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# Benchmarking Methodology for the Telecoms Price Benchmarking Study for Arab Countries



Produced for  
**AREGNET**

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**Produced by**  
**Teligen, Strategy Analytics Ltd**

***Authorised Contact Person***

Halvor Sannæs

***Director Tariff Services***

Telephone: +47 3702 3400

Email: [hsannaes@strategyanalytics.com](mailto:hsannaes@strategyanalytics.com)

Web: [www.strategyanalytics.com](http://www.strategyanalytics.com)

***Company details***

Teligen, Strategy Analytics Ltd

Great West House, Great West Road,

Brentford TW8 9DF, UK

Main Telephone number: +44 208 185 0402

## A. Introduction

Teligen has produced a Price Benchmarking study commissioned by TRA Bahrain on behalf of AREGNET. This study covers four different types of telecoms services: PSTN, Mobile, Leased Line and Broadband. For each of these services a basket methodology is used for a comprehensive price comparison across countries.

The basket methodologies for PSTN, Mobile and Leased Lines are identical to those used by the OECD (Organisation of Economic Co-operation and Development) for their ongoing price benchmarking. Teligen is maintaining and developing these methodologies on behalf of the OECD, and is producing the quarterly results for the OECD countries.

For this study the OECD basket methodologies have been adapted slightly to the countries covered, as explained below. It is still possible to compare the results from this study with the OECD member country results.

The basket methodology for Broadband services is developed by Teligen, and used in various studies for clients and public bodies in Europe.

All baskets are available as products and/or services from Teligen on a general basis covering European and OECD countries.

In addition to these 4 baskets this study also covers a simpler call cost comparison for PSTN.

This document describes the methodologies and structures for the 4 baskets and the simple call cost comparison for PSTN.

### A.1. Background data

For this study the exchange rate data has been taken from the OANDA web service on [www.oanda.com](http://www.oanda.com). OANDA is a service that offers a comprehensive set of Internet-based currency tools, including an online currency converter - this enables easy conversion of currencies between most countries for specific dates, based on interbank market rates.

Data was taken on the 1 January 2010.

The Purchasing Power Parity (PPP) exchange rates are taken from the World Bank database of Comparative Price Levels (CPL) that uses data from 2005. This is the most recent CPL data from the World Bank that covers the majority of the countries in this study. The CPL is a correction factor for the market exchange rate to calculate current PPP rates.

For a few countries not listed in the World Bank database the CPL has been assumed to values close to comparable countries in the region. The values are shown in bold in the table below.

The VAT information is taken from a variety of sources in the Internet as there is no single consistent source for tax information. Some information is found on the Deloitte website [www.deloitte.com](http://www.deloitte.com).

Related to:	US\$	US\$ PPP	%	Currency
Algeria	0.014150	0.028300	17.0 %	DZD
Bahrain	2.680700	4.061667	0.0 %	BHD
Comoros	0.002913	0.005111	0.0 %	KMF
Djibouti	0.005907	0.012306	19.0 %	DJF
Egypt	0.184900	0.660357	10.0 %	EGP
Iraq	1.000000	2.631579	0.0 %	USDx
Jordan	1.412400	2.615556	16.0 %	JOD
Kuwait	3.487400	4.777260	0.0 %	KWD
Lebanon	0.000672	0.001199	10.0 %	LBP
Libya	0.822400	2.056000	0.0 %	LYD
Mauritania	0.003875	0.010473	0.0 %	MRO
Morocco	0.131100	0.238364	20.0 %	MAD
Oman	2.666100	4.443500	0.0 %	OMR
Palestine	0.264500	1.322500	0.0 %	ILS
Qatar	0.278100	0.370800	0.0 %	QAR
Saudi Arabia	0.266800	0.416875	0.0 %	SAR
Somalia	1.000000	3.333333	0.0 %	SOS
Sudan	0.437700	0.994773	10.0 %	SDG
Syria	0.022420	0.059000	0.0 %	SYP
Tunisia	0.755900	1.679778	18.0 %	TND
UAE	0.272300	0.363067	0.0 %	AED
Yemen	0.004920	0.013667	10.0 %	YER
UK	1.612900	1.366864	17.5 %	GBP
USA	1.000000	1.000000	10.0 %	USD
France	1.436900	1.249478	19.6 %	EUR

## A.2. Tariff data

The tariff data used in this study is researched by Teligen from Internet sources, mainly operator websites. As some of the services are only presented with a minimum of price information on the net, Teligen has sought further clarifications from the operators and the regulators. In some cases it has not been possible to establish enough price information to conclude the benchmarking for a service, and this will give a gap in the benchmarking results.

The tariff data is current as of January 2010.

## B. Basket methodologies

The so called "Basket" approach relates to a theoretical shopping basket where one can assume that a shopping basket is filled with the same amounts of equivalent goods in different shops, and then the cost of the basket content is compared.

The objective of the basket approach is to create a like-for-like comparison between different providers of a service. However, for the results to be comparable the services included in the basket must be reasonably comparable.

For example, a telephony service is more or less the same thing in different countries and from different providers. But if one provider offers a service that has specific limitations, for example no access to international calls, this service will not be comparable with other services that allow international calls.

Great efforts are made to make sure that all the elements required by the basket definition are incorporated in each tariff entry. It is equally important that the calculations of the individual costs are true to the price structure of each tariff.

The “Basket Results” are created by applying the basket definition of individual calls and service parameters to the prices of each tariff. Fixed cost elements are simply calculated to the period of for example one year, while call and message elements may be significantly more complicated to calculate in a consistent manner across all tariffs. The number of calls of a given type (e.g. Local) is combined with the average duration of calls at different times of day and the distribution of the calls across the day and week to calculate the cost of such calls as defined by the basket.

These calculations produce an annual or monthly cost for each tariff element, and these costs are comparable across all tariffs. In the end the sum of the element costs for one tariff will produce the total cost of using the tariff. As all tariffs are calculated with the same set of rules, the results are also comparable.

The structure and metrics of the basket definition is critical to any comparison. If the traffic volumes and structure are too different from the real world situation the results may not be relevant for a meaningful comparison. The OECD has developed a comprehensive set of basket definitions for different types of services. These definitions are based on real traffic information from the majority of the OECD Member Countries around the world, and have produced a stable set of international benchmarking results for nearly two decades. Teligen has been working closely with the OECD through the development and implementation of these basket definitions, and is providing on-going updates to the OECD basket results.

