



International Communications Market Report 2016: Technical appendix

Research Document

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1.1 Appendix A: comparative international pricing methodology

1.1.1 Introduction and objectives

We have largely used the same methodology as in previous years in our 2016 international price benchmarking analysis, however, we have made two notable changes to the household usage profiles themselves (other than updates to the to ensure that they more accurately reflect changing use of communications services):

- 1) We have excluded the cost of mobile handsets in the analysis.** Many smartphone devices cost hundreds of pounds, sometimes more than the total cost of the services that are consumed on them, meaning that the inclusion of the handset cost can skew the results of our analysis.
- 2) We have excluded the TV licence fee from our analysis.** While there is no TV licence in Spain and the US, there are other mechanisms by which public service broadcasting content is funded, As such, including the TV licence does not allow a like-for-like comparison of the total cost of using TV services across countries.

To undertake the analysis, we use a bespoke pricing model commissioned from pricing consultancy Teligen. The model is populated with tariff data for fixed-line voice, mobile phone, fixed broadband, mobile broadband, television and 'bundled' services (i.e. incorporating more than one service, such as 'triple-play' tariffs) in the UK, France, Germany, Italy, Spain and the US. The key objectives of the work are as follows:

- to identify and compare the pricing that is available for consumers buying fixed-line voice services, mobile services, broadband internet and TV services;
- to identify and compare the pricing that is available by purchasing communications services within 'bundled' tariffs (for example, 'triple-play' services, which typically offer a single bill for the delivery of fixed-line voice, broadband and television services);
- to compare pricing across a wide range of service usage scenarios, from the requirements of those with basic needs to those of consumers with more sophisticated consumption; and
- to incorporate the cost of hardware such as set-top boxes or broadband modems/routers in order to reflect the real prices that consumers pay, and to compare like-with-like by allowing for equipment subsidies when they are included within propositions from service providers;

Basic methodology

Further detail is provided below, but the basic principles are as follows. We constructed five 'typical' household types, and defined a basket of communications services (fixed-line voice, mobile, broadband, TV) appropriate for each one. A wide range of components were included within the household usage profiles to ensure as accurate as possible a representation of the real prices consumers pay. For example:

- Fixed voice minutes were distributed by whether they were to fixed or mobile lines, by call distance (local, regional, national and international, including a range of

international destinations), and time of day (day, evening, weekend). Non-geographic calls were excluded from the analysis.

- Mobile calls (and messaging) were split between on-net and off-net, and voicemail was included.
- Call set-up and per-minute charging were incorporated, and a range of call lengths were used (distributed around a defined mean based on averages across 30 OECD countries).
- Incoming calls were included, in recognition of the different pricing mechanism in the US.
- The fixed broadband component was defined both by minimum headline speed and by minimum data requirements.
- The mobile broadband component was defined in the same way as the fixed broadband component, although there were no minimum connection speed criteria (as services are seldom marketed in this way).

The television element included a digital receiver and, for some household usage profiles, a digital video recorder (DVR). Four tiers of pay-TV were considered:

- the most basic service available above the channels available on free-to-air TV;
- a basic pay-TV service with premium sports content (top-tier football matches, or NFL in the US);
- a basic pay-TV service with premium film content (first-run Hollywood films); and
- a premium service defined by a top-price film/entertainment package and premium sports and film content.

Broadband routers, mobile broadband modems, digital set-top boxes and DVRs are included within the household usage profiles (and amortised over an appropriate period in order to attribute a monthly cost). This is necessary because this equipment is often inseparable from the service price, as operators frequently include subsidised or 'free' equipment (for example a mobile handset or a Wi-Fi router) within the monthly subscription. For similar reasons, connection and/or installation costs are included.

In July 2015 and July 2016, details of every tariff and every tariff combination (including bundled services) were collected from the largest three operators in each country by retail market share (and from more than three operators, if this was required to ensure that a minimum of 80% of the overall market was represented). Bundled tariffs (i.e. those which incorporate more than one service) were also collected. Only those tariffs available on the websites of the operators were included (i.e. the analysis excludes bespoke tariffs which are offered only to certain customers).

Across the six countries, the tariff data in 2016 consisted of:

- 490 fixed voice tariffs;
- 340 fixed broadband tariffs;
- 4,542 mobile tariffs;

- 513 mobile broadband tariffs;
- 558 television tariffs; and
- 17,969 bundled tariff options.

Our model identifies the tariffs that offer the lowest price for meeting the requirements of each household. All sales taxes and surcharges have also been included, in order to reflect the prices that consumers actually pay (although we do not account for differences in other areas of personal taxation policy within each country), and all prices are converted back to UK currency using a purchasing power parity (PPP) adjustment based on OECD comparative price levels and exchange rates as of 1 July 2016.

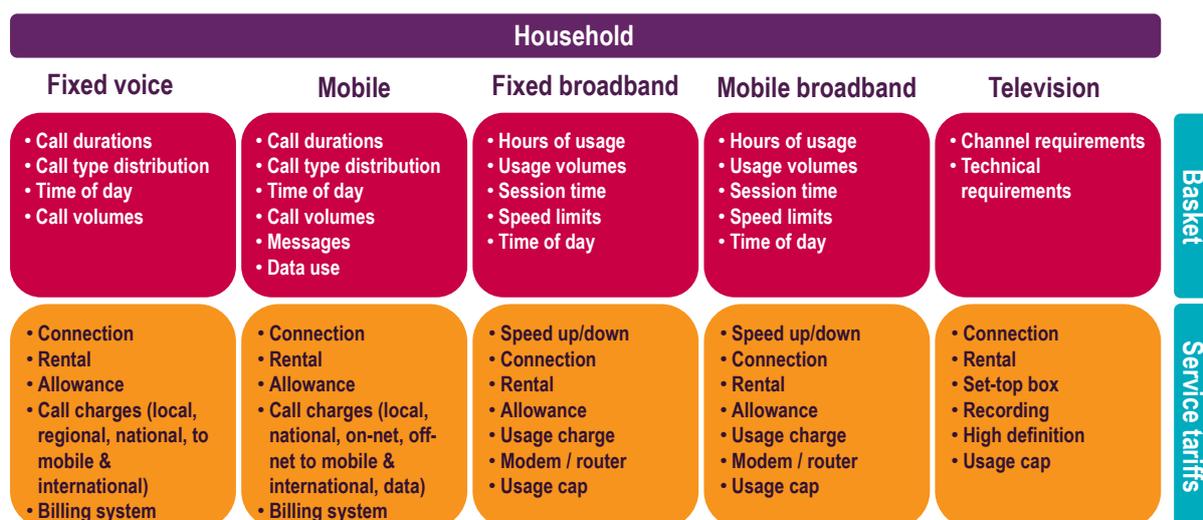
In order to provide an illustration of representative prices for the individual services in each country, and an illustration of the best value that consumers could get for their full 'basket' of services, we have provided three types of analysis for each household usage profile:

