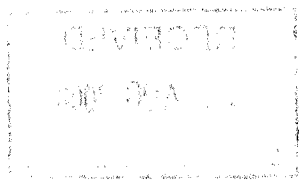**Australian Government**

**Department of Broadband,
Communications and the Digital Economy**

SUBMISSION TO THE HOUSE OF REPRESENTATIVES

STANDING COMMITTEE ON COMMUNICATIONS

INQUIRY INTO INTERNATIONAL MOBILE ROAMING

15 August 2008

Introduction

The Department welcomes the opportunity to contribute to the work of the Committee. The Department has received complaints about the level of charges for Australians using an Australian network mobile phone while overseas (international mobile roaming). The Minister and the Department are keen to have these concerns addressed both locally and internationally.

Following the ACCC's decision to regulate domestic mobile roaming charges, it conducted an inquiry into the issue of *International inter-carrier roaming* (September 2005) and concluded that prices paid by consumers for roaming services may substantially exceed the underlying cost of providing these services. More recently the European Commission acted to regulate wholesale and retail prices for roaming between European countries with a decision that took effect on 30 June 2007.

Recognising these developments, the Department engaged the consultants KPMG in March 2008 to investigate international roaming charges, divergences between costs paid by Australian consumers and consumers in other countries, and the reasons for any divergence. KPMG provided their report on *International Mobile Roaming Charges* to the Department in June 2008: the report was publicly released on 12 August 2008 and is presented with this submission for the information of the Committee.

In this submission the Department provides comments against the Terms of Reference of the Inquiry, referring to the results of the KMPG report where appropriate, and indicating possible international and domestic approaches to reducing international mobile roaming prices for consumers.

The economic benefits that could be derived from reducing or eliminating unnecessary costs for cross-border trade are potentially substantial. This submission provides a brief review of the issues with reference to commercial initiatives in other markets, the information available to Australian consumers and businesses, and the evidence that regulation overseas is having an adverse impact on the prices paid for roaming services to and from Australia. This impact brings the possibility of an emerging asymmetry in the global market where mobile carriers seek to recover revenues lost in regulated markets from the charges paid by consumers in other markets, including Australia.

Comments against the Terms of Reference

The extent to which retail international mobile roaming charges for both voice and data services reflect the underlying costs to operators of supplying the service

Charges for mobile roaming for Australian carriers appear to be high considering the cost of supplying the service. The KPMG report found a disparity between roamed and non-roamed average call charges for Australian mobile users (Graph 6 on page 17) which has been summarised in Figure 1(a) below. Figure 1(a) implies that either:

- there is a disparity in the underlying costs between roamed and non-roamed calls contributing to the higher prices (with roamed calls 2.4 times more expensive); or
- the underlying costs between roamed and non-roamed calls are similar and mobile operators are applying a sizeable retail margin on roamed calls.

Note that the average call charges do not include discounted rates and they are based on a call lasting for 1 minute, including flag falls and connection fees, for comparison purposes, taken from carriers' web sites in April 2008. The countries included in the KPMG report represent a selection of popular destinations for Australian tourists and business travellers.
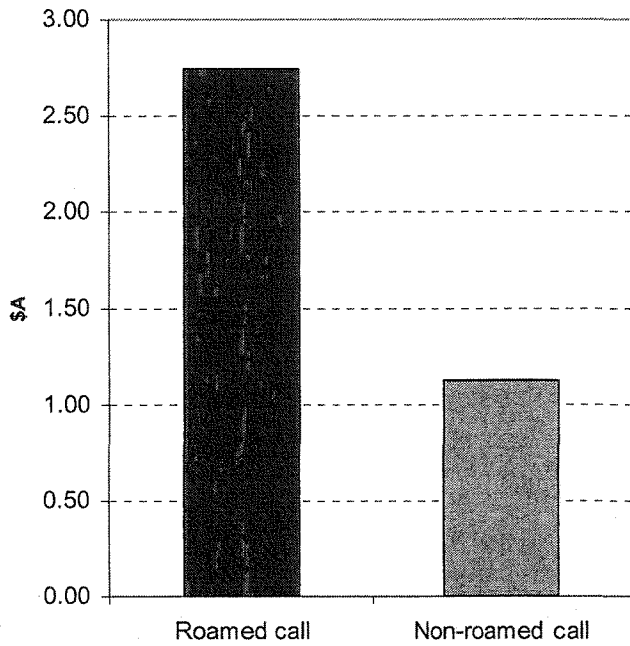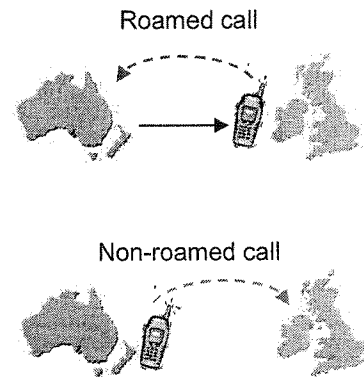
Figure 1(a): Standard average charges paid by Australian mobile callers roaming in other countries calling internationally (e.g. calling back to Australia) compared to a standard average non-roamed call made from Australia to the same countries.

Additional analysis in the KPMG report indicates that Australian roaming retail margins are approximately 3.2 times higher than non-roamed margins with no great disparity in underlying costs (Table 10 on page 23 of the KPMG report) as shown in Figure 1(b). Note that these estimates do not include fixed or administrative costs, and are based on benchmark wholesale data taken from a European study in the absence of publicly available wholesale cost data for Australian operators.

Figure 1(b): Estimated break-down of the same standard average charges shown in Figure 1(a).
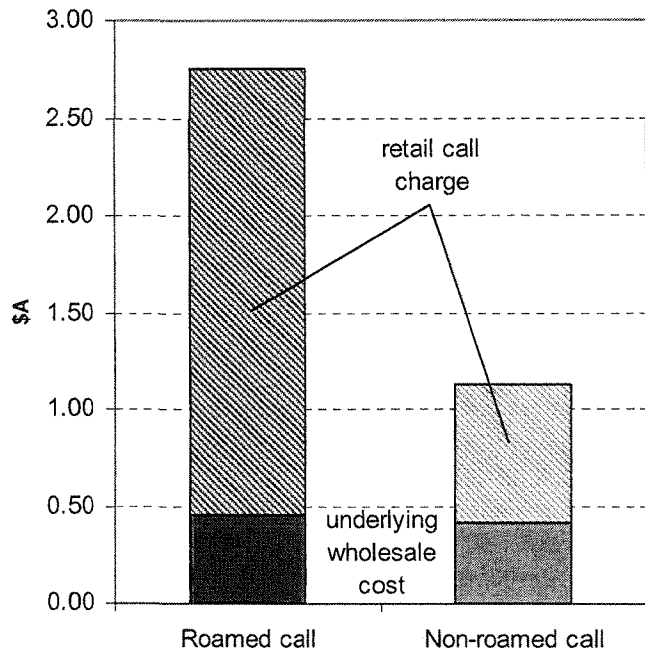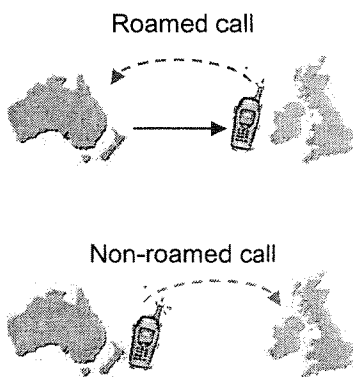
The lack of available Australian data for wholesale costs or retail margins has limited the Department's ability to confidently measure the relationship between retail international mobile roaming charges and the underlying wholesale costs. The Department has been unable to obtain information on the costs for supplying international mobile roaming services.

The KPMG report indicates that the elements attributable to the wholesale costs include the mobile call origination and termination charges (refer to the Annex for some further discussion of termination charges), the international call transit and other specific roaming costs. The report also indicates that carriers have argued that there are additional costs justifying international roaming prices associated with upgrading and maintaining infrastructure, the collection and transmission of Caller Detail Records, costs due to transits through multiple networks and costs associated with negotiating and maintaining roaming contracts (page 26). However, the KPMG report concludes that "international studies have so far concluded that these costs would have little impact on the total costs associated with providing roaming services".

Although the KPMG report did not investigate data services, charges for international data roaming also appear to be high. The Department's examination of Australian carriers' web sites indicates that international data roaming costs between $15 and $22 per megabyte (MB). One MB is equivalent to downloading approximately 200 e-mails but only 1 minute of music. Again, there is a lack of information concerning the underlying costs to operators of supplying data roaming services both domestically and internationally.

The current European Regulation relates only to voice services but the European Commissioner has alerted industry to the prospect of regulation of data. On 15 July 2008 the Commissioner expressed concerns about data roaming in relation to "bill-shock", where roaming Internet access through a laptop can generate very high volumes and therefore immense bills. She noted that wholesale data roaming prices can be well above national retail prices and that consumers using data roaming services lack the means to monitor their actual data use. Similarly, on 21 July the ACCC warned that with the emergence of new smartphone technology "consumers may be misled if they are not made sufficiently aware that their data allocations can be exceeded – at significant cost".

The adequacy of information available on Australian mobile operators' international mobile roaming costs and revenue in both retail and wholesale markets

The charges that apply to roaming are comprised of charges that a foreign carrier charges an Australian carrier for allowing carriage on its network, the wholesale charge or Inter-Operator Tariff (IOT), as well as additional charges to make up the retail price paid by the consumer to the Australian network (shown in Figure 2). The commercial agreements that underpin the wholesale rates charged between carriers are not publicly available.

The IOT charges between operators are normally agreed through an international roaming agreement which is based on a model developed by the GSM Association. Agreements can cover the types of services provided by the operators who have signed the agreement, billing and accounting information exchange, customer care contacts, data privacy requirements and fraud prevention procedures. The IOT section of an agreement can include the wholesale charges for different time bands (peak and off-peak), different charging intervals, different international destinations, taxes, directory/emergency/ customer services and wholesale tariffs for text and data services.
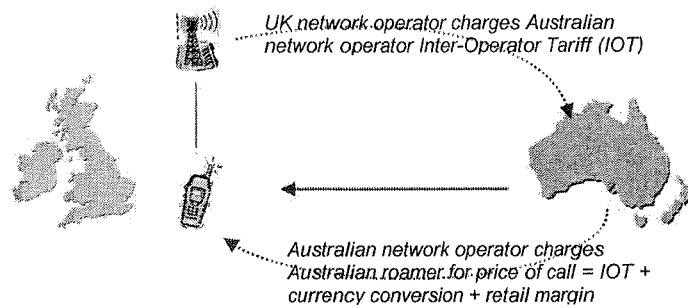
UK network operator charges Australian
network operator Inter-Operator Tariff (IOT)

Australian network operator charges
Australian roamer for price of call = IOT +
currency conversion + retail margin

Figure 2: Example of an Australian mobile roamer travelling in the UK, temporarily connected to a UK network.

Australian operators have scope to renegotiate the terms of their roaming agreements to mutually reduce the IOT charges which could lead to reduced consumer prices. In some cases this has already occurred with discount rates or reciprocal arrangements through alliances of operators or where carriers have established a presence in multiple markets. Despite the existence of discount rates, carriers are likely to continue to argue there are additional costs, indicated above, that militate against reductions in wholesale costs.

Again, the Department has been unable to obtain information concerning the negotiated international roaming agreements made between Australian operators and overseas operators.

Similarly, there is a lack of information available on Australian mobile operators' revenue with the KPMG report noting that Telstra was the only Australian mobile carrier to separately report on mobile roaming revenues in its financial statements (page 28). The report indicates that the revenue line for Telstra's mobile roaming revenue increased 22.9% from $226 million to $327 million between 2006 and 2007 representing 5.31% and 5.74% of Telstra's total mobile revenue respectively. Telstra attributed its growth in roaming revenue to increased inbound and outbound mobile roaming minutes and improvements in mobile roaming margins.

Based on Telstra's percentages, and a similar percentage published for roaming revenues in the European Union, the KPMG report concludes that the estimated total mobile roaming revenues for all Australian operators was $714 million in 2007.

This information is not collected by the Australian Government, the ACCC or the Australian Communications and Media Authority (ACMA). Although there are a number of record-keeping and reporting requirements placed on Australian mobile operators by the ACCC under Part XIB of the *Trade Practices Act*, there is no requirement for operators specifically to report on international roaming revenue, wholesale charges or costs. The analysis of mobile roaming revenues and the level of wholesale costs in the KPMG report is based on European data which is readily available as a result of the work of the European Regulators Group and the subsequent regulations imposed by the European Commission.

The KPMG report also highlights the variations in retail prices paid by Australian consumers roaming in different regions. It is most expensive for Australian consumers to roam in Europe and appreciably less expensive for Australians to roam in North America

and the Asia-Pacific (page 16), based on the countries surveyed in the KPMG report using carriers' web sites in April 2008. Even within these regions there are sizeable disparities in prices, including for the prices charged by Australian mobile carriers for roaming to the same country (e.g. an Australian consumer may be charged $2.00 per minute to roam in China if they hold a Vodafone SIM card, whereas they may be charged nearly $5.00 per minute for the same call if they hold a SIM card from Optus). It is therefore important that consumers are able to find out the likely charges for calls they may make while overseas either before they leave for their travel or whilst travelling.

The ACMA web site carries useful precautionary advice for consumers who wish to use their Australian mobile phones overseas but does not include comparative price tables.

Consumers who are not regular travellers may already be committed or 'locked in' to contracts with particular Australian operators and they will find that they have limited options to reduce their roaming costs.

The impact of new and emerging technologies and commercial initiatives that may reduce international mobile roaming charges for users or provide a substitute for international mobile roaming services

There are a range of services that could potentially be used to substitute for international mobile roaming including international calling cards, Voice over Internet Protocol (VoIP), pre-paid SIM cards, global SIM cards and dual SIM card adapters. The analysis of these substitutes in the KPMG report (pages 34-36) concludes that alternative products to international mobile roaming have not had a major downward effect on the price of roaming due to their lack of 'perfect substitutability'. The ACCC report of 2005 arrived at a similar conclusion.

The substitutes on offer have a number of disadvantages. A new SIM card means that consumers are required to use a different phone number while roaming. Personal Digital Assistant devices lose functionality when a local SIM is used. VoIP call access can be intermittent and subject to a wider variation in call quality, and all of the substitutes are likely to be more complex for consumers to put in place than simply activating global roaming on their mobile phones.

The expansion of platforms for current technology (e.g. VoIP applications on 3G networks) or the development of new technology platforms (e.g. Next Generation Networks) may result in reduced prices for consumers. Services using the open Internet may still rely on mobile networks to provide the transmission platform – potentially in competition with the network's own mobile service. Internationally there is already some discussion of the risk that mobile carriers could discriminate against third-party Internet-based services carried over their networks. This could be considered a variation of the 'net neutrality' debate in the context of the mobile market.

It is useful to note that access to Internet-based services or applications is generally based on the user-pays principle, similar to current download-based charging arrangements for consumer access to the Internet from home. This is analogous to the United States system for mobile voice calls where the 'receiving party' pays for the call. As charging arrangements are developed for future mobile services, it is not yet clear how these issues will be resolved, nor how the receiving party pays model will impact the current 'calling party pays' arrangements that exist for voice calls in most of the rest of the world including

Australia. (Hybrid charging arrangements can already be discerned. For example, an Australian roaming overseas may pick up most of the cost of a call coming in from Australia).

In the United States the receiving party pays model initially inhibited the take-up of mobile phone services, but the emergence of flat rate pricing plans has produced effective price-based competition in the North American market. The European Commissioner has also indicated that flat rate pricing could be a welcome outcome for consumers of mobile roaming services.

