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Data collection and comparative analysis provide the bedrock for informed decision making. In this vein, “Business Broadband: Assessing the case for Reregulation” written by Visiting Senior Policy Scholar Anna-Maria Kovacs provides a detailed analysis of the financial performance of firms competing in the wireline access market for business customers in the United States.

Relying on publicly available data, the paper offers a comparison of various competitors including traditional incumbent local exchange carriers (ILECS), other competitive local exchange carriers (CLECS) and multi-system cable operators (MSOs). The results indicate considerable financial success of both CLECs and MSOs relative to ILECs in the domestic market. The paper also offers an international comparison, examining the financial performance of BT and its various competitors in the UK business market. The data reveal that in the more comprehensively regulated UK market the incumbent BT enjoys relatively stronger financial earnings than its UK-based competitors, while the UK experiences lower investment intensity and broadband speeds, especially in rural areas, than does the United States.

Establishing a policy framework in which broadband providers compete vigorously and consumers enjoy the fruits of that competition is vitally important for 21st-century telecommunications policy. In that spirit, the Georgetown Center for Business and Public Policy is happy to contribute this paper to the ongoing discussion.

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Regulation in Financial Translation

Business Broadband: Assessing the Case for Reregulation

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Business Broadband: Assessing the Case for Reregulation

Executive Summary

The Federal Communications Commission (FCC) is conducting two proceedings to examine the U.S. special access market, which is part of the fixed-line business broadband market. Various competitive local exchange carriers (CLECs) allege that the incumbents (ILECs) have a competitive advantage due to their ubiquitous wireline networks. They seek regulation of rates, terms, and conditions. BT goes even further, recommending UK-style regulation for the U.S.

After reviewing the publicly-available financial results of the ILECs' various competitors, we find:

- Both the traditional U.S. CLECs and the cable companies who have entered the business broadband market are in good financial health and are generating higher free cash flow than the wireline segments of the largest ILECs. The CLECs and cable operators also have higher stock valuations, indicating that investors expect them to grow revenues and cash flow more rapidly.
- The ILECs' low cash flows reflect the continuously increasing cost of sustaining a ubiquitous network that is now serving roughly a third of the lines for which it was engineered.
- Traditional CLECs have focused on the business market exclusively and built out only in areas where high-density makes construction-cost relatively low and attainable-revenue relatively high. In other words, they build only where they can expect penetration levels high enough to ensure high free cash flow. The CLECs' metro fiber networks have brought them into or close to most buildings that house potential business broadband customers.
- Cable providers have addressed the business market from the other end, leveraging their nearly-ubiquitous and easily upgradeable networks to move up from their residential base into small and medium business and then enterprise. They are now among the top U.S. providers of Ethernet ports.
- The data provided publicly by U.S. CLECs and cable operators confirms the few facts that have so far emerged from the FCC's special access data collection, i.e. that there is extensive facilities-based competition in the business broadband market.
- The enterprise market's migration from legacy TDM facilities to Ethernet over fiber or coax facilities provides the CLECs and cable operators with the opportunity to compete on equal terms with the ILECs in the fast-growing portion of the market, while decimating the legacy revenues of the ILECs.
- BT Group is also far more profitable than AT&T's and Verizon's Wireline operations and invests a smaller portion of its revenues in its networks. The regulatory solution BT Group is asking the FCC to pursue in the United States has not produced either the business or consumer benefits for UK customers that BT Group claims. BT earns extraordinarily high margins in the business market and dominates it outside central London. In the consumer and small business markets, Ofcom has serious concerns about broadband deployment. Ofcom is also concerned about BT's service quality, which affects not only its own retail customers but those of the competitors who rely on its network.

Introduction

The Federal Communications Commission (FCC) is conducting two proceedings to examine the U.S. special access market, which is part of the fixed-line business broadband market. One proceeding is looking at the level of competition in the market and the effectiveness of its pricing flexibility triggers. The second is an inquiry initiated by the Wireline Competition Bureau to examine some of the incumbent local exchange carriers' (ILECs') special access tariffs. Various competitive local exchange carriers (CLECs) allege that the ILECs have a competitive advantage due to their ubiquitous wireline networks. For example, Level3 argues that "they are the only game in town" because they reach every premise.¹ BT Americas argues that "last mile access in the U.S. is still controlled by the incumbents" and "their profit motives are largely unconstrained by competition or regulation."² BT recommends UK-style regulation for the U.S. Others seek regulation of rates, terms, and conditions.

As Professor John Mayo has pointed out, regulators should take note of the results of regulation to avoid being swayed by ideology.³ In that spirit, the CLECs' charges raise some obvious questions: Are the U.S. competitors who, like the ILECs, serve the business broadband market impaired? Do competitive providers in the highly regulated UK market fare better or worse than CLECs in the more lightly regulated U.S. market?

An examination of their financials shows that U.S. CLECs are in good financial health, are investing in fiber networks that bring them into or close to buildings that house potential customers, and along with the cable operators who have entered the enterprise market, are well positioned to take share from the ILECs. The UK market, in contrast, is still dominated by BT. Those competitors who rely on its network suffer from low margins and survive by keeping capital investment minimal.

As Figure 1 below shows, AT&T's and Verizon's wireline operations generate far less free cash flow (FCF) as a percentage of their revenues than do the U.S. CLECs and cable providers who publish financials publicly. AT&T and Verizon also generate far less FCF/revenue than BT Group (BT).

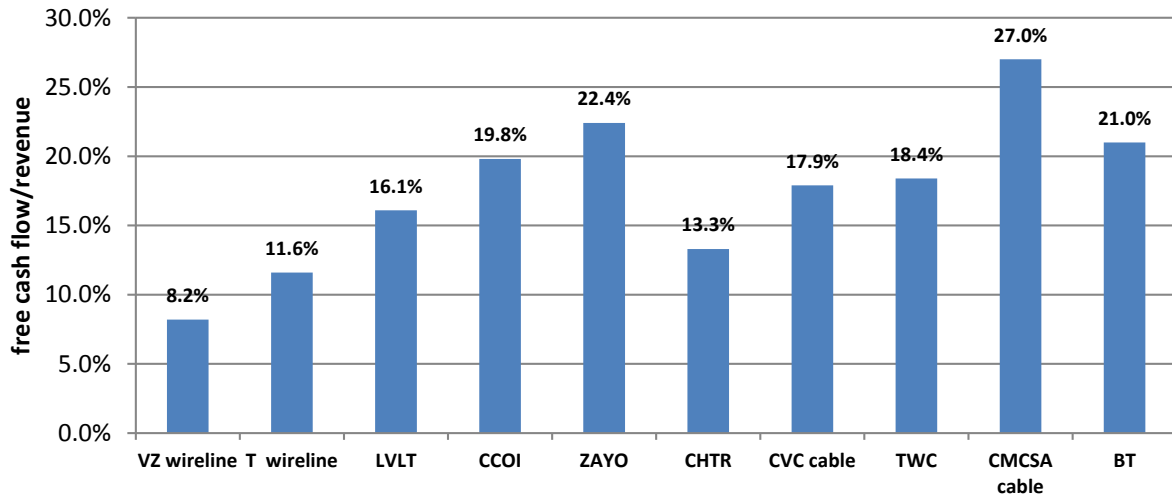
Figure 2 shows that investors value the U.S. CLECs' potential for rapid growth of revenues and cash flow far more than they value the ILECs' ubiquity or the cable operators' near-ubiquity. The CLECs' EV/EBITDA multiples (enterprise value to earnings before interest, taxes, depreciation and amortization) are roughly double those of AT&T and Verizon.

¹ Cited in Federal Communications Commission, *Order Initiating Investigation and Designating Issues for Investigation*, adopted October 16, 2015 in docket 15-247, p. 26.

² BT Americas, *Reply Comments of BT Americas on Behalf of Itself and Other BT Subsidiaries in the US*, March 9, 2015, p. 2.

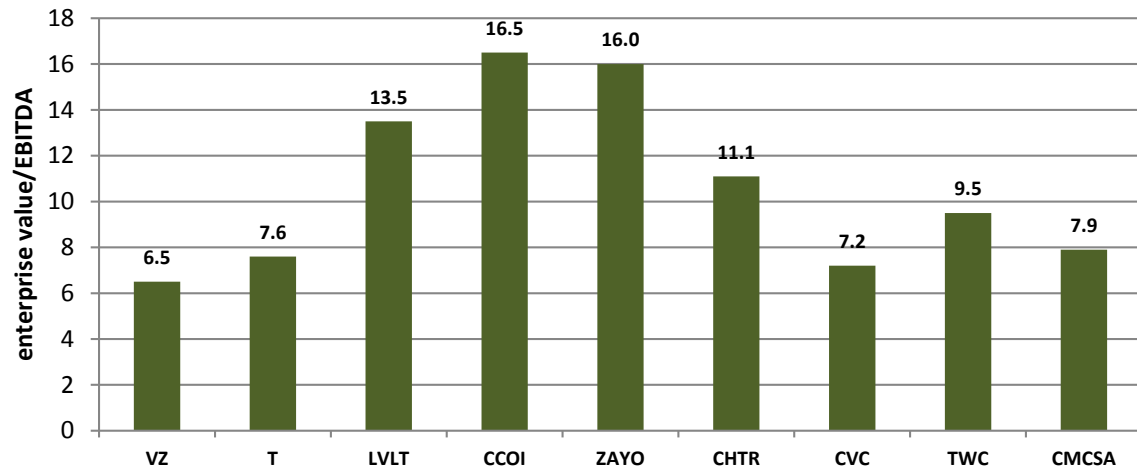
³ John W. Mayo, *Results-Based Regulation: 20th Century Lessons and 21st Century Opportunities*, Economic Policy Vignette, Georgetown Center for Business and Public Policy, September 2015.

Figure 1
Free cash flow margins of fixed network operations
 (average for FY 2013-2015)



Source: company reports. Note: LVL3 data is for 2014-2015.

Figure 2
Valuations of U.S. network providers:
 EV/EBITDA multiple based on CY 2015



Source: Thomson Reuters as of 3/7/16

From left to right, the companies and the abbreviations used for them in Figure 1 are Verizon (VZ) wireline, AT&T (T) wireline, Level3 (LVL3), Cogent (CCOI), Zayo (ZAYO), Charter (CHTR), Cablevision (CVC) cable, Time Warner Cable (TWC), Comcast (CMCSA) cable, BT Group (BT). The same abbreviations are used throughout this paper. In Figure 2, however, VZ, T, CVC, and CMCSA stand for the stocks of the consolidated parents, since the wireline segments of VZ and T and the cable segments of CVC and CMCSA do not trade separately.

Ubiquity is a disadvantage when penetration decreases

The basic argument made by the CLECs to support their request for increased regulation of special access is that the ILECs have a competitive advantage because their networks are ubiquitous. It is true, of course, that ILECs reach essentially every premise in their serving territories, because that has been and continues to be their regulatory obligation.⁴ It is not true, however, that this ubiquity provides the ILECs a competitive advantage against those with more specialized networks.