- The first, which we call 'weighted average stand-alone' pricing, illustrates the price of each individual service, as defined by the average of the lowest price tariff from each of the operators for each service in each country, weighted by the market share of the service provider in order to ensure fair representation.
- The second, which we call 'weighted average bundle' pricing is the average of the lowest bundled service prices (including separate stand-alone services where a bundle does not include all of the services required by the household) offered by each operator that provides a suitable bundled tariff in each country, weighted by their fixed broadband market shares. This is the first time that this analysis has been included in these reports, and it should be noted that fixed broadband shares are used to weight the results, regardless of whether or not the household in question requires a fixed broadband service.
- The third, which we call 'lowest available' pricing, identifies the lowest price a consumer could pay for this basket of services, including, where appropriate, by purchasing 'bundled' services.

1.1.2 Principles of the model

The model developed for Ofcom by Teligen uses individual consumption baskets for each of the services in the pricing analysis, combined in a structure that allows the definition of household usage profiles of any combination of services.

Figure 1.1 Components of the pricing comparison model



Source: Teligen

Each household usage profile may include any of the four services, with any combination of basket parameters, describing the use of each service within the household. For the mobile service the system allows definitions of multiple users, for each member of the household. The tariff information contains all charges and elements that will typically be part of a service offering. Some costs have been excluded as beyond the scope of the current analysis:

- Mobile handsets for use with the mobile phone service.
- PC/laptop/s for use with the broadband service.
- Television set/s.
- Recording equipment beyond those built into digital decoders.
- Fixed telephone handset/s.

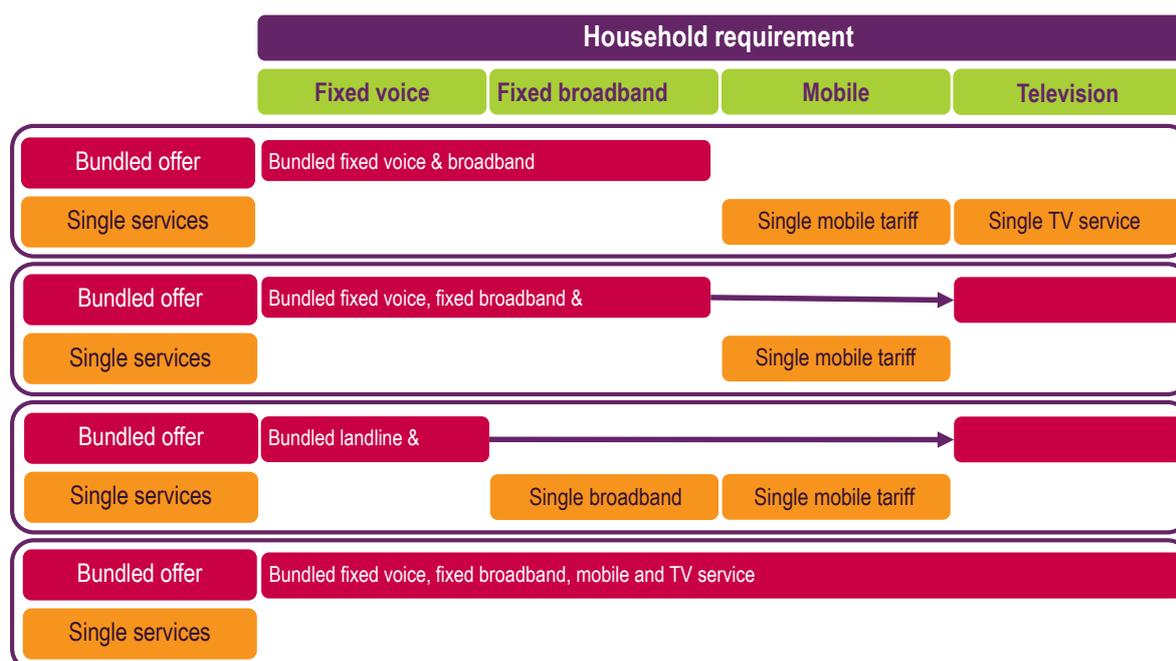
However, modems/routers and set-top boxes/TV receivers are included as they are an integral part of the service offerings, and are often subsidised by operators who recoup the value of the hardware throughout the course of a contract.

Bundled service offerings

An important part of the analysis is the inclusion of the 'bundled' service offers available in each of the study countries, whereby more than one service is purchased from a stand-alone provider, often at a discount compared with purchasing the services separately. As the household definition determines which services are required by the household, and as this may or may not correspond with the bundled offerings available, it is necessary to combine the bundled offerings with the available stand-alone tariffs in each market.

Where the bundled offer does not cover the household requirement for a particular service, a suitable stand-alone tariff is used to fill the gap. In such cases the best possible tariff (the cheapest stand-alone offer that can fulfil the usage requirements) is used.

Figure 1.2 Examples of combinations of bundled and stand-alone offers



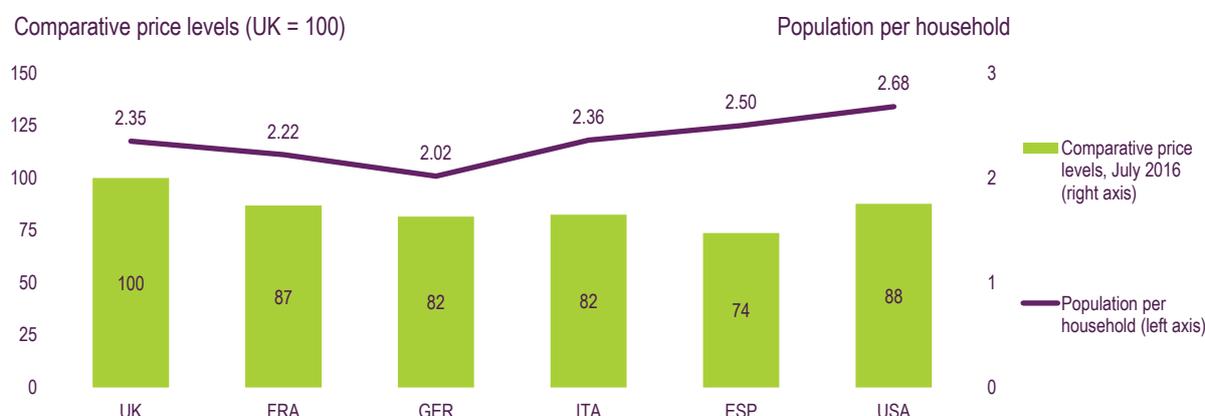
Source: Teligen

Geographic scope

We made pricing comparisons between six countries – the UK, France, Germany, Italy, Spain and the US. These countries have broadly similar socio-demographic, economic and communications-use characteristics. High-level parameters such as population per household and comparative price levels (which is a proxy for cost of living) suggest that fair comparison can be made more easily, as relative prices are not substantially influenced by differences in economic development.

