



Commission for
Communications Regulation

Irish Communications Market

Quarterly Key Data

Explanatory Memorandum

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An Coimisiún um Rialáil Cumarsáide

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1 Executive Summary

Following the publication of an annual market review in November 1999, ComReg's predecessor- the ODTR- published its first Quarterly Review on 22nd March 2000.

Since that date, ComReg has continued to collect primary statistical data from authorised operators on a quarterly basis, in order to both understand current trends in the Irish communications market and inform external users.

Telecommunications networks and services can be offered in Ireland without the need for a preceding licence or authorisation. Therefore, not all providers of networks and services operating in the Irish market may have provided data for this report. However the report does aim to represent at least 95% of the total market.

ComReg would like to thank operators who have submitted data to ComReg for this report and hopes to see their continued co-operation in the future. ComReg welcomes any comments or feedback on any aspect of the quarterly review process, and would be particularly interested in suggestions that may improve the accuracy of information received or that would ease the burden for operators in collecting the data.

This memo provides data definitions for all statistics contained in the Quarterly Report as well as a glossary of technical terms used in the report. Section 1.1 Primary Data is based on data supplied to ComReg by authorised operators, while section 2.1 Secondary data uses data supplied to ComReg by additional sources such as the European Commission and market research companies.

This memo will be updated with each published Quarterly Report to reflect where data may differ from previously published reports.

All data is quarterly unless otherwise stated.

2 Questionnaires Issued

Questionnaires were issued to the following authorised undertakings for the purposes of data collection for the Quarterly Review.

Access Telecom	Energis
Aeon Solutions	Engineering Solutions International
Airspeed	ESB Telecoms
Amocom	ESL Consulting Services
Applied Dot Solutions Ltd	Euphony
Aqua Telecom Ltd	Eurokom
AT & T	European Access Providers Ltd
ATS Voice	Fast Wireless Internet
Audio Repair Services	FastCom Broadband Ltd
Avonline	Fastnet Broadband
Avtech Multi Channel Ltd	Fulnett Ltd. (Strencom)
Berkley Technology	Global Crossing
Bitbuzz	Global Voice Networks
Blue Square Telecom	Greencom Telecommunications
Blueface Ltd	High Speed Data Solutions
Bord Gais Telecom	Hughes Network Systems Ltd
Brendan Hurley	Ice Communications
Broadband Partners	IFA Telecommunications
Broadband4Ireland	Ildana Teoranta
Broadworks Communications	Infonet BB Services Corp. (IBSC)
Brighter Networks	Irish Broadband Internet Services
BT Ireland	KPN Eurorings BV
Budget Telecommunications & Wireless	Last Mile Communications
Cable & Wireless Ltd	Level 3 Communications
Cablewatch	Loral Skynet Network Services Ltd
Cargo Community	Magnet Networks
Casey Cablevision	MCI Worldcom
Cellcom Ireland	MediaSatellite
Centrecom Systems	Netsource
Chatz Telecommunications	Network ie Ltd
Chorus	Nova Networks
Cinergi	NTL
Clane Cable Systems	Opera Telecom
Clardex Systems	Perlico
Clearwire	Pure Telecom
Clever Communications	Rainbow Telecom
Colt Telecom	Rillbank Ltd
Com1 Telecommunications	Savvis BV
Communications Design	Sigma Wireless
Complete Network Technologies	Silvertel
Conduit	Skylink Communications
Corporate Machines Ltd	Smart Telecom
Crossan & Sons	South East WAN (Brendan Kehoe)
CVC Acquisitions	Sprintlink
CVC Acquisitions	Swiftcall
Diacom	Talk Talk Direct
Digital Forge (Brendan Hurley)	Talk Telecom
Digiweb	Tele 2
Digiwest Communications Ltd	Timas (Galileo)
Dome Telecom	Transaction Network Services Ltd
Dublin WAN Society	Trustel
Educom	UTV
EGN BV (Equant)	Uutel Ltd
Eircom	
Electroplus Cable & Satellite Ltd	
Enablesoft	
e-Nasc Eireann Teoranta	

