

## **KPN Position Paper on the German Spectrum Auction**

## Management summary

- E-Plus is interested in new spectrum as an option for decreasing the cost of its plans to increase capacity and coverage in Germany. For increasing its broadband data network coverage, the most cost-effective way would be to utilize 800 MHz frequencies.
- E-Plus will take a disciplined value-driven approach in the auction so that spectrum is only acquired at the right price.
- E-Plus expects to obtain a valuable combination of spectrum due to the large available amount of spectrum.
- Even without 800MHz spectrum, E-Plus will execute planned coverage and capacity upgrades.
- E-Plus is further looking into leveraging its broad experience in partnering as more spectrum opens the scope for more partners and new forms of value-creating partnerships.

## Introduction

Today, the majority of revenues in the mobile telecommunication industry in Germany is generated by voice and SMS. These revenues have been declining due to price reductions, with significant recent growth from non SMS-data revenues almost compensating the decline. To be able to cope with the increasing growth in data traffic, current networks need to be upgraded. This will enable the mobile telecommunication industry in Germany to benefit from data growth, with substantial expected revenues in the future.

The German telecom regulator will auction 359.2 MHz of spectrum. The auction starts on 12 April 2010. KPN's subsidiary E-Plus, as well as the other German mobile network operators O2, T-Mobile and Vodafone will participate in the auction. The German mobile telecom sector is likely to benefit from this additional spectrum as it will enable improved coverage, higher capacity and increased speeds. Furthermore it offers greater flexibility and lower costs on network deployment to cope with current and future data uptake.

This paper intends to help readers better understand the various relevant aspects of the auction, whilst providing insights into E-Plus' value-driven approach.

### **E-Plus will further invest in its network to increase capacity and coverage**

E-Plus' (hereinafter the company) network strategy has always centered around investing at the right time in the right technology, based first and foremost on customer demand. Thanks to this approach, the company has over the years been able to generate a healthy Return On Capital Employed (ROCE).

Today, E-Plus covers 90% of the German population with mobile broadband, primarily based on EDGE and 3G (UMTS & HSPA). The company currently experiences increased demand for mobile data communication and therefore believes the time is now right to accelerate the upgrade of its network to higher capacity and improved data coverage.

E-Plus has different options for achieving its targeted network upgrades, for which additional spectrum could be very helpful. Regardless of additional spectrum, the recent partnership with

network supplier ZTE on UMTS/HSPA expansion and the use of their future-proof technologies will support E-Plus in further expanding its data network. The partnership furthermore ensures a fast roll-out of mobile broadband at low cost.

Although current spectrum is sufficient to serve customer demand for voice and data, additional spectrum could be helpful in supporting future mobile broadband demand at low cost. Since E-Plus uses a value-driven and pragmatic approach, new frequencies will only be acquired if the price is right. Even without 800MHz spectrum, the company's planned coverage and capacity upgrades will be executed.

## Outline of the German spectrum auction

### Frequencies on offer

With the auction of 359.2 MHz of spectrum (see table 1), the total amount of spectrum in the German market will more than double. Many value-creating combinations of current and new spectrum are possible, based on numerous variables like the specific location of spectrum in the band, the type of spectrum, availability of paired and unpaired spectrum, as well as the large available amount of spectrum. The license duration for all auctioned frequencies is until 31 December 2025. The licenses are not linked to a certain technology; i.e. operators are free to choose a standard of their choice, such as LTE, HSPA, UMTS or other transmission techniques.

MHz	Current allocation					Auction 2010	
Band	T-Mobile	Vodafone	E-Plus	O2	Total	Blocks	Total
800 MHz	-	-	-	-	-	6 blocks 2 x 5	60
900 MHz	2 x 12.4	2 x 12.4	2 x 5	2 x 5	69.6	-	-
1.8 GHz	2x 5	2 x 5.4	2 x 17.4	2 x 17.4	90.4	5 blocks 2 x 5	50
2.1 GHz	2 x 10	2 x 10	2 x 10	2 x 10	80	4 blocks 2 x 5	40
	1 x 5	1 x 5	1 x 5	-	15	1 block 1 x 5 1 block 1 x 14.2	19.2
2.6 GHz	-	-	-	-	-	14 blocks 2 x 5 10 blocks 1 x 5	190
Total	59.8	60.6	69.8	64.8	255	359.2	359.2

Table 1: Current and available spectrum in Germany

### Frequency characteristics

- Coverage: low frequencies have better propagation conditions (indoor coverage) and reach further than high frequencies
- Capacity: each frequency block has the same capacity, i.e., 5 MHz (paired) spectrum at 800 MHz can transmit/receive the same amount as 5 MHz (paired) spectrum at 2.6 GHz

### Discrimination at low frequencies

At 800 MHz, certain bidding caps are applied. E-Plus and O2 (E-network) are allowed to bid for 2x15 MHz (meaning three blocks of 2x5 MHz) at maximum, whereas T-Mobile and Vodafone (D-network) are allowed to bid for 2x10 MHz at maximum. This cap originates from the fact that T-Mobile and Vodafone have more frequencies in the 900 MHz band. Nevertheless, the auction

design still enables T-Mobile and Vodafone to obtain, in total, 2x22.4 MHz of frequencies below 1 GHz whereas E-Plus and O2 are restricted to 2x20 MHz of frequencies below 1 GHz.

