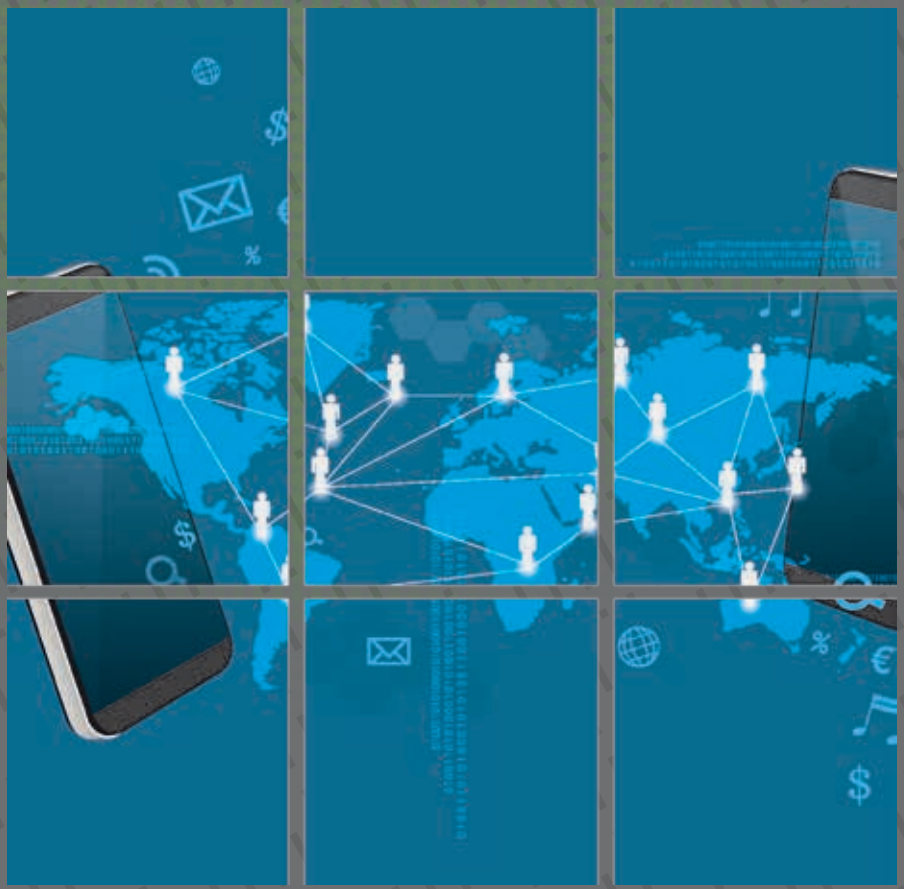
REGULATORY AND MARKET ENVIRONMENT

INTERNATIONAL MOBILE ROAMING SERVICES: FACILITATING COMPETITION AND PROTECTING USERS



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International mobile roaming services: Facilitating competition and protecting users

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This report has been prepared for ITU by Mr Dimitri Ypsilanti, under the direction of the Regulatory and Market Environment Division (RME), of the Telecommunication Development Bureau (BDT). This study has been developed based on desk research as well as using data from the ITU Tariff Policies Survey, ICTEye database (www.itu.int/icteye/).

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1 Introduction

During the last several years significant policy and regulatory actions have taken place to tackle the problem of high international mobile roaming (IMR) service prices. These initiatives have taken place at national, regional and the international level. The aim has been to reduce what are viewed as excessively high mobile roaming retail prices but also to find longer term solutions to introduce competition to a market which is viewed as not being contestable.

Despite price reduction for IMR and the emergence of a range of different technologies which, though not always offering close substitutes to roaming, may help travellers limit their expenditures, there is nevertheless general agreement that prices diverge significantly from costs and that actions to reduce prices and protect users are essential. The work that has taken place to date across different regions is encouraging and offers a number of best practice frameworks which can be used to improve the delivery of IMR services to the benefit of consumers and other users.

This paper examines some of the approaches taken in order to try and synthesize those best practices and suggest steps that can be taken to improve the economic efficiency of IMR markets, as well as indicate potential deficiencies in policies.

The paper builds on the earlier work of the International Telecommunication Union (ITU), in particular the 2008 and 2012 Global Symposium for Regulators discussion papers[1], recommendations from ITU-T and the International Telecommunication Regulations and analysis by the Organization for Co-operation and Development (OECD) on this issue in addition to regional initiatives, such as those by the European Union, the African Union and the Arab Regulators Network.

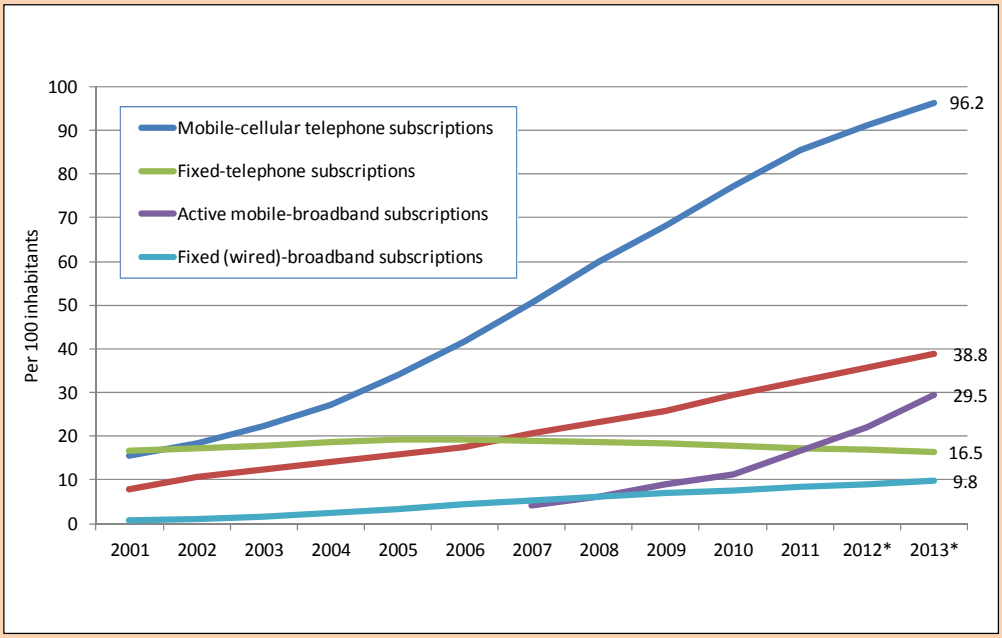
1.1 Mobile devices are becoming the main tool for communications

Over the last decade there has been significant growth at the global level in mobile cellular subscriptions relative to fixed telephone subscriptions (Figure 1). This growth has been in particular marked in developing economies. As shown in Figure 1 mobile subscriptions have also been substituted for fixed telephony, in particular in developed economies but also in some developing countries. In developing economies, where in the past connectivity was based on expanding fixed lines, this has changed with the emphasis now on mobile communications. These trends are likely to continue given, as indicated by ITU data, that access to mobile networks is now available to 90 per cent of the world population and 80 per cent of the population living in rural areas.[2]

[1] International Mobile Roaming Regulation – An Incentive for Cooperation, www.itu.int/ITU-D/treg/Events/Seminars/GSR/GSR08/discussion_papers/international_roaming_web.pdf and International roaming services: a review of best practice policies, www.itu.int/ITU-D/treg/Events/Seminars/GSR/GSR12/documents/GSR12_IMR_Ypsilanti_3.pdf

[2] www.itu.int/ITU-D/ict/facts/2011/material/ICTFactsFigures2010.pdf

Figure 1: Global mobile and fixed subscriptions per 100 inhabitants (2001-2013)



**: Estimates*
Source: ITU World Telecommunication/ICT Indicators Database, www.itu.int/icteye

Numerous studies have highlighted the positive impact that the mobile sector has for economic growth and total factor productivity. For example, Deloitte found that a 10 per cent increase in mobile penetration in developing markets increases total factor productivity by 4.2 percentage points. The study also estimated that a doubling of mobile data use leads to an increase in GDP per capita growth on 0.5 percentage points and a 10 per cent increase in 3G penetration (i.e. shift from 2G) increases per capita GDP growth by 0.15 percentage points.[3] A country specific study on Myanmar estimated that the total economic impact of the mobile sector would be 1.5-7.4 per cent of gross domestic product over the first three years once licences were issued.[4] Earlier work undertaken for Vodafone showed that "... *mobile telephony has a positive and significant impact on economic growth, and this impact may be twice as large in developing countries compared to developed countries*".[5] These estimates are mainly based on the domestic (national) impact of the development and use of mobile technologies. However, as highlighted in the Ericsson study on Myanmar, there are three distinct economic effects in estimating the economic impact: the supply side effects where value is added to production and employment, the demand side effects which result from the increase in productivity through subscriber use of mobile technology and the social benefits. These economic effects are also relevant in international mobile roaming, although they are harder to measure. The implication is that when high prices dampen demand, reduce the social

[3] Deloitte, *What is the impact of mobile telephony on economic growth?* A report for the GSM Association, www.deloitte.com/assets/Dcom-UnitedKingdom/Local%20Assets/Documents/Industries/TMT/uk-tmt-GSMA-report-112012.pdf.

[4] Report commissioned by Ericsson in collaboration with Deloitte, *The potential economic impact of mobile communications in Myanmar*, www.ericsson.com/res/docs/2012/myanmar-report-2012-13nov.pdf

[5] The Vodafone Policy Paper Series • Number 2 • March 2005, *Africa: The Impact of Mobile Phones*, info.worldbank.org/etools/docs/library/152872/Vodafone%20Survey.pdf, page 11.

effects and distort the supply side effects through inefficient prices, the potential economic impact is also diminished. The result is a welfare loss for both the visited country and the origination country. [6]

Technological change has shifted mobile subscribers from 2G to 3G mobile technologies in most markets.[7] A key part of this change has been the increasing use of smartphones by subscribers stimulating the use of mobile broadband (Figure 1) and data communications.[8] The trend from 3G to 4G (LTE) technologies in mobile markets is expected to spur the growth in mobile broadband usage as is the development and use of a range of other wireless devices such as tablets and laptops. Figure 2 shows the rapid development of mobile broadband subscriptions at the global level.

The development and rapid global diffusion of broadband providing access to the Internet and a range of related applications and services also has changed the communications behaviour of users, both business and consumers. This has led to the rapid growth of data communication which can be expected to expand significantly as broadband networks increase capacity, as new technologies such as cloud computing become more commonplace and as the range of applications widens.[9]

Users are increasingly relying on smartphones for business and social applications, and the related development of services and applications for these phones have significantly expanded the use of mobile data communications in national markets. For example, some estimates indicate that the share of e-commerce traffic in the United States from smartphones and tablets increased from 11.4 per cent to 21 per cent during 2012.[10] For many users mobile phones have become their primary means of communications for voice and for Internet access.

The behavioural changes in the use of mobile devices is reflected in international roaming with the growth in mobile data services by subscribers when visiting other countries. BEREC has estimated that in the four year period over Q2 2008 to Q2 2012 international data roaming within the European Union (EU) grew by 630 per cent.[11]

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6 The distribution of this welfare loss between the visited and origination countries would be difficult to determine.

7 According to ITU data, some 159 economies had launched 3G services in 2011, www.itu.int/ITU-D/ict/facts/2011/material/ICTFactsFigures2011.pdf

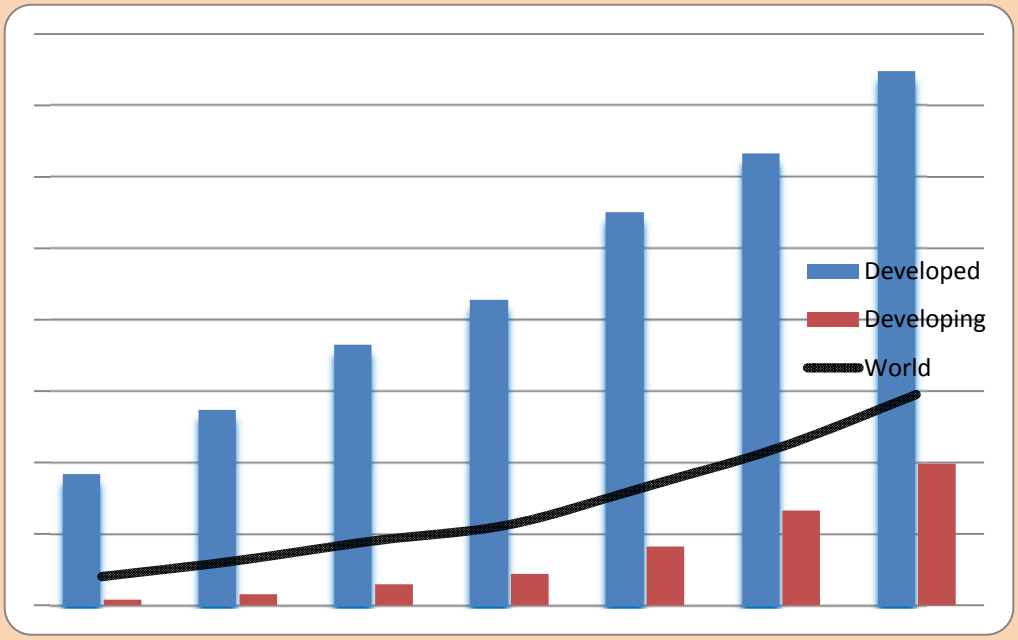
8 Smartphones are built around a mobile computing platform and support applications and provide Internet access. Nielsen has estimated that in the United States 50% of mobile subscribers had smartphones as of February 2012, see www.nielsen.com/us/en/newswire/2012/smartphones-account-for-half-of-all-mobile-phones-dominate-new-phone-purchases-in-the-us.html.

9 Cisco, for example has projected that global mobile Internet traffic will grow ten-fold from 2011 to 2016. See Cisco Visual Networking Index at www.cisco.com/en/US/netsol/ns827/networking_solutions_sub_solution.html#~forecast.

10 See *e-Strategy Trends*, http://trends.e-strategyblog.com/2013/06/06/share-of-ecommerce-traffic-from-smart-devices/11732.

11 The Body of European Regulators for Electronic Communications, International Roaming BEREC Benchmarking Data Report, January 2012 – June 2012, BoR(13)05, 28 January 2013.

Figure 2: Global active mobile broadband users per 100 inhabitants, 2007-13



Source: ITU World Telecommunication/ICT Indicators Database, www.itu.int/icteye

Data collected by Switzerland show the use of data roaming by subscribers in that country (Table 1).

Table 1: Switzerland: Data roaming, transmitted and downloaded data (MB millions)

	Within EU/EEA	Rest of World	Total
2009	21.8	4.7	26.6
2010	34.8	9.6	44.4
2011	55.6	15.2	71.0
Growth:			
2009-10	59.6%	102.4%	67.2%
2010-11	60.1%	58.9%	59.8%

Source: OFCOM[12]

At the global level Cisco has estimated that mobile data traffic grew 70 per cent in 2012 reaching 885 petabytes per month at the end of 2012, up from 520 petabytes per month at the end of 2011.[13] Cisco also predicted that the compound annual growth rate of mobile data traffic will be 66 per cent from 2012 to 2017.

[12] www.bakom.admin.ch/dokumentation/zahlen/00744/00746/index.html?lang=en&download=NHzLpZeg7t,lnp6I0NTU042l2Z6ln1ad1IZn4Z2qZpnO2Yuq2Z6gpJCDe397gGym162epYbg2c_JjKbNoKSn6A--

[13] See, Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2012–2017, www.cisco.com/en/US/solutions/collateral/ns341/ns525/ns537/ns705/ns827/white_paper_c11-520862.html

Over the last few years mobile operators have reduced roaming prices and this process has accelerated in recent years often because of political and media pressure. However, price declines have not occurred in all countries. ITU surveyed its members, throughout the ITU Tariff Policies Survey, asking whether countries had experienced over the last three years a decrease, an increase or stable IMR prices. As Table 2 indicates the percentage of countries in each region that experienced reduced prices is not high. While a majority of respondent countries in Europe have had decreasing prices over the last three years, Africa and the Asia-Pacific regions have not had the benefit of lower IMR prices.

Even in those countries where prices for roaming have decreased the general perception is that price reductions have been insufficient. This perception has been reinforced in many countries by the fact that domestic mobile (and fixed) telecommunication prices have fallen considerably in competitive markets. For example, in France the entry of a fourth mobile operator in the market led to a decrease in prices on average of 11.4 per cent in 2012.[14] In several countries a number of mobile network operators are offering monthly packages which include unlimited calls to fixed and mobile phones, unlimited SMS and generous mobile data packages. These changes in the mobile market and price reductions at the national level have led to considerable changes in usage patterns for mobile phones. Users accustomed to lower charges and to a certain consumption pattern clearly have difficulty in changing their consumption patterns when travelling and accepting and adjusting to high IMR charges.

The fact that mobile voice communications is being overtaken at national and international levels by the use of SMS, data access, access to emails using mobile phones and the use of a wide range of mobile applications poses a further challenge to international mobile roaming policy but may also offer a solution as discussed later in this paper. The mobile data applications available to smartphone subscribers and tablet users are growing rapidly. As these applications become commonplace, their use is expanding to international travellers increasing the demand for international roaming services. Many of these applications update automatically, require location data, etc., and in so doing generate, in most cases inadvertent, more mobile data traffic.

Table 2: General downward trend in IMR prices in regions
(Per cent of countries in region experiencing a downward trend in prices)

Region	Decline in IMR retail price of voice	Decline in IMR retail price of SMS	Decline in IMR retail price of data	Number of countries in region
Africa	13%	20%	18%	44
Arab States	28%	28%	28%	21
Asia & Pacific	15%	12%	17%	40
CIS	33%	33%	41%	12
Europe	56%	53%	53%	43
The Americas	20%	23%	11%	35

Source: ITU World Tariff Policies Survey, ITU ICTEye: www.itu.int/icteye.

[14] See, ARCEP, Observatoires/Services mobiles, www.arcep.fr/index.php?id=11817

The impressive growth in the use of mobile devices for voice, messaging and data at national levels does not of course translate directly in an equivalent increase in international mobile roaming traffic. A large number of subscribers are unlikely to travel across borders and many of those that do may not necessarily maintain the exact consumption pattern as they do in their home market. Nevertheless, it can be expected that there will be important growth in the IMR market because of the growth in smartphones and other wireless devices and related applications. The growth trend is also being stimulated by a number of new data applications that are being developed specifically for international users such as maps and navigation services, tourism information, translation information, and a range of location related services. Many of these applications can play an important role in facilitating travel for tourists. Visited countries often encourage the access to this information and, in so doing, encourage roaming.