3 Primary Data

Section	Indicator	Definition
1.1.1	Overall electronic communications revenues	Total revenue generated by the provision of retail and wholesale fixed and mobile voice and data services as well as retail cable and MMDS broadcasting services
1.2.1	Share of Total call volumes	Overall total volumes or minutes of voice calls made over both fixed and mobile public voice networks broken down by call type and expressed as a percentage share of the total volume.
1.3.1	Total Number of Authorisations	Total number of authorisations issued to date by ComReg to fixed, mobile and broadcasting operators.
2.1.1	Total revenue per service	Total revenue generated by the direct ¹ and indirect ² provision of retail and wholesale fixed voice and data services. Includes interconnection, retail narrowband services, leased line & managed services and other ancillary services including broadband, web-hosting, co-location services, directory publication & other services.
2.1.2	OAO market share	The proportions of overall fixed line revenues received by alternative operators and eircom. Includes shares of interconnection, retail narrowband, Leased line and managed services, and other ancillary services including broadband, web-hosting, co-location services, directory publication and other services.
2.2.1	Fixed access paths	Total number of direct ³ and indirect ⁴ fixed telephone lines, i.e. lines connecting the subscriber's terminal equipment to the public switched network and which have a dedicated port in the telephone exchange equipment. There is a one-to-one relationship between PSTN lines and access paths, i.e. one PSTN access path is equal to one line. ISDN lines can be separated by type: Basic, Fractional and Primary Rate. For basic rate ISDN line, each line is capable of carrying 2 access paths; for fractional rate ISDN, each line can carry up to 16 access paths; for primary rate ISDN, each line can carry up to 30 access paths. Therefore total fixed access paths are based on the number of PSTN lines plus the appropriate multiplier applied to the number of installed ISDN lines.
2.2.2	Indirect access lines	Total number of indirect ⁵ fixed telephone lines provided to customers by means of carrier pre-select and/or wholesale line rental. Carrier pre-select allows the user to receive all or a portion of calls from one provider and line rental from another provider (usually eircom). Wholesale line rental (also known as single billing) allows the user to receive every aspect of telephone service, including all calls and line rental from one single supplier. Note: this indicator counts the lines using either carrier pre-select or wholesale line rental.

¹ Provided to customer over their supplier's own network infrastructure

² Provided to customer by means of their supplier's wholesale access to another operator's network infrastructure

³ See note 1 above

⁴ See note 2 above

⁵ *ibid.*

Section	Indicator	Definition
2.3.1	Fixed voice call volumes	Total number of retail minutes or traffic generated by means of fixed voice calls both direct ⁶ and indirect ⁷ . Call volumes are broken down into national, international, calls to mobile and other (this category includes calls made from payphones).
2.5.1	ISDN Access Paths	Total ISDN access paths separated by type: Basic, Fractional and Primary Rate. For a basic rate ISDN line, each line is capable of carrying 2 access paths; for fractional rate ISDN, each line can carry up to 16 access paths; and for primary rate ISDN, each line can carry up to 30 access paths.
2.6.1	Number of Subscribers: Narrowband and Broadband	<p>Breakdown of internet subscribers over copper lines, including dial-up narrowband subscribers (PSTN and ISDN), flat-rate and DSL technologies, as a percentage of total internet subscribers.</p> <p>Narrowband Dial-up is defined here as a metered service (typically over a dedicated 1891 or 1892 number) where the customer pays a variable charge per month based on their specific usage of the internet. This includes subscribers who have a subscription with an ISP and those customers who do not have a subscription to an ISP.</p> <p>Narrowband Flat-rate Internet subscription is a service (typically provided over an 1893 number) where the customer pays a flat monthly fee for a defined number of hours of dial-up Internet access. This data includes both business and residential customers.</p> <p>Broadband subscribers are Digital Subscriber Line (DSL) subscribers, i.e. those using their conventional copper PSTN line for high-speed broadband access. DSL services are usually "always-on", i.e. the user does not have to initiate the Internet connection to access the internet. However some providers also offer time-based broadband services, i.e. the user pays for a limited amount of hours of broadband access per month.</p>
2.7.1	Provision of DSL access	Proportions of Digital Subscriber lines (DSL) supplied to customers by means of direct retail supply by eircom and wholesale supply by eircom to other operators by means of fully unbundled lines or bitstream. ⁸ DSL (Digital Subscriber Line) is a technology for bringing high-bandwidth or broadband information to homes and small businesses over ordinary copper telephone lines.
2.8.1	Broadband subscribers and growth rates by platform	This table includes the most recent subscriber numbers (both residential and business subscribers) across DSL, cable, satellite, fibre and fixed wireless platforms. The growth rates are for quarterly and year-on-year growth in subscriber numbers across each broadband access platform.
2.8.2	Broadband subscribers by platform	Total number of broadband subscribers (both residential and business customers) by means of DSL, cable modem, fibre, satellite and/or fixed wireless access. Cable modems allow internet broadband access

