

CAPITEL

Managing wireless Capex to profitably unlock frontier and emerging markets

Multi-market operator groups with a consistent record of delivering high RoCE in frontier and emerging markets have developed a careful and *counter-intuitive* approach to design their wireless Capex plan and end user proposition



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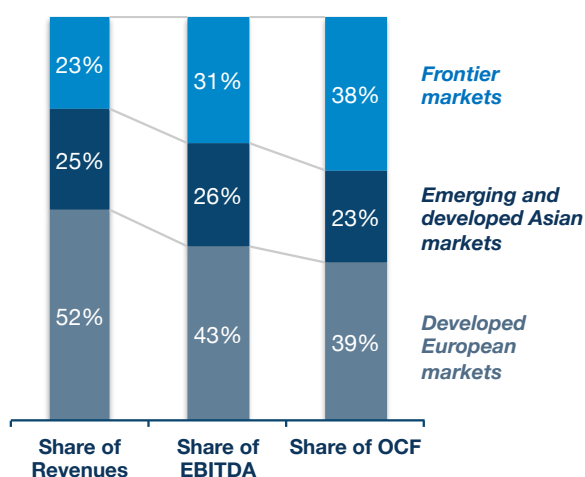
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Summary

1. Success of multi-operator groups in Frontier and Emerging (F&E) markets has been mixed.

- Some operator groups have F&E markets contributing up to 38% of their operating cash flows, even though they account for only 23% of overall revenues
- For few multi-market operator groups, this performance is consistent across all F&E markets suggesting a proven techno-commercial and financial model
- For other multi-market operator groups, the returns vary by market and are inconsistent, suggesting a need to rethink their techno-commercial dimensioning model especially for their portfolio markets with low RoCE

Figure 1. Operating cash flow¹ contribution of F&E markets² for Operator Group 1



Source: Company reports, Capitel analysis

1. Operating cash flow defined as EBITDA less Capex

2. Frontier markets refer to markets such as Bangladesh, Pakistan and Myanmar. Emerging markets refer to markets such as Thailand and Nigeria. Developed Asian markets refer to markets such as Malaysia, and Developed European markets refer to markets such as Germany and Spain.

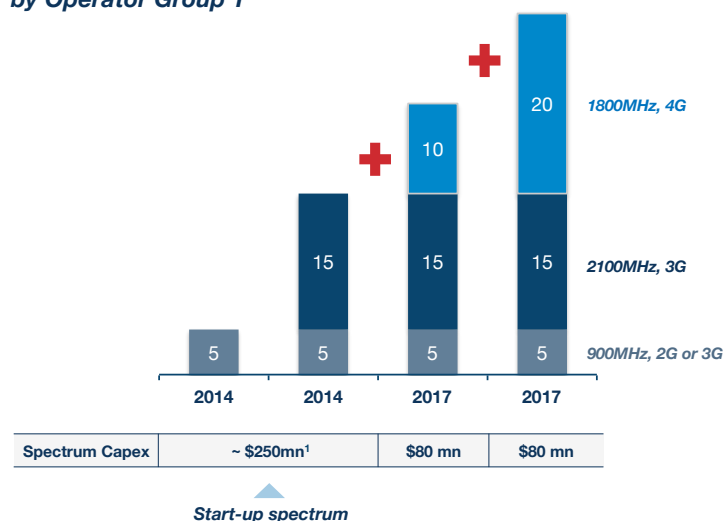
2. We develop a techno-commercial and unit economics model to understand the reasons for such wide RoCE differentials

- We analyse and model multiple operators in different F&E markets in Asia and EMEA
- We use techno-commercial variables such as quantum of spectrum and market variables such as \$/GB to derive RoCE

3. We find that operators realizing high RoCE in F&E markets generally have higher spectrum investments than competitors.

