# The Future Of 5G: In Europe, Fortune Could Favor The Cautious

**October 17, 2018**

## Key Takeaways

- Europe's 5G rollout is likely to lag the U.S. and advanced Asian markets.
- Prospects for monetizing the technology, including use-cases like fixed wireless access, are less enticing than in other regions. Europe is also behind in terms of its track record of revenue growth and the intensity of data consumption.
- That said, we anticipate that Europe will be a fast follower when 5G arrives, aided by relatively robust fiber infrastructure and converged operators, which provide solid network foundations for 5G.
- Spectrum will be the first major 5G cost for telecom operators, but we expect lower pricing than in other regions.
- Credit implications remain limited, with telecom companies' current investment in fixed network upgrades likely to transition functionally and financially to spending on 5G over the next five years.

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European telecom companies have made strong public commitments to leading on the development of 5G, the fifth generation of mobile networks, and there have already been a number of test deployments and auctions for spectrum licenses. For structural and historical reasons, however, compounded by limited near-term opportunities for monetization, we anticipate that 5G will develop more slowly in Europe than in the U.S. or Asian markets like Japan and South Korea. As a result, we expect Europe will be a fast follower rather than an early adopter of 5G, with the fiber networks of converged European operators providing a good backbone for the rollout when 5G eventually gains momentum.

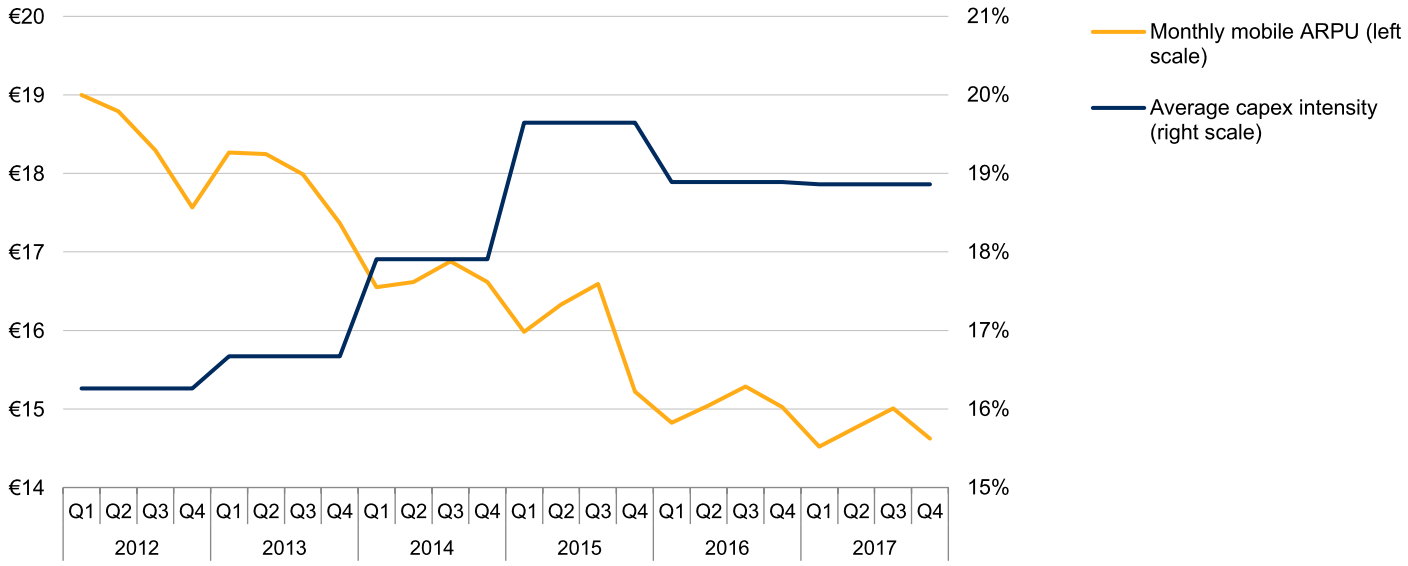
## Monetizeable Use Cases For 5G Remain Speculative

While regulatory and marketing pressures will add impetus to the 5G rollout plans of European telecom companies, we think the key motivator will be a cold calculation of return on investment. In a cost-benefit analysis full of guesswork and assumptions, we expect companies' investment appetite will be tempered by a difficult history monetizing 4G investment compared to other

regions. Indeed, Europe's rise in investment through the 4G cycle was accompanied by a steady decline in average revenue per user (see chart 1).