The OECD baskets are produced specifically to facilitate meaningful international comparisons of prices. These baskets may not be directly comparable with the usage profiles experienced in any one country, and that is not the intention. More specific national usage profiles can be used for comparisons of prices seen from a national point of view, and may give different results.

Please note:

The OECD basket methodologies were revised in 2009/2010. However, the definitions were not adopted by the time the data collection and analysis started. For consistency with previous years we have used the previous (2006) basket definitions in this study. But in order to be able to draw on the benefits of the new definitions, results have also been produced with these, but only for 2010.

The 2010 definitions are described in separate sections under each basket type. For time series comparisons this study will use the 2006 definitions.

## C. PSTN basket methodology

### C.1. PSTN baskets, 2006

#### C.1.1. Overview

The OECD basket methodology 2006 for PSTN services is built up by the following elements:

Installation	Assuming that the average life of a PSTN connection is 5 years the installation elements consists of 1/5 of any one-off charges related to the connection of the service.
Rental	As the OECD basket results are calculated for one full year the rental element is made up of any line rental charges and other recurring charges, calculated up to the period of one year.
Fixed line calls	The fixed line call element covers all local and national fixed line calls. Instead of defining local calls as “local”, the range of calls are distributed over 14 distinct distances ranging from 3 km up to 490 km. The local calling area is specified for each operator/country as covering all distances up to a certain radius. Regional and national calls will be distributed over the remaining distances according to the tariff definitions.
Calls to mobiles	Calls to mobiles are included for all major national networks. The call charges are weighted according to the best possible market share information available
International calls	International traffic include calls to all other countries covered by the study (all other OECD countries for the OECD baskets).

For fixed line calls and calls to mobiles a time of day-weighting with 6 specific time and day definitions are applied. Call charges for all of these 6 times are calculated separately and weighted.

For international calls a somewhat simpler Peak and Off-peak time definitions is used, with peak being the most expensive time of the week, and off-peak the cheapest time of the week.

The international call costs are also weighted according to the traffic volume on each route. In this study a simpler method is used due to lack of concise traffic information. Please see below.

The calculation of national calls is done as close to actual billing principles as possible, applying units, minimum charges, maximum charges and call set up charges as specified by the tariff.

There are five different basket definitions for PSTN:

- Low usage residential
- Medium usage residential
- High usage residential

- SoHo basket, single user business
- SME basket, multiple (30) user business

### C.1.2. Call volumes and proportions

The number of calls in each basket and the spread of calls by call type are shown in the two tables below. The volumes are given per user. This means that the Business SME basket will have 30 times this usage in total.

	Volumes	Call proportions		
	Total calls per month	Fixed line	Mobile	International
Residential Low	50	76.0%	19.0%	5.0%
Residential Medium	100	75.0%	23.0%	2.0%
Residential High	200	65.0%	31.0%	4.0%
Business Small	150	67.0%	29.0%	4.0%
Business SME	233	72.0%	20.0%	8.0%

### C.1.3. Time of day variation

The distribution of calls depending on time of day is divided into three parts: Fixed line calls, calls to mobile and international calls.

#### Fixed line time of day variation

	WD 11:00	WD 15:00	WD 20:00	WD 03:00	WE1 11:00	WE2 15:00
Residential Low	30.2%	28.1%	23.6%	0.9%	8.2%	9.0%
Residential Medium	27.5%	28.0%	23.0%	2.0%	8.0%	11.5%
Residential High	30.0%	29.2%	23.8%	1.1%	7.3%	8.6%
Business Small	39.5%	39.3%	7.5%	3.6%	5.5%	4.6%
Business SME	40.2%	40.5%	6.5%	3.4%	4.7%	4.7%

#### Call to mobile time of day variation

	WD 11:00	WD 15:00	WD 20:00	WD 03:00	WE1 11:00	WE2 15:00
Residential Low	28.6%	28.6%	20.5%	0.6%	10.1%	11.6%
Residential Medium	29.1%	30.5%	20.5%	0.7%	8.5%	10.7%
Residential High	30.0%	30.4%	20.0%	0.6%	8.5%	10.5%
Business Small	39.5%	39.5%	4.5%	0.3%	9.0%	7.2%
Business SME	44.0%	42.0%	1.2%	0.1%	6.3%	6.4%

#### International time of day variation

	Peak	Off-peak
Residential Low	33.0%	67.0%
Residential Medium	33.0%	67.0%
Residential High	33.0%	67.0%
Business Small	80.0%	20.0%
Business SME	80.0%	20.0%

Note: WD is Weekday, WE1 is the day before the holiday, and WE2 is the holiday. The definitions for WE1 and WE2 are used instead of the original Saturday and Sunday defined in the OECD basket definitions.

**C.1.4. Distance variation for fixed line calls**

The distribution of national fixed line calls is related to distance, with defined km distances. 14 discrete distances from 3 to 490 km are used. The following rules apply:

- Tariffs will be assigned to the sum of call proportions related to the distances they cover. For example: A local tariff covering 0 to 20 km will attract the call proportions assigned to the distances of 3, 7, 12 and 17 km.
- Proportions for distances that reach beyond the country borders will be assigned to the highest national tariff.
- The percentages listed in this table will add up to 100%, and refer to the number of national fixed line calls in the basket.

**Fixed line distance variation**

	<b>3</b>	<b>7</b>	<b>12</b>	<b>17</b>	<b>22</b>	<b>27</b>	<b>40</b>	<b>75</b>	<b>110</b>	<b>135</b>	<b>175</b>	<b>250</b>	<b>350</b>	<b>490</b>
Residential Low	62.0%	14.5%	5.2%	3.1%	1.6%	2.1%	2.1%	2.1%	1.2%	1.0%	0.8%	0.8%	0.6%	2.9%
Residential Medium	56.7%	13.3%	4.7%	2.8%	1.4%	3.2%	3.2%	3.2%	1.9%	1.6%	1.3%	1.3%	1.0%	4.4%
Residential High	63.0%	14.7%	5.2%	3.1%	1.6%	1.9%	1.9%	1.9%	1.1%	0.9%	0.7%	0.7%	0.6%	2.7%
Business Small	55.5%	13.0%	4.6%	2.9%	1.5%	3.3%	3.3%	3.3%	2.0%	1.7%	1.4%	1.4%	1.1%	5.0%
Business SME	57.2%	13.4%	4.9%	3.0%	1.5%	3.0%	3.0%	3.0%	1.8%	1.5%	1.2%	1.2%	0.9%	4.4%



**C.1.5. Call durations**

Call durations for fixed line calls are assigned based on a Time of day / distance matrix, with distances defined below and above the average size of local calling areas. Call durations for mobile and international calls are assigned based on time of day only.