- Operators with high RoCE consistently and continuously (Ref Figure 2) purchase large quantum of spectrum in F&E markets, irrespective of whether they are market leaders or followers. This is unlike their competitors that focus on optimizing spectrum Capex
- Operators with high RoCE deploy more number of 3G/4G network sites as compared to their competitors. This is contrary to the expectation of optimizing network Capex

Figure 2. Spectrum purchase and Capex in Myanmar by Operator Group 1



Source: Company reports, Capitel analysis

1. Estimated value based on pricing of 1800MHz spectrum; Total Capex was \$500mn including the cost of entry license

4. The large spectrum holding and sites is leveraged to offer big GB bucket plans to drive usage

The deployment of more spectrum on large number of sites creates significant GB capacity allowing operators to offer GB buckets at affordable \$/GB prices to drive usage, and more importantly, gain or sustain market share

Pakistan: LTE starter bundle from 3GB per month



Source: Company reports, Capitel analysis

5. Model results suggest that *once the wireless site network Capex is recovered in the initial years, the incremental low cost spectrum helps drive significant returns*

- The revenues from initial usage per sub and data adoption helps cover network cost. After a certain level of adoption, and increase in usage, the base network cost is recovered
- The incremental cost of capacity is then determined primarily by the cost of adding more spectrum, and almost all of this incremental revenue flows to EBITDA. The spectrum cost is relatively lower in F&E markets, and the incremental cost of adding such capacity is marginal
- Operators keep purchasing more spectrum as long as its available at a low price point (case in point is Myanmar, Pakistan as illustrated in Figure 2), so that they can drive margins and RoCE once the base network costs are covered.

Figure 3. Model results for RoCE for Myanmar¹

Spectrum holding				Market share
	18%	34%	46%	
40 MHz	18%	34%	46%	
30 MHz	2%	16%	26%	
20 MHz	-7%	NA	NA	
	20%	40%	60%	

Source: Company reports, Capitel analysis

1. 10,000 cell sites, US\$1/GB blended realization from mobile data. RoCE calculated as EBIT/Capex employed 2. Deployed spectrum can't support the traffic corresponding to high data market share, and so results are not applicable

Figure 4. Model results for EBITDA Margin for Myanmar

40 MHz	38%	53%	62%
30 MHz	20%	39%	51%
20 MHz	7%	NA	NA
	20%	40%	60%

Source: Company reports, Capitel analysis

6. Competitors with *smaller spectrum holdings end up with a higher network cost on a per GB basis AND a lower saleable GB capacity*

- Competitors typically under-invest in spectrum purchase, even though spectrum only forms a small component of network Capex in F&E markets
- Unlike spectrum, the requirement of number of sites can not be optimized below a certain level, as
 - Regulators generally have a minimum network roll-out obligation
 - Data is deployed on high frequency bands such as 2100MHz (3G) in the initial stages (followed by 1800MHz LTE or 2300MHz / 2600MHz LTE), and requires network densification

- Customers expect service availability, and operators need to at least partially match competitor coverage
- The network Capex remains high esp. as there are limited tower sharing opportunities
- As the limited spectrum even on a similar network site base results in lower overall capacity but similar overall Capex, the price per GB for competitors is higher

7. Competitors end up offering small MB buckets at high prices, attracting incremental user base, and losing share and profits

- Competitors typically end up with lower capacity due to lower spectrum holdings, and higher cost per GB. The lower installed capacity and the pressure to generate revenues results in either
 - Very high pricing of mobile data on a per MB basis, as was witnessed in Myanmar a year after launch, or
 - Rationing of mobile data, with operators selling pack size as low as 7MB, offering packs based on use cases (e.g. Facebook only packs), or restricting validity (24 hours, 7 days)

With careful pricing and estimation of Opex/GB, the packs tend to be profitable even with low denominations, resulting in 30%+ EBITDA margins