Although data are not available it could be argued that subscribers have a greater need to access mobile data when outside of their country because they are less familiar with the visited country than their home country, second since they may need wireless data access to carry out many of the functions that, at home, use fixed networks (home banking, paying bills, etc.), and, third, since at home when mobile devices are used much of the data access is off-loaded on to Wi-Fi networks.

At the same time mobile operators, faced with declining average revenue per user in mobile voice markets, as a result of competition in domestic markets and as users are migrating from using voice services to other messaging applications, are also placing emphasis on developing new applications and services. Subscribers who use these new applications and services on a daily basis in their home country tend to continue to do so when travelling. The increased use of wireless devices for mobile payment services, use of mobile applications for airline tickets/boarding passes and other near field applications will also generate domestic as well as international traffic.

Mobile marketing, as a separate e-commerce market, has been expanding rapidly. In the United States the Mobile Marketing Association has estimated that the contribution of mobile marketing to the US economy was USD 139 billion in 2012 and expected to reach USD 400 billion by 2015.[15] The development and increasing widespread use of mobile terminals to replace credit card transactions for point of sale transaction as well as for micro payments may also have consequences for travellers in terms of their mobile bill when they return home.

Another important mobile wireless growth area is machine-to-machine communication (M2M). This term includes devices that are connected to the Internet using a variety of fixed and wireless networks and communicate with each other.[16] *IMS Research* estimates that shipments of cellular modules for M2M will reach over 100 million by 2015.[17] Cisco estimates that M2M traffic will increase globally at a compound annual rate of 89 per cent between 2012-2017.[18] A large number of these modules can be expected to be mobile across borders and hence could be subject to international roaming charges. Examples could include M2M devices used in the tracking of international cargo, in automobiles or trucks which cross borders, in consumer devices such as e-books or medical devices. Although the data traffic per device may be small, the eventual volume of devices which may cross-borders can result in high costs for business and act as a barrier to the development of new applications, services and productivity growth.

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15 Mobile Marketing Association, www.mmaglobal.com/news/mobile-marketing-contributes-139-billion-us-economy-2012-set-rise-400-billion-2015

16 See, OECD, Machine-to-Machine Communications: Connecting Billions of Devices, DSTI/ICCP/CISP(2011)4/FINAL, Paris 2012, www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=DSTI/ICCP/CISP(2011)4/FINAL&docLanguage=En

17 http://imsresearch.com/news-events/press-template.php?pr_id=1875

18 Cisco, *op.cit*.

1.2 Growth in international travel

Separate, but concurrent with the explosive development of the Internet, mobile markets and information and communication technologies (ICT) in general, there has been a considerable expansion in worldwide trade and foreign direct investment as the global economy has become more open.[19] Outsourcing manufacturing has led to considerable growth in intra-firm trade and accounts for about one-third of world trade. Open markets have also led to a greater integration of national economies with the development of global supply chains.[20] In most continents regional integration is developing and there are numerous free trade arrangements that have led to closer ties between economies in regions. These developments have strengthened economic and social ties, have led to a higher intensity of business travel among these countries and growing tourist travel. According to some estimates business travel is responsible for one-third of the growth in world exports over the last decade.[21] Business travel has been one of the major factors behind the growth of international mobile roaming services.

The opening up of economies to foreign direct investment has also stimulated the development of tourist industries in those countries. Developing economies quickly recognized the beneficial impact of tourism for economic growth.[22] As measured by the World Tourism Organization tourist arrivals attained 1 035 million in 2012 (compared to 842 million in 2006), generating revenue of USD1 075 billion.[23] Tourism receipts account for 30 per cent of the world exports of services. Travellers want to have reliable and cheap communications with their home country and increasingly rely on mobile applications to assist them in their international business and in facilitating their tourism plans. New mobile applications need to be used in many cases when travelling to confirm, change and authenticate reservations.

Rapid growth in Gross domestic product (GDP) per capita in many developing economies also has increased business and tourist travel by citizens from those countries. In the future major changes in country shares of global GDP can be expected to increase travel from those countries.[24] Although travel by residents in countries with relatively lower incomes is increasing an important factor in growing the roaming market by users from those countries has been the ability to provide roaming to prepaid customers who account for the majority of subscribers in many parts of Africa, Asia and Latin America. Solutions, such as CAMEL (Customized Applications for Mobile network Enhanced Logic) which allow for real time billing of prepaid customers, have facilitated roaming of prepaid subscribers and have allowed mobile operators to increase their revenue opportunities by expanding the potential roaming market which in certain areas is still relatively immature. For example, it is estimated that only 3 per cent of Latin American subscribers roamed in 2011 and roaming accounted for only 1 per cent of total mobile services revenue.[25] Although cost data are not available it must be recognized that there are additional costs to facilitate the roaming of prepaid subscribers relative to postpaid in particular to ensure that the balance of the prepaid roamer's account is not overdrawn and to allow the prepaid roamers to replenish their accounts.

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[19] WTO data show nearly a threefold increase in world merchandise trade (in current prices) between 2000 and 2011.

[20] The stock valuation of foreign direct investment during the 2000 and 2011 increased 3.4 times according to OECD data.

[21] See World Travel and Tourism Council *Business Travel: A Catalyst for Economic Performance*. www.wttc.org/site_media/uploads/downloads/WTTC_Business_Travel_2011.pdf

[22] Tourism commitments have been made by over 125 WTO members, more than in any other services sector.

[23] Over 2010-2011 China, Brazil and the Russian Federation had the highest growth in outbound tourists.

[24] See, for example, OECD Economic Policy Papers, No.03, Looking to 2060: Long-term global growth prospects, OECD Publishing, November 2012.

[25] See, Olga Cavalli, Proyecto roaming Latinoamericano, 25 de abril de 2012, www.arctel-cplp.org/app/uploads/apresentacoes/Regulatel%20olga%20Cavalli.pdf

The development of a range of mobile applications for business, tourism, and eventually payments, will be constrained if international mobile roaming prices remain high and the opportunities for visited countries to develop tourism services and for users (business and consumers) to take effective advantage of smart mobile phones will be limited. The problem of high international mobile roaming service prices is a global issue but the probable impacts will weigh more heavily on developing economies in that users from those countries are facing, relative to their incomes, higher international mobile rates.

1.3 The challenge of high roaming prices

The issue of high IMR prices has been under consideration for over a decade but had not been given high priority in many countries by policy makers and regulators. There are a number of reasons for this. The focus of regulators in the mobile sector has been in developing the mobile market, creating competition in national markets, ensuring that termination rates were efficient and protecting consumers. With international mobile roaming limited to voice calls and messaging in the early days the extent of "bill shock", which began to occur with mobile data roaming, was significantly less important.[26] Another reason that the issue of high IMR prices was not tackled earlier was the belief that once sufficient competition in national mobile markets developed this competition would eventually spill over to the IMR market. Additional argument that delayed regulatory action in some cases was the argument put forward by mobile network operators that a reduction in IMR prices would result in an increase in prices in other mobile service markets such as in the voice and messaging markets (the so-called "waterbed effect"). A further concern raised by mobile network operators in the past was that national mobile markets were relatively immature and still growing and as a result any action to reduce international mobile roaming prices would have negative implications for investment and growth in those national markets. Changes in the mobile market, as described above, means that these earlier reasons for inaction are no longer valid.

Greater regional economic integration, or cohesiveness, has been one reason why the issue of high IMR prices also began to obtain greater attention - examples are the EU and members of the Arab Regulators Network (AREGNET). Second, and more recently with the rapid diffusion of smartphones and mobile data applications, the increase in well-publicized cases of "bill shock" resulting in an increase in public recognition of the high prices charged for international mobile roaming services stimulated efforts to find appropriate solutions to lower the high prices charged for international mobile roaming. Extreme cases of excess bills have also led to media and political pressure to tackle the problem of high international mobile roaming prices.[27]

There is now general agreement that the price of international mobile roaming communication services is high and is well above cost. Across the OECD countries it was estimated that roaming prices on bilateral routes vary up to eight times (i.e. the cost of the same service for subscribers visiting each other's country and calling home) and up to 20 times more expensive for an international roamer to make a call home than for a local mobile user, in that country, to make an international call to the roamer's home country. According to an OECD report, in February 2009, the average cost of making a call back to a user's home country, while roaming, across the OECD area was USD 7.79 per three minutes.[28] The European

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[26] "Bill shock" refers to the negative reaction a subscriber has to receiving a high and unexpected request for payment from his/her company. As an example, see www.tgdaily.com/mobility-brief/59141-womans-200000-phone-charge-defines-bill-shock

[27] See, for example, The Australian, December 13 2012, Woman battles telco over AUD 148,000 global roaming fee, Telecommunication Industry Ombudsman reveals, www.theaustralian.com.au/news/woman-battles-telco-over-148000-global-roaming-fee-telecommunication-industry-ombudsman-reveals/story-e6frg6n6-1226535636567

[28] OECD (2009), International mobile roaming charging in the OECD area, DSTI/ICCP/CISP(2009)8/FINAL, Paris, 2009, www.oecd.org/dataoecd/41/40/44381810.pdf. The data in this report are for 31 countries. Since the report was issued the average would have declined in view of the EU Roaming Recommendations (19 of the 31 countries are EU members and a further 2 followed the EU Roaming Recommendations).

Commission (EC) has estimated voice roaming calls were on average 3 to 4 times more expensive than domestic outgoing calls, 2.5 times higher for SMS and 25 to 35 times higher for data.[29] Prices in the EU were estimated as being, on average, 118 per cent higher than the estimated underlying costs.[30]

Finding solutions to high mobile roaming prices has been difficult to resolve, as argued below, for a number of reasons:

- First, users in a country usually choose their mobile service provider on the basis of the best prepaid offer or post-paid monthly mobile subscription package available for their particular consumption requirements. The consumption requirements are primarily for domestic mobile services. The mobile packages are usually marketed on the basis of either per minute call charges, number of minutes offered for a given fixed price, SMS charges and more recently mobile data packages. International mobile roaming charges are not advertised as part of these packages although in most cases (in particular for post-paid subscriptions) they are included in this package.
- Second, even if users are aware of the prices charged by mobile service providers for international roaming (and they are usually not), roaming is not a major consideration for them since in volume terms domestic calling, messaging and domestic mobile broadband access constitute the bulk of their mobile activity. Most users only become aware of international mobile roaming prices when travelling internationally, an exception would be multinational companies.
- Third, when travelling, a mobile user cannot usually choose his/her international roaming service provider – they have to rely on their national provider. In short, subscribers (other than large businesses) cannot use their market power to further competition in the IMR market.

No data are available as to the discounts which large businesses can obtain from their national network operators for international roaming, but it is likely that this is limited by the fact that the wholesale charges facing national operators when offering roaming services in other countries are determined by the operators in visited countries (see below). The discounts may then depend on the margin between national retail charges and the wholesale rates faced by national mobile operators and, of course, the volume of services used by a large business.

The national authorities in the country of origin of international travellers have no authority to control and regulate the wholesale prices set for international mobile roaming in a visited country. They have, or could obtain, the authority to regulate the retail prices charged by their national operators for IMR services in visited countries.

Table 3 sets out the challenge facing national authorities in determining how best to tackle the issue of high IMR prices. Essentially, there are three areas where a national authority can intervene to try and reduce voice and messaging prices.

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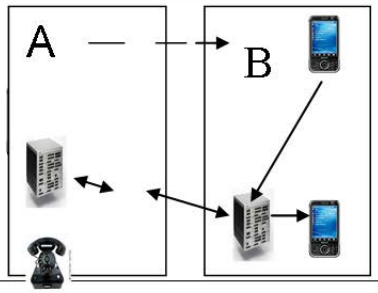
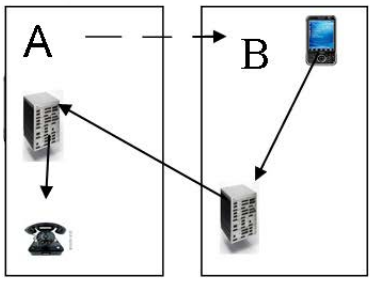
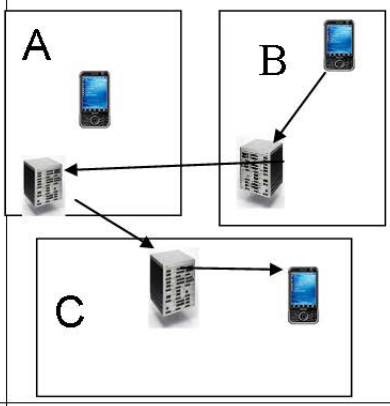
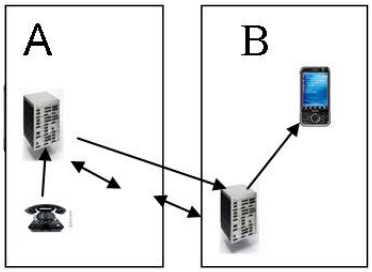
[29] Commission staff working paper, Impact assessment of policy options in relation to the Commission review of the functioning of regulation (EC) no 544/2009 of the European Parliament and of the Council of 18 June 2009 on roaming on public mobile telephone networks within the Community, SEC(2011) 870 Final, http://ec.europa.eu/information_society/activities/roaming/docs/impac_ass_11.pdf

[30] See presentation by Peter Stuckmann, European Commission Information Society and Media directorate, EU Roaming Regulation – towards structural solutions, March 2012, Geneva, www.wto.org/english/tratop_e/serv_e/sym_march12_e/sym_march12_e.htm

Table 3: Main international mobile voice roaming services and their cost structures

Call type	Cost elements	Illustration
Call inside a visited Country A traveller from country A goes to country B and makes a call to a subscriber of country B.	Mobile origination in country B + [National transit in country B] + Mobile termination in country B + Roaming-specific costs + Retail-specific costs	
Call from a visited country to the home country A traveller from country A goes to country B and makes a call back home to a subscriber in country A.	Mobile origination in country B + International transit + Mobile or fixed termination in country A + Roaming-specific costs + Retail-specific costs	
Calls from a visited country to a third country A traveller from country A goes to country B and makes a call to a subscriber in country C. Note that country C may or may not be in a region where international roaming prices are regulated.	Mobile origination in country B + International transit + Mobile or fixed termination in country A + Roaming-specific costs + Retail-specific costs	
Receiving a call in a visited country A traveller from country A goes to country B and receives a call from **either of the countries**	Mobile termination in county B + International transit + Roaming specific costs + Retail specific costs	

Source: Global Symposium of Regulators GSR2008 Discussion Paper "International Mobile Roaming Regulation – An Incentive for Cooperation"[31]

[31] www.itu.int/ITU-D/treg/Events/Seminars/GSR/GSR08/discussion_papers/international_roaming_web.pdf

A regulator from country A can intervene to reduce the retail prices charged by their national operator for calls made from a visited country (country B) to the home country or the retail charge for calls received when visiting country B. The regulator can intervene to reduce the termination charges of operators in their own country (country A) which may be reflected in a reduction in the retail charges faced by a caller from country A visiting another country and calling home. In all the foregoing cases the wholesale charges faced by operators from country A in country B set a floor to possible reductions in retail charges. The regulator in country A could also take action on the wholesale charges that national network operators in country A charge operators from third countries. However, this would have no impact on residents of country A when travelling but may benefit residents of other countries visiting country A. There is no incentive for a regulator in country A to take such action unless, as argued later, a regulator in another country reciprocates.

The challenge in the IMR market is to find ways to create an efficient market for IMR services and as the schema in Table 3 illustrates the ability of a national regulator to do so unilaterally is limited. The rest of this paper examines the options available to regulators to tackle the problem of high IMR charges. There are essentially four areas where action can be taken:

i. to take regulatory action in the national market to reduce wholesale and retail prices, impose obligations on national mobile operators toward subscribers and to develop competition;

ii. protect and empower subscribers to help them manage their usage of mobile services when abroad and to ensure that they have full information;

iii. to ensure that there are no obstacles in the market so that any opportunities to create competition are maximised;

iv. to initiate and engage in bilateral/ multilateral actions in order to develop an open and competitive international mobile roaming service market.

In the longer term it is the last item of this list that needs to be given priority. The requirement to develop a competitive IMR market has been given higher priority as a result of the decision to include roaming in the International Telecommunication Regulation. The Final Acts of the World Conference on International Telecommunications (WCIT-12), signed by 89 countries, agreed that: "*Member States shall endeavour to promote competition in the provision of international roaming services and are encouraged to develop policies that foster competitive roaming prices for the benefit of end users*."[32]

2 Key IMR regulatory issues

This section looks at the key regulatory initiatives which are available. It is followed by a resume of regional and bilateral initiatives that have been taken and those of international organisations.

2.1 Responding to high IMR prices

The analyses and reviews of international mobile roaming that have been undertaken by all the international organisations, regional bodies and individual countries have reached similar conclusions. These are that retail prices for international mobile voice, messaging and data roaming are significantly high, the prices have no relation to the domestic mobile prices for these services and are significantly higher than the underlying costs for the provision of these services. There is also widespread agreement that a major reason for the high international mobile roaming retail prices are the underlying wholesale prices in visited countries. There is, to a large extent, agreement that a lowering of wholesale rates may in itself be insufficient to lower retail rates since market forces are weak in the international roaming market.

[32] Paragraph 5, 4.7, www.itu.int/en/wcit-12/Documents/final-acts-wcit-12.pdf

As noted earlier price regulation of IMR charges is not very effective if carried out unilaterally by a country since the only prices they can regulate are the retail margin imposed on the wholesale roaming charges faced by national clients when roaming internationally and the wholesale charges imposed by national operators on foreign operators entering into roaming agreements. However, bilateral and regional agreements can be effective in lowering IMR charges where there is agreement by one or more countries and where the national regulators have the legal authority to implement changes. Some of the initiatives which have been taken are discussed below.

It is important to note that price regulation should be viewed as an interim step since it may result in lower prices but does not resolve the longer term problem which is the creation of sustainable competition in the IMR market which is required if prices are to attain efficient levels. Without the development of effective competition in the IMR market there is a risk that there will be a continued, long-term, need for price regulation which is not a desirable outcome.

Price regulation needs to be based on information on existing and desirable retail and wholesale prices. Such information is not always readily available. A number of initiatives have been taken to respond to the high IMR retail prices. These have usually targeted wholesale as well as retail prices. As noted earlier IMR prices have in general declined overtime but it is clear that these reductions have been insufficient to bring prices in line with costs.

Although there has been much activity at the international, regional and, in addition bilateral levels, the number of countries that have taken concrete measures is small relative to the total number of ITU members. Table 4 based on the ITU Tariff Policies Survey indicates the number of countries in each region where initiatives have been taken (the numbers indicate the number of respondents to the questionnaire rather than all countries in the region).

