

Final Report for BT

BT Wholesale Interconnect Tariff benchmarking

Analysys

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CONFIDENTIAL

BT Wholesale interconnect tariff benchmarking

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0 Executive Summary

BT Wholesale commissioned Analysys Research to provide an independent benchmark of interconnection prices in the UK against comparable European countries.

Data from the reference interconnect offers has been taken and adapted to establish the average price for a typical three-minute local, single tandem and double tandem call in each of the countries.

The results of this show that, for local and single tandem calls, the UK is either the least expensive or the second least expensive country for call origination or call termination. For double tandem calls, the UK does not have the lowest prices but is in the lower 50% of benchmarked countries.

	<i>Call origination</i>	<i>Call termination</i>
Local	1	2
Single tandem	1	1
Double tandem	6	4

Exhibit 0.1: *Ranking of UK interconnect rates for typical three-minute call against 12 other European countries [Source: Analysys Research, 2005]*

This document discusses the relevance of benchmarking and details of the methodology used in arriving at a standardised three-minute call, and summarises the results for each type of call.

1 Purpose of the Document

BT Wholesale commissioned Analysys Research to provide an independent comparison of call origination and termination prices across 13 European countries including the UK. This document summarises the interconnect rates for a typical three-minute call for local, single tandem and double tandem call origination and call termination in each country as of 1 January 2005.

To arrive at comparable prices for interconnection a methodology has been used to adjust for differences in interconnect tariff structures. This document specifies in detail the methodology used, to show how the comparable prices were derived.

2 Relevance of Benchmarking

This benchmarking survey compares interconnection prices in 13 European countries. The countries included in the survey were:

- Austria
- Belgium
- Denmark
- France
- Germany
- Greece
- Ireland
- Italy
- the Netherlands
- Norway
- Spain
- Sweden
- the UK.

There are a number of reasons why different countries might have different fixed interconnect prices:

- Operators may have different cost bases, for example due to
 - superior economies of scale in switching in countries with a higher average population density
 - smaller countries having shorter distances for average double tandem inter-tandem links

- Different levels of usage of the fixed telephone network may generate increased economies of scale, arising from a variety of factors:
 - cultural factors increasing usage of telephony
 - levels of competition (driving lower prices and hence increased usage, as well as some innovative services)
 - the recent use of mobile or metered dial-up Internet
- Regulators forcing prices down more effectively since liberalisation.

We have not tried to allow for the quantitative effects of cost and demand differences within this report. However, the geography and usage of telephony in the major European economies is not so different as to make benchmarking a pointless exercise. We note here that benchmarking of interconnect tariffs between European countries is a regular part of the European Commission's annual market reports as well as being used within the reports and market intelligence services of other market research agencies.

We appreciate that regulators setting rates for operators that are already among the cheapest face particular difficulties, as they will not be able to reduce real rates forever. If an operator has among the lowest prices for interconnect compared with its peers, then it will be among the first group of operators to face a significant squeeze between regulated prices on the one hand and the minimum efficient cost of supply on the other.

3 Methodology

3.1 Overview of methodology

As the structure of interconnection prices differs by country, a fair comparison of these prices on a like-for-like basis requires a number of adjustments to be made to the base tariffs published by operators in their reference interconnect offers (RIOs).

The broad structure of origination and termination charges is similar in each of the 13 countries in this benchmark, with prices depending on distance and time. Typically there are three distance zones (local, single tandem, double tandem) and two time zones (peak and off peak). However, despite similarities in overall structure, the differences between countries (in essence, different choices for distance and time zones) mean that a number of manipulations are required before arriving at a standard set of results that can be directly compared.

In order to construct a comparable weighted average price for call origination and call termination for local, single tandem and double tandem interconnect a five-stage process has been employed. Exhibit 3.1 summarises this process.

<i>Stage</i>	<i>Adjustment</i>	<i>Summary of adjustment</i>
1	Tariff collection	Original price data has been collected from the incumbent operators and national regulatory authorities
2	Conversion to Euros	All prices, including prices originally in Euros, have been converted using purchasing power parity (PPP)
3	Category standardisation	Across the countries, distance categories vary from two to five distances zones. These data have been standardised into three basic categories (local, single tandem and double tandem)
4	Calculation of a three-minute call	Using the three standardised distances, the price of a three-minute call is calculated. This reflects the average length of a call, and provides a balance between call set-up charges and price-per-minute charges
5	Conversion to weighted average call cost	The estimated call volume in each time period in each country is used to establish the weighted average price for a three-minute call, regardless of the time of day

Exhibit 3.1: *Summary of the five-step methodology [Source: Analysys Research, 2005]*

3.2 Methodology in detail

In this section we list the sources of information and describe the methodology employed. The impact of assumptions that have been made are discussed in the sensitivity analysis section

3.2.1 Tariff collection

All of the information used in this survey comes from publicly available sources referenced in Exhibit 3.2. Where any information was unclear or not readily available, the national regulatory authority (NRA) or incumbent operator has been contacted for clarification.