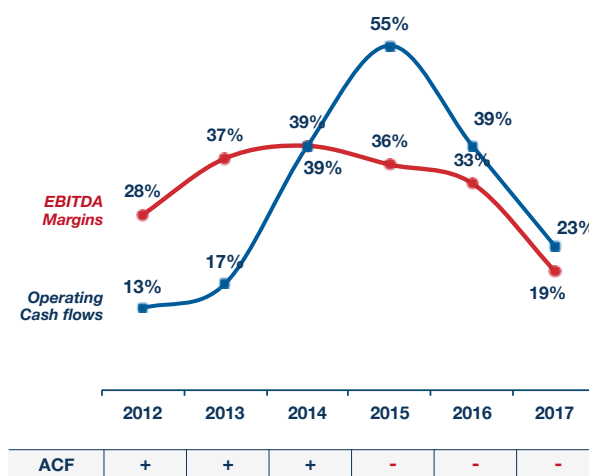
Figure 6: Illustrative plans for an operator group in F&E markets, validity ranging from 1 day to 7 days



Source: Company reports, Capitel analysis

- However, the limited available data capacity for sale results in limited revenue growth, and finally the data rationing and poor user experience results in limited share gains
- As the pressure to expand network continues due to consumer demand or competitive presence, the EBITDA margins begin to degrade

Figure 7. EBITDA and Adjusted Cash Flow (ACF) in Bangladesh for Operator Group 2



Source: Company reports, Capitel analysis

- Finally, the capex intensity increases as network sites continue to expand while revenues remain stagnant
- Competitors are on a negative spiral with declining operating cash flows (stagnant revenues), followed by cost pullback on sales & marketing, resulting in declining market share, and compressing EBITDA
- Ultimately, groups have to either orchestrate an inorganic event to achieve scale in terms of spectrum holdings, get access to market share to drive revenues, and optimize on the overall fixed network costs

8. As a final point, such a market dimensioning model works only in markets with low spectrum cost and growing data adoption / usage

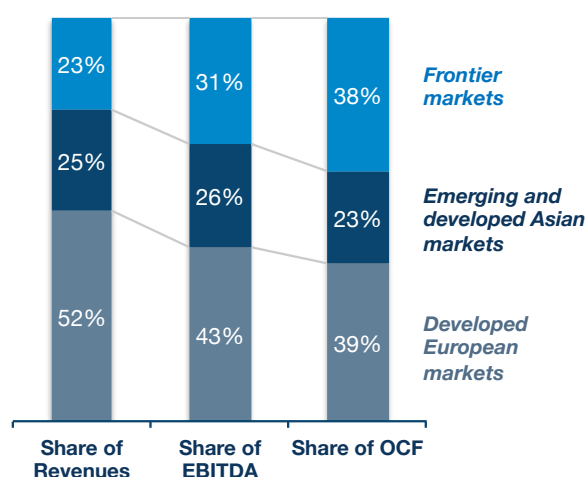
alpha report

1. Success of multi-operator groups in frontier and emerging (F&E) markets has been mixed

Some operator groups have F&E markets contributing up to 38% of their operating cash flows, even though they account for only 23% of overall revenues

For few multi-market operator groups, this performance is consistent across all F&E markets suggesting a proven techno-commercial and financial model that works effectively

Figure 8: Operating cash flow¹ contribution of F&E markets² for Operator Group 1



Source: Company reports, Capitel analysis

1. Operating cash flow defined as EBITDA less Capex
2. Frontier markets refer to markets such as Bangladesh, Pakistan and Myanmar. Emerging markets refer to markets such as Thailand and Nigeria. Developed Asian markets refer to markets such as Malaysia, and Developed European markets refer to markets such as Germany and Spain.

Other operator groups have had mixed success – delivering strong returns in some of their F&E markets, but equally poor returns in other F&E markets.

This is especially true for returns on a data Capex model – after purchase of 3G or 4G spectrum and deployment of 3G/4G sites, operators returns did not recover to pre-launch level and went on a downward spiral.

