA.

Viptela provides virtualization technology for Wide Area Networks to Global 2000 Enterprises. Viptela's solutions deliver unified and centralized management of all WAN infrastructures, reduce WAN infrastructure costs, and increase WAN Security. The company was founded in 2012 and is headquartered in San Jose, CA.

SD-WAN Color: Software Defined Wide Area Networking (SD-WAN) is the application of Software Defined Networking (SDN) technology to Wide Area Network (WAN) connections.

Wide Area Network connections are used to connect Enterprise Networks over large geographic distances, such as branch offices to central Data Centers. WAN connections are typically handled by proprietary hardware, but SD-WAN leverages a software centric approach, moving Networking control into the "Cloud".

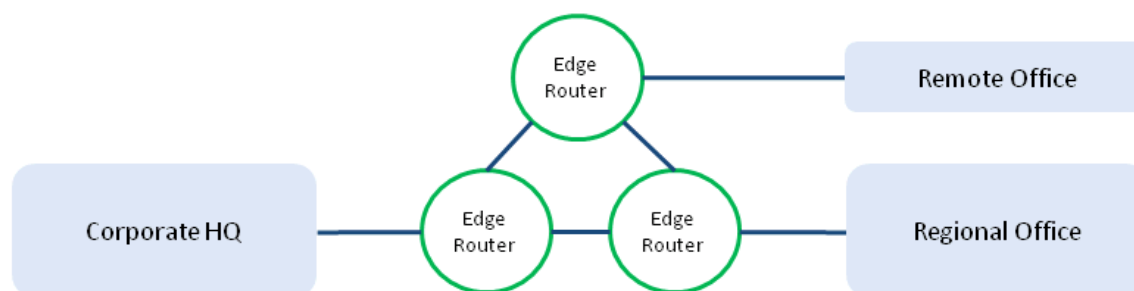
The emergence of SD-WAN is driven by Enterprise customers demanding more flexible, open, Cloud-based technologies, versus the legacy proprietary hardware model.

The benefits of SD-WAN are improved security, cheaper operational costs and increased IT flexibility. Security is increased by software based Networking tools like Virtual Private Networks (VPN), etc.

SD-WAN is cheaper to implement, by provisioning connectivity and services through the Cloud versus purchasing expensive, proprietary Routing hardware. SD-WAN also increase flexibility by enabling IT departments to scale up connectivity during peak demand periods, through the use of Cloud Software.

For example, SD-WAN allows remote offices to leverage bandwidth intensive applications (video conferencing, VoIP, online file backup, email, etc) that might have been restricted to larger offices (see Figure 32 and 33).

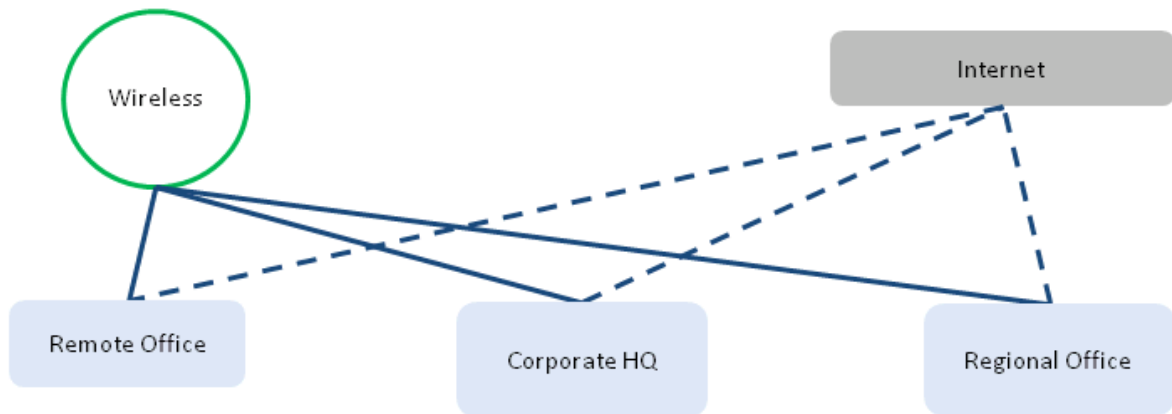
Figure 32: Legacy Multiprotocol Label Switching (MPLS) Network Architecture



Source: Deutsche Bank



Figure 33: Software Defined Wide Area Network (SD-WAN) Architecture



Source: Deutsche Bank



Theme #2: Terabit Optical

Portfolio Manager Summary

We are in an Optical “Super Cycle” and note opportunities in 100/400G+ Data Center Optical Interconnects, Software Defined Networking and Network Function Virtualization (SDN/NFV), 100G/400G+ Metro, Long-haul, and Subsea Optical build outs.

100G+ Optical is a robust Theme representing ~\$20B a year in capex spending; growing +50% Y/Y in Data Centers and +10% in Metro Networks at major carriers.

We note opportunities across the Optical landscape below (see Figure 35 for a detailed investment illustration):

- **100/400G+ Data Center Optical Interconnects** are the key for “Distributed” Web 2.0 workloads at Hyperscale Clouds like GOOGL, AMZN, MSFT, FB, AAPL, etc.
- **Software Defined Networking and Network Function Virtualization (SDN/NFV)** initiatives at Tier-1 Telcos: T, VZ, BT, etc are driving the need for faster and more energy efficient Optical technologies.
- **100G+ Metro Optical** build outs are in the early innings, as noted by VZ, T, CTL, CMCSA, China Telcos, etc. The size of Network traffic is growing at a robust rate due to growth of 4K+ video, mobile streaming, virtual reality, IoT, etc.
- **100G/400G+ Long-haul Optical** sees ongoing upgrades at Carriers and Internet Providers due to major Enterprises shifting workloads to Public and Hybrid Clouds (e.g. MSFT Azure, AWS, etc) and unprecedented growth of Network traffic.
- **100G+ Subsea Optical** routes are expected to grow ~35-45% CAGR (According to TeleGeography) driven by growth in 4G/5G wireless, Cloud computing, on-demand content delivery and increasing Data Center connectivity.

Ideas (a primary risk factor is Q/Q volatility in Optical IT spending patterns)

CSCO: CSCO is well-positioned in FY17+ in 100G+ Data Center Optical. The company’s Optical Networking solutions include: Dense Wave Division Multiplexing (DWDM), Packet Optical Transport Systems, Data Center Interconnect and Optical Network management.

ACIA: Our Small Cap Growth Idea levered to double-digit growth trends in 100G+ (scaling to a Terabit in FY18+) Optical rollouts at Hyperscale Clouds and Service Providers. ACIA is disrupting the Optical Component industry by leveraging CMOS photonics, DSPs, and hence Moore’s Law economics.

CIEN: CIEN is our Small Cap Idea on a multi-year 100G+ Optical rollout cycle at Hyperscale Clouds, Subsea, and Metro. Ongoing record product order backlog anchors our Overweight CIEN Thesis.



Color on the Optical Investment Landscape and Ideas

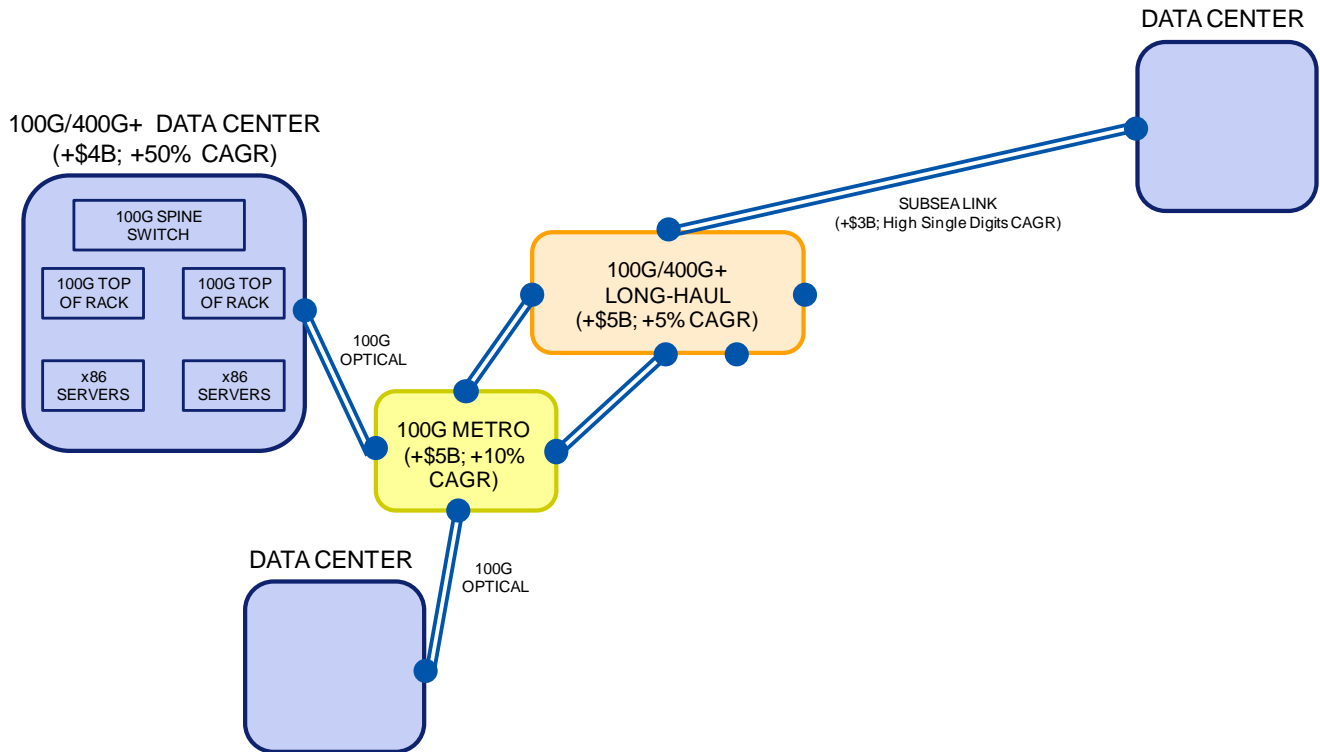
IT demand for 100G+ Optical is likely to accelerate through FY17+ with Global 2000 IT and Carriers following the Hyperscale Cloud lead. We note an Optical Networking TAM of ~\$20B (see Figure 34).

