

# **Benchmarking Methodology**

for the

## **2016 Telecoms Price Benchmarking Study**

### **for Arab Countries**



**Produced for**  
**TRA Bahrain and AREGNET**

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## A. Introduction

Teligen has produced a Price Benchmarking study commissioned by TRA Bahrain on behalf of AREGNET, with 7 past updates from 2007 to 2015. A new study update has started in January 2016, with more or less the same scope as before.

This study covers five different types of telecoms services: PSTN, Mobile Voice and Data, Leased Line, Fixed Broadband and Mobile Broadband. For each of these services a basket methodology is used for a comprehensive price comparison across countries.

The basket methodologies 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 for each basket below. It is still possible to compare the results from this study with the OECD member country results.

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

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

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

### A.1. Background data

For this study the exchange rate data will be 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.

Exchange rates will be based on the rates of the 1 February 2016.

The Purchasing Power Parity (PPP) exchange rates will be taken from the World Bank database of Comparative Price Levels (CPL). This data covers the majority of the countries in this study. However, some countries may not be covered up to 2016, and where this is the case the latest available data will be used. The CPL is a correction factor for the market exchange rate to calculate current PPP rates.

The VAT information is taken from a variety of sources on 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).

## 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/February 2016, with data collection starting on the 11 January 2015.

## B. Basket methodologies

The so called “Basket” approach relates to the concept of 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 also 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 overall 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 over 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 that for 2016 the following applies:

The OECD basket methodologies for voice services and leased lines were revised in 2009/2010. In this study the 2010 OECD methodologies are used, and data for previous years are also analysed with this most recent methodology.

For Fixed Broadband the most recent OECD methodology agreed in 2014 is used.

For Mobile Broadband the OECD methodology as of June 2012 is used.

## B.1. Time series

With this update being the 8<sup>th</sup> in the series of benchmarking studies, the potential range of time series results makes visual presentation across all Aregnet countries more difficult. It has been decided to only include the last 5 years in the main report time series graphs.

The full time series data will still be available in the basket spreadsheets, and the Bahraini report will still be showing the full range of time series data.

The time series results are based on two key assumptions:

- The latest baskets are used for all years in the time series. Where baskets have changed in a way that does not allow inclusion of services from past years, e.g. with introduction of new services, only the relevant years covering the full scope of the basket will be included in the time series<sup>1</sup>.
- The latest exchange rate and PPP rate information available is used for all years. This will exclude any exchange rate variations from the results, only leaving the price changes seen in each market. However, it may also mean that the results for the early years of the time series can have a different price balance between countries than originally experienced.

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<sup>1</sup> One example is “Mobile Voice with Data” where data prices were not collected in the first few years.

## C. Fixed Voice Benchmarking methodology

### C.1. OECD PSTN baskets, 2010 version

#### C.1.1. Overview

The OECD 2010 basket methodology 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 month the rental element is made up of any line rental charges and other recurring charges, calculated to a period of one year.
Fixed line calls	The fixed line call element covers all local and national fixed line calls. Calls are divided into Local and National calls, describing the shortest and longest call distances within the country. The local calling area is specified for each operator/country as covering all distances up to a certain radius. Regional calls, if defined in the price list, are not considered.
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 dividing the week into Daytime, Evening and Weekend times is applied. Call charges for all of these three times are calculated separately and weighted. Weekend is defined as the “end-of-working-week” period in any country.

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.

**C.1.2. PSTN Call distribution**

**Overall basket volumes and destination distribution (Fixed)**

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%

**Time of day distribution: Fixed to fixed**

	Fixed to Fixed		
	Day	Evening	Weekend
20 calls basket	53%	25%	22%
60 calls basket	60%	22%	18%
140 calls basket	52%	26%	22%
420 calls basket	52%	26%	22%
100 calls business basket	69%	17%	14%
260 calls business basket	75%	15%	10%

**Time of day distribution: Fixed to mobile**

	Fixed to Mobile		
	Day	Evening	Weekend
20 calls basket	45%	28%	27%
60 calls basket	57%	22%	21%
140 calls basket	46%	27%	27%
420 calls basket	46%	27%	27%
100 calls business basket	69%	18%	13%
260 calls business basket	77%	14%	9%

**Time of day distribution: International (fixed)**

	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.1.3. PSTN call durations**

**PSTN call durations: Fixed to fixed local, minutes per call**

	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

**PSTN call durations: Fixed to fixed national, minutes per call**

	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

**PSTN call durations: Fixed to mobile, minutes per call**

	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

**PSTN call durations: International**

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

*Note: Day and Evening applies to weekdays, while Weekend applies to the entire “end-of-working-week” period. Call durations are given in fractions of minutes, i.e. 4.6 minutes mean 4 minutes and 36 seconds.*



#### **C.1.4. Other OECD 2010 basket rules**

- Only incumbent operators are covered.
- 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. This method ensures a reasonable approximation of the distribution of call durations.
- National call charges to fixed networks are based on a local / national split. While this is adequate for most prices, some operators may split their prices into local / regional / national. In such cases only the prices for local and national areas will be considered.
- 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 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.
- Selective discounts mean discounts to a chosen set of numbers or destinations. The effect of such discounts is calculated using the approach taken in the OECD baskets, see C.1.6 below.
- Results are presented in US\$ / PPP per month, excluding VAT for Business baskets and including VAT for Residential baskets.