Table 4: Number of responding countries per region taking action on IMR prices (2012 or latest available data)

Indicator		Africa	Arab States	Asia & Pacific	CIS	Europe	The Americas	**Total**
Are retail prices of IMR regulated in your country?	Yes	1	5	2	1	19	0	**28**
	No	21	4	16	5	5	18	**69**
If yes, what kind of regulatory practice is applied? *	Price Cap	0	4	1	1	17	0	**23**
	Ex ante obligations on operators designated as having significant market power	2	0	1	0	0	0	**3**
	Benchmarking of tariffs	0	0	0	0	1	0	**1**
	Others	1	1	3	0	4	0	**9**
Is there regulation on the wholesale price of IMR in your country?	Yes	2	2	2	0	18	0	**24**
	No	19	9	15	6	7	19	**75**
Region size		**44**	**21**	**40**	**12**	**43**	**35**	**195**

* This question allows multiple answers per country/economy

Year: 2012 or latest available data.

Source: ITU World Tariff Policies Database

2.2 Wholesale IMR charges

All mobile wireless operators charge a wholesale interconnection rate (mobile termination rate) at the domestic level. These charges are what other operators pay (fixed or mobile) for delivering a call to mobile wireless providers. In effect, the terminating operator has a monopoly on call termination for their subscribers since it controls access to the specific subscriber being called. Termination rates provide a significant source of revenue for mobile operators so that there is little incentive to reduce these rates which also implies that larger mobile operators benefit more from above-cost rates. This also implies that above-cost termination rates result in a subsidy by subscribers of one network at the expense of another network. The termination rates faced by call originating service providers impacts directly on the retail prices originating operators can charge and the flexibility they may have in structuring retail offers. There is also a strong correlation between the volume of outgoing minutes on mobile networks and the termination rate.[33]

At the national level many telecommunication regulators have concluded that high domestic mobile termination rates impact negatively on competition, innovation and consumer welfare in mobile markets leading them to intervene in this market to set lower domestic wholesale termination rates. Although a number of mobile service providers have argued that reducing revenues from interconnection charges would lead to higher prices in other parts of the mobile market (the so-called "waterbed effect"), there is no evidence that in a competitive market this has occurred.[34] On the contrary, in many countries where the mobile termination rate has declined to low levels, operators have started to provide innovative pricing packages such as unlimited national, international calls, unlimited SMS and mobile Internet access with relatively high caps.[35]

At the international level mobile network operators (MNOs) in country *A* have to pay a wholesale mobile termination rate to an operator in country *B* in order to deliver a call to one of their customers visiting country *B*. The MNOs in country *A* also have to pay an operator in country *B* if one of their customers visiting country *B* wishes to originate a call back to their home country or to a subscriber in country *B*. These wholesale roaming rates, for GSM networks (Global System for Mobile communications), are determined by inter-operator tariffs (IOTs) which provide a non-discriminatory tariff – known to all GSM Association (GSMA) members – and which provide the benchmark for negotiating wholesale rates. The final outcome may as a result of negotiations differ from the IOT level for a particular operator since it may take into account volume of traffic, and traffic balance. The wholesale rate provides the base to determine the retail rates the MNOs in country *A* charge their customers for international roaming. Roaming agreements follow a framework defined by the GSM Association, which provide standard terms for international roaming agreements (STIRA). These guidelines apply only to operators that have an operating licence (i.e. mobile network operators) and as a result can be members of the GSM Association (effectively this excludes mobile virtual network operators and Network Service Providers)[36]. Although in early 2012 there were indications that this would change, this has still not taken place. The STIRA guidelines require that operators do not discriminate, that is, they apply the same terms and conditions to other operators. Nevertheless, operators can offer volume discounts, can steer traffic, and can offer their own terms for billing and other administrative charges.

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[33] For example, in the United States where Receiving Party Pays is used termination rates are very low resulting in very high volume of calls per subscriber. See Figure 6, OECD, Developments in Mobile Termination, DSTI/ICCP/CISP(2013/FINAL, http://dx.doi.org/10.1787/5k9f97dxnd9r-en

[34] BEREC (the Body of European Regulators of Electronic Communication) notes that in reviewing the impact of price caps in the European economic Area on IMR charges that "[t]here are no clear indications that operators have tended to raise the prices of unregulated “Rest of World” roaming calls to make up for lost revenue due to the regulated price caps. Paragraph 1.12. International Roaming BEREC Benchmark Data Report January 2011-June 2011, BoR(11)51.

[35] For example, see www.free.fr

[36] The GSMA has indicated that they are in the process of allowing MVNOs to use standard documents such as STIRA and presumably participate fully in the GSMA system.

The wholesale prices in country *B* are clearly outside the scope of jurisdiction of the regulator in country *A*. In effect, just as in national mobile markets where the terminating operator has a monopoly on call termination for their subscribers since they control access to the specific subscriber being called, in international markets the service operator in country *B* controls access by the country *A* subscriber when that subscriber roams in country *B*. Similar to national markets, the access market for the purposes of international mobile roaming is not contestable.[37] As argued by WIK "[a]*t current levels of usage demand elasticity, it is rational for MNOs to take high markups over the wholesale IOT for mobile voice roaming. The marketplace for mobile voice roaming is unlikely to organically correct itself under current conditions.*"[38]

The regulator in country *A* may be in a position to regulate the retail margin imposed on international mobile wholesale rates facing operators in country *A* but would be limited in that the wholesale rate sets a floor to the extent that the retail margin could be reduced. Other than the wholesale rate there are other cost elements that need to be factored into retail prices including international transit, signalling and billing costs. Of these cost elements the most important by far are mobile origination and termination charges. The OECD noted that the:

> "*...major contributor to high retail charges is the wholesale rates charged by foreign operators. Where information is available the wholesale rate makes up around three quarters of the retail rate. Wholesale roaming charges are frequently in excess of USD 2 to USD 3 per minute and sometimes are more than USD 4 per minute*."[39]

National telecommunication regulators could regulate mobile origination charges that their national MNOs charge foreign MNOS and the termination charges faced by foreign MNOs, but to do so usually falls outside of their mandate of ensuring that their citizens benefit from a competitive national telecommunication market. The only incentive that a national regulator in country *A* has to reduce the origination and termination charges its MNOs charge foreign MNOs is if this provides a benefit to its national citizens. Residents of country *A* only benefit from lower international roaming wholesale charges to service providers from country *B* if wholesale roaming charges to mobile service providers from country *A* are lowered in country *B*.[40]

There is a question as to whether action should be taken only against wholesale rates and allow the lower rates to be reflected through the market on retail rates, or to take action on both wholesale and retail rates simultaneously. The preferred course of action would be to focus only on wholesale charges but this assumes that the market is working sufficiently well to pass on price reductions to end users. However, as noted above, there is very little competition at the retail level so that the incentive to pass on lower wholesale rates is probably quite low and even with some competition would take a much longer period to be reflected in retail charges. Taking action at both the wholesale and retail levels at least has the advantage of ensuring that consumers obtain benefits rapidly.

There have been several significant initiatives to try and tackle the lack of competition in the IMR market through regulation. The European Union, in particular, has made significant progress in reducing mobile roaming rates within the European Economic Area (EEA, the EU member states and Iceland, Liechtenstein and Norway). In 2002 the EU had identified the wholesale national market for international roaming on

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[37] A contestable market is one where there is freedom of entry and exit in the market and the threat of competition is sufficient to keep prices low and prevent the abuse of monopoly power.

[38] WIK-Consult, Final Study Report, Study for the European Commission, Study on the Options for addressing Competition Problems in the EU Roaming Market, SMART 2010/0018, page 6, http://ec.europa.eu/information_society/activities/roaming/docs/cons11/wik_report_final.pdf

[39] OECD (2009), *op.cit*.

[40] If country *A* residents are not regular visitors to country *B* there is little benefit from declining IMR prices in country *B*.

public mobile networks as a relevant market susceptible to ex-ante regulation.[41] In effect this regulation required that regulatory authorities should examine the market and if it was found that national operators have significant market power in this market the regulatory authorities should impose obligations on these operators. However, because of the cross-border nature of the roaming market it was difficult for national telecommunication authorities to take action in this market alone, that is, without the co-operation of regulators in other countries. The evident need for regional co-operation on this issue led the European Commission to directly intervene in this area working closely with the national regulatory authorities of Member States. The work of the European Commission eventually led to the adoption of a roaming regulation in 2007[42], which was recast in 2009[43] and again in 2012.[44] The regulations targeted both retail and wholesale rates. An initial proposal made by the European Regulators Group (ERG) had suggested that only wholesale roaming charges should be regulated and an index of retail prices used to verify whether reductions in wholesale prices were being passed on to subscribers. This suggestion was viewed as being unwieldy and modified to include a maximum Europe wide retail price set at a margin above the regulated wholesale rate.

The initial EU proposal on roaming stated that the average of national mobile termination rates across the EU would provide the benchmark for international mobile roaming and that the total wholesale charges faced by a visiting operator for an origination call back to the home network should not exceed "by a factor of two" for calls made to the home country and "by a factor of three" for calls made to a public network in a third EU member state.[45] The Roaming Regulation adopted in 2007 (the prices came into effect in August 2008) stated that the *"… maximum average per-minute charge established by this Regulation should therefore be determined taking into account the average mobile termination rate, which offers a benchmark for the costs involved. The maximum average per-minute charge at wholesale level should decrease annually to take account of reductions in mobile termination rates imposed by national regulatory authorities from time to time."*[46]

With respect to wholesale rates for voice services within the EEA area (see section below for retail) a maximum charge of EUR 0.30 per minute was set for the provision of origination, transit and termination on visited networks.[47] A glide path was also agreed to reducing wholesale charges to a maximum of EUR 0.28 and EUR 0.26 on 30 August 2008 and 30 August 2009 (amended to 1 July 2009). Further amendments made in 2009 led to further decreases in the maximum wholesale rate to EUR 0.22 and EUR 0.18 on 1 July 2010 and 1 July 2011 respectively.

In its third roaming regulation, adopted in 2012, the EU agreed that the average mobile termination rate for mobile network operators in the Union provided the most appropriate benchmark for call origination and terminating calls on mobile networks.[48] It further argued, in 2012, that the maximum charge per minute at the wholesale level should decrease yearly to reflect reductions in mobile termination rates

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41 Directive 2002/21/EC.

42 Regulation (EC) no 717/2007 of the European Parliament and of the Council of 27 June 2007.

43 Regulation (EC) No 544/2009 of the European Parliament and of the Council of 18 June 2009.

44 Regulation (EC) No 53/2012 of the European Parliament and of the Council of 13 June 2012.

45 See, European Union, COM(2006) 382 final, Proposal for a Regulation of the European Parliament and of the Council on roaming on public mobile networks within the Community and amending Directive 2002/21/EC on a common regulatory framework for electronic communications networks and services, Brussels, 12.7.2006

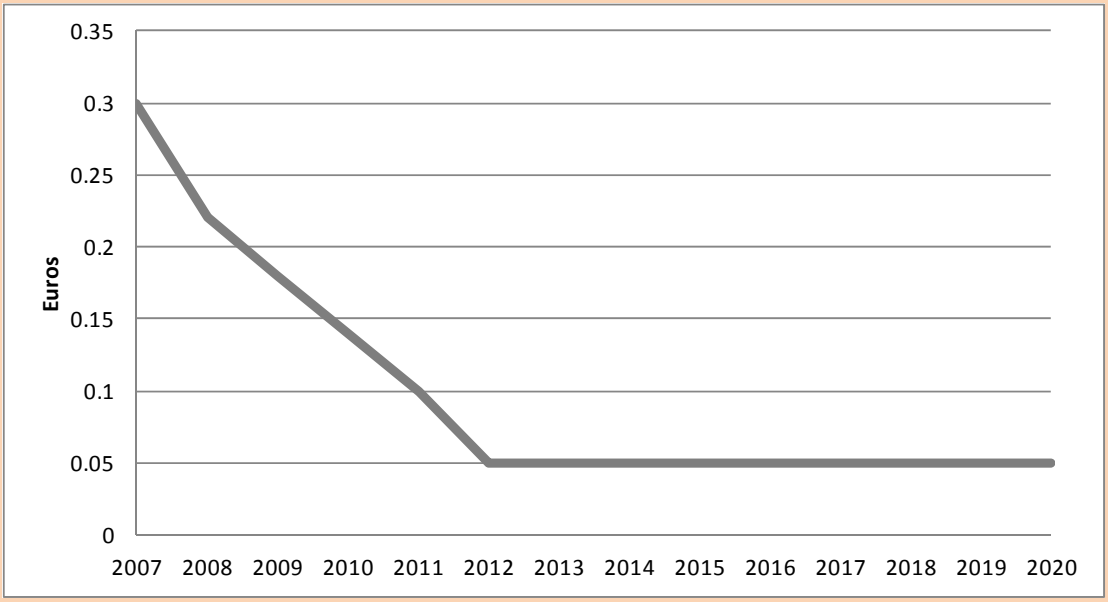
46 REGULATION (EC) No 717/2007 of the European Parliament and of the Council of 27 June 2007 on roaming on public mobile telephone networks within the Community and amending Directive 2002/21/EC, paragraph (21), http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2007:171:0032:0040:EN:PDF

47 *op.cit.*, Regulation (EC) no 717/2007.

48 The EU simple average mobile termination rate as of 1 July 2012 was 0.0357 EUR per minute.

imposed by the national regulatory authorities. This led to the requirement for a wholesale rate of EUR 0.14 per minute from 1 July 2012 decreasing to EUR 0.10 on 1 July 2013 and to EUR 0.05 on 1 July 2014 and to remain at that level until 30 June 2022. Figure 3 shows the decline in the outgoing voice wholesale roaming rates and Table 5 the agreed roaming caps on all roaming services. The obligation for voice wholesale charges would remain in place until the structural measures which were introduced (see section 3 below) had developed competition sufficiently so that price regulation was no longer needed. The European Commission was tasked with determining by 2016 whether the structural measures have been fully implemented and have been effective in creating competition.

Figure 3: EU wholesale roaming rates: outgoing voice calls



Source: European Commission Digital Agenda for Europe – Telecom rules (http://ec.europa.eu/digital-agenda/en/telecoms-rules)

Table 5: EU Wholesale caps for mobile roaming within EU and EEA (Euros)

Effective from	30 July 2007	30 August 2007	07 July 2009	01 July 2010	01 July 2011	07 July 2012	01 July 2013	01 July 2014
Outgoing calls to any EU/EEA number	0.3	0.28	0.26	0.22	0.18	0.14	0.1	0.05
Inbound calls	Same as termination of a non-roaming call on the visited network							
Outgoing SMS to any EU/EEA number	Not regulated		0.04			0.03	0.02	
Incoming SMS from any number	Not regulated		Free					
Data transfer	Not regulated		1	0.8	0.5	0.25	0.15	0.05

Note: *EU average mobile termination rate was EURO 0.0357 per minute in 2012*
EU average termination rate was EURO 0.0320 per SMS in 2012.

Source: European Commission Digital Agenda for Europe – Telecom rule (http://ec.europa.eu/digital-agenda/en/telecom-rules)

A further step taken to reduce wholesale charges was the requirement that mobile network operators should be required to charge wholesale rates on a per second basis, rather than the more commonly used per minute charging basis, but allowing for an initial flagfall charge of 30 seconds or less. This requirement was reflected in retail charges as well. The concept of paying for services actually consumed is an important change resulting in significant savings for users.

The Body of European Regulators for Electronic Communications (BEREC) published a number of reports following the 2007 and 2009 roaming regulations which indicated that among the EU member states there was a high degree of compliance with the recommendations. The powers invested in the European Union, the European Parliament and its institutions, and the underlying aim to create a single market was a decisive factor in enabling the adoption of the roaming regulations, and ensuring their implementation. Clearly, the co-operation of the national regulatory authorities that participate in BEREC and undertook the necessary background work and consultations, played an important role. The EU, unlike other regional bodies, ensures that, once adopted, regulations are adhered to by entities in member states. The incremental reductions in wholesale voice mobile roaming rates has been reflected in required reductions in retail charges (see section 2.3 on retail charges below).

SMS was subject to the same regulations as voice at the wholesale level. The average wholesale charge that an operator in a visited country could charge for the provision of an SMS originating in that country was set at EUR 0.04 per message from 1 July 2009. From 1 July 2012, the wholesale charge that the visited network operator may levy for a roaming SMS message originating on a visited network was set at EUR 0.03 declining to EUR 0.02 on 1 July 2013 remaining at that level until 30 June 2022. From 1 July 2009 incoming SMS for subscribers roaming within the EU were not charged in that, based on the 2009 roaming regulation, the ".. *wholesale price limit for regulated roaming SMS should include all costs incurred by the provider of the wholesale service, including, inter alia, origination, transit and the unrecovered cost of termination of roaming SMS messages on the visited network*".[49] In addition, according to the GSMA, there are no financial transfers between mobile operators with respect to incoming roaming SMS.[50]

The Arab Regulators Network (AREGNET) has also undertaken significant work on international mobile roaming and while there appeared to be consensus among regulators in the region on how to move forward. AREGNET took a different approach than EU in its efforts to reduce IMR prices. For wholesale prices ARGNET proposed IOTs based on retail prices of similar national calls in each country and on this basis proposed a sliding scale over three years for IOTs that were 1.5, 1.4 and 1.3 times the respective retail prices. For incoming calls for a visiting subscriber AREGNET suggested that the home operator retail charge for international calls to a visited operator should be used. While different in substance from the EU proposal, AREGNET, as in the EU, decided not to rely on cost modelling but on benchmarking to determine pricing recommendations. Unfortunately, AREGNET was unable to obtain the necessary political support to implement their recommendations.

However, the initial work of AREGNET was picked-up by the Gulf Cooperation Council (GCC) roaming working group. The GCC proposed to cap wholesale and retail roaming charges, using the methodology developed by AREGNET. The GCC proposals were adopted by the Arab Telecommunications and Information Council of Ministers in June 2010 (see Box 1).[51] A cap was imposed on inter-operator tariffs

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[49] Recital 30, Regulation (EC) no 544/2009 of the European Parliament and of the Council of 18 June 2009 amending Regulation (EC) No 717/2007 on roaming on public mobile telephone networks within the Community and Directive 2002/21/EC on a Common Regulatory Framework for Electronic Communications Networks and Service, available at: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:167:0012:0023:EN:PDF

[50] See, BEREC, BoR(10)58, International Mobile Roaming Regulation, page 153, www.irg.eu/streaming/BoR%20(10)%2058%20International%20Roaming_final_110209.pdf?contentId=547089&field=ATTACHED_FILE

[51] The GCC countries are: Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates.

for roaming calls made within GCC countries and a 15 per cent margin on the wholesale charge for retail charges. Similarly, for local calls within the visited country the IOT was set at 0.205 SDR and a 15 per cent margin for the retail charge. Further reductions were agreed for June 2011 (deferred to February 2012) resulting in a decrease in the roaming IOT of 18 per cent, a decline in the retail charge by 26 per cent and a reduction in the wholesale and retail charges for local calls made in the visited country by 33 per cent. The agreement did not cover SMS or mobile data roaming.