There are a number of commercial initiatives that have resulted in reduced prices for consumers across the world. The KPMG report identifies several examples where carriers have established a presence in multiple markets or through inter-carrier alliances and preferential trading groups. Some are focused on the expansion of developing countries' networks (e.g. in Africa). For Australian consumers inter-carrier alliances including the Hutchison Whampoa *3 Like Home*, Vodafone *Traveller* and the Optus *Bridge Alliance* initiatives, have the potential to provide some benefits. Consumer access to these discount rates is limited to the particular countries in which they are offered.

The adequacy of existing information from mobile operators available to consumers concerning international mobile roaming charges for users

Carriers provide substantial detail on roaming prices via data published on their web sites and through information available from their customer call centres. In addition, roaming price comparisons are available in Europe through a few web sites or portals that consolidate information from a number of carriers including the European Union's Information Society online portal and the GSM Europe web site.

In practical terms, however, comparing pricing data and offerings from different carrier web sites can be time consuming and requires access to the Internet. The KPMG report notes that the non-standard presentation of roaming data (carrier web sites display multiple time and billing unit combinations, flag fall options, loyalty bonuses and a host of peak and off-peak time and volume based discounting choices) contributes significantly to consumers being unaware of the true cost of mobile roaming (page 25). The KPMG report does note that, generally, the four Australian carriers that were sampled presented roaming information that was easier to access and understand than many European and Asia Pacific carriers sampled.

Overall there is a high level of complexity and a wide range of prices facing Australian consumers when they are roaming with SIM cards from different Australian carriers in different countries on different networks. In order to assist consumers in receiving up-to-date pricing information it would be appropriate to consider some of the initiatives introduced into other markets. For example,
- the use of web sites or portals to provide transparent and standardised information on mobile roaming plans and prices – this would be assisted by regional or global standardisation for this type of information, or
- encouraging carriers to provide SIM card holders with up-to-date pricing information as they roam by sending SMS messages to SIM card holders as they connect on to a visited carrier network or upon request by the SIM card holder.

This could be achieved largely by industry, supported where necessary by industry codes and consumer information measures. Under the European Commission regulations,

operators are obliged to provide European consumers, free of charge, with clear and customised information on the retail price of international roaming via a text message when they visit a country within the European Union.

Domestic Approaches

The main problems with accessing international roaming for a consumer are that:
- they are often locked in to their current mobile phone arrangements, and cannot easily transfer to another operator who may be offering a less expensive roaming option;
- there are no perfect substitutes for roaming;
- consumers who do wish to compare information on mobile roaming prices are likely to find it complex and difficult as prices are not presented in a standardised format;
- consequently, consumers are uncertain as to the true costs of roaming and can be surprised to receive excessive bills when they arrive back home from an overseas trip.

Overall, there is an obvious information asymmetry between consumers and mobile operators placing consumers at a disadvantage.

There are a number of options available to address these problems for consumers. More transparent information on roaming prices would assist consumers to avoid excessive bills. This could be achieved by:
- establishing mechanisms for price information to be easily accessible to consumers through standardised reporting requirements to enable consumers to clearly compare prices and offerings;
- encouraging or mandating the development of industry codes on matters such as prompt timeframes for informing customers of excessive bills; and
- raising awareness, for example, through the ACMA web site providing advice to consumers and the recent ACCC warning of significant costs for data roaming.

The policy challenge is to weigh up the improvements that could be achieved through improved information available to consumers to support a more competitive market against the option to regulate the Australian market and the potential side effects, costs and limitations of regulation.

The two main regulatory options available to the Government are to regulate retail prices charged to consumers or to regulate wholesale tariffs charged between operators (or both). The retail and wholesale markets are distinct and, as indicated above, the relationship between retail and wholesale prices is not clear.

The introduction of retail price controls would require legislative change to provide the ACCC with the power to act.

The ACCC has power to regulate mobile roaming wholesale charges under Part XIC of the *Trade Practices Act.* Although in its 2005 report the ACCC questioned whether it had the "jurisdiction to regulate roaming charges set by operators in overseas jurisdictions", it can again consider whether it should declare wholesale international roaming services in order to regulate the wholesale costs that Australian carriers charge overseas carriers. This would benefit international travellers roaming into Australia with their handsets and so could be welcomed by the Australian tourism industry and reduce the costs for overseas companies to do business in Australia. It is unlikely to benefit Australian consumers who travel overseas.

The Department would support the ACCC revisiting its 2005 review into international inter-carrier charging and considering not only the charges for international transactions between carriers but also the wholesale charges for roamed calls as they apply to domestic resellers of mobile services.

The ACCC could be provided with the power to put in place price control arrangements (or price caps). In theory, this is likely to place pressure on Australian carriers to negotiate better contracts with overseas carriers, but it would place Australian carriers at a disadvantage and it could also reduce their ability to offer a roaming service entirely if contracts could not be renegotiated.

The impact of European Union regulation

The regulation of mobile roaming in the European Union is an example of a single market regulating both retail and wholesale charges. Unfortunately the unilateral regulation by the European Commission appears to be having an adverse impact on the prices paid for mobile roaming services in other markets.

The KPMG report notes international studies that suggest that, in response to retail price capping regulation implemented across European Union countries, European carriers have engaged in "water bedding" where they have raised the wholesale settlement rates they charge non-European carriers and therefore non-European SIM holders to roam in the European Union. As a consequence of these increases, mobile roaming retail rates for inbound and outbound roaming to and from the European Union have increased significantly – with some European SIM holders experiencing increases of over 160% in their retail roaming rates since 2006.

Any regulatory action would require better information than is currently available on both wholesale charges and retail prices.

In 2005 the report by the ACCC considered placing reporting requirements on Australian mobile operators and the Department would support revisiting the issue of requiring operators to report on international roaming revenues and roaming minutes, as well as wholesale charges. This information should enable the ACCC to undertake the relevant modelling of the costs and charges for international roaming, as well as to determine the impacts over time of strategies such as "water-bedding" by overseas operators.

International Approaches

At the international level, there are different ways in which the issue can be approached. The Minister has already initiated discussion within APEC and bilaterally with the European Commission and others to explore the options. The Department is undertaking work to follow up the Minister's initiative to encourage collaboration in the APEC region and beyond.

Three broad opportunities for international engagement can be distinguished.

Firstly, bilateral discussions should continue to explore the possibility of mutually beneficial arrangements being worked out between like-minded countries.

Secondly, international collaboration can be developed to provide better information on costs and charges, and to share best practices in forums such as APEC and the OECD. Although the outcome of this work may be non-binding, it can be very influential in encouraging concerted action toward a common purpose and establishing baselines for good regulatory practice.

These first two opportunities can be pursued in parallel.

Thirdly, international rule-making can be explored. The International Telecommunication Union (ITU) is the global forum where international telecommunications accounting methods are debated, and trade negotiations can consider telecommunications both as a traded service and as a fundamental infrastructure that supports trade of all kinds.

The rule-making approach is inherently difficult and slow.

Trade agreements have generally focused on domestic rather than international telecommunications regulation – largely because of problems of jurisdiction – but there may be opportunities at least to look at excessive termination charges as a barrier to trade. On the other hand, institutions like the ITU can support international models for good practice and the ITU is an appropriate agency for monitoring telecommunications developments and making recommendations. This is likely to become more important as the global mobile market continues to develop and to expand its focus from voice to broader data services.

Conclusion

Charging arrangements for international mobile roaming calls are complex, and there are difficulties for the Government and consumers to obtain detailed and accurate cost and price information. Nevertheless, there is an accumulation of evidence that international mobile roaming has been treated as a premium service and that retail prices on international roaming services are very high.

In a world in which mobile phones are more widely used than fixed phones and are relied on for essential business and social interactions, Australians travelling overseas, whether for business or personal reasons, find it difficult to avoid high priced services and can suffer unexpectedly high bills. Reduced prices for internationally roamed calls are likely to encourage more extensive use of mobile phones for international communications, with wider benefits to society and the economy.

Some market developments are producing lower priced roaming options, but these are confined to particular carriers and countries, and are not yet having a broad impact on mobile roaming charges.

As mobile services expand to offer data as well as voice services, business users and consumers will have access to new technologies and service offerings. Better provision of information to users about prices and accumulated charges would assist users to avoid unexpectedly high bills. It may also help to encourage price-based competition.

The industry is in a position to improve information and service offerings to consumers without being prompted by regulatory measures, but regulatory action should be considered if this is not forthcoming.

To date, price regulation has been confined to roaming within national borders or within the boundaries of the European Community. European regulation at this stage covers only voice services, but it could expand to cover data services if the industry is not seen to be serving the objectives of a single European market.

For Australia, there is a risk that 'water-bedding' by European operators could have an adverse impact on mobile roaming charges for travellers between Europe and Australia. It is therefore appropriate to encourage more extensive international consideration of the issues, and for Governments to consider the economic implications of disproportionately high costs for international mobile telecommunications services.

The Department welcomes the opportunity provided by the Inquiry into International Mobile Roaming to elicit further information and discussion of the issues around international mobile roaming and stands ready to assist the Committee further in its deliberations.

ANNEX

Regulation of termination charges

At base, termination of a mobile call is an opportunity to impose a charge on a bottleneck facility. When a mobile roams from one network to another network, a termination charge can be imposed on the calling network and ultimately on the person making the call (assuming a sender pays model as applies in Australia). Termination costs therefore affect overall wholesale costs and retail charges for the end user.

When calls are made entirely within one network competition between networks operates to keep prices down, but mobile roaming charges have concerned regulators at the domestic level because call termination of fixed to mobile and mobile-to-mobile roamed calls can be charged at levels that are well above cost. Regulators in Australia and overseas have acted to reduce these charges as they apply to calls within the country. Regulatory action on international roaming has not occurred until recently because no national regulator has been in a position to regulate a cross-border transaction: the network making the termination charge is in one jurisdiction while the caller and the network initiating the caller's connection is in a different jurisdiction.

The exception to this is the European Commission, which has recently imposed rules on calls across national borders within the European Community.

Department of Broadband, Communications and the Digital Economy

Report of findings on: International Mobile roaming charges

June 2008

The Department of Broadband, Communications and the Digital Economy
International mobile roaming charges
June 2008

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Disclaimers

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KPMG have indicated within this document the sources of the information provided. We have not sought to independently verify those sources unless otherwise noted within the Report. KPMG is under no obligation in any circumstance to update this Report, in either oral or written form, for events occurring after the Report has been issued in final form.

1 Executive summary

The recent, rapid expansion and uptake of mobile telecommunications technology across the world has altered what consumers expect from international communications systems. This change in consumer expectations has altered the telecommunications industry's perspective on the importance of seamless, reliable and cost-effective international mobile telecommunications.

While there is no argument that international mobile communication products and service levels have improved significantly over the last decade, one aspect has continued to raise the attention of telecommunications mass market and business consumers, international regulators, governments and other consumer advocate groups—the persistently perceived high cost of international mobile roaming.

International mobile roaming enables SIM[1] holders from one network to connect onto overseas mobile networks provided by other carriers. Roaming services are provided under the operating terms contained in Roaming Agreements between mobile carriers. At present, telecommunications industry analysts estimate that the revenue from international mobile roaming represents between five and 10 per cent of global mobile revenues.

Numerous public and private technical studies referenced throughout this report suggest that international mobile roaming charges are unreasonably high. These studies, in addition to the first hand data we have collected and analysed, point to a number of key issues that contribute to the high cost of roaming when compared to other forms of telecommunications.

These key issues are listed in the table immediately below:

Key international roaming issues

1	Consumers and regulators believe that the price of international mobile roaming is excessive
2	Numerous technical studies have concluded that mobile roaming retail margins are very high
3	There is a lack of consumer clarity around mobile roaming plans and prices
4	There are limited market incentives for roaming prices to decrease

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[1] Subscriber Identity Module (SIM) cards are used in mobile telephone handsets. SIM cards store the service-subscriber key ('IMSI') used to identify individual SIM holders to carriers.

Consumers and regulators believe the price of international mobile roaming is excessive

Detailed studies into the costs of mobile roaming concluded that the retail prices paid by consumers for mobile roaming are excessively high. Our own data suggests that it is most expensive for European Union (EU) SIM holders to roam from the EU to the Asia–Pacific including Australia. The average rate for this usage pattern was AU$4.54. The next most expensive roaming usage pattern was for Australian SIM holders to roam into the EU. The average rate for this usage pattern was AU$2.99.

This data provides some valuable context for EU surveys in which it is reported that:

* the cost of international mobile roaming is the most common reason Europeans limit the use of mobile when travelling abroad, and
* almost 60 per cent of European travellers indicated they would use their mobile phones to roam more frequently if roaming were less expensive.

Analysis of the prices paid by Australians using mobiles in other countries reveals some interesting comparisons. For example:

Roaming in Indonesia is on average three times more expensive than roaming in Singapore and twice the price of roaming in Thailand.

It can cost more for an Australian SIM holder to roam in New Zealand than in France, Japan, the Netherlands, the United Kingdom or the United States.

Average prices for roaming in China can vary by more than 100 per cent depending on which Australian carrier is charging the SIM holder.

Of the countries we analysed, for Australian SIM holders the lowest average per minute roaming cost was less than AU$1.00 (roaming in Singapore with Vodafone[2]) and the most expensive was over AU$5.00 (roaming in Indonesia also with Vodafone). The most common average per minute costs were between AU$2.00 and AU$3.00.

More data on the costs of mobile roaming (by country) is outlined in Section 3 of this report and a matrix of carrier roaming rates per minute has been included in Appendix 1 of this report.

Technical studies have concluded that mobile roaming retail margins are very high

International technical studies have calculated that international mobile roaming costs should be 10 to 20 per cent higher than non-roamed call costs. However, the same studies (including a detailed study of current international roaming charges performed by the European Commission) have concluded that the average retail charge for an international roamed mobile call is more than five times higher than the approximate cost of providing the wholesale service, and on received mobile roaming calls, carriers can realise retail margins of up to 400 per cent.

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[2] Roaming rates for four Australian carriers— Optus, Hutchison 3 (Three), Telstra and Vodafone—were included in our analysis.

The European Commission has also recently concluded that 'despite repeated warnings and numerous public initiatives, the prices of international roaming rates remain unjustifiably high... and the present excessively high costs, which do not reflect the actual costs of the operators of such services, constitute a deterrent to the use of mobile telephones by foreign consumers'.

Roaming margins—an Australian context

In an Australian context, based on the data we collected from Australian carrier websites, we calculated that:

- average Australian mobile roaming margins are approximately 300 per cent higher than non-roamed margins and
- on average, for a roamed mobile call lasting one minute, the retail price an Australian SIM holder roaming overseas can expect to pay is AU$2.75 of which we calculated that approximately 46 cents per minute is made up of wholesale costs including inter-operator tariffs (IOTs) with the remaining AU$2.29 per minute being the retail margin charged by the Australian carrier[3].

In addition, the Australian Competition and Consumer Commission in its September 2005 report into international mobile roaming stated that: 'The Commission considers that the final prices for international roaming services lie significantly above the final prices charged for non-roamed equivalents. This suggests that the prices of international roaming services may exceed their underlying cost of provision by a significant amount'.

Further analysis on international mobile roaming retail margins is outlined in Section 3 of this report.

There is a lack of consumer clarity around mobile roaming plans and prices

While there has been a recent push by public and industry groups to improve the transparency surrounding mobile roaming prices and recent government initiatives have established independent, standard roaming websites (most notably in the EU and Middle East) the exact details of roaming plans including the final, 'true' cost of roaming is still widely unknown amongst roaming users. For example, a recent EU study concluded that more than 40 per cent of European SIM holders do not have a clear idea about the nature or extent of roaming charges when travelling abroad.