Figure 34: Optical Networking TAM and CAGR [DB View]

Terabit Optical	DB View of Market Opportunity (CY17)	DB View of TAM Growth (CY17-20 CAGR)
Data Center	+\$4B	+50%
Metro	+\$5B	+10%
Long-haul	+\$5B	+5%
Subsea	+\$3B	High Single Digits

Source: Deutsche Bank, baseline industry data from IHS and company filings

Figure 35: Optical Networking Investment Landscape [DB View]



Source: Deutsche Bank, baseline industry data from IHS and company filings



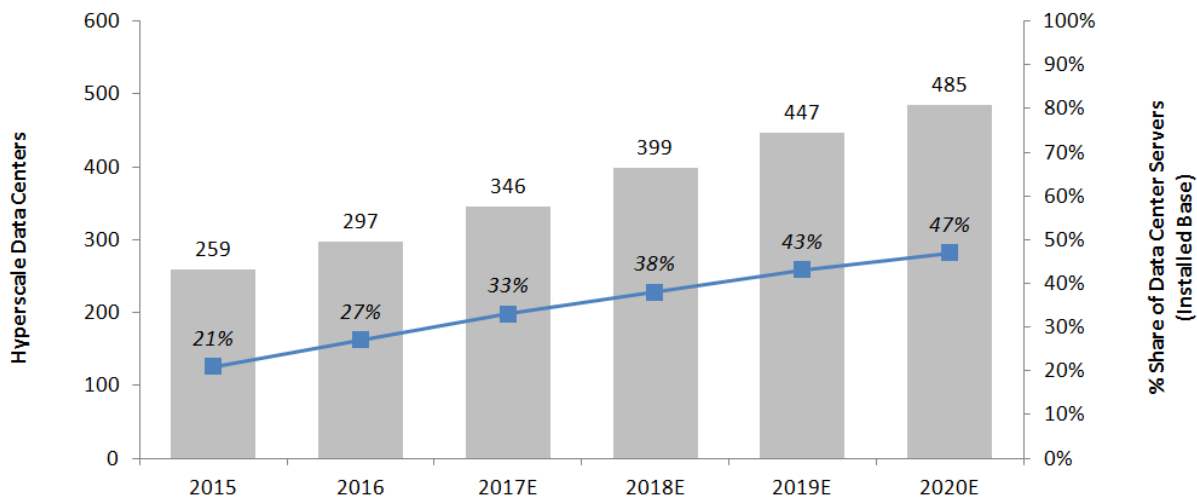
100G+ Optical demand is driven by Hyperscale Cloud buildouts. We note that Hyperscale Clouds are growing at an unprecedented rate and are expected to represent ~53% of all Data Center traffic by 2020 (see Figure 36 and 37). The dominant Enterprise use case is Data Center Interconnection (see Figure 38).

Figure 36: Hyperscale Data Center Growth

Hyper Scale Data Centers:	Today	2020E
% of All Data Center Servers	21%	47%
% of All Data Center Processing Power	39%	68%
% of All Data Stored in Data Centers	49%	57%
% of All Data Center Traffic	34%	53%

Source: Deutsche Bank and baseline data from Cisco Global Cloud Index(GCI): 2015-2020
 Note: Refer to www.cisco.com for Cisco GCI data

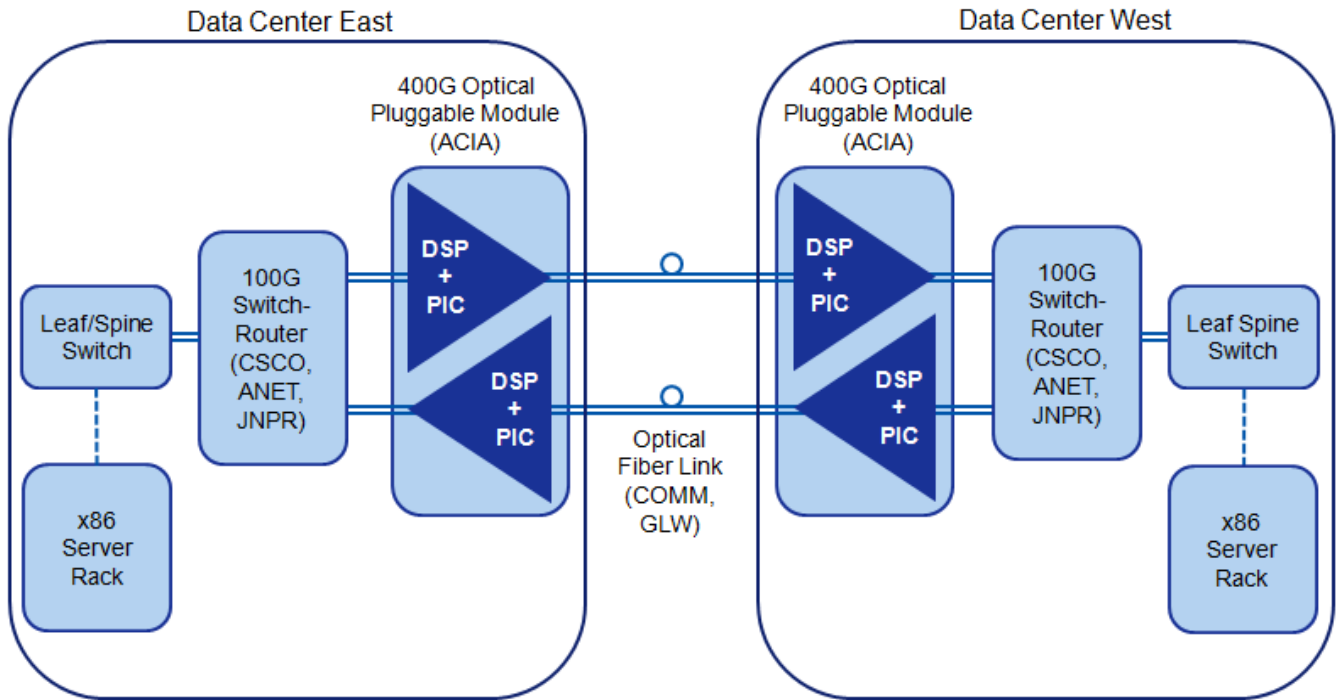
Figure 37: Data Center Server Growth



Source: Deutsche Bank and baseline data from Cisco Global Cloud Index(GCI): 2015-2020
 Note: Refer to www.cisco.com for Cisco GCI data



Figure 38: Hyperscale Cloud Data Center Interconnect Opportunity [DB View]



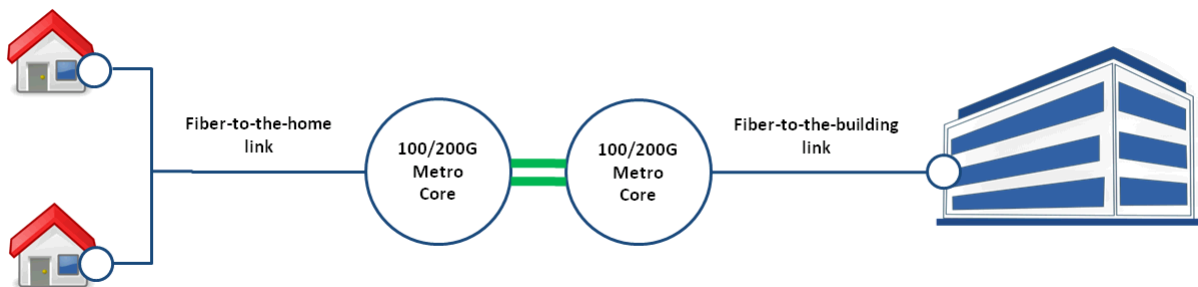
Source: Deutsche Bank

In addition, Tier-1 Telcos and Cablecos are starting to “scale out” their 100G Metro Optical plans, as they gear up their Networks for Over the Top Video, and 100 Megabit to Gigabit Speed Services for businesses and consumers.

T’s recent 400G Fiber to the Building project is a case in point. T plans to start 400G Ethernet trials to ~200k business customers in 2017.

Further, during T’s Q4 FY16 earnings call, the company reiterated their focus on growth investments, noting progress ahead of schedule for their Fiber to the Home (FTTH) builds. T indicated FTTH in 4M consumer homes, growing to 12.5M over the next few years (see Figure 39 for FTTH illustration).

Figure 39: Metro Fiber to the Home / Building [DB View]



Source: Deutsche Bank



CSCO

CSCO is well-positioned in FY17+ in 100G+ Data Center Optical. The company's Optical Networking solutions include: Dense Wave Division Multiplexing (DWDM), Packet Optical Transport Systems, Data Center Interconnect and Optical Network management, etc.

We highlight CSCO's Optical Networking capabilities below:

- 100G: CSCO offers an end-to-end 100G solution that spans the Network core, Network edge, Data Center, and Optical transport (e.g. CSCO CPAK, etc).
- Optical Transport: Covers Metro, Regional, Long-haul, and Data Center Optical transport Networks for Enterprises and Service Providers (e.g. CSCO Network Convergence Systems).
- DWDM: Tightly integrates DWDM interfaces with the Routing platform, which increases efficiency, simplifies management, and accelerates service delivery (e.g. CSCO Carrier Routing System, Aggregation Services Routers, Multi Service Transport Platform).
- Enterprise: CSCO addresses Enterprise bandwidth demands with high-capacity Optical Network solutions, including backup and disaster recovery products (e.g. CSCO DWDM and Optical Network Manager).

What is DWDM?

Dense Wavelength Division Multiplexing (DWDM) is a fiber optic transmission technique used to increase bandwidth (400G+) over existing fiber optic backbones.

DWDM combines multiple signals simultaneously at different wavelengths on the same fiber, effectively transforming one fiber into multiple virtual fibers.

ACIA

ACIA is our Small Cap Growth Idea levered to double-digit growth trends in 100G+ Optical rollouts at Web 2.0s and Service Providers. ACIA is "disrupting" the Optical Networking market through its Silicon based 40G through 400G+ Optical Modules and Chipsets (see Figure 40 and 41).

Figure 40: Legacy Coherent Interconnect Solutions [DB View]



Source: Deutsche Bank

Figure 41: DB View of ACIA Siliconization



Source: Deutsche Bank



The “siliconizing” of discrete Optical components brings “Moore’s Law” economics to Optical Networking, enabling meaningful time to market and price/performance advantages for major Equipment Vendors and End-Customers: Web 2.0s, Telcos, and Cablecos.

FY17+ could see ACIA’s customer mix shift to higher volume and higher spending intensity customers – in particular, to Web 2.0 and Cloud customers: GOOGL, FB, AMZN, etc and to Data Center Switching vendors: CSCO, ANET, etc.

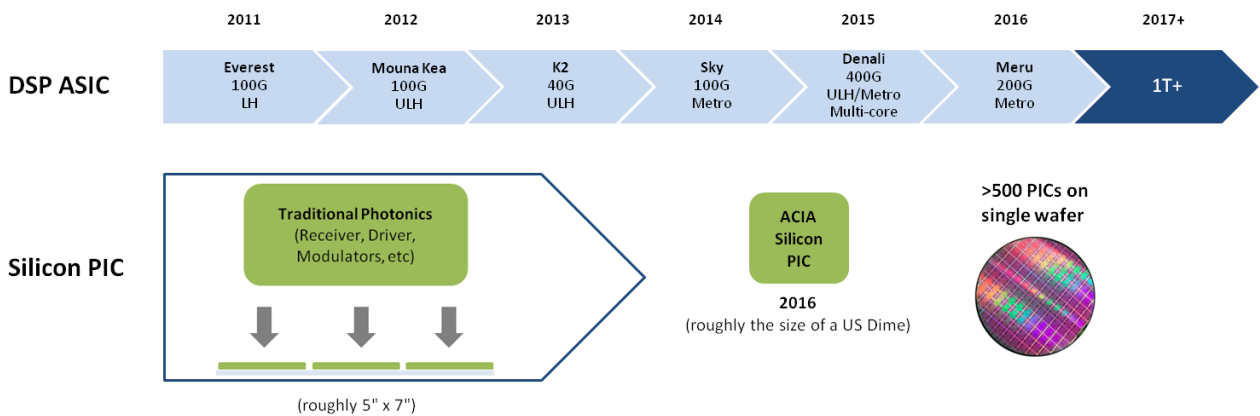
Case in point, in a November 2016 FB blog post (An open approach for switching, Routing, and transport), FB engineers highlighted the use of ACIA’s DSP ASIC and optics module (AC400) inside of FB’s Voyager platform.