E-Plus and O2 have challenged this discrimination in court as BNetzA missed an opportunity to remedy the asymmetries in the frequency endowments which have resulted from the later licensing of the E-network operators. On 17 March 2010 the Administrative Court of Cologne rejected the lawsuit – however allowing further proceedings at higher courts.

As a result, BNetzA will have to assess the impact of opening up the 900 MHz band (re-farming) on the competitive situation and potentially reallocate 900 MHz frequencies in order to eventually create a level playing field for all mobile operators after the auction.

If the outcome of the auction does result in a further strengthening of the dominant operators' position, E-Plus will strengthen its actions at both German and EU level to ensure proper monitoring of the competitive situation in Germany, and seek adequate redress. This might include a strong case to rebalance the distribution of lower frequencies, at the latest when the 900MHz licenses expire in 2016.

### **Bidding process**

The bidding process will be structured as a 'simultaneous multi-round auction', which is similar to, for instance, the auction of the German UMTS licenses in 2000. The minimum price for a block of 2x5 MHz (paired) spectrum amounts to EUR 2.5m.

The auction can take anything between a couple of days to several weeks, depending on the bidding activity of the four participants. The auction will end for all blocks at the same time (no interim winners for any blocks), once no further bids for any of the blocks have been submitted. The auction will have several rounds per day. After each round, the regulator will publish via their website ([www.bundesnetzagentur.de](http://www.bundesnetzagentur.de)) the highest bid and name of the bidder for each of the different blocks on auction. These interim snapshots of the auction, however, do not give any hint on likely final results or bidding activities / strategies of any of the operators involved. Being top ranked or not does not mean a halt on bidding in this block by one or another operator.

### **Roll-out obligations**

Each frequency band has specific roll-out obligations for the successful bidder. Relevant roll-out obligations of licensees at 1.8 GHz, 2.1 GHz, and 2.6 GHz spectrum are already fulfilled by all bidders due to their actual network roll-out with frequencies in use today.

The 800 MHz licenses are being auctioned to provide every German household with broadband coverage. The requirement per federal state is therefore to build out in four stages and in areas with currently no broadband, starting in:

- Smaller towns and districts with 5,000 or fewer inhabitants (priority stage 1), then
- Towns and districts with between 5,000 and 20,000 inhabitants (priority stage 2), then
- Towns and districts with between 20,000 and 50,000 inhabitants (priority stage 3);
- The 4th priority stage is for towns and districts with more than 50,000 inhabitants.

Priority stage 2 roll-out can only begin in a federal state when at least 90% of the population in the towns and districts specified by that federal state for priority stage 1 has been provided with access. The same principle applies with regard to the transition from priority stage 2 to priority stage 3 and from priority stage 3 to priority stage 4.

If, in the period up to 1 January 2016, towns and districts are served by other providers/ technologies using equivalent or advanced broadband solutions such as DSL, this coverage will

count towards the 90% target roll-out obligation. Furthermore, BNetzA allows for entering into cooperation agreements and for leasing frequencies between mobile network operators as permitted under the regulatory and competition law frameworks.

## **New spectrum broadens scope of opportunities to increase capacity and coverage**

The auction provides several opportunities for the German mobile telecommunication industry and Germany at large. The most tangible opportunities are to reduce overall network costs and minimize investments for the mobile telecommunication industry, whilst improving capacity and coverage for all consumers and businesses in Germany.

### **Increase capacity**

Substantially growing traffic demand requires the extension of current network capacity. This can be realized in three ways – and/or a smart combination of these:

- Increasing the efficiency of the spectrum
  - Within existing technology (e.g., HSPA evolved instead of HSPA)
  - With new technology (e.g., LTE instead of HSPA)
- Using new spectrum and additional carriers; by doubling the amount of spectrum, capacity of a single base station doubles
- Building new base stations; by doubling the number of base stations, capacity almost doubles

The most cost-effective and fastest way of enhancing network capacity is to increase spectral efficiency within the deployed radio technology, which, depending on the equipment in place, may only be a software upgrade. This is the approach E-Plus follows in Germany, independent of the auction outcome. The company enables HSPA evolved in its deployed HSPA network, thereby increasing capacity.