**Fixed line call duration (minutes)**

	Local (below 26 km)						National (above 26 km)					
	WD 11:00	WD 15:00	WD 20:00	WD 03:00	WE1 11:00	WE2 15:00	WD 11:00	WD 15:00	WD 20:00	WD 03:00	WE1 11:00	WE2 15:00
Residential Low	3.7	3.7	4.7	4.7	4.5	4.5	4.4	4.4	7.0	7.0	6.6	6.6
Residential Medium	3.7	3.7	4.7	4.7	4.5	4.5	4.4	4.4	7.0	7.0	6.6	6.6
Residential High	3.7	3.7	4.7	4.7	4.5	4.5	4.4	4.4	7.0	7.0	6.6	6.6
Business Small	1.9	1.9	2.1	2.1	2.3	2.3	2.2	2.2	3.0	3.0	3.1	3.1
Business SME	1.9	1.9	2.1	2.1	2.3	2.3	2.2	2.2	3.0	3.0	3.1	3.1

**Call to mobile duration (minutes)**

	WD 11:00	WD 15:00	WD 20:00	WD 03:00	WE1 11:00	WE2 15:00
Residential Low	1.8	1.8	2.1	2.1	1.9	1.9
Residential Medium	1.8	1.8	2.1	2.1	1.9	1.9
Residential High	1.8	1.8	2.1	2.1	1.9	1.9
Business Small	1.6	1.6	1.7	1.7	1.7	1.7
Business SME	1.6	1.6	1.7	1.7	1.7	1.7

**International call duration (minutes)**

	Peak	Off-peak
Residential Low	5.5	7.2
Residential Medium	5.5	7.2
Residential High	5.5	7.2
Business Small	2.9	3.9
Business SME	2.9	3.9

*Note: All durations are given in minutes and fractions of minutes, i.e. 7.2 minutes equals 7 minutes 12 seconds.*

**C.1.6. Other OECD basket rules, 2006**

- Only incumbent operators are covered.
- Nonrecurring charges are covered using the simple average of the charge for a new installation of a service, and the charge for taking over an existing installation.
- Nonrecurring charges are distributed over 5 years, except where the installation is a tradable asset (Japan) where the charge is distributed over 20 years.
- All call costs are calculated as actual call costs as opposed to average, i.e. the real cost of a call with full unit charges is used.
- Calls to mobile use a weighted average charge for calls to all national mobile networks, based on a subscriber number weight.<sup>1</sup>
- International calls to other OECD countries are included, with call charges weighted according to actual traffic volumes. This means that those destinations with most traffic will carry most weight.
- For international call charges the highest charge is used for peak time, and the lowest is used for off-peak time.
- For each operator a relevant number of tariff packages shall be included. Combinations of packages are allowed. Certain discount packages with “selective discounts” are not included for technical reasons.
- Note: Selective discounts mean discounts to a chosen set of numbers or destinations. Since no general algorithms exist to determine the number of calls to such destinations, such discount schemes cannot be included in the baskets.
- The 3 residential baskets and the “Small” business basket all include 1 line and 1 user. The “SME” business basket includes 30 lines and 30 users. This means that all relevant costs per line are multiplied with the number of lines (and users), i.e. 30.
- Results are presented in US\$ per year, excluding VAT for Business baskets and including VAT for Residential baskets.

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<sup>1</sup> For the OECD countries Teligen has used subscriber numbers from the Informa Mobile Subscriber database for the distribution of prices for calls to mobile.

## C.2. PSTN baskets, 2010

### C.2.1. Overview

The basket results according to the 2010 OECD basket methodology represent the end user cost for one month. All previous OECD baskets have been based on a one year period.

The OECD basket methodology 2010 for PSTN services is built up by the following elements:

Installation	Assuming that the average life of a PSTN connection is 5 years the installation elements consists of 1/60 of any one-off charges related to the connection of the service.
Rental	The rental element is made up of any line rental charges and other recurring charges for one month.
Fixed line calls	The fixed line call element covers local and national fixed line calls. Local represents calls made within the local calling area, if such is used. National represents the longest calling distance in the country. Regional distance zones are not included. The local calling area is specified for each operator/country, and a specific formula is used to adjust the split between Local and National call weights.
Calls to mobiles	Calls to mobiles are included for all major national networks. The call charges are weighted according to the market share.
International calls	International traffic includes calls to all other countries covered by the study (all other OECD countries for the OECD baskets).

For fixed line calls and calls to mobiles a time of day-weighting split into Daytime, Evening and Weekend times is used.

For international calls Peak and Off-peak time definitions is used, with peak being the most expensive time of the week, and off-peak the cheapest time of the week.

The international call costs are also weighted according to the traffic volume on each route. In this study a simpler method is used due to lack of concise traffic information. Please see below.

The calculation of individual national calls is done as close to actual billing principles as possible, applying units, minimum charges, maximum charges and call set up charges as specified by the tariff. A special formula is used to account for the distribution of call durations. Please see below.

There are six different basket definitions for PSTN:

Type of basket	Basket
Residential	20 calls basket
Residential	60 calls basket
Residential	140 calls basket
Residential	420 calls basket
Business	100 calls business basket, single user
Business	260 calls business basket, single user

### C.2.2. Call volumes and proportions

The number of calls in each basket and the spread of calls by call type are shown in the two tables below. The volumes are given per user.

Calls per month	Total calls	Call distribution			
		Fixed to fixed Local	Fixed to fixed National	Fixed to mobile	International
20 calls basket	20	61%	20%	17%	2%
60 calls basket	60	60%	15%	21%	4%
140 calls basket	140	58%	15%	23%	4%
420 calls basket	420	73%	17%	8%	2%
100 calls business basket	100	48%	19%	30%	3%
260 calls business basket	260	43%	23%	25%	9%

### C.2.3. Time of day variation

The distribution of calls depending on time of day is divided into three parts: Fixed line calls, calls to mobile and international calls.

	Fixed to Fixed		
	Day	Evening	Weekend
20 calls basket	53%	25%	22%
60 calls basket	57%	24%	19%
140 calls basket	56%	23%	21%
420 calls basket	56%	23%	21%
100 calls business basket	58%	22%	20%
260 calls business basket	65%	21%	14%

	Fixed to Mobile		
	Day	Evening	Weekend
20 calls basket	45%	28%	27%
60 calls basket	47%	27%	26%
140 calls basket	46%	27%	27%
420 calls basket	46%	27%	27%
100 calls business basket	57%	25%	18%
260 calls business basket	68%	20%	12%

	International	
	Peak	Off peak
20 calls basket	45%	55%
60 calls basket	44%	56%
140 calls basket	47%	53%
420 calls basket	47%	53%
100 calls business basket	75%	25%
260 calls business basket	87%	13%

### C.2.4. Call durations

Call durations are given in minutes and fractions of minutes, i.e. 7.2 minutes equals 7 minutes 12 seconds.