A number of international surveys and technical studies have attributed the lack of roaming cost awareness amongst consumers to the following key factors:

- roaming price matching (by comparing data from different carrier websites) is time consuming, complex and predicated on a consumer having access to the internet
- the non-standard presentation of roaming price data (carrier websites display multiple time and billing unit combinations, different flag fall options and loyalty bonuses and a host of peak and off-peak time and volume based discounting choices) contributes

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[3] The calculation methodology, baselined wholesale charges and retails rates used to calculate these estimates are outlined in Table 10 in Section 3.12 of this report.

significantly to complexity involved for consumers trying to ascertain the true cost of mobile roaming

- international mobile roaming prices and plans change frequently and without notice and
- mobile roaming rates can vary significantly between regions, countries and also carriers. An Australian SIM holder can be charged significantly different roaming rates for exactly the same call depending on which carrier network the SIM holder roams. For example, an Australian SIM holder may be charged less than AU$2.00 per minute to roam in China if they hold a Vodafone SIM card whereas that SIM holder could be charged nearly AU$5.00 per minute for the same call if they hold a SIM card from Optus.

During our data collection and research processes we assessed the ease of access to, and clarity of, the roaming information presented on carrier websites. Generally, we observed that the four Australian carriers we sampled presented roaming information that was easier to access and understand than many of the European and Asia Pacific carriers we sampled.

There are limited market incentives for roaming prices to decrease

Technical studies analysing the economic forces that influence international mobile roaming prices have concluded that a number of key market factors currently act as deterrents towards the reduction of retail roaming prices. These factors include the:

- limited number of mobile roaming carriers which combined with their concentration of market share has lessened price competition and reduced downward pressure on wholesale roaming charges
- lack of true retail roaming competition—non-licensed telephony providers cannot significantly reduce retail prices given they act as resellers of network time offered by the limited number of mobile infrastructure operators and
- lack of commercial incentives for operators to reduce wholesale prices and pass on any decreases to consumers.

Further details (including references to international studies) on the market factors outlined above are contained in Section 4 of this report.

The carriers' perspective

Throughout our data gathering and research processes we have noted that carriers providing international mobile roaming services argue that international roaming prices are justified and are generally attributable to the:

- frequent increases in the costs associated with upgrading and maintaining the technical infrastructure that supports mobile roaming
- international collection and transmission of caller detail records (CDRs) to other carriers
- interconnection and network transit costs that can include transit payments payable to more than one carrier in the event a roamed call transits multiple networks and
- direct costs associated with negotiating and maintaining roaming contracts.

Some carriers have also argued that residual, non-network, costs should also be factored into the costs of providing roaming services. These costs include administrative and indirect charges such as the cost of sales, marketing, handsets, customer care and capital for providing network infrastructure assets. Further analysis on the carrier arguments outlined above are presented in Section 4 of this report.

2 Background

Scope

The Department of Broadband, Communications and the Digital Economy (the Department) sought advice from KPMG on charging and billing systems associated with current and emerging mobile communications technologies focusing on international mobile roaming charges (IMRC):

- paid by Australian consumers when roaming internationally
- paid by inbound tourists roaming in Australia and
- applied by a sample of international telecommunications carriers across different regions (refer to Appendix 1 for a matrix listing the international telecommunication carriers sampled and the IMRC rates they apply to consumers).

Approach

Based on the requirements in the Department's Request for Tender (RFT ATM/08/947) and our previous discussions, we:

- identified key information sources yielding IMRC data (refer to Appendix 2 – Key information sources for a full list of information sources)
- collected relevant, freely available, public and industry IMRC data and trends
- developed methodologies to highlight and analyse IMRC trends by call type (inbound, outbound, roamed and non-roamed), carrier and region and
- developed an automated spreadsheet tool to compare and analyse IMRC data and trends.

Methodology

The international mobile roaming data presented in this report (including the source data used to calculate mobile roaming rates) was directly sourced from publicly available data published on or in:

- carrier websites (refer to Appendix 3 – Key information sources for a list of websites used)
- audited financial statements
- mobile roaming industry expert reports and research papers
- Government and regulatory authority reports, impact assessments and discussion papers
- telecommunications industry reports, discussion papers and presentations and
- reputable media articles.

All of the data obtained from the third party sources outlined above has been referenced in footnotes at the conclusion of each applicable page.

Calculation of average roaming rates

Where we have presented average roaming rates per minute, we have done so on the basis of selecting a sample of standard roaming rates published on carrier websites (between Monday 7 April 2008 and Wednesday 16 April 2008) and calculating the statistical average of the sample selected.

Where possible, we selected 'standard' roaming rates (for example, roaming rates that did not include spending caps, loyalty bonuses such as 'air-time', call time and volume discounts or flag-fall based discounts) based on the assumption that 'standard rates' would be, on average, the most readily used plans by a representative sample of international roaming users departing from and arriving into Australia.

Conversion of roaming rates

All of the international mobile roaming rates presented in this report appear in Australian Dollars and, where required, were converted from the source international currencies according to the mid conversion rates taken from the XE.com currency data feed service as at 16 April 2008.

Purchasing power disparity between source currencies has not been factored (for example by calculating an 'international dollar rate' based on the Geary-Khamis method) into the mobile roaming rates presented in this report.

Our findings

Our findings have been set out based on the specific requirements outlined in the Department's RFT and include:

Initial detailed findings

* Number of Australians who use international mobile roaming services ('outbound roamers')
* Number of consumers from foreign countries roaming within Australia ('inbound roamers')
* Purpose of travel for inbound and outbound roaming customers (e.g. tourism or business)
* Trends in the nature of roaming usage
* IMRCs paid by Australian outbound roamers compared to those paid by outbound roamers from other regions
* Variations in IMRCs paid by outbound roamers in other regions across different mobile platforms including voice (2G and 3G) and data
* IMRCs paid by inbound roamers
* IMRCs paid by outbound and inbound roamers compared to non-roamed calls and
* Divergences between IMRCs paid by outbound roamers, inbound roamers and roamers in other countries including the relationship between domestic termination rates and IMRCs.

Interim detailed findings

- Factors contributing to high retail and wholesale international mobile roaming charges
- Causes of divergences in roaming charges paid by consumers roaming in different countries and
- Australian mobile operators – roaming revenues.

Final detailed findings

- Technology-based challenges for inbound and outbound roamers
- Substitutes to reduce international mobile roaming charges
- Pricing trends in non-regulated international mobile roaming regions
- Attempts by mobile operators to offset lost revenue due to international mobile roaming caps, by raising prices for other services and
- Commercial initiatives (such as VOIP, GPRS and HSDPA), market incentives and regulatory measures in markets other than Australia that may have the effect of reducing charges to users.

3 Detailed findings

Unless stated otherwise, all call costs in this report are based on calls lasting one minute and include all flag falls and connection fees. GST is generally not levied on international roaming charges billed in Australia, however, VAT and other taxes may be levied on accounts billed in other countries. These taxes are included in international billing amounts where they were evident.

In addition, call costs and charges are in Australian dollars converted using exchange rates4 published on 16 April 2008.

3.1 'Outbound' vs. 'inbound' roaming

For the purposes of this report, an outbound roamer is an Australian SIM card holder who departs Australia and uses their Australian mobile telephone directly on international mobile networks.

Figure 1 – Outbound roaming
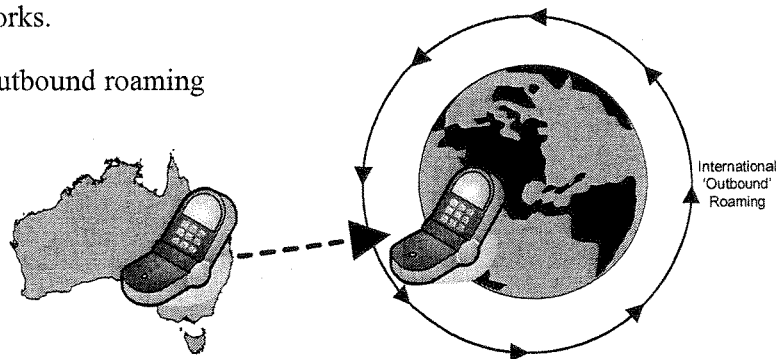
Any visitors arriving in Australia holding a SIM from their originating country connecting onto an Australia mobile network is termed an 'inbound roamer' for the purposes of this report.

Figure 2 – Inbound roaming
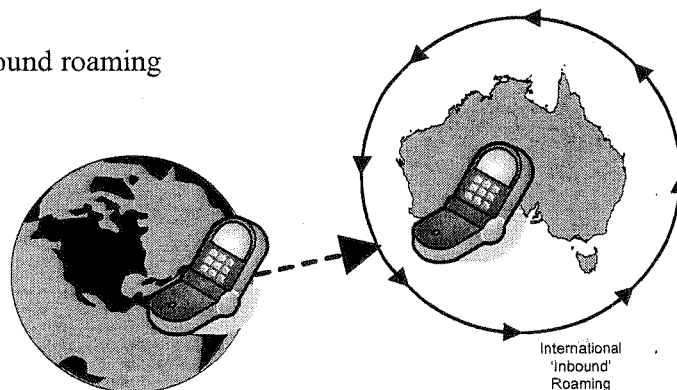
The detailed findings of this initial report are as follows.

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[4] All international currency conversion mid rates taken from the XE.com currency data feed service as at 16/04/2008.

3.2 Outbound and inbound roaming usage

We have estimated the number of Australian outbound roamers and international inbound roamers in Table 1 below.

Table 1 – Outbound and Inbound roamers	Lower estimate based on: data extrapolation	Upper estimate based on: assumptions
Australians who use outbound international roaming services annually	275,000[5]	1,100,000[6]
International visitors using inbound roaming services in Australia annually	310,000[7]	1,250,000[8]

3.3 International roaming usage trends

Publicly available data on international mobile usage is scarce and, when available, outdated. In addition, the majority of mobile roaming usage data is unsourced and cannot be relied upon.

However, based on the reliable sources we could identify, the consensus amongst telecommunication industry analysts was that while mobile roaming usage levels are relatively low compared to mobile traffic as a whole, continued increases in roaming usage, particularly with respect to intra-continental countries such as Europe and North America can be expected. In addition, steady growth in roaming usage is predicted within inter-continental countries such as usage between Australia and member states of the European Union. This analysis is corroborated by the data outlined in Table 2 below.

Table 2 – Roaming usage trends	Roaming minutes and revenue trends
Telstra[9] (Australia)	International roaming revenue grew by 22.9% to AU$327 million in the year ended 30 June 2007 (compared to an increase in roaming revenue of 9.5% for the year ended 30 June 2006). The rise was due to increases in outbound and inbound roaming minutes and marginal revenues per call. The increase in inbound roaming revenue is in line with international mobile growth trends and the increase of travellers to Australia using their own mobile phones.

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[5] Australian Bureau of Statistics' (ABS) 2008 Year Book Australia, reported 4.9 million short team resident departures from Australia during the year-ended December 2006. Further, the Australian Communications and Media Authority (ACMA) reported (on page 247 of the ACMA Communications report 2005/2006) that approximately 80% of Australians owned or used mobile phones and of these users approximately 7% used them for global roaming services. Based on these figures, we calculate that approximately 275,000 residents departing with a mobile telephone used global roaming services during 2006.

[6] ABS 2005 Year Book reported that approximately 69% and 20% of Australian international departures were for holidays (including family visits) and business purposes respectively (the remainder travelled for other purposes). This equates to approximately 3 million and 980 thousand holiday and business departures respectively. We assumed that at least 50% of departures for Business and 20% for Holidays would be likely to use international mobile roaming.

[7] The ABS reported (2008 Year Book Australia) that 5.5 million international visitors arrived in Australia in 2006. Given no available statistical data specifying the number of international visitors using roaming services in Australia, we used statistics compiled by ACMA (per footnote [5]) to calculate that 310,000 international visitors in Australia used mobile roaming services during 2006.

[8] ABS 2008 Year Book reports that 72% of international visitors (four million visitors) arrived in Australia to holiday and visit friends and family, 17% (900,000 visitors) arrived for business purposes and the remaining 11% arrived for other purposes. We have assumed that at least 50% of arrivals for business and 20% for holidays (including family visits) would be likely to use international mobile roaming.

[9] Telstra, 2007 Annual Report.

Table 2 – Roaming usage trends	Roaming minutes and revenue trends
Vodafone Group Plc[10] (United Kingdom)	Intra-continental roaming usage increased by 15.8% for the year ended 31 March 2007. The increase in usage was not reflected in the roaming revenue increase of 1.2% as it was offset by the EU pricing regulations.
SmarTone[11] (Hong Kong)	Revenue from outbound roaming services increased for the year ended 30 June 2007. Inbound roaming revenue decreased due to downward pricing pressure on global wholesale roaming tariffs.

3.4 Purpose of travel for inbound and outbound roamers

Table 3 below outlines the travelling purposes of Australian outbound and international inbound roamers.

Table 3 – Purpose of travel	Business purposes	Holidaying (including visiting friends and family)
Australians who use outbound international roaming services for:	20% (approx. 980,000)[12]	69% (approx. 3,000,000)[12]
International visitors using inbound roaming services in Australia for:	17% (approx. 900,000)[13]	72% (approx. 4,000,000)[13]

3.5 Average outbound charges paid by Australians

Graph 1 (below) depicts the standard roaming charges paid by an Australian SIM holder when roaming internationally.

Graph 1 highlights the most expensive countries for Australian SIM holders to roam in (China, Germany, India, Indonesia, Spain and Portugal) and the most expensive Australian carriers to roam with.

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[10] Vodafone Group Plc, 2007 Annual Report.
[11] SmarTone Telecommunications Holdings Limited, 2007 Annual Report.
[12] ABS 2005 Year Book.
[13] ABS 2008 Year Book.

Graph 1

X-axis categories: USA, Canada, Spain, Netherlands, France, Germany, Ireland, United Kingdom, Portugal, Japan, China, Indonesia, India, Hong Kong, New Zealand, Thailand, Singapore

Y-axis: AUD$ (0.00 to 6.00)

Legend:
- Australia Optus
- Australia Telstra
- Australia Three
- Australia Vodafone
- —*— Average
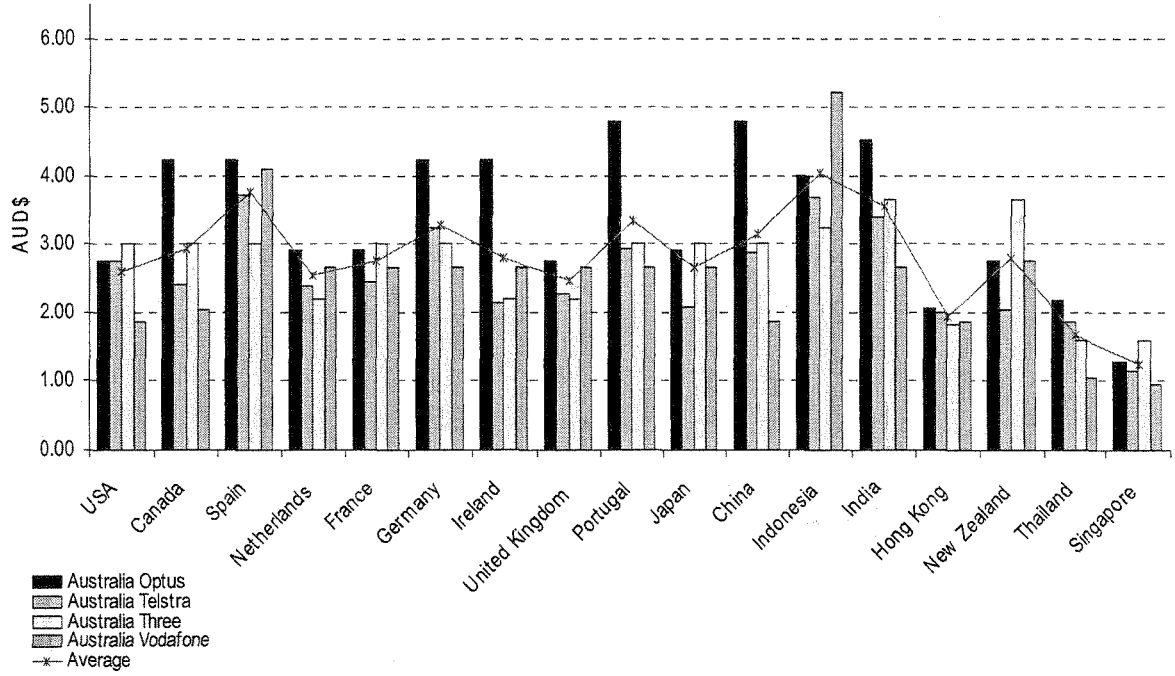
3.6 Average charges paid by Australian outbound roamers compared to outbound roamers from other regions

Test case 1: European Union[14]

Graph 2 depicts standard average roaming charges paid by an Australian SIM holder when roaming in the EU and making a call compared to average EU charges for roaming in Australia.