2. We develop a techno-commercial and unit economics model to understand the reasons for such wide RoCE differentials

We use techno-commercial variables such as quantum of spectrum, pricing of spectrum, number of 3G/4G sites and cost per GB. We also model the impact of market variables such as price charged per GB, operator market share, mobile data adoption and usage levels to finally derive RoCE

We studied five operator groups operating in multiple markets globally, with some of their portfolio companies in the F&E market categories. Some of these operator groups have consistent success in opening up F&E markets and delivering a stellar RoCE, except for situations where there is a disruptive market entrant or regulatory set-back.

3. We find that operators realizing high RoCE in F&E markets generally have higher spectrum investments than competitors

Focus is on driving usage and network utilization – incremental margins are super high. Large data bucket plans with monthly prices only for data ranging from \$1 to \$13 are on offer in market such as Myanmar, which witnessed its first mobile phone few years back

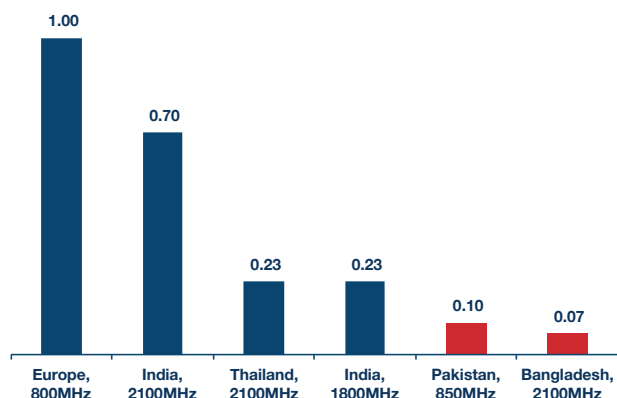
Spectrum in F&E markets is cheap, although its monetization potential is high.

The US\$/MHz/Pop indicators suggest that spectrum pricing in F&E markets is much lower as compared to other developed markets, or higher spectrum price regimes such as India.

Some of this pricing accounts for the fact that population in these markets is low – however, we find that the need for Internet, and the usage for these markets remains high (much more than 800MB per month for markets in Europe). The fixed line penetration is low, entertainment options are limited, and the gains to productivity are high.

The US\$/MHz/Pop metric results in 10MHz of 1800MHz spectrum being sold in Myanmar for as low as US\$80 mn.

Figure 8: Price benchmarks for spectrum (US\$/MHz/Pop) by market and frequency band¹



Source: Company reports, Capitel analysis

Note: 1. Benchmarks not adjusted for spectrum duration, foreign exchange and PPP – chart to illustrate directional difference in spectrum pricing

Multi-market operator groups understand that the low cost spectrum can generate significant data capacity (GB) that can be used to drive high revenues, and more importantly RoCE (as the underlying spectrum Capex is low).

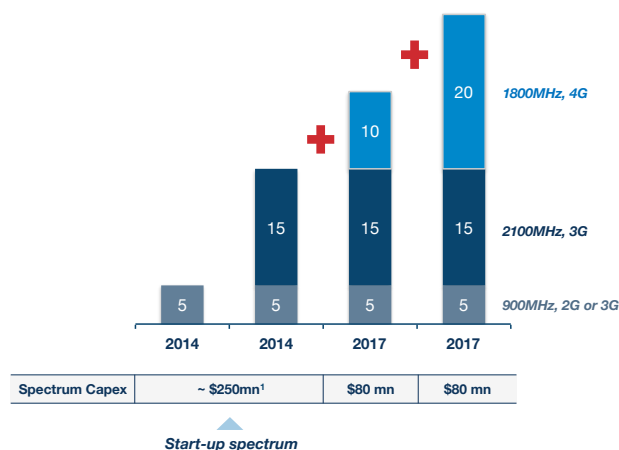
Such an approach results in the operator groups purchasing as much spectrum as possible, with allocations in some of the F&E markets as high as 35MHz to 40MHz of data spectrum.

