

The World is becoming flat...

Overcoming infrastructure issues for mobile operators

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Flat fee offerings are emerging for voice, data and for multimedia services in many countries around the world. As flat fee offers become increasingly aggressive, it can be already observed that they cause severe quality problems for all customers consuming voice, data or multimedia services. Therefore, any pricing move is not merely a pricing move but must be accompanied by means which go beyond a cost reduction strategy. In this article we will highlight the main infrastructure issues for a mobile operator and how they could be overcome.

In this article we have also put the spotlight on the 'femto' concept. From the analysis it appears to be an interesting alternative though we do not see a mass market scenario for this new technology.

The truth about flat fee pricing

Flat fee tariffs are emerging in the mobile world in all markets and across all segments. It often starts with voice followed by data and finally multimedia services which are increasingly being sold via bundles. There is a vast breadth of offer design options, allowing operators to take turns in under-pricing each other and it is fair to expect that many services will be flat fee priced in a few years.

One recent example for flat voice packages is the Zero7¹ tariff from H3G Italy, which includes unlimited local and even international fixed calls for selected destinations. The best examples for flat² mobile broadband offerings can be found in the Austrian market. T-Mobile has launched Fairclick for €25 which includes 10GB data volume on HSDPA. When it comes to content flat fee, again H3G sets currently the top benchmarks. The X-Series which has been launched in the European H3G countries as well as in Australia and Hong Kong, comprises of a wide range of value added services, such as unlimited instant messaging, Skype calls, web surfing and mobile TV via Slingbox streaming.

The trend of flat fee offerings is often started by smaller players who have sufficient production capacity and little to loose on (by further cannibalization). However, as bigger players follow suit with similar offers, often communicating these with a much louder voice and with significantly more marketing power, the customers win and the market price settles at lower levels.

Many operators are presently working out the question how quickly they want the world to go flat and how many rounds of offers they should take. However, this is only the upper part of the equation: as tariffs go flat, usage increases in more locations and volumes which networks are required to carry, increase substantially and thus pose two very distinct infrastructure issues:

- indoor coverage
- network capacity

The issue with indoor coverage

Although often overlooked, mobile operators still struggle to ensure proper coverage, both in 2G and 3G networks. This is especially true for indoor coverage in dense urban areas. When suffering from indoor coverage wholes, operators stifle their own flat-fee service offerings, as the risk of churn increases. This has a direct impact on ARPU and subscriber base.

In 2G one would initially think that coverage problems do not exist anymore. However this is not true: indoor coverage shortages exist especially for operators relying on the 1800 MHz band. In 3G coverage problems are more obvious due to the late start of the network rollout.

¹Zero7: €49 per month including unlimited calls in all Italian networks, unlimited video calls in the H3G Italian network, unlimited calls in fixed foreign networks in zone 1 (e.g. most European countries, USA) as well as other services (partially free SMS, MMS, mobile TV basic package).

²Or "virtually" flat, with enough volume included to easily meet an average users' need.

Also the nature of the 3G frequency spectrum results in unsatisfactory indoor coverage, which especially is critical for mobile broadband services.

Indoor coverage problem can have two effects: For the share of customers where switching is not an option, the operator will miss out on revenues generated from calls which would have been made or received when outside of coverage: we estimate this to amount to about 40% of ARPU – including mobile termination. However, if the customer has a choice, he may churn all together and all revenues would be lost.

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The issue with network capacity

So far there have been no major issues relating to available network capacity. Now the introduction of flat fee offerings triggered unexpected high usage patterns resulting in exceeding capacity requirements and deteriorating service quality. Those operators reluctant to invest into 3G capacity will loose in a flat world because of lacking ARPU upsides and due to capacity shortages.

We have seen both types of operators suffer from capacity issues: integrated and mobile only operators – indicating a generally weak organizational link between the network and the pricing managers, or unanticipated overly aggressive uptake in consumption when the rate is flat. The most famous use of a flat fee tariff is the “baby phone,” where users make a call and simply don’t hang up.

Those who failed to plan ahead suffered from cell blocking rates of up to 10% – a development which definitely stifles ambitions to win or retain customers, especially since any network quality deterioration applies to all customers in a cell, regardless of their tariff choice.

Opposite to previous industry opinions there are also capacity limitations in 3G data networks. Measurements show that in average a sector capacity of approx. 0.8 to 1.0 Mbps per carrier is the norm (see Figure 1).