Far from being “the only game in town,” ILECs face increasing competition in all segments they serve. According to the FCC’s most recent *Local Competition Report*, by 2013 the ILECs’ wireline networks had lost 59% of the lines they’d had in 1999, the first year such a report was issued.⁵ Given the rate of loss over the prior years and reported results in 2014 and 2015, we estimate that by the end of 2015, the ILECs had lost 65% of the access lines they had at the peak. Indeed, by the end 2015, we estimate that wireline competitors had roughly the same number of lines as the ILECs.⁶ Competition against the ILECs arises from two sources: Cable MSOs (multiple system operators) who traditionally focused on the consumer market but are now successfully attacking the business market and CLECs who generally focus on the business market.⁷

Networks consist largely of fixed cost. The higher the level of penetration relative to the peak level for which the network is engineered, the lower the fixed cost per subscriber and the total cost per subscriber.⁸ Conversely, as Figure 3 shows, cost per remaining-subscriber increases as network penetration decreases and the effect becomes extreme at low penetration levels.⁹ In this model we calculate total network cost per subscriber as a percentage of cost at peak penetration, and show two curves, one based on an assumption of 33% variable cost and one based on an assumption of 50% variable cost.¹⁰

⁴ Not only are ILECs not allowed to refuse service, they are often forced to retain duplicate networks, maintaining older, less cost-efficient copper-based TDM technologies alongside fiber-based IP technologies.

⁵ Federal Communications Commission, *Local Telephone Competition: Status as of December 31, 2013*, Table 5, p. 16. Access lines include both switched and VOIP lines.

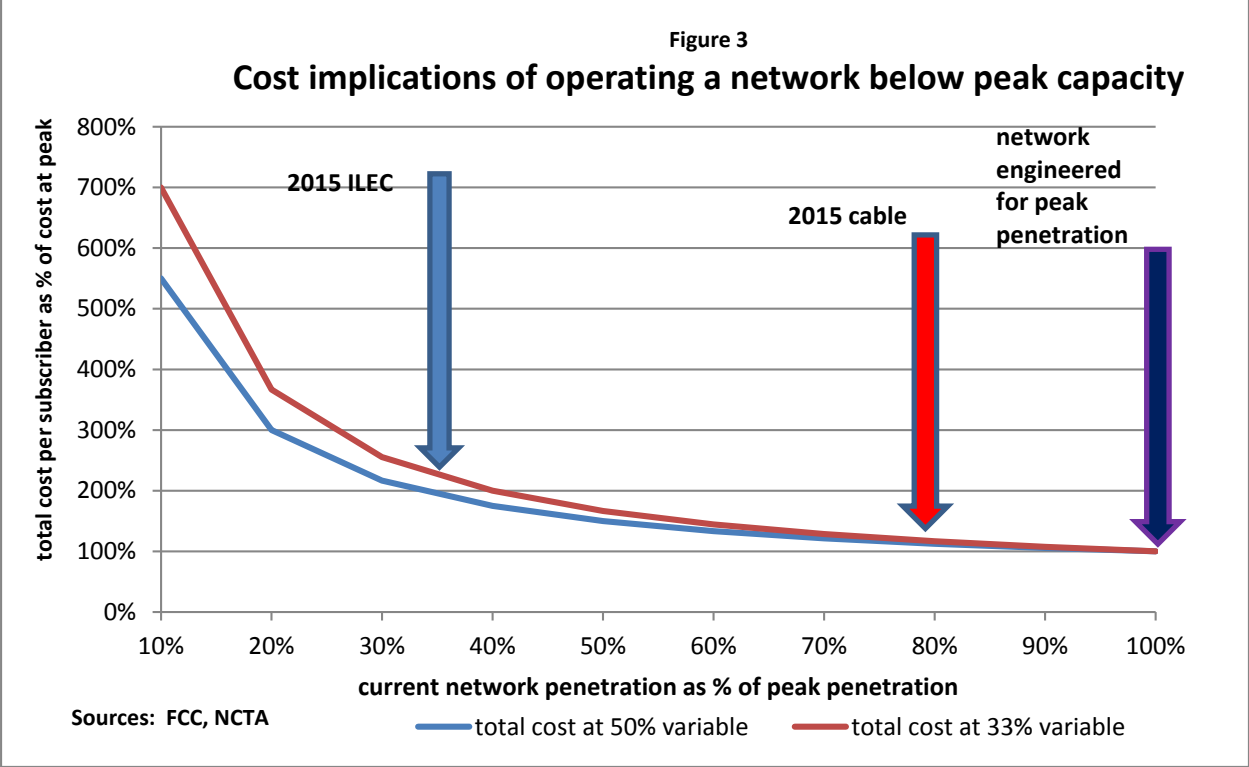
⁶ ILECs have also lost lines to cord-cutting, i.e. substitution of wireless for wired services. As a result, the percent of lines lost from the peak is greater than the percent of lines lost to wired competition.

⁷ Under business, we include all non-consumer customers.

⁸ Variable cost per subscriber is assumed to be the same at all levels of penetration, so the shape of the total cost curve is determined by the shape of the fixed-cost curve.

⁹ The curve is asymptotic at the low end. We cut off the curve at 10% at the low end to make the graph easy to view, but the effect continues, with cost per remaining-subscriber approaching infinity as penetration approaches 0%.

¹⁰ 50% variable cost is unrealistically high, but we include it to show that at the low penetration levels ILECs have now reached, even such a high level of variable cost is not enough to prevent catastrophic cost increases.



At the 2015 ILEC penetration level of 35% of peak, total network cost per remaining subscriber has essentially doubled and the networks passed the inflection point beyond which penetration losses result in catastrophic cost increases. By contrast, the cable industry, which also covers much of the U.S.--though generally not its most rural, lowest density portions--has retained roughly 80% of the core pay-TV subscribers it had at its peak in 2001.¹¹ Cable is still operating in the flat part of the cost curve and cost-per-subscriber increase due to penetration loss is minimal.

Thus, cable has the advantage of network penetration of its core service much closer to the peak for which its networks were engineered than the ILECs now have. Cable’s hybrid fiber-coax network also upgrades at relatively low incremental cost, which has enabled cable to add broadband, voice-over-IP, and even business services to its core video service.¹² To compensate for the loss of 20% of its pay-TV subs, cable has added 61% of U.S. broadband subscribers and roughly 24% of U.S. wireline voice

¹¹ In 2001, the cable industry had a peak 66.9 million pay-TV subscribers. It also had 7.3 million cable-modem subscribers, and 1.5 million voice subscribers. In 2015, it had 53 million pay-TV subscribers, 59 million Internet subscribers, and 30 million voice subscribers. NCTA website, citing SNL Kagan December 2015 statistics.

¹² Cable has added fiber to its network to bring its nodes closer to homes and businesses, but its coax has enough capacity that it does not need to go all the way to the premise to compete effectively against even fiber-to-the-premise. For example the upgrade to DOCSIS 3.1 is primarily a software upgrade.

subscribers. By contrast, to compensate for the loss of about 65% of their access subscribers, the ILECs have added 11% of the video market, and 39% of broadband subscribers.¹³

Bottom line: cable's network cost has barely risen due to video share loss and it has enjoyed an enormous revenue increase due to its rapidly increasing penetration of the broadband and voice markets. By contrast, the ILECs have seen their network costs rise sharply due to share loss in their core voice market, have had high incremental cost to upgrade their networks for broadband and video services, and have added relatively few broadband and video subscribers. For the ILECs, ubiquity is an increasingly costly requirement imposed by regulators.

Changing technology favors competitors in the business broadband market

Cable's software-driven hybrid-fiber-coax network is ideally suited for the Ethernet services that dominate the business broadband market. Cable is leveraging its network-penetration and technology advantages by expanding from the consumer market into the business market. Cable companies began addressing the business market only a few years ago but are gaining share rapidly in both the small business and high capacity markets. Business revenues constituted roughly 11% of the combined revenues of Cablevision, Charter, Comcast, and Time-Warner Cable in 2015. Their combined \$9.5 billion in business revenues were up 42% in just two years.¹⁴ MoffettNathanson Research projects that by 2019, cable business revenues will nearly double from their 2014 total.¹⁵ Even today, the cable networks have become leaders in the highly competitive Ethernet market. Vertical Systems Group's (VSG) *U.S. Carrier Ethernet Leaderboard* ranks Time Warner Cable, Comcast, and Cox as numbers 5, 6, and 7 in the U.S. Ethernet services market, which is the fastest growing segment of the U.S. data communications services market in the U.S., according to TIA.¹⁶ VSG noted: "The cable MSO segment remained the fastest growing overall in 2014...Already established in metro markets, leading cable companies are fortifying their Ethernet offerings to meet the needs of larger businesses with regional and nationwide networks."¹⁷ Comcast recently announced that it has successfully begun to address the enterprise space directly.

¹³ The ILECS have added 11.3 million video subscribers and 35.2 million broadband subscribers. Federal Communications Commission, *Sixteenth Report on the Status of Competition in the Market for the Delivery of Video Programming*, released April 2, 2015, table 7, p. 60. Leichtman Research Group, *About 645,000 Add Broadband in the Third Quarter of 2015*, November 17, 2015, p. 2

¹⁴ Data provided in the companies' respective 2013, 2014 and 2015 10Ks and q4'2015 investor relations releases. We do not include Cox Communications here because it is privately held and does not provide publicly available financials.

¹⁵ Craig Moffett, Cathy Yao, Jessica Moffett, *U.S. Cable and Telecommunications: It's Time to Take a Fresh Look at Broadband Market Share*, MoffettNathanson Research, December 9, 2015.

¹⁶ Vertical Systems Group, *2015 U.S. Carrier Ethernet LEADERBOARD*, February 25, 2016, and *TIA's 2015-2018 ICT Market Review and Forecast*, table 4-3.7 on p. 4-36.

¹⁷ Vertical Systems Group, *2014 U.S. Cable MSO Ethernet LEADERBOARD*, March 16, 2015.

The more traditional CLECs have focused on the business market exclusively and built out only in areas where high-density makes construction-cost relatively low and attainable-revenue relatively high. In other words, they build only where they can expect penetration levels high enough to ensure high free cash flow. Where costs are high, they rely on the ILECs' ubiquitous networks.¹⁸ In other words, where costs are low, CLECs build their own networks. Where costs are high, they lease from ILECs at prices that do not reflect those high costs. Level3, Zayo, Cogent, and BT Group, all of whom have publicly available financials, have such business models in the U.S.