Box 1: Reforms by the Gulf Cooperation Council (GCC)[52]

Effective 1 September 2010

Outgoing calls made by GCC roamers within the GCC countries:

- Inter-operators tariffs (IOT) Cap: SDR 0.512 (EUR 0.45)
- Retail Tariff Cap: SDR 0.588 (EUR 0.51)

Local calls made by GCC roamers within visited countries:

- IOT Cap: SDR 0.205 (EUR 0.22)
- Retail Cap: SDR 0.236 (EUR 0.21)

Effective 1 February 2012

Outgoing calls made by GCC roamers within the GCC countries:

- IOT Cap: SDR 0.330 (EUR 0.29)
- Retail Tariff Cap: SDR 0.435 (EUR 0. 38)

Local calls made by GCC roamers within visited countries:

- IOT Cap: SDR 0.137 (EUR 0.12)
- Retail Cap: SDR 0.181(EUR 0. 16)

The closer economic ties between GCC countries including a commitment to economic integration, much like the EU, facilitated the success of the GCC.[53] The GCC agreement, which is in the form of a Memorandum of Understanding (MoU), foresees that other countries may join but need to have adequate provisions to enforce the agreement. The individual regulators in the GCC issued directives implemented the agreement reached by the GCC.

In the Southern African Development Community (SADC), the Communications Regulatory Association of Southern Africa (CRASA) has responsibility for harmonizing policy and regulation. CRASA undertook a review of roaming prices and compared prices in the region to EU prices and found that the average pricing in the region may be significantly higher than that in Europe for all categories (voice, SMS and data).[54]

The CRASA recommendation to Ministers was to adopt a "Roam like a local" approach whereby the roaming price was tied to the price paid for national domestic calls in the visited country. The local wholesale charge would be increased by a factor, "X", which would be the same for all SADC countries and

[52] www.tra.gov.om/newsite1/Portal/Upload/Documents/457_GCCRoamingFramework.pdf Telecommunications Regulatory Authority, Oman.

[53] The GCC member states launched a common market on 1 January 2008 following the 28th Gulf Heads of State Summit in Doha.

[54] CRASA Roaming Project, Information analysis and research report, 2012, page 3, www.crasa.org/tempex/doc_pub_eng81.pdf

take into account specific roaming costs. The local retail price would be increased by a factor "X" for calls back to the home country. Roaming rates, unlike the EU case, would differ from country to country and it was recognized that the roaming rate in one country could be less than the local rates in another country. A SADC Ministerial meeting in 2012 agreed that the region should adopt a "Roam like a local" framework and requested regulators to implement appropriate regulations by April 2014.[55]

Australia and New Zealand decided in February 2013 to move forward and regulate roaming rates in the framework of their bilateral agreement. In this context the measures to be taken include wholesale regulated terms of access (i.e. a reference wholesale roaming offer), wholesale price caps, retail price caps, mobile local-access services.[56]

2.3 Retail charges

As indicated earlier an important issue in debates on the regulation of IMR prices has been the question as to whether action should be taken only against wholesale rates and allow these lower rates to be reflected through the market on retail rates, or to take action on both wholesale and retail rates simultaneously. Most telecommunication regulators regulate wholesale prices only and have tended to forbear from regulating retail prices on the assumption that the development of competition in the retail market will result in price reductions.[57] The recognition that there is very little competition at the retail level for international mobile roaming services, and consequently little incentive to pass on lower wholesale rates, has raised the consideration that both wholesale and retail rates need to be regulated.

If a regulator of a country does not have the legal power to take regulatory action on wholesale rates an alternative would be for the regulator to determine that the retail rates for IMR paid by national subscribers are too high and take action accordingly. A study undertaken for Australia found that the average roaming margins for Australian operators are approximately 3.2 times higher than domestic margins.[58] BEREC, in reviewing the performance of prices caps in the European Economic Area, highlighted that "... *a sizeable margin remains between the average wholesale and retail prices. While the difference between average non-group wholesale and off-net retail rates has narrowed in relative and absolute terms in the past year, it remains significant (with retail representing a 429% or EUR 2.097 margin over the per minute wholesale rate in Q2 2010, and 428% or EUR 1.539 in Q2 2011)*."[59] The General Secretariat of the Arab Council of Ministers analysed prices for Arab roamers and found, in 2005, that Arab roamers are paying prices for a local fixed call in the visited country that are between 15-500 per cent higher compared to national calls.[60]

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55 Media statement on the occasion of the SADC ICT Ministers meeting 8th November 2012 Balaclava, Mauritius, www.sadc.int/files/2313/5420/7273/Press_Realease_SADC_ICT_Ministers_Meeting_November_8_2012.pdf

56 Trans-Tasman roaming, Final Report, February 2013, www.dbcde.gov.au/__data/assets/pdf_file/0003/161274/TTR_Final_Report.pdf

57 In the early days of competition the fixed incumbent retail and wholesale prices were often regulated. Retail price regulation was often aimed at ensuring a smooth rebalancing of retail prices.

58 Department of Broadband, Communications and the Digital Economy, Report of findings on: International Mobile roaming charges, June 2008, www.dbcde.gov.au/__data/assets/pdf_file/0005/86369/KPMG_Report_of_findings_on_International_Mobile_roaming_charges.pdf

59 BEREC, op.cit., paragraph 1.23.

60 Maitha Ali Jaffaar, GCC International Roaming Regulatory Initiative, www.wto.org/english/tratop_e/serv_e/sym_march12_e/presentation_%20maitha_jaffar.pdf

However, there is a limit on what actions can be taken. National operators could be required to reduce their retail rates, but the only part of these rates they have direct control over is the margin they are imposing on wholesale rates they face in other countries. Reducing these margins may lead mobile service providers to try and negotiate better wholesale rates from their counterparts in other countries although they may have very little negotiation power. The argument that national mobile operators would face a margin squeeze if regulators lower the retail rates that these operators charge their customers for mobile roaming is only valid if regulators are not made aware of the level of these wholesale rates. It would be up to the national operators to inform regulators of these wholesale rates.

However, given that the main cost component which affect IMR prices is the wholesale rate, the longer term solution is to find ways to reduce this rate while ensuring that reductions in wholesale rates are passed on to the retail market. Reviews of experiences in the European Union following the imposition of price caps is that prices declined to meet the requirements of price caps, but on average did not decline below the caps. If a regulatory initiative is taken which only imposes wholesale price regulation, it would seem necessary that retail prices should be monitored to determine whether they are reduced to reflect wholesale reductions. If retail prices remain sticky then it would be necessary to consider retail price regulation in addition to wholesale price regulation.

The EU, in addition to imposing wholesale caps in its roaming regulations, also took action on retail prices for voice, SMS and mobile data. The 2007 Roaming Regulation ((EC) No 717/2007) introduced a "Eurotariff" which set maximum prices for mobile voice calls made and received within the EU. The Eurotariff, which was set at EUR 0.49 per minute for calls made and EUR 0.24 for calls received (excluding VAT), was a maximum rate and did not supersede other lower rates which subscribers may have had as a result of their operators roaming package. Nevertheless, all subscribers could opt for the Eurotariff. The Eurotariff, which came into effect on 30 June 2007, was also subject to a glide path following that of wholesale rates. For calls received within EU the reduction in the Eurotariff was set at EUR 0.5 effective in 2014, that is the same level as the inter-operator wholesale rate that was set for 2014 (see Figure 4). The maximum Eurotariffs set are to remain valid until 30 June 2017 subject to a review which had to be completed by June 2016.

The requirement from 2009 to charge on a per second basis brought about important decreases in retail prices. The BEREC Benchmark report found that prices fell by about 27 per cent in the second quarter of 2009, about 5.7 per cent in the third quarter of 2011 and a further 5.6 per cent in the fourth quarter of 2011.[61]

The Economic Community for the West African States (ECOWAS) has undertaken important initiatives in developing regional roaming arrangements.[62] These have been undertaken through intra-operator agreements which allow roaming subscribers to receive free calls when roaming and pay local rates for outgoing calls. The arrangements however are not generalised in that they only cover specific networks and do not apply completely to all ECOWAS countries. Regional roaming has been facilitated by the fact that several operators have a regional footprint (*Orange Zone*, *Zain One*, and *One World*) but also because of close co-operation between the regional telecommunication authorities.[63]

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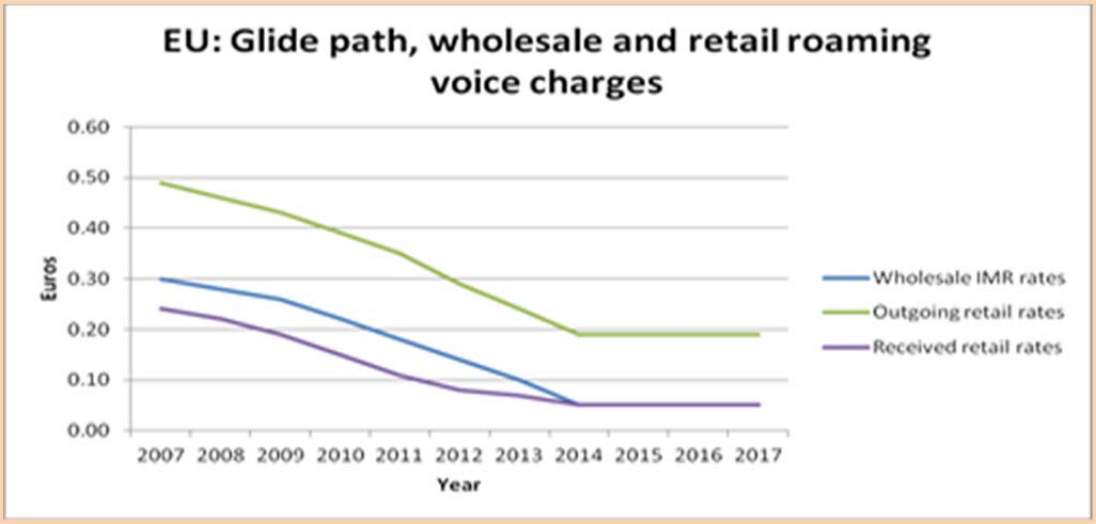
[61] BEREC, International Roaming BEREC Benchmark Data Report, July 2011 – December 2011 BoR (12) 24, http://berec.europa.eu/files/news/bor12_24.pdf, paragraph 1.8.

[62] International Telecommunication Union, West African Common Market Project: Harmonization of Policies Governing the ICT Market in the UEMOA-ECOWAS Space Interconnection, 2004, www.itu.int/ITU-D/treg/projects/itu-ec/Ghana/modules/FinalDocuments/Interconnexion.pdf

[63] See Rupa Ranganathan and Vivien Foster, *ECOWA's infrastructure: a regional perspective*, The World BankAfrica Region, Sustainable Development Unit, Policy Research Working Paper 5899, December 2011, "*The national members of the West Africa Telecommunications Regulators Association (WATRA) communicate regularly to keep abreast of telecom issues in the region and share information. The existence of this relatively developed institutional structure has helped to facilitate the roaming arrangements that are observed in the region*.", page 59, www-wds.worldbank.org/servlet/WDSContentServer/WDSP/IB/2011/12/05/000158349_20111205145616/Rendered/PDF/WPS5899.pdf

Figure 4: EU regulated wholesale and retail roaming voice charges



Source: http://ec.europa.eu/digital-agenda/en/telecoms-rule

2.4 Data roaming

Data roaming takes place in a number of ways: exchanging emails, exchanging multimedia messages, surfing the Internet and downloading using a wireless terminal. As noted earlier many applications on smartphones check regularly for updates which would incur charges as well when roaming. The variety of data applications can also result in a significant variance in data usage as shown in Table 6.

Table 6: Estimates of data traffic use by activity[64]

Activity	Data traffic use
One hour of instant messaging	0.25 – 1 MB
One hour of web browsing	1.5 – 25 MB
Download 100 emails	1 – 10 MB
100 minutes talk on VoIP video calling	Around 50 MB
Download one photo	0.05 – 2 MB
One software download	70 – 800 MB
Download one MP3	3 – 8 MB
Download one film	700 – 1500 MB
Streaming one hour of video	250 – 500 MB
Streaming one hour of audio	50 – 150 MB

[64] GSMA, International roaming explained, www.gsma.com/publicpolicy/wp-content/uploads/2013/05/GSMAMobileRoaming_Arab13.pdf

The European Commission has argued that "the persistence of high wholesale charges for data roaming services is primarily attributable to high wholesale prices charged by operators of non-preferred networks".[65] The 2007 Roaming Regulation ((EC) No 717/2007) did not regulate mobile data roaming. The second regulation on roaming ((EC) No 544/2009) led to the imposition of wholesale price caps on data roaming and retail charges were capped following the third regulation. BEREC acknowledged in its 2010 review of the impact of regulation that " *... the theoretical arguments for expecting competitive pressures to moderate retail data roaming prices... led BEREC not to support regulation of retail data roaming [in the 2008 Review]. Unfortunately, recent evidence on average roaming prices indicates that any such pressures may not be sufficiently strong to bring prices down to a reasonably competitive level. Retail prices have fallen, but the rate of decline has not matched that of wholesale data roaming*."[66]

The maximum wholesale charge that EU operators could impose for data roaming on visited network operators was set in 2009 at EUR 1 per megabyte (MB) declining to EUR 0.8 on 1 July 2010 and EUR 0.50 on 1 July 2011. From 1 July 2012 the average wholesale charge that a visited network operator could charge declined to EUR 0.25 and a further decline to EUR 0.15 took place on 1 July 2013. It was agreed that from 1 July 2014 this wholesale charge would be reduced to EUR 0.05 per megabyte and remain at that level until 30 June 2022 (unless the review in 2016 recommended further adjustments). [67]

The decision not to impose any caps on retail charges was taken because there was a perception that roaming customers had alternative means of accessing data when roaming which would act to place competitive pressure on retail prices. The 2012 roaming regulation ((EU) No 531/2012) stated:

> "*As with the regulatory measures already in place for voice and SMS services, until the structural measures bring sufficient competition, the most effective and proportionate approach to regulating the level of prices for Union-wide retail data roaming services for a transitional period is the introduction of a requirement for roaming providers to offer their roaming customers a transitory euro-data tariff which does not exceed a specified maximum charge*."[68]

As a result a euro-data retail tariff was imposed (as for voice and SMS) from 1 July 2012. This was set at EUR 0.70 per megabyte used declining to EUR 0.45 per megabyte used on 1 July 2013 and to EUR 0.20 per megabyte used on 1 July 2014 remaining at that level until 30 June 2017.

An additional requirement as of July 2010 was aimed at reducing "bill shock" by introducing a cut-off mechanism once data roaming bill had reached 50 Euros and operators were required to send an SMS message once subscribers had reached 80 per cent of the agreed limit.[69]

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[65] *op.cit*. Regulation (EC) No 53/2012, paragraph 72.

[66] BEREC Report, BoR(10)58, International Mobile Roaming Regulation, December 2010, www.irg.eu/streaming/BoR%20(10)%2058%20International%20Roaming_final_110209.pdf?contentId=547089&field=ATTACHED_FILE, paragraph 28.

[67] This is subject to a review which has to be undertaken by 30 June 2016.

[68] Paragraph (75), REGULATION (EU) No 531/2012 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 13 June 2012 on roaming on public mobile communications networks within the Union, http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2012:172:0010:0035:EN:PDF

[69] Consumers can select a different cut-off limit or opt out of this bill shock safeguard entirely. Operators will be obliged to send a message (SMS, e-mail or pop-up message) to customers informing them of how much it will cost to surf the net via their mobile devices when they use roaming services in addition to the alert message warning customers when they have used 80% of their agreed limit.

2.5 Transparency

The level of wholesale charges, and the inability to reduce these charges through a competitive market process, is the key issue facing policy makers for IMR charges.

Increased transparency at the wholesale level can play an important role in helping the process to reduce wholesale rates. However, transparency of IOTs is only a supplementary measure. As stated in the *Trans-Tasman Roaming Report* "*The information disclosed could "name and shame" operators into more competitive offerings. It could also provide the Governments and regulators with information they may use to decide whether consideration of further intervention is necessary.*"[70]

In general, wholesale rates paid by a retail company in an industry are not known to competitors and there is a danger that if they are made public that the competitive process can be negatively affected. However, where there is no or insufficient competition making wholesale rates known can help in creating competition. Such transparency measures have been used, for example, in many countries in the energy sector to improve competition and prevent retail price distortions. Transparency of international accounting rates played an important role in fostering competition and reducing prices for international long distance calls in the fixed voice market. In the case of IMR, high wholesale rates have been determined as being at the core in explaining high retail charges so that the evolution of these charges is important to ensure that any policies regulators take are effective. In the case of the telecommunication sector it has been common practice by telecommunication regulators to make public wholesale rates (interconnection/termination rates) and this has helped drive the process of creating more effective competition. In the case of roaming the IOTs are transparent to the mobile operators but not to the regulators.

Transparency of wholesale rates is therefore crucial if action to reduce them is taken and to enable regulators to monitor developments in the market so as to ensure that effective competition is emerging in the market. In this context it is important that regulators have the authority to obtain wholesale IMR rates charged by their national operators and share these rates when entering into bilateral or regional agreements. Regulatory authorities could also encourage the GSMA to publish headline (non-discounted) wholesale charges for international mobile roaming services (voice, SMS, mobile data). To again return to the analogy with accounting rates for international (fixed) telecommunication services, one of the important factors in helping reduce prices were efforts by several countries to publish accounting rates and increase transparency. Transparency is helpful in assessing the effectiveness of the policies that have been taken to improve market conditions and increase competition in the IMR market.

2.6 Impacts of the different initiatives

The EU initiatives on international mobile roaming provide important lessons for other regions and/or international initiatives on this issue. The Body of European Regulators for Electronic Communications (BEREC) examined in 2010 the impact of the previously adopted roaming regulations (Regulations 2007 and 2009) and considered whether the 2009 regulation should be extended.[71]

BEREC found that: "*Small network operators have at an overall level been positively affected by the introduction of wholesale price regulation. The Regulation has enabled such operators to get better deals when buying wholesale inbound roaming. This has improved their competitive situation as suppliers in downstream markets, such as terms of the wholesale resale roaming that they can offer to MVNOs hosted on their network, and in the retail market.*"[72]

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[70] Trans-Tasman roaming, Final Report, February 2013, page 52, www.dbcde.gov.au/__data/assets/pdf_file/0003/161274/TTR_Final_Report.pdf

[71] *op. cit*., BEREC Report, BoR(10)58.

