



# The costs to end users of prepay mobile packages: the US and the EU compared

A note for Vodafone

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## 1 Introduction

Commissioned by Vodafone, this study compares prepay packages in the US and the European Union in terms of cost of ownership. Our focus is on comparing cost of ownership for the low usage customers who, in the absence of a suitable prepay mobile package, might not be connected to the telecommunications network at all.

We find that US prepay tariffs (especially those provided by the biggest operators), require minimum spend commitments that make them significantly more expensive for low users than the corresponding EU packages. Smaller US operators are more lenient, but costs are still significantly more than similar packages in the EU for lower than average prepay users. In summary, low use pre-pay users in the US pay more, and have a restricted choice of network operator.

## 2 The low usage profiles

We consider the cost of ownership for the three prepay end users profiled in Figure 1:

- The **average** prepay user, who generates 120 minutes of voice calls, inbound or outbound, per month
- The **low usage** prepay customer who generates 40 minutes of such voice calls per month
- The **very low usage** prepay customer who generates 20 minutes of voice calls per month.

These profiles are based on analysis of the calling records of Vodafone's prepay customers in Europe.

**Figure 1 The prepay customer profiles used**

Pre pay profile	<i>Case 1</i>	<i>Case 2</i>	<i>Case 3</i>
Description	<i>Average prepay</i>	<i>Low use prepay</i>	<i>Very low use prepay</i>
Number of calls out per month	30	10	5
Number of minute out	60	15	5
Number of calls in per month	30	10	5
Number of minute in	60	25	15
Total calls per month	60	20	10
Total minutes per month	120	40	20
Number of days on which phone is used	26	15	9

Note that we have calculate the number of days on which the phone is used to either make or receive calls for each of the profiles. This parameter is required to assess the average end user costs for the US packages. The rationale behind the calculations is set out in Annex A.



### **3 The prepaid packages considered**

#### **US prepaid**

There are five major providers of prepaid packages in the US – AT&T Wireless, Verizon, Sprint, T-Mobile and Virgin Media. The key charges for those prepaid packages aimed at the low volume user are as follows

##### **AT&T Wireless - Go Phone package**

- The user pays \$0.25 per minute for voice calls made to or received from any network at any time
- Alternatively the user pays \$0.10 per minute for such voice calls plus \$1 per day on the days on which the phone is used to make or receive calls
- The user tops up his or her prepaid account at regular intervals and the minimum top-up is \$15
- Top ups of less than \$30 per month, the relevant amount for low-volume use, have a 30 day expiration period. If the user fails to top-up within this 30 days then any credits remaining in the account are lost at the end of the period. If the user does top-up then credits remaining at top-up are carried forward, together with the top-up itself for the next 30 day period.

##### **The Verizon InPulse package**

- The user pays \$0.10 per minute for off-net calls made or received and nothing for on-net calls
- In addition the user pays \$0.99 per day for every day on which the phone is used to make or receive calls
- The rules for topping up credits are the same as for the AT&T Go Phone package.

##### **T-Mobile Pay As You Go**

- The user pays \$10 for 30 minutes of use, \$25 for 130 minutes or \$50 for 400 minutes
- The user can top up in \$10, \$25 or \$50 increments to buy more minutes as appropriate
- Credits expire after 90 days

##### **Sprint Boost Mobile Pay As You Go Basic**

- The user pays \$0.10 per minute for on net or off peak call minutes – inbound or outbound
- The user pays \$0.20 per minute for off net, peak time, call minutes – inbound or outbound
- The minimum top up is \$10
- Credits expire after 90 days

##### **Virgin Mobile**

- The user pays \$0.18 per minute for all call minutes – inbound or outbound
- The minimum top up is \$20

- Credits expire after 90 days

### EU prepay packages

We have selected for assessment two UK and two German prepay packages:

- The Racoon package from Orange UK
- the Everyone package from T-Mobile UK
- The Xtra Click package from T-Mobile Germany
- The Zehnsation package from E-Plus Germany

Under both of the UK packages:

- The end user is charged 15 pence per minute for all outbound voice calls regardless of when the calls are made and whether calls are on- or off-net
- There is no charge for inbound calls
- The conditions on expired credits of the US packages do not apply. Credits last until the user changes package or supplier, providing that the end user uses the phone at least once every 90 or 180 days to make a call.

Under the **T-Mobile** package in Germany the user pays €0.05 per minute for outbound on net calls and €0.19 per minute for outbound off net calls. Under the **E-Plus** package in Germany the user pays €0.10 per minute for outbound calls when the top up is €20 or more and €0.25 per minute for outbound calls otherwise. In neither case are there any charges for inbound calls or any time limits on use of the top up credits.

Figure 2 compares the key characteristics of the nine packages in tabular form.