While they differ considerably in scale, these CLECs have global fiber-based IP networks as well as metro networks that focus primarily on the enterprise, data-center, and cellsite-backhaul markets. At year-end 2015, Level3's global network spanned 200,000-plus route miles, connected 52,000 customers in 43,200 on-net buildings, and boasted a "Deep North America Metro Presence."¹⁹ Of those buildings, 78% were in the U.S. Indeed, in a 2011 investor presentation, Level3 noted that its U.S. network, which then included 27,000 metro route miles, was within 500 feet of 100,000 enterprise buildings. With the 2014 acquisition of tw telecom, Level3's U.S. network essentially doubled. At year-end 2015, it included 58,000 route miles,²⁰ and it is reasonable to assume that it is now close to about 200,000 buildings. In other words, its roughly 33,700²¹ U.S. buildings represent less than 20% of the buildings within 500 feet of its network. While Level3 added about 1600 buildings in North America in 2015 (out of a total of 2600 globally), that amounted to only 62% of the added buildings, while North American revenue is 81% of the company's total and all of Level3's revenue growth in 2015 was in North America.²² An obvious question is why Level3 is not linking to more buildings in the U.S.

The issue is not excessive cost of self-provisioning. In its 2015 10K, Level3 points out: "The fact that our metro networks have significant reach throughout major metropolitan areas means that we can make relatively short network extensions to reach customer locations that our network does not currently reach."²³ It explains: "Our high fiber count metropolitan networks allow us to extend our services directly to our customers' locations at low costs, because the availability of this network infrastructure does not require extensive multiplexing equipment to reach a customer location."²⁴ One can only conclude that Level3 finds special access rates even lower than its own low construction costs.

¹⁸ Where they lease under tariffs, CLECs are also able to take advantage of the fact that ILECs operate under tariffs that are based on average costs over wide geographic areas.

¹⁹ Level3 presentations at Barclays High Yield and Syndicated Loan Conference 2015, June 11, 2015, slides 4 and 6, and Level3 Fourth Quarter and Full Year 2015 Results, February 4, 2016, slide 14.

²⁰ Level3, *10K for 2015*, pp. 18.

²¹ Level3's presentation slides for the q4'2015 earnings call. Slide 14 shows a total of 43,200 on-net buildings globally, with 78% in North America.

²² These figures are pro-forma, assuming tw telecom was part of Level3 for both 2014 and 2015.

²³ Level3, *10K for 2015*, p. 7.

²⁴ Level3 *10k for 2015*, p. 18.

Special access also appears to provide more flexibility than some of Level3's other options. Level3's 2015 10K indicates that Level3 has a total of \$2.3 billion in right-of-way agreements and operating leases extending out in some cases to 2060. Of the \$2.3 billion, 19% are for 2016, another 26% are for 2017-2018, and 55% extend from 2019 to 2060. On the other hand, out of the cost-of-access services which include special access only 13% extend beyond 3 years. Out of a total of \$1.2 billion (including maintenance services), 48% of cost-of-access services are for 2016 and 39% are for 2017-2018. Level3's cost-of-access service contracts appear to commit it essentially for a 1-3 year period, while its right-of-way and lease contracts commit it for decades.²⁵

Other CLECs also have extensive networks. Zayo's network spanned 95,178 route miles that encompassed 7.4 million fiber miles at year-end 2015 and connected 6,700 customers in 19,341 buildings.²⁶ Cogent Communications' network at year-end 2015 spanned 56,079 intercity route miles, 28,158 metro fiber miles, connecting 2,251 buildings that included 45,473 on-net customer connections.²⁷ Cogent's connected buildings average 51 tenants of whom Cogent served an average of 14.5 at year-end 2015.²⁸ Birch Communications announced in a press release on November 30, 2015 that it had added 80,000 buildings in 2015, for a total of 400,000 buildings on its U.S. metro-fiber network, which spans 31,000 fiber route miles. Birch's CEO told *Fierce Telecom* that it is targeting 1 million buildings in 2016.²⁹

Zayo's year-end 2015 analyst presentation and call explain the long-term benefits that a CLEC gains by placing metro facilities. Zayo's CEO, Dan Caruso, first describes a \$100 million major fiber-to-the-tower (FTT) project in Atlanta, noting that while it is "speculative" in that not all of the capacity is instantly committed, he states that it is "an investment that will be earning returns off it for many years to come."³⁰ He then goes on to provide some examples of the way Zayo leverages such investments. One is a municipal government project that leverages a FTT buildout Zayo is currently building. Caruso explains that the customer is moving from a legacy service to Zayo's lit fiber, and the contract is "a greater-than-12-month pay-back, but a very profitable project because we're leveraging investment

²⁵ Level3 10K for 2015, pp. 49-50, footnote 16.

²⁶ Zayo Group Holdings Inc., *Earnings Call Presentation*, Fiscal Year 2016 Q2, slide 5.

²⁷ *Cogent Communications Reports Fourth Quarter and Full Year 2015 results and Increases Regular Quarterly Dividend on Common Stock*, February 25, 2016, p. 7. The configuration would differ in office buildings v. data centers.

²⁸ Cogent Communications Holdings Inc., *Earnings Call Preliminary Transcript*, February 25, 2016, Thomson Reuters, p. 11.

²⁹ Birch Communications press release dated November 30, 2015, and Sean Buckley, *Birch's Oddo: We'll expand our fiber network to 1M buildings via organic builds, partner agreements*, in *Fierce Telecom*, December 2, 2015. Birch uses a combination of fiber it lays itself and fiber it leases via long-term leases (IRUs). Birch is privately held and provides very limited information publicly, so we are not able to discuss their financials.

³⁰ Dan Caruso, Q2 2016 Zayo Group Holdings Inc., *Earnings Call Transcript*, Thomson Reuters, p. 5. All quotes in this paragraph cite this page. Note: Zayo's fiscal year (FY) ends in June, so the December 2015 quarter is its second quarter of FY 2016.

that's being made also for the fiber-to-the-tower bid." Another project is a data center and headquarters for a "content-type company" that has a payback in less than 12 months, "very quick because it's directly leveraging network that is largely in place." He cites one more project with a payback of less than 12 months as well as two more projects that have positive internal rates of return (IRRs) although the paybacks take more than 12 months. It is clear in context that these are just a sampling of the ways Zayo leverages its metro networks by building offshoots that require relatively low incremental investment, and helps explain why Zayo is willing to commit to a very high level of capital intensity, despite the company's youth and rather small size.

The data provided publicly by these CLECs confirms the few facts that have so far emerged from the FCC's special access data collection,³¹ i.e. that there is extensive facilities-based competition in the business broadband market. Woroch et al found that: "Competitors have deployed sunk facilities in virtually every census block accounting for virtually all special access demand."³² Their analysis indicates that "even if only a single competitor has deployed facilities to just one building in a far corner of a census block, that competitor would generally be able to extend those facilities to all or most other buildings that have demand for special access services in that census block, and thus compete for business at those other locations as well." NCTA cites Zarakas and Gately as showing that there are more census blocks with fiber from three or more CLECs than there are census blocks identified as having special access demand.³³

The CLECs' investment in their networks is paying off. Based on their share of Ethernet ports, BT Global Services is ranked number 2 in the world Ethernet market by VSG, with AT&T, Verizon, and Level3 ranked numbers 4, 5, and 6 globally.³⁴ In the U.S., Level3 is ranked number 2, behind AT&T and ahead of Verizon. Cogent and Zayo are listed as challengers.³⁵ Rick Malone of VSG noted: "U.S. Ethernet port growth was unprecedented in the first half of 2015 and easily surpassed prior estimates. This market seems to be defying the law of large numbers....Primary drivers for growth are massive migration from TDM to Ethernet services, robust demand for higher speed Ethernet private lines and rising

³¹ While the FCC normally aggregates and releases confidentially provided data in a way that makes it useful while preserving confidentiality, e.g. in its various competition reports, in this case the FCC has placed unusually tough restrictions that make the data essentially unusable by those without confidential access.

³² Glenn Woroch, Mark Israel, and Daniel Rubinfeld, *White Paper*, redacted version, submitted in docket 05-25 January 27, 2016, pp. 4-5. The paper notes that the average size of a census block which has special access demand is less than 0.15 square miles and 50% of such census blocks have areas less than 0.02 square miles.

³³ NCTA reply comments in docket 05-25, February 19, 2016, p. 15. We cite NCTA, whose counsel had confidential access, because the public version of the Zarakas and Gately declaration is too heavily redacted for direct use.

³⁴ Vertical Systems Group, *Mid-Year 2015 Global Provider Ethernet LEADERBOARD*, September 3, 2015.

³⁵ Vertical Systems Group, *2015 U.S. Carrier Ethernet LEADERBOARD*, February 25, 2016.

requirements for connectivity to public and private clouds.”³⁶ The U.S. Ethernet market grew 20% in 2015.³⁷

Even as the Ethernet-services market is growing rapidly, legacy services are declining sharply. Gartner Group estimates that enterprise spending over the 2014-2019 period on leased lines will decline by 18.6% annually so that leased lines will amount to only \$3 billion or 6% of enterprise spending by 2019. Legacy packet services will disappear by 2016, and even IP VPN will begin to decline by 2.3% annually. Spending on Ethernet services, on the other hand, is estimated to grow by 9.1% annually and reach \$18.6 billion by 2019.³⁸

As Danielle Young of the Gartner Group points out, enterprises are migrating to Ethernet services for better performance as well as better pricing. “Compared to broadband, T1 or T3 access, fiber-based Ethernet access is more reliable and agile,” she writes, and notes that “Ethernet can support higher bandwidths at lower cost.”³⁹

The migration from TDM to Ethernet over fiber favors the CLECs with their fiber networks. Ms. Young highlights that a key characteristic of this market is “Wide competition: Large carriers (AT&T, Sprint, Level 3, CenturyLink and Verizon) as well as pure-play providers (Comcast, Cogent Communications and Zayo Group) compete equally in the Ethernet services market.”⁴⁰

The result of a better cost structure and more competition is lower prices. While the prices of TDM-based services are essentially flat, Gartner Group expects the price of Ethernet access to fall by about 9% per year over the 2015 to 2018 period and the price of Ethernet WAN services by about 5% per year over that timeframe.⁴¹ Substitution of Ethernet for legacy leased lines makes it possible for an enterprise to increase bandwidth while cutting cost. For example, a 45 Mbps T-3 that costs \$1,400 to \$2,200 could be replaced by a 100 Mbps Ethernet that costs \$850 to \$1700. Savings are even greater at higher bandwidths: a 622 Mbps OC12 that costs \$15,000 to \$25,000 could be replaced by a 1 Gbps Ethernet that costs \$1,500 to \$5,200. Given the combination of savings with greater bandwidth and better performance, it is not surprising that Gartner Group recommends that its enterprise clients replace legacy TDM with Ethernet services.⁴²

³⁶ Vertical Systems Group, *Mid-Year 2015 U.S. Carrier Ethernet LEADERBOARD*, August 24, 2015.

³⁷ Vertical Systems Group, *2015 U.S. Carrier Ethernet LEADERBOARD*, February 25, 2016.

³⁸ Danielle Young, *Leverage Declining U.S. Telecom Prices to Control Enterprise IT Spending*, Gartner Group, July 1, 2015.

³⁹ Danielle Young, *U.S. Ethernet WAN Access Enables Digital Business Strategies*, Gartner Group, October 6, 2015.