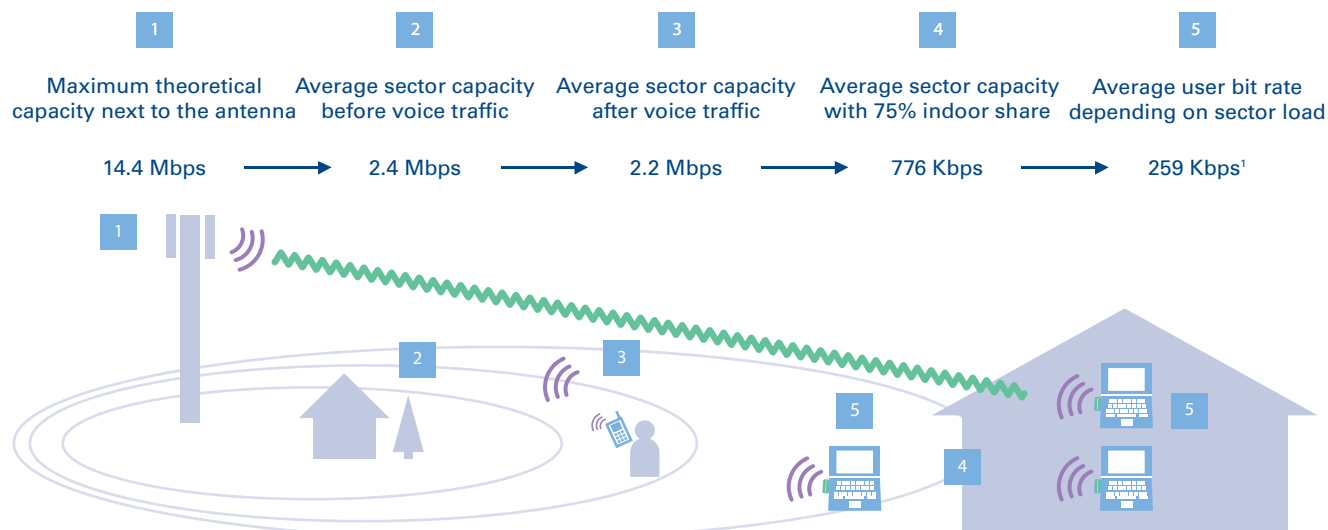
This is significantly divergent from the user bit rates of 3.6 or 7.2 Mbps currently being marketed by European operators. Mobile broadband with its underlying technology framework is not yet the substitute for fixed line broadband connections when it comes to speed.

The solution – macro build out vs. indoor CPE

There are two major options to overcome network coverage and capacity issues: Network build out and offloading to indoor customer premises equipment (CPE) through femto or UMA devices. While both options have their merits, the selection depends on market conditions, timing, technology availability and service considerations. Even though a femto business case quickly turns positive we still have major doubts regarding their mass market potential.

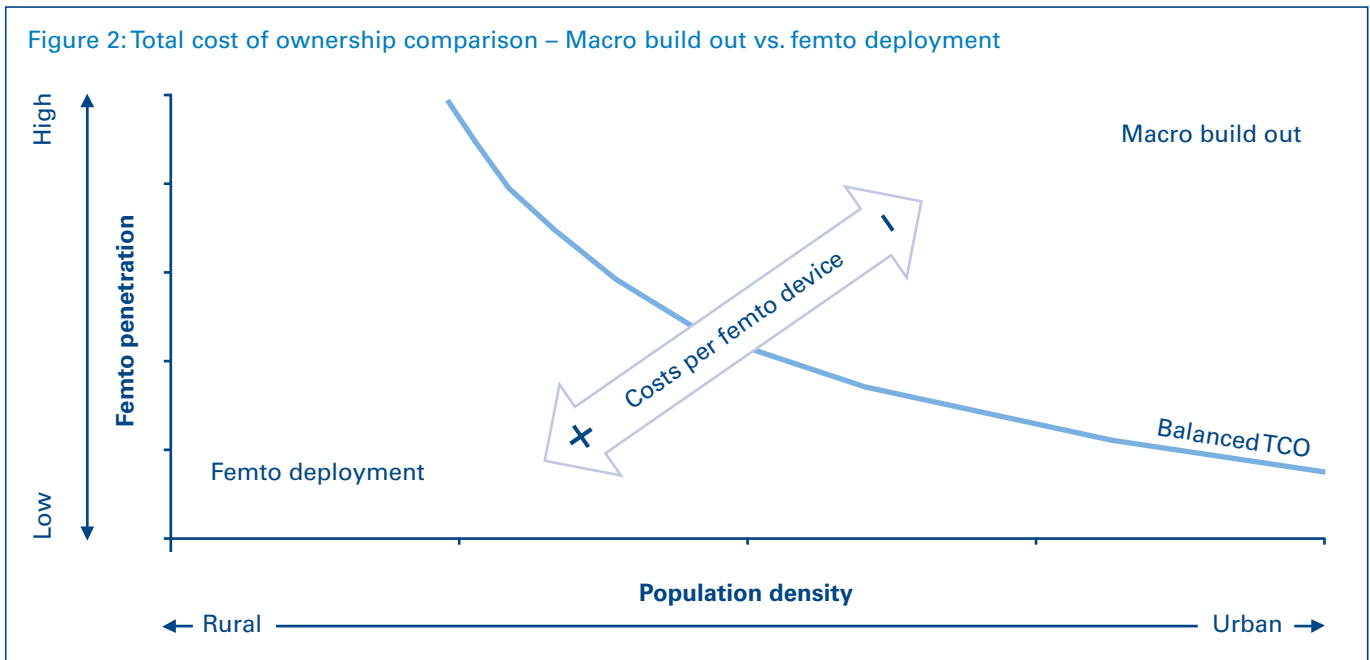
Generally, if there are substantial coverage or capacity wholes (e.g. more than 50% of customers are affected, especially in dense areas), we believe that due to the cost structure attempts should be made to solve the problem from the macro environment by pushing the network build out further (see Figure 2).