Chart 1

**Declining ARPU Despite Rising Capex In Europe's Top Five Markets**
European average (top five markets)

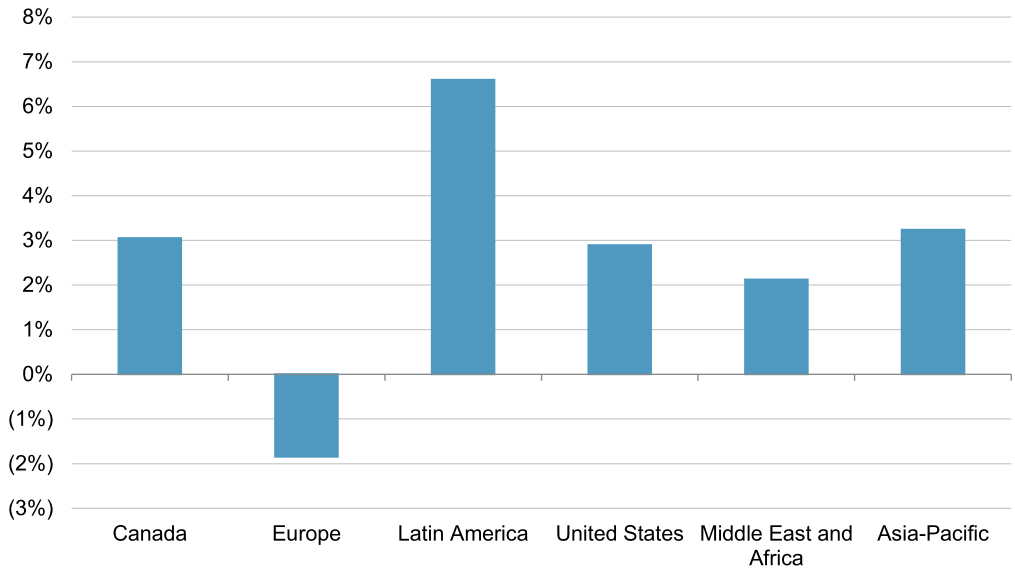



Source: S&P Global Ratings.


Europe's chastening 4G experience is only likely to be overcome by improved revenue visibility. However, we think Europe's track record of slower adoption of new technology, underperforming telecom revenue growth relative to global peers (see chart 2), and a lack of a compelling early-stage use cases will hamper monetization prospects compared to Asia and the U.S.

Chart 2

**European Telecom Growth From 4G Has Lagged Other Regions**
Revenue compound annual growth rate 2010-2016




Note: Weighted-average compound annual growth rate of telecoms with at least $5 billion revenue and mobile operations, adjusted for mergers and acquisitions. Source: S&P Global Ratings.


In Europe, we think potential 5G revenue will be a function of:

- Telecom providers' ability to generate higher value for existing products through enhanced mobile broadband, and
- Additional subscriptions to support innovative new use cases that are enabled by 5G (for further details, see "The Future Of 5G: Will Global Telcos Get Enough Bang For Their 5G Buck?," published on Oct. 17, 2018, on RatingsDirect).

As with enhanced mobile broadband in the U.S., we question the propensity of customers in Europe to spend more for faster speeds or lower latency on handsets and tablets. We see particularly weak prospects for an upsell on existing services in Europe's business-to-consumer segment, given its track record of using roughly half as much mobile data per month as regions like the U.S. and Asia, despite comparatively lower prices.

We expect the principal growth driver will instead be from new subscriptions, primarily machine-to-machine (M2M), to support new use cases requiring the unique attributes of 5G. But here, too, we are skeptical on short-term revenue opportunities. While there are many possible use cases--from broad-based applications like fixed wireless broadband (mobile network technology used in place of home or business fixed-line broadband), autonomous driving, and smart cities, to more specialized applications like remote medical procedures and virtual reality--we think most of them will not reach a critical scale for at least another five years. In

addition, we believe there is still of lot of uncertainty as to the extent operators in Europe (as in other regions) will be able to tap into the value added by these applications, as they would have to move from being solely connectivity providers to suppliers of more comprehensive "Internet of Things" (IoT) based services.