Voyager is an Optical Networking “white-box” product that enables a “clean separation” of hardware and software, resulting in increased data transfer speeds (200/400G) in Metro and Long-haul fiber optic Networks (see Figure 38 for a 400G Optical Pluggable example).

FB has taken an active approach to many open development projects (Telecom Infra Project (TIP), Open Compute Project, etc) to address increasing global internet demand in a scalable and cost effective way.

We see little competition for ACIA’s 100G and 400G Coherent Silicon Photonics + DSP based modules (we highlight a roadmap to Terabit Scale Silicon Photonics in Figure 42 and 43) and note stable pricing trends near-term.

Figure 42: ACIA Product Roadmap



Source: Deutsche Bank and company filings



Figure 43: DB View of the Future of Optical: Consolidated DSP and Silicon PIC



Source: Deutsche Bank

ACIA is attractive at ~13x P/E DB FY18E – implying consensus (FactSet) view for +10% Top Line Growth, which is meaningfully lower versus our ~25% FY18 growth view.

CIEN

CIEN is our Small Cap Idea on a multi-year 100G+ Optical rollout cycle, we note, at Hyperscale Clouds, Subsea, and Metro. The record order backlog in Q1 FY17 (highest in company’s history) anchors our Overweight CIEN Thesis. We would note:

- Solid order trends for CIEN’s 6500 series (and early phase of design wins for the Waveserver DCI platform) 100G+ packet/Optical systems at major Hyperscale Cloud and Hosting Providers (we believe at GOOGL, FB, EQIX, etc) for interconnecting Data Centers across Metro and trans-oceanic Optical links.

For example, GOOGL is looking to deliver higher bandwidth and lower latency performance for G Suite Apps and for Google Cloud Services via the trans-oceanic fiber link – Pacific Light Cable Network (anticipated FY18 completion).

- We call for expanding Metro Optical order trends in FY17/18 for CIEN’s 100G+ packet/Optical portfolio at major US Telcos and Cablecos (e.g. T, VZ, CTL, CMCSA, etc – who are current CIEN customers).

CIEN is working on higher order modulation schemes (e.g. 16-QAM, etc) to drive 200G and 400G Optical speeds, using software control, through its packet/Optical platforms.

- We note multi quarter order book strength for CIEN’s Packet Networking portfolio at Tier-1 US and Western Europe Fiber to the Home rollouts (T U-verse fiberization plans, Deutsche Telekom Optical access buildouts, etc).

We highlight recent news and proof points of CIEN’s Subsea, US Telco, Cableco, Hyperscale Clouds, and India infrastructure opportunities below:

Subsea Optical: CIEN is solidly positioned at Subsea Optical rollouts at major Hyperscale Clouds in FY17/18+, in our view, based on the competitive strength (price/performance metrics, etc) of CIEN’s 100/200G+ packet/Optical Networking solutions based on higher order modulation schemes (e.g. 16-QAM, etc) and a “robust” Optical Services Layer (required for Operations, Administration, Provisioning, etc).

- Facebook (FB) and Google (GOOGL), along with partners in Asia, announced a plan to build an 8,000 mile, 120 Terabit per second Subsea

Optical Order Trends Highlight

International Example: TLS, Australia’s largest Telco and Media Company, announced at MWC 2017 plans to expand their Long-haul, Metro and Regional Fiber Optic Networks using CIEN technology (converged packet-optical transport systems, etc).

The 3 year deal will enable TLS to deliver +400G speeds, and up to 1TB on the busiest routes, in preparation for expected traffic growth from mission critical IoT, 5G and Cloud and Media services.

CIEN solutions will bring TLS’s vertical network elements into a horizontal, SDN layer, allowing SDN programmability.



cable connecting Los Angeles and Hong Kong – the highest capacity trans-Pacific cable to date (opening 2018). Other such Subsea projects include: Unity, SJC, FASTER, MONET and Tannat. (Source: Bloomberg)

- FB and MSFT are partnering to build a 160 Terabit trans-Atlantic cable.

US Telcos: We are calling for CIEN to be a primary beneficiary of T's multi-year Optical Network upgrade plans – i.e. T's Metro and Long-haul Networks scaling from 10/40G to 100G and 200/400G - based on CIEN's incumbency advantage and Software Defined Packet Optical systems (for ratcheting up speeds from 100G to 200G and 400G, via Software) at T in Metro and Long-haul Packet/Optical.

- Verizon (VZ): In Early 2015, VZ selected CIEN and CSCO as prime vendors for its 100G Optical Metro rollout in the US. CIEN management anticipates VZ revenues to ramp up over the next few years, based on VZ's target to complete the majority of 100G rollouts in FY17/18.
- We see headroom for multi-quarter order strength at VZ as CIEN Packet/Optical systems are designed with 100G speeds as a minimum, and with the option to scale to higher speeds of 200G and 400G – which is consistent with VZ's Metro Optical Network upgrade plans.

US Cablecos: Comcast (CMCSA): CIEN has had a long standing relationship with CMCSA (partnered to deliver the first successful 1 Terabit Optical trial a few years ago), and we anticipate continued growth driven by evolving consumer and Enterprise Broadband demands (proliferation of big data, IoT, Internet streaming, 4K content, etc).

Hyperscale Clouds: CIEN called out a higher mix of non Telco revenues of 31% in FY16 (11% Y/Y growth). The company attributed Non Telco growth mainly to order strength at major Hyperscale Clouds, particularly in Data Center Interconnects and Subsea Optical.

- A recent example of CIEN's innovation in high speed optics is the introduction of WaveLogic Ai, a fully programmable coherent Optical systems that improves Network performance through deep Network visibility.
- WaveLogic Ai is relevant for data intensive IoT applications in Metro and DCI Networks (the new WaveLogic system drives 400G speeds).

India Infrastructure rollouts: CIEN has been investing in the Indian market for +10 years and is starting to reap the benefits. Robust Government and Telco spend is driven by double digit growth in Broadband Internet connections and plans for Over the Top Video delivery from major Cloud and Content Providers.

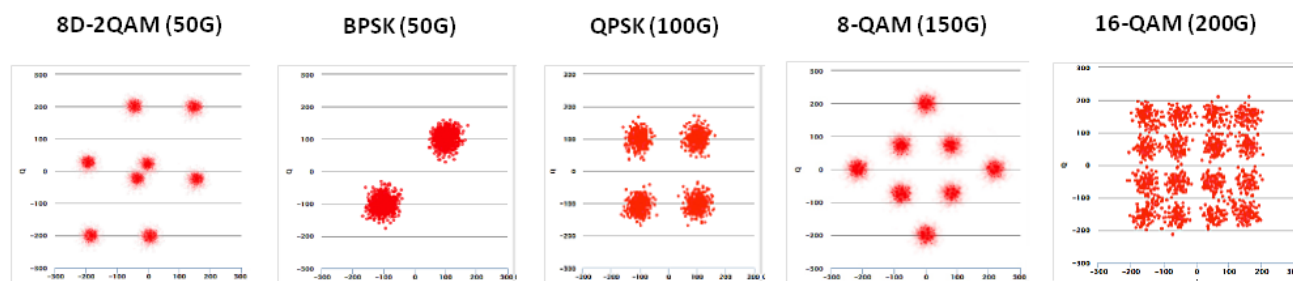
WaveLogic 3 Color: CIEN's WaveLogic 3 solution enables higher fiber capacities in Metro and regional Networks (200G+ speeds using 16QAM modulation).

16-QAM modulation doubles wavelength capacity and spectral efficiency, allowing more bits on a single fiber (see Figure 44). This is important in applications where fiber is limited, such as Metro Networks. 16-QAM also significantly reduces transport costs by enabling a single DWDM line to transport 2x as much traffic.

CIEN's WaveLogic 3 solution is able to extend 16-QAM benefits from Metro to regional applications, a key differentiation versus competitors. This enables customers to apply the increased capacity of 16-QAM to regional Networks (covering distances between 800–1400km).



Figure 44: 16-QAM Enables Higher Fiber Capacities



Source: Ciena

INFN

At Insight Infinera 2016, the company highlighted new platform releases: DTN-X Meshponder (XT3300 / XT 3600), which integrates INFN's Gen 4 PIC, creating the industry's first Meshponder platform to deliver up to 2.4 Terabits per second. The company noted potential for an estimated +50% improved total cost of ownership versus conventional Networks.

INFN noted their primary competitive advantage at Hyperscale Clouds – for Data Center 100G+ Optical Interconnects, based on the company's lower cost structure versus competitors, technical features of INFN's "Meshponder" products (XT3300 / XT3600) and customer credibility earned from consistent execution with Cloud workflows over the past few years.

The Carrier Metro Optical opportunity was noted as "early stage"; a "decade long" transition, in the company's view.

INFN noted that the 100G Metro market opportunity is still early and announced that it would be accelerating product refresh cycles. For example, INFN's "Infinite Capacity Engine" (ICE), which is a multi-Terabit Optical subsystem that combines the company's Next Gen Coherent Processor and Gen 4 PIC, should see "Cloud Speed" upgrades every 2 years.

Case in point, INFN attributed Q4 performance to strength in Data Center (+60-100% Y/Y market growth), solid growth in EMEA, and a Metro deal from a Large North American Cableco. INFN's fundamentals are recovering sooner than anticipated, based on ramp of new design wins for INFN's 100G+ Optical portfolio at Cloud and Carrier customers.

INFN also previewed its Gen 5 PIC (up to 9.6 Terabits per second), which is expected to hit the market in 2018.

This is significant news as INFN's ICE expands the company's "Instant Bandwidth" capability by enabling pre-deployed bandwidth to be provisioned to customers on-demand in 100G increments through software activation.



Theme #3: 5G and Internet of Things (IoT)

Portfolio Manager Summary

5G buildouts for “Gigabit Speed” wireless access, and for “Networking” +20B Internet of Things devices is a priority for Tier-1 Telcos and Enterprises (T, VZ, NTT, etc).

Industrial IoT is a core focus for Top Corporates – e.g. WMT, BA, HON, ROK, etc – requiring “Cloud Scale” Networking hardware and software assets. CSCO’s Edge and Data Center Cloud solutions and ruggedized Enterprise Networking Routers and WiFi access points, are a case in point.

Ideas:

GLW: We highlight a multi-year buildout cycle in Telco and Cable Fiber to the Home. Hyperscale Cloud demand for Fiber Connectivity is a double digit growth driver for GLW in FY17+.

COMM: We anticipate continued strength in COMM’s Fiber Connectivity and Wireless Solutions businesses in FY17+ driven by 5G infrastructure rollouts. 5G base stations are mostly “fiber connectivity” based and require new antenna systems.

CSCO: CSCO has the broadest set of Industrial IT design wins for IoT Scale Cloud Networking platforms. We see 5G and IoT as a multi-year Theme for CSCO, involving a wide range of hardware, software and Cloud Services portfolios.



Color on the 5G and IoT Investment Landscape and Ideas

The mobile industry is undergoing a major transition from 3G/4G connectivity to much faster 5G infrastructure (~10x faster versus 4G LTE). This transition is driven by increase in mobile Broadband demand, evolving mission critical technologies, growth of IoT devices, etc (see Figure 46).