	Fixed to fixed local		
	Day	Evening	Weekend
20 calls basket	2.6	4.0	2.6
60 calls basket	2.6	3.8	2.9
140 calls basket	3.1	4.8	3.7
420 calls basket	3.6	5.4	5.4
100 calls business basket	1.9	2.3	2.1
260 calls business basket	2.0	2.8	3.1

	Fixed to fixed national		
	Day	Evening	Weekend
20 calls basket	4.0	6.3	5.4
60 calls basket	4.1	6.4	6.4
140 calls basket	4.7	7.6	7.1
420 calls basket	5.3	8.1	8.1
100 calls business basket	2.3	3.3	3.3
260 calls business basket	2.4	2.7	3.4

	Fixed to mobile		
	Day	Evening	Weekend
20 calls basket	1.5	2.1	1.3
60 calls basket	1.9	2.4	1.9
140 calls basket	1.7	2.3	2.1
420 calls basket	1.8	2.3	2.3
100 calls business basket	1.6	1.9	1.5
260 calls business basket	1.7	2.2	1.9

	International	
	Peak	Off peak
<i>20 calls basket</i>	4.6	6.2
<i>60 calls basket</i>	4.7	6.8
<i>140 calls basket</i>	4.7	6.8
<i>420 calls basket</i>	5.0	8.1
<i>100 calls business basket</i>	3.2	5.4
<i>260 calls business basket</i>	3.7	4.1

### C.2.5. Other OECD basket rules, 2010

- Only incumbent operators are covered.
- For each operator a relevant number of tariff packages shall be included. Combinations of packages are allowed. Discounts shall be incorporated in the calculations for each tariff.
- Selective discounts are calculated with the algorithm described.
- Nonrecurring charges are covered using the charge for a new installation of a service.
- Nonrecurring charges are distributed over 5 years, except where the installation is a tradable asset (Japan) where the charge is distributed over 20 years.
- Call costs are calculated using the duration of  $D + (\text{Unit}_{(\text{seconds})} - 1)/2$ , based on basket call duration  $D$  converted to seconds and average per second charges. Unit is the billing unit in seconds.
- National call charges to fixed network are based on a local / national split. While this is adequate for most tariffs, some operator may split their prices into local / regional / national. In such cases only the local and national areas will be considered.
- Proportion of calls to the local calling area will be adjusted for local calling area radius as described below.
- When call charges to mobile networks differ by network, the weighted average charge for calls to all national mobile networks shall be used, based on available subscriber numbers.
- International calls to other OECD countries are included, with call charges weighted according to actual traffic volumes. This means that those destinations with the most traffic will carry the most weight. Traffic volume weights can be provided by national regulators. Until such weights are provided the existing weights are used.
- For international calls the highest charge is used for peak time, and the lowest is used for off-peak time.

- Allowances are deducted in the following order: Selective discounts, minute allowance, value allowance. Specific volume discounts will be deducted from the total cost at the end.
- Results are presented in USD / PPP per month, excluding VAT for business baskets and including VAT for residential baskets. Nominal exchange rates can be used.

**C.2.6. Local calling areas for the PSTN baskets**

Previous versions of the baskets provided 14 discrete distances for national fixed line calls. This enabled both a distance distribution and a method for incorporating the size of local calling areas.

Tariffs have changed over the last few years, and only a small minority of the tariffs go beyond the Local and National split in their call type classification. In the latest basket this only occurs in five of the OECD countries.

An added adjustment of the proportion of calls within the local calling area will be incorporated. The adjustment will increase the proportion of local calls, and correspondingly reduce the proportion of national calls, with increasing size of local calling area. The adjustment is based on assumed average radius of the local calling areas.

The following adjustment of the Local and National call proportions will be used, based on the closest size of local calling area:

**Local and national call proportions**

Average local call radius	Local adjustment	National adjustment
10 km	-8.9%	+8.9%
15 km	-4.2%	+4.2%
20 km	-1.4%	+1.4%
25 km	0.0%	0.0%
30 km	3.2%	-3.2%
50 km	6.4%	-6.4%
100 km	9.6%	-9.6%

In addition the percentages above must be adjusted with the proportion of fixed line calls in each basket, as given below.

**Basket adjustment**

	Basket adjustment
20 calls basket	81%
60 calls basket	75%
140 calls basket	73%
420 calls basket	90%
100 calls business basket	67%
260 calls business basket	66%

An example: The 60 calls basket will have the following adjustment factors:

**Example – 60 call basket**

Average Local call area radius	Local adjustment	National adjustment
10 km	-6.7%	6.7%
15 km	-3.2%	3.2%
20 km	-1.1%	1.1%
25 km	0.0%	0.0%
30 km	2.4%	-2.4%
50 km	4.8%	-4.8%
100 km	7.2%	-7.2%

If the operator, for example, uses an average local calling radius of 15 km, the fixed-to-fixed local proportion will be  $60\% - 3.2\% = 56.8\%$ , and the fixed-to-fixed national portion will be  $15\% + 3.2\% = 18.2\%$

### **C.2.7. Selective discounts**

Selective discounts are discounts which are limited to calls to a set of nominated numbers. Users can typically specify 1, 2, 3 or up to 10 or more numbers (depending on tariff) to which calls and/or messages will be free or discounted. Such plans are also known under brand names like “Friends and Family”, “Bestmates”, “Preferred numbers”, “Calling circle” etc.

The handling of the selective discount is based on the following elements and assumptions:

- The total number of minutes for all calls in the basket is V.
- The discount applies to N nominated numbers
- The discount D (%) applies to each of these calls
  - (D=100% is a free call)
- The proportion of minutes A (%) receiving the discount is calculated based on the formula below, using V and N as input data. The proportion A is adjusted according to the discount D
- ( $A_2 = A \times D$ )
- Mapping information will indicate which call types are affected by the discount.
- The remaining proportion  $A_2$  is used to calculate the number of minutes to be deducted from the basket minutes according to the call type mapping.
- Cost of remaining minutes is calculated as usual.