At the same time, we do not think fixed wireless access will play as important a role in Europe as in markets like the U.S. This is due to differences in market structure as well as regulation. For example, most European incumbent operators (former state-owned monopolies) are converged, meaning that they already offer fixed and wireless communication services. In markets like Spain and France, their competitors are converged as well, and fiber-to-the-home (FTTH) rollouts or high-speed cable upgrades are well underway. For these players, there is little incentive to deploy a fixed wireless network that will compete with, and possibly cannibalize, their existing fixed broadband offerings. In markets such as Germany and the U.K. where incumbents have so far focused on deploying fiber-to-the-cabinet (FTTC), we believe the next stage of network upgrades could involve a mix of technologies. Even here, we project that 5G fixed wireless would mainly be a selective complement to future FTTH investments.

Furthermore, despite some announcements, we generally do not expect wireless-only players or other operators that lack their own fixed networks to consider large-scale 5G fixed wireless investments. This is because in nearly all markets there is either regulated or commercial wholesale access to at least one high-speed broadband infrastructure. Wholesale access presents a simpler and cheaper point of entry for new or newly converged competitors, reducing the incentive for fixed wireless associated with large deployment costs and uncertain return on capital.

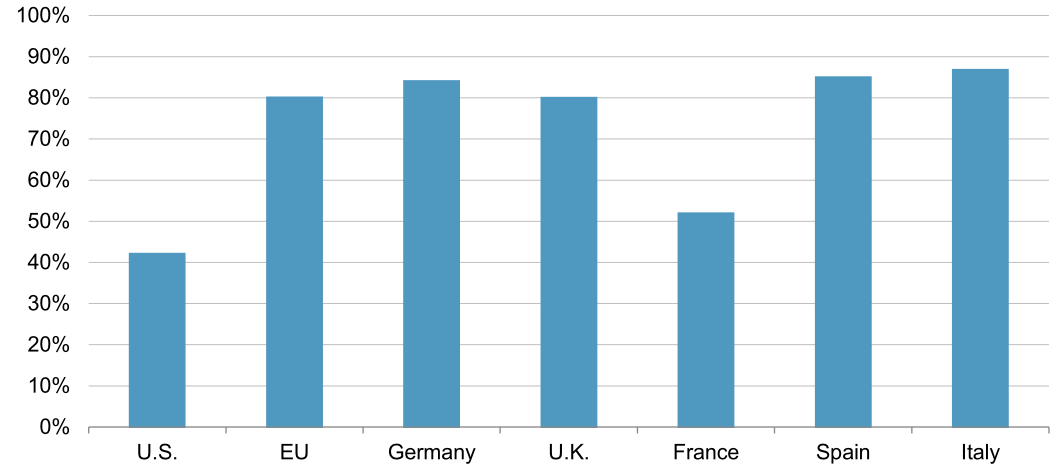
Some 5G deployments are likely be motivated by operators' efforts to cope with the cost of continually rising data consumption. According to Ericsson, combined 4G and 5G sites can be 10 times more cost-efficient than basic 4G sites today. Therefore, we think pure cost considerations will induce operators to gradually switch from upgrading 4G sites to deploying 5G technology over the first half of the next decade. However, we think they will largely be able to achieve this by reallocating existing capital expenditure (capex) budgets rather than raising them.

## Europe's Fiber Networks Position Operators To Be Fast Followers

At the same time, we acknowledge that new use cases will likely emerge, just as the unexpected spread of smartphones accelerated demand for faster and more robust mobile networks. Intensifying data demand from today's consumers will continue this trend, and eventually we believe that only 5G will be able to provide a long-term solution. In this respect, we think Europe will be well-positioned to rapidly deploy 5G networks, and be a fast follower of developments in the U.S. and Asia when the time comes. The key for this is Europe's high ratio of converged operators, and their growing fiber networks (see chart 3), which will reduce the need for infrastructure buildout to support 5G's dense cell network. Being later on the cost curve for 5G equipment will also benefit European players as production scales up first from Asian and U.S. deployments.

Chart 3

**Telecom Fiber To The Cabinet Coverage Supporting NGA**
Homes covered by FTTC; includes mobile operators that also have fixed networks




Note: Data are estimates based on company and regulator filings. NGA--Next generation access. FTTC--Fiber to the cabinet. Source: S&P Global Ratings.


Converged operators have traditionally derived synergies from leveraging their fixed network to support mobile operations, both in terms of backhaul (the connection between the wireless cell tower and the internet) and offloading mobile traffic to Wifi. With 5G's even denser cell networks and data loads, we think these synergies are set to increase, with benefits accruing to the converged owners of FTTC, FTTH, or high-speed cable networks. While consumer cord-cutting must be managed through service and pricing differentiation, the risk should be manageable given our view that M2M growth will be the primary 5G driver. Furthermore, we view markets for third-party fiber backhaul--i.e., from dark fiber providers--as less developed in Europe, limiting wholesale options and increasing the benefits of owned fiber networks relative to other regions.