<i>Country</i>	<i>Source</i>
Austria	Zusammenschaltungsentgelte (Festnetz) ab 01.10.2003 (RTR 09/2004)
Belgium	Belgium's Reference Interconnect Offer for licensed telecommunications operators (valid from 01/01/04 to 31/12/04) ¹ (Belgacom, December 2003, http://www.belgacom.be/nationalwholesale/en/jsp/static/regulatory_voice.jsp)
Denmark	TDC, 2004, http://www.itst.dk/static/LRAIC/UdkastPrisfastsattelse.pdf
France	Services d'interconnexion, Catalogue de France Telecom 2005, http://www.francetelecom.com/fr/groupe/initiatives/savoirplus/documentation/interconnexion/
Germany	Interconnection Reference Offer, October 2003, http://www.regtp.de/en/reg_tele/start/fs_05.html
Greece	OTE, November 2004, http://www.otewholesale.gr/files/telh_diasyndeshs.pdf
Ireland	Reference Interconnect Offering from Eircom Ltd, January 2005, http://www.eircomwholesale.ie/regulatory/subreg_details.asp?id=80
Italy	Offerta di Riferimento di Telecom Italia 2005, Telecom Italia, October 2004, http://www.wholesale-telecomitalia.it/cgi-bin/wholesale.dll/wholesale/TI_WS_GuestLogin.jsp
The Netherlands	Notification regarding the decision to approve the tariffs and other measures to be applied for KPN's Interconnection and Special Access Services as from 1 September 2004 and 1 July 2004, respectively Opta, June 2004, http://www.opta.nl/download/Notification_regarding_tariff_decision_30_June_2004.pdf
Norway	Jara, 2004, http://www.jara.no/produktlosninger/produktomraader/samtrafik/pdf/samtrafikk_avtale011204.pdf
Spain	Oferta de servicios de interconexion de referencia de telefonica de Espana SAU para operadores con licencia de tipo, CMT, April 2004, http://www.cmt.es/cmt/centro_info/interc/pdf/OIR2003%20Abril04.pdf
Sweden	Skanova, September 2003, http://www.skanova.com/index.asp?lev=1558
UK	BT Wholesale Current Carrier Price List, December 2004, http://www.btwholesale.com/application?origin=redirectURL.jsp&event=bea.portal.framework.internal.refresh&pageid=typical&nodeld=navigation/node/data/service_and_support/pricing/pricing_hub

Exhibit 3.2: Sources of interconnection data [Source: Analysys Research, 2005]

1 Belgacom's Reference Interconnect Offering for 2005 had not been approved by the Belgian Institute for postal services and telecommunications at the beginning of 2005

3.2.2 Conversion to EUR PPP

All currencies have been converted into EUR purchasing power parity. The rates used in conversion are detailed in Exhibit 3.3.

<i>Country</i>	<i>Currency</i>	<i>Local currency into Euro at PPP</i>
Austria	Euro	1.01
Belgium	Euro	1.04
Denmark	Krone	0.11
France	Euro	1.05
Germany	Euro	0.97
Greece	Euro	1.33
Ireland	Euro	0.94
Italy	Euro	1.00
Netherlands	Euro	0.99
Norway	Krone	0.10
Spain	Euro	1.22
Sweden	Krona	0.10
UK	Pound sterling	1.49

Exhibit 3.3: PPP exchange rate used in the benchmarking
 [Source: Analysys Cutting the Cost 2004, derived from figures supplied by the OECD, 2003]

3.2.3 Category standardisation

Interconnect categories have been standardised to local, single tandem and double tandem rates. Of the countries in the benchmark, six have tariffs that match this structure directly. For these six countries, the prices for each distance zone have been left untouched (i.e. we have not attempted to correct for the difference between the sizes of UK and other zones). For the other seven countries adjustments have been made to give prices in three distance zones, as summarised in Exhibit 3.4.

Country	<i>Adjustments to reference interconnect offer (RIO) price</i>		
	<i>Local equivalent</i>	<i>Single tandem equivalent</i>	<i>Double tandem equivalent</i>
Austria	As per RIO	As per RIO	As per RIO
Belgium	Local level	Intra-access area	Intra-access area (for origination). Extra-access area (for termination)
Denmark	As per RIO	As per RIO	As per RIO
France	As per RIO	As per RIO	Single tandem (for origination). As per RIO (for termination)
Germany	As per RIO	As per RIO	As per RIO
Greece	As per RIO	As per RIO	As per RIO
Ireland	As per RIO (primary)	As per RIO	As per RIO
Italy	Average of local and metropolitan	Average of metropolitan and single tandem	As per RIO
Netherlands	As per RIO (local)	As per RIO (regional)	As per RIO (national)
Norway	As per RIO (within region)	As per RIO (within region)	As per RIO (outside region)
Spain	Average of local and metropolitan	Average of metropolitan and single tandem	As per RIO
Sweden	Average of local and city	Average of city and single tandem	As per RIO
UK	As per RIO	As per RIO	Weighted average of double tandem short (0.5 weighting), medium (0.4) and long (0.1)

Exhibit 3.4: Summary of adjustments to distance zones [Source: Analysys Research, 2005]

The assumptions made (where there was an absence of actual data) in order to adjust benchmarked tariffs to a three-category interconnect regime (local, single tandem and double tandem) are described for each country below. The possible effect of these assumptions on the rankings of tariffs benchmarked in this report is discussed in the ‘Sensitivity Analysis’ section.

Belgium

In Belgium there are no separate single tandem and double tandem call origination rates. We have not disaggregated the Belgian single tandem origination rate into separate estimated single and double tandem rates; instead we have used the published single tandem call origination rate for both single tandem and double tandem call origination.

France

In France there are no separate single tandem and double tandem call origination rates. We have not tried to disaggregate the French single tandem origination rate into separate single and double tandem rates; instead we used the published single tandem call origination rate for both single tandem and double tandem call origination.