⁶ Provided to customer over their supplier's own network infrastructure

⁷ Provided to customer by means of their supplier's wholesale access to another operator's network infrastructure

⁸ Bitstream access refers to the situation where the incumbent installs a high-speed access link to the customer premises and then makes this access link available to third parties, to enable them to provide high-speed services to customers. Bitstream depends in part on the PSTN and may include other networks such as the ATM network, and bitstream access is a wholesale product that consists of the provision of transmission capacity in such a way as to allow new entrants to offer their own, value-added services to their clients. The incumbent may also provide transmission services to its competitor, to carry traffic to a 'higher' level in the network hierarchy where new entrants may already have a broadband point of presence

Section	Indicator	Definition
		by means of cable TV. Fixed wireless access allows internet broadband access by means of wireless devices or systems in fixed locations such as homes and offices.
2.8.3	Eircom's DSL share of total broadband market	This chart shows eircom and OAOs' retail DSL market shares as a percentage of the total broadband market.
2.10.1	Fixed data access lines	Total number of retail and wholesale leased lines (national and international) supplied in the Irish market. Leased lines are Internet broadband connections by means of dedicated capacity provided over metallic copper pairs, including tail ends or partial circuits and are usually supplied to business customers. The data aggregates retail and wholesale leased lines for speeds ranging from 64K up to and greater than STM-1 (> than 155 M/bits).
3.1.1	Irish mobile penetration rate	Total number of mobile phone subscribers (GSM or 2G and 3G) in Ireland as measured by the total number of active SIM cards divided by the total population. The definition of "active subscriber" differs from operator to operator.
3.1.3	Number of subscribers (pre-paid/post paid)	Percentages of total number of mobile phone subscribers (GSM or 2G and 3G) using pre-paid and post-paid (i.e. contract) packages.
3.1.4	Number of subscribers (pre-paid/post paid) by operator	Percentages of total number of mobile phone subscribers (GSM or 2G and 3G) to each of the mobile networks, broken down by pre-paid and post-paid (contract) packages
3.2.1	Market share – number of subscribers	Each mobile operator's share of the total number of mobile subscribers (GSM or 2G and 3G), expressed as a percentage.
3.2.2	Market share – revenue	Each mobile operator's share of total mobile revenues (retail and wholesale), expressed as a percentage.
3.3.1	Mobile Numbers Ported	Total number of mobile numbers which have been retained by customers when they switched from one mobile operator to another. This represents a cumulative total since MNP was introduced in July 2003.
3.4.1	SMS, MMS and Call minutes	Total volumes of mobile voice (calls) and data messages (both SMS and MMS) ⁹ made over all mobile networks.
4.1.1	Take-up of broadcasting services	Percentages of TV households in Ireland broken down by the platforms used to deliver TV services – satellite, digital cable, analogue cable and free-to-view.
4.1.2	Pay TV market (analogue and digital)	Percentages of total pay TV households broken down by analogue and digital pay TV platforms.
4.1.3	Digital TV (Cable and Satellite Breakdown)	% breakdown of digital TV subscribers between those using digital cable and satellite services.