Not everyone invests in spectrum.

For some reason, not all operator groups are as aggressive in investing in spectrum, as compared to the high RoCE ones. It's either a belief that the market will take time to mature, that usage (GB) will remain limited or just a question of aligning investments to demand.

Also, even in markets that do not have a strong incumbent operator, some entrants have invested in substantial acquisition of spectrum. Even in Pakistan, only one operator group expressed interest in purchasing 10MHz of 850MHz after it was put on auction.

Figure 9: Spectrum purchase and Capex in Myanmar by Operator Group 1



Source: Company reports, Capitel analysis

Estimated value based on pricing of 1800MHz spectrum; Total Capex was \$500mn including the cost of entry license

4. This accumulated spectrum pool is leveraged to offer large GB bucket plans to drive usage and market share

Once operators have deployed data spectrum on a reasonably large number of cell sites, the focus is on selling this GB capacity to end consumers.

Latent demand.

It is very common to see operators in F&E markets offering 4GB and 10GB plans. There are two reasons for such offerings, a) spectrum is cheap and plenty, b) user experience benchmark is very low, and c) fixed line penetration is negligible.

The per site Capex is driven by Mbps throughput rather than offered GB capacity – in developed markets, high spectrum prices as well as user expectation of high speed to support latest devices and applications (such as Netflix) increase Capex demand substantially.

Easier to sell.

Finally, it's a much easier sell for tangible data usage bucket as compared to realized speeds esp. for mobile-first users. Speed measurements are always open to discussion based on average vs. peak, loaded site vs.

unloaded sites and time of the day among multiple parameters. A monthly committed GB usage is easier for end user to understand and buy.

Figure 10: Plan details for an Operator group in Nepal



Figure 11: LTE starter bundle from 3GB per month in Pakistan



Source: Company reports, Capitel analysis

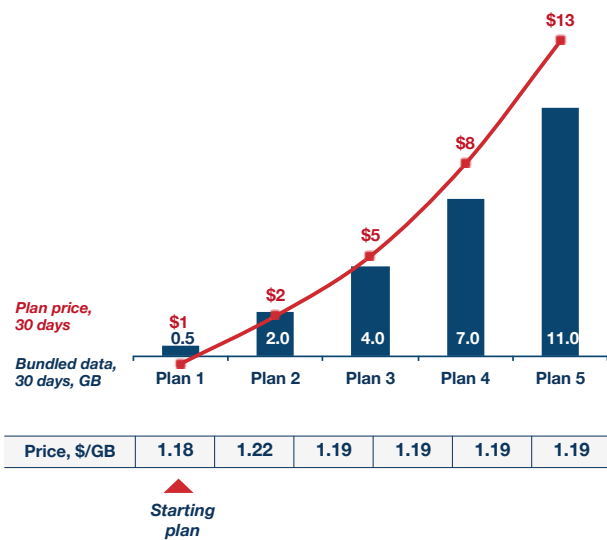
In markets with high wireline and fiber broadband penetration, the use cases on wireline (such as Netflix or Facebook videos) also start to reflect on mobile, as consumers tend to use the same applications even when they are on mobile networks. This results in similar user experience demand on mobile networks as fixed lines. In such

markets, even though the GB usage per month is low (due to high share of offload on fixed lines at home or offices), the Capex intensity tends to be high to support higher Mbps demand for faster devices and applications.

Focus is on \$ per month rather than \$/GB.

High RoCE operators typically prefer selling plans on a committed ARPU model, rather than pay-as-you-go type offerings. To monetize the substantial capacity that has been created, the effort is to create plans anywhere from 500MB to 10GB, and even 40GB at ARPU ranging from US\$1 to US\$13.