Italy

Prices for origination and termination are in four categories on the operators’ RIO: local, metropolitan, single tandem and double tandem. To be converted to three categories, prices for local are given as an average of the local and metropolitan price, single tandem is an average of the metropolitan and single tandem price. Double tandem prices are unchanged from the RIO.

Netherlands

'Regional' tariffs are benchmarked as single tandem and 'national' tariffs are benchmarked as double tandem.

Norway

For both origination and termination, 'outside region' is benchmarked as double tandem and 'inside region' is benchmarked as single tandem and local.

Spain

As with Italy, prices for origination and termination are in four categories on the operators reference interconnect offer (RIO): local, metropolitan, single tandem and double tandem. To be converted to three categories, prices for local are given as an average of the local and metropolitan price, while single tandem is an average of the metropolitan and single tandem price. Double tandem prices are unchanged from the RIO.

Sweden

Sweden has four distance tariffs (local, city, single tandem and double tandem). To convert them into three categories, prices for local are given as an average of the local and city price, single tandem is an average of the city and single tandem price. Double tandem prices are unchanged from the RIO.

UK

Local and single tandem are as per the BT carrier price list. Double tandem is a weighted average of the three double tandem prices (short, medium and long). Weighting is 0.5 short, 0.4 medium and 0.1 long.

3.2.4 Calculation of a three-minute call

The Euro prices for the three regions have been used to calculate the price of a three-minute call.

In some countries there is no charge for call set-up, while in others there is a call set-up charge and, typically, lower per-minute charges. If only the price for the first minute of a call is compared, countries with no set-up charge can appear substantially less expensive than those with set-up charges. By looking at a more typical three-minute call, the bias toward price regimes that do not have set-up charges is eliminated. As the average call is around three minutes long, it also means that the prices in the benchmark more closely reflect the price paid for a typical call.

The price of a three-minute call is therefore:

$$p = s + 3m$$

Where p = price of a three-minute call, s = set-up charge and m = price per minute

3.2.5 Conversion to weighted average call cost

The weighed average cost of a call, independent of the time of day, has been calculated to give the price of a call, regardless of the time of day. To get the correct weighting, the volume of calls for each price band is calculated. Call traffic volume information for the UK has been used as a base and this has been adjusted to reflect the different time bands for peak and off-peak calls in each country.

We have used data provided by BT regarding the UK percentage splits of, separately, originating and terminating traffic between peak (weekday day-time), off-peak I (weekday evenings) and off-peak II (weekends) for 2004. We have assumed a flat distribution of call traffic within each time-period and, in order to calculate the call-volume in a 'typical' UK peak-period hour, UK off-peak I hour and UK off-peak II hour.

In the absence of specific data from each of the benchmarked countries we have used this estimated UK hourly call distribution to estimate the volume of calls for each country in their respective peak and off-peak time-periods. As the UK off-peak I and off-peak II rates are almost identical we have used an average hourly volume estimate across both periods. We have then calculated the volume of traffic within individual countries' peak and off-peak periods using the estimated hourly call volumes for UK peak and (average) off-peak calls.

Overall time-of-day independent rates of local, single tandem and double tandem call origination and termination have then been calculated using the call-volume distributions estimated for each country as weightings for the respective peak and off-peak tariffs.

Exhibit 3.5 shows the peak and off-peak time bands for each of the 13 countries in the benchmark.

<i>Country</i>	<i>Peak hour</i>	<i>Off peak I</i>	<i>Off peak II</i>
Austria	Monday–Friday 0800–1800	All other times and bank holidays	–
Belgium	Monday–Friday 0800–1900	All other times	–
Denmark	Monday–Saturday 0800–1930	All other times and bank holidays	–
France	Monday–Friday 0800–1900	Monday–Friday 0700–0800; 1900–2200. Weekends 0700–2200	2200–0700
Germany	Monday–Friday 0900–1800	All other times and bank holidays	–
Greece	Monday–Friday 0800–2000	Monday–Friday 0000–0800 and 2000–2400, Saturdays	Sundays
Ireland	Monday–Friday 0800–1800	Monday–Friday 1800–0800	Weekends
Italy	Monday–Friday 0800–1830, Saturday 0800–1300	All other times and bank holidays	–
Netherlands	Monday–Friday 0800–1900	Mon–Fri 1900–2400	Monday–Friday 0000–0800, Weekends
Norway	Monday–Friday 0800–1700	Mon–Fri 1700–0800, all of Saturday and Sunday	–
Spain	Monday–Friday 0800–1800	All other times and national bank holidays	–
Sweden	Monday–Friday 0800–1800	Any other time	–
UK	Monday–Friday 0800–1800	Monday–Friday 1800–0800	Weekends

Exhibit 3.5: *Peak and off-peak time bands for 13 European countries [Source: Analysys Research, 2005]*

Exhibits 3.6 and 3.7 show the call-volume distributions calculated for each country for call termination and origination. Where a country does not have a separate off-peak II rate then the off-peak I weighting is used for the entire off-peak period.