Graph 2
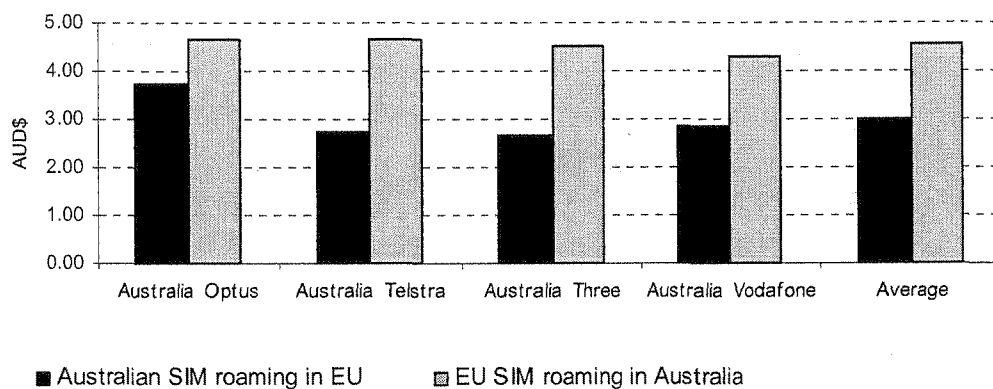
Table 4 below provides a quick reference guide to compare average outbound calls from the EU with average inbound calls from the European Union (EU).

Table 4 AU – EU			Average rate per minute Optus	Average rate per minute Telstra	Average rate per minute Three	Average rate per minute Vodafone	Average of all carriers
SIM country	Call from	Call to					
AU	EU	International	3.73	2.73	2.66	2.86	2.99
EU	AU	International	4.66	4.67	4.54	4.31	4.54
AU roamers pay less compared to EU roamers by the following percentages			20%	42%	41%	34%	34%

Test case 2: North America[15]

Graph 3 depicts standard average roaming charges paid by Australian SIM holders when roaming in North America and making a call compared to average North America consumer charges[16] for roaming in Australia.

Graph 3

■ Australian SIM roaming in NA   **▨ NA SIM roamng in Australia**
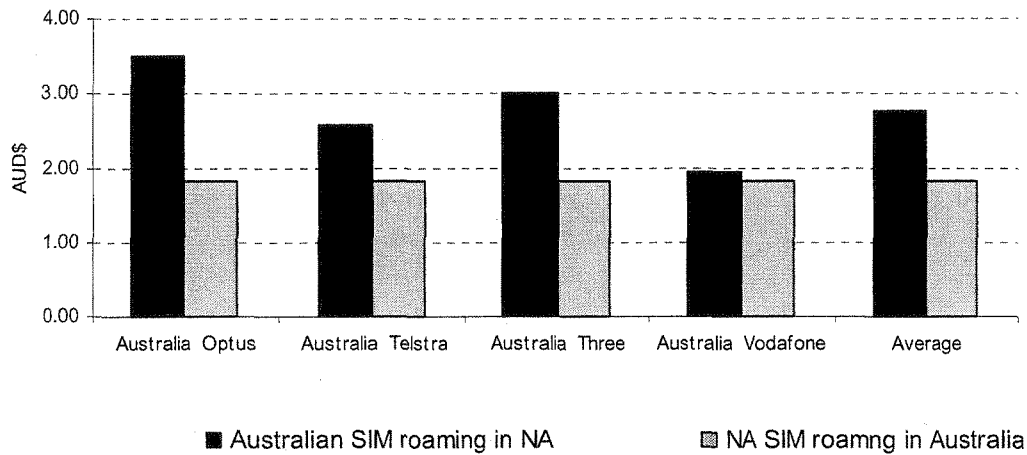
Table 5 below provides a quick reference guide to compare average outbound calls from NA with average inbound calls from North America (NA).

Table 5 AU – NA			Average rate per minute Optus	Average rate per minute Telstra	Average rate per minute Three	Average rate per minute Vodafone	Average of all carriers
SIM country	Call from	Call to					
AU	NA	International	3.50	2.58	3.02	1.95	2.76
NA	AU	International	1.82	1.82	1.82	1.82	1.82
AU roamers pay more compared to NA roamers by the following percentages			92%	42%	66%	7%	52%

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[15] North American carriers include: AT&T USA, Cincinnati Bell USA, Nextel USA, Rogers Telecom Canada and T-Mobile USA.

[16] The average rates used for United States consumers exclude United States carrier 'Airtime minutes; charges and other additional contract surcharges and caps due to the variability of the pricing packages and contracts offered.

Test case 3: Asia–Pacific[17]

Graph 4 depicts standard average roaming charges paid by Australian SIM holders when roaming in the Asia–Pacific and making an average call compared to average Asia–Pacific SIM holders charges for roaming in Australia.

Graph 4

■ Australian SIM roaming in AP　　　▨ AP SIM roaming in Australia
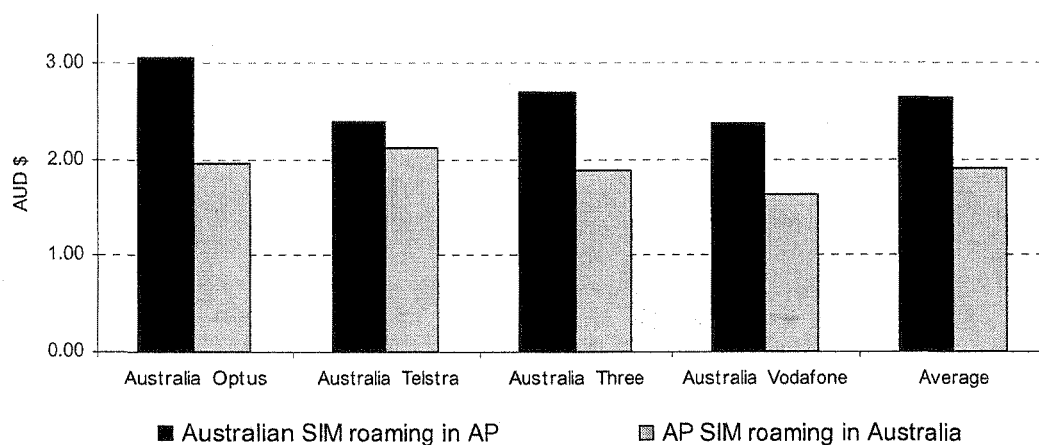
Table 6 below provides a quick reference guide to compare average outbound calls from Asia–Pacific (AP) with average inbound AP calls.

Table 6 AU – AP			Average rate per minute Optus	Average rate per minute Telstra	Average rate per minute Three	Average rate per minute Vodafone	Average of all carriers
SIM country	Call from	Call to					
AU	AP	International	2.95	2.29	2.67	2.34	2.56
AP	AU	International	1.96	2.11	1.89	1.64	1.90
AU roamers pay more compared to AP roamers by the following percentages			51%	9%	41%	43%	35%

3.7 Charges paid by inbound roamers

Graph 5 depicts the regional average standard charges paid by foreign SIM holders in Australia.

Graph 5
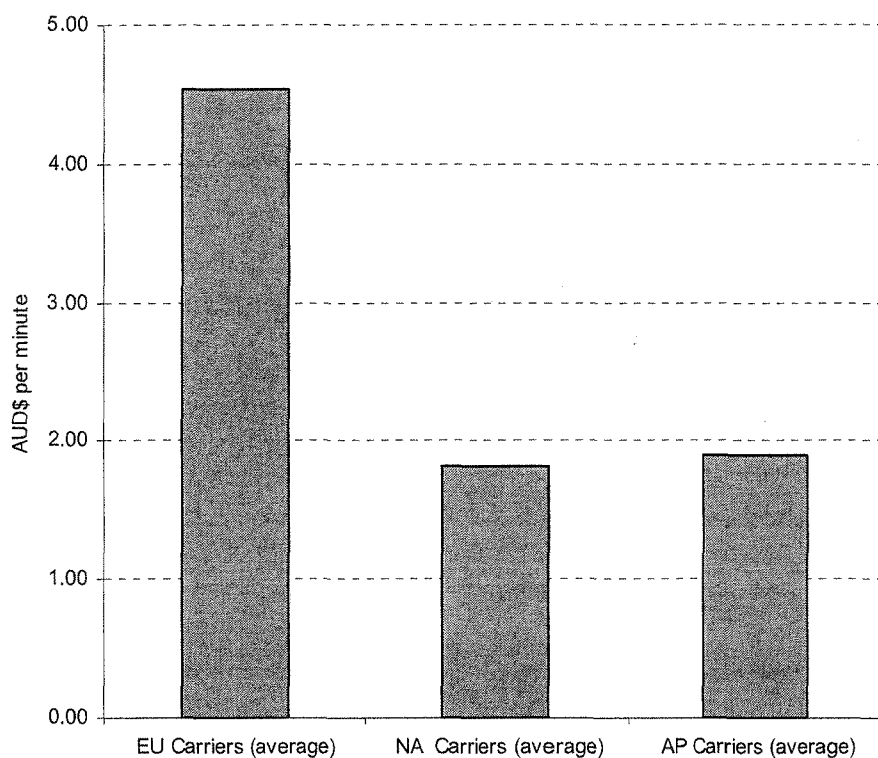
Table 7 below provides a quick reference guide to the comparative average roaming rates for foreign SIM holders roaming within Australia and calling internationally:

Table 7 Average roaming—foreign SIM holders roaming in AU

SIM region	Call to	Average rate per minute
EU	International	4.54
NA	International	1.82
AP	International	1.90

3.8 Variations in charges paid by international outbound roamers across different mobile platforms

We have not identified significant variances in the international retail roaming charges being applied to different platforms (for example, 3G 2100, GSM 1800 and GSM 900/1800). However, we are aware that wholesale costs may vary according to different mobile platforms.

3.9 Charges paid by outbound and inbound roamers compared to non-roamed calls

Based on the information collected to date, the graphs below depict the average charges paid by outbound and inbound roamers compared to average charges for non-roamed calls.

Test case 1: Australia

Graph 6 depicts standard average roaming charges paid by Australian SIM holders in other countries calling internationally (e.g. calling back to Australia) compared to an international call made from Australia to the same countries using an Australian SIM[18].

Graph 6

_____
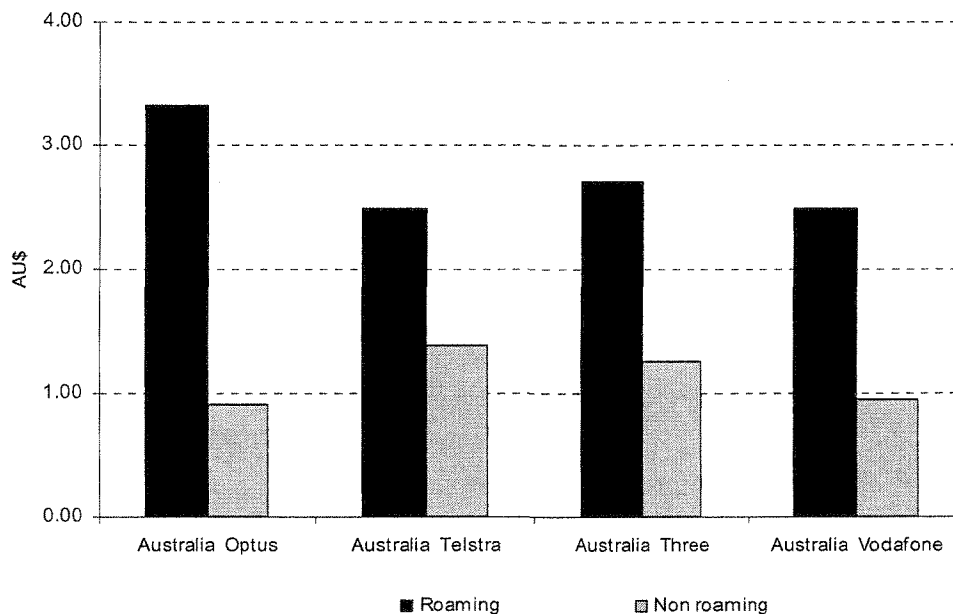
[18] Standard non-roaming international rates were used (as published on carrier websites). No volume, time or mobile phone plan based discounted rates were included in the calculation of average non-roamed long distance rates.

Table 8 Australian roamed vs. non-roamed international calls			Roamed calls are more expensive by:
Australian carrier	Roamed call charge	Non-roamed call charge	
Optus	3.32	0.90	267%
Telstra	2.49	1.38	80%
Three	2.70	1.28	111%
Vodafone	2.49	0.96	160%
Average	2.75	1.13	143%

Test case 2: Average roamed vs. non-roamed international charges (by region)

Graph 7 depicts standard average roaming charges paid by international SIM holders (by region) compared to standard average international non-roamed call charges[19] (for the same regions).

Graph 7

■ Roaming   ▨ Non roaming
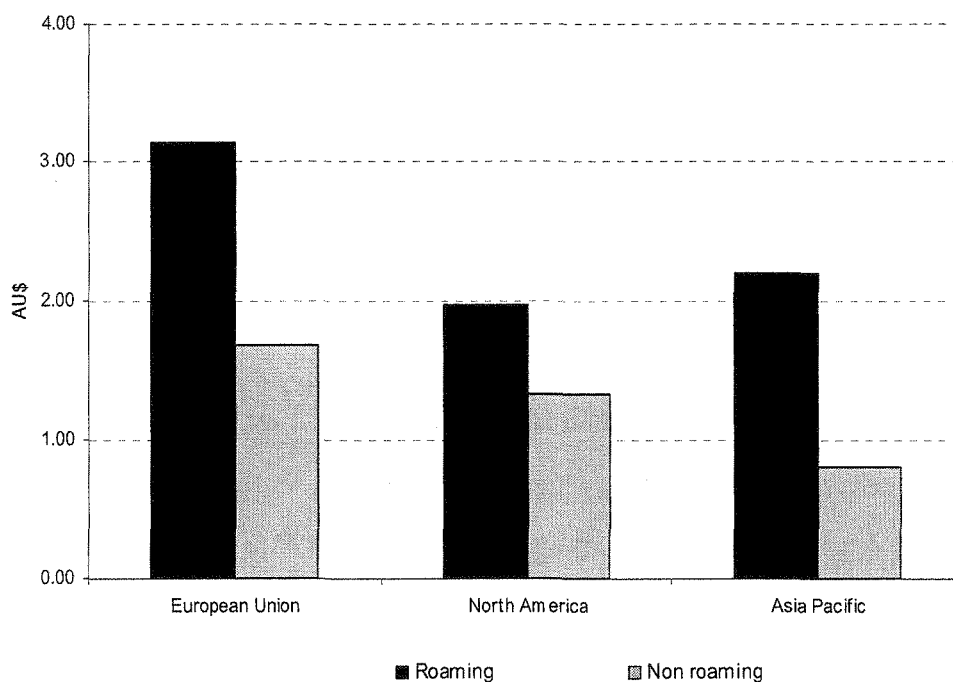
[19] Standard non-roaming international rates were used (as published on carrier websites). No volume, time or mobile phone plan based discounted rates were included in the calculation of average non-roamed long distance rates.