Because of the existence of local markets in the US, we have used tariffs available in the state of Illinois. This was chosen as being reasonably representative of the US as a whole in terms of its relative wealth and rural-urban split. Nevertheless, US pricing should not be viewed as being representative of the whole country.

Figure 1.3 Demographic characteristics and relative price levels across countries



Source: OECD / IMF / US census bureau

Tariff data

For practical reasons, it was not possible to incorporate every tariff from all of the operators in every country. Instead, we set a requirement that the analysis included the three largest operators by retail market share for each service and represented at least 80% of the retail market. Therefore, in markets where the three largest operators had collective market share of over 80%, we limited our analysis to tariffs from these three operators; otherwise we included the fourth and fifth largest operators to ensure that we represented a minimum of 80% of the market.

All the operators included by these criteria were also considered for ‘bundled’ offers. While this methodology excludes smaller operators, which may offer the lowest prices for some services, we believe that using the prices of the largest operators is appropriate, both because they are the best reflection of the general consumer experience and because they are in large part defined by the competitive environment in which they operate.

Research was undertaken in July of each year from 2008 to 2016, and only those tariffs detailed on the websites of the operators were included. Special offers and promotions (for example, reduced line rental for a number of months, or ‘free’ installation or hardware) were included, but only if they were available to all new customers and were available for the whole month.

Household types

For this study we make reference to five hypothetical ‘typical’ households, and have defined their requirements for communications services. These household types are designed to be collectively broadly representative of the overall population of the five countries; although in order to provide comparison across the full range, from very basic to advanced communications-service users, we have created significant variation in the contents of the baskets of communications services. The details of the household usage profile composition are provided in Section 2 above.

Figure 1.4 Household types

‘Typical’ household type		Summary	Fixed voice	Mobile voice	Mobile messaging	Mobile handset data	Fixed line broadband	Mobile broadband	Television
1	Basic needs	A low use household with basic needs	Medium use	Low use	None	None	None	None	Free-to-air with HD
2	Late adopters	A broadband household with basic needs	High use	Low use	Low use	Low use	Low use	None	Basic pay-TV with HD & DVR
3	A mobile ‘power user’	A mobile-only household	None	High use	High use	High use 4G	None	High use	Basic pay-TV with sports, HD & DVR
4	Connected family	A family household with multiple needs	Medium use	Medium use	Medium use	Medium use- some 4G	Medium use superfast	None	Premium pay-TV with sports, films HD & DVR
5	Sophisticated couple	An affluent two person household	Low use	Medium use	Medium use	Medium use 4G	High use ≥100Mbit/s	None	Basic pay-TV with films, HD & DVR

Source: Ofcom

1.1.3 Fixed-line voice services

Fixed-line tariff information

The fixed voice service is assumed to be a home-based fixed telephony service. A household is assumed to have no more than one fixed-line service.

Single fixed-voice services are normally offered on a dedicated analogue line (PSTN services). In the context of bundled services, the fixed voice service may be delivered as a VoIP telephony service over a broadband connection, and these are included in our analysis. From a user point of view, these services are exchangeable, but from a technical point of view they are very different. As connection and line rental charges are covered by the broadband service, the bundled fixed voice services can have zero or very small fixed charges over and above the broadband charges.

Typically, fixed-voice tariffs incorporate some or all of the following types of charging:

- Connection charge and takeover charge.
- Monthly rental charge, plus the monthly charge for any additional options taken.
- Allowances in terms of minutes included per month, or a value deducted from use each month. These allowances are mapped onto the different types of calls and times of day.
- Billing system information.
- Call charges for day, evening and weekend:
 - Local calls
 - Regional calls
 - National calls
 - Calls to mobiles (for each network, weighted)
 - International calls to ten destinations

As such, calls to non-geographic numbers are excluded from the analysis.

The billing system information is used to determine the price elements included in a typical call. Seven types of billing are possible.

Figure 1.5 Types of billing for fixed voice calls

Calculation types	
1	Per second
2	Per unit
3	Per minute
4	Per second with allowance
5	Per second with initial minute
6	Per second capped
7	Per minute capped

Source: Teligen

Each tariff is handled individually, and will have the most appropriate call cost calculation system applied.

Fixed voice basket

The fixed voice basket defines the use per month for the household, and calculates the monthly cost of using the fixed voice service. The basket elements are listed below, with values for each of the five households. The cost of customers' equipment is amortised over a five-year period.

Figure 1.6 Components of the fixed voice baskets

	Basket 1	Basket 2	Basket 3	Basket 4	Basket 5	Units
Call durations						
Local	4	4	n/a	4	4	Mins
Regional	6	6	n/a	6	6	Mins
National	6	6	n/a	6	6	Mins
Fixed to mobile	2	2	n/a	2	2	Mins
International	6	6	n/a	6	6	Mins
Destination weights						
Local	67	70	n/a	68	67	%
Regional	10	8	n/a	9	10	%
National	16	13	n/a	14	16	%
Fixed to mobile	7	7	n/a	7	7	%
International	0	2	n/a	2	0	%
Time of day weights						
Day	58.3	58.3	n/a	59.2	58.3	%
Evening	24.5	24.5	n/a	24.9	24.5	%
Weekend	17.2	17.2	n/a	15.9	17.2	%
Depreciation	5	5	5	5	5	years

Source: Teligen

Note: All fixed call types are calculated with five different durations, below and above the number of minutes indicated.

International calls are weighted according to the table below, considering each originating country and each destination country.