<i>Country</i>	<i>Peak-period call volume</i>	<i>Off-peak I call volume</i>	<i>Off-peak II call volume</i>
Austria	0.56	0.44	0.00
Belgium	0.58	0.42	0.00
Denmark	0.63	0.37	0.00
France	0.58	0.42	0.00
Germany	0.51	0.49	0.00
Greece	0.60	0.31	0.09
Ireland	0.56	0.26	0.18
Italy	0.57	0.43	0.00
Netherlands	0.58	0.09	0.33
Norway	0.51	0.49	0.00
Spain	0.56	0.44	0.00
Sweden	0.56	0.44	0.00
UK	0.56	0.26	0.18

Exhibit 3.6: *Estimated call termination volume splits by period for benchmarked countries*
[Source: Analysys Research, 2005]

<i>Country</i>	<i>Peak-period call volume</i>	<i>Off-peak I call volume</i>	<i>Off-peak II call volume</i>
Austria	0.47	0.53	0.00
Belgium	0.49	0.51	0.00
Denmark	0.55	0.44	0.00
France	0.49	0.51	0.00
Germany	0.42	0.58	0.00
Greece	0.51	0.38	0.11
Ireland	0.47	0.31	0.22
Italy	0.48	0.52	0.00
Netherlands	0.49	0.11	0.39
Norway	0.42	0.58	0.00
Spain	0.47	0.53	0.00
Sweden	0.47	0.53	0.00
UK	0.47	0.31	0.22

Exhibit 3.7: *Estimated call origination volume splits by period for benchmarked countries*
[Source: Analysys Research, 2005]

4 Results

4.1 Summary of results

For a typical three-minute call, the UK has the lowest interconnection rates out of the 13 countries benchmarked for local and single tandem call origination and for single tandem call termination. For local call termination, only Denmark has a lower rate. For double tandem origination and termination, the UK ranks sixth and fourth respectively, and is in a second group, clustered with a number of other countries with similar rates, all slightly above those in Denmark. Denmark is the least expensive country for both call origination and termination.

	<i>Call origination</i>	<i>Call termination</i>
Local	1	2
Single tandem	1	1
Double tandem	6	4

Exhibit 4.1: *Ranking of UK interconnect rates for a typical three-minute call against 13 European countries [Source: Analysys Research, 2005]*

For the countries in the benchmark, the main variation between the way the countries charge is the call set-up charge. Six countries in the benchmark do not have a call set-up charge (Austria, Germany, Greece, Italy, Spain and the UK). For a three-minute call, although Austria, Greece and Spain are consistently among the most expensive countries, it cannot be said that the absence of a call set-up charge leads to higher call costs. The UK, for example, has per-minute charges consistently lower than the per-minute charges in the Netherlands, which does have a call set-up charge.

Although consistently among the least expensive countries, the UK and Denmark have different pricing mechanisms. While the UK has no set-up charge and a per-minute charge typically the third or fourth least expensive, Denmark has a set-up charge combined with per-minute charges that are the lowest or the second lowest.

The most expensive countries, Greece, Austria and Spain, do not have call set-up charges but do have high per-minute prices.

The prices estimated for Spain do not take into account the off-peak volume discounts that are available. Volume discounts are provided for off-peak tariffs per point of interconnect. according to the following formula:

$$D = (20V) / (V + 7)$$

Where D = discount as a %, V = total volume of off-peak minutes for all types of interconnection in that POI.

4.2 Local call origination

For local call origination, the UK is cheaper than the other benchmarked European countries. The UK is 0.14 Euro cents PPP cheaper than Denmark and 1.45 Euro cents PPP cheaper than Spain (Exhibits 4.2 and 4.3), the most expensive country for local call origination.

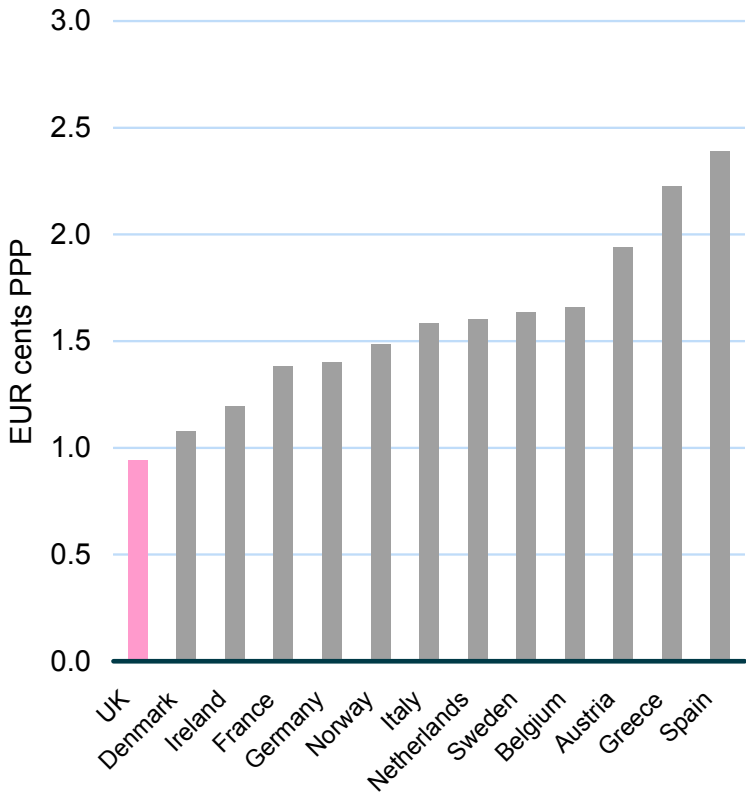


Exhibit 4.2:
Cost of a three-minute call: local call origination
[Source: Analysys Research, 2005]