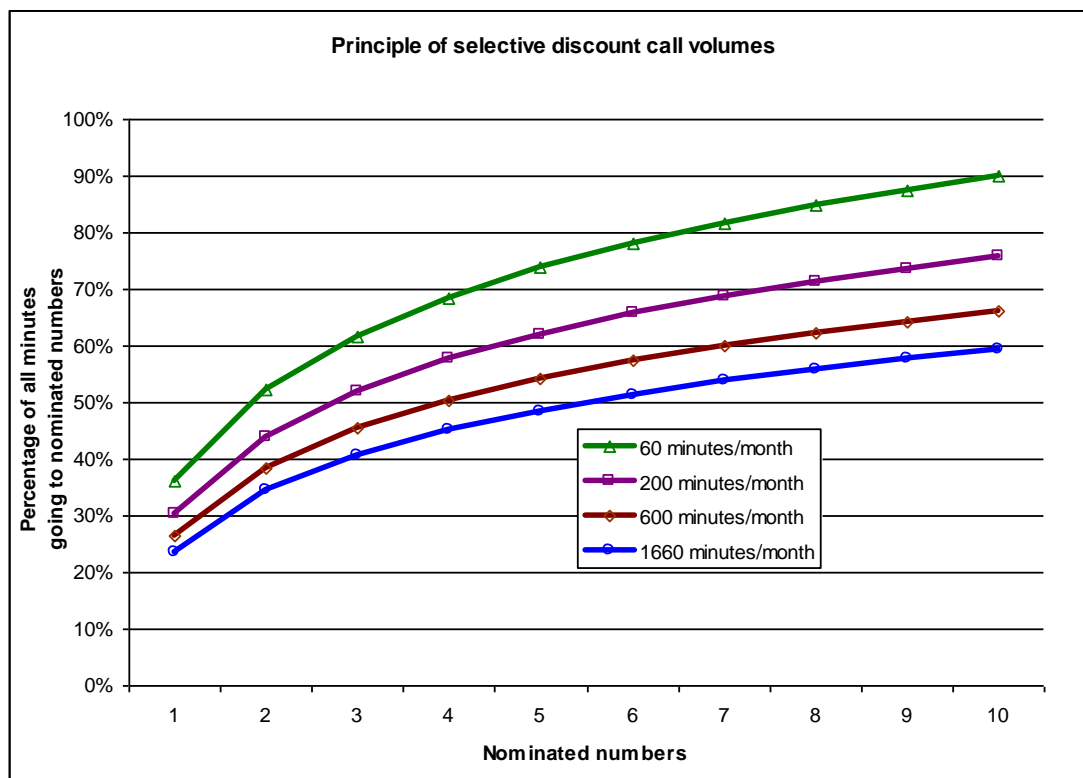
The critical element is the calculation of A. This proportion is based on N (number of nominated numbers) and V (total minutes in basket), and an empirically developed function can be used to calculate the proportions as shown on the graph below. The function is:

$$A (\%) = \text{Log}(10 \times N^{1.5}) / \text{Log}(10 \times V)$$



This function provides a proportion that resembles the amount of calls going to nominated numbers in the data received from operators in this basket review.

**Selective call discount volumes**



The selective discount will be taken before any minute, message and value allowances included in the tariff. The amount of minutes that will be deducted because of the selective discount is calculated as

- $V_{(2)} = V_{(1)} \times (\text{Log}(10 \times N^{1.5}) / \text{Log}(10 \times V)) \times D$

where  $V_{(1)}$  is the total number of minutes defined by the basket, and  $V_{(2)}$  is the number of minutes going to the nominated numbers.

- $V_{(2)}$  is then distributed to the specific call types according to the selective discount mapping. Each call type will have between zero and  $V_{(2)}$  minutes to be deducted. The remaining minutes for each call type is used for the following distribution of allowances and calculation of call costs.

### C.3. Modifications for Arab baskets

In the Price Benchmarking Study for Arab Countries some minor modifications have been made to the OECD baskets listed above:

- The definition of Weekend is changed to cover the weekly holiday regardless of day. The “Saturday is changed to mean the day before the weekly holiday.
- As the subscriber numbers for mobile operators in the Arab countries are not known at this stage, the prices for calls to each network are evenly distributed. The effect is minimal as the prices are normally quite close, and the distribution is still within reason.
- Due to the lack of traffic data for the international weighting an approximate method has been used. The traffic volumes are distributed according to the table below:

From	To	N. Africa	ME West	ME East	E. Africa	Europe	N. America	Asia
North Africa	5	30%	10%	10%	10%	20%	10%	10%
ME West	4	10%	35%	10%	5%	20%	15%	5%
ME East	8	10%	10%	35%	5%	5%	15%	20%
East Africa	5	10%	10%	20%	30%	10%	10%	10%

The countries covered under each category are:

North Africa	Algeria	Libya	Mauritania	Morocco	Tunisia			
ME West	Jordan	Lebanon	Palestine	Syria				
ME East	Bahrain	Iraq	Kuwait	Oman	Qatar	Saudi	UAE	Yemen
East Africa	Comoros	Djibouti	Egypt	Somalia	Sudan			
Europe	France	UK	Spain					
N. America	USA							
Asia	India	Phillipines	Japan	Australia				

The weight for each destination country is taken from the table above, and divided with the number of other countries in the relevant category. For example:

A call from Algeria to Egypt will have a weight of  $10\% / 5 = 2\%$ .

A call from Jordan to Lebanon will have a weight of  $35\% / 3 = 11.67\%$

In total all weights will add up to 100%.

## D. Mobile Basket Methodology

### D.1. Mobile baskets, 2006

#### D.1.1. Overview

Mobile services offer a slightly different set of challenges than for fixed line services. Because of this the OECD has defined a separate basket methodology for mobile. It is built with these elements:

Installation	Assuming that the average life of a mobile connection is 3 years the installation elements consists of 1/3 of any one-off charges related to the connection of the service.
Rental	As the OECD basket results are calculated for one full year the rental element is made up of any monthly charges for service provision and options taken with the tariff, calculated up to the period of one year.
Fixed line calls	The fixed line call element covers local and national fixed line calls.
On-net calls	On-net calls to same network
Off-net calls	Off-net calls to other networks. When charges distinguish between networks the weighted average using market share is used.
Voicemail retrieval	Voicemail retrieval is included, and that also implicates any recurring charges for the provision of basic voicemail service.
SMS	SMS to own network and other networks
MMS	MMS to own network and other networks
Allowances	Allowances defined as minutes, messages or monetary value are included, along with definitions of the application of allowances to specific types of calls.