⁴⁰ Danielle Young, *U.S. Ethernet WAN Access Enables Digital Business Strategies*, Gartner Group, October 6, 2015.

⁴¹ Danielle Young, *Leverage Declining U.S. Telecom Prices to Control Enterprise IT Spending*, Gartner Group, July 1, 2015.

⁴² Danielle Young, *U.S. Ethernet WAN Access Enables Digital Business Strategies*, Gartner Group, October 6, 2015. This article includes the prices cited in this paragraph. The monthly recurring revenue per unit cited by Zayo in its

Cogent confirmed in its year-end 2015 report that the price per megabit is falling sharply. For Cogent's product mix, price per megabit fell 38% between year-end 2013 and year-end 2015. Zayo's year-end 2015 pricing-trends release shows prices stable with falling volumes for all TDM services from T1 to OC48, and prices falling with rising volumes of all Ethernet services and the highest speed Wave products.⁴³

Given a highly competitive business-broadband environment with a migration from legacy services to lower priced Ethernet and Wave services, it is important to look at the financial health of the competitors and we do so below.

Methodology for assessing financial results

We compare AT&T's and Verizon's wireline results to those of the carriers who compete with them in various segments of wireline network services. We are, of course, limited to those companies which are publicly owned and provide their financials publicly.⁴⁴ In each case, we look at the bottom line—i.e., the free cash flow that the various companies have left after they have paid for their capex. For the sake of simplicity and consistency, for all the companies we are defining free cash flow (FCF) as earnings before interest, taxes, depreciation and amortization (EBITDA) minus capital expenditures (capex), even while recognizing that various companies have various definitions.⁴⁵ Because BT Group sets out its UK regulation as a model for U.S. regulation, we include an extensive discussion of BT's financial results versus that of its key UK competitors.

We are not only limited to the companies that provide public financial information, we are also limited by the information they do provide.⁴⁶ We show margins at the most granular level we can accurately determine for comparable operations.⁴⁷ In the case of AT&T and Verizon, information about revenues,

Pricing Trends Fiscal Year 2016 Q2 is generally consistent with these ranges, except for OC12. Zayo's monthly recurring revenue per unit for OC12 is \$5,900.

⁴³ Zayo Group Holdings Inc., *Pricing Trends Fiscal Year 2016 Q2*, December 2015. Zayo's Ethernet speeds range from 10 Mbps to over 1 Gbps, and Wave speeds range from 1 Gbps to 10 Gbps.

⁴⁴ Thus, we have no access to and are unable to discuss the financials of XO (which has not published financials since 2010), Birch, and many other traditional CLECs as well as Cox Cable.

⁴⁵ For example, EBITDA is also called operating cash flow (OCF) and free cash flow may be defined by some companies as the cash left after all cash expenses including interest and taxes. We use the same EBITDA definition for all the companies, namely revenue minus cash operating costs, before interest, taxes, depreciation and amortization. In each case, unless otherwise stated, our sources are each company's 10Ks, annual reports, or for BT its 20-F, as well as their investor relations releases, KPI schedules, and other supplementary and trending schedules.

⁴⁶ AT&T's results from the first half of 2015 are annualized because it no longer reports wireline separately. Unless otherwise stated, Level3's results for 2014 are pro-forma for the tw telecom acquisition, based on the supplementary data provided by Level 3 with its 2015 quarterly results.

⁴⁷ Because the economics of wireline operations are very different from those of either wireless or satellite operations, or content networks, we limit this discussion to the financials of the fixed network operations of these companies, excluding e.g. NBCU from the Comcast discussion, and the brief period during which AT&T has owned

EBITDA and capital expenses is available for their wireline operations at the segment level, making it possible to determine FCF for their wireline segments.⁴⁸ Comcast's and Cablevision's data is available at the level of their cable segments. In Comcast's case, that is separate from NBCU and corporate. In Cablevision's case that includes cable plus Lightpath, but not its content and other properties. On the other hand, Charter and Time Warner Cable break out revenues and EBITDA by segment, but not capex, thus their FCF can only be determined at the consolidated level.⁴⁹ Zayo provides some segment information, but not capex, so we use its consolidated numbers, as we do for Cogent. The UK companies present the additional complexities of different accounting standards as well as limited segment information, so we focus on their numbers at the consolidated level.⁵⁰

We highlight that segment results—even when all segments are added together—can be materially different from consolidated results. Level3 provides a useful example. In the case of Level3, geographic segment information about revenues, EBITDA and capex before corporate expenses is available for Level3 through 2015. It is also available on a pro-forma basis for tw telecom, with which it merged in October 2014. Because tw telecom operated only in North America, we can merge its results with those of Level3's North American segment in 2014 to determine the new Level3's North American segment margins in our discussion of that segment. In Figure 2 below, we show the free cash flow, EBITDA, and capex margins⁵¹ of Level3 averaged for 2014-2015. We show them on a consolidated basis, as a sum of all its segments (North America, EMEA, and Latin America), and for the North American segment. We include a full year 2014 of tw telecom on a pro-forma basis, since it is naturally included in the 2015 results.⁵² The difference is substantial between consolidated and segment results, because the consolidated figures include an average of \$840 million of expense per year and \$155 million of capex per year that are not allocated to the segments, on total revenue of \$8.2 billion per year.

DTV from the AT&T discussion. We also omit carriers, like Vodafone in the UK, whose fixed-line operations are a minor part of their results. We do discuss Sky, because it is an important competitor to BT, but note that it's a hybrid of fixed-network and satellite.

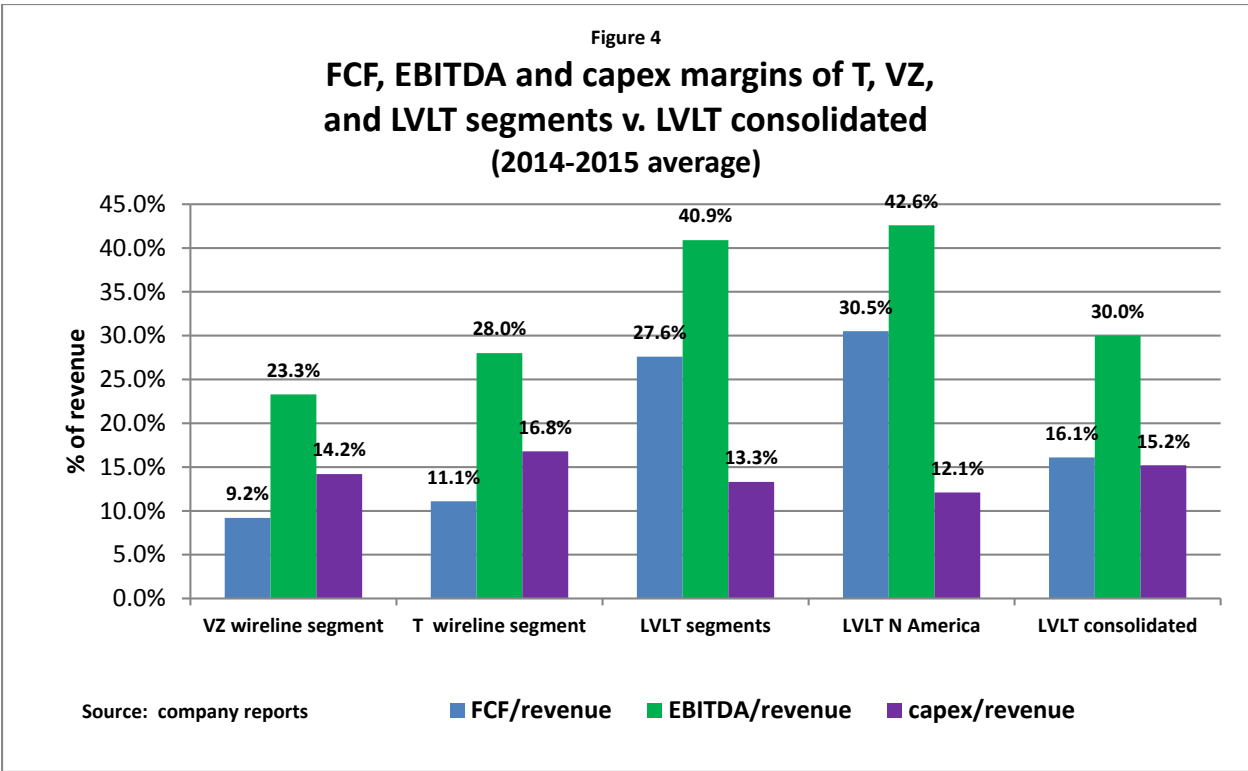
⁴⁸ For AT&T, that information is only available through the first half of 2015, when AT&T changed its segment reporting to reflect the DTV acquisition. Thus, for AT&T we annualize first-half 2015 financials in our calculations.

⁴⁹ For Comcast, for example, that means that the expenses at the corporate level as well as at NBCU are not included.

⁵⁰ The one exception is Sky, which breaks out revenues and EBITDA for UK/Ireland, its largest segment by far.

⁵¹ Capex margins are often called capital intensity. We use the terms interchangeably to mean capex/revenue.

⁵² Available in Level3's quarterly supplements, from q4'2014 to q4'2015.