<i>Rank</i>	<i>Country</i>	<i>Call origination local rate (EUR cents PPP)</i>
1	UK	0.94
2	Denmark	1.08
3	Ireland	1.20
4	France	1.38
5	Germany	1.40
6	Norway	1.48
7	Italy	1.59
8	Netherlands	1.60
9	Sweden	1.64
10	Belgium	1.66
11	Austria	1.94
12	Greece	2.22
13	Spain	2.39

Exhibit 4.3:

Ranking by country of the cost of origination of a three-minute call

[Source: Analysys Research, 2005]

Although it does not have a call set-up charge, Spain's per-minute charge of 0.80 Euro cents PPP is more than twice that of the UK's (0.31 Euro cents PPP per minute). The balance of set-up charges and call-minute charges means that Spain, which would not be the most expensive country for a one-minute call, is considerably more expensive than other countries for a three-minute call. Austria and Greece, 11th and 12th in the rankings, also have no set-up charge but high per-minute charges.

Ireland, with high set-up charges but the lowest per-minute charges, has a pricing approach at the other end of the spectrum from the trio of Austria, Greece and Spain.

Sweden, one of the earliest countries to liberalise its telecoms market, has one of the most expensive local rates, with relatively high per-minute charges and a relatively high call set-up charge.

4.3 Local call termination

For local call termination, the UK is the second least expensive country. The UK is 0.08 PPP Euro cents more expensive than the Denmark, the cheapest country, and 1.43 PPP Euro cents less than Spain, the most expensive country (Exhibits 4.4 and 4.5).

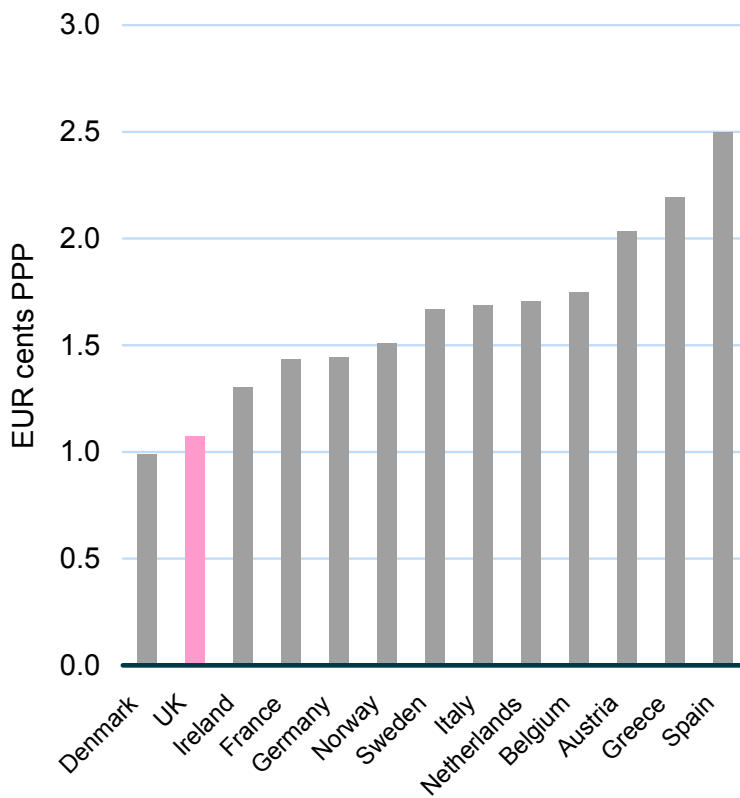


Exhibit 4.4:
 Cost of a three-minute call: local call termination
 [Source: Analysys Research, 2005]

<i>Rank</i>	<i>Country</i>	<i>Call termination local rate (EUR cents PPP)</i>
1	Denmark	0.99
2	UK	1.07
3	Ireland	1.30
4	France	1.43
5	Germany	1.44
6	Norway	1.51
7	Sweden	1.67
8	Italy	1.69
9	Netherlands	1.71
10	Belgium	1.75
11	Austria	2.03
12	Greece	2.19
13	Spain	2.50

Exhibit 4.5:

Cost of a three-minute call: local call termination

[Source: Analysys Research, 2005]

Again, high per-minute charges mean that Spain, Greece and Austria have the most expensive rates for a three-minute call. As with local origination, Sweden is relatively expensive.

Although the UK has no set-up charge, only three countries have lower per-minute charges, Norway, Ireland and Denmark. Each of these three countries has a call set-up charge.

4.4 Single tandem call origination

For single tandem call origination, the UK is the least expensive country. The UK is 0.18 Euro cents PPP cheaper than the nearest country, Denmark. The UK is 2.00 Euro cents PPP cheaper than the most expensive country Greece (Exhibits 4.6 and 4.7).