#### **C.1.5. Local calling areas for the PSTN baskets**

Most tariffs today have one call charge for all fixed line calls within a country. In some countries there may still be a distinction between local area calls and calls beyond the local area. The local area may in principle be seen as a circular area around the calling party.

To account for the differences that may appear as a result of different sizes of local calling areas, where such differences in price is specified in the tariffs, 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.1.6. 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:

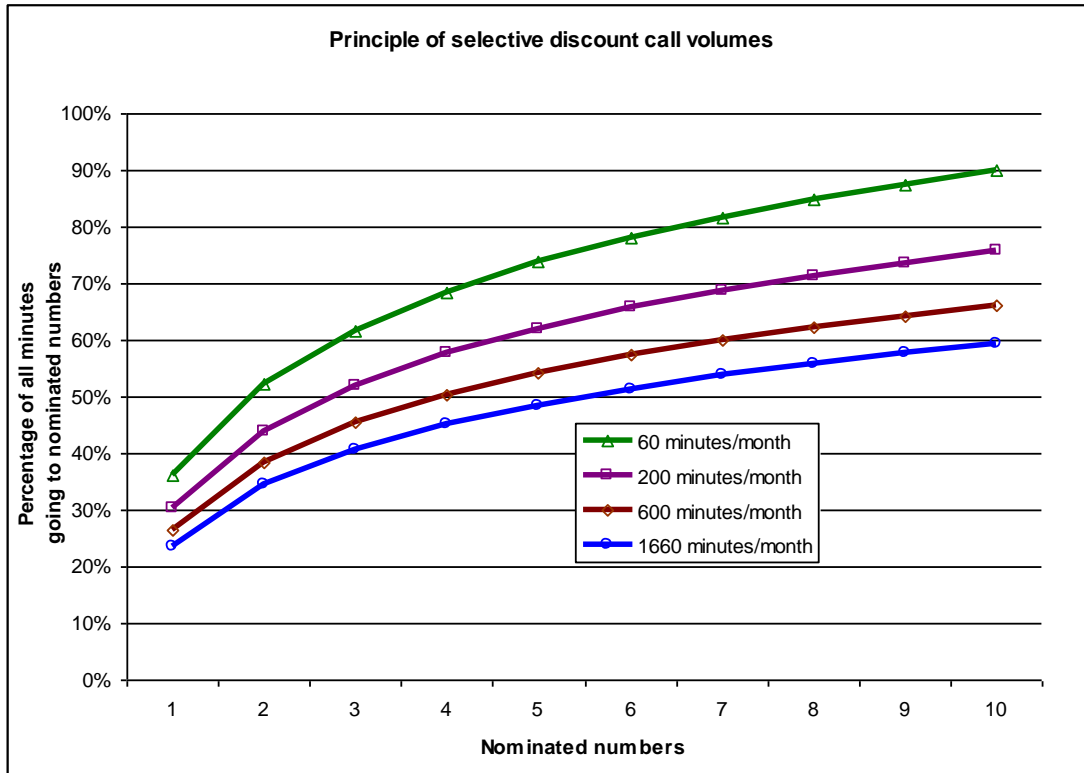
- The total number of minutes for all calls in the basket is V.
- The discount applies to N nominated numbers
- The discount D (%) applies to each of these calls
  - (D=100% is a free call)
- The proportion of minutes A (%) receiving the discount is calculated based on the formula below, using V and 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.2. Modifications for Arab baskets

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

- As a complete list of subscriber numbers for mobile operators in the Arab countries is not available, 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 Voice Benchmarking Methodology

### D.1. OECD Mobile Voice Baskets 2010

#### D.1.1. Overview

Reflecting the changes in mobile services over time, and the benchmarking requirements, the mobile voice 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
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.1.2. 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	
30 calls basket	30	16%	55%	25%	4%	100
100 calls basket	100	17%	52%	28%	3%	140
300 calls basket	300	14%	46%	37%	3%	225
900 calls basket	900	14%	55%	28%	3%	350
40 calls prepaid basket	40	14%	64%	18%	4%	60
400 messages basket	8	8%	55%	25%	12%	400

### D.1.3. 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.1.4. 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.1.5. 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% 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. 4G services are also included. Data services are analysed with a separate set of combined voice and data baskets, see D.2 below.
- 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.2. Combined voice and data basket for mobile handsets

When the OECD defined the new mobile broadband baskets in 2012 a new set of baskets for data usage from mobile handsets was also included. These baskets are distinguished from the mobile broadband baskets for laptops and tablets in that they are to be combined with the mobile voice baskets defined in section D.1 above.