⁹ SMS – Short Messaging Service; MMS = Multimedia Messaging Service

4 Secondary data

4.1 Pricing data

Sections 1.4, 2.4, 2.9 and 3.6 contain comparative pricing data and are supplied by Teligen in its T-Basket product.

The pricing data is valid as at November 2005.

An OECD-approved methodology was adopted by T-Basket to compare operators' tariffs. This format follows a basic three-step process consisting of: (i) the construction of one or more baskets of telephone/leased line services; (ii) the pricing of those baskets; and (iii) the conversion of the individual currencies to standard units (e.g. Euros or Purchasing Power Parities (PPPs)). Section 6 of this document provides more detail on the base rates used to calculate PPPs in the Teligen tariff baskets.

The DSL baskets were commissioned separately by ComReg from Teligen.

The OECD has previously carried out its own research into ADSL services, separately from those baskets compiled by Teligen in the T-Basket product, for the purpose of the Communications Outlook publication. Teligen, however, also monitors prices for these services, and the following are two methodologies developed to highlight variations in price levels across Europe using different assumptions. The ADSL offerings from the incumbent operator or associated ISP in each of the EU15 countries are used.

The tariffs used in the comparison relate to the installation and rental of the ADSL service only, not to the provision of the standard PSTN service. Charges for modems or routers and ISP subscription charges are only included in the comparison in cases where they are bundled in with the complete service offering. Specific relevant details for each country are given in the "comments" column of the ADSL spreadsheet.

The two comparisons aim to benchmark a combination of the relevant costs based on the speed (bitrate) of the service. Teligen's research suggests that there is no single bitrate combination that is offered in all countries, and therefore creating an inter-country price comparison is quite difficult. In order to overcome this and produce a set of indicators representative of price levels, both of the following methodologies should be considered:

Normalised prices to a common bitrate – The calculated price for 1 Mbit/s bitrate is chosen as a measure. This price is produced by:

- Adding the upload and download bitrates to get a total bitrate (e.g. 64 kbit/s upload and 256 kbit/s download gives a total bitrate of 320 kbit/s);
- The monthly rental is divided by the calculated total bitrate and multiplied with 1024 to give the price per 1 Mbit/s;
- For the installation charges the highest charge per provider is used (if appropriate). This will in most cases, where appropriate, correspond with the lowest normalised monthly rental charge found, i.e. the offering identified by the normalisation process described above. The installation charge is depreciated over 5 years.

The implications of this normalisation are:

- As the monthly price per unit (i.e. per Mbit/s) will normally decrease with increasing bitrate, the offerings with higher total bitrates will be favoured. Providers offering only "low speeds" will fall behind in the comparison;
- The prices shown are not actual prices paid by the customer. Tracing the calculations back to the origin requires information about the actual bitrates involved;
- As prices for installation tend to be independent of the bitrate, a similar normalisation is not really relevant for these charges.

Actual prices for the cheapest offering – As an alternative to the normalised method above, the actual prices for the cheapest offering from each provider can be compared.

- The price comparison comprises the monthly rental charge for the cheapest offering for each operator and the installation charge associated with this offering (depreciated over 5 years);
- Due to the differences in bitrates, however, it is important to also show what the customer actually receives for their money, i.e. the bandwidth of the service.
- The results of the cheapest monthly price comparison should therefore be shown together

with the bitrates provided at those prices, so that the reader is able to assess the suitability of the service and the value for money.

This method of showing the prices means:

- Prices are not directly comparable. Ultimately it would be necessary to consider other elements of each service offering (i.e. inclusive data transfer limits, webspace/e-mail addresses etc.) to find out the actual value of any price/bitrate combination.
- The providers offering low bitrates will usually also have the lowest prices. This means that the low-bitrate services will be favoured using this method of presentation.