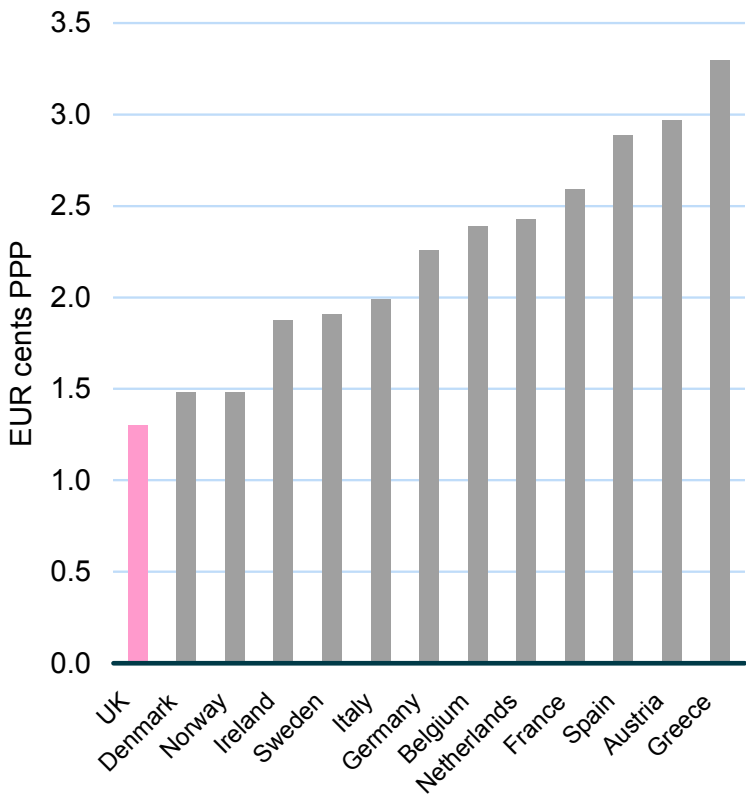


Exhibit 4.6:
Cost of a three-minute call: single tandem call origination [Source: Analysys Research, 2005]

<i>Rank</i>	<i>Country</i>	<i>Call origination single tandem rate (EUR cents PPP)</i>
1	UK	1.30
2	Denmark	1.48
3	Norway	1.48
4	Ireland	1.88
5	Sweden	1.91
6	Italy	1.99
7	Germany	2.26
8	Belgium	2.39
9	Netherlands	2.43
10	France	2.59
11	Spain	2.88
12	Austria	2.97
13	Greece	3.30

Exhibit 4.7:

Cost of a three-minute call: single tandem call origination [Source: Analysys Research, 2005]

The most expensive country, Greece, has a weighted per-minute call charge of over 1 Euro cent PPP per minute, three times the lowest per-minute charge of 0.32 Euro cents PPP per minute (for Norway).

4.5 Single tandem call termination

For single tandem call termination, the UK is the cheapest of the benchmarked countries. The UK is 0.05 Euro cents PPP cheaper than Norway, second in the ranking, and 1.66 Euro cents PPP less than Greece, the most expensive country (Exhibits 4.8 and 4.9).

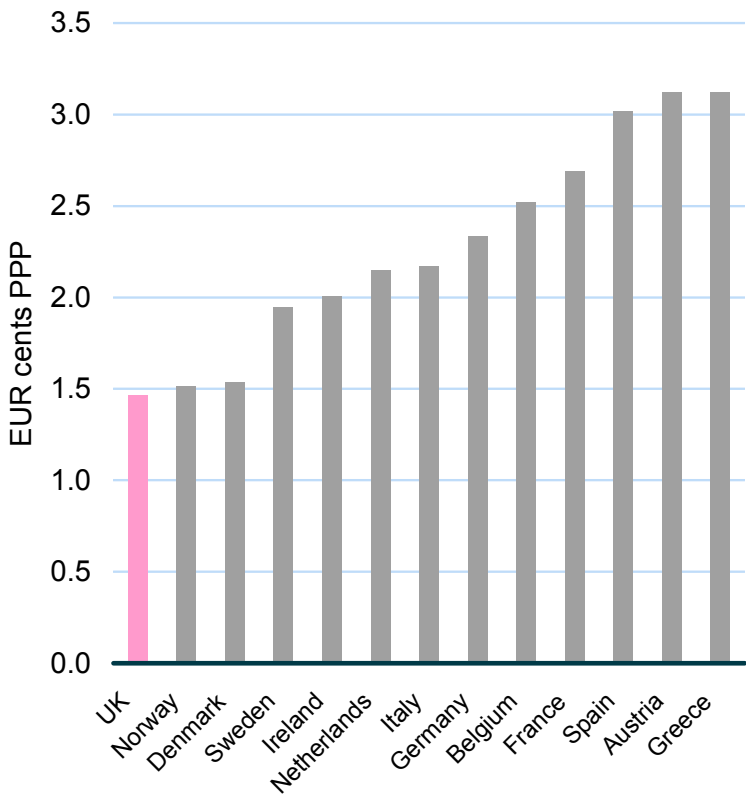


Exhibit 4.8:
Cost of a three-minute call: single tandem call termination
[Source: Analysys Research, 2005]

<i>Rank</i>	<i>Country</i>	<i>Call termination single tandem rate (EUR cents PPP)</i>
1	UK	1.46
2	Norway	1.51
3	Denmark	1.53
4	Sweden	1.95
5	Ireland	2.01
6	Netherlands	2.15
7	Italy	2.17
8	Germany	2.34
9	Belgium	2.52
10	France	2.69
11	Spain	3.02
12	Austria	3.12
13	Greece	3.12

Exhibit 4.9:
Cost of a three-minute call: single tandem call termination [Source: Analysys Research, 2005]

As with single tandem call origination, despite having no call set-up fee, only three countries have a lower per-minute charge than the UK.

4.6 Double tandem call origination

For double tandem call origination, Denmark is, by some distance, the lowest priced country, 0.42 Euro cents PPP cheaper than the next country, Ireland. Between the second and sixth cheapest country, the UK, there is only 0.19 Euro cents PPP of difference (Exhibits 4.10 and 4.11).