Table 9 Average roamed vs. non-roamed international calls			Roamed calls are more expensive by:
Carriers by region	Roamed call cost	Non-roamed call cost	
EU	3.14	1.68	87%
NA	1.97	1.32	49%
AP	2.20	0.81	171%

3.10 Variations in charges paid by international outbound roamers by region

Based on our results, we identified that, in absolute terms, it is most expensive for EU SIM holders to roam from the EU to the Asia–Pacific including Australia (average EU international roaming rate to the Asia–Pacific: AU$4.54). The next most expensive roaming usage pattern was for Australian SIM holders to roam into the EU (average AU international roaming rate to the EU: AU$2.99).

In absolute terms, North American SIM holders have the least expensive average roaming rates to the EU and to the Asia–Pacific including Australia (average North American international roaming rate: AU$1.97).

Factors contributing to variations in charges paid by international outbound roamers by region

Our results highlighting the relatively high cost of outbound mobile roaming from, and inbound mobile roaming to, the EU are corroborated by recent expert reports[20] and media articles[21] which suggested that in response to retail price capping regulation implemented across EU countries, EU carriers have raised the wholesale roaming settlement rates they charge non-EU carriers for EU SIM holders roaming outside the EU. This practice of raising prices in one area of operations to cover decreasing margins in another is often termed 'water bedding'.

As a consequence of wholesale settlement rate increases, according to recent data published by Informa[20], mobile roaming retail rates for inbound and outbound roaming to and from the EU have also increased—with some EU SIM holders experiencing increases of more than 160 per cent in their retail roaming rates since 2006.

Therefore, it is likely that the high relative costs associated with roaming to and from the EU (as outlined in our data results) can be attributed to EU carrier increases in the following costs and charges to account for roaming margin reductions across the EU:

* Increases in wholesale settlement costs paid by international carriers
* Increases in retail charges paid by EU SIM holders travelling abroad and
* Increases in retail charges paid by International SIM holders travelling to the EU.

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[20] *Informa Telecoms and Media Report*, 30 May 2008: *Global Mobile Roaming, Forecasts 2008-2013* extracts as published on the website: *http://telecoms.com/itmgcontent/tcoms/news/articles*.

[21] *The Economist*, 3 May 2007: 'When in roam'.

Publicly available technical analysis focusing on the reasons for relatively low mobile roaming rates across North America compared to the EU has, to the best of our knowledge, not been the subject of any recent detailed studies. However, during our data gathering procedures we noted a general trend across North American carriers towards voluntarily providing 'fixed' or 'flat fee' roaming options across their roaming services. This trend may allow consumers to make better roaming price comparisons while attracting consumers who desire greater transparency over their potential roaming bills.

This move towards standardised 'flat-fee' models for roaming plans combined with the large market size and inherent levels of competition across North American carriers may have provided incentives for North American carriers to absorb some of the recent increases in EU wholesale roaming charges.

3.11 Roaming and non-roaming margin analysis

Margins for roamed calls

International roaming charges can be separated into two broad components:

- 'retail charge'—representing the amount charged to the consumer by the carrier that has provided the SIM card used to make calls
- 'wholesale cost'—representing the Inter-operator Tariff (IOT) which is an agreed per-minute settlement rate for all calls made between the carrier providing the SIM card to the consumer and the international carrier(s) whose network is used to make, receive and terminate calls.

The IOT is a negotiated rate based on calculating network origination[22] and termination costs, international call transit and currency exchange rates and other roaming specific costs[23].

According to public information provided by the European Commission Directorate General for Competition[24], the average retail margin charged by originating carriers in the EU is between 10 and 35 per cent of the wholesale call cost. This information is in line with public Australian data indicating that a leading Australian carrier currently applies a retail margin 30 per cent[25].

Due to the commercially sensitive nature of IOTs, no publicly available Australian data could be found. However, for the purposes of this report, we have used publicly available international benchmark IOT data to estimate local IOT charges (refer table 10 of this report).

Margins for non-roamed calls

Non-roamed international call charges are made up of similar cost components to roamed calls (as outlined above) with the exception of roaming specific costs and Goods and Services Tax (GST) which is charged for international calls that originate in Australia.

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[22] No GST is applicable on outbound roaming calls made on Australian carrier networks.

[23] Roaming specific costs can include: contracting fees, intercarrier billing and service testing and provisioning costs.

[24] European Commission Directorate General Working Document, 2000: Initial Findings of the Sector Inquiry into Mobile Roaming Charges.

[25] Telstra roaming margins—published on their website.

Retail margins charged on Australian non-roaming international calls are approximately 60 per cent[26] of call costs. A leading Australian carrier [27] recently reported a 64.31 per cent retail margin for non-roaming international business calls in their annual report (the corresponding margin for international residential calls 59.61 per cent)

3.12 Roaming and non-roaming IOT breakdown

Example call types

We have created the following high-level roaming and non-roaming IOT breakdown (refer table 10 of this report) based on the average rates charged by Australian carriers for the following international call types:

Figure 3a – Call scenario: Roamed call back to SIM holder's country of origin
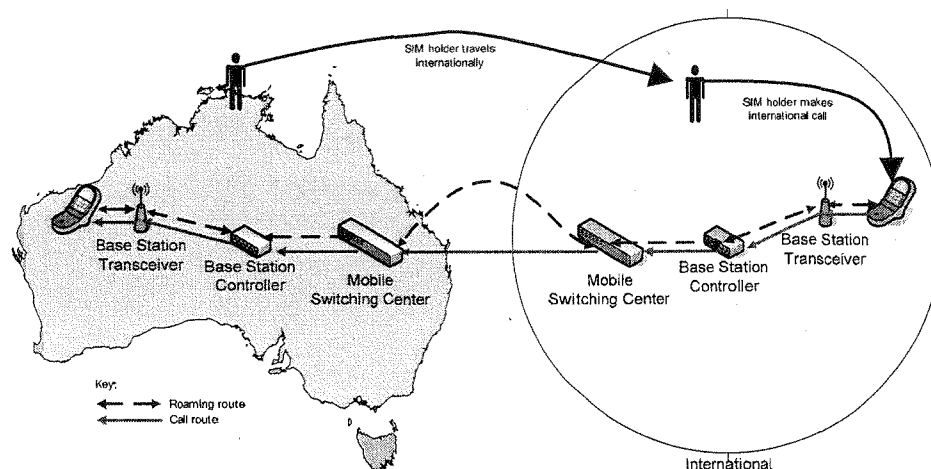
Figure 3b – Call scenario: Non-roamed call back to SIM holder's country of origin
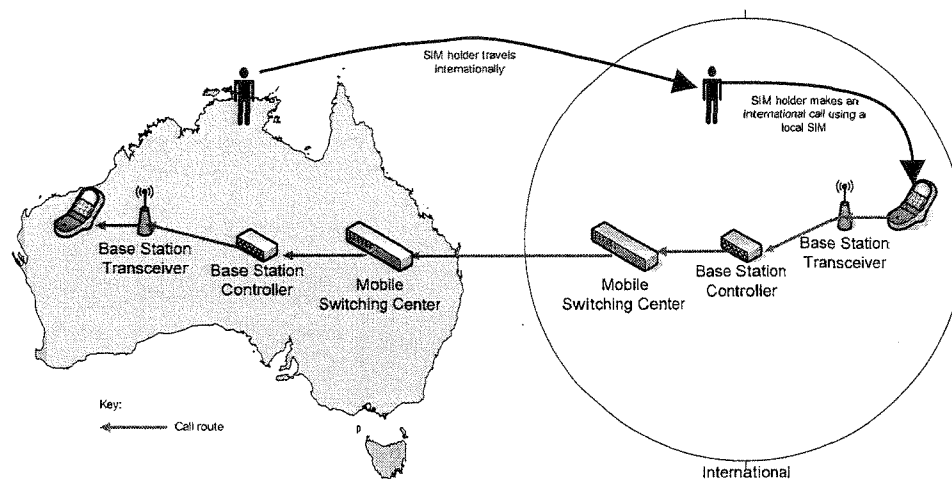
[26] Australian Consumer and Competition Commission (ACCC), 2005/2006: Roaming Report.

[27] ACCC, December Quarter 2007: Australian Carrier imputation and non-price terms and conditions report.

Figure 4a – Call scenario: Roamed international call from SIM holder's international
destination country
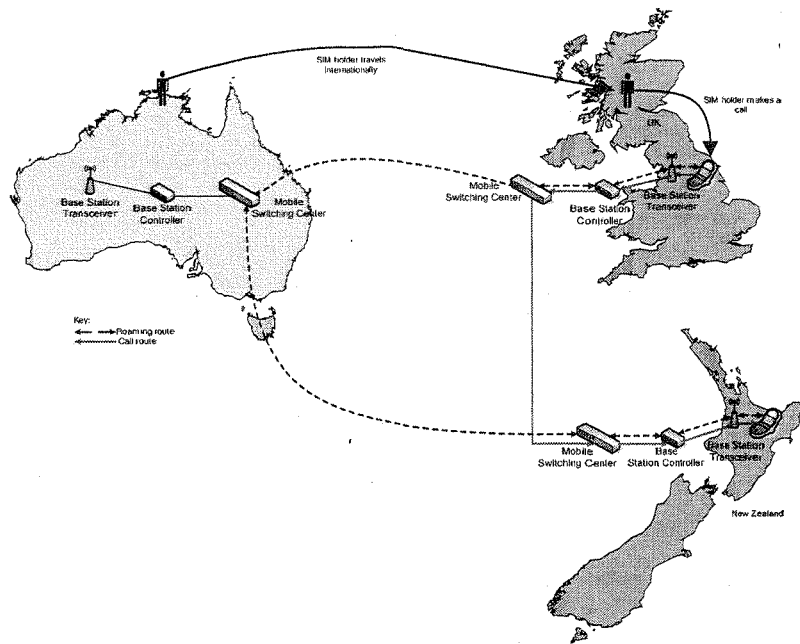
Figure 4b – Call scenario: Non-roamed international call from SIM holder's international
destination country
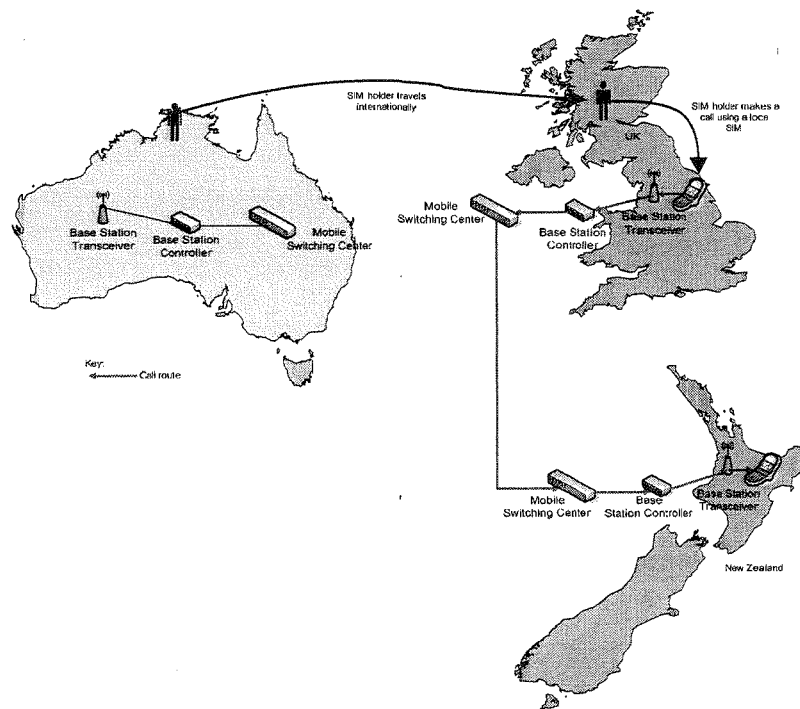
Roaming and non-roaming charges breakdown

The wholesale charges set out below are based on Australian carrier's average international call charges and are estimates only. The wholesale charges we have arrived at can vary significantly based on calculation methods, call scenarios chosen and the transit and termination routes of calls. Given the commercially sensitive nature of carrier wholesale data, no publicly available Australian wholesale cost data could be found.

However, for the purposes of this report, we have used publicly available international benchmark data[28] to calculate estimates for wholesale roaming charges and converted these estimates into Australian dollars. It should also be noted that no fixed or administrative costs were included in the calculation of the wholesale roaming margins outlined below.

Table 10[29] Average roamed and non-roamed IOT[30] charges for:
international roamed and non-roamed calls made from the SIM holder's destination country

Charge element	Roamed charge per minute[31]	Non-roamed charge per minute[31]
Mobile call origination / termination	0.38	0.38
International call transit	0.04	0.04
Roaming specific costs	0.04	Not applicable
Estimated total wholesale cost	0.46	0.42
Average retail cost to consumers	2.75	1.13
Approximate retail margin on wholesale cost[32]	2.29	0.71

According to the estimated wholesale costs and retail charges calculated above, we observe that:

* by our estimates, domestic termination costs account for approximately 19c per minute out of an average retail roaming charge of $2.75 per minute (or approximately eight per cent of the retail margin). Therefore, there is only a very limited degree of correlation between wholesale termination costs and the international roaming charges being paid by consumers. This observation is supported in recent international studies that have analysed the relationship between mobile roaming wholesale costs and roaming retail charges and

* average Australian roaming margins are approximately 3.2 times higher than non-roamed margins. Comparatively, the Technical University of Denmark's recent mobile roaming margin analysis results[28] reported that that European Union retail margins for international roaming calls were four times higher than non-roamed mobile calls.

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[28] Benchmark wholesale cost data taken from Page 7, Table 1 of the Centre for International & Communication Technologies, Technical University of Denmark's report: *Regulation of international roaming charges—the way to cost based prices?*

[29] Definitions of the key terms used in table 10 can be found in Appendix 3 – Key terms of this report.

[30] IOT is the Inter-operator Tariff which is an agreed per-minute settlement rate for calls made between the carrier providing the SIM card to the SIM holder and the international carriers whose networks are used to make, receive and terminate calls by the SIM holder.

[31] Conversion based on international currency mid rates taken from the XE.com currency data feed service as at 16/04/2008.

[32] This analysis does not include any retail and administrative costs incurred by the carrier.

4 Analysis of detailed findings

4.1 Key factors contributing to high retail and wholesale international mobile roaming charges

Based on the available research data that we have reviewed, eight general factors contribute most significantly to the prevalence of high retail and wholesale international mobile roaming charges. These factors are set out in the table below and outlined in further detail as follows.

Table 11 General factors contributing to high retail and wholesale roaming charges

1	Limited number of mobile roaming carriers
2	Limited retail competition
3	Lack of transparency and awareness of total roaming costs
4	Lack of commercial incentives for operators to reduce wholesale prices
5	Additional network costs associated with international roaming
6	Absence of 'perfect' substitutes
7	Lack of international roaming price regulation
8	Language barriers to accessing substitute technology

Divergences in the charges paid by consumers for roamed and non-roamed international calls are primarily due to the eight general factors outlined above. These factors all contribute to the relatively high retail costs charged for international mobile roaming but do not appear to correspondingly impact the cost of international non-roamed calls.

Limited number of mobile roaming carriers

The limited number of international mobile roaming carriers combined with their apparent concentration of market share has impacted price competition and lessened downward pressure on wholesale roaming charges.