Figure 1.7 Fixed voice international call destinations for comparator countries

		Call to									
		CAN	FRA	GER	ITA	JPN	RUS	SAF	ESP	UK	USA
Call from	CAN		2.2%	2.1%	1.7%	1.0%		0.3%		6.5%	86.2%
	FRA	2.8%		25.2%	19.0%	1.4%			13.7%	24.7%	13.2%
	GER	2.7%	21.6%		20.0%	1.7%	2.3%	0.8%	8.6%	20.4%	22.0%
	ITA	3.4%	26.5%	30.3%		1.0%			7.0%	15.6%	16.2%
	JPN	4.4%	5.0%	6.8%	2.5%		1.6%		1.1%	11.5%	67.1%
	RUS	2.2%	8.8%	35.1%	11.8%	2.0%			3.4%	10.6%	26.1%
	SAF	4.4%	5.0%	13.9%	4.4%	1.8%				46.7%	23.7%
	ESP	0.8%	27.6%	23.8%	11.2%	0.7%	0.7%	0.2%		24.0%	10.9%
	UK	6.2%	18.1%	19.5%	8.7%	2.8%		2.7%	8.0%		34.0%
	USA	47.9%	5.6%	12.2%	4.6%	8.7%	1.3%	0.8%	2.2%	16.7%	

Source: Teligen

Note: Vertical axis is the originating country and horizontal is the destination country.

Basket logic

Once the cost of using each fixed voice package is calculated, the cheapest package per provider and per country is identified. These are the packages that are considered in the household cost scenarios. The packages that are part of a bundled offering are identified separately from the single packages.

Fixed voice data issues

Fixed voice services are covered with both direct and indirect services. Any line installation or monthly rental charges incurred by those using indirect services are included in the service costs. Some providers offer a wide range of add-on options for their tariff packages, with possible cost reductions. Where relevant, these have been incorporated in order to identify the lowest prices available for a basket of services.

1.1.4 Mobile services

Mobile tariff information

The mobile service is assumed to be a personal service; a household may have several users with individual usage profiles and requirements. VoIP over mobile networks' services were excluded from the analysis. Typically, the mobile tariffs will use some or all of the following charge categories:

- Connection charge.
- Monthly rental charge, plus the monthly charge for any additional options taken.
- Allowances in terms of call minutes and/or messages included per month, or a value deducted from usage each month. These allowances are mapped onto the different types of calls and times of day.
- Billing system information.
- Call charges for day, evening and weekend:

- Local calls
- National calls
- On-net calls to mobiles
- Off-net calls to mobiles (for each network, weighted)
- Voicemail calls
- International calls to ten destinations
- Data use and technology (3G/4G)
- Messages.

The billing system information is used to determine the price elements included in a typical call. Seven types of billing are possible:

Figure 1.8 Types of billing for mobile voice calls

Calculation types	
1	Per second
2	Per unit
3	Per minute
4	Per second with allowance
5	Per second with initial minute
6	Per second capped
7	Per minute capped

Source: *Teligen*

Each tariff is handled individually, and will have the most appropriate call calculation system applied.

Mobile basket

The mobile basket defines the use per month for the user, and calculates the monthly cost of using the mobile service. The basket elements are listed below, with values for some of the typical user types. Mobile handsets were assumed to have a three-year life.

Figure 1.9 Components of the mobile baskets

	Basket 1	Basket 2	Basket 3	Basket 4				Basket 5		
	Users 1&2	Users 1&2	User 1	User 1	User 2	User 3	User 4	User 1	User 2	
Call durations										
Local	1.5	1.5	1.7	1.8	1.8	1.5	1.5	1.7	1.8	Mins
National	1.5	1.5	1.7	1.8	1.8	1.5	1.5	1.7	1.8	Mins
On-net	1.6	1.6	1.9	1.9	1.9	1.6	1.6	1.9	1.9	Mins
Off-net	1.4	1.4	1.8	1.7	1.7	1.4	1.4	1.8	1.7	Mins
Voicemail	-	-	1	1	1	1	1	1	1	Mins
International	2	2	2	2	2	2	2	2	2	Mins
Destination weight										
Local	16	16	8	11	13	20	20	13	20	%
National	8	8	5	6	7	10	10	7	10	%
On-net	38	38	37	33	34	30	30	29	30	%
Off-net	38	38	37	33	34	30	30	29	30	%
Voicemail	0	0	7	7	12	10	10	8	10	%
International	0	0	6	10	0	0	0	14	0	%
Time of day weight										
Day	48	48	60	50	50	48	48	60	50	%
Evening	25	25	19	24	24	25	25	19	24	%
Weekend	27	27	21	26	26	27	27	21	26	%

Source: Teligen

Notes: All mobile call types are calculated with five different durations, below and above the number of minutes indicated.

International calls are weighted according to the table below, considering each originating country and each destination country.

Figure 1.10 Mobile voice international call destinations for comparator countries

		Call to									
		CAN	FRA	GER	ITA	JPN	RUS	SAF	ESP	UK	USA
Call from	CAN		2.2%	2.1%	1.7%	1.0%		0.3%		6.5%	86.2%
	FRA	2.8%		25.2%	19.0%	1.4%			13.7%	24.7%	13.2%
	GER	2.7%	21.6%		20.0%	1.7%	2.3%	0.8%	8.6%	20.4%	22.0%
	ITA	3.4%	26.5%	30.3%		1.0%			7.0%	15.6%	16.2%
	JPN	4.4%	5.0%	6.8%	2.5%		1.6%		1.1%	11.5%	67.1%
	RUS	2.2%	8.8%	35.1%	11.8%	2.0%			3.4%	10.6%	26.1%
	SAF	4.4%	5.0%	13.9%	4.4%	1.8%				46.7%	23.7%
	ESP	0.8%	27.6%	23.8%	11.2%	0.7%	0.7%	0.2%		24.0%	10.9%
	UK	6.2%	18.1%	19.5%	8.7%	2.8%		2.7%	8.0%		34.0%
	USA	47.9%	5.6%	12.2%	4.6%	8.7%	1.3%	0.8%	2.2%	16.7%	

Source: Teligen

Note: Vertical axis is the originating country and horizontal is the destination country.

The internet traffic is defined both as megabytes of download volume and minutes of use, as tariffs may be charged according to either of these two methods.

Basket logic

Once the cost of using each mobile package is calculated, the model checks whether the package is able to offer the amount of data required by the basket. If it does not, the package will not be considered.

Then the cheapest package per provider and per country is identified. These are the packages that will be considered in the household cost scenarios. The packages that are part of a bundled offering will be identified separately from the single packages.

Mobile service data issues

Although the model allows for pre-pay and post-pay services to be considered separately, we have not defined whether the mobile phone component in a basket is pre-pay or post-pay. We believe this enables better international comparison, given the very different pre-pay/post-pay splits in different countries (for example, around 80% of Italian mobile connections are pre-pay, while around 80% of US mobile connections are post-pay).

However, a consequence of this is that the analysis does not recognise the different characteristics of the services; for example, a pre-pay mobile may be the only option available to consumers with a poor credit rating, and may also offer advantages to those who vary their use month by month.