[72] *ibid*., paragraph 16.

An important finding by BEREC was also that the roaming regulations did not appear to have affected the prices of other mobile services i.e. there was no apparent waterbed effect.[73] The fact that roaming revenue accounts for only a small percentage of total mobile revenue was cited as one reason for this.

BEREC also analysed costs examining in particular the wholesale caps in relation to assumptions on costs, their future development and the relationship with the retail price caps. For voice roaming services BEREC concluded that wholesale prices (at that time) allowed for a mark-up per minute of approximately 100 per cent. For mobile data roaming it was concluded that the average mark-up was "several hundred per cent" relative to the wholesale prices.[74] BEREC work on costs relied on a forward looking approach taking into account incremental termination costs and inputs from cost models of European regulatory authorities. In addition, domestic mobile price trends were used as a benchmark for comparative purposes. Nevertheless, while the use of domestic prices can usefully serve as a benchmark, it has also been recognized that domestic markets are not necessarily competitive so that using these prices as a benchmark is very much second best.

In putting forward recommendations on prices BEREC also had to face a problem which other regional entities or countries which want to enter into a bilateral roaming arrangement need to face. That is, should prices reflect those of the home country or visited country or should they be the same across a region (or bilateral arrangement)? In terms of wholesale prices an argument can be made that underlying costs for efficient operators should be fairly similar across countries which have close economic relations and, if this is the case, then one would expect that retail prices across a region would be similar. Usually this is not the case so, as BEREC highlighted, this could occur when wholesale prices are low and markets are competitive. The BEREC recommendation to the European Union, which was followed, was to maintain price caps "*set at appropriate levels .... taking into account both of costs and of corresponding domestic prices*."[75] As noted above, the SADC adopted a 'Roam like a local' framework which results in different retail prices in the different member countries but also recognizes that different countries may have differences in prices because of competitive reasons.

In the impact assessment undertaken by the European Commission, in support of Roaming Regulation (EU) No 531/2012, it was estimated in 2011 that the gain in consumer surplus, if the proposals in the regulation were adopted, would be in the region of EUR 3 656.7 million. The costs in implementing the regulation would be in the region of EUR 300 million. In contrast, with no regulation the loss in consumer surplus was estimated at EUR 18 604.6 million.[76]

An assessment of the Gulf Council Countries (GCC) reforms indicated a savings of USD 115 million per year for subscribers in the region and a growth in traffic of 14 per cent.[77] The impact on the revenue of operators was estimated at between 0.3-0.84 per cent and despite the price reductions the retail margin for mobile operators on roaming services was estimated at between 36-42 per cent.

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[73] However, there were reports that Arab operators were facing increasing wholesale prices from European operators who were trying to recuperate revues lost as a result of EU regulations. In turn this put upward pressure on IOTs in the Arab countries and retail roaming rates in those countries. See, Implementation of the AREGNET Recommendation on the International Roaming Rates applied among Arab Countries, https://www.tra.org.bh/EN/pdf/Presentation_Background_Roaming-MOU.pdf

[74] *ibid*., paragraph 22.

[75] *ibid*., paragraph 96.

[76] See Commission staff working paper, Impact assessment of policy options in relation to the Commission review of the functioning of regulation (EC) no 544/2009 of the European Parliament and of the Council of 18 June 2009 on roaming on public mobile telephone networks within the Community, SEC(2011) 870 Final, http://ec.europa.eu/information_society/activities/roaming/docs/impac_ass_11.pdf

[77] Implementation of the AREGNET Recommendation on the International Roaming Rates applied among Arab Countries, Proposals of the AREGNET Working Group on International Roaming, www.tra.org.bh/en/pdf/Presentation_Background_Roaming-MOU.pdf

Generally, roaming is considered as contributing a small percentage to overall mobile revenue, although good data are not available to obtain precise figures. BEREC, in 2009, estimated that within the EU roaming accounted for 4.2 percent, on average, of overall mobile roaming revenue.[78] A report to the Australian government estimated that roaming accounted, globally, between 5 to 10 percent of mobile revenues.[79] The exception may be for small island states, with high levels of incoming tourists, where roaming may generate up to 50 percent of revenue. However, even though roaming may contribute only a small percent of revenue its contribution to overall profits is thought to be much higher.

2.7 Taxation

Taxation of roaming charges, and in particular the double taxation of such charges, is an important factor in some countries in increasing the cost of international mobile roaming. It is also at times a complex issue to resolve. There is a general principle that the taxation of consumption should take place where consumption takes place. In the case of roaming services obtaining consensus as to where the services is performed and consumed is more complex. Early work by the OECD on electronic commerce suggested that when trying to determine where consumption, and therefore taxation, takes place in the cross-border supply of intangibles, for business to consumer services "... *the place of consumption should be the jurisdiction in which the recipient has his or her usual residence*."[80] The EU has adopted a directive which provides that from 1 January 2015, value-added tax on telecommunication services provided by a supplier located in EU will be charged in the jurisdiction where the customer belongs.[81] In addition, Paragraph 8.3 of the International Telecommunication Regulations (ITRs) state:

> "*Where, in accordance with the national law of a country, a fiscal tax is levied on collection charges for international telecommunication services, this tax shall normally be collected only in respect of international services billed to customers in that country, unless other arrangements are made to meet special circumstances.*"[82]

With respect to roaming services arguments have been made that the main components of the service are provided by the roamer's service provider in the home country despite the billing and authentication (which is a small part of the service) in the visited country. Nevertheless, some countries, for example, India, has argued that the service is consumed in India hence inbound roamers should be taxed. The GSMA has estimated that double taxation applies to 72 per cent of routes in Latin America.[83] Estimates of the impact of double taxation in Latin America indicate that this results in an increase in prices of between

78 See BEREC, International Mobile Roaming Regulation, BoR(10)58, December 2010, paragraph 18, www.irg.eu/streaming/BoR%20(10)%2058%20International%20Roaming_final_110209.pdf?contentId=547089&field=ATTACHED_FILE

79 See, KPMG, Report of findings on: International Mobile roaming charges, Department of Broadband, Communications and the Digital Economy, www.communications.gov.au/__data/assets/pdf_file/0005/86369/KPMG_Report_of_findings_on_International_Mobile_roaming_charges.pdf

80 Paragraph 11, Implementation of the Ottawa Taxation Framework Conditions, The 2003 report, www.oecd.org/tax/administration/20499630.pdf

81 Council Directive 2008/8/EC of 12 February 2008 amending Directive 2006/112/EC as regards the place of supply of services, http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:044:0011:0022:EN:PDF

82 Paragraph 8.3, www.itu.int/en/wcit-12/Documents/final-acts-wcit-12.pdf

83 GSMA, Roaming in Latin America 4Q 2011, www.gsma.com/latinamerica/wp-content/uploads/2012/08/latamroamingatkearney.pdf

35-60 per cent.[84] In this context the Latin American Forum of Telecom Regulators (REGULATEL) and the Inter-American Telecommunications Commission (CITEL) had been tasked in 2010 to examine what modifications are required to eliminate double taxation in the region. The Asia Pacific Telecommunity (APT) undertook a survey on taxation and found that most responding economies did not impose taxes on IMR wholesale or retail prices.[85]

Table 7 provides a synopsis of the value-added tax regime of OECD countries as applied to mobile roaming. Practices across countries vary. Value-added tax (VAT) is applied in some cases to both incoming and outgoing calls (Chile, India) whereas in other countries VAT is applied only to outgoing roaming calls (e.g. the Netherlands, Norway, Spain). Turkey applies VAT to inbound roamers but only if the home country of the roamer applies taxes to Turkish roamers. In certain countries, in addition to VAT, other applicable taxes such as local taxes or communication taxes are also applied to roaming services (e.g. Brazil, Chile). In most cases VAT is applied to the total price paid by the roamer (wholesale plus retail margin) whereas Turkey only applies tax to the retail margin of their home operators.

[84] IMOBIX, An Overview of Roaming Initiatives in the South American Market, http://aimp.apec.org/Documents/2009/TEL/TEL40-LSG-WKSP/09_tel40_lsg_wksp_009.pdf

[85] Asia Pacific Telecommunity, International Mobile Roaming Working Group, Working Group Report, 15 May 2012, www.apt.int/sites/default/files/2012/05/APT_IMR_Working_Group_Report_Final.pdf

Table 7: Taxes on mobile roaming (adapted from Table 7, OECD, Digital Economy Papers, No. 16, International Mobile Roaming Charging in the OECD Area)

	Tax rate (%)	Outbound SIM card holders	Inbound SIM card holders
OECD countries			
Australia	10	No	No
Austria	20	Yes	Yes for non-EU countries
Belgium	21	Yes	No
Canada	0-15.5	Yes for calls to home province no for receiving calls	International calls are not taxed
Chile	19	Yes	Yes
Czech Republic	19	Yes	No
Denmark	25	Yes	No
Estonia	18	Yes	Yes
Finland		Yes	No
France		Yes	No
Germany		Yes	No
Greece		Yes	No
Hungary		Yes	No
Iceland		Yes	No
Ireland		Yes	No
Israel	15.5	Yes for calls received	Yes
Italy		Yes	No
Japan		No	No
Korea		Yes	No
Luxembourg		Yes	No
Mexico		Yes	No
Netherlands		Yes	No
New Zealand		Yes	No
Norway		Yes	No
Poland		Yes	No
Portugal		Yes	No
Slovak Republic		Yes	No
Slovenia	20	Yes	Yes, rate applies to non-EU roamers + calls to non-EU countries
Spain		Yes	No
Sweden		Yes	No
Switzerland		Yes	No
Turkey		Yes to the margin of the Turkish operator	No unless the foreign country applies tax to roamers in Turkey
United Kingdom		Yes for EU area, no for rest of world	No
United States		Yes for calls originating in the US No for local roaming calls made in foreign countries	Yes depending on the State in which the user is roaming

Source: www.oecd-ilibrary.org/docserver/download/5kml8rbpw6tk.pdf?expires=1373357319&id=id&accname=guest&checksum=9BB161D62E000A1A6B039D3791CDB0B1

The issue of double taxation brings into conflict the desire of telecommunication authorities to ensure that prices are competitive and benefit users and the taxation authorities concerned with raising revenue. Nevertheless, there is a large consensus that the services rendered to an inbound roamer should not be subject to tax in the country that the roamer is visiting, in effect this service should be treated as an 'export' in the visited country and only subject to a consumption tax in the country of residence.

3 Structural solutions on the IMR market

The current structure of the international mobile roaming market does not lend itself to the creation of long-lasting competition. For users it is difficult to compare mobile roaming prices when they enter into a contract with a mobile operator since these services are part of the bundle offered by the mobile operator and the primary consideration of a subscriber is the relative cost of the domestic package. The emergence of substitutes has been helpful but most are not close substitutes as explained in Section 5 below (the exception is in the mobile data roaming market). Technological developments have also helped in lowering prices, for example, traffic steering has allowed mobile network operators to negotiate better wholesale terms.[86] The expansion of mobile network operators with wide cross-border footprints has also helped bring about significant improvements in certain regions, but such developments are not global.

It is fairly evident that price regulation (wholesale and retail) is beneficial to users. However, such regulation would likely have to be prolonged since it is unlikely that there would be an incentive by operators to maintain lower prices once such regulation is lifted without the pressure of competition. Maintaining price caps over a prolonged period is not viewed as a desirable option by most regulators. To obtain sustainable competition in the market requires a change in market structure, and in turn, this requires that structural solutions are imposed on the market.

The EU recognized that there was a need for structural solutions in its third (2012) roaming regulation. In the context of the data roaming market the EU stated "*Given the infancy of the* [data] *market and the rapidly increasing consumer demand for data roaming, regulated retail charges might only keep prices around the proposed maximum charges themselves, ...instead of pushing them down further, which therefore confirms the need for further structural measures.*"[87]

There are a number of structural measures that would be required based on the need to open the IMR market to competition. The key measure is to allow international mobile roaming voice and data services to be offered as separate services so if a customer wishes they can use, with their existing national voice, messaging and data subscription, a separate service provider for cross-border roaming thus separating (decoupling) the home and visited market. This implies that a subscriber can choose an international mobile roaming service provider before leaving the home country while maintaining an existing mobile number. This would be similar to the pre-selection process that was successful in creating competition in the fixed market for domestic and, in particular, international long distance. Such a selection could be on a short (per visit) basis or could be on a longer term basis.

It is difficult to predict the outcome of such measures but, if they result in competition and lower prices, it would be likely that MNOs would significantly reduce their prices in order to maintain their existing subscribers as roaming clients. In order to create a separate IMR market, regulatory initiatives need to be

[86] "Better" wholesale terms does not only imply lower wholesale prices since the home operator (operator A) will also be interested in the amount of traffic that the visited operator (operator B) sends from its subscribers who are roaming in the operator A country.

[87] REGULATION (EU) No 531/2012 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 13 June 2012 on roaming on public mobile communications networks within the Union, paragraph 31, http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2012:172:0010:0035:EN:PDF

implemented and, while wide-ranging, in the long term they can ensure that the IMR market will no longer be subject to regulation.

A basic requirement is to allow market entry in national markets to MVNOs or resellers, including MVNOs that may limit their service provision to the provision of international mobile roaming services whether these services are targeted at nationals of that country, visitors to that country or both. For instance, in the EU Roaming Regulation No 531/2012 there is no requirement that MVNOs or reseller companies that want to provide roaming services need to be from the EU/EEA area. Allowing market entry needs to be linked with an obligation on MNOs to provide wholesale access (interconnection) at the same terms as they provide other MNOs in their country to MVNOs who want to offer international roaming. The EU Roaming Regulation No 531/2012 (Article 3) requires MNOs to provide such wholesale access and to publish a reference offer, including a service level agreement. It is also envisaged that MNOs provide the authentication and billing information necessary to provide retail roaming services (as part of their service level agreement).

The decoupling of roaming services from the package of mobile services customers normally subscribe to requires a range of implementation decisions and accompanying regulations, much like local loop unbundling. For this reason the EU published implementation regulations which set out technical solutions to implement the regulation and, in addition, BEREC had set down guidelines.[88] The guidelines also suggest that MNOs provide the billing and verification services as part of their service level agreements.[89]

BEREC examined a number of technical solutions in the context of decoupling roaming from domestic services. These included using a single IMSI (International Mobile Subscriber Identity), double IMSI and "Local Break Out – LBO". BEREC concluded that the "... *single IMSI is as now the most adequate method for decoupling* ..."[90] recognizing that this solution was more complex than initially foreseen. Clearly there are complications with all solutions and pros and cons.

Some of the pros and cons related to the different options are shown in Table 8 based on comments by Telekom Austria to a BEREC consultation. In its final opinion BEREC considered that implementation of decoupling should include single IMSI and local break out (LBO). The BEREC opinion was subsequently endorsed by the EU.[91] The EU Regulation No 531/2012 requires that, from July 2014, mobile operators in visited countries have the possibility to directly offer data roaming services to foreign roamers on their own networks. Local break out allows service providers in the visited network country to provide mobile Internet access directly and independently of the home provider.

Another structural change which is important in many countries is the liberalization of international gateways. These provide facilities for the transmission and reception of international calls and can add to the cost of roaming if not liberalized. The GSMA calculated that in the Middle East, international roaming call prices between Arab countries with liberalized gateways were 25 per cent lower than between Arab countries with gateway monopolies.[92]

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88 Commission Implementing Regulation (EU) No 1203/2012 of 14 December 2012 on the separate sale of regulated retail roaming services within the Union, http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ%3AL%3A2012%3A347%3A0001%3A0007%3AEN%3APDF

89 BEREC, BoR (13) 54, International Roaming Regulation, BEREC Guidelines on Roaming Regulation (EU) No 531/2012, (Third Roaming Regulation), (Articles 4 and 5 on Separate Sale of Roaming Service, www.berec.europa.eu/files/document_register_store/2013/5/BoR_(13)_54_BEREC_Guidelines_on_Roaming_Regulation_(45).pdf

90 BoR (12) 109, ROAMING REGULATION - CHOICE OF DECOUPLING METHOD, *BEREC opinion on article 5 implementing act,* http://berec.europa.eu/eng/search?q=BoR%2812%29109

91 *op. cit*., Commission Implementing Regulation (EU) No 1203/2012.

92 GSMA, Information Paper, Overview of the Global Roaming Market outside of the European Union, October 2011, www.wto.org/english/tratop_e/serv_e/sym_march12_e/doc_gsma.pdf

Table 8: Pros and cons of decoupling using dual and single IMSI solutions[93]

Dual IMSI	
Benefits	**Concerns**
» One time change of SIM-Card » Customer keeps handset and number » Different service offerings by » Home/Roaming M(V)NO ensured » Customer keeps services not associated with roaming » Transparency requirements supported (informing customer of usage, etc.)	» One time change of SIM-Card required » Possibly PIN-Code needed for selection » Cost and time of implementation » Second bill for the customer
Single IMSI	
Benefits	**Concerns**
» No change of SIM-Card » Customer keeps his phone number » Faster/less costly to implement	» No service differentiation between » Home/Roaming MNO » Wholesale between HMNO and alternative M(V)NO to be regulated » Second bill for the customer

It needs to be recognized that structural solutions would still require price regulation and close monitoring of market developments in order to decide when it would be appropriate to lift price regulation. Such procedures would need close collaboration between bilateral or regional partners or at the global level.

In September 2013 the EU put forward further proposals on roaming which are subject to approval by the European Parliament.[94] These included:

- a requirement that operators could no longer charge for incoming calls to subscribers from the EU travelling to other EU countries;
- mobile operators would be free of regulation, if they extend their domestic plans/bundles so that by July 2016 their subscribers can "roam like at home";
- subscribers will have the right to leave their domestic operator when travelling to use cheaper services in a visited country (or rival company in the home country) without changing SIM cards.

[93] Based on Telekom Austria Group view on the EU Commission proposal on Roaming 3 Meeting with BEREC, October 2011, www.telekomaustria.com/group/public-policy/tag_position_roaming.pdf

[94] See "Connected Continent: Building a Telecoms Single Market", http://ec.europa.eu/digital-agenda/en/connected-continent-single-telecom-market-growth-jobs

4 Protecting and empowering subscribers

Since the transformation of telecommunication markets beginning in the mid-1990s telecommunication users have benefited significantly from competition through lower prices, more choice, better quality of services and a significant increase in service innovation. Competition has also played a significant role in the development and diffusion of new communication technologies and services which have also benefited users. At the same time the pace of change in communication technologies and services can make it difficult for users to master all the products and the complexity of pricing plans. Regulators and service providers need to provide the support to help users, in particular consumers, in meeting the challenges of new technologies and services.