Entry into the mobile roaming carrier market is constrained by licensing regulations, spectrum availability and high infrastructure costs. This has resulted in a concentrated number of mobile roaming carriers in each country.

Recent European research has concluded that the two leading mobile network carriers in each Western European country typically hold above 90 per cent of combined consumer market share[33]. This trend towards market concentration is also reflected in Australia,

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[33] Stumpf, Ulrich, October 2001: Prospects for Improving Competition in Mobile Roaming.

where the two oldest mobile network carriers (Telstra and Optus) dominate the local mobile telephony market with 74 per cent consumer market share[34].

Limited retail competition

Non-licensed telephony providers such as mobile virtual network operators provide international roaming products and increase the level of retail choice for consumers. However, this does not significantly reduce retail prices as non-licensed telephony providers act as resellers of network time provided by the small number of mobile infrastructure operators. Given that non-licensed telephony providers normally do not own telecommunication infrastructure themselves, but lease infrastructure under commercial wholesale arrangements[35], they cannot significantly impact retail-roaming rates as they resell services purchased from a limited number of mobile network operators at set wholesale prices.

Lack of transparency and awareness of total roaming costs

Carriers provide substantial detail on roaming costs via data published on their websites and information available from their customer call centres. Roaming costs are also available through public access websites such as the European Union's Information Society's online portal and the GSM Europe website. However, performing roaming price matching by comparing data from different carrier websites is time consuming and predicated on having access to the internet. In addition, the non-standard presentation of roaming data (carrier websites display multiple time and billing unit combinations, flag fall options, loyalty bonuses and a host of peak and off-peak time and volume based discounting choices) contributes significantly to consumers being unaware of the true cost of mobile roaming.

The lack of consumer awareness regarding roaming plans and costs has been confirmed by several empirical studies, and most recently, by a Eurobarometer survey[36] published in 2006. In this survey more than 40 per cent of international mobile users did not have a clear idea of the costs associated with using mobile roaming abroad. As such, significant numbers of uninformed users continue to use their mobile telephones to roam internationally and, while doing so, incur charges that are significantly in excess of their normal usage charges.

Lack of commercial incentives for operators to reduce wholesale prices

Recent market studies[37] have concluded that the overall demand for roaming services is inelastic and as much as 60 per cent of carrier roaming profits are generated from business consumers who are less price-sensitive to the cost of international roaming calls. These factors contribute to roaming retail prices remaining high even after intercarrier wholesale prices have reduced.

Until recently, domestic network operators could not influence the selection of the SIM holders visited network on arrival in a foreign country. International telecommunications analysts have argued that visited network operators in foreign countries did therefore not

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[34] Ibisworld Industry Report, February 2008: *Mobile Telecommunications Carriers in Australia.*

[35] KPMG, January 2006: White Paper *Jumping on the MVNO brandwagon: How niche can you get?*

[36] Eurobarometer, 2007: Special survey number 269 pp 14 and 17.

[37] European Parliament, 2006: *Briefing Note on the Technical Issues on Roaming* p.16.

have an incentive to reduce wholesale prices as price reductions may not directly impact roaming traffic volumes[38].

Advances in telecommunication technology (such as SIM over-the-air programming) have enabled carriers to establish default intercarrier roaming arrangements. For example, Optus can arrange for its SIM holders roaming in Singapore to default onto SingTel's network. This provides increased opportunities for domestic carriers to arrange bilateral agreements for traffic redirection and discounting at the wholesale level. However, as stated above, there is conjecture amongst experts[39] as to whether intercarrier roaming agreements will produce any incentives for mobile network operators to pass on wholesale discounts to consumers in the form of reduced retail prices.

Additional network costs associated with international roaming

From a carrier's perspective, the provision of international roaming services involves the following, unique cost driving activities that contribute to raising the cost of roamed calls:

* international collection and transmission of call detail records containing retail billing data for roamed calls (this can include 'real-time' data in the case of pre-paid customers)
* interconnection and network transit costs. These can include transit payments payable to more than one carrier in the event roamed calls transit multiple networks between the destination carrier and the SIM holder's home carrier
* call origination and termination costs for calls originated and terminated by the SIM holder on the destination carrier's network
* costs charged by the SIM holder's home carrier for customer care and billing processes and
* direct costs associated with negotiating and maintaining roaming agreements.

While it is reasonable to conclude that the cost drivers outlined above contribute towards making roamed international calls more costly from a carrier perspective, international technical studies into the costs of mobile roaming have questioned the degree to which these wholesale costs impact retail charges paid by consumers.

In addition, roaming carriers have stated that residual, non-network, costs should also be factored into the costs of roaming services. These residual costs include administrative and indirect charges such as the cost of sales, marketing, handsets, customer care and capital for providing network infrastructure assets.

The attribution of these administrative and indirect costs to international roaming is difficult to accurately calculate and international studies have so far concluded that these costs would have little impact on the total costs associated with providing roaming services.

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[38] Salsas, R. & Koboldt, C: *Roaming free? Roaming network selection and inter-operator tariffs*

[39] Technical University of Denmark: *Regulation of international roaming charges—the way to cost based prices?*

Absence of 'perfect' substitutes

In its 2005 report[40], the ACCC stated that the lack of perfect substitute products for international mobile roaming contributed to lower levels of competition and reduced price constraints on retail roaming prices.

Whilst submissions by mobile carriers to the ACCC have suggested that substitute products exist in the form of prepaid SIM cards, fixed line and VOIP telephony, hotel room telephones and facsimiles, each of these has limitations compared to the functionality provided by international mobile roaming. For example, the use of prepaid SIM cards remains an unattractive substitute (particularly to business roamers) due to the SIM holder's inability to retain and use their original domestic mobile telephone number(s).

Lack of international roaming price regulation

With the exception of the EU which endorsed regulations on 7 June 2007 proposing that roaming charges be subject to a retail price cap lasting for three years (applicable to EU SIM holders roaming only in EU countries) we have not evidenced any significant, on-going legislative initiatives or processes enacted to monitor or regulate mobile roaming costs and prices in an international context.

As a consequence, international research studies into mobile roaming charges and potential regulatory solutions[39] have concluded that, while a limited amount of market competition exists, no clear relationship can be drawn between the mobile roaming wholesale costs paid by international carriers and the prices currently paid by consumers. In the research data that we have analysed, it is generally concluded, that the absence of government supervision of international mobile roaming retail prices is a contributing factor to the current high levels of disparity between roaming costs and consumer prices.

Language barriers to accessing substitute technology

Outbound SIM holders may also be more likely to use their domestic mobile carrier's default international mobile roaming services if they face significant language barriers while attempting to locate, purchase and use mobile roaming substitutes (such as fixed line telephony, pre-paid international calling cards or VOIP services) in foreign countries.

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[40] ACCC, September 2005: Mobile Services Review on International Inter-Carrier Roaming.

4.2 Australian mobile operators—roaming revenues

Based on data published in their financial statements, the four leading Australia carriers increased their mobile revenues during the 2006–07 financial year. The increase in mobile revenues was attributed to a general growth in the total number of mobile subscribers and increased demand for 3GSM and data services.

Telstra was the only Australian mobile carrier to separately report mobile roaming revenues in its financial statements. This revenue line increased 22.9 per cent from $266 million to $327 million between 2006 and 2007 representing 5.31 per cent and 5.74 per cent of Telstra's total mobile revenue respectively.

Telstra attributed its growth in roaming revenue to increased inbound and outbound mobile roaming minutes and improvements in mobile roaming margins.

Table 12	Total mobile revenue ($m)		Change (%)	Mobile roaming revenue ($m)[41]		Change (%)	Mobile customers	Estimated market share by customers (%)	Change from prior year (%)
Australian carrier	2007/ 2006	2006/ 2005		2007/ 2006	2006/ 2005				
Telstra[42]	5,701	5,006	14%	327	266	23%	9,212	40%	8.0%

EU comparison estimates

Data released in the 5 April 2007 article: *Analysis: Global Mobile Roaming Rates* (published by the online telecommunications industry magazine Wireless Business Forecast) has been used to compare EU roaming revenue as a percentage of total EU mobile revenues in table 13 below.

In table 13 we have also used the percentage of Telstra's roaming to non-roamed mobile revenue figures (as outlined above) and extrapolated them across the mobile revenue reported by the other Australian carriers to provide total mobile roaming revenue estimates.

Table 13 EU mobile roaming revenue compared to Australia

Country / region	Estimated total mobile roaming revenue ($m)	Estimated percentage of total mobile revenues
Australia	714	5.74%
EU	12,000	5.70%

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[41] Telstra's 2007 Annual Report details mobile roaming revenue of $327 million in 2007 and $266 million in 2006 representing 5.74% and 5.31% of total mobile revenue respectively.

[42] Telstra, 2007 Annual Report.

4.3 Points of interconnection (POI) and interaction between international carriers for internationally roamed calls:

A mobile call made in a foreign country by an Australian SIM holder to a person in the same country

Figure 5a – Call scenario: Roamed local call
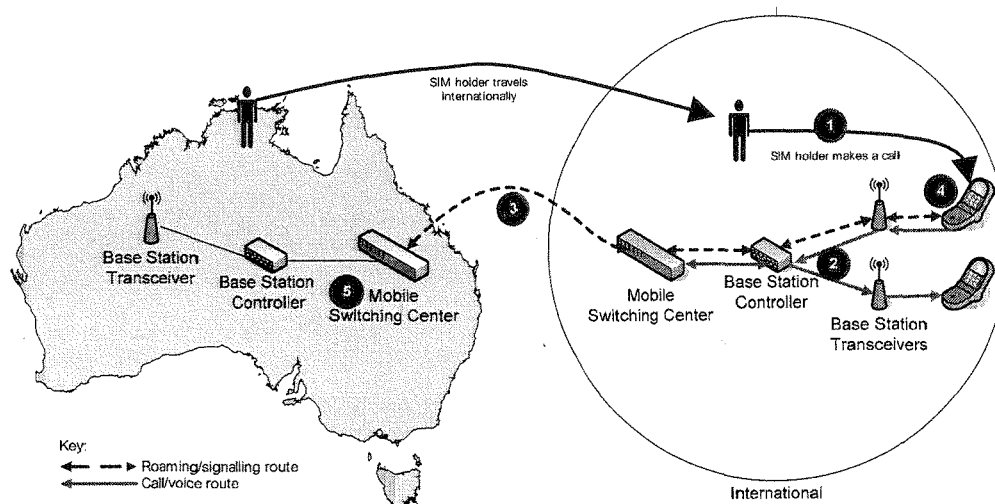
Table 14 Roamed local call – call process

Key	Network	Call process
1	Destination country	SIM holder initiates a mobile call in their destination country to another person in the same country
2	Destination country	Call originates, is switched, transits and terminates on carrier network (in the destination country)
3	Destination and home country	POI—destination carrier (after identifying the appropriate home carrier via the SIM holder's International Mobile Subscriber Identifier number) switches signalling communication back to the SIM holder's home carrier for authentication (via home carrier's switching centre processes including: handset registration, authentication and call data recording)
4	Destination country	SIM holder ends call (in destination country)
5	Destination and home Country	POI—destination carrier finishes switching signalling communication back to the SIM holder's home carrier to create a final call detail record (CDR) of the call. The CDR consolidates data including the: SIM holder, telephone number called, call time and duration and the call's geography including details of Transited Carrier networks. The CDR is the primary data element driving the billing processes of the SIM holder's home carrier.

A mobile call made in a foreign country by an Australian SIM holder to a person in a country different from Australia and the foreign (destination) country

Figure 5b – Call scenario: Roamed international call to a country other than the country of SIM origin
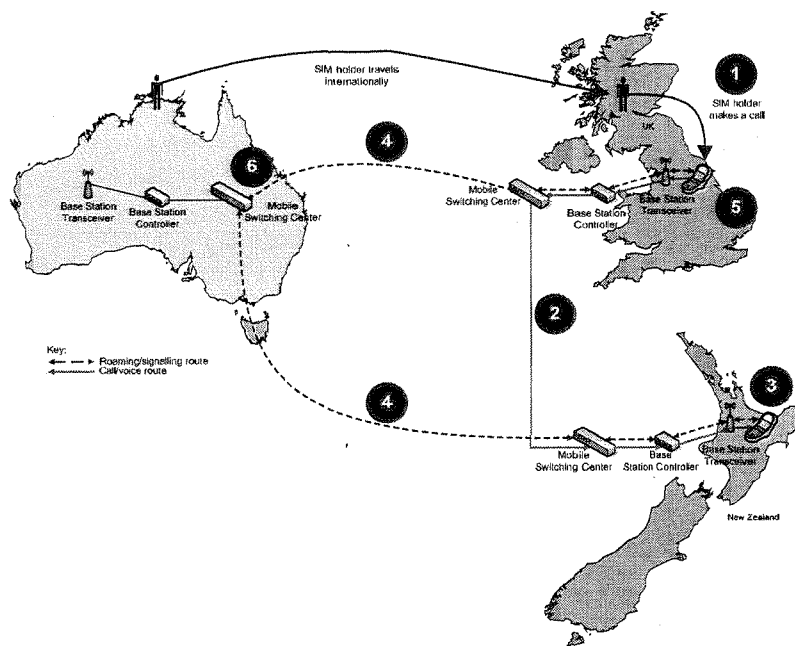
Table 15 Roamed international call – call process

Key	Network	Call process
1	Destination country	SIM holder makes a mobile call from their destination country to an international country (other than their home country)
2	Destination country	POI—call originates in destination country, is switched and transits to a carrier in the International country
3	International country	POI—call is switched and transits international carrier network to the call recipient (call termination point)
4	Destination, international and home country	POI—destination and international carriers (after identifying the appropriate home carrier via the SIM holder's International Mobile Subscriber Identifier number) switch signalling communication to SIM holder's home carrier for authentication (via home carrier switching centre processes including: location and handset registration) and call data recording
5	Destination country	SIM holder ends call (in destination country)
6	Destination and home country	POI—destination and international carriers finish switching signalling communication back to the SIM holder's home carrier to create a final CDR of the call. The CDR consolidates data including the: SIM holder, telephone number called, call time and duration and the call's geography including details of transited carrier networks (in this case in the international country). The CDR is the primary data element driving the billing processes of the SIM holder's home carrier.

Note: Depending on Intercarrier Agreements and the level of network integration, calls can be switched and authenticated by the SIM holder's international destination carrier removing the need for other carriers to signal back to the SIM holder's home carrier.