Call charges are split into Day, Evening and Weekend times. For messages only peak and off-peak definitions are used.

The calculation of allowances is a particularly complicated part of this basket. Several levels of allowances are possible, and the implementation of such calculations can make a significant difference. Teligen has worked with several operators to ensure that the implementation is as close to real billing as possible.

There are 3 mobile basket definitions:

- Low usage basket (for pre- and post-paid)
- Medium usage basket (post-paid)
- High usage basket (post-paid)

The OECD basket definitions contain the following metrics:

“Old” baskets refer to the baskets before the last revision in 2006.

### D.1.2. Call and message volumes

Volumes of calls and messages are given per year

Volume	Voice	SMS	MMS
Low usage	360	396	8
Medium usage	780	600	8
High usage	1680	660	12

### D.1.3. Time of day variation

The distribution of calls over time of day is given as a percentage of the number of voice calls.

ToD	Peak	Off-peak	Weekend
Low usage	48.00%	25.00%	27.00%
Medium usage	50.00%	24.00%	26.00%
High usage	60.00%	19.00%	21.00%

### D.1.4. Call and message destinations

The distribution of calls and messages over different (types of) destinations are given as a percentage of the total number of calls and messages.

Destinations	Local	National	Mobile On-net	Mobile Off-net	Voice mail	SMS On-net	SMS Off-net
Low usage	15.00%	7.00%	48.00%	22.00%	8.00%	65.00%	35.00%
Medium usage	14.00%	7.00%	48.00%	24.00%	7.00%	65.00%	35.00%
High usage	13.00%	7.00%	47.00%	26.00%	7.00%	65.00%	35.00%

### D.1.5. Call durations

The call durations are given for each type of call (Fixed corresponds to both local and national fixed line calls)

Durations	Fixed	Mobile On	Mobile Off	Voicemail
Low usage	1.5	1.6	1.4	0.8
Medium usage	1.8	1.9	1.7	0.8
High usage	1.7	1.9	1.8	0.8

*Note: All durations are given in minutes and fractions of minutes, i.e. 1.4 minutes equal 1 minute 24 seconds.*

### D.1.6. Other basket rules, 2006

- Two largest operators are covered for each country, based on subscriber numbers. The operators covered should between them have at least 50% of the market share.
- Tariffs shall be typical 2G services with the main focus on voice.
- A range of relevant tariffs are covered, allowing the lowest cost tariff to be selected for each operator. The relevance of tariffs are judged from the apparent target customer group, and some basic criteria like:
  - No selective discounts (i.e. discounts to selected numbers)
  - Single user tariff only
  - No tariffs clearly beneficial for traffic volumes outside the scope of the OECD baskets
- Nonrecurring charges are distributed over 3 years
- All call costs are calculated as actual call costs as opposed to average, i.e. the real cost of a call with full unit charges is used.
- Off-net M2M charges are weighted according to subscriber numbers for each country, where relevant for the pricing of calls.<sup>2</sup>
- The value of call and message allowances included in the tariff will be deducted from the usage element of the basket, up to the value of actual usage.
- Results are presented in US\$ per year, including VAT.

## D.2. Mobile baskets, 2010

### D.2.1. Overview

Reflecting the changes in mobile services over time, and the benchmarking requirements, the mobile service baskets have been changed in the latest revision in 2010. The baskets are built with these elements:

Installation	Assuming that the average life of a mobile connection is 3 years the installation elements consists of 1/36 of any one-off charges related to the connection of the service.
Rental	As the OECD basket results now are calculated for one month the rental element is made up of any monthly charges for service provision and options taken with the tariff.
Fixed line calls	The fixed line call element covers local and national fixed line calls.
On-net calls	On-net calls to same network

<sup>2</sup> For the OECD countries Teligen has used subscriber numbers from the Informa Mobile Subscriber database for the distribution of prices for calls to mobile.

Off-net calls	Off-net calls to other networks. When charges distinguish between networks the weighted average using market share is used.
Voicemail retrieval	Voicemail retrieval is included, and that also implicates any recurring charges for the provision of basic voicemail service.
SMS	SMS to own network and other networks
Allowances	Allowances defined as minutes, messages or monetary value are included, along with definitions of the application of allowances to specific types of calls.
Selective discounts	Selective discounts are included as described in section C.2.7 above.

Note: MMS is no longer included in the mobile baskets.

Call charges are split into Day, Evening and Weekend times. For messages only peak and off-peak definitions are used.

The calculation of selective discounts and allowances is a particularly complicated part of this basket. Several levels of allowances are possible, and the implementation of such calculations can make a significant difference.

There are 6 mobile basket definitions:

Basket
<i>30 calls per month</i>
<i>100 calls per month</i>
<i>300 calls per month</i>
<i>900 calls per month</i>
<i>40 calls per month pre-paid basket</i>
<i>400 messages per month basket</i>

The OECD basket definitions contain the following metrics:

### D.2.2. Call and message volumes

Volumes of calls and messages are given per month

Volume per month	Total calls	Call distribution				SMS
		Mobile to fixed	On-net	Off-net	Voicemail	
<i>30 calls basket</i>	30	16%	55%	25%	4%	100
<i>100 calls basket</i>	100	17%	52%	28%	3%	140
<i>300 calls basket</i>	300	14%	46%	37%	3%	225
<i>900 calls basket</i>	900	14%	55%	28%	3%	350
<i>40 calls prepaid basket</i>	40	14%	64%	18%	4%	60
<i>400 messages basket</i>	8	8%	55%	25%	12%	400

### D.2.3. Time of day variation

The distribution of calls and messages over time of day is given as a percentage of the total number of voice calls and messages.

	Voice call distribution			Message distribution			
	Day	Evening	Weekend	Peak	Off-peak	On-net	Off-net
30 calls basket	46%	29%	25%	66%	34%	53%	47%
100 calls basket	51%	26%	23%	66%	34%	51%	49%
300 calls basket	49%	32%	19%	66%	34%	50%	50%
900 calls basket	49%	32%	19%	66%	34%	50%	50%
40 calls prepaid basket	46%	29%	25%	66%	34%	53%	47%
400 messages basket	46%	29%	25%	66%	34%	50%	50%

### D.2.4. Call durations

The call durations are given for each type of call (Fixed corresponds to both local and national fixed line calls)

	Call duration (minutes / call)			
	Mobile to fixed	On-net	Off-net	Voicemail
30 calls basket	2.0	1.6	1.7	0.9
100 calls basket	2.1	1.9	1.8	1.0
300 calls basket	2.0	2.0	1.8	1.0
900 calls basket	1.9	2.1	1.9	1.1
40 calls prepaid basket	1.9	1.9	2.0	0.9
400 messages basket	1.6	2.2	1.6	1.1

Note: All durations are given in minutes and fractions of minutes, i.e. 1.4 minutes equal 1 minute 24 seconds.