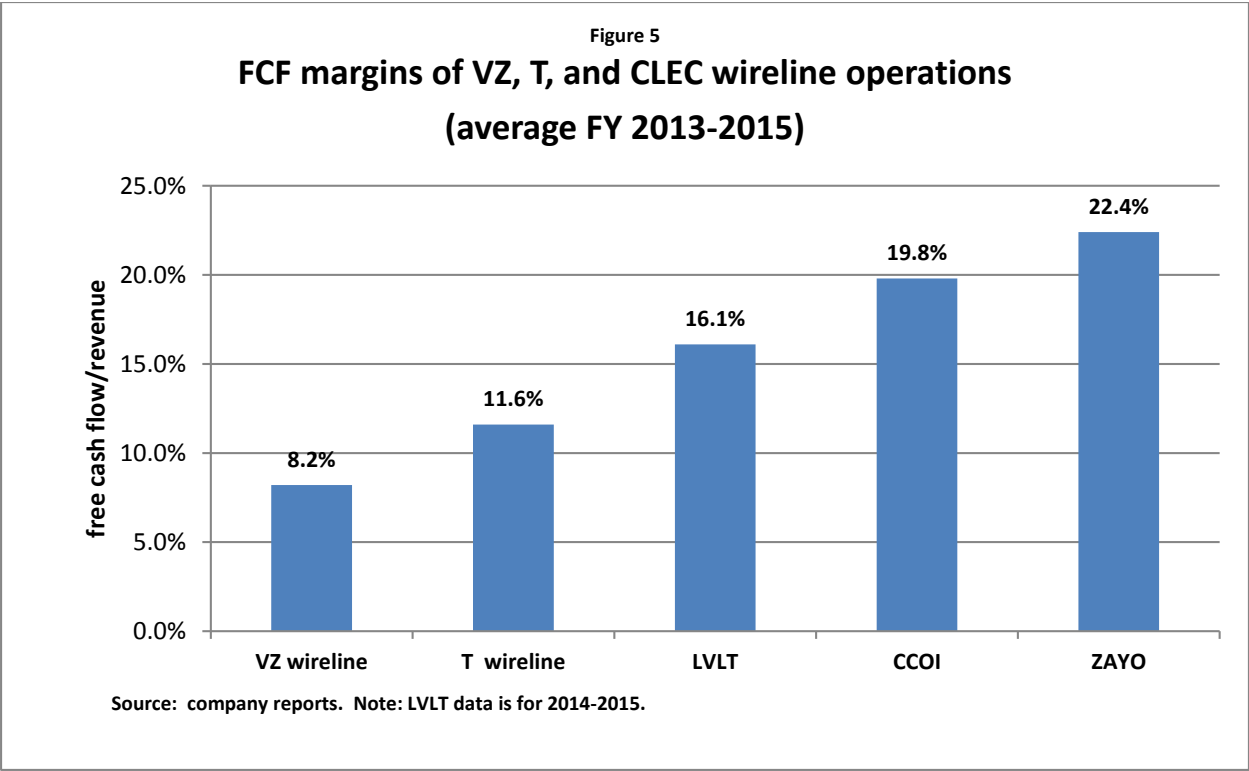


Bottom line: As the Level3 results in Figure 4 above show, using segment financials excludes recurring corporate expenses and thus usually results in higher margins than do consolidated results. The FCF, EBITDA, and capex margins shown for AT&T wireline and Verizon wireline as well as for Comcast cable and Cablevision cable throughout this paper are at the segment level and do not include recurring corporate expenses. All other companies are shown on a consolidated basis and do include recurring corporate expenses. Thus, the results of AT&T wireline, Verizon wireline, Comcast cable and Cablevision cable are overstated relative to those of the other companies in this report whose results are provided on a consolidated basis.⁵³ Put another way, low as AT&T and Verizon wireline’s EBITDA and FCF margins are, they would be even lower if they included their portion of corporate expenses.

The CLECs are far more profitable than AT&T’s and Verizon’s wireline segments

The free cash flow and EBITDA margins of AT&T’s and Verizon’s wireline operations are much lower than those of the publicly-held CLECs and cable MSOs as well as their UK counterpart, BT Group. As we noted earlier, in the U.S. competition comes from two sources: traditional CLECs who focus on the high-end of the business market, i.e. enterprise and wholesale, and cable companies who compete in both the consumer and business markets. Because their focus is so different, we discuss the two groups separately.

⁵³ Given that AT&T wireline, VZ wireline, and Level3 are all global carriers, arguably the best comparison is AT&T wireline and VZ wireline v. LVLT total segments, i.e., comparing the three global networks at the segment level, as we have done in Figure 2 above.



As Figure 5 shows, despite their greater scale, the wireline operations of Verizon and AT&T have much lower FCF margins than those of the CLECs.⁵⁴ Level3’s average revenues in 2014-2015⁵⁵ were \$8.2 billion or 14% of AT&T wireline’s⁵⁶ and 21% of Verizon wireline’s average revenues for 2013-2015. Despite its smaller scale, Level3’s consolidated FCF margin far exceeded theirs over the period. Level3’s FCF margin was 1.4 times that of AT&T and 2.0 times that of Verizon. The disparity becomes even more dramatic if one focuses on its North American operations. Pro-forma including tw telecom for the full year 2014, Level3’s North American EBITDA averaged margin was 42.6%, its FCF margin was 30.5%, and capex/revenue was 12.1%. These North American Level3 figures, like those of AT&T wireline and Verizon wireline are at the segment level, before each company’s corporate expenses. In its year-end 2015 guidance to analysts, Level3 stated that it expects its revenues to grow by 8%, EBITDA by 9%-12% and capex to remain at 15% of revenues.⁵⁷ If its projections prove to be accurate, Level3’s FCF margin will continue to expand, as it did in 2015.

Cogent Communications’ and Zayo’s FCF margins are even more remarkable than those of Level3. These CLECs, whose revenues are dwarfed by those of all the other companies we discuss in this paper, have

⁵⁴ They would, of course, be even lower if we were able to include their share of recurring corporate overhead.

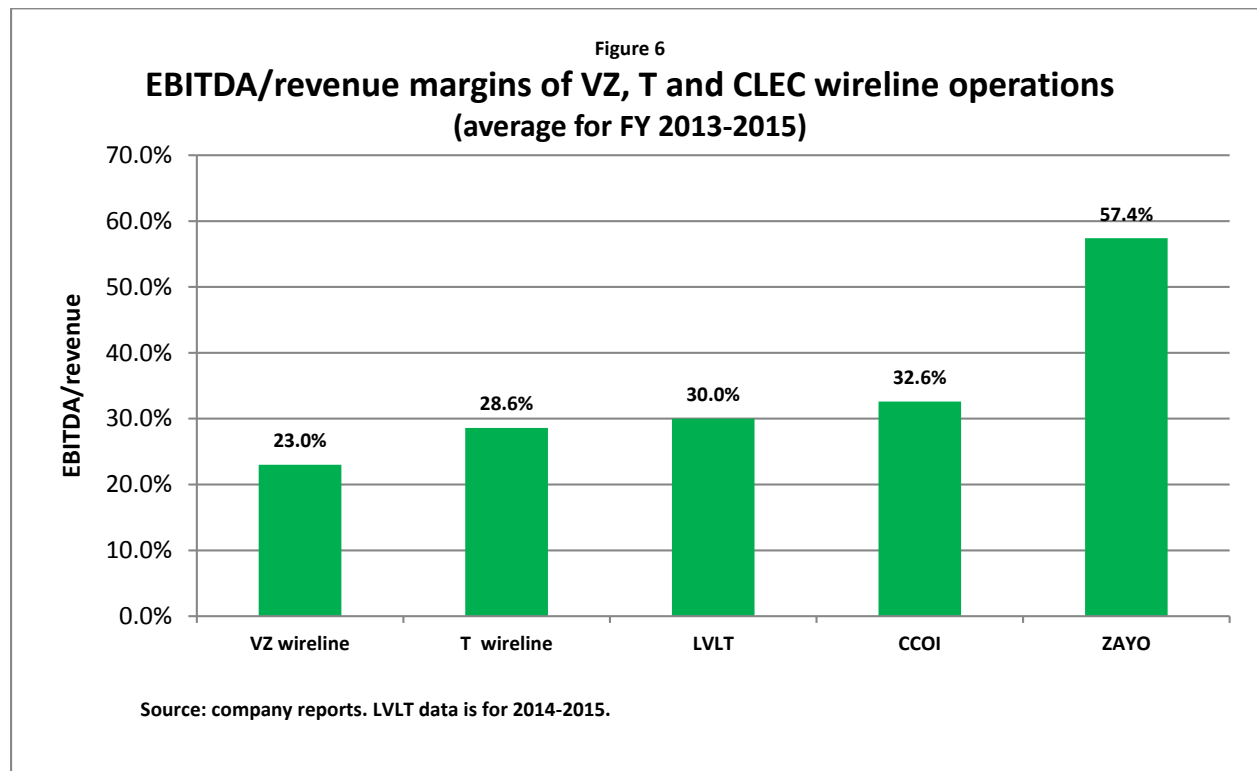
⁵⁵ For Level3, pro-forma information including tw telecom is only available for 2014-2015.

⁵⁶ The AT&T wireline, 2013-2015 include historical full years for 2013 and 2014 and first-half 2015 annualized, with data from the AT&T 8K dated 8/11/2015.

⁵⁷ Level3 q4’2015 *Earnings Presentation* slides, slide 12, and *Earnings Call Transcript*, February 4, 2016, Thomson Reuters, p. 7.

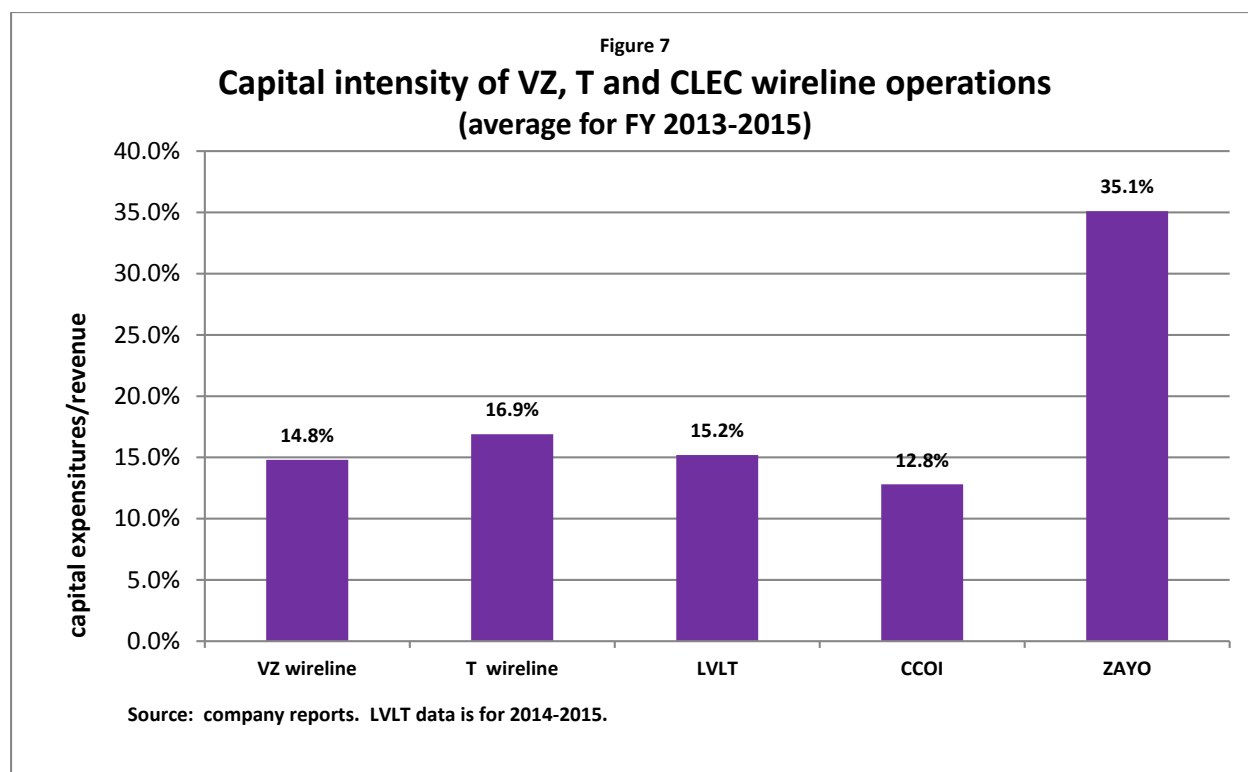
some of the highest FCF margins. Cogent’s FCF margin was 1.7 times that of AT&T wireline and 2.4 times that of Verizon wireline, even though its revenues amounted to 1% of theirs. Zayo’s FCF margin was 1.9 times that of AT&T and 2.7 times that of Verizon even though its revenues amounted to 2% and 4%, respectively, of their wireline operations. Cogent’s year-end guidance was for 10%-20% constant-dollar revenue growth and long-term EBITDA expansion of 200 basis points per year.⁵⁸ Zayo’s guidance in its December analyst call Q&A focused on long-term revenue growth of over 10% and a short term increase in capital investment followed by a long-term improvement in capital efficiency as the company leverages the networks it has built.⁵⁹ Thus, both are expecting long-term FCF improvement.