Competition in national telecommunication markets developed mainly though supply side measures, however, an important role can be played by service subscribers themselves in enhancing competition through demand side choices. For this to occur it is necessary to ensure that subscribers are empowered by providing them with better information and more flexibility in making choices in the market. It is also necessary that they have the flexibility to change their service supplier. Much effort has been taken in many countries by telecommunication authorities or consumer protection bodies to protect consumers in mobile markets at the national level.[95] Many of these efforts can be transferred to protecting and empowering consumers when roaming internationally.

In the IMR market the relatively more simple steps available to policy makers and regulators are those aimed at providing users with relevant information so that they are able to prepare effectively before travelling and manage their use of communication services when roaming outside of their home markets. Greater awareness of the charges that they may face when travelling outside their home market can help users in modifying their consumption patterns, and take steps to avoid inadvertent charges. Better information will also help users in looking for appropriate substitutes. Such steps should help in diminishing the number of cases of "bill shock". In addition to measures which improve transparency of prices, it is important to minimize the costs of switching services and facilitate timely and easy to use settlement of consumer complaints. While improved understanding of the IMR market and prices may help reduce costs to users, these measures, though necessary, will not create the conditions for effective competition or result in efficient pricing in the IMR market. Box 2 provides some details of steps that can be taken.

[95] See for example, OECD, Policy Guidance for Protecting and Empowering Consumers in Communication Services, OECD Ministerial Meeting on the Future of the Internet Economy, Seoul, Korea, 17-18 June 2008, www.oecd.org/internet/consumer/40679279.pdf

Box 2: Information for users on IMR services before roaming

Information for users to be made available before roaming by mobile operator:

- Warning that mobile prices in visited countries are different in level and structure (e.g. per minute instead
  of per second) and can result in high charges if sufficient care is not taken by subscriber.
- Access to roaming prices (voice, SMS and data) available on mobile operator's web sites. Such data should
  be easy to find and provided in a simple and easy to use form.
- Information of a technical nature available on web sites (service compatibility of phone in visited country, unlock phone if possible before travelling).
- Warning that applications on Smartphones may incur charges when roaming because of automatic updating, searching location information, etc., even if not actively used by subscriber and how to turn off data roaming.
- If applicable how to ensure that a partners network is being used in a visited country.
- Process to follow if subscriber believes that there has been inadvertent roaming.
- Data consumption of different commonly used applications.

4.1 Transparency of retail charges

The IMR market is a sub-market of mobile services. In other words, subscribers choose their mobile service provider on the basis of a package of voice, messaging and data services and related prices i.e. the demand elasticity for subscriptions and call packages is considered much higher than for international mobile roaming. The provision of international mobile services is part of that bundle and not the most important in terms of user criteria or everyday use. In addition, roaming prices are seldom made transparent to the consumer when subscribing to mobile services and service providers do not use IMR prices to attract new customers. Indeed, in some cases, depending on the country and service provider, consumers need to specifically request international roaming as an option before travelling. This is particularly the case for prepaid customers who usually have to purchase credit for their devices before roaming. In certain countries postpaid customers need also to provide a deposit before roaming internationally and, in some cases, they need to pre-purchase a roaming package before travelling.

Regulatory initiatives which increase transparency for users are important in allowing them to better manage their usage of mobile roaming, understand the implications of roaming on their bills and can help reduce bill shock. Increased sensitivity to IMR service prices can also provide an incentive for users to examine more closely alternative technologies and calling procedures which could be used when roaming. However, even with greater transparency a consumer has limited scope to make choices since they are usually already tied to a contractual arrangement with a mobile service provider. The concern by consumers with respect to high mobile roaming prices was indicated in a European survey that found that 72 per cent of mobile users limit their mobile usage while travelling because of high prices, while 20 per cent of travellers do not use their phone while travelling and 10 per cent roam silently (phones switched off).[96]

[96] Special Eurobarometer, 356 Roaming in 2010, http://ec.europa.eu/public_opinion/archives/ebs/ebs_356_en.pdf

There are two major ways to empower users when they roam.

The first is through increased transparency on roaming service prices providing users with the necessary information so that they can adjust their consumption of roaming services, if necessary, and are more aware of the total bill they will face when they return to their home country. This requires that international roaming prices for voice, messaging and data are easily accessible (e.g. a link on the main page of the mobile service provider). The information has to be made available in a form which is easily understandable by users. Disclosure of international roaming prices in the form of "*fine print*" is inadequate. It is often the case that different units are used to provide pricing information. For example, whereas in many countries a monthly postpaid mobile subscription may include several hours of calls per month, users do not in fact know the per minute or per second cost of calls. In other cases domestic mobile voice packages may be charged in seconds. IMR prices are often cited on a per minute basis. Numbering plans also vary from country to country so that users need to be aware whether they are charged differently in calling a fixed or mobile number in the visited country. Similarly mobile data may be unlimited with a postpaid subscription in the home country, or it may be set at a level expressed in gigabytes whereas for purposes of roaming tariffs will often be in terms of megabytes.

Users with some experience in travelling will try and find price information for the country(ies) they are travelling to before departing from home. Irrespective of whether a user is experienced or not it is important that when arriving in a visited country that they receive an SMS which indicates the charges they will face for voice calls and messages to their home country, calls and messages in the visited country and calls and messages to third countries. They should also be informed of prices for the use of mobile Internet (data services) in the visited country.

"Bill shock" often occurs because of insufficient understanding of mobile data, mobile applications resulting in consumers often maintaining the same level of consumption when travelling as they do at home. Many users are not even aware of the data consumption of various activities. In this regard many mobile operators, as well as web sites following the industry, are now beginning to indicate on web sites the data use of various applications (see Table 6 above). In addition to the type of usage different types of phones may also vary in their usage of data (see Table 9 as an example).

Many mobile applications which have been downloaded on smartphones also access the Internet on a regular basis, for example to update software, update weather applications, obtain location information, and so forth. Users should be made aware of how to manage their date use and how to turn off mobile broadband on smartphones when roaming in order to minimize charges. A predetermined usage level (either in monetary or volume terms) could be set for users when roaming and they should be informed when approaching this predetermined level and once it is reached. Users should then have the choice of continuing to use mobile data and set their own level of usage.

The second way is to increase user awareness of alternate technologies and services which they may be able to use to make and receive calls, to obtain messages and to access the Internet when travelling outside of their home country (these are discussed in the next section). In this context users need to be aware that there are different mobile technologies across the world and their device may not function in other countries and they need to take steps to access alternative services (e.g. by unlocking their mobile phones) before travelling.

Table 9: Data usage by type of mobile phone

Device type	Email without attachment	Email with attachment	App or game	4 minute song	Web page
BlackBerry	2 KB	200 KB	440 KB	4 MB	70 KB
Smartphone	20 KB	300 KB	4 MB	4 MB	180 KB
Mobile Internet	35 KB	600 KB	20 MB	4 MB	250 KB

Source: Derived from www.sasktel.com/datacalculator/

***Note:** The above usage per task examples are estimates based on averages and could vary from actual data usage for the given task.*

Although regulators and mobile operators have a certain responsibility to provide users with the information they require when roaming, consumers themselves are also responsible to ensure that they take adequate precautions in using their mobile devices when abroad. However, consumer diligence may be inadequate and result in complaints. These need to be resolved fairly and in a timely manner. Such dispute resolution procedures should in any event be in place in the communication sector and need not be specific for IMR services. However, given the international nature of services it may be difficult to determine where responsibility lies. For example, calling home from abroad may result in an initial set-up charge and the caller finds that it is necessary to redial several times because of dropped calls caused by poor quality of service in the visited country. A complaint in such cases may be difficult to resolve unless the operator in the home country is willing to make compensation.

4.2 Information requirements for users

A number of national regulatory authorities, regional bodies, and international organizations have either taken regulatory action or made recommendations on how to increase transparency for users when they are roaming internationally and to help them limit charges incurred. Many mobile operators have also reacted to the increased concern with high IMR prices to improve the information available on their web sites.

At the ITU, ITU-T Study Group 3 approved in September 2012 a new Recommendation ITU D.98 on Charging in International Mobile Roaming Service[97]. Section 4 of this Recommendation contains principles for lowering IMR rates including empowering consumers (section 4.1), market-based solutions (4.2) and regulatory intervention (section 4.3). The main recommendations relating to consumer protection are highlighted in Box 3.[98] In addition, the International Telecommunication Regulations (ITR) agreed that "*Member States shall foster measures to ensure that authorized operating agencies provide free-of-charge, transparent, up-to-date and accurate information to end users on international telecommunication services, including international roaming prices and the associated relevant conditions, in a timely manner.*[99]

Box 3: Excerpt from ITU Recommendation D.98 Charging in International Mobile Roaming Service[100]

Empowering consumers:

1. Transparent information on IMR retail rates and structure before users roam internationally.
2. Usage alerts when users start to roam.
3. Warning alert when a certain cost has incurred.
4. Roaming cost caps.
5. Special user protection measures for inadvertent roaming in border regions.
6. User choice of visiting network.

97 www.itu.int/en/ITU-T/studygroups/com03/Pages/results.aspx

98 ITU-T, Recommendation ITU-T D.98, Charging in International Mobile Roaming Service, 16-20 January 2012, TD 227 Rev.2 (PLEN/3)-E.

99 Article 4, 4.4 International Telecommunication Regulations, www.itu.int/en/wcit-12/Pages/itrs.aspx

100 ITU Telecommunication Standardization Sector, Recommendation ITU-T D.98, Charging in International Mobile Roaming Service, www.itu.int/ITU-T/recommendations/index_sg.aspx?sg=3

The work of the OECD on roaming led to the adoption of a non-binding recommendation in February 2012 (OECD Council Recommendation)[101] which put forward a series of measures that policy makers could use to raise consumer awareness and protection, ensure lower prices and encourage effective competition. The main points of the Recommendation as regards consumer protection are highlighted in Box 4.

Box 4: Excerpt from OECD Council Recommendation[102]

The OECD Recommendation encourages governments to:

- promote awareness about the cost of roaming services and the availability of substitutes;
- promote transparency of information provided to customers by international roaming providers regarding the use and billing of roaming services;
- promote transparency of information provided to customers by international roaming providers regarding the use and billing of roaming services;
- provide information to data roaming customers on the risk of automatic and uncontrolled data roaming connections and downloads and explanations about how to switch off these connections; agreed financial limits, beyond which data roaming transmission would be stopped, unless the customer follows an indicated procedure: personalised notifications when data roaming services have reached a certain proportion of an agreed financial limit.

The European Union roaming regulations included consumer protection measures which imposed certain obligations on mobile operators to increase transparency, including providing pricing information to users when they enter a foreign country. Measures were also introduced aimed at reducing "bill shock" by introducing a cut-off mechanism once data roaming bill had reached 50 euros. Mobile operators are also required to send an SMS message to subscribers once they had reached 80 per cent of the 50 euro limit.[103] Box 5 provides a synopsis of the main provisions of the EU Roaming regulation with respect to subscribers.

[101] OECD, 16 February 20102, Recommendation of the Council on International Mobile Roaming Services, Paris 2012, http://webnet.oecd.org/OECDACTS/Instruments/ShowInstrumentView.aspx?InstrumentID=271&InstrumentPID=276&Lang=en&Book=False.

[102] See OECD, 16 February 2012, Recommendation of the Council on International Mobile Roaming Services, Paris.

[103] Consumers can select a different cut-off limit or opt out of this bill shock safeguard entirely. Operators will be obliged to send a message (SMS, e-mail or pop-up message) to customers informing them of how much it will cost to surf the net via their mobile devices when they use roaming services in addition to the alert message warning customers when they have used 80% of their agreed limit.

Box 5: Consumer protection: Main provisions of the EU 2012 Roaming Regulation[104]

- An obligation for operators to automatically provide customers – via a messaging service – with basic personalized information about roaming tariffs for voice, data or SMS when they enter another EEA country or a country outside the EEA.
- The obligation for roaming operators to offer customers, free of charge, a service providing information on the accumulated consumption of roaming data which guarantees that the accumulated expenditure on that service does not exceed a specific monetary limit (EUR 50 by default) after which the service is no longer provided.
- Customers should be billed on a per-second basis for all calls subject to a euro-voice tariff subject only to the possibility to apply a minimum initial charging period of no more than 30 seconds for calls made.
- Customers should not have to pay for receiving voice mail messages in a visited network (they can be charged for listening to such messages).
- Customers should pay on a per-kilobyte basis and only for data services actually consumed.

The Communication Regulators' Association of Southern Africa (CRASA) set up a Regional Alliance Task Team (RATT) in 2008 to examine the problem of high IMR charges and subsequently commissioned a study published in 2010 and which put forward a number of short term goals for SADC's consideration.[105] These included increased transparency and consumer protection including greater IMR price transparency through SMS notification when travelling. In Africa, the African Union has also examined the possibility of affordable roaming tariffs through regulation.[106] In this context the Commission put forward a number of proposals including requiring transparency for roaming tariffs and developing a single web site showing roaming tariffs.

APEC Ministers first discussed the issue of IMR in 2008 followed up by further analysis in APEC TEL. Emphasis was placed on developing guidelines to protect consumers and in 2010 APEC TEL produced *"Guidelines for the Provision of Consumer Information on International Mobile Roaming"* which put forward best practice suggestions on providing IMR information to consumers.[107] The guidelines suggested the types of information that should be provided to consumers, how to provide this information as well as the need to provide information on alternative technologies to consumers. The Asia Pacific Telecommunity International Mobile Roaming Working Group also developed guidelines for regulators and for operators aimed at enhancing transparency of information.[108] The *Guidelines for Regulators to Provide Information on International Mobile Roaming (IMR) Services* is aimed at suggesting what type of information regulators should make available to the public including informing consumers of the high cost of IMR, providing information on alternatives to IMR services and that regulators should have a dedicated page on their website on IMR issues with the following information.

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[104] See http://ec.europa.eu/information_society/activities/roaming/regulation/archives/current_rules/index_en.htm

[105] Regulatory Impact Assessment Study SADC Home and Away, 23 April 2010, Ref. 15493-154, available at www.crasa.org

[106] Commission de l'Union Africaine, Pré-étude de faisabilité pour le développement d'un programme pour la mise en place de tarifs de roaming abordables en Afrique, Synthèse, Juin 2011, www.itu.int/ITU-D/finance/work-cost-tariffs/events/tariff-seminars/Cotonou-12/pdf/Session6_1_Guellouz.pdf

[107] www.apec.org/Groups/SOM-Steering-Committee-on-Economic-and-Technical-Cooperation/Working-Groups/Telecommunications-and-Information.aspx

[108] APT Working Group Report, 15 May 2012, www.apt.int/sites/default/files/2012/05/APT_IMR_Working_Group_Report_Final.pdf

A similar set of *Guidelines for Operators to Provide Information on International Mobile Roaming (IMR) Services* emphasised similar requirements to improve transparency by providing subscribers with information. The guidelines also put forward suggestions for reducing "bill shock". They also suggested that operators provide subscribers with information highlighting differences in charging structures between IMR services and domestic mobile services, and how subscribers can deactivate part or all of the IMR services. Box 6 summarises the main features of these guidelines as they relate to consumer empowerment.

Australia recently put in place obligations on operators to help prevent bill shock. As in other countries there is a requirement to notify users when arriving in a foreign destination that higher charges apply and to provide them with pricing information. Users would also receive notification when their roaming bills reached USD 100 for data usage.[109]

The GSMA, in June 2012, obtained agreement among 24 (of 800) members to enhance transparency for customers when roaming. This initiative is limited to data roaming and includes sending SMS to customers to remind them of data roaming charges when they arrive in a foreign country, implementing a data spending limit and sending alerts when that limit was reached and temporarily suspending data services when the limit was reached.[110] The GSMA also developed in 2006 a voluntary Code of Conduct for operators in the Arab Region signed by 27 operators in the region (as of 2007). The aim of the Code of Conduct *"... is to provide greater consistency and clarity to the range of information available to consumers on charges and available services, so that when away from their home network they are able to make better informed decisions..."*.[111]

[109] Australian Communications and Media Authority, Telecommunications (International Mobile Roaming) Industry Standard 2013. www.acma.gov.au/~/media/Consumer%20Interests/Information/pdf/Telecommunications%20International%20Mobile%20Roaming%20Industry%20Standard%202013%20pdf.pdf

[110] www.gsma.com/newsroom/gsma-launches-data-roaming-transparency-initiative/

[111] GSM Association, Code Of Conduct for Information on International Roaming Retail Prices in the Arab Region, page 2, www.gsmaw.org/documents/gsme_coc_int_roaming.pdf

Box 6: Extract from APT guidelines for regulators and for operators on consumer protection[112]

- Regulators should have a webpage on their websites dedicated for provision of IMR-related information and advices to consumers.
- Regulators should provide hyperlinks to the web pages of individual operators dedicated for IMR-related information.
- Information of various types of alternatives to IMR services, including but not limited to a description of how these alternatives are used, their advantages and limitations, etc.
- Operators are recommended to provide clear, accurate and easy to understand information on IMR services to customers.
- Customers should be informed that in general IMR is significantly more expensive than using their national mobile services.
- Subscribers should be informed that, when roaming, they may be paying for making and receiving calls and SMS messages as well as using mobile data services including email.
- Operators are recommended to inform subscribers of different charging structures for IMR compared to national services.
- Customers should be provided with inform on how to deactivate all or some IMR services.
- Customers should be notified by SMS messages when they roam outside their home country through SMS that IMR charges will apply.

5 Initiatives by mobile network operators

There was an earlier perception in the mobile industry that as the mobile market developed and matured competition would reduce international roaming prices. Indeed, IMR prices have declined over time, but not sufficiently relative to costs and relative to price reductions for services at the national level. Many also argued that technology would also bring about changes in the market avoiding the need for any regulatory initiatives. Again, while new technologies have emerged, they have not been sufficiently close substitutes so as to create conditions for the development of effective competition in the IMR market. On the contrary, with the growth in the number of mobile subscribers, expanded usage of mobile services and the development of mobile data services, the problem of high prices has become more serious. In effect, the maturity in the mobile market and technological developments, such as smartphones and mobile Internet, have increased rather than reduced the problem of high roaming prices.