### D.2.5. Other basket rules

- At least two largest network operators are covered for each country, based on subscriber numbers. The operators covered should between them have at least 50% of the market share.
- Discount brands offered by the network operators will only be included when clearly linked with the network operator's website and brand.
- Tariffs shall be typical 2G and 3G services with the main focus on voice.
- A range of relevant tariffs shall be covered, allowing the lowest cost tariff to be selected for each operator. Only tariffs presented clearly as current tariffs on the operator web pages will be considered.
- All baskets can be used for both pre-paid and post-paid services. The 5th basket has a usage profile specifically taken from pre-paid traffic data, while the others are taken from post-paid traffic data. However, all profiles can be used to analyse both pre- and post-paid tariffs.
- Nonrecurring charges are distributed over 3 years, or 36 months.

- Selective discounts are calculated with the algorithm described in the section on selective discounts under PSTN above.
- The value of call and message allowances included in the tariff will be deducted from the usage element of the basket, up to the value of actual usage.
- Allowances are deducted in the following order: Selective discounts, most restricted minute allowance, least restricted minute allowance, message allowance, value allowance. Specific volume discounts will be deducted from the total cost at the end.
- Off-net mobile-to-mobile charges are weighted according to subscriber numbers for each country, where relevant for the pricing of calls.
- Call costs are calculated using the duration of  $D + (\text{Unit}_{(\text{seconds})} - 1)/2$ , based on basket call duration D given below converted to seconds and average per second charges. The Unit is the billing unit in seconds.
- Results are presented in USD / PPP per month including VAT. Nominal exchange rates can be used.

### D.3. Modifications for Arab baskets

In the Price Benchmarking Study for Arab Countries some minor modifications have been made:

- An International element is included in the Arab Mobile baskets, based on the same principles as with PSTN. A number of international calls are added on top of the national OECD baskets with separate call durations and distribution. The structure of the international basket element is:

International definition, 2006 basket

	Calls	Distribution		Duration (minutes)	
		Peak	Off-peak	Peak	Off-peak
Low user	15	25%	75%	2.0	2.0
Medium user	30	50%	50%	2.0	2.0
High user	45	75%	25%	2.0	2.0

International definition, 2010 basket

	Calls	Distribution		Duration (minutes)	
		Peak	Off-peak	Peak	Off-peak
30 calls basket	1	25%	75%	2.0	2.0
100 calls basket	2	25%	75%	2.0	2.0
300 calls basket	4	50%	50%	2.0	2.0
900 calls basket	12	75%	25%	2.0	2.0
40 calls prepaid basket	1	25%	75%	2.0	2.0
400 messages basket	1	25%	75%	2.0	2.0

The value of these international calls are added to the national basket as a separate international element.



- Due to the lack of traffic data for the international weighting an approximate method has been used. The traffic volumes are distributed according to the table below:

From	To	N. Africa	ME West	ME East	E. Africa	Europe	N. America	Asia
North Africa	5	30%	10%	10%	10%	20%	10%	10%
ME West	4	10%	35%	10%	5%	20%	15%	5%
ME East	8	10%	10%	35%	5%	5%	15%	20%
East Africa	5	10%	10%	20%	30%	10%	10%	10%

The countries covered under each category are:

North Africa	Algeria	Libya	Mauritania	Morocco	Tunisia			
ME West	Jordan	Lebanon	Palestine	Syria				
ME East	Bahrain	Iraq	Kuwait	Oman	Qatar	Saudi	UAE	Yemen
East Africa	Comoros	Djibouti	Egypt	Somalia	Sudan			
Europe	France	UK	Spain					
N. America	USA							
Asia	India	Phillipines	Japan	Australia				

The weight for each destination country is taken from the table above, and divided with the number of other countries in the relevant category. For example:

A call from Algeria to Egypt will have a weight of  $10\% / 5 = 2\%$ .

A call from Jordan to Lebanon will have a weight of  $35\% / 3 = 11.67\%$

In total all weights will add up to 100%.

## E. Leased Line basket methodology

The OECD basket for Leased Lines is based on a relatively simple structure that calculates the average cost of a circuit of varying length, for 3 specific bitrates:

- 64 kb/s
- 2 Mb/s
- 34 Mb/s

The basic definition will follow these rules:

### E.1. Circuit numbers and weights

The basket results will represent the price of 1 circuit weighted over the distances covered.

	<b>circuits</b>	<b>2 km</b>	<b>20 km</b>	<b>50 km</b>	<b>100 km</b>	<b>200 km</b>	<b>500 km</b>
OECD basket	1	35%	20%	15%	20%	5%	5%

The 2 km distance is considered a local circuit between two customer premises. Other distances are considered regional or long distance circuits between customer premises.

### E.2. Circuit bitrates

The basket data covers the following bitrates:

- 64 kb/s
- 2 Mb/s
- 34 Mb/s \*

*Note: Where 34 Mb/s is not offered, and 45 Mb/s is used instead, a conversion factor of  $34 / 45 = 0.75$  will be used on the price.*

### E.3. Other basket rules

- The basket shall include transparent end-to-end leased lines from the incumbent operators. Virtual circuits can be included in cases where traditional leased circuits do not exist any more; xDSL services, however, fall outside the scope of the basket.
- Non-recurring charges (installation) are excluded from the basket. Only annual rental charges are included.
- Circuits above 2 km shall include two 2 km local tail circuits within the defined distance. This means that, for example, a 50 km circuit will have 2 local tail circuits of 2 km, and a main circuit of 46 km. Some operators include the local tail circuits in the total price, some do not.
- Circuits are assumed to be within or out of the major city in the country. This means that the 2 km circuit is a local circuit within the major city, and the rest of the distances will have one end in the major city, and the other end outside.

- Where the distance exceeds the possible distance for a country, the highest available price is used for that distance. This means that even when a circuit length would go beyond the borders of a country, this circuit is included in the basket, using the price of the longest possible circuit.<sup>3</sup>
- Results are presented in US\$ per year, excluding VAT.