Allowances or 'free' minutes/ messages/ data are included in the tariffs, and are treated as similarly to the billing system principles as possible (e.g. per-minute or per-second charging). The deduction of minutes and messages will follow the traffic weights defined by the basket profiles.

1.1.5 Broadband services

Broadband tariff information

The broadband services covered may be on any platform typical for home use; the most common are ADSL, cable and fibre. Mobile broadband is included as a separate requirement to fixed broadband for one household basket. Tariffs are categorised by headline speed. Typically, broadband tariffs use some or all of the following charge categories:

Connection charge.

Installation charge, for either self install or engineer install (the cheapest solution is used).

- Purchase price for modem, and possibly router.
- Any specific connection charges paid to the incumbent operator.
- Monthly rental for broadband service.
- Possibly, a monthly price for modem and router rental.
- Any specific rental charges paid to the incumbent operator:
 - Usage time allowance
 - Usage time limit
 - Usage time charge (per minute or hour beyond allowance)
 - Usage data volume allowance

- Usage data technology for mobile services (3G/4G)
- Usage data volume limit
- Usage data volume charge (per MB or GB beyond allowance)
- Maximum cost per month

Broadband basket

The broadband basket is relatively simple, and basically calculates the monthly cost of using a broadband service in a home environment. The basket parameters are generally given per month. The values below are related to the five defined households.

Figure 1.11 Components of the broadband baskets

	Basket 1	Basket 2	Basket 3	Basket 4	Basket 5
Type of service	n/a	Fixed	Mobile	Fixed	Fixed
Usage time (hours/month)	n/a	100	160	300	500
Usage volume (GB/month)	n/a	25	15	50	100
Session duration (mins)	n/a	20	20	20	20
Minimum speed (Mbit/s)	n/a	10	n/a	30	100
Usage in daytime (%)	n/a	30	30	30	30
Usage in evening (%)	n/a	40	40	40	40
Usage at weekend (%)	n/a	30	30	30	30
Depreciation (years)	n/a	3	1	3	3

Source: Teligen

The 'up to' advertised 'speed of each tariff package is checked against the usage volume, and if the speed is too low to accommodate the traffic indicated, the tariff is excluded from the analysis. The speed of each tariff package is checked against the speed range required by the basket, and if the speed is outside this range the tariff is excluded from the analysis. If the tariff package has a penalty for excess use whereby the speed delivered is 'throttled', the tariff is excluded from the analysis once this penalty takes effect. The resulting cost is presented as connection/set-up cost, rental and use.

- The monthly connection/set-up cost is the sum of all one-off charges (including any discount/promotions), amortised over three years.
- The rental cost is the sum of all monthly charges.
- The usage cost is calculated from any per-minute or per-MB charges. The session durations and usage volumes of the baskets are used for this calculation, along with any time or volume allowances.

Basket logic

Once the cost of using each package is calculated, the following checks take place:

- If the package uses a limiting mechanism that will take effect when the allowance is exceeded, the status of this limit has to be checked. If it turns out that the package is

not able to accommodate the traffic defined in the basket within this allowance, and that download speed will be limited as a result, the package cannot be considered.

- If the download speed of the package is outside the range defined by the basket, the package will not be considered.
- The basket will define whether a fixed or wireless package is used, and this will also be checked.
- The resulting total monthly cost of the remaining packages will be compared, and the cheapest package from each provider and also for each country will be identified.

Broadband data issues

Broadband services of different types are covered: ADSL, cable and fibre as well as wireless. The bitrates used are the headline 'up to' speeds published by the provider, not considering any speed reductions caused by local circumstances. Only the download speed is considered, although the upload speed is also covered. Where available, the prices for both self-installation and engineer installation are covered. However, in some cases only one of these may be available. The cheapest option is always used.

It is common to have special offers with reduced rental for the first few months. This is included wherever it applies, given that the promotional offer is valid in the month of tariff data collection (July 2015 and July 2016). The monthly rental is then averaged over the depreciation period of three years. The research shows that some providers will only offer broadband services bundled with other services, as a bundled package. Hence there will not always be stand-alone offers for all providers listed.

1.1.6 Television services

Television tariff information

Television services are probably those where there is most variance between the countries in terms of services' description and quality. In this benchmarking study the television services covered fall into three categories:

- Basic service with a range of free-to-air channels.
- Basic pay-TV service, with a basic set of channels beyond the free-to-air channels.
- Basic pay-TV service, with premium sport (top league football/NFL) content.
- Basic pay-TV service, with premium film (first-run Hollywood film) content.
- Premium service, based on the provider's top-of-the-range offering, including premium sports and movies content and a top-price entertainment package.

All of the pay-TV service baskets include a DVR and HD content.

The basket definitions below will show how these parameters are defined for each of the households.

Television services will cover the most relevant offerings from each provider based on the two broad definitions above. Typically, television tariffs will use some or all of the following charge categories:

- Connection charge.
- One-off charges for the set-top box (STB) and digital video recorder (DVR).
- Monthly rental for basic television service.
- Monthly rental for additional channel packages.
- Monthly rental for hardware (STB, DVR).

The cost of the TV set and any TV licence fee is excluded from the analysis.

Television basket

The television basket is relatively simple, and calculates the monthly cost of having the relevant channel package, together with the cost of installation and/or equipment amortised over three years. The basket parameters are generally given per month. The values below are related to the five defined households.

Figure 1.12 Components of the television baskets

	Basket 1	Basket 2	Basket 3	Basket 4	Basket 5
Free-to-air or pay-TV	Free-to-air	Free-to-air	Pay-TV	Pay-TV	Pay-TV
HD capable	No	Yes	Yes	Yes	Yes
DVR included	No	Yes	Yes	Yes	Yes
Football channels	No	No	Yes	Yes	No
Movie channels	No	No	No	Yes	Yes
Depreciation	3	3	3	3	3

Source: Teligen

Basket logic

Once the charges for using each television package are calculated, the following checks take place:

- Is the number of channels offered in the package equal to or above the minimum number of channels defined in the basket?
- Is HD capability and a DVR required by the basket and offered by the package?
- Are premium film and/or sport content required by the basket and offered by the package?

If any of these are answered with a “no”, the package will not be considered. The cheapest package is identified for each provider and for each country, and these are used in the household cost assessment.