## 5G Spectrum Auctions Show Prices Continuing To Decline

Many telecom regulators in Europe have announced their plans for spectrum auctions in the 700 megahertz (MHz) band, 3 gigahertz (GHz) to 4 GHz bands, and some in the very high frequency "mmWave" bands. Some auctions have recently been completed, including in the U.K. in April 2018, Spain in July, and Italy and Finland this month. We expect 5G spectrum auctions in most of the key European markets by the end of 2020, as operators look to build their capacity and position themselves competitively versus market peers. Auctions will also be prompted by the EU Electronic Communications Code, which requires all EU countries to make available additional spectrum in the 700 MHz, 3.6 GHz, and 26 GHz bands by 2020.

### European Spectrum Auctions

| Country | Timeline | Key spectrum | Population (millions) | MHz | Proceeds (mil. €) | €/MHz POP* | Source |
|---|---|---|---|---|---|---|---|
| Finland | Q3 2018 | 3.4 GHz-3.8GHz | 5.5 | 390 | 78 | 0.04 | Actual |

## European Spectrum Auctions (cont.)

| Country | Timeline | Key spectrum | Population (millions) | MHz | Proceeds (mil. €) | €/MHz POP* | Source |
|---|---|---|---|---|---|---|---|
| France | 2015 | 700 MHz | 67.4 | 60 | 2,798 | 0.69 | Actual |
| | 2019 (not set) | 3.6 GHz | | 200 | 1,350-2,700 | 0.10-0.20 | Estimate |
| | 2020 (not set) | 28 GHz | | 2,400 | 300-1,600 | 0.002-0.01 | Estimate |
| Germany | 2015 | 700 MHz | 83.0 | 60 | 1,000 | 0.20 | Actual |
| | Q1 2019 | 1.9 GHz-2.1 GHz | | 120 | 1,000-2,000 | 0.10-0.20 | Estimate |
| | | 3.6 GHz | | 300 | 2,500-5,000 | 0.10-0.20 | Estimate |
| Italy | Q3 2018 | 700 MHz | 60.5 | 75 | 2,040 | 0.45 | Actual |
| | | 3.6 GHz | | 200 | 4,350 | 0.36 | Actual |
| | | 26 GHz | | 1,000 | 164 | 0.00 | Actual |
| Spain | 2019 (not set) | 700 MHz | 46.6 | 50 | 750-1,050 | 0.32-0.45 | Estimate |
| | 2018 (not set) | 1.5 GHz | | 40 | 180-380 | 0.10-0.20 | Estimate |
| | Q3 2018 | 3.7 GHz | | 200 | 438 | 0.05 | Actual |
| | 2020 (not set) | 26 GHz | | 1,000 | 100-500 | 0.002-0.01 | Estimate |
| U.K. | H2 2019 | 700 MHz | 66.5 | 50 | 1,050-1,500 | 0.32-0.45 | Estimate |
| | Q2 2018 | 2.3 GHz | | 40 | 231 | 0.09 | Actual |
| | | 3.4 GHz | | 150 | 1,305 | 0.13 | Actual |

*Price per megahertz per population in millions.

We broadly expect spectrum prices to continue to decline overall, and we anticipate that frequencies in the low-band (700 MHz) and mid-band (1 GHz to 4 GHz) will be costlier than higher frequencies in the mmWave band (6 GHz and above). Low-band and (to a lesser extent) mid-band spectrum are relatively scarce due to their limited size and reduced availability as a result of existing usage. These bands also have stronger propagation characteristics, making them more attractive to operators for establishing coverage and meeting regulatory requirements. By contrast, mmWave spectrum is relatively plentiful, and requires a denser network since its signal attenuates more quickly. In addition, mmWave 5G applications and devices still look far away, dimming monetization prospects. So, we expect mmWave band auctions will either come later, or be significantly discounted relative to lower-frequency bands on a MHz POP basis (a measure of bandwith per population in the spectrum license coverage area) .