We highlight the 5G and IoT TAM opportunity below:

Figure 45: 5G and IoT TAM and CAGR [DB View]

5G and IoT (Network Infrastructure)	DB View of Market Opportunity (CY17)	DB View of TAM Growth (CY17-20 CAGR)
5G Testing	+\$5B	+30%
5G and IoT Network Infrastructure Buildouts	+\$10B	+10%

Source: Deutsche Bank, baseline industry data from IHS and company filings

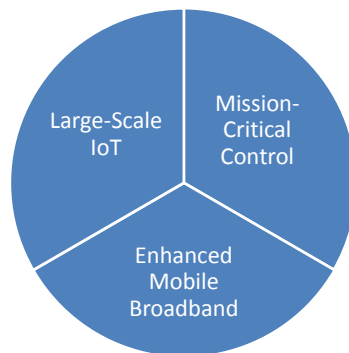
Figure 46: 5G Core Value Propositions and Use Cases

Large-Scale IoT Attributes

Deep Coverage: Reach challenging locations
 Low Energy Usage: 10+ years of battery life
 Low Complexity: 10s of bits per second
 High Density: 1M nodes per km

Use Cases

Smart Cities
 Smart Home / Building



Mission-Critical Control Attributes

Strong Security: Trusted by Health/Gov/Financial Sectors
 Ultra-high Reliability: <1 of 100M packets lost
 Low Latency: As low as 1 millisecond
 User Mobility

Use Cases

Self-driving Cars
 Industry Automation

Enhanced Mobile Broadband Attributes

High Capacity: +10TB/s
 High Data Rates: Multi-G peak rates, +100MB/s user rates

Use Cases

Ultra High Definition Video (+4K)
 Virtual / Augmented Reality

Source: Deutsche Bank



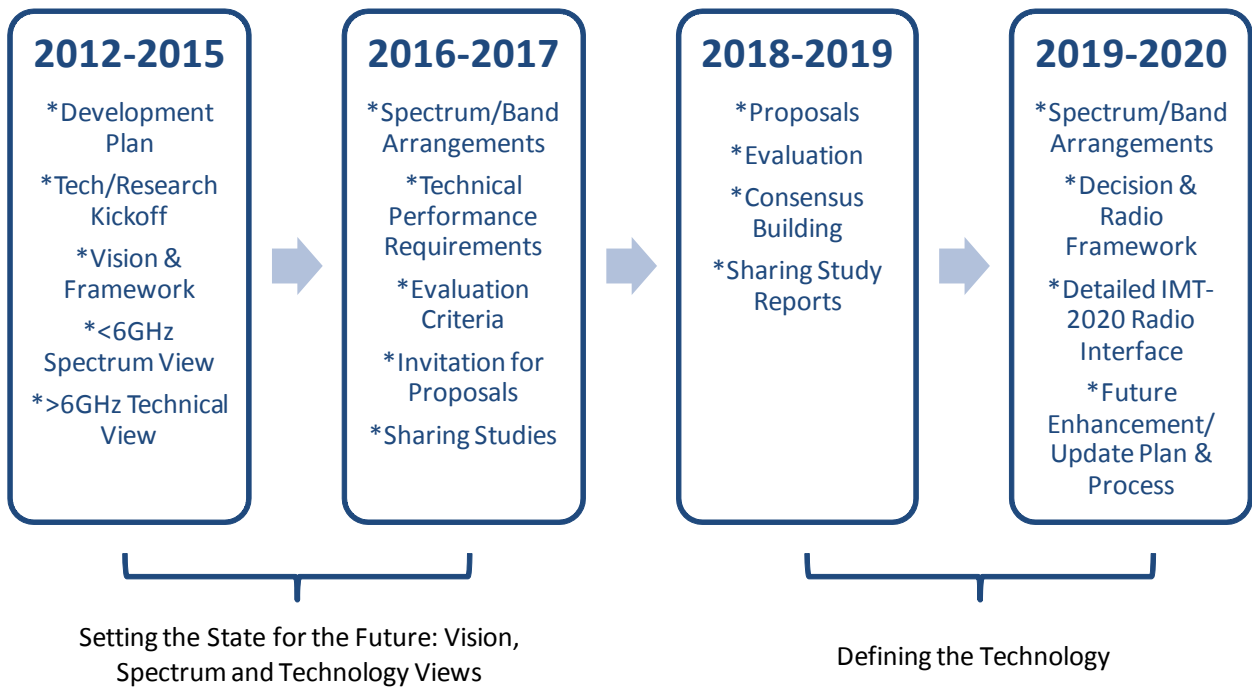
5G infrastructure technology is a critical piece required to enable connectivity among devices and people in the IoT economy.

We would note:

1) 5G research, development and testing timelines are accelerating: Official 5G standards have not yet been defined, but some operators (VZ, T, etc) have announced early trials and commercial rollouts of pre-standard 5G Networks. Official 5G technologies are expected to be deployed in 2020 (see Figure 47).

Case in point, VZ initiated their Next Gen fiber deployments in Boston, and is launching 10 pre-commercial 5G pilots across the country to test 5G fixed wireless technologies in preparation for commercial rollouts (Q4 FY16 earnings call).

Figure 47: Telecom Industry View of 5G Rollouts



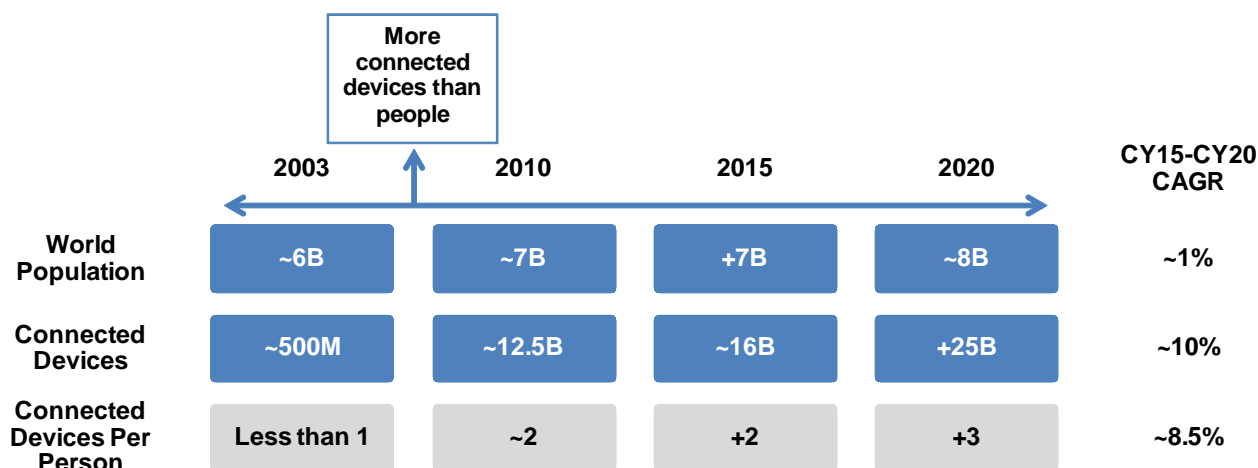
Source: Deutsche Bank and International Telecommunications Union (ITU)

2) Robust growth in Internet of Things (IoT) connected devices and data usage require billions of new wireless connections. While LTE currently services early generation IoT devices, mission critical IoT devices such as connected cars or life support machines require faster and more reliable connections.

We anticipate +25B connected devices by 2020 (~10% CAGR CY15-CY20; CSCO baseline data), approximately +3 connected devices per person (see Figure 48).



Figure 48: DB View of Exponential Growth of Internet Connected Devices



Source: Deutsche Bank and baseline data from Cisco Visual Networking Index (VNI): 2015-2020
 Note: Refer to www.cisco.com for Cisco VNI data

What is 5G? 5G New Radio (NR) is an ongoing 3GPP study that defines a new OFDM-based wireless radio standard; it is essentially the development of global standard specifications for 5G, which is the foundation for Next Generation mobile Networks.

5G NR brings new capabilities to mobile Networks, lowers cost per bit, significantly lowers latencies, and enhances mobile Broadband with multi gigabit per second data rates.

New 5G NR technologies are a key piece in enabling increasing connectivity requirements for consumer demand (virtual reality, augmented reality, 4K+ video, big data, etc).

Further, 5G NR technologies need to adapt and scale to a variety of services, devices and deployments types. It also needs to leverage a wide band of spectrum (from low bands below 1GHz, to mid bands 1GHZ-6GHZ, and high bands known as millimeter wave 6GHz+).

We note recent 5G NR field trials with major technology firms:

- QCOM, ERIC, T and SK Telecom collaborated on 5G New Radio trials intended to accelerate wide-scale 5G deployments. In late 2016 / early 2017, QCOM announced plans to conduct interoperability testing and over the air field trials based on 5G NR specs being developed by 3GPP.

The trials support millimeter Wave (mmWave) spectrum in the 28GHz and 39GHz bands and utilizes device and base station prototypes from QCOM and ERIC, and spectrum from T and SK Telecom, to simulate real work use cases. The interoperability testing and trials are planned to launch in the US and South Korea in 2H17. Trials are important milestone checks for pre-standard 5G technologies to be compliant with the 5G New Radio 3GPP specs, enabling quicker commercialization.



What is 5G Fixed Wireless Access? 5G Fixed Wireless Access (FWA) is a stepping stone to full 5G mobility. Network operators are implementing 5G FWA to help prepare for full-scale 5G deployments. By testing 5G FWA, Network operators are working with new technologies such as spectrum bands, radio form factors, and antenna systems (also used for full 5G mobility Networks).

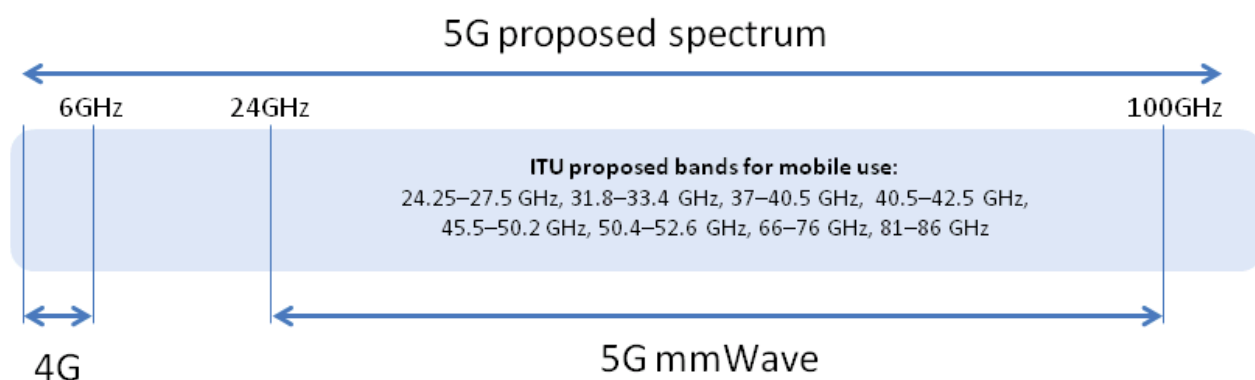
5G FWA enables fiber-like speeds over the air, while also paving the way for full 5G mobility. The Telco industry is likely to use 5G FWA to meet increasing consumer and Enterprise demand for cost efficient fiber-like Network speeds (VZ and T have already started 5G fixed wireless access field trials).