Figure 1: Myth vs. reality – The true 3G capacity



¹ e.g. assumption that available capacity is shared among three data users

Figure 2: Total cost of ownership comparison – Macro build out vs. femto deployment



For 2G however a further build out needs to be evaluated with care. Due to the limited data capabilities – which will be a key success factor for mobile operators – any investment in 2G appears to be short sighted. In order to prevent investments one common workaround is to offload existing 2G customers onto the 3G network. Generally, it seems that offloading voice traffic to existing 3G networks is a strategically sound option. However, there are also a few obstacles which need to be considered such as coverage issue not be fully addressed, inefficient 3G indoor usage and user acceptance issues.

In contrast to 2G buildout, future proof 3G buildout has its special merits. However, as we can not expect to be allowed to build substantially more than 1-2 BTS per km² in a dense urban setting there is a physical limit with regard to network capacity and coverage. Even with three carriers enabled we estimate the maximum mobile broadband penetration to be about 30% of an operator's subscriber base.

“We believe that femtos will serve only the niche segment of heavy users, which will only result in a femto penetration of maximum 10-20%.”

In case of smaller or more scattered coverage problems, we believe that both UMA and femto cells are solutions worth considering. The advantage of femto cells or UMA solutions is that they can be bundled with the “problem-causing-tariff(s)” and thus avoid any capacity issue in the first place.

Indoor CPEs must first find their way into the households on a wide-scale basis, however there are three major drawbacks of such an approach:

- It is less defensible against competitive reaction.
- It suffers from a limited addressable market as the customer requires a fixed line broadband connection.
- Congestions which occurs outside the range of the device are not resolved.

In addition there are also some significant technical and legal issues which are yet to be overcome such as frequency interference, network integration, regulatory approval, fraud protection and ongoing maintenance. Taking all the above into consideration we believe that femtos will serve only the niche segment of heavy users, which will only result in a femto penetration of maximum 10-20%.

However, withstanding all this the femto concept has become reality with Sprint launching the first femto based offering called “AIRAVE” in September 2007 in selected cities in the USA. This showcase is the first opportunity to observe the uptake of femtos in the day-to-day commercial environment.

Besides the network build out and the deployment of indoor CPEs, there is in the long term an additional possibility to increase network capacity and coverage: 3G frequency refarming seems the most preferable since it overcomes the poor propagation of the 2.1 GHz band and because it offers ample spectrum. However, guidelines are only crafted now and hardware is not available, yet. Before an operator can enjoy these benefits, the operator will suffer from three pains along the way: increasing 3G (2.1 GHz) handset penetration, 2G redesign (lowering of cluster size, freeing up of spectrum) and 3G (900 MHz) deployment.

Conclusion

We have seen flat fee tariffs emerge in many countries around the world. As markets saturate operators try to churn customers with a more attractive price offering.

What we have seen is that once voice markets turn flat and consequently mobile broadband is used to offset the ARPU decline, mobile broadband turns flat as well – yielding a much larger capacity issue if an operator is unable to offload data traffic.

As the growth of data traffic, when operators introduce flat fee offerings, appears to be exponential and not linear, the pressure of supplying enough capacity heats up drastically.

Once a trend is started operators need to adjust their infrastructure strategy in the light of their strategic decisions:

- If an operator wants to lead the pack towards a flat world, they will need to be sure to have sufficient capacity to avoid overall quality deterioration. In addition, they need to ensure enough 3G coverage and capacity to offset some of the negative ARPU implications with data services. They also should consider offloading indoor-data traffic via indoor-devices in areas where this is profitable.
- If they have much to loose in a flat world, they should be careful with the aggressiveness of the offerings to avoid capacity shortages. Generally it is better to play more on the possible variations of tariffs than making it generally flat.
- An integrated operator with substantial fixed network assets could leverage its position and consider rollout of femto cells in areas where this is profitable. While they may still want to avoid an early price battle, an incumbent operator will generally be more easily able to overcome the indoor capacity issues he may face with 3G.

However for all market players it is important that they start preparing the topic of 3G frequency refarming today, in order to provide coverage and capacity beyond the limitations of 3G in the long term.

The decision on which route to take will depend on the operator's ability to defend against cannibalization, to overcome voice capacity shortages and to deploy 3G services and indoor coverage and capacity. To stop investing in 3G in preparation for lower voice ARPUs seems short-sighted in developed countries.

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