Auction results to date have largely reinforced our view, and confirmed the decline in spectrum prices since 3G, even for low-band spectrum. For example, the average price for 700 MHz in Italy's October auction was €0.45 per MHz POP, compared to €1.21 for 3G. In the U.K., the 3.4 GHz-3.8 GHz band went for an average of €0.13 per MHz POP (€2.37 for 3G). And in Spain, it was sold for about €0.05 per MHz POP, perhaps best illustrating the monetization concerns of telecom operators so far.

The early surprise in Europe's 5G auctions has been Italy. While competitive bidding has met or exceeded reserve prices in European markets so far, Italy's €6.55 billion final price tag was 260% of the €2.5 billion reserve price. An intense fight for the 3.6 GHz band was the main cause of the inflation, pushing the price per MHz POP well past expectations to €0.36 per MHz POP, nearly triple the rate for similar auctions to date in Europe.

### How We Account For Delayed Spectrum Payments

Payments for spectrum in Italy's recent auction will be spread between 2018 and 2022. We will reflect cash flows in the period they occur. In addition, and as per our ratios and adjustments criteria and guidance, we will adjust the company's debt to reflect future spectrum spending commitments as the spectrum becomes available on net-present-value basis using a 7% discount rate.

Could this have repercussions for other markets? We view the Italian auction as somewhat anomalous, as the combination of Italy's auction and market structures heightened competition. Three evenly matched players in terms of subscriber share--Telecom Italia, Vodafone, and WindTre--were all competing for two large 80 MHz blocks of 3.6 GHz spectrum, creating an all-or-nothing scenario and stoking the bidding war. Meanwhile, aggressive bidding with new entrant Iliad for the two smaller 20 MHz blocs, while yielding a smaller absolute headline number, created a per MHz comparison that also fueled higher bidding. There is a lack of such asymmetry in upcoming European auctions, where we expect that smaller and more even frequency bloc availability should lead to more moderate outcomes. However, we think competitive auctions to date underline the strategic importance of 5G for the positioning of telecom operators in their respective markets. This is enhanced by the large number of players across the fragmented European telecom markets compared with the U.S.

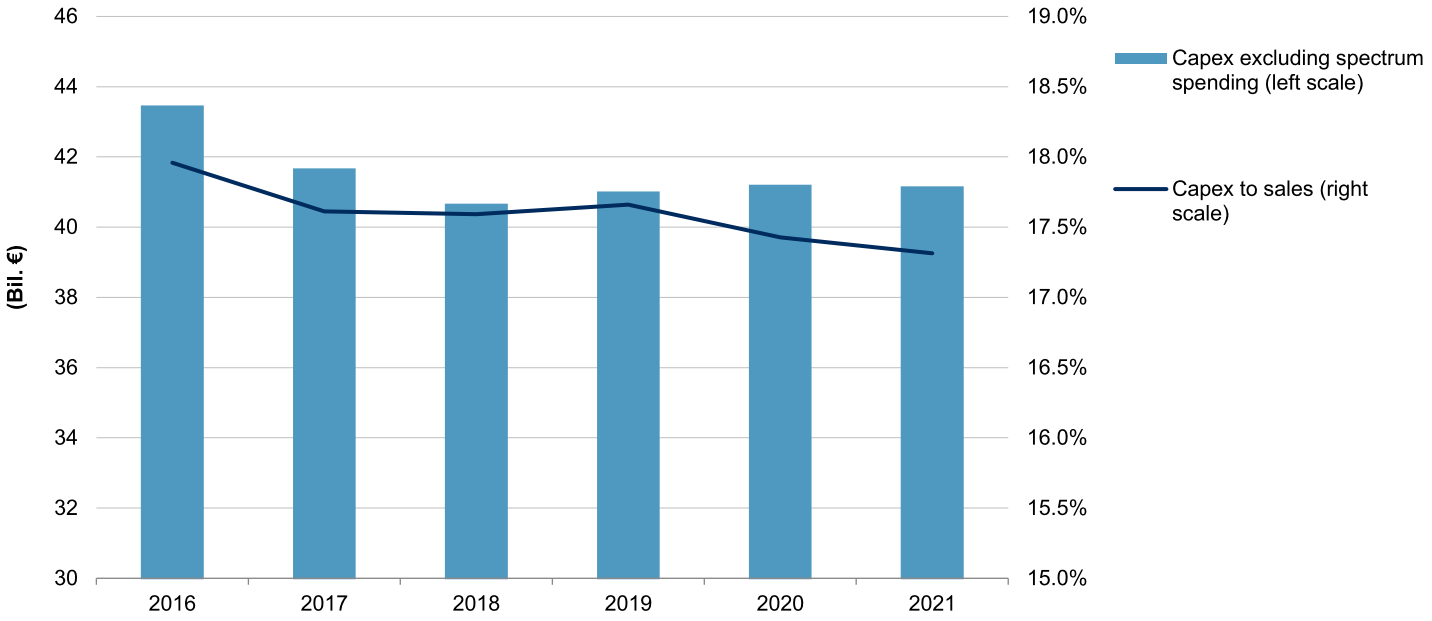
In contrast to the more static landscape in Asia and the U.S., some countries like Belgium may attempt to facilitate the entry of a fourth mobile operator through the 5G auction process, and similar measures are discussed in Germany where United Internet is often rumored as additional bidder. Whether there are new entrants or not, market structure considerations can also increase spectrum competition, pushing prices higher. We believe that the levels of 5G investment will ultimately depend on how the future market structure for 5G affects the potential for players to monetize the technology and differentiate through network quality.