We would highlight VZ launching ~10 pre-commercial 5G pilots across the US with multiple use cases, including dense urban and suburban areas (noted on the Q4 FY16 earnings call). VZ is testing 5G fixed wireless technologies in different environments in order to successfully operationalize 5G technology for commercial rollouts.

While fiber offers the fastest Network speeds, rolling out fiber to homes and Enterprise premises is expensive (laying fiber in remote areas, etc) and time consuming (approval to dig and lay fiber can take weeks). 5G FWA addresses these pain points while delivering a comparable end-user experience from both a cost and Network speed perspective.

What is mmWave? Millimeter wave spectrum (mmWave) is a band of spectrum between 24 GHz and +100GHz (also known as extremely high frequency) that can be used for high speed wireless communications (e.g. 802.11ad WiFi, which is operating at 60 GHz).

Figure 49: 5G Proposed Spectrum (mmWave Bandwidth Opportunity)



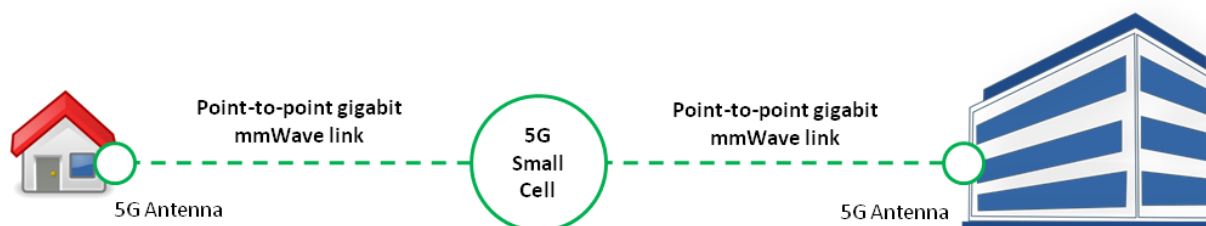
Source: Deutsche Bank

mmWave is being tested by the 5G standards organization, Federal Communications Commission (FCC), and industry researchers as a way to bring 5G to the market by increasing available bandwidth (see Figure 49).

mmWave is useful for highspeed, point to point wireless local area Networks (WLANs; see Figure 50) and Broadband access (e.g. mmWave enables mobile and wireless Network speeds greater than 10G, which is critical for Service Providers).



Figure 50: Point-to-point 5G High Speed Wireless Link (mmWave)



Source: Deutsche Bank

That said, mmWave frequencies are currently utilized in limited use cases (e.g. high resolution video streaming indoors) because high frequencies are not yet reliable for outdoor use (due to propagation loss, absorption and blockage from objects like buildings, cars, etc).

GLW

We are positive on GLW's Optical Communications business given robust demand for IoT connectivity and 5G infrastructure builds. We note Cloud demand as a new growth driver for "Optical Connectivity" (versus for Optical fiber per-se) in FY17+.

We would note:

- Solid demand for Optical Fiber Connectivity solutions from Hyperscale Clouds (mid teens capex intensity), Fiber to the Home (mid single digit capex), and a capacity constrained environment.
- In our view, GLW's "moat" around their Optical Fiber Connectivity business is based on ~2 year of "Architectural Solutions" engagement with their top tier Cloud, Telco and Cable customers - which makes GLW's Optical business an "Architectural Play" versus transactional book and ship.
- GLW is among the "lowest cost" producers of Optical Fiber Connectivity solutions and arguably one of the "highest quality" suppliers.
- A next phase growth driver for GLW's Optical Connectivity business is in Enterprise in-building environments.
- We see a multi quarter buildout cycle in Telco and Cable Fiber to the Home, mainly in the US and in Western Europe (minimal APAC exposure, currently).

COMM

We anticipate continued strength in COMM's Fiber Connectivity and Wireless solutions businesses driven by capacity upgrades from US Carriers, India and EU Telcos Fiber to the Home and 5G infrastructure builds.

5G commercialization is only a few years away (full commercialization anticipated in 2020; pre-commercial trials in 2017) and as wireless operators begin to test, design and deploy 5G technologies, we anticipate a major opportunity for COMM to capture 5G infrastructure investments.

For example, to support the ongoing demand for bandwidth growth, COMM is seeing increased investments in Metro Cell, Small Cell, and Distributed



Antenna Systems (DAS). 5G wireless is likely to further accelerate that spend given the elevated operating requirements for increased speed, low latency and reliability.

We highlight:

- **Fiber-to-the-Home builds:** As residential and business bandwidth consumption continues to grow (OTT Video, 4K+ Video, multiscreen viewing, etc), many Service Providers are installing fiber deeper into their Networks to increase capacity. COMM is well positioned as a Next Generation Network technology provider (e.g. base station antenna technology, DAS, small cell, etc).
- **Data Center:** Hyper connectivity drives more demand for computing power and Network performance (e.g. fiber optics, cables, terminals and connectors, etc) in the Data Center, especially at large Enterprises and Hyperscale Clouds. COMM is well positioned with their intelligent Enterprise infrastructure solutions.
- COMM recently strengthened sales channels in India and China, positioning the company to capture anticipated Enterprise growth.
- **Increasing Telco investments in 5G wireless infrastructures:** 5G commercialization is only a few years away (expected in ~2020) and as wireless operators begin to test, design and deploy 5G technologies, we see a major opportunity for COMM to capture 5G infrastructure investments.
- **COMM's active participation with various organizations to build the vision and roadmap for the 5G future.** Examples include:
 - 1) The U.S. Advanced Wireless Industry Consortium includes 20 companies and organizations contributing resources for 4 city-scale 5G wireless research platforms. COMM is providing connectivity solutions such as antennas, RF cabling, cabinets, small cells, and fiber optics.
 - 2) COMM is a member of the Board of Governors of 5G Americas, the influential industry trade organization composed of Service Providers and Network equipment manufacturers.

CSCO

In our view, CSCO is likely gearing up to offer a wide range of IoT platforms and expand 5G Software and Cloud Services over the next few years. (Please refer to our note "A Three Year+ Top Line Growth View for CSCO: DB Ideas Piece" for a deep dive on use cases).

CSCO 5G Color: The transition of 4G LTE Networks to 5G is a "decade long" Theme in our view, with Telcos such as T, VZ, NTT, etc starting to engage in field trials of 5G services in 2017. 2018-19 is likely early inflection point years for 5G Network infrastructure rollouts.

CSCO's capabilities in 5G is likely to center around Software and Cloud Services platforms for Mobile Core, managing millions of Internet Connected Devices, Software based Routers, Automation Software, etc.

CSCO's virtual managed services software platform will leverage virtualization, automation, analytics and Cloud services such as CSCO iWAN and threat-based Security solutions. This announcement comes ahead of VZ's pre-commercial 5G trials scheduled to rollout in 11 US cities by mid-2017.



Case in point, at MWC 2017, CSCO highlighted a deal with VZ to build their 5G architecture for pre-commercial mobile network trials. Solutions include virtualized managed services, new business applications (virtual reality, augmented reality, etc), a Virtualized Packet Core (as part of its Ultra Service Platform), a 5G enabled Router and mobile backhaul infrastructure (to enable +1G network transfer speeds).

CSCO also announced a partnership with Reliance Jio, one of India’s largest mobile network operators, to expand Jio’s multi-Terabit capacity into India’s first all-IP converged network for broadband, mobile video, VoLTE and VoWiFi services to +19k cities across the country.

The All-IP network is a result of co-innovation between CSCO and Jio, supports the “Digital India” national agenda, and is primarily built on CSCO’s Open Network Architecture and Cloud Scale networking technologies.

We anticipate multiple CSCO products to be involved in the pre-5G buildout including MPLS, Edge and Core Routing, Nexus 9K and 3K Data Center Switching, Optical Transport, Security Applications, Automation Software, Mobile Packet Core, etc.

CSCO IoT Color: CSCO’s IoT platforms is likely to focus on industry vertical specific solutions for manufacturing, energy, retail, mining, smart connected cities, etc. We highlight CSCO’s IoT solution capabilities in Figure 51.

Figure 51: Examples of CSCO IoT System Capabilities

Solutions	Capabilities
Edge Cloud Computing	Software and hardware that extends IoT applications to the network edge, enabling data to be analyzed and managed.
Network Connectivity	Scalable, high-performance networking solutions including a broad portfolio of routing, switching, and wireless products – also available in software solutions that integrate into 3rd party devices.
Physical and Cybersecurity	Security solutions spanning from the cloud to the network edge that address the spectrum of threats (before, during, after). Includes OT specific products, the IoT network as a sensor and IoT physical security.
Data Analytics	Distributed network infrastructure components and IoT-specific APIs. Enables business-specific software analytics packages throughout the network architecture – from the cloud to the edge.
Management and Automation	Simplified management of large IoT networks - enables the convergence of OT data with the IT network.
Application Platform	Platform that allows scalable, cloud-based app development and deployment from cloud to edge. Also offers open APIs and app development environments for customers, partners, and third parties.

Source: Deutsche Bank and company filings

CSCO’s IoT Solutions Use Cases:

CSCO Industrial Initiatives: CSCO is a market leader in “Connected Factories” and “Connected Machines”.

Industrial companies are partnering with and using CSCO Networks to boost security, increase operational efficiency and productivity, improve overall equipment effectiveness, monitor machines and perform predictive maintenance. We highlight specific use cases below:



- GE and CSCO improved manufacturing productivity by deploying GE's "Brilliant Manufacturing Suite" with CSCO's IT Networking environment.
- GM and CSCO collaborated to create the "Zero Down Time" application which is currently deployed across hundreds of GM factory robots and prevents downtime across connected machines.
- SWK and CSCO increased manufacturing visibility and productivity by implementing systems built on CSCO's WiFi infrastructure and Ethernet.

CSCO IoT Smart City solutions enable city leaders to build more connected cities and address problems using intelligent Networking. According to the UN, ~54.5% of the world's population lives in urban areas today. By 2030, urban areas are projected to accommodate ~60% of the global population.

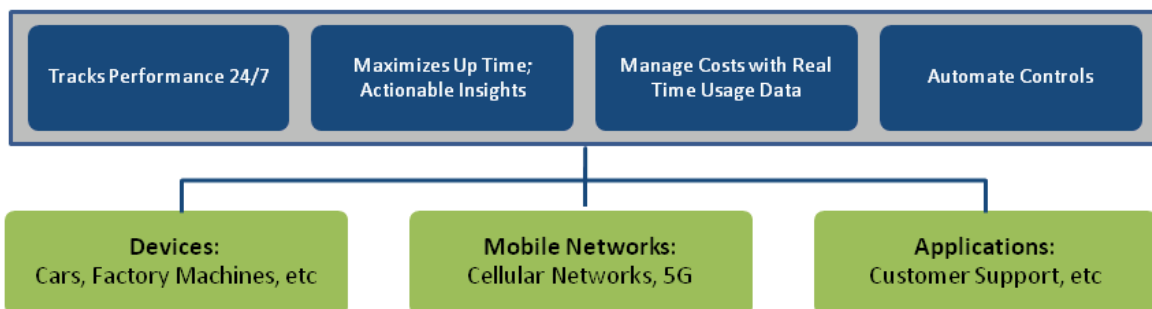
CSCO is building Next Generation Network infrastructures to support evolving cities. We highlight a few use cases below:

- New York City collaborated with CSCO to launch an interactive platform that delivers local information, services and offerings in real time to densely populated areas through WiFi.
- Kansas City is using CSCO's Smart + Connected Communities solutions to build underlying Network infrastructures to support Internet Connected Community Kiosks, Video Sensors, and Smart Lighting.
- Amsterdam has been working with CSCO and Philips on Network enabled LED street lighting.