The ways the competitors arrive at much higher FCF margins differ, as Figures 6 and 7 show. All three CLECs enjoy higher EBITDA margins than AT&T’s and Verizon’s wireline operations. Level3 and Cogent also spent somewhat less than AT&T on capital expenditures as a percent of revenues. Despite their declining wireline revenues and the lowest EBITDA margins in the group, AT&T and Verizon continue to invest in their wireline networks at 16.9% and 14.8% of revenues, respectively. Zayo’s capex/revenue ratio was very high at 35.1%, but its 57.4% EBITDA/revenue margin allowed it to earn the highest FCF margin in the group. Far from being disadvantaged by their lack of ubiquity, CLECs are advantaged by being able to pick and choose the customers, geographies, and technologies that are the most cost-effective for them.



⁵⁸ Cogent, q4’2015 *Earnings Call Transcript*, February 25, 2016, Thomson Reuters, p. 6.

⁵⁹ Zayo, q2’FY2016 *Earnings Call Transcript*, February 12, 2016, Thomson Reuters, p. 9.



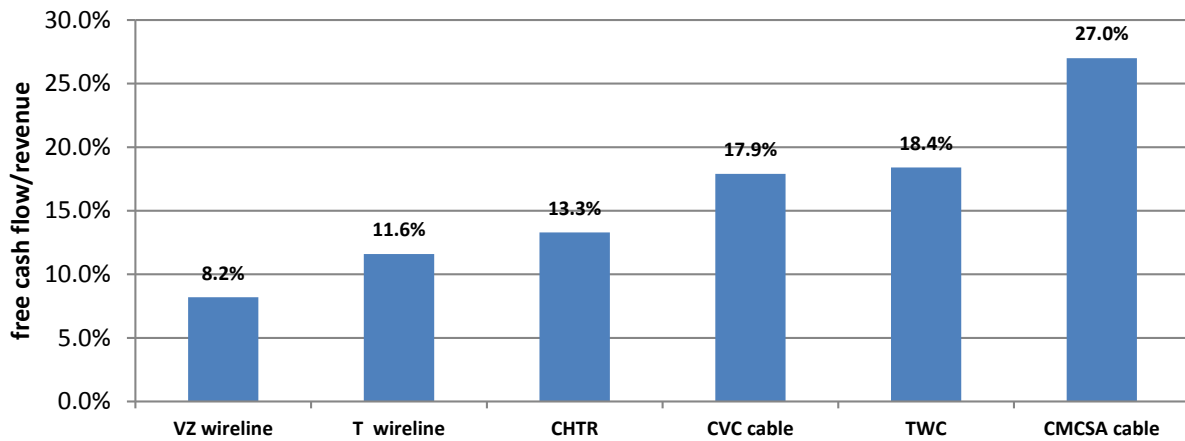
All three CLECs rely to varying degrees on the ILECs for special access as well as competing with them in the enterprise and wholesale markets. The CLECs' superior financial results, especially their free cash flow, which reflects both their profit margins and their capital investments, do not support an allegation that they are suffering competitive harm.

The cable operators are far more profitable than AT&T's and Verizon's wireline segments

The cable MSOs (multiple system operators) compete against the ILECs in both the consumer and business markets. As we discussed above, they have not only retained most of their video share but have captured the majority of the broadband market and are growing very rapidly in the voice market via VOIP (voice over IP). They are also becoming a formidable force in the business market, especially in its most rapidly growing portion, the provision of high-capacity Ethernet. For each of the cable operators we discuss, business revenues are showing the fastest growth. Both Comcast and Time Warner Cable grew their business revenues by more than 40% between year-end 2013 and year-end 2015. Time Warner Cable (TWC), Comcast (CMCSA), Cox, Charter (CHTR), and Cablevision's Lightpath (CVC) are all on Vertical Systems Group's *Ethernet Leaderboard*, with Time Warner Cable, Comcast, and Cox in the top tier.⁶⁰

⁶⁰ Vertical Systems Group, *2015 U.S. Carrier Ethernet LEADERBOARD*, February 25, 2016.

Figure 8
FCF margins of VZ and T wireline v. cable operators
(average FY 2013-2015)

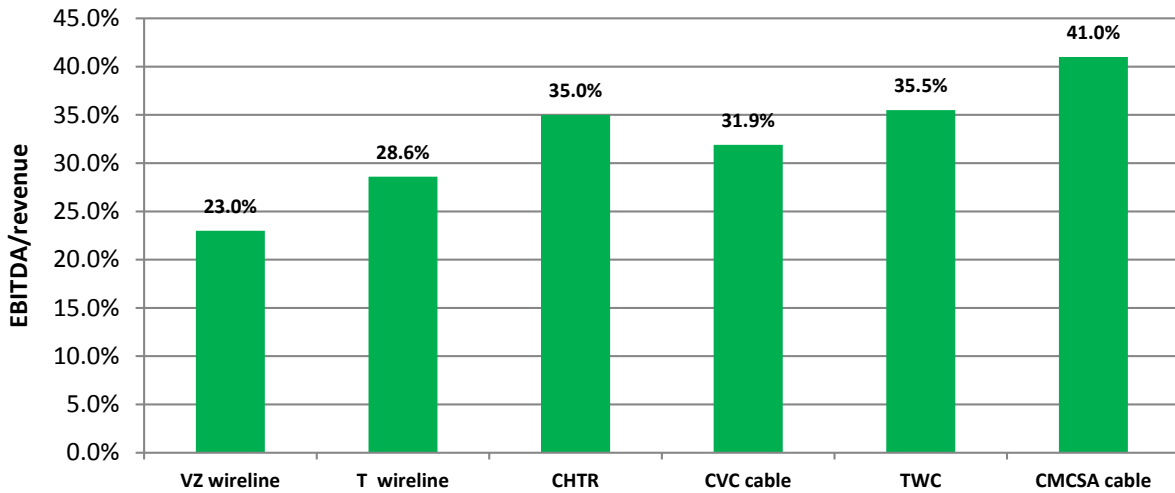


Source: company reports

Like the CLECs, the cable MSOs have far better financial results than the ILECs. As Figure 8 shows, the wireline segments of AT&T and Verizon have lower FCF margins than Charter, Cablevision, Time Warner Cable, and Comcast’s cable unit. Charter’s FCF margin is 1.1 times that of AT&T’s and 1.6 times that of Verizon’s wireline segments. Cablevision’s cable operation (including Lightpath) has a FCF margin is 1.5 times that of AT&T’s and 2.2 times that of Verizon’s segments. Time Warner Cable’s is 1.6 times that of AT&T’s and 2.2 times that of Verizon’s segments. Comcast cable’s FCF margin is 2.3 times that of AT&T’s and 3.3 times that of Verizon’s segments.

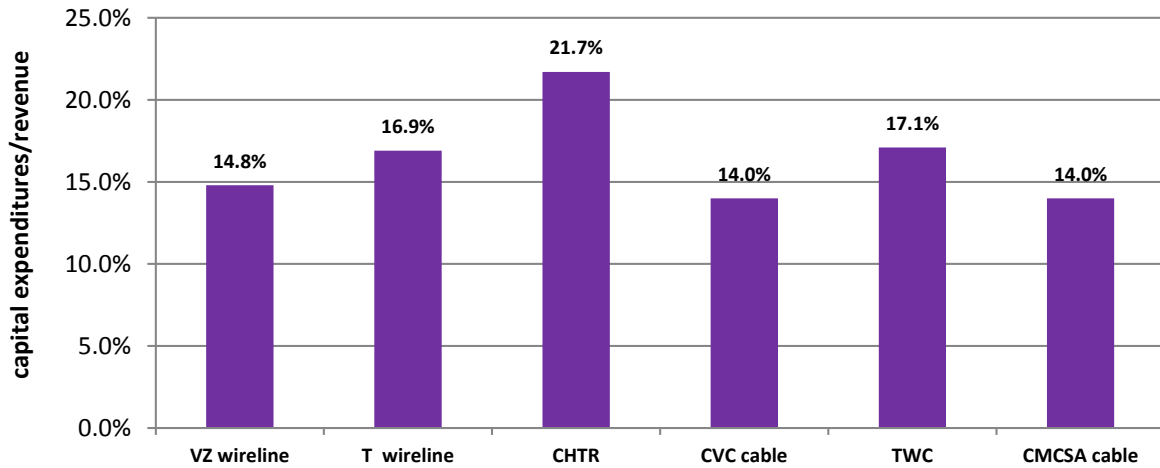
As Figures 9 and 10 show, the various cable MSOs arrive at the higher FCF margins in somewhat different ways. Comcast cable has the highest EBITDA margin and is tied with Cablevision cable for the lowest cable-MSO capex intensity. Cablevision cable has both the lowest cable-MSO capex intensity and the lowest cable-MSO EBITDA margin. Time Warner Cable has a very high EBITDA margin, but also the second-highest cable-MSO capex intensity.

Figure 9
EBITDA margins of VZ and T wireline v. cable operations
 (average for FY 2013-2015)



Source: company reports

Figure 10
Capital intensity of VZ and T wireline v. cable operations
 (average for FY 2013-2015)



Source: company reports

BT Group is far more profitable than AT&T's and Verizon's wireline operations as well as most of its fixed-line UK competitors

BT Group is the incumbent wireline provider in the U.K., just as AT&T and Verizon are the incumbent wireline providers in their service territories in the U.S. On January 29th, BT acquired mobile operator EE. The first results BT will report that include EE will be for the fourth quarter of FY 2016, ending March 31, 2016. The BT financials we discuss below are for the fiscal years 2013-2015, so our discussion of BT does not include EE, just as our discussion of AT&T and Verizon does not include their wireless operations.

Although the U.S. represents less than 5% of BT Group's revenues,⁶¹ BT has been very active in the FCC's special access docket via its BT Americas subsidiary. Indeed, BT has argued that Ofcom's regulation of BT would be a desirable model for U.S. regulation of ILECs.⁶² However, the financial results of its UK competitors, the high level of concentration in the UK business market, and the complaints about BT's broadband deployment and service quality contradict those claims, as does Ofcom's recently concluded review of BT.