## Capex Is Going Nowhere But Sideways

Based on our expectation for a cautious 5G rollout in Europe, we forecast broadly flat investment profiles--albeit with capex at a currently relatively elevated level (generally a high-teen percentage of revenues). This is because we project operators will reallocate resources freed up by the continued decline in 4G spending to progress with upgrades of fixed networks, which should then transition to funding the gradual ramp-up of 5G investments over the next five years. As such, we think operators will be able to avoid a spike in capex, excluding spectrum licenses, but incipient 5G spending will probably prevent a post-4G drop in capex intensity (see chart 4).

Chart 4

**European Capex Levels To Hold Steady**
Top 14 converged European telecom companies




Source: S&P Global Ratings.


Our aggregated forecast masks some variation between operators, depending on where they are in their respective capex cycles. Some such as Telefonica and Telenor ramped down capex to the low teens as a percentage of revenue, but many (including Deutsche Telekom, Swisscom, KPN, and Telecom Italia) are spending at or close to 20% as they densify 4G networks and continue or ramp up fiber spending and fixed network upgrades.

## Credit Implications For Major European Players Look Limited

We continue to believe 5G will have a limited impact on credit profiles for European telecom operators. On the one hand, we think competition is likely to prevent significant 5G upselling opportunities among traditional customers, and new use cases and IoT applications remain outside the scope of our forecast until the early part of the next decade. Therefore, we do not expect any material topline benefits from 5G through at least 2020. But this is offset because we also expect a slower rollout and measured investment approach. With stable capex levels as telecom companies shift from 4G to fixed upgrades and then to 5G, we consider the net effect largely neutral.

More broadly, we note that the last five years of topline pressure, coupled with high investments and mergers and acquisitions, have weakened European telecom credit profiles, leaving many

players with limited rating headroom. But the manageable impact of 5G, combined with modest signs of cash flow growth, afford some flexibility for variation around our 5G spending assumptions, provided that this cushion is not redirected toward shareholders. Some of our key industrywide base-case assumptions are:

- Fading topline pressure as the industry nears the end of regulation-induced revenue losses, and modest gains from improved monetization of data consumption and speeds;
- Extensive cost-cutting efforts that should continue to improve profitability and contribute to incremental EBITDA growth; and
- Cash flow from operations bolstered by refinancing at lower borrowing costs as operators have taken advantage of sustained low interest rates.

We think the most salient credit risk for European telecom companies is a combination of outsize spectrum payments and an acceleration of 5G investments that push capex intensity sustainably above 20% of revenues. At such levels, we do not see our current operational and margin assumptions affording sufficient relief for pressured balance sheets. Although it's not our base case, an upsurge in competition within Europe's crowded telecom markets could potentially spark such a scenario. If this happened for a sustained period, or if it was combined with operational headwinds from price competition or increased shareholder returns, it could put pressure on ratings.

## Related Criteria

- Corporate Methodology: Ratios And Adjustments, Nov. 19, 2013

## Related Research

- The Future Of 5G: Will Global Telcos Get Enough Bang For Their 5G Buck?, Oct. 17, 2018
- The Future Of 5G: North American Telcos Race To 5G, Putting Balance Sheets At Risk, Oct. 17, 2018
- The Future Of 5G: In Asia-Pacific, Developed Countries Are Leading The Charge, Oct. 17, 2018
- Guidance: Applying "Corporate Methodology: Ratios & Adjustments", Feb. 6, 2018

This report does not constitute a rating action.