Jasper IoT Cloud Color: In early 2016, CSCO acquired Jasper Technologies, a Cloud based platform that helps Enterprises launch, manage and monetize IoT services. Jasper enables the creation of new business models and incremental sources of revenues by converting products into connected services, leveraging widespread cellular Networks and IoT data collection (see Figure 52).

Some use case examples include: predictive maintenance for industrial manufacturing, usage-based insurance for connected cars, and asset tracking for commercial fleet management (see Figure 53 for example).

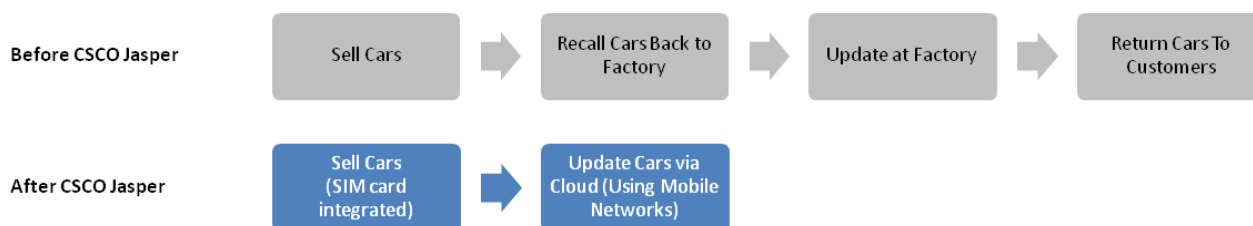
Figure 52: CSCO (Jasper) IoT Cloud Framework



Source: Deutsche Bank



Figure 53: CSCO (Jasper) IoT Example



Source: Deutsche Bank

We also highlight the strategic alliance between CSCO and Salesforce (CRM) to jointly develop and market Jasper and CRM's IoT Cloud. The collaboration connects IoT events with Salesforce and provides insight into Enterprise customers and drives product stickiness through engaging user experiences.

KEYS

KEYS is well positioned longer term due to supportive demand trends in 5G Wireless Testing (VZ, T, VOD, etc) and the company's focus on building strategic relationships with 5G industry leaders (25+ partnerships).

KEYS has seen acceleration in 5G investment timelines driven by wireless carriers planning to launch 5G trials as early as 2017. We highlight a few examples below:

- At MWC 2017, KEYS and Samsung announced a technology collaboration on 5G development and testing to support early operator trials. The partnership will initially focus on V5GTF (Verizon 5G Technology Forum) specs, and transition to future work in 3GPP NR.
- Verizon (VZ) has been aggressive in its 5G wireless trials with the CEO noting plans for a commercial 5G launch in 2017. Case in point, VZ initiated Next Gen fiber deployments in Boston, and plans to deploy 10 pre-commercial 5G pilots across the US (Q4 FY16 earnings call).

While 5G technology standards are yet to be defined (planned to be defined in late 2018/2019), VZ has been actively involved with testing new technologies and offering inputs to the 5G standards body.

- AT&T (T) is working with several technology firms (ERIC and INTC) to try and deploy 5G technologies faster. The company is accelerating over the air interoperability testing and is exploring mobility as well as fixed connections for its 5G roadmap.



- Vodafone Australia started lab trials of 5G technologies on its Network at the end of 2016. The company is undertaking technical trials, such as Multiple-Input Multiple-Output (MIMO) combinations with multi-user beam forming to improve performance in dense areas. Production trials for 5G are scheduled for 2018/19 (commercial deployment starting in 2020).
- SK Telecom is targeting an accelerated launch of 5G technologies, with pre commercial deployment expected in 2017. Pre deployment requires testing of key technologies such as WiGig (60GHz) interworking; virtualized RAN; Network slicing; and a distributed core Network. We could see healthy APAC testing spend over the next few years, especially as South Korea trials the 5G Network for the 2018 Winter Olympics, and Japan utilizes 5G for the upcoming 2020 Summer Olympics in Tokyo.
- KEYS expanded their commitment to Telecom Infra Project (TIP) and will co-chair a new sub-group focused on test automation within TIP's OpenCellular project group. The company will contribute open source code to enable testing and measurement for low cost OpenCellular base stations.

As the industry shifts to 5G and explores higher frequencies, the engineering challenges to deliver reliable service become increasingly complex. KEYS Solutions are compelling in 5G Testing due to its extensive experience with higher frequencies (KEYS already supports 6GHz+ frequencies in Commercial and Aerospace, Defense Solutions).

What's MIMO?

Multiple input, multiple output (MIMO) is a smart antenna technology in wireless communications where multiple antennas are used at the source (transmitter) and destination (receiver).

MIMO technology has a broad range of applications including digital television, wireless local area Networks, Metro Network, and mobile communications.



Investment Thesis

CSCO

Basis for our BUY rating: CSCO is our "Top Mega Cap to Own" for FY18+. CSCO is currently valued as a flattish growth hardware business, while Software and Subscription revenues are growing "Mid Teens", and could be meaningful at +40% of FY20E revenues [DB View]. We maintain conviction on our "rerating" call - from low to mid teens P/E, based on upward estimate revisions we anticipate in FY18+. CSCO is transitioning to a Systems, Software, and Cloud Services business.

Valuation: Our \$40 PT is derived using DCF – our primary valuation method: WACC of 11%; 3.5% perpetual growth rate; 5.5% risk-free rate; beta of 1.1; equity risk premium of 5.5%.

Our \$40 PT is a modest ~13x ex-cash P/E on DB FY18E – a discount to ~16-17x market multiple.

Risks: 1) Unanticipated shifts in enterprise and carrier IT spending patterns – influencing shifts in purchasing patterns around Cisco's networking portfolio; 2) Technology disruptions and share shifts driven by competitive product launches (JNPR, ANET, HPE, whitebox vendors, etc) or market transitions (e.g. SDN, network virtualization, Big Data networking, etc).

Figure 54: CSCO Valuation Snapshot based on DB FY17-19 Published Estimates

	Pro-forma			GAAP		
	FY17E	FY18E	FY19E	FY17E	FY18E	FY19E
Target Price	40	40	40	40	40	40
EPS - Diluted	\$2.37	\$2.59	\$2.75	\$1.92	\$2.26	\$2.42
P/E	16.9x	15.5x	14.5x	20.8x	17.7x	16.5x
Less: Interest Income/(Expense) per share	0.09	0.12	0.14	0.09	0.12	0.14
Less: Net Cash/(Debt) per share	\$7.33	\$7.33	\$7.33	\$7.33	\$7.33	\$7.33
EPS Ex-cash	\$2.28	\$2.47	\$2.62	\$1.83	\$2.14	\$2.29
Price Ex-cash	\$32.67	\$32.67	\$32.67	\$32.67	\$32.67	\$32.67
P/E Ex-cash	14.4x	13.2x	12.5x	17.9x	15.2x	14.3x

	EV Ratios on Target Price		
	FY17E	FY18E	FY19E
Target Price	40	40	40
Number of Shares	5,026	4,914	4,802
Market Capitalization	201,020	196,560	192,080
Add: Net Debt/(Cash)	(38,126)	(42,617)	(46,256)
Add: Non-controlling Interests	-	-	-
Less: Long-term Investments	-	-	-
Enterprise Value (EV)	162,894	153,943	145,824
EV/ Sales	3.4x	3.1x	2.8x
EV/ FCFF	10.8x	10.3x	9.9x
EV/ FCFE	7.8x	10.9x	10.5x
FCFE Yield	10.4%	7.2%	7.3%

Source: Deutsche Bank

Note: The Target price is for the NTM and the valuation multiples for the forecast years are implied based on NTM Target Price.



GLW

Basis for our BUY rating: GLW is our Large Cap Growth Idea on 2 multi-year growth drivers that are yet to be fully baked into consensus: 1) The Optical Super Cycle – driven by strength in Fiber to the Home and Cloud Optical; 2) Auto Glass. We highlight setup for continued moderate Displays pricing in FY17, plus a solid capital return story.

Valuation: Our \$30 PT is derived using DCF – our primary valuation method: WACC of 11%; 6% perpetual growth rate; 5.5% risk-free rate; beta of 1.1; equity risk premium of 5%.

Risks: 1) Customer concentration in Displays (mainly in non US markets); 2) FX headwinds (mainly USD/JPY); 3) Glass supply chain disruptions; 4) Steeper than anticipated price erosion in Glass substrates for Displays. We note competition in Displays mainly from Nippon Electric Glass and Asahi Glass, and from COMM in Datacenter Optical and Wireless.

Figure 55: GLW Valuation Snapshot based on DB FY17-19 Published Estimates

	Pro-forma			GAAP		
	FY17E	FY18E	FY19E	FY17E	FY18E	FY19E
Target Price	30.0	30.0	30.0	30.0	30.0	30.0
EPS - Diluted	\$1.66	\$1.85	\$2.05	\$1.32	\$1.50	\$1.66
P/E	18.1x	16.2x	14.7x	22.6x	20.0x	18.1x
Less: Interest Income/(Expense) per share	(\$0.13)	(\$0.15)	(\$0.16)	(\$0.13)	(\$0.15)	(\$0.16)
Less: Net Cash/(Debt) per share	1.30	\$1.30	\$1.30	\$1.30	\$1.30	\$1.30
EPS Ex-cash	\$1.79	\$2.01	\$2.21	\$1.46	\$1.65	\$1.83
Price Ex-cash	\$28.70	\$28.70	\$28.70	\$28.70	\$28.70	\$28.70
P/E Ex-cash	16.0x	14.3x	13.0x	19.7x	17.4x	15.7x

	EV Ratios on Target Price		
	FY17E	FY18E	FY19E
Target Price	30.0	30.0	30.0
Number of Shares	1,022	950	903
Market Capitalization	30,660	28,500	27,090
Add: Net Debt/(Cash)	242	1,696	1,970
Add: Non-controlling Interests	67	67	67
Less: Long-term Investments	481	622	768
Enterprise Value (EV)	30,488	29,641	28,359
EV/ Sales	3.0x	2.8x	2.6x
EV/ FCFF	19.1x	16.6x	15.8x
EV/ FCFE	20.7x	17.9x	17.0x
FCFE Yield	4.8%	5.8%	6.2%

Source: Deutsche Bank

Note: The Target price is for the NTM and the valuation multiples for the forecast years are implied based on NTM Target Price.



AKAM

Basis for our BUY rating: While we are cognizant of the near-term drag to headline EPS due to the higher opex burn and level of investment, our conviction has incrementally improved on the setup for “Mid Teens” Top Line Growth in FY18/19, based on revenues from new IT budget pools (Enterprise Security and Video, etc) and AKAM likely to get its fair share of wallet in Over the Top Video, as the Long Tail of Media increasingly delivers programming over the Internet.

Valuation: Our \$80 PT is derived using DCF – our primary valuation method: WACC of 12.5%; 6% perpetual growth rate; 5.5% risk-free rate; beta of 1.4; equity risk premium of 5%.