Handset data prices are closely connected with the regular voice tariffs, where the data element is an integral part. Hence it is not possible to look at the cost of handset data use in isolation, the voice (and text) cost must be included in the total for a meaningful comparison.

The OECD defined 5 different combinations of voice and data baskets, where the voice baskets refer to the exact baskets from the 2010 definition above.

	Voice basket	Data usage
Basket 1	30 calls	0.1 GB
Basket 2	100 calls	0.5 GB
Basket 3	300 calls	1.0 GB
Basket 4	900 calls	2.0 GB
Basket 5	100 calls	2.0 GB

Each voice tariff has an integral data pricing part, and these will combine to give the total voice and data cost of the basket<sup>2</sup>. The results from the fixed cost calculation, voice cost calculation and message cost calculation for each individual tariff is combined with the data cost calculation based on the usages defined by the voice baskets (2010 definitions) and the data usage in the table above.

Many mobile voice tariffs will include a data allowance as part of the tariff. However, in addition to this allowance it is often possible to purchase additional data bundles to reduce or manage the cost of handset data. The implementation of the OECD baskets now includes the possibility to include a range of such add-on data packages, and to automatically optimise the cost to the lowest cost package option. The benchmarking system will select the cheapest add-on package if the basic tariff does not include enough data allowance to support the data usage defined by the basket. Only add-on packages relevant for the individual tariff will be considered, e.g. a post-paid voice tariff will not include pre-paid data packages.

Many tariffs will also apply limitations to the data usage, often with a “Fair Usage Policy” (FUP) that effectively limits the use of data by reducing speed or stopping the data service at the FUP limit. When the usage exceeds the FUP limit of such tariffs the tariff as a whole is deemed inappropriate for the usage level of the basket, and removed from the analysis.

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<sup>2</sup> Voice and data pricing will always come from the same tariff as defined by the operator.

### D.3. Modifications for Arab baskets

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

- Price data for international calls is included in the mobile voice benchmarking system, along with capabilities to include this in the results, based on the same principles as with PSTN.  
A number of international calls can be added on top of the national OECD baskets with separate call durations and distribution. The structure of the international basket element is:

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.

- For the reports however, the international element is removed**, and baskets are used exactly as with the OECD analysis (contrary to previous years). Results for past years, in the time series analysis, will also no longer include international calls.
- 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 benchmarking methodology

The basket weights of the 2010 OECD basket methodology are:

	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%

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 64 kb/s, 256 kb/s and 155 Mb/s will be included in the results.

*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.1. 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<sup>3</sup>. Only monthly 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>4</sup>
- Results are presented in US\$ per month, excluding VAT.

<sup>3</sup> For leased lines the non-recurring charges are mostly related to the selection of physical interface at customer end, and this is considered outside the definition of the tariff. Such interfaces can vary considerably in price, and are largely dependent on customer technical requirements rather than location.

<sup>4</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.

## F. Fixed Broadband benchmarking methodology

### F.1. OECD Fixed Broadband Baskets

The OECD baskets for Fixed Broadband were re-defined in October 2014 with new speed and volume ranges. Previous years' data has been adapted to match this change. The basic methodology remains more or less the same as before, and is described below.

In the OECD baskets there is a pre-defined list of providers to be covered. However, for this study of fixed broadband services in Arab countries it was decided to only cover the incumbent provider in each country.

In general there is a wide range of offerings for broadband, with speeds from 256<sup>5</sup> kb/s upwards. The data is split into different speed ranges, in order to obtain consistency between to services compared. The ranges are listed in the table below.

The main parameter in the Fixed Broadband baskets is speed. However, please note that the speed ranges refer to a minimum speed only, allowing higher speeds offered at low prices to also be considered. The upload speed is normally not considered in the filtering of tariffs.

OECD Fixed broadband baskets

Service speeds		Usage volume (GB/month)		
Download speed (Mb/s)	Minimum upload speed (Mb/s)	Low	Medium	High
≤1.5/2.0	0.256	5	10	20
>1.5/2.0 – 10	0.512	5	15	50
>10 – 25/30	0.768	10	25	100
>25/30 – 100	1	15	50	200
>100 – 1000	3	25	100	400
>1000	10	100	250	1000

<sup>5</sup> The speed of 128 kb/s offered by some providers is not considered broadband in the OECD context, and is omitted from this analysis.