**Figure 2 The nine packages compared**

<i>Package</i>	<i>Price per minute</i>	<i>Price applies to incoming</i>	<i>Per day charge</i>	<i>Minimum top-up</i>	<i>Top-up expiry</i>
US – AT&T Go Phone	\$0.25 <b>or</b> \$0.10	Yes	None <b>or</b> \$1.00	\$15	30 days
US – Verizon InPulse	\$0.10 off-net No charge on-net	Yes	\$0.99	\$15	30 days
US – T-Mobile Pay as you go	\$10 for 30 minutes	Yes	None	\$10	90 days
US – Sprint Pay as you go Basic	\$0.10 on-net or off-peak \$0.20 off-net peak	Yes	None	\$10	90 days
US – Virgin Mobile	\$0.18	Yes	None	\$20	90 days
UK – Orange Racoon	£0.15	No	None	n/a	None, provided sub makes 1 call every 90/180 days
UK – T-Mobile Everyone	£0.15	No	None	n/a	None, provided sub makes 1 call every 90/180 days
Germany - T-Mobile Xtra Click	€0.05 on-net €0.19 off-net	No	None	n/a	None
Germany – E-Plus Zehnsation	€0.10 if >€20 top-up €0.25 if <€20 top-up	No	None	€20 to get the 10c/min rate n/a otherwise	None

## 4 The end user costs compared

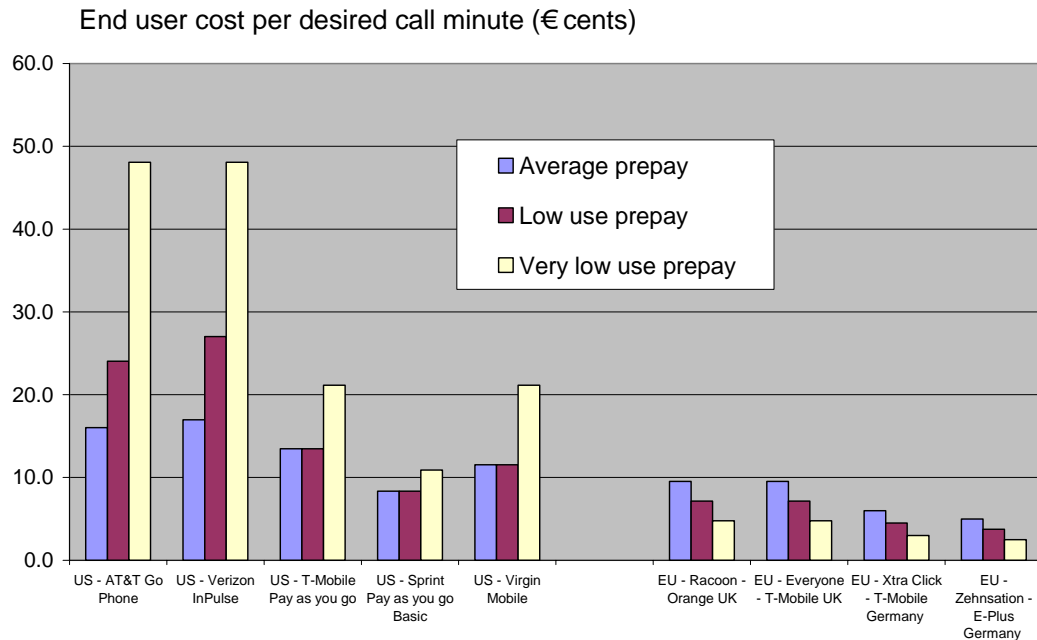
The US packages are all designed to varying degrees to encourage the user to make more calls or to spend more time on the phone than he or she might wish, given that otherwise the credits are lost. To enable us to compare the end user costs across the packages we use the concept of the *average end user cost per desired call minute* in which we divide the monthly expenditure required to maintain a workable phone by the number of call minutes which the user would wish to make, as reflected by the calling patterns of low usage end users in the EU.

Using this metric the end user costs of the various packages are as set out in the table of Figure 3 and the graph of Figure 4. Annex B provides details of the calculations and assumptions used.