As a fixed-line network operator that provides voice, broadband and video services, BT has essentially two parts. Openreach includes BT's last-mile access network, and by regulatory fiat it wholesales that network to competitors as well as to BT's other segments, via resale and unbundling. Openreach's internal and external customers then retail the network to end-users. Openreach is expected to deal with and price to BT's segments on an arms-length basis, i.e., on the same terms as it deals with BT's competitors. Of Openreach's FY 2015 revenues, 61% were provided to other BT segments and 39% were provided to the UK equivalent of CLECs. Over 90% of Openreach's revenues are provided at regulated prices.⁶³ Ofcom, the UK regulator, monitors and enforces Openreach's arms-length separation from the rest of BT and provides extensive oversight and price regulation.

The rest of BT (pre-EE) consists of Wholesale, Business, Consumer, Global Services, and "Other."⁶⁴ The segment called "Wholesale" provides services only to non-BT providers. Consumer provides fixed-line services to UK consumers, Business serves UK businesses, and Global Services serves the global enterprise market. "Other" includes Technology, Service & operations (TSO), as well as various corporate functions.

⁶¹ BT's FY 2014-2015 20F (the equivalent of a U.S. 10K) shows that Global Services constitute 38% of BT's revenues and the U.S. and Canada together constitute 13%, so that the U.S. must be less than 5% of BT's total.

⁶² BT Americas, *ex parte*, July 2, 2015 in dockets WC 05-25, GN 12-3, and RM-10593.

⁶³ BT press release dated February 1, 2016, announcing BT's new structure.

⁶⁴ As of the close of the EE acquisition, BT added a segment called EE, which will retail EE's wireless services to consumers. BT has also reorganized BT's Business and Global Services segments to some extent, e.g. EE's business division as well as UK-based enterprises are becoming part of BT Business. Our discussion covers BT prior to this acquisition and reorganization.

Using the segment information in BT's 20-F filing for 2015,⁶⁵ if one looks at the financials of those two parts of BT as if they were, indeed, separate entities, one finds that Openreach had an EBITDA margin of 52% and FCF margin of 31% on combined internal and external revenues of £5 billion in FY 2015. That approach ignores, of course, the fact that BT is a single entity which, after eliminating the £3.1 billion in transactions between Openreach and its siblings as well as another £0.5 billion in internal transactions, reports £17.9 billion in consolidated revenue.

BT also reports segment margins on that consolidated basis, providing each segment's external revenues, EBITDA, and capex. On the consolidated basis, Openreach shows an EBITDA margin of 133.5% and FCF margin of 79.7% on external revenues of £1.95 billion. Under either approach, the non-Openreach part of BT had an EBITDA margin of 23.1% and FCF margin of 14.9% on external revenues of £15.9 billion.

Neither approach is very satisfactory. Ignoring the need to eliminate duplicate revenues inflates BT's total revenues. On the other hand, an EBITDA margin over 100% implies that in the inter-segment elimination process, Openreach retained some of the profits associated with internal revenues while the revenues themselves are recognized in other BT segments. In our comparisons between BT and its U.S. and UK competitors below, we focus on the consolidated total figures for EBITDA, FCF, and capital intensity from BT's 20-F filings, because those appear the most reliable.

It is worth noting, however, that BT also files regulatory books, and Ofcom required BT to restate its FY 2015 results, because it disagreed with some of the allocations between wholesale and retail.⁶⁶ The consolidated total remained unchanged. On the restated 2015 regulatory books, Openreach showed an EBITDA margin of 55.1% on external plus internal revenues of £5.145 billion, and an EBITDA margin of 70.1% on its business connectivity market revenues of £1.298 billion. BT as a whole showed an EBITDA margin of 33.8% on revenues of £18 billion.⁶⁷

BT's results present interesting issues. While Ofcom is a vigilant regulator, Figures 11 and 12 show that BT Group is far more profitable than either the largest U.S. ILECs or the UK CLECs, except Virgin Media. BT's FCF margin is 1.8 times that of AT&T wireline and 2.6 times that of Verizon wireline. BT accomplishes that via a combination of a much higher EBITDA margin and a lower capex margin. In other words, BT Group is not only much more profitable than its U.S. counterparts, but invests a smaller portion of its revenues in its network.

⁶⁵ The 20-F is analogous to the U.S. 10K filing. BT's FY ends on March 31st.

⁶⁶ BT, *Revised Current Cost Financial Statements 2015 including Openreach Undertakings*.

⁶⁷ These equate to return on mean-capital-employed (MCE), the UK's equivalent to rate-of-return, of 10.4% for Openreach as a whole, 23.7% for business markets, and 18.1% for BT as a whole.

Figure 11
FCF, EBITDA, and capex margins of BT v. VZ and T wireline
 (FY 2013-2015)

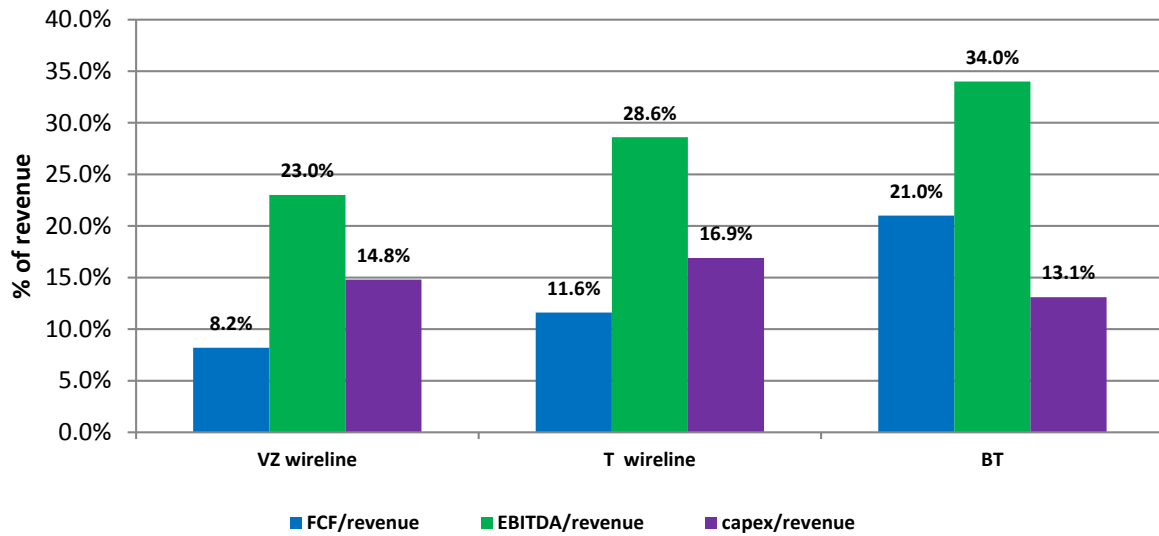
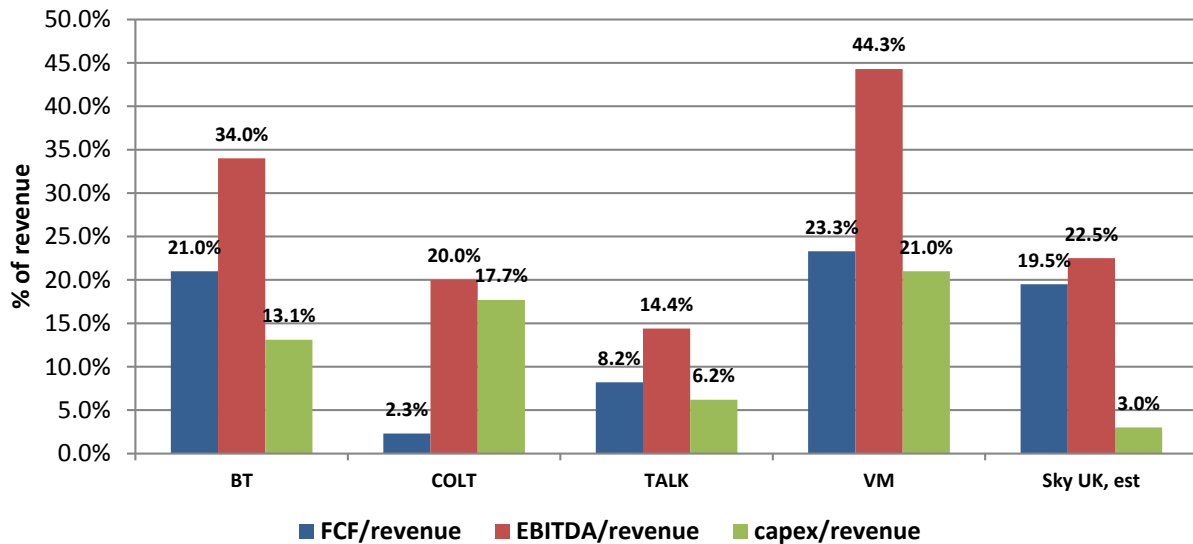


Figure 12
FCF, EBITDA and capex margins of BT and its UK competitors
 (FY 2013-2015)



Source: company reports. Note VM data is for 2014-2015, Sky UK 2015 capex is estimated.

From left to right, the abbreviations in Figure 12 stand for British Telecom Group, Colt Group, TalkTalk Telecom Group, Virgin Media, and Sky Plc's UK/Ireland segment.

BT is also more profitable than its major UK competitors, with the exception of Virgin Media. TalkTalk competes against BT in the UK using a combination of unbundled loops it leases from BT and its own backbone to deliver voice, broadband, and video. It also has some mobile customers, operating as an MVNO, but that's a minor part of its business.⁶⁸ TalkTalk's margins are very low, and its CEO Dido Harding accuses BT of setting its wholesale prices, especially for fiber, too high: "We believe that BT are currently exercising a margin squeeze."⁶⁹ TalkTalk also complains about BT's service, especially its slow installations, which affect TalkTalk's customers' perception of TalkTalk.⁷⁰

Sky is somewhat unusual in that its network is a hybrid of terrestrial and satellite. Sky's UK/Ireland operation competes against BT terrestrially for voice and broadband via a combination of unbundled loops from BT and its own backbone. Sky delivers video via satellite. Sky also receives substantial revenues for content. Sky provides revenue and EBITDA numbers for the UK/Ireland operation, but has only provided capex on a consolidated basis since it expanded into Germany and Italy in FY 2015, so we cannot precisely derive its UK/Ireland capex and FCF. The UK/Ireland capex level was about 3% before the acquisitions, and we use that level in estimating the FY 2015 level.⁷¹ As Figure 10 shows, Sky's EBITDA is well below BT's, but better than TalkTalk's. Sky's capex/revenue is, however, the lowest of the group, resulting in an FCF margin that is close to BT's.

COLT, which was acquired by Fidelity in the fall of 2015, competes against BT in the enterprise market in the UK, but also has a global network that operates throughout the rest of Europe and Asia. It is barely present in the US with only 16 employees, v. 970 in the UK, 3572 in Europe as a whole, and 5438 worldwide.⁷² The UK represented 26.5% of COLT's revenues in 2013-2014.⁷³ We highlight that unlike TalkTalk, Virgin Media, and Sky, COLT's business is mostly outside the UK. We include it only because it provides some insight into the economics of a CLEC that grew out of the UK and still has a meaningful presence there. COLT's financial results are very poor, with its capex devouring almost all of its EBITDA, resulting in FCF/revenue of only 2.3%.