Risks: 1) Seasonal factors impacting Q/Q revenue and opex volatility; 2) Market share shifts in CDN and in Cloud Security; 3) Fluctuations in foreign exchange rates; 4) Unanticipated shifts in the growth rates of digital media, pricing for CDN services, and in e-commerce activity.

Figure 56: AKAM Valuation Snapshot based on DB FY17-19 Published Estimates

	Pro-forma			GAAP		
	FY17E	FY18E	FY19E	FY17E	FY18E	FY19E
Target Price	80.0	80.0	80.0	80.0	80.0	80.0
EPS - Diluted	\$2.81	\$3.27	\$3.80	\$1.92	\$2.37	\$2.89
P/E	28.5x	24.5x	21.0x	41.7x	33.8x	27.7x
Less: Interest Income/(Expense) per share	(0.07)	(0.07)	(0.06)	(0.07)	(0.07)	(0.06)
Less: Net Cash/(Debt) per share	\$5.57	\$5.57	\$5.57	\$5.57	\$5.57	\$5.57
EPS Ex-cash	\$2.88	\$3.33	\$3.87	\$1.99	\$2.43	\$2.95
Price Ex-cash	\$74.43	\$74.43	\$74.43	\$74.43	\$74.43	\$74.43
P/E Ex-cash	25.8x	22.3x	19.3x	37.4x	30.6x	25.3x
PEG (3Yr Topline (FY16-FY19E CAGR))	2.2x	1.9x	1.6x	3.1x	2.6x	2.1x
PEG Ex-Cash, (3Yr Topline (FY16-FY19E CAGR))	2.0x	1.7x	1.5x	2.8x	2.3x	1.9x

	EV Ratios on Target Price		
	FY17E	FY18E	FY19E
Target Price	80.0	80.0	80.0
Number of Shares	174,034	172,034	170,589
Market Capitalization	13,922,720	13,762,720	13,647,120
Add: Net Debt/(Cash)	(345,927)	(488,952)	(888,177)
Add: Non-controlling Interests	-	-	-
Less: Long-term Investments	779,311	779,311	779,311
Enterprise Value (EV)	12,797,482	12,494,457	11,979,632
EV/ Sales	5.0x	4.2x	3.5x
EV/ Adjusted EBITDA	12.5x	10.8x	9.0x
EV/ FCFE	28.2x	27.5x	23.2x
EV/ FCFE	29.1x	28.4x	23.8x
FCFE Yield	3.2%	3.2%	3.7%

Source: Deutsche Bank

Note: The Target price is for the NTM and the valuation multiples for the forecast years are implied based on NTM Target Price.



JNPR

Basis for our SELL rating: Fundamental caution on weak Product Revenue Growth, consensus expectations for Top Line and Earnings Growth sponsored mainly by lower quality Services Revenues, and downward revisions we anticipate to current elevated consensus earnings estimates.

Valuation: Our \$20 PT is derived using DCF – our primary valuation method: WACC of 11%; 4% perpetual growth rate; 5.5% risk-free rate; beta of 1.1; equity risk premium of 5%.

Risks: Upside risks: 1) Stronger-than-expected JNPR QFX Switching sales and carrier capex spending trends; 2) Share shifts versus JNPR's peers – CSCO, ANET, etc, based on market acceptance of new JNPR routers based on custom silicon; 3) Takeout optionality.

Figure 57: JNPR Valuation Snapshot based on DB FY17-19 Published Estimates

	Pro-forma			GAAP		
	FY17e	FY18e	FY19e	FY17e	FY18e	FY19e
Target Price	20.0	20.0	20.0	20.0	20.0	20.0
EPS - Diluted	\$1.95	\$1.95	\$2.01	\$1.37	\$1.36	\$1.40
P/E	10.3x	10.2x	9.9x	14.6x	14.7x	14.3x
Less: Interest Income/(Expense) per share	(0.17)	(0.17)	(0.16)	(0.17)	(0.17)	(0.16)
Less: Net Cash/(Debt) per share	\$1.17	\$1.17	\$1.17	\$1.17	\$1.17	\$1.17
EPS Ex-cash	\$2.12	\$2.12	\$2.17	\$1.54	\$1.52	\$1.56
Price Ex-cash	\$18.83	\$18.83	\$18.83	\$18.83	\$18.83	\$18.83
P/E Ex-cash	8.9x	8.9x	8.7x	12.2x	12.3x	12.0x

	EV Ratios on Target Price		
	FY17e	FY18e	FY19e
Target Price	20.0	20.0	20.0
Number of Shares	380,600	372,850	365,250
Market Capitalization	7,612,000	7,457,000	7,305,000
Add: Net Debt/(Cash)	(858,396)	(1,238,882)	(1,620,252)
Add: Non-controlling Interests	-	-	-
Less: Long-term Investments	1,071,800	1,071,800	1,071,800
Enterprise Value (EV)	5,681,804	5,146,318	4,612,948
EV/ Sales	1.1x	1.0x	0.9x
EV/ FCFF	6.2x	6.5x	5.8x
EV/ FCFE	6.8x	7.1x	6.3x
FCFE Yield	11.0%	9.7%	10.0%

Source: Deutsche Bank

Note: The Target price is for the NTM and the valuation multiples for the forecast years are implied based on NTM Target Price.



COMM

Basis for our BUY rating: We maintain our positive fundamental view on FY17+ Top Line and EPS growth drivers. Specifically, we highlight: 1) Outside Plant Fiber buildouts at T, etc; 2) Datacenter Fiber refresh at Cloud Portals and Global 2000 Enterprises; 3) 4G macro and small cell capacity upgrades in North America; 4) US AWS3 buildouts, etc; 5) Multiple expansion from ongoing deleveraging (Q4 net leverage was 3.7x, our glidepath calls for ~3x in FY17 trending to ~2x in FY18).

The stock is yet to price in the "Connectivity Premium" in our view; current levels reflect investors giving COMM a "Wireless Equipment" multiple at ~12x on DB FY18E - summing up our basis for our BUY rating.

Valuation: Our \$42 PT is derived using DCF – our primary valuation method: WACC of 10.5%; 6% perpetual growth rate; 5% risk-free rate; beta of 2.0; equity risk premium of 2.75%.

Risks: 1) Dependence on unpredictable carrier capex cycles and the global microenvironment (especially, EMEA and APAC); 2) Customer concentration risks at large Tier-1 US Telcos; 3) Changing technological trends and customer demand trends; 4) Negative impact from product mix impacting gross margins; 5) Share loss and design win loss in Fiber Connectivity solutions to GLW, etc.

Figure 58: COMM Valuation Snapshot based on DB FY17-19 Published Estimates

	Pro-forma			GAAP		
	FY17E	FY18E	FY19E	FY17E	FY18E	FY19E
Target Price	42.0	42.0	42.0	42.0	42.0	42.0
EPS - Diluted	\$2.96	\$3.21	\$3.52	\$1.69	\$2.15	\$2.63
P/E	14.2x	13.1x	11.9x	24.8x	19.5x	16.0x

	EV Ratios on Target Price		
	FY17E	FY18E	FY19E
Target Price	42.0	42.0	42.0
Number of Shares	198,701	200,235	202,212
Market Capitalization	8,345,442	8,409,870	8,492,904
Add: Net Debt/(Cash)	3,677,043	3,080,101	2,445,133
Add: Non-controlling Interests	-	-	-
Less: Long-term Investments	-	-	-
Enterprise Value (EV)	12,022,485	11,489,971	10,938,037
EV/Sales	2.3x	2.1x	1.9x
EV/FCFF	12.0x	11.5x	11.0x
EV/FCFE	21.1x	22.7x	21.3x
FCFE Yield	6.8%	6.0%	6.1%

Source: Deutsche Bank

Note: The Target price is for the NTM and the valuation multiples for the forecast years are implied based on NTM Target Price.



ANET

Basis for our BUY rating: Our Overweight thesis calls for a thematically improving fundamental story, based on 100G Switching refresh still early cycle at major Hyperscale Clouds, Enterprises, and Carriers. ~10% of the Datacenter Switching market is currently 100G speeds, in our view. 100G is the highest ASP: ~\$800-1000 per port versus ~\$100 per port for 10G (DB view; IHS baseline data).

A primary upside driver to FY17+ consensus expectations is ANET's Jericho Silicon Routers securing multi-year design wins at US Telcos (e.g. T) and Clouds (e.g. MSFT Azure, NFLX, etc) – summing the basis for our BUY rating. While the current product importation ban and the ongoing CSCO – ANET legal dispute remains a key overhang and risk factor, we conservatively model ANET's gross margin trajectory and ~20% Top Line CAGR for FY17-19.

Valuation: Our \$130 PT is derived using DCF – our primary valuation method: WACC of 11%; 5% perpetual growth rate; 5.5% risk-free rate; beta of 1.1; equity risk premium of 5%.

Risks: 1) Q/Q revenues and gross margin volatility; 2) share loss to peers (CSCO, JNPR, etc).

Figure 59: ANET Valuation Snapshot based on DB FY17-19 Published Estimates

	Pro-forma			GAAP		
	FY17e	FY18e	FY19e	FY17e	FY18e	FY19e
Target Price	130.0	130.0	130.0	130.0	130.0	130.0
EPS - Diluted	\$3.66	\$4.31	\$5.00	\$2.80	\$3.99	\$4.75
P/E	35.5x	30.2x	26.0x	46.5x	32.6x	27.4x
Less: Interest Income/(Expense) per share	\$0.02	\$0.02	\$0.03	\$0.02	\$0.02	\$0.03
Less: Net Cash/(Debt) per share	\$11.13	\$11.13	\$11.13	\$11.13	\$11.13	\$11.13
EPS Ex-cash	\$3.65	\$4.29	\$4.96	\$2.78	\$3.97	\$4.71
Price Ex-cash	\$118.87	\$118.87	\$118.87	\$118.87	\$118.87	\$118.87
P/E Ex-cash	32.6x	27.7x	23.9x	42.8x	30.0x	25.2x
PEG (3Yr Topline (FY16-FY19E CAGR))	1.6x	1.4x	1.2x	2.2x	1.5x	1.3x
PEG Ex-Cash, (3Yr Topline (FY16-FY19E CAGR))	1.5x	1.3x	1.1x	2.0x	1.4x	1.2x

	EV Ratios on Target Price		
	FY17e	FY18e	FY19e
Target Price	130.0	130.0	130.0
Number of Shares	76,034	78,484	80,724
Market Capitalization	9,884,420	10,202,920	10,494,120
Add: Net Debt/(Cash)	(1,172,944)	(1,546,623)	(1,998,043)
Add: Non-controlling Interests	-	-	-
Less: Long-term Investments	-	-	-
Enterprise Value (EV)	8,711,476	8,656,297	8,496,077
EV/ Sales	6.0x	5.0x	4.2x
EV/ FCFF	25.6x	27.8x	23.3x
EV/ FCFE	25.7x	27.9x	23.3x
FCFE Yield	3.4%	3.0%	3.5%

Source: Deutsche Bank

Note: The Target price is for the NTM and the valuation multiples for the forecast years are implied based on NTM Target Price.