Results:

Results are given in US\$/PPPs including VAT. The results of these 2 benchmarks should be considered together – the normalised method favours services with higher bitrates, whereas the minimum rental method favours lower bitrates. Considering both will give an enhanced picture of price variations.

It is important to remember that these comparisons do not consider some elements of ADSL services that may well have an impact on the way they are priced – these might include carrier specific “Quality of Service” features, such as guaranteed transmission bitrates, or limitations on the maximum volume of transmissions. It does, however, produce comparable price points for what are widely different offerings across the countries in the comparison. It should be noted that cheaper or more expensive services may be offered in each country by other service providers.

5 Comparative data

Figure 2.6.2 Household penetration of PCs and Internet, 2005

This chart is taken from the Central Statistics Office’s quarterly survey of households as published in their Information Society and Telecommunications 2005 report.¹⁰ The chart measures the percentage of households with home access to a PC and/or the Internet in from 1998 to 2005.

Figure 2.8.5 Broadband Penetration Rate

This chart from the European Commission’s 11th Implementation Report compares broadband penetration (i.e. DSL and alternative platforms such as cable modem) across the EU-25 member countries based on a per capita measurement, i.e. broadband subscribers per 100 population (total broadband subscribers/total population X 100/1)

Figure 3.1.2 European mobile penetration rates

Total number of mobile phone subscribers (GSM and 3G) in the EU-15 as measured by the total number of active SIM cards divided by the total population. The definition of “active subscriber” differs from operator to operator. This chart is based on data supplied by Informa Telecoms & Media in their fortnightly *Mobile Communications* journal.

Figure 3.5.1 European ARPU Compared

This chart ranks a number of EU countries based on a blended monthly ARPU (Average Revenue per User) as calculated by the Yankee Group. The blended ARPU is calculated as an average of ARPU across all operators in a number of markets based on a number of variables including average churn rates, marketable mobile market, mobile penetration rates and population statistics.

¹⁰ <http://www.cso.ie/releasespublications/documents/industry/2005/ictireland2005.pdf>

5 Glossary

Access Line	A circuit that connects a subscriber to a switching centre.
ADSL	Asymmetric Digital Subscriber Line: Utilises a technology that transforms a normal telephone line into a high-speed digital line that enables access to telephony services and the Internet at the same time. ADSL provides always-on access to Internet or TV and Video on-demand services at speeds that are 10 to 40 times faster than a standard 56k modem. An ADSL line has a higher downstream speed (into the end user) than upstream speed (away from the end user).
Analogue	The direct representation of a waveform, as opposed to digital which is a coded representation. An analogue signal is one that varies continuously (eg. Sound waves). Analog signals vary along two parameters, amplitude (strength) and frequency (tone). The unit of measurement is the Hertz, or cycle per second.
ATM	Asynchronous Transfer Mode – the internationally agreed basis for broadband ISDN. A technology that enables all types of information (data, voice and video in any combination) to be transported by a single network infrastructure.
ARPU	Average Revenue Per User- A measure of the average revenue generated per subscriber over a specific time period; ARPU in this report is calculated on a monthly basis.
Bandwidth	The physical characteristic of a telecommunications system that indicates the speed at which information can be transferred. In analogue systems, it is measured in cycles per second (Hertz) and in digital systems in binary bits per second. (Bit/s).
Bits per second	Basic unit of measurement for serial data transmission capacity; abbreviated as K bps, or kilobit/s for thousands of bits per second; M bps or megabit/s for millions of bits per second; G bps, or gigabit/s for billions of bits per second; T bps or terabit/s or trillions of bits per second.
Broadband	A service or connection allowing a considerable amount of information to be conveyed, such as television pictures. Generally defined as a bandwidth > 2Mbit/s Broadband Integrated Services Digital Network (B-ISDN). The capability to integrate any type of communications signals (voice, data, image or multimedia) and carry them over a single broadband channel of 150-mbps and above, 4k (B-ISDN) regardless of their content.
Cable Modem	A cable modem is a device that enables a PC to be linked to a local cable TV line for internet/data services.
Calling Line Identity (CLI)	A facility that enables identification of the number from which a call is being made.
Carrier Pre-selection (CPS)	The facility offered to customers which allows them to opt for certain defined classes of call to be carried by an operator selected in advance (and having a contract with the customer), without having to dial a routing prefix or follow any other different procedure to invoke such routing.
Dial-up	Connections made to a data network using the switched network to provide a voice band or data bearer.
Digital	The coded representation of a waveform by, for example, binary digits in the form of pulses of light, as opposed to analogue which is the direct representation of a waveform.
Digital Subscriber Line (DSL)	A family of technologies generically referred to as DSL or xDSL, which are capable of transforming a normal telephone line into a high-speed digital line. These include ADSL (Asymmetric DSL), SDSL (Symmetric DSL), HDSL (High data rate DSL) and VDSL (Very high data rate DSL). DSL enabled lines are capable of supporting services such as