A mobile call made in a foreign country by an Australian SIM holder to a person in Australia

Figure 5c – Call scenario: Roamed call back to the country of SIM origin
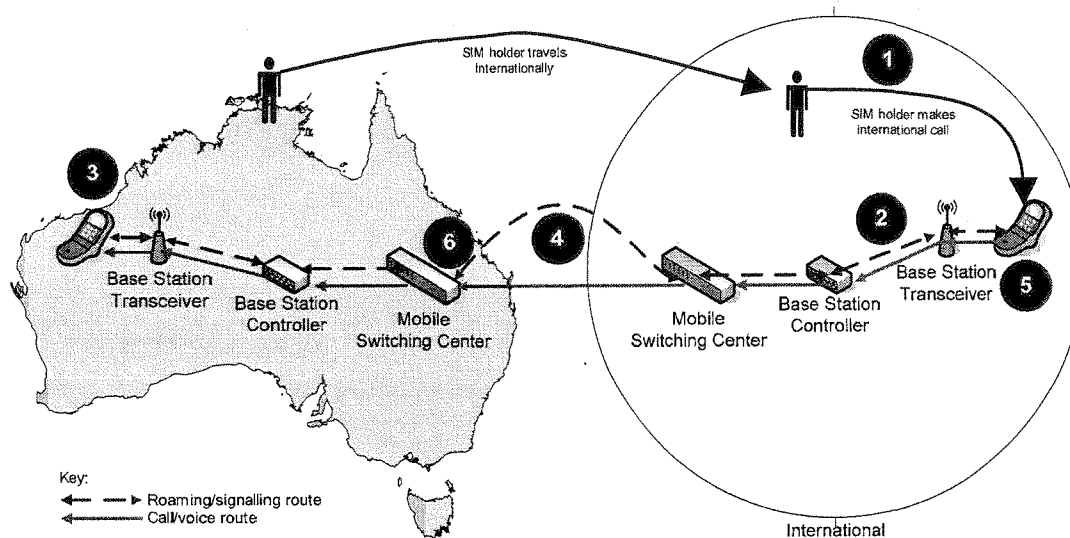
Table 16 Roamed call back to home country – call process

Key	Network	Call process
1	Destination country	SIM holder makes a mobile call in their destination country to their home country
2	Destination country	Call originates, is switched and transits the carrier network (in destination country)
3	Home country	POI—call is switched and transits the home carrier's network to the call recipient (call termination point)
4	Destination and home Country	POI—destination carrier (after identifying the appropriate home carrier via the SIM holder's International Mobile Subscriber Identifier number) switches call signalling (and voice) communication back to the SIM holder's home carrier for authentication (via home carrier switching centre processes including: location and handset registration) and the inception of call data recording
5	Destination country	SIM holder ends call (in destination country)
6	Destination and home Country	POI—destination carrier finishes switching signalling communication back to the SIM holder's home carrier to create a final CDR of the call. The CDR consolidates data including the: SIM holder, telephone number called, call time and duration and the call's geography including details of transited carrier networks (in this case in the international country). The CDR is the primary data element driving the billing processes of the SIM holder's home carrier.

An international mobile call received in a foreign country by an Australian SIM holder

Figure 5d – Call scenario: Received international roamed call
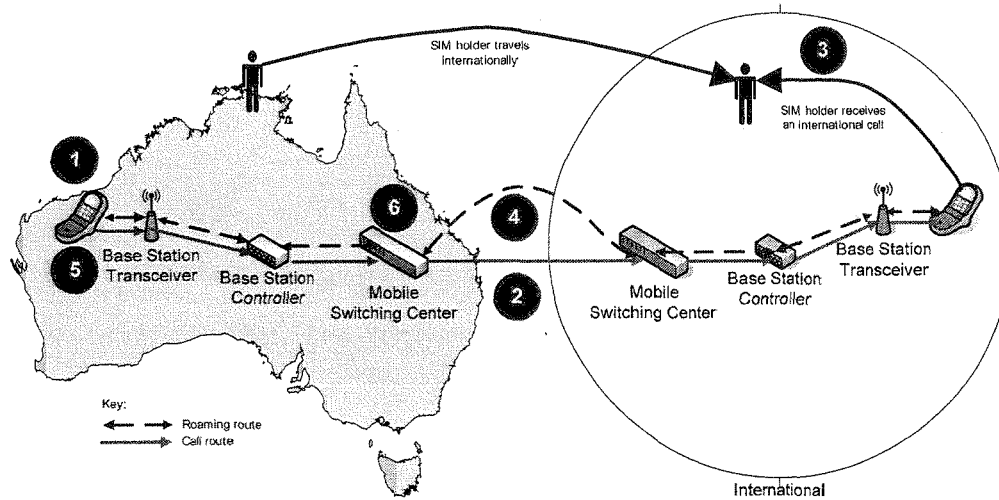
Table 17 Roamed call back to home country – call process

Key	Network	Call process
1	Home country	A call is made from the SIM holder's home country to the SIM holder (overseas)
2	Home country	Home carrier originates the call and switches it to the carrier network in the destination country
3	Destination country	POI—SIM holder receives a mobile call in their destination country (call termination point)
4	Destination and home countries	POI—destination carrier (after identifying the appropriate home carrier via the SIM holder's International Mobile Subscriber Identifier number) switches call signalling communication back to the SIM holder's home carrier for authentication (via home carrier switching centre processes including: location and handset registration) and the inception of call data recording
5	Home country	Caller ends the call (on the home carriers network)
6	Destination and home countries	POI—destination carrier finishes switching signalling communication back to the SIM holder's home carrier to create a final CDR of the call. The CDR consolidates data including the: SIM holder, telephone number called, call time and duration and the call's geography including details off transited carrier networks (in this case in the international country). The CDR is the primary data element driving the billing processes of the SIM holder's home carrier.

5 Technological trends

5.1 Technology based challenges impacting inbound and outbound roamers

The technology-based challenges that most significantly impact a SIM holder's ability to roam internationally can be separated into two main categories:

* handset compatibility and
* network access.

Handset compatibility

The main technology platforms used by carriers to connect SIM holders onto their respective networks are the:

* Global System for Mobile Communications (GSM) and
* Code Division Multiple Access (CDMA) systems.

GSM is a technology platform that operates mainly on 850MHz and 1900MHz frequencies in North America and 900MHz and 1800MHz frequencies in most of Asia, Australia and Europe[43].

CDMA networks include first generation 'CDMAone' networks, as well as newer 3G, CDMA2000 and Wideband CDMA (WCDMA) networks. Australia does not operate CDMAone networks—newer WCDMA network have superseded this technology[44].

International roamers need to consider that GSM handsets are not compatible with CDMA networks and vice versa. For a SIM holder to roam on an overseas carrier network, they must have a handset capable of operating on the correct network frequency and compatible with the network technology system (GSM or CDMA) or have a 'dual network' handset that can operate on GSM and WCDMA networks. Other handsets operating over multiple frequencies on the same network (GSM or CDMA) are available and are referred to as 'dual band', 'tri band' or 'quad band' handsets.

Based on carrier network data published by the GSM Association and the CDMA Development Group, a list of countries and compatible handsets is outlined below:

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[43] Based on data published on: GSM Association, 2008 website.

[44] Based on data published on: CDMA Development Group, 2008 website.

Table 18 Handset compatibility

Handset operating frequency	AU	EU	NA	AP	Japan
GSM 900/1800 MHz	✓	✓	✗	✓	✗
GSM 850/1900 MHz	✗	✗	✓	✗	✗
GSM 900/1800/1900 MHz	✓	✓	✓	✓	✗
GSM 850/1800/1900 MHz	✓	✓	✓	✓	✗
GSM Quad Band 850/900/1800/1900 MHz	✓	✓	✓	✓	✗
CDMA 800 MHz	✗	✗	✓	✓	✗
WCDMA 850Mhz 3G	✓	✗	✓	✗	✗
WCDMA 2.1GHz 3G	✓	✓	✗	✓	✓
WCDMA 1.7GHz 3G	✗	✗	✗	✗	✓

Network access

To roam internationally, SIM holders must have their roaming permission activated individually by their home carrier. This is typically done prior to the SIM holder's departure or on the inception of the contact between the SIM holder and their home carrier.

The range of countries that the SIM holder can roam in depends on roaming agreements established between the SIM holder's home carrier and the international carriers the SIM holder intends to roam with. In the event no roaming agreements are in place between the SIM holder's home carrier and the international carrier the SIM holder intends to roam with—the SIM holder will be unable to roam on the international carrier's network.

The number of countries available for Australian SIM holders to roam in varies between 122 and 174 depending on the Australian carrier issuing the SIM.

5.2 Substitutes that can potentially reduce international mobile roaming charges

Domestic[45] and international[46] research we have reviewed has generally concluded that substitute products to international mobile roaming have not had a major downward effect on the price of roaming due to their lack of 'perfect substitutability' (refer to Section 4.1 for further detail). If consumers adopt international mobile roaming alternatives in significant numbers in future years, the retail price of mobile roaming may decrease accordingly.

However, there are current roaming alternatives available to consumers looking for less expensive options when calling from overseas destinations. Some of the main alternatives are:

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[45] ACCC, September 2005: *Mobile Services Review on International Inter-Carrier Roaming.*

[46] Stumpf, Ulrich, October 2001: *Prospects for Improving Competition in Mobile Roaming.*

Table 19 Alternatives to international mobile roaming

1	International calling cards (including credit card calls)
2	Voice over internet protocol (VOIP)
3	Pre-paid Subscriber Identity Module (SIM) cards
4	Global SIM cards
5	Dual SIM card adapters (and dual numbered SIM cards)

International calling cards

International calling cards are prepaid or billed cards allowing consumers to make international and domestic calls by dialling a cheaper local 'override' number. Calling cards are cheaper either due to wholesale arrangements negotiated with international carriers or through their use of VOIP technology to transmit the international call via the internet.

VOIP

VOIP technology involves the transmission of voice data via the internet instead of using the Public Switched Telephone Network (PSTN)[47]. While VOIP has had a significant impact on fixed telephony, allowing for cheaper voice calls and the provision of complementary data services, international experts believe that IP-based mobile telephony will only become a significant part of the overall mobile telephony market in the medium-to long-term after the mass take-up of mobile IP technology which currently remains expensive and limited in distribution.

VOIP calls can be made in the following configurations:

* Computer to computer
* Computer to PSTN mobile or VOIP phone
* VOIP phone to computer and
* VOIP phone to a PSTN mobile or VOIP phone.

The Australian VOIP market is set to increase significantly in the short-term. The number of VOIP providers increased by 27 to 269 during the last five months of 2007 and there is a forecast increase in VOIP subscribers of 237 per cent by 2011[48].

Local pre-paid SIM cards

Local pre-paid SIM cards can be purchased for use in handsets in the country in which they intend to roam. In its 2005 report, the ACCC noted that in most countries, consumers can choose from at least four pre-paid SIM mobile services[49].

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[47] ACMA, 2008: website, *www.acma.gov.au/WEB/STANDARD/pc=PC_310759*.

[48] ACMA, April 2008: *The Australian VOIP Market*.

[49] ACCC, September 2005: *Mobile Services Review on International Inter-Carrier Roaming*.

Global SIMs

Global SIMs are pre-paid SIM cards specifically designed for international mobile roaming users. They provide consumers with relatively less expensive outbound (and often free inbound) calls through an automated call back process[50]. Users of Global SIM cards are provided with a telephone number often originating from the Isle of Man or Lithuania. Users set their original mobile number to forward automatically to their Global SIM number and receive calls on their Global SIM, in the process being charged local rates rather than international roaming rates. Global SIMs are not currently feasible in an Australian mass-market context as there are no Global SIMs available with Australian numbers (meaning all calls to a Global SIM in Australia would be charged at international rates. However, using a Global SIM from Australia may still be less expensive than roaming given the cheaper rates applied to non-roamed international calls.

Dual SIM card adapters (and dual numbered SIM cards)

Dual SIM card adapters can be inserted into the mobile handset (subject to handset capability) allowing the handset to carry two SIM cards—and therefore two phone numbers—alternately. Dual SIM numbers are where the SIM issuer agrees to add a second number to an existing SIM card. To switch between the two SIM numbers, in most cases, the mobile handset must be switched off and restarted.

Dual-SIM-card handsets are useful for international roamers who travel predominantly between two countries as they can switch SIM cards in either country effectively retaining a local phone number in each country. However, a reason dual SIM card devices are not widespread is mobile carriers are reluctant to potentially share their customers with competitors[51]. Giving customers the possibility to easily use two SIM cards opens the opportunity for them to have cards from different carriers in their home market.

A summary of the advantages and disadvantages of each of the alternatives outlined above is contained in Table 20 below.

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[50] Information sourced from GlobalSIM, 2008 website: www.globalsimcard.co.uk.

[51] International Telecommunication Union, 2008: *GSR Mobile Roaming Discussion Paper* page 24.

Summary of advantages and disadvantages of roaming substitutes

Table 20	Advantages	Disadvantages
International calling cards	Cost effective Widely availability Easy to use	User requires a phone connection (often fixed line) User can make outbound calls only, and cannot be contactable on inbound calls Call voice quality can be reduced (especially on cheaper calling cards)
VOIP	Cost effective Potentially superior quality voice transmission to mobile calls, pending Internet traffic congestion Ability to offer more data services at the same price	Subject to a wider variation in call quality as call transmission is dependent on Internet connection speed and Internet traffic congestion Generally requires a broadband connection Requires VOIP equipment or software
Local pre paid SIM cards	Can be used in any unlocked mobile handset User can make and receive calls at any location pending network reception	Cannot use your original mobile number Requires a handset that is not network locked
Global SIMs	Cost effective roaming solution	Not widely available Requires a handset that is not network locked
Dual SIM card adapters and dual SIM numbers	Cost effective—potentially avoids roaming charges Make and receive calls retaining the original SIM number	Not widely available (restricted by some carriers) Requires a handset that is not network locked Requires alternating between a local number and a roamed number

5.3 Roaming pricing trends in non-regulated markets

Our research and international studies[52] have highlighted that international mobile roaming carriers (irrespective of roaming market regulation) are generally seeking to establish as many roaming agreements with as many other carriers as possible to benefit from servicing as many inbound roaming SIM holders as possible. Furthermore, some carriers have established presences in multiple markets and the development of intercarrier alliances and preferential trading groups has increased the potential to reduce wholesale IOTs. Recent studies[51] have pointed to the development of intercarrier alliances in Europe including alliances across Vodafone's, Orange's, T-Mobile's and Tele2's carriers and alliances between network operators Freemove51 and Starmap52. According to the same studies, similar market consolidation can be observed in other, non-regulated, markets—most notably across carriers in Africa, Asia and the Arab States[53].

The formation and continued development of intercarrier alliances has created significant trends towards market rationalisation in international mobile roaming—particularly in non-regulated markets—as evidenced by:

* Zain / MTC subsidiary Celtel abolishing roaming charges in East Africa between Kenya, Tanzania and Uganda in September 2006. Celtel later expanded roaming services to

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[52] International Telecommunication Union, 2008: *GSR Mobile Roaming Discussion Paper*.

[53] Arab states carriers including: Zain/MTC, Orascom, Qtel, Etisalat, Batelco, and MTN.

12 African countries, enabling approximately half of all African SIM holders to communicate across national borders without incurring roaming costs[52]

- It has been forecast[52] that by the beginning of 2008, Celtel's roaming service network (allowing SIM holders to make roaming calls at local rates within the 12 alliance countries and receive incoming calls free of charge without any prior registration or fee) will have the potential to reach a population of nearly 400 million, living in an area twice as large as Western Europe.

- As a result of Celtel's initiative, other African carriers have formed alliances offering SIM holders roaming services at domestic rates

- Hutchison Whampoa (trading as '3') abolishing roaming charges for calls received by its customers on its own networks in Australia, Austria, Denmark, Hong Kong, Italy, the Republic of Ireland, Sweden and the United Kingdom[52]

- dual number SIMs being offered by a number of carriers to customers in Hong Kong, Macau and China[52] (refer to Section 5.2 for further detail on dual number SIM cards)

- Baltic State carriers (TeliaSonera, Omnitel, LMT, EMT and Tele2) offering free incoming roamed calls and reduced charges for outgoing calls for SIM holders roaming across the Baltic[52]

- West Africa's Telecel networks (operating in Benin, Burkina Faso, Cote d'Ivoire, Niger, Togo and Gabon) offering SIM holders a roaming service called '@Sim'[52] which involves providing dual SIM cards—one for the SIM holder's home network and the other(s) for the local networks in the countries visited and

- the Conexus Mobile Alliance[52] created in April 2006 whose nine[54] members across Asia offer reduced rate roaming services including the first pay-per-day data roaming flat rate plan in Asia

- the Arab Regulators' Network (AREGNET) successfully encouraging more open access to its international gateways across a number of local carriers. According to resulting estimates by the GSM Association[55], international call prices decreased by 20 to 50 per cent across member countries.

5.4 Attempts by mobile operators to offset lost revenue due to retail caps by raising prices for other services

As outlined in Section 3.10 of this report, international studies[56] suggest that, in response to retail price capping regulation implemented across EU countries, EU carriers have 'water bedded' or raised the wholesale roaming settlement rates they charge non-EU carriers for their SIM holders roaming in the EU.