Virgin Media, on the other hand, is doing well financially. It operates a cable network in the UK and Ireland. Virgin Media currently passes 13.8 million homes in the UK and Ireland and has committed to

⁶⁸ I.e., reselling an underlying mobile carrier's service.

⁶⁹ *TalkTalk Telecom Group PLC and Sky Partner with CityFibre Conference Call*, Thomson Reuters, April 15, 2014, p. 4.

⁷⁰ In the *Q32016 TalkTalk Telecom Group PLC Trading Statement Call*, Thomson Reuters, February 2, 2016, p. 14, CEO Harding states: "[Britain] needs a service that when I'm moving home the engineer turns up to connect me the day I move home, not six weeks later. If I'm a business trying to connect a new high-speed circuit that it gets connected when I need it, not three months later. And that's what's not happening today."

⁷¹ Sky's capex/revenue before the expansion was about 3% and subsequently about 4%, so one can assume that its UK capex/revenue continued in that 3% to 4% range, implying that its FCF margin for the UK/Ireland operation is between 19%-20%.

⁷² Colt Group SA, *2014 Annual Report*, pp. 36 and 100.

⁷³ Colt Group SA, *2014 Annual Report*, p. 99.

increasing that number to 17 million.⁷⁴ It also provides mobile services, but at 10% that's a relatively small portion of its revenues. Roughly 14% of Virgin Media's revenues come from business services and it is BT's most significant competitor in the business market, especially outside central London. Unlike TalkTalk's and Sky's terrestrial networks, but like Sky's satellite operation, Virgin Media's network is essentially independent of BT's. It is owned by Liberty Media, a U.S. company which has operations around the globe, but does publish separate financials for the UK operation for the sake of its debt-holders. Virgin Media's 23.3% free cash flow margin exceeds even those of BT and Sky and far exceeds those of COLT and TalkTalk.⁷⁵ It is particularly impressive, because Virgin Media invests 21% of revenue in capex.

Comparisons of BT's financial results with those of AT&T and Verizon's wireline operations as well as with those of its key UK competitors show that BT is doing extraordinarily well. BT, as a fixed-line incumbent, has been far more profitable than the two largest U.S. wireline incumbents, as well as most of its own UK competitors. Conversely, the major U.S. CLECs who report publicly have done far better than the publicly-reporting UK CLECs.

There are, of course, any number of reasons for competitors to do well or badly. But it is at least fair to say that the highly regulated UK environment has not been as favorable to competitors as the U.S. communications market, which has been more lightly regulated for the past decade.⁷⁶ Nor has the UK's experiment in forcible unbundling/leasing encouraged investment. BT's own capex/revenue is below the level of the U.S. network providers. TalkTalk and Sky, which rely on Openreach in whole or part, have extremely low levels of capex/revenue. Only Virgin Media, which has overbuilt BT, is investing heavily in the UK. COLT invests heavily, but mostly outside the UK.

Regulation of BT has also failed to curb its power in the UK business market. In July, BT presented a set of slides at the FCC which shows how thoroughly it dominates the UK business market. The fourth slide is a table copied out of a report by Ofcom, BT's UK regulator, on the UK business-connectivity market.⁷⁷ Ofcom conducted a very granular analysis by geography and service. The slide summarizes competition in the UK business market. It shows that BT has 94% market share of low-bandwidth TDM circuits provided to businesses in the area outside the UK's cities, an area which encompasses 99.8% of the UK's land mass and 92.8% of its businesses. BT has 88% share in TDM circuits in cities outside London, 70% in the London Periphery and 53% in London itself. Thanks mostly to Virgin Media, its share in Ethernet and WDM (wavelength-division multiplexing) is lower, but BT retains roughly half the market outside central London. The two companies combined have 54% share of the Central London (CLA) business market in

⁷⁴ Virgin Media press release February 13, 2016.

⁷⁵ We have not included Vodafone, which also operates in the UK, because its revenues are primarily from mobile, and its UK fixed-line EBITDA and FCF are not provided separately.

⁷⁶ The FCC's decision to impose Title II regulation on the broadband ISPs and its showing of greater interest in price-regulation more generally may change that.

⁷⁷ BT Americas, *ex parte*, July 2, 2015 in dockets WC 05-25, GN 12-3, and RM-10593, slide 4 which is a duplicate of Table 4.4 on p. 73 of Ofcom, *Business Market Connectivity Review*, May 15, 2015. Businesses are defined as those that have 10 or more employees, per, p. 15 of the Ofcom report.

Ethernet and WDM, and 73%, 80%, and 87% share respectively of London Periphery (LP), other cities (excluding Hull), and the rest of the UK. Indeed, Ofcom notes that “BT’s physical network is ubiquitous in the UK,” while the coverage of others’ networks “is significantly less extensive than that of BT,” so that they have to rely on third-party supply while BT can self-provide.⁷⁸ At various points in the report Ofcom notes that outside central London BT has high market share in mobile backhaul, in TDM circuits, in Ethernet First Mile, and in all but the highest-bandwidth Ethernet and WDM.

In the *Revised Current Cost Financial Statement 2015* that BT submitted to Ofcom, it provides detailed revenue and profitability data by product line.⁷⁹ It shows that BT’s return on mean capital invested (MCE) for the business connectivity market is 23.7%. That translates to an EBITDA margin of 70.1% on combined internal and external revenue of £1.3 billion. Within that market, the highest returns are on the traditional-interface (i.e. TDM) markets. For example, for low-bandwidth TISBO (the closest equivalent to U.S. T1), return on MCE is 30.4% and EBITDA margin is 64.2% on combined internal and external revenue of £324 million.

The dearth of competitive presence outside the 13 square mile area of Central London is particularly striking given how densely populated the UK is in comparison with the U.S. Average population density in the UK is 678 people per square mile, while average U.S. density is 88 people per square mile.⁸⁰ Put another way, per the Ofcom/BT slide referenced above, the urban area in the UK encompasses a total of 154 square miles. In the US, according to the U.S. Census Bureau, the urban area encompasses a total of 108,062 square miles. The UK’s total area is 95,426 square miles, while the US covers 3,535,329 square miles.

Issues remain on the mass-market (consumer and small business) side, as well, contradicting BT’s claim at the FCC that UK leased-line regulation is beneficial to consumers. Rural broadband coverage remains an issue, especially for “superfast” broadband which is defined as 30 Mbps download speed. Despite the UK’s greater population density, as of 2015, it was available to only 37% of rural households, well below the 49% of U.S. rural households who had access to 50 Mbps download speed in mid-2014.⁸¹ Ofcom is particularly concerned about the small businesses throughout the UK, 400,000 of whom do not have access to 30 Mbps download speed. Ofcom is also concerned about BT’s service quality and responsiveness. Ofcom’s *Strategic Review of Digital Communications* notes: “Although Openreach must treat all competing providers equally, the quality of their service has, too often, been equally poor for

⁷⁸ Ofcom, *Business Market Connectivity Review*, pp. 26-27. Ofcom notes that in addition to BT and Virgin Media, Vodafone, Level3, Colt, Verizon, Zayo and others supply leased lines. It also notes that Virgin Media, Vodafone and Level3 “own and operate sizeable physical networks in the UK, but the coverage of each of their networks is significantly less extensive than that of BT. Therefore, to provide national services, most CPs other than BT rely on some third-party supply of leased line services.”

⁷⁹ BT, *Revised Current Cost Financial Statements 2015 including Openreach Undertakings*, p. 27.

⁸⁰ UK Office of National Statistics, *Overview of the UK Population*, November 5, 2015, pp. 15-16. U.S. Census Bureau website, *Tables by state and county for 2010 Classification Rural and Urban*.

⁸¹ Ofcom, *Connected Nation 2015*, December 1, 2015, p. 9 and NTIA, *Broadband Availability in Urban v. Rural Areas*, Broadband Statistics Report, data as of June 2014, published March 2015, p. 7.

everyone.”⁸² BT’s poor service affects not only its own retail customers, but the customers of those competitors who unbundle or lease its network. BT, Sky, and TalkTalk collectively hold 68% of the fixed broadband market and BT’s service quality affects all of their end users.⁸³ Only the customers of Virgin Media, whose network is independent of BT, are immune, along with those of a few small CLECs that are also attempting overbuilds.

Ofcom concluded a review of BT and Openreach on February 25th, and indicated significant concerns about the level of broadband deployment in general and fiber deployment in particular in the UK, about BT’s service quality, and about Openreach’s relationship with BT and its potential negative effects on BT’s competitors.⁸⁴ The document includes recommendations to improve service quality and transparency, and indicates that Ofcom will take further steps to open up BT’s network and to increase Openreach’s independence from BT.

Ofcom is a diligent regulator that performs very thorough reviews of BT’s operations and applies regulatory remedies to fit its findings. Nevertheless, Figure 11 makes it clear that U.S. competition has been much more effective in disciplining incumbents’ financial results than UK regulation has been. Conversely, a comparison of the results of Level3, Cogent, Zayo, TalkTalk, Sky, and COLT shows that CLECs whose primary base of operation is the U.S. do far better than those whose primary base is the UK. Ofcom documents also make it clear that Ofcom’s regulation, even when taken to the extreme of arm’s-length separation of the access network from retail operations, has not eliminated BT’s domination of the UK business market. BT’s attempt to persuade the FCC that it should emulate the UK regulatory model raises an obvious question: Why would the U.S. want the UK’s high market concentration, low investment, and reduced service quality?

Conclusion

Some U.S. CLECs, as well as BT, argue that the ubiquity which results from the U.S. ILECs’ obligation to provide service to all who request it provides the ILECs with a competitive advantage. That view, however, ignores the ever-rising cost of sustaining a network which is serving roughly a third of the lines for which it was engineered. It also ignores the advantage the CLECs have, the right to invest only in those geographic areas, those services, and those market segments that are most profitable. The returns of the U.S. CLECs whose financials are publicly available make it obvious that their ability to focus only on the lowest-cost and highest-revenue markets outweighs whatever advantage scale and ubiquity might have provided AT&T’s and Verizon’s wireline networks. Level3, Cogent, and Zayo enjoy much higher free cash flow than AT&T’s and Verizon’s wireline operations. Their stocks carry far higher valuations, because investors expect much higher growth and profitability from them. The cable operators who are rapidly growing their penetration of the business market also enjoy both much higher free cash flow and higher valuations than AT&T and Verizon wireless. Finally, a comparison of the

⁸²Ofcom, *Strategic Review of Digital Communications: Discussion Document*, July 16, 2015, p. 9.

⁸³ Ofcom, *The Communications Market 2015: Telecoms and Networks*, p. 292.

⁸⁴ Ofcom, *Making communications work for everyone: Initial conclusions from the Strategic Review of Digital Communications*, February 25, 2016.

returns of the U.S.-based CLECs with those who are based in the more heavily-regulated UK shows that the U.S. environment is far friendlier to CLECs.