This does not mean that there has been no progress in the market. On the contrary there have been several developments taken by mobile network operators over the last decade which have helped somewhat in reducing prices and increasing the efficiency in offering IMR services. An important development was the implementation of traffic steering allowing a mobile operator to steer their roaming subscribers in visited countries to preferred mobile networks, rather than randomly as in the past. The preferred networks are either affiliated with the home operator or are preferred because more favourable wholesale discounts have been negotiated. Such techniques can stimulate some wholesale competition to the extent that an operator can use steering techniques to obtain better IOTs. This does not necessarily imply that these lower wholesale rates are always reflected in retail rates. However, a rare example of transparency indicates that using preferred networks can lead to substantial savings: China Unicom has informed subscribers that "[u]*sers will enjoy different discounts in roaming charges in*

[112] See Asia Pacific Telecommunity (APT), International Mobile Roaming Working Group Working Group Report, 15 May 2012: www.apt.int/sites/default/files/2012/05/APT_IMR_Working_Group_Report_Final.pdf

different operator networks .... For instance, uses roaming in Australia will spend 2.86 yuan/minute to call back to the mainland China in Vodafone's network; it will cost 6.86 yuan/minute to make the same phone call in Telstra's network. Users could have more benefits overseas if they choose the preferential operators".[113]

A second development has been the creation of alliances which have been facilitated by steering. These alliances have been either between independent companies or through affiliated companies allowing for lower mobile roaming rates at the wholesale as well as the retail level. Such alliances include companies such as Airtel, MTN, Orange and Vodafone in Africa, and Vodafone and Hutchinson 3 in Europe, as well as alliances among non-affiliated companies (Starmap, Bridge Alliance, Free Move).

The development of roaming hubs has also helped market participants, in particular the small mobile network operators, reduce costs by outsourcing billing and other administrative procedures to these hubs. The GSMA Open Connectivity project, which began in 2005, was aimed at allowing operators to interconnect through hubs rather than have to rely on bilateral agreements. In 2007 the Open Connectivity project began commercial launch of SMS hubbing allowing operators to exchange SMS with other operators through a single multilateral agreement. The project has been followed with Roaming Hubbing which facilitates the roaming reach of operators by allowing them to enter into roaming agreements with other operators through hubs.[114]

However, there remain significant anomalies in the international mobile roaming market. For example, in examining roaming prices, whether for voice or data, it would be expected that if an operator from country A (A1) charges relatively low rates for its clients when they roam in country B then the clients of an operator in country B (B1) would be expected to also incur low roaming rates when travelling in country A. This expectation is based on the fact that the largest part of costs facing the operator A1 are the wholesale charges of B1. If wholesale prices offered to A1 by B1 are relatively low, why has the operator A1 not reciprocated? The answer is either that operator B1 has imposed high retail margins, or that significant traffic imbalances exist between the two operators, or costs are significantly different. If the volume of traffic generated by A1 is significantly higher than traffic generated by B1 this could account for differences in bargaining power and hence wholesale rates. As an example, calling China from the United States while roaming with China Telecom costs USD 0.15 per minute. Calling the United States from China using the standard rates from major United States mobile operators costs in the range of USD 1.99 to USD 2.99. In contrast using Skype to call China or the United States from anywhere in the world incurs a charge of USD 0.26 per minute, a price which reflects call termination charges. The rationale for this significant difference in charges is difficult to understand.

A number of mobile operators have put in place special offers for mobile roaming either as a general offer covering all countries or for specific countries, usually those that are the most visited. Some of these offers require that travellers pre-subscribe before leaving their countries and in certain cases offer a monthly package (for a specific country or region/zone) for a price lower than the standard roaming rate. While in many cases the per minute price of these offers are significantly lower than the standard prices, this is only the case if all the minutes in the offered package are used since unused minutes are not reimbursable. In addition, some packages are offered on a monthly basis so that a subscriber travelling for only a short period is unable to take advantage of them. Other packages, while offering low per minute prices, require a one-off subscription charge which effectively increase the per minute call charge.

[113] China Unicom Press Release, http://eng.chinaunicom.com/media/Releases/file152.html

[114] See, for example, www.gsma.com/newsroom/ir-80-v1-2-technical-architecture-alternatives-for-open-connectivity-roaming-hubbing-model

5.1 Mobile voice and SMS roaming

Roam like home

A number of operators offer rates similar to home, sometimes with a surcharge to compensate for exchange rate differentials. African mobile operators have been leaders in reducing and eliminating international mobile roaming charges within the region that they operate in. Zain (formerly Celtel), in particular, has been a leader in this process. In 2006 Zain inaugurated One Network eliminating IMR charges for its customers in Kenya, Tanzania and Uganda (i.e. customers paid domestic rates for outbound calls when roaming and were not charged for incoming calls).[115] The One Network expanded during 2007 to cover 6 more countries in Africa.[116] By the end of 2007 Zain claimed that One Network served "400 million people across 12 countries now connected across Africa in one borderless mobile network covering an area more than twice the size of Europe".[117] [118] Subsequent expansion of Zain also covered the MENA region.[119]

The fact that Zain had licences in contiguous countries was an important factor supporting the development of One Network as was the liberalization of international gateways in the countries in which it operated. One Network subscribers can make calls to their home country and send SMS at prices applicable in visited countries and receive incoming calls from their home country for free. However, the elimination of roaming charges applied only to traffic which was retained on the Zain network i.e. on-net calls. Nevertheless, given the rapid expansion of the company across the African continent the benefit to customers was significant.

By creating disruptive competition Zain created pressure resulting in a number of other African operators offering cheaper IMR to neighbouring countries or to countries where they had a footprint usually following the Zain model by providing subscribers with free incoming calls and SMS in visited countries and paying prices in the visited countries for outgoing calls. For example, Glo announced in May 2012[120] a roaming service (UniWorld) offering a uniform local tariff for prepaid and postpaid subscribers in Nigeria, Benin and Ghana. Orange created a zone of West Africa countries in 2007, comprising Guinea, Guinea Bissau, Ivory Coast, Mali and Senegal and provided free incoming calls for subscribers in those countries when roaming in the region.[121] Vodacom (South Africa) provides free incoming calls and SMS to its subscribers roaming in six African countries (Democratic Republic of Congo, Ghana, Kenya, Lesotho, Mozambique and Tanzania), where Vodafone or Vodacom operate, calls in the visited country at local rates, flat rates for outgoing calls back home and data roaming charged at ZAR 5 per MB (EUR 0.38).[122] In contrast, in Europe (prior to the EU regulations on roaming) where several companies have a fairly extensive cross-border footprint prices were reduced but never eliminated.

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115 See Sutherland, Ewan, International mobile roaming in Africa, Link Public Policy Research Paper No. 10, March 2010, http://link.wits.ac.za/papers/Sutherland-2010-mobile-roaming-africa.pdf

116 In early 2010, Zain accepted an offer for the sale of all its Africa operations to Bharti Airtel which still operates the One Network in Africa.

117 Zain Press Release at: www.zain.com/media-center/press-releases/africa-abolishes-roaming-as-zains-one-network-expands-2/

118 It should be noted that the percentage of population roaming in the One Network region compared to Europe is much lower as is the revenue generated by roaming relative to total mobile service revenues.

119 The Zain Africa interests were sold in 2010 to Bharti Airtel.

120 The Nation (Nigeria), www.thenationonlineng.net/2011/index.php/business/infotech/48384-will-subscribers-get-cheaper-roaming-charges.html

121 See, www.orangebusiness.sn/njelbeenbumaag,djoumtou,3,7,50,788,ay,b10fb419cb7cf0c

122 See, www.vodacom.co.za/personal/services/roamingproductsandservices/africaroaming/?pageUrl=/personal/services/roamingproductsandservices/africaroaming&firstLoad=true

MTN (South Africa) offers free incoming calls and SMS for its subscribers roaming in the South and East Africa region and outgoing calls to the countries in the region are at a similar rate. Telia (Denmark) can 'roam like home', that is voice and SMS incur the same charges as in Denmark when calling back to Denmark and incoming calls from Denmark are free. The service is valid for the Baltic and Nordic countries (if the subscriber remains on the Teliasonera network). Tele2 (Sweden) is marketing a VoIP application allowing its customers to make and receive calls outside of Sweden at the price of a normal mobile voice call. Meteor (Ireland) announced in 2011 that subscribers would pay the same charges for voice and SMS.[123] This included no charges to receive calls or SMS. Vodafone New Zealand offers its standard home rate for its subscribers travelling to Australia.

"Roam like home" pricing offers clearly benefit subscribers by reducing their roaming charges. However, there is a question from the regulatory perspective as to whether such practices distort competition. In other words, does the fact that large MNOs with a multi-country footprint in a region harm competition in that their wholesale roaming charges for their own affiliates are lower than those charged competitors. Regulatory authorities in national markets have found that on-net pricing by mobile operators can distort competition and in a number of countries restrictions on on-net discounts have been imposed on operators. As an example, the French competition authority in 2012 found that the differential between on-net and off-net prices charged by Orange and SFR were not justified by cost differences between the cost of these calls. The authority also found that the "club effect" (i.e. customers shifting to the large operator since most of their family and friends are with that operator) from low on-net calls had a negative impact on smaller operators.[124]

Do these concerns apply to the IMR market? In that subscribers seldom choose operators on the basis of their IMR prices, since they are more concerned with the domestic bundle of services and prices of operators, the "club effect" does not play a role in the IMR for consumers. For businesses, which are active in a multi-country geographic region "Roam at home" pricing may be important. Again, given that larger businesses may be able to negotiate lower roaming prices with operators such roaming packages may not be that important. There could be a general regulatory concern that MNOs with affiliates in neighbouring countries discriminate in wholesale prices although IOTs, in principle, are required to be applied in a non-discriminatory way to all MNOs according to the GSMA STIRA obligations.

If MNOs with a multi-country footprint are offering "Roam at home pricing" and adhering to STIRA obligations, then the ability to offer lower roaming prices implies that this is undertaken by significantly reducing retail margins rather than wholesale - or providing significant discounts to the wholesale prices. The basis for offering calls for free in a visited country is not clear. In such cases a call for free in the visited country implies that mobile termination in the visited country (which should be paid by the MNO's affiliate of the home country), international transit, and roaming specific costs are absorbed by the home country MNO. If these costs are low, they can be compensating by the higher charges for outgoing calls. It should be noted that before the introduction of the IOT framework by the GSMA, the framework in place (normal network tariff) only allowed visited networks to charge for incoming calls if domestic subscribers also paid for incoming calls. As a result in those countries with "calling party pays" there was no charge for incoming roaming calls.[125]

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[123] See, www.meteor.ie/do_more/roaming/

[124] Autorité de la concurrence, www.autoritedelaconcurrence.fr/user/standard.php?id_rub=417&id_article=2013

[125] See, European Commission, Working Document on the initial findings of the sector inquiry into mobile roaming charges, Brussels, 13 December 2000, http://ec.europa.eu/competition/sectors/telecommunications/archive/inquiries/roaming/working_document_on_initial_results.pdf

5.2 Mobile data roaming

A number of mobile operators have introduced mobile roaming data packs which provide a prepaid data allowance valid for a fixed period. These packs may be cheaper than the standard mobile data roaming prices depending, however, on use. The leftover allowance is not refundable so that a casual user of mobile data roaming may end up paying more per MB used if all the allowance is not consumed. The packs have the advantage in that a user is made more aware of their consumption and charges since once the allowance is consumed the user is required to "top-up" the allowance. Nevertheless, in most countries outside the EU, which now has regulated mobile data roaming prices, the prices of packs are significantly higher than what a customer would pay for domestic mobile broadband. For example, *Telstra*, Australia, charges AUD 29 for 20MB for roaming which is 72 times higher than its 1GB domestic mobile broadband internet charge. For some operators the comparison between domestic and international mobile data roaming charges is difficult to calculate. For example, *Telecom New Zealand* charges NZD 10 per day for roaming in selected countries without an allowance whereas for domestic use prices are per MB. For the non-selected countries, however, roamers pay NZD 2.50 per MB compared to NZD 0.03 per MB at home. *Verizon* (US) has a global data plan equivalent to USD 0.25 per MB compared to USD 20.0 MB that a subscriber would pay on a pay-per-use basis when roaming. *Telekom* (South Africa) charges ZAR0.03 per MB for domestic stand-alone mobile data whereas for roaming the price is ZAR 12 per MB for most destinations (and ZAR 26 for New Zealand and Australia). *Telekom Austria* introduced a data roaming SIM which starts at EUR 9.90 and allows access to mobile Internet at EUR 0.54 per MB. The SIM is available as a standalone product and covers 60 countries and remains valid as long as it is used once a year.

The EU has set standardized wholesale and retail charges for data roaming across the EU (and EEA) countries. In 2012 *Telefónica* introduced a standardized data roaming plan for its Movistar and O2 subscribers for EUR 2 per day for 25MB, significantly lower than the maximum regulated Eurotariff of 0.45 per MB effective from July 2013 and the agreed Eurotariff of EUR 0.2 effective from July 2014. [126] *Three Mobile* (UK) has a per day data roaming offer for unlimited use in Europe for EUR 5.8 per day and *Meteor* (Ireland) has a data roaming offer of EUR 0.99 per day for 10MB. *T-Mobile* (UK) has a range of offers valid for Europe and other regions which are valid for 30 days (Table 10). *Vodafone's EuroTraveller* allows the subscriber to have the same mobile data access in the EU as at home for GBP 3 a day. Many of these offers indicate the success of EU in regulating prices and the pressure from customers for more competitive data roaming prices has led to some operators to reduce their prices below the regulated Eurotariff data roaming retail price.

Table 10: T-Mobile (UK) Broadband Booster roaming charges (In GBP)

Data allowance (MB)	EU	US	Australia	South Africa	China
3	1	5	5	10	5
20	5	20	20	37.5	20
50	10	30	30	75	30
200	35	100	100		100

Source: T-Mobile (UK), www.t-mobile.co.uk/shop/mobile-broadband/euro-broadband-booster/

Elsewhere, many other mobile operators have reduced prices or introduced specific packages applicable for multiple countries or for specific countries. As an example Vodafone India has introduced a roaming package which is valid for individual countries. The packages provide significant discounts. For example,

[126] Movistar is in Spain and O1 in the UK, Ireland, the Czech Republic and Slovakia.

the Vodafone India discounted data roaming prices in France (see Table 11) are much lower than the standardised rates. However, the sign up charge (equivalent to around EUR 32) is equivalent to six times the monthly charge for the most expensive monthly postpaid subscription. Vodafone India also offers unlimited roaming data access in Japan and Saudi Arabia on its partner networks for INR 499 per day (EUR 6.4). Another interesting case is 3 Denmark, subscribers receive voice/data services at exactly the same rates when roaming internationally on sister network 3 Sweden as when at home on 3G and 4G networks.

Table 11: Vodafone India Roaming Package for France (prices in Indian Rupees)

Roaming services	Existing	Discounted
Local outgoing call	INR 70/min	INR 25/min
International call	INR 140/min	INR 50/min
Incoming Call	INR 70/min	INR 25/min
Outgoing SMS	INR 15/SMS	INR10/SMS
Data	INR 5.50/10Kb	INR 0.40/10KB
Pack validity	30 days	
One time charge	INR 2499	

Source: Vodafone India, www.vodafone.in/postpaid/roaming/pages/international_roaming_offers.aspx?cid=mum#plan1

In many cases operators have reduced charges as a result of regulatory pressure rather than legal requirements. For example, *Etisalat* reduced calling charges for its UAE customers travelling within the Gulf Council Countries (GCC) by up to 26 per cent in early 2012 following a request by GCC officials to the regions MNOs. In April 2011 Singapore and Malaysia announced a progressive reduction of roaming rates (up to 30 per cent for voice and 50 per cent for SMS) following Ministerial pressure and in June 2012 Singapore and Brunei announced that they would begin in 2013 to jointly reduce roaming rates.

In May 2012 China Telecom began a novel prepay service by launching a UK MVNO (CTExcelbiz) which markets prepaid packages for China Telecom customers in the UK. The service also provides a local Chinese number which friends and family in China can use to call a China Telecom roamer in the UK. China Mobile is also offering discounted data roaming rates to their customers for voice calls and data access when they are roaming internationally in key business destinations. For example, the China Mobile data roaming price for its customers when they are in the US is the equivalent of USD1.50 per MB significantly lower than what US operators are offering their customers when roaming in China. The company has also indicated that it would become an MVNO in the USA, with plans for entry into France and Germany. In July 2013 China Telecom announced further price cuts in roaming fees stating that its maximum roaming charge for customers calling home would be CNY 3 (about 38 eurocents a minute) and for some regions prices would be just under CNY 2 (26 eurocents) or just under CNY 1. For example in Singapore the charge would be just under CNY1 (13 eurocents). The price for mobile Internet was also reduced for 63 countries to CNY5 per MB (64 eurocents).[127] China Unicom has also been reducing its roaming prices significantly. For example, their subscribers roaming in the US can make local calls, receive calls and call home for CNY 0.96 a minute (EUR 0.12). [128] China Unicom also offers a data roaming package of CNY 60 for 60 MB per day (EUR 7.37) in the Asia-Pacific region.[129]

[127] CRI English, http://english.cri.cn/7146/2013/07/04/2361s773869.htm

[128] See, www.cn-c114.net/576/a779370.html

[129] It is worth highlighting that China Unicom providers for data roaming a daily traffic alert to its subscribers and a reminder for each 10MB of data used.

5.3 Substitutes for mobile roaming

Many of the technological solutions that have emerged for roaming, have done so precisely because roaming prices are high providing arbitrage opportunities. One estimate of the market for alternative mobile roaming services which by-pass traditional offers is that it reached USD 17 billion in 2012.[130] Although, as noted above, there has been a downward trend in IMR prices, demand has also increased as a result of increased travel and the use of mobile data.[131] Unless significant changes take place in pricing structures, especially for mobile data roaming, the market for alternative solutions is likely to grow.

Regulatory authorities can take steps to ensure that some of the substitutes on the market are made available for users but they are not in a position to make recommendations on substitutes or to "pick winners" by describing the benefits or limits of the various technological solutions. However, an important role for regulators is to take steps to remove any unjustifiable obstacles which may limit the availability of these substitutes and the ability of substitute services to compete in traditional mobile roaming markets. By so doing, regulators can facilitate the development of some mobile roaming market competition. In respect to IMR markets there are several areas where a regulator can take action. These are outlined below.

In entering into a commercial contract for mobile services there are certain demand characteristics which are important to the user. These are accessibility, that is the ability to make and receive calls from a single number; mobility, allowing the user to make and receive calls from any geographic location; coverage, allowing the user to make and receive calls while on the move; and, having a single subscription, eliminating the need for several bills and to deal with several companies. It is important to understand these demand characteristics since they play a role in the extent that alternate services and technologies have utility to the user and can be considered as substitutes. Thus, payphones and hotel phones in the visited country, while always available, cannot be considered as substitutes. Neither is email a substitute for SMS messaging.