## F.2. Fixed Broadband methodology

The fixed broadband benchmarking methodology contains these elements:

Installation	A 3 year lifetime of service is assumed, dividing all one off installation and modem costs <sup>6</sup> by 36 months. 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 volume limit if applicable. There will also be a text description of what the consequence of breaking the limit will be. Tariffs with time limits are normally not considered.
Usage cost	If usage beyond the 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 advertised 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:

- 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.
- Results are presented in USD / PPP per month including VAT. Nominal exchange rates can be used.

## F.3. Baskets used in Arab study

To reflect the services available in the Arab countries only a subset of the 18 baskets above will be used in this study. In the 2015 study it was decided to not include the two highest speed tiers, and limit the speed coverage to 100 Mb/s. This will limit the number of baskets to 12, which will provide a relevant range of results for the fixed broadband markets in the Arab countries, and a consistent comparison with the OECD results.

<sup>6</sup> Modem cost may be included in the basic installation cost, or specified separately. If specified separately it is added to the installation cost.

Following the data collection the range of actual service offers will be reviewed, and where services for a particular speed range are available in less than 5 countries the speed range may be taken out of the presentation in the report. All speed and volume tiers will still be available in the benchmarking system.

In addition to the residential tariffs specified by the OECD basket definitions we will also analyse business offers, as in previous studies.

As in the OECD basket definitions we will not include any time related parameters, as tariffs with such elements appear to disappear.

Only the incumbent provider in each country is covered. For the Bahraini report the services on Mena, Bahrain will be included.

## G. Mobile Broadband benchmarking methodology

### G.1. OECD Mobile Broadband Baskets

Mobile Broadband baskets were defined by the OECD in June 2012. For the previous studies (including 2015) we used two baskets drawn from the previous Teligen collection of baskets. Now, with a clearer definition of OECD baskets, we will use these for the analysis. The OECD baskets are listed below. The OECD baskets are defined in two groups, one for laptop and dongle modem use, and one for tablet use. The baskets are defined by usage volume only, and do not consider speed.

#### OECD baskets for Mobile Broadband

	Laptop use	Tablet use
Usage level 1	0.5 GB	0.25 GB
Usage level 2	1.0 GB	0.5 GB
Usage level 3	2.0 GB	1.0 GB
Usage level 4	5.0 GB	2.0 GB
Usage level 5	10.0 GB	5.0 GB

The data volume indicated is the accumulated data volume over one month.

All baskets assume that the tariff is in use 30 days a month. Tariffs that are based on time billing (e.g. paid per hour of use), or have validity of less than 1 month, are not considered in the analysis.<sup>7</sup>

Results are presented in US\$ / PPP per month, including VAT for residential tariffs and excluding VAT for business tariffs.

<sup>7</sup> Pre- and post-paid tariffs that will have to be renewed or re-filled through the month are not considered in the OECD baskets. Please see modifications for Arab baskets.

## G.2. Modifications for Arab baskets

Instead of covering a range of 10 OECD baskets the alternative approach used in earlier updates will also be used in the 2016 update:

- The definition of device is taken out, i.e. all results shown may include either laptop and tablet related tariffs.
- Two speed ranges are used: 2-8 Mb/s and >8 Mb/s. This will show the development from 3G to 4G in a better way than with the OECD baskets
- Two usage levels are used, 1 GB and 6GB. This gives a reasonable range of usage related to the Arab tariffs.
- Tariffs with time usage are not included in the baskets.
- Number of days used per month is however relevant, especially for pre-paid tariffs. As this is not a part of the OECD basket definitions we have added this element based on previous definitions, as indicated below.
- Separate results for residential and business tariffs are considered, using the same set of 4 baskets.

Mobile broadband baskets

Data volume	Speed	Days / month
1 GB	2-8 Mbit/s	15
6 GB	2-8 Mbit/s	30
1 GB	>8 Mbit/s	15
6 GB	>8 Mbit/s	30

“Data volume” is the accumulated data volume over one month.

“Speed” is the advertised maximum speed

“Days / month” is the number of days the service is actually used within a month.

The tariff data for mobile broadband will cover largely the same providers as for the mobile voice baskets, however, where possible up to three providers will be covered.

## G.3. Mobile Broadband methodology

The mobile broadband benchmarking methodology contains these elements:

Installation	A 3 year lifetime of service is assumed, dividing all one off connection by 36 months.
Rental	The sum of the monthly service cost and any option charges.
Usage limitations	Indication of time limit or volume limit if applicable. Exceeding the allowance or fair use policy may result in exclusion of the tariff.
Usage cost	If usage beyond the time or volume allowance may result in further charges per minute or MByte, such charges will be included in the overall cost calculation as “Usage”
Days valid	Number of days a top-up or package is valid.
Maximum usage	Some tariffs that apply usage charges may also have a



cost	maximum usage cost per billing period.
Contract duration	Minimum duration of contract (in months)

## H. 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	√	√

\* Introduced 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.