CIEN

Basis for our BUY rating: CIEN is attractive at ~12x P/E DB FY18e on our high single digit Top Line growth view, suggesting modest multiple expansion on beat and raise execution - likely with US Fiber Home and Cloud buildouts, heading into 2H17+. The company has a solid order backlog in Optical upgrades at: 1) Hyperscale Clouds: e.g. GOOGL, FB, etc for Datacenter Interconnects and Subsea; 2) Metro and Fiber to the Home projects at major US Carriers: e.g. T, VZ, CTL, CMCSA, etc, India Infra rollouts, etc.

That said, a key risk factor is our latest industry checks suggest potential for Q/Q volatility at Hyperscale Cloud customers – given constantly shifting infrastructure upgrade priorities - that could impact intra quarter refresh timing of Optical upgrades.

Valuation: Our \$30 PT is derived using DCF – our primary valuation method: WACC of 11%; 3% perpetual growth rate; 5% risk-free rate; beta of 2.0; equity risk premium of 3%

Risks: 1) Meaningful level of convertible debt; 2) Technology and execution risks - especially around 100G; 3) Competition from INFN, CSCO, Huawei, etc – influencing ASPs and deal size shifts; and, 4) Unanticipated changes in capex spending patterns on optical networking equipment.

Figure 60: CIEN Valuation Snapshot based on DB FY17-19 Published Estimates

	Pro-forma			GAAP		
	FY17E	FY18E	FY19E	FY17E	FY18E	FY19E
Target Price	30.0	30.0	30.0	30	30	30
EPS - Diluted	\$1.74	\$2.03	\$2.15	\$0.94	\$1.18	\$1.53
P/E	17.2x	14.8x	14.0x	32.1x	25.4x	19.6x

	EV Ratios on Target Price		
	FY17E	FY18E	FY19E
Target Price	30.0	30.0	30.0
Number of Shares	168,586	154,830	158,430
Market Capitalization	5,057,580	4,644,900	4,752,900
Add: Net Debt/(Cash)	38,578	(167,247)	(425,554)
Add: Non-controlling Interests	-	-	-
Less: Long-term Investments	109,934	109,934	109,934
Enterprise Value (EV)	4,986,224	4,367,719	4,217,412
EV/ Sales	1.8x	1.4x	1.3x
EV/ FCFF	15.2x	13.9x	12.7x
EV/ FCFE	-125.9x	15.6x	14.2x
FCFE Yield	-0.8%	6.0%	6.2%

Source: Deutsche Bank
Note: The Target price is for the NTM and the valuation multiples for the forecast years are implied based on NTM Target Price.



ACIA

Basis for our BUY rating: We maintain our longer-term positive outlook and our BUY rating on ACIA - a disruptive secular growth story that is capturing the most economic profit in Optical sub-systems.

We note a directional mix shift to higher volume and higher spending intensity customers – in particular, to Cloud customers: GOOGL, FB, AMZN, etc and to Datacenter Switching vendors: CSCO, ANET, etc. Further, ACIA noting increased demand for 100G+ Digital Optical modules (augmented by a FY17+ ramp for 100G+ Analog Optical modules) is indicative of a meaningful multi-year runway for ACIA's portfolio at major Networking Vendors, Cloud Providers and Service Providers (case in point: FB 400G Optical Opportunity; DB View).

Valuation: Our \$100 PT is derived using DCF – our primary valuation method: WACC of 11.5%; 5.5% perpetual growth rate; 4.5% risk-free rate; beta of 1.4; equity risk premium of 5%.

Risks: 1) Customer Concentration: ACIA is dependent on a small number of large customers which may adversely impact its financial performance; 2) Key Customer Risk: ZTE is ACIA's biggest customer and there is uncertainty looming around future business from ZTE owing to regulatory concerns. Any regulatory hurdle poses significant risk to ACIA's financial performance; 3) Supplier Concentration; 4) Cyclical End-Markets: The end-market for ACIA's product is highly cyclical and any delay in adoption of latest technologies would mean volatility in Q/Q ordering patterns for ACIA's modules and chips.

Figure 61: ACIA Valuation Snapshot based on DB FY17-19 Published Estimates

	Pro-forma			GAAP		
	FY17E	FY18E	FY19E	FY17E	FY18E	FY19E
Target Price	\$100.0	\$100.0	\$100.0	\$100.0	\$100.0	\$100.0
EPS - Diluted	\$3.36	\$3.95	\$4.40	\$2.98	\$3.58	\$4.09
P/E	29.8x	25.3x	22.7x	33.6x	27.9x	24.4x
Less: Interest Income/(Expense) per share	0.01	0.01	0.01	0.01	0.01	0.01
Less: Net Cash/(Debt) per share	\$7.44	\$7.44	\$7.44	\$7.44	\$7.44	\$7.44
EPS Ex-cash	\$3.35	\$3.94	\$4.39	\$2.97	\$3.57	\$4.08
Price Ex-cash	\$92.56	\$92.56	\$92.56	\$92.56	\$92.56	\$92.56
P/E Ex-cash	27.6x	23.5x	21.1x	31.2x	25.9x	22.7x
PEG (3Yr Topline (FY16-FY19E CAGR))	1.2x	1.0x	0.9x	1.4x	1.1x	1.0x
PEG Ex-Cash, (3Yr Topline (FY16-FY19E CAGR))	1.1x	1.0x	0.9x	1.3x	1.1x	0.9x

	EV Ratios on Target Price		
	FY17E	FY18E	FY19E
Target Price	\$100.0	\$100.0	\$100.0
Number of Shares	42,897	44,497	46,097
Market Capitalization	4,289,700	4,449,700	4,609,700
Add: Net Debt/(Cash)	(452,608)	(613,603)	(802,521)
Add: Non-controlling Interests	-	-	-
Less: Long-term Investments	-	-	-
Enterprise Value (EV)	3,837,092	3,836,097	3,807,179
EV/ Sales	6.4x	5.1x	4.1x
EV/ Adjusted EBITDA	21.9x	17.7x	15.0x
EV/ FCFF	27.4x	24.1x	20.6x
EV/ FCFE	27.4x	24.1x	20.6x
FCFE Yield	3.3%	3.6%	4.0%

Source: Deutsche Bank

Note: The Target price is for the NTM and the valuation multiples for the forecast years are implied based on NTM Target Price.



INFN

Basis for our BUY rating: We are encouraged by INFN's sales execution: new 100G+ Optical Networking design wins at Cloud Datacenters, Metro and Backbone Service Providers. Optical Networking is a "solid" theme this year, with 100G+ Cloud Optical Spending seeing mid double digit growth; Metro Optical growing low teens. INFN has a compelling PIC based Optical portfolio; several new platforms and refreshed Optical Transport products in "sales execution" mode; sufficiently differentiated versus legacy peers – summing up the basis for our BUY rating.

Valuation: Our \$12 PT is derived using DCF – our primary valuation method: WACC of 12.5%; 6% perpetual growth rate; 5.5% risk-free rate; beta of 1.4; equity risk premium of 5%.

Risks: 1) Market share shifts: The long haul optical market is highly competitive with CIEN, CSCO, Coriant, Huawei, etc participating in carrier RFPs. New product introductions or adverse changes in INFN's customer relationships could negatively impact INFN's market share position; 2) Supplier concentration: INFN sources key optical components from a limited set of suppliers. Any supply chain delays could adversely impact INFN's financial results; 3) Slowdown in optical long haul, metro or datacenter interconnect networks could result in weaker than expected Q/Q financial performance from INFN and also a slowdown in the Y/Y growth rate outlook; 4) Weak macroeconomic conditions could cause long periods of delay or structural declines in demand for optical networking products.

Figure 62: INFN Valuation Snapshot based on DB FY17-19 Published Estimates

	Pro-forma			GAAP		
	FY17E	FY18E	FY19E	FY17E	FY18E	FY19E
Target Price	12.0	12.0	12.0	12.0	12.0	12.0
EPS - Diluted	(\$0.22)	\$0.04	\$0.25	(\$0.77)	(\$0.48)	(\$0.24)
P/E	-53.7x	287.3x	48.3x	NM	NM	NM
Less: Interest Income/(Expense) per share	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)
Less: Net Cash/(Debt) per share	\$1.24	\$1.24	\$1.24	\$1.24	\$1.24	\$1.24
EPS Ex-cash	(\$0.15)	\$0.12	\$0.33	(\$0.70)	(\$0.40)	(\$0.16)
Price Ex-cash	\$10.76	\$10.76	\$10.76	\$10.76	\$10.76	\$10.76
P/E Ex-cash	NM	90.0x	33.0x	NM	NM	NM

	EV Ratios on Target Price		
	FY17E	FY18E	FY19E
Target Price	12.0	12.0	12.0
Number of Shares	145,270	146,070	146,870
Market Capitalization	1,743,240	1,752,840	1,762,440
Add: Net Debt/(Cash)	(151,113)	(130,225)	(139,004)
Add: Non-controlling Interests	-	-	-
Less: Long-term Investments	40,779	40,779	40,779
Enterprise Value (EV)	1,551,348	1,581,836	1,582,657
EV/ Sales	1.8x	1.6x	1.4x
EV/ FCFF	76.3x	77.9x	35.7x
EV/ FCFE	208.2x	200.7x	49.5x
FCFE Yield	0.4%	0.4%	1.8%

Source: Deutsche Bank
Note: The Target price is for the NTM and the valuation multiples for the forecast years are implied based on NTM Target Price.



KEYS

Investment Thesis omitted. KEYS is currently on our restricted list as DB is acting as a sell side advisor on the KEYS and XXIA transaction.



We thank Abhishek Agarwal from Evalueserve for his contribution to this FITT report.



Glossary

16-QAM	Quadrature Amplitude Modulation
3GPP	3rd Generation Partnership Project
5G	Fifth Generation Wireless Technology
AAA	Analytics, Artificial Intelligence, Automation
ACO	Analog Coherent Optical
AI	Artificial Intelligence
ASIC	Application Specific Integrated Circuit
CFP	C Form-factor Pluggable
CFP2	Next Gen C Form-factor Pluggable
CMOS	Complementary Metal Oxide Semiconductor
DCI	Data Center Interconnect
DCO	Digital Coherent Optical
DDoS	Distributed Denial of Service
DSP	Digital Signal Processor
DWDM	Dense Wavelength Division Multiplexing
FTTH	Fiber-to-the-home
FWA	Fixed Wireless Access
IoT	Internet of Things
MIMO	Multiple Input Multiple Output
mmWave	Millimeter Wave
NFV	Network Function Virtualization
NR	New Radio
OFDM	Orthogonal Frequency Division Multiplexing
PIC	Photonic Integrated Circuit
QSFP	Quad Small Form-factor Pluggable
SDN	Software Defined Networking
WLAN	Wireless Local Area Network



Appendix 1

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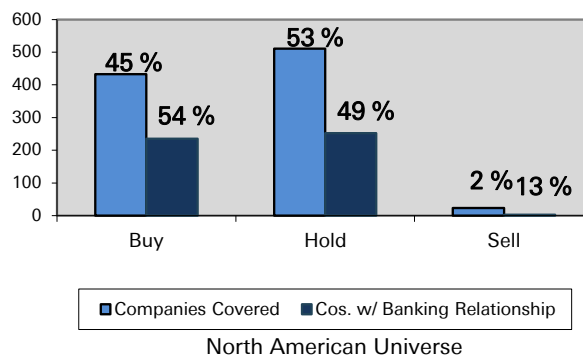
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