**Figure 3 The end user costs compared (in €cents per minute)**

	<i>Average prepay</i>	<i>Low use prepay</i>	<i>Very low use prepay</i>
US - AT&T Go Phone	16.0	24.0	48.1
US - Verizon InPulse	17.0	27.0	48.1
US - T-Mobile Pay as you go	13.5	13.5	21.2
US - Sprint Pay as you go Basic	8.3	8.3	10.9
US - Virgin Mobile	11.5	11.5	21.2
EU - Racoon - Orange UK	9.5	7.1	4.8
EU - Everyone - T-Mobile UK	9.5	7.1	4.8
EU - Xtra Click - T-Mobile Germany	6	4.5	3
EU - Zehnsation - E-Plus Germany	5	3.75	2.5

Figure 4 The end user costs compared graphically

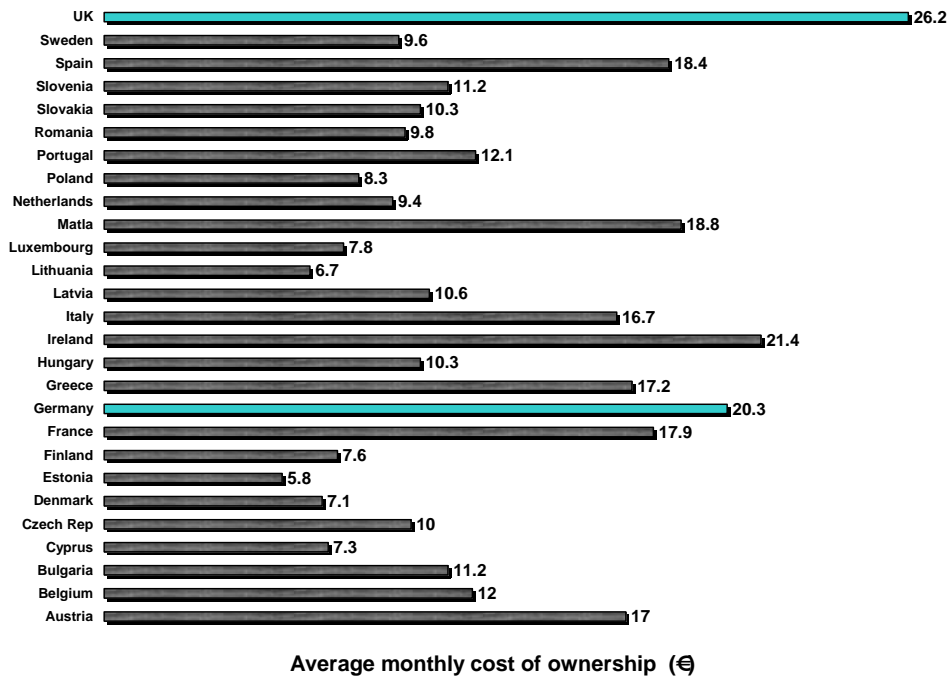


We can see from Figure 4 that:

- The US packages are generally more expensive than the EU packages
- The AT&T and Verizon packages are especially expensive
- Even the cheapest of the US packages (from Sprint) is more than twice as expensive as an EU package for the very low volume user
- The rational low volume user in the US has little choice when compared with his or her EU counterpart. In the typical EU member state there may be a choice of three or four, price competitive, prepay packages. In the US there is only one package which comes close to EU prices.

The question arises as to whether, in selecting UK and German prepay packages, we might be choosing packages which are cheap by EU standards, so invalidating the conclusions set out above. This seems unlikely. Figure 5 provides a comparison of the monthly cost of ownership in the 27 EU member states for mobile users who generate 30 outbound calls per month (the same as in Case 1). We can see that, far from being cheaper than equivalent packages in other EU member states, UK and German packages are more expensive than the EU average.

**Figure 5 Comparison of mobile cost of ownership across the EU – low usage basket**



Source: Report on Telecoms Price Development 1987 to 2007, Teligen, April 2008



## Annex A The number of days on which a phone is used

We assume that  $N$  calls are placed independently at random times during a month of 30 days. The probability that on any particular day at least one call is placed is given by:

$$1-(29/30)^N$$

So:

- If  $N = 1$ , the probability is 0.0333, and the expected number of days on which at least one call is made is 30 times this = 1.0
- If  $N = 2$ , the probability is 0.0656, and the expected number of days on which at least one call is made is 30 times this = 2.0
- If  $N = 3$ , the probability is 0.0967, and the expected number of days on which at least one call is made is 30 times this = 2.9 etc

So:

- If  $N = 10$  the probability is 0.287, and the expected number of days on which at least one call is made is 30 times this = 8.6
- If  $N = 20$  the probability is 0.492, and the expected number of days on which at least one call is made is 30 times this = 14.8
- If  $N = 60$  the probability is 0.869, and the expected number of days on which at least one call is made is 30 times this = 26.1.



## Annex B Calculating the end user costs

### The AT&T Go Phone package

In Case 3 (the very low usage customer) the rational end user would pay:

- An initial \$15 to put credit into the account
- \$5.00 in usage charges (20 minutes x \$0.25 per minute). Under the alternative set of usage charges the user would paid \$11 (20 minutes x \$0.10 per minute + 9 days x \$1 per day). We assumed the user chooses the first set of usage charges

At the end of the month the user then has a credit of \$10 (\$15 less the \$5 usage changes). In subsequent months the user might repeat this pattern, and so gradually accumulate a large credit. Alternatively the user might fail to top-up one month, at which point the accumulated credit is lost. In either case the minimum monthly fee for a useable phone is \$15.