Figure 12: Plan details for operator groups with high RoCE in Myanmar, 30 day packs



This is not to suggest that these operators do not have smaller validity or smaller denomination plans – it’s the focus on upgrading consumers to high GB plans through pricing and other mechanisms, the focus on increasing data adoption through increased network coverage, and service coverage (even if that means upgrading users from 2.5G to 3G to 4G). The focus is not on rationing GB capacity or maximizing US\$/GB pricing – its on maximizing the monthly data ARPU from maximum possible data customers.

5. Model results suggest that once the wireless site network Capex is recovered in the initial years, the incremental low cost spectrum helps drive significant returns

We run a unit economics model for F&E markets, for each of the market in our coverage portfolio (Asia and EMEA). The model is structured to produce a RoCE result for various levels of the following parameters:

- spectrum purchase (MHz)
- spectrum price (\$/MHz/Pop)
- number of cells sites with 3G/4G upgrade from 2G, and active Capex
- number of new cell sites deployed for 3G/4G coverage, and passive and active Capex
- % data adoption
- % operator market share
- GB usage per sub per month, and
- Blended US\$/GB price

We focus on understanding the key levers affecting RoCE, and building scenarios on those parameters.

We find that spectrum holding is a key variable for creating network capacity (assuming a defined level of network coverage on 2G and some augmentation for 3G/4G), along with operator market share.

Operator market share is intuitive in the sense that higher market share will generally translate into a higher return – it's the level of market share at which the RoCE turns positive is of interest to us.

Myanmar.

We run the model for Myanmar for an operator group assuming 10,000 network sites (with the number of sites increasing marginally with increasing market share), and a 1GB per month blended data usage (with a marginal increase in GB usage with deployment of additional spectrum – the maximum blended usage is capped at 1.8 GB per subscriber per month).

Figure 13. Model results for RoCE for Myanmar¹

40 MHz	18%	34%	46%
30 MHz	2%	16%	26%
20 MHz	-7%	NA ²	NA ²
	20%	40%	60%

Source: Company reports, Capitel analysis

1. RoCE calculated as EBIT/Capex employed 2. Deployed spectrum can't support the traffic corresponding to high data market share, and results are not applicable

Figure 14. Model results for EBITDA Margin for Myanmar¹

40 MHz	38%	53%	62%
30 MHz	20%	39%	51%
20 MHz	7%	NA ²	NA ²
	20%	40%	60%

Bangladesh.

We run the model for Bangladesh for an operator group assuming 11,000 network sites (with the number of sites increasing marginally with increasing market share), and a 1GB per month blended data usage (with a marginal increase in GB usage with deployment of additional spectrum – the maximum blended usage is capped at 1.8 GB per subscriber per month).

Figure 15. Model results for RoCE for Bangladesh¹

20 MHz	17%	34%	47%
10 MHz	5%	20%	32%
5 MHz	-3%	NA ²	NA ²
	30%	40%	50%

Source: Company reports, Capitel analysis

1. RoCE calculated as EBIT/Capex employed 2. Deployed spectrum can't support the traffic corresponding to high data market share, and so results are not applicable

Figure 16. Model results for EBITDA Margin for Bangladesh¹

20 MHz	41%	55%	64%
10 MHz	24%	43%	53%
5 MHz	12%	NA	NA
	30%	40%	50%

6. Competitors with smaller spectrum holdings end up with a higher network cost on a per GB basis AND a lower saleable GB capacity

Even if an operator saves on spectrum cost in a F&E market, they necessarily have to provide a certain level of network coverage. In markets such as Bangladesh, some operator groups deployed 3G on 10,000 sites, whereas others deployed 3G on less than 5,000 sites.

Interplay of network and spectrum Capex.

Unlike spectrum, the requirement of number of sites can't be reduced below a certain level, as

- Regulators generally have a minimum network roll-out obligation
- Data is deployed on high frequency bands such as 2100MHz (3G) in the initial stages (followed by 1800MHz LTE or 2300MHz / 2600MHz LTE), and requires network densification
- Customers expect service availability, and operators need to at least partially match competitor coverage

Deploying less number of sites with low spectrum results in very limited GB capacity, which is a) either concentrated in few cities, or b) too fragmented across many cities. In the first case the addressable market gets limited, and in the second case the user experience is negatively affected.