Television data issues

The television data have been limited to packages offering channels that are within the basket definition, resulting in five categories of offers:

- Basic ‘free-to-air’ packages over a digital transmission network.
- Basic pay-TV access with a DVR and HD channels and no special programme requirements.
- Basic pay-TV access with a DVR and HD channels and premium sport (top league football/NFL) content.
- Basic pay-TV access with a DVR and HD channels and premium film (first-run Hollywood film) content.
- Pay-TV access with a DVR and HD channels and a top-price entertainment package with premium sport and film content.

A vast number of optional offers exist, and it is not feasible to cover them all.

Purchasing power parity adjustment

All prices have been converted back to UK currency, using a purchasing power parity (PPP) adjustment based on OECD comparative price levels in July 2016 and exchange rates as at 1 July 2016. Comparative price levels represent the number of specified monetary units necessary to buy the same representative basket of consumer goods and services, relative to any specified country (in this case, the UK), and enable a comparison of relative consumer pricing for any product or service.

In addition, in order to ensure that the changes we identify within countries have been driven by changes in the market, rather than simply by changes in the currency exchange rate, we have used the exchange rate used for 2016 and applied it to 2015 data.

Figure 1.13 Purchasing power parity conversion rates

Country	Currency	Exchange rate August 2015 to July 2016 (£)	Comparative price level (July 2016)	PPP adjusted rate (£)
UK	GBP (£)	1.00	100	1.00
FRA	EUR (€)	1.21	87	1.05
GER	EUR (€)	1.21	82	0.98
ITA	EUR (€)	1.21	82	0.99
ESP	EUR (€)	1.21	74	0.89
USA	USD (\$)	1.34	88	1.17

Source: Teligen using OECD data

1.1.7 Analysis

Having identified the lowest prices for each single service from each of the three largest operators in each country, and the lowest-price ‘bundled’ services appropriate to meet the needs of all, or part of, each basket, we performed three types of analysis, which are detailed in the write-up of the findings:

- The ‘weighted average stand-alone’ price for each of the components in every household usage profile (fixed-line voice, broadband, post-pay mobile, pre-pay mobile, pay TV). This was calculated as the average of the lowest-price tariffs from

every provider of each service in each country, weighted by the market share of the service provider in order to ensure fair representation.

- The 'weighted average bundle' price for each household usage profile. This is calculated as the average of the lowest-price tariffs from every provider of suitable bundled services in each country (plus separate stand-alone services where a bundle does not include all of the services required by the household), weighted by their fixed broadband market shares. It should be noted that fixed broadband shares are used to weight the results regardless of whether or not the bundles in question include fixed broadband.
- The 'lowest available' price available for each household. This identifies the lowest price that a consumer could pay for this basket of services, including, where appropriate, by purchasing 'bundled' services. This was calculated by identifying the lowest price from any tariff for each component of every basket, together with the lowest-price bundled services suitable for the basket, and identifying the overall lowest price available.

We believe all three types of analysis are important for providing an overall understanding of comparative pricing.

Stand-alone pricing provides a useful comparison of the relative costs of communications services, and, because it is an average weighted by market share, it provides a good indication of the prices that many consumers are actually paying. However, an important limitation is that stand-alone offers are sometimes not available from leading suppliers. For example, in the UK, TalkTalk offers broadband only with its fixed-voice service.

We believe the inclusion of 'weighted average bundle' and 'lowest available' pricing is also essential to understand the pricing of communications services, which are increasingly being delivered as multi-service propositions (examples in the UK include TalkTalk and Sky's triple-play offers which provide TV, fixed voice and fixed broadband, and Virgin Media's quad-play offer which includes TV, fixed voice, fixed broadband and mobile).

However, a limitation is that 'bundled' service offerings are typically not available to all consumers, as they are generally geographically confined to areas where premises are connected either to a cable network or to an unbundled telephone exchange. And although focusing on the 'lowest available' provides insight into the lowest prices available to some customers, it is not as good a reflection of the prices that consumers are actually paying as the 'weighted average' analysis that is possible when looking at stand-alone pricing.

Limitations

One of our key learnings in constructing international price comparison models is that it is a very problematic exercise, which requires assumptions to be made and imposes 'like-for-like' comparisons on markets that are very different. In future years, we will look to continue to improve our methodology, and we welcome any feedback on the research.

We highlight the following limitations to the analysis:

- The analysis assumes a systematic and rational consumer who has a full understanding of his or her usage requirements and is prepared to shop around and undertake some often quite complex calculations to identify the tariff which offers the best value. In reality, few consumers act in this way and will be on the lowest-cost combination of services for their usage profile, but we believe the assumption is necessary in order to provide effective international comparisons.

- In looking only at tariffs offered by the largest operators in each country, lower prices which might be available from smaller operators seeking to disrupt markets are not included, purely for practical reasons. Nevertheless, we believe that using the prices of the largest operators is appropriate, both because they are the best reflection of the general consumer experience and because their pricing both defines and is defined by the competitive environment in which they operate.
- Although we have been as comprehensive as possible, tariffs are often highly complicated and there are some components that we have been unable to incorporate into our model; for example, benefits that are available only to certain types of consumers, such as *BT Basic* which offers lower-price line rental to consumers on income support, and differing levels of customer service.
- In order to calculate the weighted average, we have used market share calculations based on operators' retail customers. Market share calculations are based on the overall subscriber base, not the subscriber base for the particular tariff (for which figures are not available).
- Pay-TV services are a component of three of the baskets we examine. However, it has not been possible to compare like-for-like subscriptions, principally because of differences in the composition of basic and premium channels across the six countries. As a consequence, quantitative comparison of international TV pricing is arguably less meaningful than for telecoms services. This is also an issue in the pricing of 'triple-play' services, where there is a wide variation in the types of TV content.
- For television services in some countries there are only two operators with nationwide coverage and/or significant market share (or only one, for some premium TV offerings). In these instances, we have identified the best-value tariff from each of them and calculated a blended average based on their market shares.
- Some services are not available nationwide. This is particularly true for services which are available only where local exchanges have been unbundled, and for IPTV, which requires a high-speed broadband connection, but is also true for cable TV and all types of broadband.
- We do not define whether the mobile phone component in a household usage profile is pre-pay or post-pay. We believe this enables better international comparison, given the very different pre-pay / post-pay splits in different countries (for example, over 80% of mobile connections in Italy, but less than 20% in the US, are pre-pay). However, a consequence of this is that the analysis does not recognise the different characteristics of the services; for example, a pre-pay mobile may be the only option available to consumers with a poor credit rating and may also offer advantages to those who vary their use month by month.
- Representative pricing in the US as a whole is difficult, due to large regional variations as a result of local incumbent telco operators and cable operators offering localised prices for fixed-line services. We use only those tariffs available within the state of Illinois, chosen because it is broadly representative of the US as a whole in terms of its relative wealth and rural-urban split (it incorporates the city of Chicago as well as large agricultural regions). Nevertheless, US pricing should not be viewed as representative of the whole country.
- In order to ensure that the changes we identify within countries have been driven by changes in the market rather than simply by changes in the currency exchange rate,

we have used the same PPP-adjusted exchange rate in 2016 and applied it to 2015 data. This means that there may be some distortions in the relative positions of countries compared to the findings in the 2015 report. The prices quoted are in nominal terms.