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[54] Conexus Mobile Alliance members include: Far EasTone (Taiwan); Bharat Sanchar Nigam (India), Mahanagar Telephone Nigam (India); Hutchison Telecommunications (Hong Kong and Macau); PT Indosat Tbk (Indonesia); KT Freetel (South Korea); NTT DoCoMo, (Japan); StarHub (Singapore) and Smart Communications (Philippines).

[55] Based on data published on: GSM Association, 2008 website.

[56] Informa Telecoms and Media, 30 May 2008: *Global Mobile Roaming, Forecasts 2008-2013* published as extracts on the website: *http://telecoms.com/itmgcontent/tcoms/news/articles*.

As a consequence of wholesale settlement rate increases, according to recent data published by Informa[56], mobile roaming retail rates for inbound and outbound roaming to and from the EU have also increased significantly—with some EU SIM holders experiencing increases of over 160 per cent in their retail roaming rates since 2006.

In addition, the European Regulators Group[57] also concluded that billed roaming minutes significantly exceeded actual elapsed minutes (typically 20 per cent at the retail level) as a consequence of carriers adopting a minimum charging interval of up to one minute at both the wholesale and retail level. This process may have been implemented to offset the impact of retail price capping regulations enacted across EU countries.

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[57] European Regulators Group ("ERG"), April to September 2007: International Roaming ERG benchmark data report, page 2.
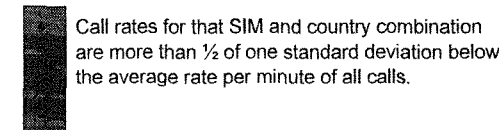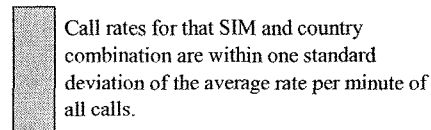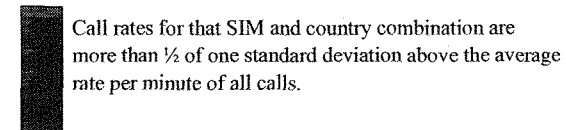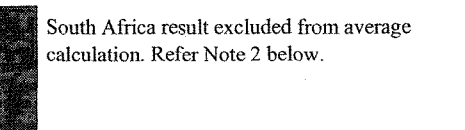
Appendix 1 – Roaming charges by carrier and country

International carrier charge table

The table below outlines international roaming charges levied by carrier and country destination.

Key:

■	Call rates for that SIM and country combination are more than ½ of one standard deviation below the average rate per minute of all calls.
▨	Call rates for that SIM and country combination are within one standard deviation of the average rate per minute of all calls.
■	Call rates for that SIM and country combination are more than ½ of one standard deviation above the average rate per minute of all calls.
■	South Africa result excluded from average calculation. Refer Note 2 below.

Note:
All rates presented in the table above are 'standard rates' for calls lasting one minute. The rates were selected between Monday 7 April 2008 and Wednesday 16 April 2008 and were taken directly from data published on carrier websites. The rates include flag falls and connection fees where applicable but do not include 'discounted rates' (for example, preferred roaming carrier discounts or volume and time based discounts).
South Africa MTN Mobile's average roaming rate to Japan of AU$45.32 has been confiirmed as correct. However, for the purposes of our statistical analysis this rate has been excluded from our calculations given its skewing impact on the average rate per minute for all calls.
All table cells marked 'no rate' have no published rate for that carrier pair.
The above rates for US consumers exclude US carrier 'Airtime' charges and other additional contract surcharges and caps due to the variability of the pricing packages and contracts offered.
SK Telecom of Korea removed from sample of carriers due to a lack of publicly available data.

Appendix 2 – Key terms

The following Key Terms used in this report are defined in the table below:

SIM holder	Is the holder of a SIM card that is used in their mobile telephone. SIM cards securely store the service-subscriber key (IMSI) used to identify individual SIM holders.
Roaming	The ability, by means of accessing an international mobile telephony network, for a SIM holder to make & receive mobile voice calls, send and receive data, or access other services when travelling outside the geographical coverage area of their home network. Establishing mobile roaming between a home and international network operators is based on the commercial terms included in Intercarrier Roaming Agreements and is technically supported by mobility management, authentication and billing procedures operated by the home and international network operators.
Inbound roamer	A visitor arriving in Australia holding a SIM card from their Home Country connecting onto an Australia mobile network is termed an 'inbound roamer' for the purposes of this report.
Outbound roamer	An Australian SIM holder who departs Australia and uses their Australian mobile telephone directly on international mobile networks is termed an 'outbound roamer' for the purposes of this report.
Carrier	Also know as Mobile Network Operator (MNO) or Carriage Service Provider ("CSP") a Carrier is the mobile telephony company providing services (and SIM cards) to the mobile phone subscribers on its network.
Inter-operator Tariff	Is an agreed per-minute settlement rate for calls made between the carrier providing the SIM card to the SIM holder and the international carriers whose networks are used to make, receive and terminate calls by the SIM holder.

The following Key Terms used in this report are defined in the table below:

Call detail record	Is the data record produced by a telephone exchange containing specific details of calls that it has processed. A call detail record (CDR) normally includes details recording the: • number of the SIM holder making the call (A party number) • the number receiving the call (B party number) • call origination (date and time) • call duration • unique identifier of the telephone exchange producing the CDR • unique sequence number identifying the CDR • digits on the B number used to correctly route or charge the call • result of the call (whether it was answered, busy etc.) • route by which the call entered the exchange • route by which the call left the exchange (and any points of transit) • details of any fault conditions encountered and • facilities used during the call, such as call waiting or call diversion
Point of Interconnect (POI)	The point of connection between two or more carrier networks (i.e. the physical point at which a call travels from one carrier network onto another). A high-level example POI could be a call originating in Sydney on a Telstra mobile network that terminates in Auckland on a Telecom New Zealand network. This call will have at least one POI between Telstra's network switch sending the call and Telecom New Zealand's network switch that is receiving the call.
Home country	The original country where the SIM holder purchased his or her mobile network service subscription. In this report Australia is generally assumed to be the Home Country
Destination country	The country to which the SIM holder travels and uses his or her mobile telephone.
Call origination	The point when a SIM holder makes a mobile call on a network for connection to another called party.
Call termination	The called party or end point (the call origination being made by the SIM holder who initiated the call).

Appendix 3 – Key information sources

The following publicly available websites and publications were referred to:

Organisation	Website, webpage and document references
Asia-Pacific Economic Cooperation Telecommunications and Information Working Group	www.apectelwg.org
Australian Bureau of Statistics	www.abs.gov.au
Australian Communications Industry Forum	www.acif.com.au
Australian Communications and Media Authority	ACMA communications report of 2005–2006
Australian Telecommunications Users Group	www.atug.com.au
Department of Immigration and Citizenship	www.immi.gov.au
International Telecommunications Users Group	www.intug.net
International Telecommunication Union	www.itu.int/net/home/index.aspx
Organisation for Economic Co-operation and Development	www.oecd.org/home/0,2987,en_2649_201185_1_1_1_1_1,00.html
United States Federal Communications Commission	www.fcc.gov
XE.com currency data feed service	www.xe.com/ucc
Aircel	www.aircel.com/chennai/postpaid/international_roaming.asp
Aircel	www.aircel.com/north_east/west_bengal/prepaid.html
Airtel	www.airtel.in/Prepaid_tarrifs.aspx?path=1/6/6/2&cid=2
AIS	www.gsmadvance.ais.co.th/tariffs_eng/tariffs_ir_index.html
AIS	www.gsmadvance.ais.co.th/e/services/idd/charging.aspx

Organisation	Website, webpage and document references
AT&T	www.wireless.att.com/learn/international/roaming/international-roaming.jsp?WT.svl=calltoaction
AT&T	www.wireless.att.com/learn/international/long-distance/go-phone-international.jsp
Bharti Airtel	www.airtel.in/InternationalRoaming_Postpaid.aspx?path=2/14/87/120/49
China mobile	www.chinamobile.com/en/mainland/products/world.html
China mobile	http://it.sohu.com/20070515/n250023075.shtml
Cincinnati Bell	www.cincinnatibell.com/consumer/wireless/coverage/international.asp
Cincinnati Bell	www.cincinnatibell.com/consumer/wireless/rate_plans www.cincinnatibell.com/consumer/wireless/coverage/international.asp
France Telecom	www.orange.fr/bin/frame.cgi?u=http%3A//assistance.orange.fr/1870.php%3Fdub%3D2%26
Hutchinson 3	www.three.co.uk/personal/help_support_/network_coverage_/going_abroad_/pay_monthly/destination.omp?cid=31898&plantype=PayMont
Hutchinson 3	www.3ireland.ie/international/internationalpricing.htm
Hutchinson 3	www.three.ie/priceplans/3pay.htm www.three.ie/international/band_6_2.htm
Hutchinson 3	www.three.co.uk/personal/help_support_/network_coverage_/going_abroad_/pay_monthly/destination.omp?cid=31898&plantype=
Indosat	www.indosat.com/Mentari_Rates
KPN	www.kpn.com/mobiel/gsm-abonnement/diensten-op-je-mobiel/alle-diensten-/beeldbellen.htm
Movistar	www.movistar.es/particulares/roaming/tarifas
MTN mobile	www.mtn.co.za/?pid=237578
MTN mobile	www.mtn.co.za/?pid=237578
Nextel	www.nextel.com/en/services/worldwide/internationalcoverage.shtml
Nextel	www.nextel.com/en/services/worldwide/internationalcoverage.shtml

Organisation	Website, webpage and document references
O2	http://shop2.o2online.de/nw/produkte/tarife/ausland/index.html
O2	http://shop2.o2online.de/nw/produkte/mitigation/ausland/index.html http://shop2.o2online.de/nw/produkte/mitigation/ausland/index.html
Optimus	www.optimus.pt/particulares/tarifarios/repositorio/html/Internacionalroamingoptimusa
Optus	www.optus.com.au/portal/site/business/menuitem.97a8a35c2959cb2af42ff7109c8ac7a0/?vgnextoid=0a998546f92d9010VgnVCM10000029867c0aRCRD
Optus non roamed	www.optus.com.au/portal/site/business/menuitem.97a8a35c2959cb2af42ff7109c8ac7a0/?vgnextoid=39e88546f92d9010VgnVCM10000029867c0aRCRD
Orange	http://sites.orange.fr/ge/content/pdf/v2_pdf/documentation/fiche_tarifaire_gen.pdf
Orange	http://movil.orange.es/roaming/tarifas/tarifas/index.html
Orange	www.business.orange.co.uk/servlet/Satellite?pagename=Business&c=OUKPage&cid=1144404029946
Orange	www.business.orange.co.uk/servlet/Satellite?pagename=Business&c=OUKPage&cid=1044134936091
Portugal - Optimus	www.optimus.pt/Particulares/Tarifarios/Tarifarios/Detalhe/ZeroZero
Portugal - TMN	www.tmn.pt/portal/site/tmn/menuitem.d132b3bf8eee6c2b3b777310751056a0/?vgnextoid=6b0db3a4f3b5df00VgnVCM1000005a01650aRCRD
Portugal - Vodafone	https://loja.vodafone.pt/tarifarios/planobest
Rogers	www.rogers.com/web/content/wireless-network/international_roaming
Rogers	www.rogers.com/web/content/wireless-products/paygo_rates?content10=paygo_rates
SingTel	http://welcome.singtel.com/default.asp
SingTel	http://welcome.singtel.com/default.asp
SK Telecom	www.skroaming.com/en/use/simulation.asp#Continent
Smartone	www.smartone-vodafone.com/jsp/mobile/going_abroad/roaming/english/index.jsp
Smartone	www.smartone-vodafone.com/jsp/mobile/prices/store_valued_SIM/english/tariff.jsp www.smartone-vodafone.com/jsp/mobile/overseas/idd/english/smart_idd.jsp

Organisation	Website, webpage and document references
Softbank	http://mb.softbank.jp/mb/en/global_service/international/call/voice_call_charges/index.html
Softbank	http://mb.softbank.jp/mb/en/global_service/international/call/voice_call_charges/index.html http://mb.softbank.jp/mb/en/prepaid/about/charges.html
Spain - Movistar	www.movistar.es/fwk/cda/controller/controller/0,2189,8887_117665995_9721_0_0,00.html
Spain - Orange	http://movil.orange.es/tarjeta/llamadas_internacionales/50.html
Spain - Vodafone	www.vodafone.es/particulares/internacional-roaming/internacional/index.jsp
Telcom	www.telecom.co.nz/prepaid?nv=sd www.telecom.co.nz/internationalmobile
Telcom NZ	www.telecombusinesshub.co.nz/Calling/Roaming/Pages/WorldmodeDetails.html?link=rdt
Telkomsel	www.telkomsel.com/web/simpati_international_roaming
Telkomsel Simpati	www.telkomsel.com/web/simpati_international_roaming
Telstra	www.telstra.com.au/mobile/networks/internat_roaming.cfm
Telstra non roamed	www.telstra.com.au/business/products/mobiles/plansandpricing/memberplans.htm#memberplan
Three	www.three.com.au/cs/ContentServer?subId=1156241342637&homeId=1154931041257&c=Page&pagename=Three%2FPage%2FBusinessVideoCallingTemplate&p=1155054450851&cid=1196812432313&Nav=0
Three non roamed	www.three.com.au/cs/ContentServer?subId=1154931041257&homeId=1155054450811&c=Page&pagename=Three%2FPage%2FIFramePageTemplate&p=1155054450851&cid=1202087463442
TMN	www.tmn.pt/TMN%20Institucional/Roaming/Pos-Pagos/tarif_ppp.pdf
T-Mobile	www.t-mobile.com/International/RoamingOverview.aspx?tp=Inl_Tab_RoamWorldwide
T-Mobile	www.t-mobile.com/International/RoamingOverview.aspx?tp=Inl_Tab_RoamWorldwide
Vodacom	www.vodacom.co.za/services/travel/charge_guide.jsp
Vodacom	www.vodacom.co.za/services/travel/charge_guide.jsp
Vodafone	www.vodafone.de/privat/ausland-tarif-mms-sms-roaming-reiseversprechen-international/101691.html

Organisation	Website, webpage and document references
Vodafone	www.vodafone.ie/planscosts/paymonthly/roaming/world/
Vodafone	www.vodafone.co.nz/roaming/countries/
Vodafone	www.vodafone.pt/main/Particulares/Roaming/ActivacaoTarifas#
Vodafone	www.vodafone.es/particulares/internacional-roaming/roaming/tarifasycobertura/vodafoneworld/
Vodafone	www.abroad.vodafone.co.uk/index.cfm?do=cost.callsMonthly&me=a1&nu=1&le=1&business=true&sn=s1&wtcgn=(business)What%20are%20the%20costs&wtcgs=Calls%20and%20Texts
Vodafone	www.vodafone.com.au/Personal/CoverageRoaming/InternationalRoamingwithVodafoneWorld/RoamingCountriesDetails/index.htm
Vodafone	http://shop.vodafone.de/Shop/product_details.jsp?menuKey=1021&selectedTab=tariffOptions www.vodafone.de/infofaxe/659.pdf
Vodafone	www.vodafone.ie/planscosts/prepay/international/ www.vodafone.ie/planscosts/prepay/other/
Vodafone	www.vodafone.co.nz/plans/prepay/classic-prepay-plans.jsp
Vodafone	http://online.vodafone.co.uk/dispatch/Portal/appmanager/vodafone/wrp?_nfpb=true&_pageLabel=template10&pageID=PPP_0038
Vodafone non roamed	www.vodafone.com.au/Personal/PricingPlans/index.htm