Over a period of time, driven by consumer demand or by revenue pressure, operators will have to expand their 3G / 4G network to new locations. This results in an increase in cell site Capex, either by deployment of new tower

locations and / or active equipment Capex for 3G/4G access and backhaul.

The network and site Capex is also high in markets with limited tower sharing opportunities.

Higher Cost/GB.

For operators with less quantum of spectrum, the available network capacity is limited – the numerator of their cost/GB model is limited by increasing network and site cost, while the denominator is limited by reduced spectrum.

This situation results in competitors with a high US\$/GB cost model as compared to operators who topped up on affordable spectrum, and spread that spectrum over multiple sites.

7. Such competitors end up offering small MB buckets at high prices, attracting incremental user base, and losing share

Competitors typically end up with lower capacity due to lower spectrum, but still with higher cost per GB. The lower installed capacity, and the pressure to generate revenues results in either

- Very high pricing of mobile data on a per MB basis, as was witnessed in Myanmar a year after launch, or
- Rationing of mobile data, with operators selling pack size as low as 7MB, offering packs based on use cases (e.g. Facebook only packs), or restricting validity (24 hours, 7 days)

Figure 17: Illustrative plans for an operator group in F&E markets, validity ranging from 1 day to 7 days



Source: Company reports, Capitel analysis

However, the limited available capacity for sale results in limited revenue growth, and finally the data rationing and poor user experience results in limited market share gains.

Price vs. Revenues.

In some cases, operator groups fine-tune their end user offerings to match competitor offerings, and start offering packs at either lower \$/GB, or with higher GB allowance.

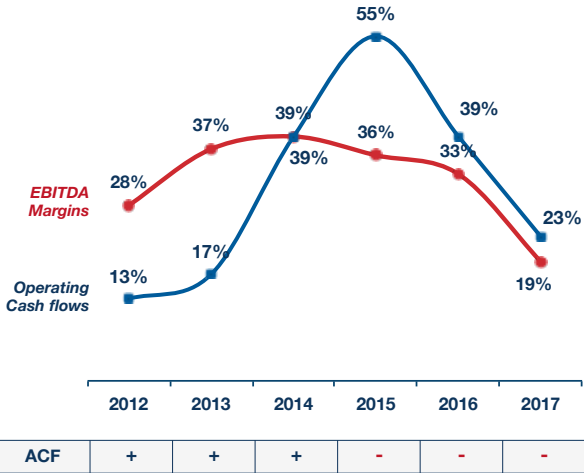
Figure 18: Illustrative plans for an operator group in F&E markets

Facebook Plus Packs	Price	Volume	USSD	SMS
2 Days	200Ks	200 MB	*4441#	Send FB1 to 4441
Weekly	999 Ks	999 MB	*4442#	Send FB7 to 4442
Monthly	3,999 Ks	3,999 MB	*4443#	Send FB30 to 4443

Source: Company reports, Capitel analysis

However, the available capacity on the network remains a constraint, and is generally limited by deployed spectrum. Selling available capacity at lower prices results in reduced revenues, and ultimately affects EBITDA margins.

Figure 19: EBITDA and Adjusted Cash Flow (ACF) in Bangladesh for Operator Group 2



8. Such a market-dimensioning model works only in markets with low spectrum cost and growing data adoption / usage

This approach of driving returns with addition of low priced spectrum is of course valid only in markets where such opportunities exist. Markets such as India with high spectrum pricing do not allow such models to be successful.

Also, the model assumes growth in data adoption in the F&E markets, and that operators are able to successfully increase blended GB usage after addition of incremental spectrum to their network. If not, then addition of spectrum will increase Capex, and due to stagnant usage / adoption, result in declining returns.

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Capitel is headquartered in Singapore with offices in New Delhi and New York.

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