1.2 Appendix B: TV viewing methodology

1.2.1 Introduction

We use the data in the *One TV Year in the World* report to produce our analysis of broadcast TV viewing for our 15 comparator countries. The report is compiled by Médiamétrie.

Médiamétrie work with audience measurement and research organisations for each country that is included in their publication and bring together their respective industry standard viewing data into a single report.

We set out the industry standard criteria with the comparator countries below. The information reflects the status and reported data for each country at the time that Médiamétrie’s report was published in April 2016. These might have evolved since then.

Figure 1.1 Comparator countries and their audience measurement

Country	Audience base	Area	2015 date range	Type of viewing reported
UK	Individuals 4+	National	1st Jan 2015 - 31st Dec 2015	Live + viewing on the same day as live + up to 7 days time-shifted
France	Individuals 4+	National	29th Dec 2014 - 3rd Jan 2016	Live + viewing on the same day as live + up to 7 days time-shifted
Germany	Individuals 3+	National	1st Jan 2015 - 31st Dec 2015	Live + viewing on the same day as live + up to 3 days time-shifted
Italy	Individuals 4+	National	1st Jan 2015 - 31st Dec 2015	Live + viewing on the same day as live + up to 7 days time-shifted
USA	Individuals 2+	National	29th Dec 2014 - 27th Dec 2015	Live + viewing on the same day as live + up to 7 days time-shifted
Japan	Individuals 4+	Kanto region (the most selected region for analysis of TV viewing in Japan but should not be considered as equivalent to nationally representative data)	1st Jan 2015 - 31st Dec 2015	Live only
Australia	Individuals 0+	A combination of regional areas to reflect national data: Queensland, Northern New South Wales (NSW), Southern NSW, Victoria and Tasmania and Regional Western Australia.	1st Jan 2015 - 31st Dec 2015	Live + viewing on the same day as live + up to 7 days time-shifted
Spain	Individuals 4+	National	1st Jan 2015 - 31st Dec 2015	Live only
Netherlands	Individuals 6+	National	1st Jan 2015 - 31st Dec 2015	Live + viewing on the same day as live + up to 6 days time-shifted
Sweden	Individuals 3+	National	1st Jan 2015 - 31st Dec 2015	Live + viewing on the same day as live + up to 7 days time-shifted
Poland	Individuals 4+	National	1st Jan 2015 - 31st Dec 2015	Live only
South Korea	Individuals 4+	National	1st Jan 2015 - 31st Dec 2015	Live only
Brazil	Individuals 4+	15 markets - Florianópolis, Campinas, Porto Alegre, Distrito Federal (Brasília), São Paulo, Rio de Janeiro, Curitiba, Grand Belo Horizonte, Salvador, Vitória, Manaus, Goiânia, Fortaleza, Recife, Belém	1st Jan 2015 - 31st Dec 2015	Live only
Russia	Individuals 4+	National. Cities with a population greater than 100,000 inhabitants	1st Jan 2015 - 31st Dec 2015	Live + viewing on the same day as live
China National	Individuals 4+	National	1st Jan 2015 - 31st Dec 2015	Live only

Broadcast TV viewing - Scheduled TV programming which is available to all viewers at the same time (such as those that are listed in electronic programme guides (EPG)). It includes time-shifted viewing of these programmes up to a specified number of days. Figure 1.1 details what is reported for each comparator country.

Live viewing - Watching programmes during broadcast at the scheduled time, not only to live events such as football matches.

Viewing on the same day as live (VOSDAL) – viewing to broadcast programmes other than at the time of broadcast but on the same day as it was aired.

Time-shifted viewing – viewing of broadcast programmes up to the specified number of days after live broadcast, excluding viewing on the same day as live.

Total time-shifted viewing includes VOSDAL plus any subsequent time-shifted viewing.

Time-shifted includes viewing through recording devices (such as a DVR) as well as to catch-up TV services (where applicable to the country). Viewing to devices such as PCs and laptops, tablets and smart phones where attached to the TV set are included where measured in the relevant country. In the UK, all of these forms of viewing up to seven days after broadcast are included in the industry standard data.

Guest viewing (i.e. people who are not normally part of the household in panel home) is included when measured by a country.

SVoD (Subscription video-on-demand) – a subscription service (usually paid monthly) that offers video-on-demand content (SVoD) usually delivered via the internet. Services may offer live streaming to a selection of channels/content as well as VoD content. Examples of SVoD services in the UK are Netflix, Amazon and Disney Life.

Full list of UK domestic publicly-owned channels including HD and +1 channels – BBC One, BBC Two, BBC Three (ceased March 2016), BBC Four, BBC News, BBC Parliament, CBBC, CBeebies and BBC red button services, along with Channel 4, E4, More4, Film4, 4seven, 4Music.

1.3 Appendix C: Consumer research methodology

1.3.1 Introduction

This section describes the methodology used for the 2016 international communications behaviour research, which was carried out by Populus, an independent market research agency, on behalf of Ofcom.

The survey covered the communications behaviour of internet users in nine markets: the UK, France, Germany, Italy, the US, Japan, Australia, Spain and Sweden. As in previous years, the research looked at the ownership and use of communications services and devices such as TV, mobile, fixed landline and the internet. In addition, it explored the changing nature of communication, and use of connected devices, postal services, online shopping, mobile payments, and take up of 4G and Superfast Broadband in the various markets.

The 2016 research comprised 9,100 interviews completed between 18th and 31st October 2016.

1.3.2 Research methodology

The international communications behaviour research was conducted using an international online consumer access panel. The research panel employed was managed by Toluna. The numbers of active panel members in each market are shown in Figure 1.2. A total of 9,100 interviews with internet users were completed – with at least 1,000 in each market. Age and gender quotas in each market were set to ensure the samples were representative of the online population of each country. A small amount of post-survey weighting was applied to further refine the representativeness of the samples..

The study was carried out among adults aged over 18. Data for setting quotas for the different online panels came from comScore, which uses a range of data sources, including the NRS for the UK, the Estudio General de Medios (EGM) for Spain, and its own proprietary studies for all other markets.