#### E.4. The 2010 Leased Line baskets

The revision of the OECD baskets in 2009/2010 have brought a few changes. However, for the purpose of the Arab baskets it will be more convenient to use the 2006 basket definitions as presented above. The changes in the 2010 baskets are:

- 64 kb/s is omitted from the baskets
- The basket weights are changed, and are now individual to the bitrate:

	2 km	20 km	50 km	100 km	200 km	500 km
2 Mbit/s	50%	18%	6%	8%	10%	8%
34 Mbit/s	42%	18%	15%	9%	8%	8%

For consistency the 2006 version of the weights will be used in the Arab baskets study. The effects of the new definitions are small.

#### E.5. Modifications for Arab baskets

In the Price Benchmarking Study for Arab Countries a minor modification has been made to the leased line basket:

- Where tariffs are available the additional bitrates of 256 kb/s and 155 Mb/s will be included in the results.

## F. Broadband benchmarking methodology

### F.1. Broadband baskets used in previous studies

#### F.1.1. Overview

Broadband services have not been covered by the general OECD baskets, even though the OECD has benchmarked broadband prices for a while. However, Teligen has developed a structure for comparing broadband prices, and this has been adopted by various bodies like the European Commission and various regulatory bodies in Europe. The basic methodology is described below.

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<sup>3</sup> If a small country in principle only allows circuits up to for example 50 km within its borders, the weights and calculations for longer circuits will still be used as if circuits up to 500 km were possible. The price for the longest zone given in the tariff will be used for those excessive distances. In most cases this will not have an impact as the circuits in small countries do not normally have a distance element (i.e. per km charge) in the pricing.

There is unfortunately little information available on the detailed consumption of traffic within broadband services. However, it has become clear that the price structure used for such services lends itself to misinterpretation of benchmarking results, and that further non-price information will have to be included in the results.

In general there is a wide range of offerings for broadband, with speeds from 128 kb/s up towards 20 Mb/s. When looking for the cheapest available service the low speed offerings will inevitably appear as the best choice. On the other hand, these services will not necessarily fulfil the requirements for high speed access to the Internet. An alternative is to compare the price per Mb/s, i.e. using prices normalised to the same speed. This will however favour the higher speeds, as the price per speed unit tends to go down with increasing speed.

As both of these methods have their weaknesses, but in the opposite direction, a combination of the two may appear sensible. But as there is no clear mathematical relationship between the two methods the assessment will have to be done manually, reviewing the two sets of results together.

### F.1.2. Broadband methodology

The broadband benchmarking methodology contains these elements:

Installation	A 3 year lifetime of service is assumed, dividing all one off installation and modem costs <sup>4</sup> by 3. Charges related to the provision of the physical line are not included.
Rental	The sum of the monthly service cost and any option charges related to for example modem. Charges related to the provision of the physical line are not included.
Usage limitations	Indication of time limit or volume limit if applicable. There will also be a text description of what the consequence of breaking the limit will be.
Usage cost	If usage beyond the time or volume limit results in further charges per minute, hour or MByte, such charges will be included in the overall cost calculation as "Usage"
Maximum usage cost	Some tariffs that apply usage charges may also have a maximum usage cost per billing period.
Speed	The up- and down-load bitrates.
Email addresses	Number of email addresses included in basic service
Web space	Amount of web space included in basic service
Contract duration	Minimum duration of contract (in months)

The non-charge elements of the methodology are used for assessment of the service suitability and perceived value.

The costs may be calculated in one of two ways:

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<sup>4</sup> Modem cost may be included in the basic installation cost, or specified separately. If specified separately it is added to the installation cost.

- Actual cost of installation, rental and usage based on a specific usage profile.
- The cost of installation, rental and usage, normalised to for example 1 Mb/s speed, based on a specific usage profile.

### F.1.3. Baskets used in Arab study

The usage profiles are selectable, and can be changed. Default profiles contain the following elements:

Basket #	Hours per month	Minutes per session	GB per month	% day	% evening	% weekend	Years
1	10	20	1	25%	50%	25%	3
2	15	20	2	25%	50%	25%	3
3	30	30	5	25%	50%	25%	3
4	50	30	5	25%	50%	25%	3
5	75	60	10	25%	50%	25%	3
6	100	60	20	25%	50%	25%	3

The basket calculation can also be limited to a subset of the packages selected by speed range, for example below 1 Mb/s, 1 – 4 Mb/s, 4 – 10 Mb/s and above 10 Mb/s.

The results presented in the study report use two speed ranges: below 1 Mb/s and above 1 Mb/s.

For usage the results are presented with baskets #1 and #3 in the table above.

## F.2. Broadband baskets defined by OECD in 2010

### F.2.1. 2010 OECD baskets

In the latest revision of the OECD baskets a structure for broadband benchmarking has been developed. These baskets are not part of the analysis in the Arab basket system.

Fixed broadband basket profile, by advertised download capacity

Speed range	Usage per month			
	Lower use		Higher use	
	GB	Hours	GB	Hours
>0.25 Mbit/s	2	10	6	30
>2.5 Mbit/s	6	15	18	45
>15 Mbit/s	11	20	33	60
>30 Mbit/s	14	25	42	75
>45 Mbit/s	18	30	54	90

Please note the difference from the previous baskets in that all speeds up to the range ceiling can be included, not only those within the range limits.

## G. Call cost methodology

Beyond the basket analysis required in this study there is also a requirement for calculating the cost of actual 3 minute calls from the fixed network to different destinations, and from mobile network(s) back to the national fixed network.

	Peak	Off-peak
Local 3 minute call	√	√
National 3 minute call	√	√
Fixed to mobile 3 minute call *	√	√
Mobile to fixed 3 minute call *	√	√
International 3 minute call to USA	√	√

\* New in 2010

The calculation of a call shall be as close as possible to the real billing principles, and may include:

Call set up	A charge raised at the beginning of the call
Unit	A fixed price unit that is applied with different durations for different types of calls. The unit is the minimum billing amount.
Per second	Charging per second based on a price normally given per minute.
Per minute	Charging in whole minute units with a price given per minute. A variant is charging per half or quarter minute.
Minimum	A minimum charge used if the total cost of the call is less than the minimum
Maximum	A maximum charge used instead of actual cost if the call cost goes beyond the maximum value.
Initial period	The first period of the call, often specified as the first minute. This period has a specific charge that may be different from the rest of the call

One aspect of the “Mobile to Fixed” calls is that these prices are taken from the mobile service tariffs rather than the PSTN tariffs. As there may be several mobile operators within a market there is not a single price to present. Teligen has chosen to use the simple average of the best prices from the two largest mobile operators.