Increasing spectrum efficiency by deploying next generation technology (e.g., LTE on existing HSPA/HSPA evolved) requires significant initial investments and also depends on sufficient penetration of customer devices to support this technology, but allows for handling long-term traffic development.

Utilizing current base stations with additional carriers and using new spectrum could also be cost effective. Additional required equipment is a fraction of the cost of the existing base station. Adding to existing base stations generates only a relatively modest increase in Opex.

Splitting cells and building new base stations is a relatively costly way of increasing capacity. To double capacity of one existing base station, building a second base station is required, which doubles both Capex and Opex.

The decision to either upgrade existing base stations with additional carriers or to split cells strongly depends on the price for spectrum and the required capacity upgrade. Required capacity upgrades differ widely between, and even within regions.

Overall, E-Plus has identified several scenarios, considering different prices of new spectrum. E-Plus will implement the most cost-effective combination of measures, and may follow a different approach for different regions to increase network capacity.













	Capex	Opex	New spectrum
<b>Increase spectral efficiency</b>			
- within deployed technology			
- by deploying next generation technology			
Deploy additional carriers			
Build capacity base stations			

Table 2: Options to increase the capacity of a network with their impact on Opex, Capex and their spectrum requirement. Level of shading corresponds to level of Opex/Capex or amount of new spectrum required, all illustrative.

### Increase coverage

E-Plus is committed to increase coverage of its high-speed data network with a broad geographic footprint. There are two options for realizing this plan:

- Building a relatively dense base station network, i.e., building new base stations for high frequency spectrum in existing spectrum holdings at 2.1 GHz or new spectrum at 1.8 GHz or 2.6 GHz
- Exploiting the advantageous propagation conditions of lower frequencies allowing wide area coverage with substantially fewer base stations by acquiring 800 MHz in the forthcoming auction

The most cost-effective way of increasing broadband data network coverage would be to deploy 800 MHz equipment on existing and relatively few new base stations. Important to remember is the fact that each spectrum block of 2x5 MHz has the same capacity, independent of the band. As a result, a dense base station network would still be required for providing a high-capacity mobile-data network in urban areas.

For increasing coverage, the price of spectrum blocks in various bands and the availability of current spectrum eventually determine what the most cost-effective solution would be. If the price for 800 MHz would be disproportionate, E-Plus will build its future network on a combination of existing and higher frequencies.

## **E-Plus will take a disciplined value-driven approach in the auction so that spectrum is only acquired at the right price**

E-Plus is willing and capable to invest in new spectrum but not at any price. A value-driven approach is implemented to assess the price of the spectrum, based on the cost/cash-out benefits that E-Plus would generate. It includes strict hurdle rates, adequate returns within reasonable time frames, and realistic business plan assumptions.

In order to assess the value of the spectrum, many aspects have been considered as described in the previous chapter. Furthermore, other aspects have been included in the considerations such as off-loading traffic, employing other technologies, technology migration and compression techniques.

The value-driven approach and all analyses have been incorporated in a model and a process that assesses at each round in the auction the most cost-effective mix of spectrum blocks. The process also takes into account the future capacity needs of E-Plus' current and potential partners, the company's customers, as well as other competitive considerations. If all interesting spectrum block combinations become more expensive than a set maximum value, it would be more cost-effective for E-Plus to upgrade its network without using new spectrum. In this case, the company will continue with the existing strategy of improving capacity and coverage without buying new spectrum.

### **Spectrum blocks**

Additional spectrum is a very cost-efficient solution for increasing capacity and thereby preventing future network congestion. Congestion is however only an issue for a very limited number of base stations. One additional frequency block would already be very useful in eliminating most congestion risk. Second and subsequent blocks would be required at even fewer base stations. In rural areas, providing coverage is the main challenge. One block of low frequencies would already facilitate upgrades in both coverage and capacity.

E-Plus expects to obtain a valuable combination of spectrum due to the large available amount of spectrum.

### **E-Plus is further looking into leveraging its broad experience in partnering**

Another key element of E-Plus' value-driven approach is the core principle of the company to work together with partners. The company has always been open to partnerships for leveraging investments, servicing specific customer segments to create customer pull, reduce costs and share risks. This partnership approach has resulted in a leading position for the whole KPN Group with MVNO partners in Germany, Belgium and the Netherlands. More spectrum and wireless broadband opens the scope for more partners and new forms of value-creating partnerships.

## **Concluding remarks**

- E-Plus is interested in new spectrum as an option for decreasing the cost of its plans to increase capacity and coverage in Germany. For increasing its broadband data network coverage, the most cost-effective way would be to utilize 800 MHz frequencies.
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