Members of Toluna's access panel were screened to meet age and gender requirements. Respondents were invited to participate using a random online sampling approach to ensure a representative sample. The following methods were used:

- Email invitation via random sampling from the panel, within qualifying age bands.
- Real-time sampling, allowing visitors to the Toluna website to access the screeners and participate (if they qualified).
- Toluna also allow respondents who have screened out or quota failed an alternative survey to be directed into the live survey via a router, based on their demographics and what is still open in terms of quotas.

Toluna sampled its panel by selecting email addresses randomly within the market and demographic quotas required, taking account of predicted response rates by target demographic, and country, to avoid over-contacting panellists and to ensure that a bias was not introduced in the responses. The sample itself was then automatically randomised for

potentially-qualifying individuals. A twenty-five minute self-completion web-based survey was completed by all respondents in each market.

Quotas

Quotas of 1,000 interviews per market were set to match previous waves and at least 1,000 interviews were completed per country.

Quotas were set to reflect the age and gender profile of internet users in each market of consumers. The data were weighted using figures published by ComScore.

Figure 1.2 Achieved sample, by nation and demographics

	UK	FRA	GER	ITA	USA	JPN	AUS	ESP	SWE
Male	507	515	545	543	471	568	515	530	501
Female	493	493	465	489	545	433	492	486	499
18 – 24 yrs	171	154	146	144	139	133	165	164	110
25 – 34 yrs	207	192	178	235	205	210	218	292	161
35 – 44 yrs	195	206	193	296	212	251	211	249	154
45 – 54 yrs	186	183	230	223	166	189	184	182	171
55 – 64 yrs	91	161	130	92	124	169	119	102	153
65+ yrs	150	112	133	42	170	59	110	27	251

Statistical significance

Demographic quotas were employed to match internet use in each market. Results were tabulated and significance testing (at 95% confidence) was applied.

Statistical significance is indicated by the use of directional arrows on some of the figures in the report. An upward arrow indicates a significantly greater proportion and a downward arrow indicates a significantly lower proportion (see individual figure footnotes for details of years/sub-groups being compared).

Access panel

The 2016 survey used Toluna’s access panel. The panel includes the following number of members in each of the relevant markets:

Figure 1.3

Toluna panel member volumes

	UK	FRA	GER	ITA	USA	JPN	AUS	ESP	SWE
Members (000s)	479	371	352	226	2,321	210	113	227	35

Panel members were recruited from a variety of sources, using a ‘double opt-in’ procedure. The process was as follows:

- Step 1 - A prospective panellist completes a panel registration form, which includes contact and demographic information (first opt-in).
- Step 2 - An automatic email is sent to the prospect, requesting verification of their panel registration by clicking a link that confirms their log-in details.
- Step 3 - Once the prospect has clicked the link (second opt-in), he or she is officially a panellist and is presented with an opportunity to complete additional profiling. Another automatic email is sent that includes the panellist’s account log-in information for future reference by the panellist.

For this survey, all panellists completing the survey were paid a small incentive payment for their time.

1.4 Appendix D: comScore

1.4.1 Introduction

The UK Online Measurement Company (UKOM) was formed in 2009 with a mandate from the advertising industry to establish measurement standards for digital media. In 2011, comScore was appointed as the sole data supplier for UKOM on contract extending to March 2018.

The *Internet and online content* chapter predominantly draws from three comScore sources. For analysis of laptop and desktop computer internet activity we use comScore MMX, which employs comScore's Unified Digital Measurement methodology, explained below. The comScore MMX panel excludes Apple Mac computers; comScore has been recruiting mac panellists into the comScore sample since September 2015. Mac panellists' data started contributing to Unified data produced in June 2016 within the US, but census-level activity is captured from both PCs and Apple Macs. comScore MMX is consistent across the six comparator countries for which data are available: France, Germany, Italy, the US, Japan, Australia and Spain.

For analysis of mobile internet activity, we use comScore Mobile Metrix. In the US, the UK, Spain and Italy, comScore Mobile Metrix uses comScore's Unified Digital Measurement methodology, with a panel of smartphone (iOS and Android handsets). However, France, Germany, Japan and Australia comScore Mobile Metrix is currently informed only from census-level activity on publishers' digital content.

Unified Digital Measurement

comScore's Unified Digital Measurement (UDM) methodology combines panel and census measurement techniques to measure digital audiences. UDM uses comScore's global measurement panel to determine audience reach and demographics. Census-level activity is captured from publishers' digital content, such as on websites, videos, and computer and mobile applications. comScore combines census-level data with those captured from the panel, to help provide a more accurate view of audiences and their consumption habits. This approach allows comScore to capture the most accurate consumption activity from publishers, and attribute this to audience demographics in a way that is not affected by cookie deletion, blocking, or rejection.

Metrics

Throughout the report, we refer to a number of metrics, defined below:

- *Unique audience* – the total number of unique persons who visited a specific website or used a specific application at least once in a given month. Persons visiting the same website more than once in the month are counted only once.
- *Active audience* – the total number of people who visited any website or used any application at least once in a given month.
- *Digital audience* – the active audience across all platforms (laptop/desktop computers, mobile phones and tablets, for those websites that are tagged in comScore's census network).
- *Active reach* – the unique audience of a website as a proportion of the active audience.

- *Time spent per month* – the average time spent browsing a website per unique visitor per month (excludes time spent watching online video and listening to streamed music).

Dictionary

Each of the entities reported by comScore are attributed to a level in comScore's Client Focused Dictionary. Several entities can exist within one website (e.g. BBC Sport and BBC iPlayer) and comScore's dictionary defines how these entities are structured and related to each other. It is 'client-focused' because comScore's clients define how their websites appear in reports, according to this dictionary. All comScore reports use the same six-tier dictionary structure as explained below:

Property [P] - The highest level of reporting in the Client Focus structure; Properties represent all Full Domains (i.e. felmont.com), Pages (i.e. sports.felmont.com/tennis), Applications or Online Services, under common ownership or majority ownership for a single legal entity. A Property may also contain digital media content that is not majority-owned but has been legally signed over for reporting purposes by the majority owner.

Media Title [M] - A Media Title is an editorially- and brand-consistent collection of content in the digital landscape that provides the marketplace with a view of online user behaviour. This may represent a domain, a group of domains, an online service or application.

Channel [C], SubChannel [S], Group [G] and SubGroup [SG] - Within a Media Title there may be grouped URLs of editorially consistent content that make up a Channel. For some of the largest Media Titles, Channels themselves may be broad, and Subchannels, Groups and Subgroups within the larger Channels may prove useful for categorisation within the comScore Dictionary.