	fast Internet access and video or TV on-demand.
Direct Access	The situation where a customer is directly connected to a telecommunications operator by a wire, fibre-optic or radio link to connect that customer to the public telecommunication network.
Directory Enquiry Service (DQ)	Directory information service which is operator assisted and involves the operator looking up entries on a database.
Fibre Optic Cable	A transmission medium that uses glass or plastic fibres rather than copper wire to transport data or voice signals. The signal is imposed on the fibres via pulses (modulation) of light from a laser or a light-emitting diode (LED). Because of its high bandwidth and lack of susceptibility of interference, fibre-optic cable is used in long-haul or noisy applications.
Fixed telephone Services	Means the provision to end-users at fixed locations of a service for the originating and receiving of national and international calls, including voice telephony services and may include, in addition, access to emergency 112 services, the provision of operator assistance, directory services, provision of public pay telephones, provision of service under special terms or provision of special facilities for customers with disabilities or with special social needs but does not include value added services provided over the public telephone system.
Flat Rate Internet Access (FRIACO)	The provision of a Flat Rate Internet Access Call Origination via a wholesale un-metered Internet access product.
Fixed Wireless Access (FWA)	A system that connects subscribers to the public switched telephone network (PSTN) using radio signals as a substitute for copper wires for all or part of the connection between the subscriber and the switch.
Global System for Mobile Communications (GSM)	A second generation digital mobile technology. Initially developed for operation in the 900MHz band and subsequently modified for the 850, 1800 and 1900MHz bands. GSM originally stood for Groupe Speciale Mobile, the CEPT committee which began the GSM standardisation process.
ICT	Information & Communications Technologies
Independent Service Provider (ISP)	Entities which provide telecommunications services over fixed or mobile networks, or services with a telecommunication service component, to the public at large but do not own or operate telecommunications networks. Some independent service providers may not use telecommunication networks e.g. they may be publishers of printed directories.
Indirect Access	Where a customer's call is routed and billed through operator A's network even though the call originated from the network of operator B. It is the generic term for both easy access and equal access.
Integrated Services Digital Network (ISDN)	A network based on the existing digital PSTN which provides digital links to customers and end to end digital connectivity between them. ISDN2 provides a maximum bandwidth of 128kbit/s.