We can see that the package is designed to encourage the user to make more calls or to spend more time on the phone than he or she might wish, given that otherwise the credits are lost. To enable us to compare the end user costs across the packages we use the concept of the *average end user cost per desired call minute* in which we divide the monthly expenditure on the phone by the number of call minutes which the user would wish to make, as reflected by the calling patterns of low usage end users in the EU. With this metric the cost of using the AT&T Go Phone package is:

- \$0.25 per minute in Case 1 (120 minutes x \$0.25/120 minutes)
- \$0.375 per minute in Case 2 (\$15/40 minutes)
- \$0.75 per minute in Case 3 (\$15/20 minutes)

### The Verizon InPulse package

Figure B1 provides calculations of the average end user cost per desired call minute. We can see that:

- In Cases 1 and 2, the usage charge rather than the top-up fee is the binding constraint
- The average end user cost per minute is slightly higher than with the AT&T package in Cases 1 and 2.

**Figure B1 End-user costs per desired call minute – Verizon InPulse prepay package**

Case	Case 1	Case 2	Case 3
Description	Average prepay	Low use prepay	Very low use prepay
Call minutes per month - in+out	120	40	20
Call minutes off net	60	20	10
Days used per month	26	15	9
Charge per minute off net (\$)	0.10	0.10	0.10
Charge per day used (\$)	0.99	0.99	0.99
Usage charge (\$)	31.74	16.85	9.91
Minimum top up (\$)	15	15	15
Effective charge per month (\$)	31.74	16.85	15
End user cost per desired call minute (\$)	<b>0.26</b>	<b>0.42</b>	<b>0.75</b>

### T-Mobile Pay As You Go

In Case 1 the user buys \$25 packages each month and the rate is \$0.21 (\$25/120 minutes)

In Case 2 the user buys \$25 packages each quarter and the rate is \$0.21 (\$25/120 minutes)

In Case 3 the user buys two \$10 packages each quarter and the rate is \$0.33 (\$20/60 minutes)

### Sprint Boost Mobile Pay As You Go Basic

We assume that 70% of minutes are charged at \$0.10 per minute and 30% at \$0.20 per minute

In Cases 1 and 2 the top up constraints do not bind and the user pays the blended rate of \$0.13 per minute

In Case 3 the user pays the top up fee of \$10 every quarter for 60 minutes of use ie a rate of \$0.17 (\$10/60 minutes)

### Virgin Mobile

In Cases 1 and 2 the top up constraints do not bind and the user pays the standard rate of \$0.18 per minute

In Case 3 the user pays the top up fee of \$20 every quarter for 60 minutes of use ie a rate of \$0.33 (\$20/60 minutes)

### EU prepay packages

Figure B2 calculates the end user cost per desired call minute for the two UK packages while Figures B3 and B4 do the same for the two German packages.

**Figure B2 End-user costs per desired call minute - UK packages**

Case	Case 1	Case 2	Case 3
Description	Average prepay	Low use prepay	Very low use prepay
Call minutes per month	120	40	20
Call minutes out	60	15	5
Charge per minute out (£)	0.15	0.15	0.15
Usage charge per month (£)	9.00	2.25	0.75
End user cost per desired call minute (£)	<b>0.075</b>	<b>0.0563</b>	<b>0.0375</b>

**Figure B3 End-user costs per desired call minute – T-Mobile Germany**

Case	Case 1	Case 2	Case 3
Description	Average prepay	Low use prepay	Very low use prepay
Call minutes per month	120	40	20
Call minutes out	60	15	5
Charge per minute out (€) (1)	0.12	0.12	0.12
Usage charge per month (€)	7.20	1.80	0.60
End user cost per desired call minute (€)	<b>0.06</b>	<b>0.0450</b>	<b>0.03</b>

(1) Blended rate of 50% on net and 50% off net

**Figure B4 End-user costs per desired call minute – E-Plus Germany**

Case	Case 1	Case 2	Case 3
Description	Average prepay	Low use prepay	Very low use prepay
Call minutes per month	120	40	20
Call minutes out	60	15	5
Charge per minute out (€) (1)	0.10	0.10	0.10
Usage charge per month (€)	6.00	1.50	0.50
End user cost per desired call minute (€)	<b>0.05</b>	<b>0.0375</b>	<b>0.025</b>

(1) Assuming €20 top up

## Currency conversion rates

We convert the end user costs per minute from \$ and £ to € using the following exchange rates:

- \$1.56 per €
- £0.787 per €