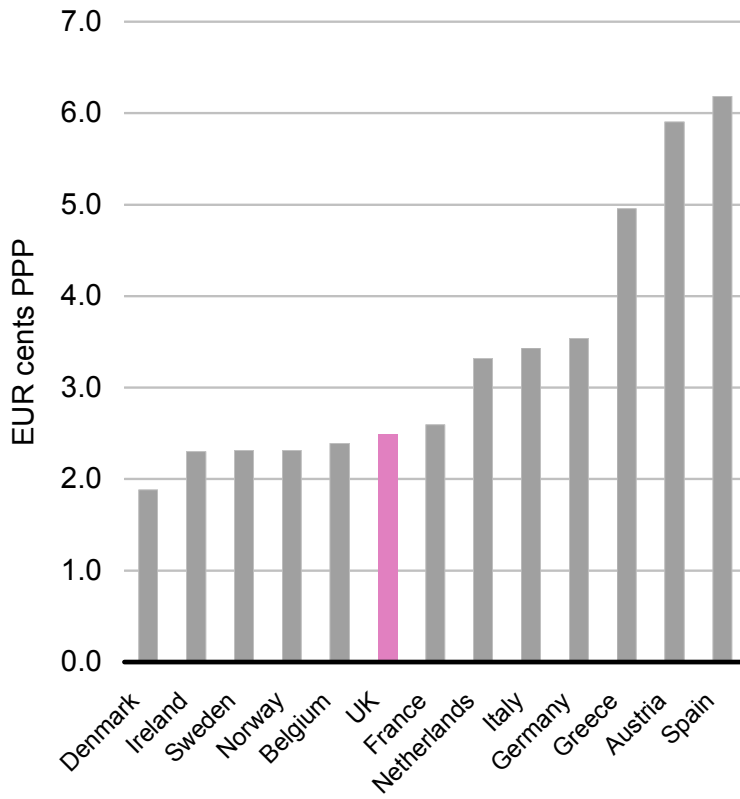


Exhibit 4.10:

Cost of a three-minute call: double tandem call origination [Source: Analysys Research, 2005]

<i>Rank</i>	<i>Country</i>	<i>Call origination single tandem rate (EUR cents PPP)</i>
1	Denmark	1.88
2	Ireland	2.30
3	Sweden	2.31
4	Norway	2.31
5	Belgium	2.39
6	UK	2.49
7	France	2.59
8	Netherlands	3.32
9	Italy	3.43
10	Germany	3.54
11	Greece	4.96
12	Austria	5.90
13	Spain	6.19

Exhibit 4.11:

Cost of a three-minute call: double tandem call origination [Source: Analysys Research, 2005]

As with local and single distance calls, Spain, Austria and Greece, are the most expensive, with Spain, the most expensive, 4.31 Euro cents PPP more expensive than Denmark.

Ireland, which out of the benchmark's 13 countries was the second most recent to liberalise the telecoms market, is the second least expensive country. Although Ireland has a relatively high call set-up charge (the second highest call set-up charge), only Denmark has a lower per-minute charge.

4.7 Double tandem call termination

As with double tandem call termination, Denmark is the least expensive country and again by a relatively large margin, 0.40 PPP Euro cents less expensive than Norway. The UK is the fourth least expensive country, 0.72 PPP Euro cents more expensive than Denmark (Exhibits 4.12 and 4.13). Although Denmark has a call set-up charge, its price per minute is almost half that of the UK.

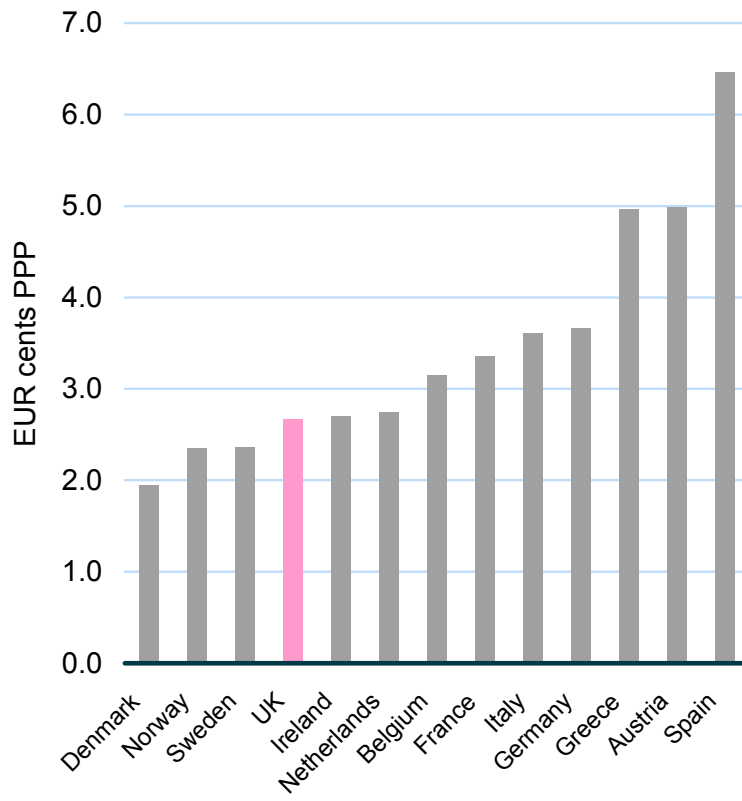


Exhibit 4.12:
Cost of a three-
minute call: double
tandem call
termination
[Source: Analysys
Research, 2005]

<i>Rank</i>	<i>Country</i>	<i>Call termination double tandem rate (EUR cents PPP)</i>
1	Denmark	1.95
2	Norway	2.35
3	Sweden	2.36
4	UK	2.66
5	Ireland	2.70
6	Netherlands	2.75
7	Belgium	3.15
8	France	3.35
9	Italy	3.61
10	Germany	3.66
11	Greece	4.96
12	Austria	4.99
13	Spain	6.47

Exhibit 4.13:
*Cost of a three-
minute call: double
tandem call
termination [Source:
Analysys Research,
2005]*

On a per-minute basis, Spain is more than four times more expensive than Denmark – a three-minute call in Denmark, including the set-up charge, is less expensive than a one-minute call in Spain.