Interconnection services	Services provided by one telecommunications organisation to another for the purpose of the conveyance of messages and information between the two systems and including any ancillary services necessary for the provision and maintenance of such services.
Internet protocol (IP)	Packet data protocol used for routing and carriage of messages across the internet.
Internet telephony	A specific type of VoIP service that uses the public Internet to carry the IP traffic (also referred to as Voice over the Internet).
ISP	Internet Service Provider
Leased line	A leased line is a telephone line that has been leased for private use. In some contexts, it's called a <i>dedicated</i> line. A leased line is usually contrasted with a <i>switched line</i> or <i>dial-up line</i> .
Local Loop	The access network connection between a customer's premises and the local exchange. This usually takes the form of a pair of copper wires.
Local Loop unbundling (LLU)	LLU was mandated by the EU in December 2000. It requires those operators designated as having significant market power) to make their local networks (i.e. the telephone lines that run from a customer's premises to the local telephone exchange) available to other telecommunications companies.
Mobile Number Portability (MNP)	The facility which allows mobile subscribers to retain their mobile number when moving between mobile networks e.g. a customer with a 085, 086, 087 mobile number can be an active subscriber on the network of their choice with their current number.
Modem	A device which converts digital signals from a data-transmitting terminal into modulated analogue signals which can be carried by a public telephone network.
Narrowband	A service or connection allowing only a limited amount of information to be conveyed, such as for telephony. This compares with broadband which allows a considerable amount of information to be conveyed.
Originating network	The network to which a caller who makes a call is directly connected.
Other Authorised Operators (OAOs)	Companies, other than eircom, which operate telecommunications systems.
Premium rate services (PRS)	Services, including recorded information and live conversation, run by independent service providers. All calls to these companies are charged at a higher rate than ordinary calls to cover the companies' costs in providing the content of the call and the operator's cost for the special network facilities needed.
Private circuits	Point-to-point circuits for customers exclusive use covering speech, data or image communications.
Public switched telephone network (PSTN)	The telecommunications networks of the major operators, on which calls can be made to all customers of all PSTNs.
Public telecommunications network	A telecommunications network used, in whole or in part, for the provision of publicly available telecommunications services.
Purchasing Power Parities (PPPs)	Purchasing Power Parities (PPPs) are currency conversion rates that both convert to a common currency and equalise the purchasing power of different currencies. In other words, they eliminate the differences in price levels between countries in the process of conversion.
Resellers	Service Providers who do not have their own network.

Roaming	A service unique to GSM which enables a subscriber to make and receive calls when outside the service area of his home network e.g. when travelling abroad
Spectrum	The range of wavelengths used, for example, for broadcasting radio, terrestrial television and satellite television. Usable wavelength ranges from about 100 KHz to about 400 GHz although there are as yet no broadcasts above about 12 GHz.
Subscriber Identity Module (SIM)	A smart card containing the telephone number of the subscriber, encoded network identification details, the PIN and other user data such as the phone book. A user's SIM card can be moved from phone to phone as it contains all the key information required to activate the phone.
Switch	Relates to a telecommunications network comprising at least one exchange and capable of routing signals and messages from one line to all other lines comprised in the network.
Telecommunications	Conveyance of speech, music and other sounds, visual images or signals by electric, magnetic, electro-magnetic, electro-chemical or electro-mechanical means.
Third generation mobile systems (3G)	A European 3G mobile communications system provides an enhanced range of multimedia services (e.g. high speed Internet access).
Transit	A transit service is a conveyance service provided by a network between two points of interconnection. It is, therefore, a service that links two networks that are not in themselves interconnected.
Trunk network	That part of a telecommunications network which provides connections between.
Voice over Internet protocol (VoIP)	The generic name for the transport of voice traffic using Internet Protocol (IP) technology. The VoIP traffic can be carried on a private managed network or the public Internet (see Internet telephony) or a combination of both. Some organisations use the term 'IP telephony' interchangeably with 'VoIP'.
Voice telephony service	A service available to the public for the commercial provision of direct transport of real-time speech via the public switched network or networks such that any user can use equipment connected to a network termination point at a fixed location to communicate with another user of equipment connected to another termination point.
Virtual private network (VPN)	These are used by a company or private group to make inter-site connections either for telephone speech or data as if there were dedicated leased lines between these sites. The equipment used is located within the public telecommunications operators' premises and forms an integral part of the public network but is software-partitioned to allow for a genuinely private network
Wireless Local Area Networks (WLAN)	Also known as 'hotspot' services. A WLAN access point provides Internet connection and virtual private network (VPN) access from a given location e.g. public places, such as airports, hotels, and coffee shops. Access is facilitated via the user's own portable computer.