Sweden, one of the most expensive countries for local calls (both termination and origination), is the second least expensive country for double tandem call termination.

5 Sensitivity Analysis

In the absence of available data we have made a number of assumptions regarding call volume distributions in order to adjust the interconnect categories of those countries (Italy, Spain and Sweden) with a fourth category of interconnect ('metropolitan' or 'city') to match a three-category interconnect regime of local, single tandem and double tandem. The actual weighting that should be used to make this adjustment would depend on the relative call volumes of local, metropolitan (or city), single tandem and double tandem traffic and on the amount of metropolitan (or city) interconnect traffic that should be regarded as comparable to local, single tandem or double tandem interconnect.

Within this report we have assumed a 50/50 weighting of local and metropolitan (or city) for local interconnect and a 50/50 weighting of metropolitan (or city) and single tandem for single tandem interconnect for each of the three countries. To determine the impact of this assumption we have also conducted a sensitivity analysis to model the effect of assuming different weightings.

Exhibit 5.1 shows the three alternative weightings used to calculate the effect of different assumptions at the extremes of possible ranges.

	Weighting used to calculate weighted local category		Weighting used to calculate weighted single tandem category	
	<i>Local weighting</i>	<i>Metropolitan (or City) weighting</i>	<i>Metropolitan (or City) weighting</i>	<i>Local weighting</i>
Weighting 1	1%	99%	1%	99%
Weighting 2	50%	50%	50%	50%
Weighting 3	99%	1%	99%	1%

Exhibit 5.1: *Alternative weightings used to assess the impact of alternative weighting assumptions [Source: Analysys Research, 2005]*

As metropolitan (or city) tariffs are in general higher than local tariffs, the effect of a higher (lower) weighting for the metropolitan (or city) element is to raise (lower) the calculated weighted average tariff. The same argument applies for average single tandem values with single tandem tariffs higher than metropolitan (or city) ones.

Exhibit 5.2 summarises the relative rankings of Italy, Spain and Sweden against the other benchmarked countries for each of the three alternative weighting assumptions. The ranking for each country was obtained while holding all other estimates constant at weighting 2.

<i>Calculated tariff</i>	<i>Country</i>	<i>Ranking with weighting 1</i>	<i>Ranking with weighting 2*</i>	<i>Ranking with weighting 3</i>
Local call termination	Italy	11	8	3
	Spain	13	13	11
	Sweden	7	7	7
Single tandem call termination	Italy	7	7	6
	Spain	13	11	11
	Sweden	7	4	4
Local call origination	Italy	11	7	4
	Spain	13	13	12
	Sweden	9	9	9
Single tandem call origination	Italy	6	6	6
	Spain	12	11	11
	Sweden	6	5	4

Exhibit 5.2: *Effect of alternative weighting assumptions on country rankings [Source: Analysys Research, 2005]*

* Rankings obtained with weighting 2 correspond to those used elsewhere within this report.

For most countries the sensitivity analysis indicates that alternative weighting assumptions had at best a marginal impact on a country's rankings. However there was a ranking effect of more than plus or minus two places (against weighting 2) for Italy (local call termination and call origination) and Sweden (single tandem call termination). The most significant of these two effects was on the position of Italy with rankings for local call termination ranging from 3 to 11 and for local call origination from 4 to 11 under different weighting assumptions. The reason for this lies in the large differential between local and metropolitan tariffs in Italy. However, despite the significant effect none of the alternative assumptions examined caused the rankings of either Italy, Spain or Sweden to be raised above that of the UK.

We have used Norway's 'within region' category as the benchmark for both local and single tandem rates and its 'outside region' category for double tandem. The effect of using the single 'within region' tariff for both local and single tandem rankings is to worsen the ranking of Norway for local interconnect and improve it for single tandem interconnect against a fully comparable disaggregated tariff. A similar argument applies for the use of the Belgian double tandem 'intra-access' area for both single tandem and double tandem call origination interconnect. We do not believe that the result of disaggregating these tariffs would be to improve the ranking of either Belgium or Norway over the ranking of the UK for these interconnect categories.

6 Conclusion

The benchmarking of interconnection tariffs show that there are considerable variations in prices for a typical three-minute call. The most expensive countries are between two and three times more expensive than the least expensive countries for the same call.

For local and single tandem calls, the UK is the cheapest country for all calls, with the exception of call termination for single tandem calls, where it is the second least expensive country. For double tandem calls, the UK is the sixth and fourth most expensive country, for call origination and termination respectively.

	<i>Call origination</i>	<i>Call termination</i>
Local	1	2
Single tandem	1	1
Double tandem	6	4

Exhibit 6.1: *Ranking of UK interconnect rates for a typical three-minute call against 13 European countries [Source: Analysys Research, 2005]*