6 PPP Conversion Rates data

Exchange rates used: Related to:	US\$	2005 US\$ PPP	VAT %	Spare lists US\$	2005 US\$ PPP	VAT %	Population 1000's	Index	GDP Millions	Conversion from FT format	
Australia	0.747199868	0.698317634	10	0.747199868	0.698317634	10	17529	1	401,360	1.33833	0.7472
Austria	1.19780562	1.079104162	20	1.19780562	1.079104162	20	7884	2	2,035,606	0.83486	1.197806
Belgium	1.19780562	1.098904239	21	1.19780562	1.098904239	21	9998	3	7,035,470	0.83486	1.197806
Canada	0.847744998	0.792285045	15	0.847744998	0.792285045	15	27367	4	681,427	1.1796	0.847745
Czech Rep.	0.040396206	0.06732701	19	0.040396206	0.06732701	19		5		24.7548	0.040396
Denmark	0.160498186	0.113026892	25	0.160498186	0.113026892	25	5170	6	859,771	6.2306	0.160498
Finland	1.19780562	0.950639381	22	1.19780562	0.950639381	22	5042	7	475,608	0.83486	1.197806
France	1.19780562	1.069469304	19.6	1.19780562	1.069469304	19.6	57372	8	6,987,221	0.83486	1.197806
Germany	1.19780562	1.069469304	16	1.19780562	1.069469304	16	80569	9	2,794,200	0.83486	1.197806
Greece	1.19780562	1.330895133	19	1.19780562	1.330895133	19	10300	10	14,846,938	0.83486	1.197806
Hungary	0.004790052	0.007369311	25	0.004790052	0.007369311	25		11		208.766	0.00479
Iceland	0.016402854	0.009881237	24.5	0.016402854	0.009881237	24.5	260	12	382,255	60.965	0.016403
Ireland	1.19780562	0.900605729	21	1.19780562	0.900605729	21	3548	13	28,620	0.83486	1.197806
Italy	1.19780562	1.151736173	20	1.19780562	1.151736173	20	56777	14	1,507,190,000	0.83486	1.197806
Japan	0.008590696	0.006557783	5	0.008590696	0.006557783	5	124336	15	64,933,000	116.405	0.008591
Korea	0.000961354	0.001131004	10	0.000961354	0.001131004	10	43663	16	169,701,000	1040.2	0.000961
Luxembourg	1.19780562	1.098904239	15	1.19780562	1.098904239	15	390	17	300,000	0.83486	1.197806
Mexico	0.091026598	0.126425831	15	0.091026598	0.126425831	15	89538	18	865,166	10.795	0.092635
Netherlands	1.19780562	1.0889142	19	1.19780562	1.0889142	19	15178	19	563,220	0.83486	1.197806
New Zealand	0.699799857	0.660188545	12.5	0.699799857	0.660188545	12.5	3414	20	78,848	1.42898	0.6998
Norway	0.153836687	0.102557791	25	0.153836687	0.102557791	25	4286	21	702,952	6.5004	0.153837
Poland	0.301977956	0.487061219	22	0.301977956	0.487061219	22		22		3.3115	0.301978
Portugal	1.19780562	1.460738561	21	1.19780562	1.460738561	21	9846	23	9,358,000	0.83486	1.197806
Slovak Rep.	0.030678893	0.051998124	19	0.030678893	0.051998124	19		24		32.5957	0.030679
Spain	1.19780562	1.287963032	16	1.19780562	1.287963032	16	39085	25	58,852,000	0.83486	1.197806
Sweden	0.125569773	0.103776672	25	0.125569773	0.103776672	25	8668	26	1,439,835	7.9637	0.12557
Switzerland	0.774533344	0.545446017	7.6	0.774533344	0.545446017	7.6	6875	27	343,600	1.2911	0.774533
Turkey	0.73964497	1.041753479	18	0.739644970	1.041753479	18	58775	28	311,000	1.352	0.739645
UK	1.770287495	1.594853599	17.5	1.770287495	1.594853599	17.5	57848	29	594,183	0.56488	1.770287
USA	1	1	10	1	1	10	255020	30	5,920,200	1	1