Other than trying to limit usage to reduce costs a mobile user, when roaming, has to find alternative calling and mobile messaging and Internet access services. In all cases the substitutes available are very much second best where users may no longer benefit from using their home country mobile number, may not have mobility (that is may need to call from a fixed geographic location), and may be required to contract for another subscription. Nevertheless these alternative solutions help reduce charges either for outgoing calls back to the country of origin, make calls in the visited country or to a third country, receive calls or for messaging. The foregoing applies mainly to voice and messaging services. In contrast substitutes for mobile data roaming are close in features offered by home mobile service providers (speeds may differ), although not necessarily in terms of pricing.

The growth in mobile roaming substitutes are reminiscent of developments in the fixed market for international calls where, because of high prices, call-back services developed providing cheaper international voice services. High international call prices were largely due to high international wholesale charges (accounting rates) which in certain markets were significantly high.[132] As accounting rates declined toward cost many of these services disappeared.

The substitutes outlined below do not provide a complete overview of all services since the market is evolving rapidly with many new entrants and new technologies which have emerged on the market. Some are innovative but it is not clear what impact they will have and in many cases their success is dependent

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[130] See Syniverse, www.vanillaplus.com/news/item/2264-syniverse-identifies-us$17-billion-transient-roamer-market

[131] China Mobile has estimated that travellers from China increased to 83 million in 2012, up 18 per cent from 2011. See CRIEnglish at http://english.cri.cn/7146/2013/07/02/2702s773533.htm

[132] See, for example, OECD, OCDE/GD(97)14, New technologies and their impact on the accounting rate system, Paris, 1997, www.oecd.org/sti/2091041.pdf

on having high prices in the traditional IMR market. One example of an innovative technology is *Crowdroaming*[133] which essentially makes available a subscriber's smartphone data subscription to other subscribers who have downloaded the *Crowdroaming* application on their smartphone. This application is effective where subscribers have unlimited data, or unused data, as part of their mobile subscription. In return for making their excess data requirements available to visitors, the subscriber when travelling has access to other *Crowdroaming* subscribers in visited countries. Clearly the success of this application will depend on how popular the service becomes and the type of mobile data packages available in visited countries, as well as the ability to find a local *Crowdroaming* subscriber in a visited country.

The technologies, excluding fixed public telephony solutions which are always available, can be divided into a number of categories:

- Use of alternate SIM cards
- VoIP solutions
- Messaging solutions
- Mobile data substitutes

5.3.1 Use of alternate SIM cards

Visited country SIMs

One important alternative available to users when roaming is the ability to purchase a SIM card in the visited country. GSM networks, which use SIM cards, are widespread across the globe and increasingly CDMA terminals support removable smartcards. [134] [135] Many new smartphones are also tri- or quad-band facilitating roaming. Most countries allow non-residents to purchase SIM cards.[136] There are, however, constraints.

To use an alternate SIM card requires that the user's mobile terminal is unlocked. All countries do not have a requirement that mobile service providers are required to unlock mobile phones after a relatively short contractual period. This issue is linked with the subsidy provided to users of mobile phones. It is a regulatory issue that needs to be resolved to facilitate roaming and, in general, in the interest of users to facilitate domestic competition.

However, by purchasing a SIM card in the visited country an international roamer no longer has access to their home country number and can only be reached when reinserting the home country SIM in their mobile phone, or if the user has a second mobile phone, or a dual SIM card device. If the user opts to use a SIM from a visited country then it is necessary to inform family, friends or business colleagues of the new number which in itself can incur costs. Where different technologies are used in the visited country, changing SIM cards may not be possible so that handset rental is required often at relatively high prices. Overlay SIM card technologies exist which allow the subscriber to keep their existing SIM. The overlay SIM handles calls when the subscriber is in a visited country. Depending on the technology some of the overlay SIMs provide what is essentially a callback service.

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[133] See www.crowdroaming.com/

[134] Many CDMA terminals do not have a removable card, however, to facilitate roaming a R-UIM (removable user identity card) was developed for CDMA handsets extending the GSM SIM card to CDMA terminals and networks. This card has been superseded by the CSIM application allowing users to change smartcards.

[135] In some countries only GSM devices which support 3G can be used (e.g. Japan and the Republic of Korea). A characteristic of the GSM standard is the removable SIM card.

[136] One exception is Japan where foreign visitors can rent but not purchase SIM cards for voice (although b-mobile sells data SIMs).

The rationale in changing SIM cards is to save roaming costs. However, determining whether using a SIM card from the visited country is cheaper than using the user's own mobile service operator for voice calls and messaging is complex and requires the user to know their expected consumption in the visited country and a knowledge of pricing structures in that country. As shown in the example in Table 12 for a French visitor in Japan the most cost effective choice depends on usage which is often difficult to predetermine and requires an estimate by the user of their expected basket of calls, messaging and data usage. Language may also pose a problem in trying to find the best deal and, in addition there are search costs involved in finding an appropriate service provider in a visited country. There is a probability that users who have insufficient knowledge and have not undertaken sufficient preparatory work before travelling could end up paying more for voice and messaging services than if they used mobile services in their own country. Much in fact depends on prices in the home country and the pricing structure in the visited country.

Table 12: Local rental or pay roaming charges? The case of a French visitor to Japan

	JP Operator1	JP Operator2	JP Operator3	JP Operator4
SIM/rental	Free	0.8 EUR/day	7.26 EUR/day	0
Incoming calls	Free	Free	Free	0.30 EUR/min
Outgoing call*	1.77 EUR/min	3.1 EUR/min	1.22 EUR/min	0.34 EUR/min
Local calls	Free	0.80 EUR/min	1.22 EUR/min	0.34 EUR/min
Outgoing SMS**	0.96 EUR	1.14 EUR	Free	0.27 EUR
Incoming SMS	Free	Free	Free	Free
Data roaming	16.5 EUR /MB	20 EUR/MB	Free	0.51 EUR/MB

* *To France; Outgoing to rest of world – For FR operator=2.19 EUR/min; for JP1 =1.77 EUR/min; for JP2 range from 2.3-7.5 EUR/min; for JP1.22 EUR/min*

** *per SMS message*

Source: Author from operator web site

Other SIM card solutions

In lieu of obtaining a SIM card in the visited country a user can try and take advantage of a number of different technologies and services which are on the market. The choice is difficult and in many cases some of these services are more suited to heavy users of international roaming or to users who visit a particular country frequently or expect a relatively long stay in a visited country. A user who is visiting multiple destinations may not always find a solution covering all destinations and would also need to determine whether a second SIM card is the cheapest for all visited destinations. If the user is a frequent visitor to a second country then a dual-SIM card device or dual-IMSI may provide a solution.[137] For the average visitor to another country the choice is not simple and the proposed solutions may in fact be more expensive. Many of these services require users to be familiar with prices, their expected consumption pattern, have some technical knowledge and are well prepared before leaving their home country since they are required to pre-subscribe to many of these services.

The availability of dual-SIM cards provides users with an alternative calling procedure to by-pass high IMR charges but also requires users to subscribe to a second service provider and to purchase a terminal which supports dual-SIM cards, although software solutions exist which integrate the home SIM card with a SIM card purchased in the visiting country avoiding the need to have a dual-SIM card phone. The use of SIM cards with multi-IMSI numbers have also been suggested as a potential technical solution. This would allow a user to choose a different operator

[137] IMSI or international mobile subscriber identity numbers are embedded on SIM cards and used to identify the subscriber.

for local mobile services and international mobile services. *Gentay*, a company specializing in the communication needs of the maritime industry launched in 2012 a global roaming SIM card using multi-IMSI[138] technology and offering worldwide connectivity for voice and data at local rates.[139] Multiple numbers can also be incorporated on the SIM cards to reduce the cost of incoming calls. *HolidayPhone* provides a range of packages depending on he visited country. For some countries *HolidayPhone* uses call forwarding allowing a roamer to receive calls on their domestic mobile number while roaming with the *HolidayPhone* SIM card. The range of pricing from *HolidayPhone* in Table 13 is also indicative of what alternate providers can negotiate with service providers in visited countries.

Table 13: *HolidayPhone* pricing packages for a roamer from France

	France-United States	France-Canada	France-South Africa
Incoming calls from France	1 hour free from domestic number	1 hour free from domestic number	1 hour free from domestic number
Outgoing calls to France	4 hours included	EUR 0.54/min	
Local calls	Unlimited free	EUR 0.36/min	EUR 0.09/min
SMS receive	free	free	free
SMS send	Deducted from 4 hours of outgoing calls but outgoing MMS free	EUR 0.25	EUR 0.14
Data	2GB included	EUR 18 for 500MB	EUR 5.78 for 500MB or 23.89 for 2GB
Price and validity	EUR 99.90 / 30 days	EUR 49.90/30 days	39.90

Source: www.holidayphone.fr/

Flexiroam (Malaysia) supports roaming in 200 countries but the subscriber needs to purchase a local SIM card in the visited country and requires a mobile phone with call forwarding functionality.[140] *TravelSIM* (Australia) provides a prepaid SIM card and a single number valid for 190 countries. It allows the user to receive free calls in 115 countries. The service also allows users (for an extra charge) to divert calls to their home mobile number to the *TravelSIM* service allowing them to receive these calls when using the *TravelSIM* service.

Global MVNOs

A number of companies have emerged as 'global MVNOs'. These have obtained access to local mobile and fixed networks in several countries at local wholesale prices and can connect to local mobile network operators. The development of these companies has been facilitated by regulations in some countries that require MNOs to allow MVNOs to connect to their network. Global MVNOs can reduce prices relative to traditional MNOs by by-passing IOTs. As argued earlier, to implement structural solutions to develop effective competition in global roaming, such requirements are necessary. Regulators play an important role in facilitating market entry of MVNOs and ensuring that they can interconnect on reasonable terms with MNOs. The GSMA, for example, found that in Asia and Latin America that regulation has constrained market entry of MVNOs.[141] MVNOs which provide substitute roaming services usually provide local

[138] The International Mobile Subscriber Identity is a unique identification associated with a mobile user and used to send details of the mobile to the network including details of the mobile to the Home Location register or to the Visitor Location Register (when roaming).The IMSI determines whether a subscriber can use a particular network and used to obtain the subscriber data.

[139] www.gentay.co.uk/newsandpr.php?category=News

[140] www.flexiroam.com/

[141] GSMA, The MVNO model, global footprint and outlook, https://gsmaintelligence.com/analysis/2012/05/the-mvno-model-global-footprint-and-outlook/337/

numbers to clients in each of the visited countries. As an example, *Woolworths Mobile Global Roaming* (Australia) uses a global SIM covering over 200 countries. The SIM comes with a UK local number and the subscribers home mobile number can be diverted to receive calls on the global SIM. Local landline numbers can be bought for other countries. The cost for a SIM, which is valid for one year, is AUD 29 (EUR 20), equivalent to about 10 calls from France to Australia at the standardized roaming charges of the major mobile operators from that country. Data roaming charges with *Woolworths* would be AUD 0.61 for 1MB for roaming in the UK compared to AUD 15-20 with the standard charges of the traditional mobile operators from that country.

Truphone (UK) offers local rates for voice, SMS and data in a number of countries using local MVNOs as local partners in those countries. Maxroam (Ireland) provides a global SIM with wide coverage at USD 19.44. Customers can purchase local landline numbers in 60 countries so that incoming rates to a local number would be diverted to the Maxroam number and the customer would be charged at a local rate. Toggle (UK) provides a local number in 8 European countries on its SIM card so that roaming in those countries is at local rates. It also supports free incoming calls in 20 countries. Roamer uses a software solution and allows the subscriber to make and receive calls on their usual number. Before leaving on a trip the customer redirects their phone number and obtains a SIM card in the visited country so that incoming calls to the home mobile number are redirected to the number in the visited country. Roam Mobility, based in Canada offers roaming for Canadians visiting the United States. It has teamed up with T-Mobile in the US and provides a US number to customers and unlimited calls and text to Canada and the US for a fixed per day charge.[142] Transatel, a French based company, offers to European roamers a multi-IMSI SIM card with embedded local numbers in 5 countries so that local calls in the visited country are made at local rates and outgoing international calls are also at local rates.[143] Singtel GlobalDial 121 provides customers with a call-back service. Interfone, a Danish company markets an overlay chip for GSM phones, available only to business users, which when the user dials an international number or roams internationally takes over the call.[144]

5.3.2 VoIP solutions

Although VoIP service applications, such as *Skype*, provide a relatively cheap means of communications when roaming, there are constraints. In certain countries mobile operators can prevent their subscribers from downloading on their smartphones VoIP applications preventing them from accessing these services. For certain VoIP applications the subscriber has to obtain Wi-Fi access which limits the use of such services and, where free Wi-Fi is unavailable may increase the charges in using such services. If the VoIP communication uses wireless then data roaming charges will come into play again increasing the cost of calls. Nevertheless services such as Skype offer subscription prices for specific countries (as opposed to *pay-as-you-go pricing*) which provide for unlimited minutes for a fixed price. As an example, the monthly rate for unlimited calls to the US from anywhere is EUR 4.99 a month or for 120 minutes the monthly rates is EUR 1.69 a month. the 'Unlimited World' rate is EUR 10,49 a month. *Zerophone* provides an unlimited North American call package (US and Canada) for EUR 5.27 month or country specific packages, such as for France at EUR 7.53 for unlimited calls. *Zerophone* recommends that its subscribers use Wi-Fi when roaming and estimates that a 10 minute call would use 1.2 MB of data which would be subject to roaming charges if 3G were used.[145] Despite the high price for data roaming in many countries, there could be considerable savings from using some of the VoIP solutions. There are a number of other VoIP service providers with a range of prices and features, many of which require a subscriber to undertake research and comparative pricing before travelling.

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142 www.roammobility.com/

143 www.transatel-mobile.com/

144 www.interfone.com/frontpage.php

145 See FAQs, www.zerofone.ca/

5.3.3 Messaging solutions

A number of substitutes exist for messaging services but they are not exclusively linked to the mobile terminal number and, as such, may not be considered as close substitutes even though for some of the messaging applications the message can be received on the terminal. SMS is ubiquitous and it is sufficient to know a mobile number to send a message. Most 'Over the Top' (OTT) applications are limited to communicating with users who have also downloaded these applications and have accepted other users as 'friends'. Despite this, applications such as '*WhatsApp*', *'Facebook chat'* and '*iMessage*', etc. offer a means to remain in contact with family and friends at low or no cost. However, in that Internet access may be required data roaming charges will be incurred for OTT use unless free Wi-Fi access is available.

5.3.4 Mobile data substitutes

The fastest growing mobile service in home markets and in mobile roaming is for mobile data (referred to as well as mobile Internet or mobile broadband). The prices charged for mobile roaming data by most mobile network operators tend to be extremely high and the examples of "bill shock" that have led to media interest are usually the result of access to mobile data while roaming.

Many of the alternative offers, such as Global MVNOs, include mobile data roaming or have standalone offers. Relative to voice and messaging services, the mobile data roaming offers are a close substitute to the services offered by a subscriber's home mobile network operator. This is because numbering is not an issue. However, the inconvenience may be that voice is disabled on the subscriber's terminal during the period that the data SIM card is being used. But given the increasing proliferation of tablets which are 3G compatible, such roaming offers can be viewed as full substitutes to mobile data roaming. In many countries it is possible to purchase local SIMs and obtain access at local prices. For example, in France a visitor can obtain a data SIM for tablets at a per MB price ranging from EUR 0.03 to 0.01 from the established MNOs. Some MNOs have affiliates specialised in mobile data roaming such as R*oamline*, an affiliate of KPN, the Dutch fixed and mobile incumbent carrier that offers a global mobile data roaming service requiring a subscriber to pre-purchase a SIM card which can be used in 130 countries and is charged on a per use basis.[146]

DOODAD (US) offers an international data SIM card covering 59 countries.[147] For EU countries the price per MB is marginally higher than the regulated data Eurotariff. The price for Australia is USD 0.30 per MB compared to domestic offers from the major local MNOs of USD 0.03 per MB. *Globalgig* provides clients with a SIM for mobile data access with contract periods covering one, three and twelve months for 1GB, 2 GB and 5GB.[148] It is interesting that the *Globalgig* out-of-plan charge is EUR 0.17 per MB. This compares to the retail Eurotariff agreed at the EU level of EUR 0.45 and the wholesale tariff of EUR 0.15 effective 1 July 2013. *Globalgig* use the *Three* network in the UK, *Optus* in Australia and *Sprint* in the US. *LeFrenchMobile* has data bundles for Europe as well as for North America and the Asia Pacific region.[149] For Europe the data bundles are priced at EUR 0.40 per MB for 50MB and decreasing if a larger bundle is purchased.

For roamers calculations of the relative cost of data roaming is much simpler than for voice services as is the ability to purchase data SIMs in the visited country at the same price as national residents.

146 www.roamline.com/

147 www.getadoodad.com/

148 www.globalgig.com/

149 www.lefrenchmobile.com/

5.3.5 Wi-Fi access

A number of mobile network operators are taking steps to reduce roaming costs for customers by offering them packages providing Wi-Fi access in visited countries to access the Internet. These packages are useful for data access but nevertheless require customers to find the Wi-Fi access points which are not always convenient. For example, *Zain* has tried to reduce mobile Internet roaming prices by entering into an agreement with *iPass Mobile* network which has an extensive global Wi-Fi network.[150] This agreement will allow *Zain* to offer its subscribers Wi-Fi access when roaming. KDDI of Japan has offered a limited package to its users by providing Wi-Fi access for smartphones across 100 countries also with iPass.[151] SFR (France) has an agreement with Fon allowing SFR customers access to 8 million Fon hotspots across the globe (and Fon clients can use SFR hotspots in France).[152] *AT&T* and *Boingo Wireless* also agreed in 2013 to a reciprocal Wi-Fi roaming deal giving *AT&T* subscribers access to the *Boingo* global Wi-Fi hotspots while *Boingo* customers travelling to the United States obtain access to the *AT&T* Wi-Fi hotspot network.[153] Xcom Global provides mobile Internet access in over 150 countries.[154] Customers rent a device which essential allows mobile terminals or tablets to tether. The per day cost for unlimited Internet access is USD 14.95.

Wi-Fi provides a useful means of communication in particular for access to email and other Internet applications as well as a means to use VoIP services. Nevertheless it cannot be viewed as being a close substitute for international mobile roaming.

5.4 Making choices

As indicated above there are a range of different solutions, some are complex while others seem relatively simple, but all require that the subscriber reads the *fine print* and undertakes some research before leaving their home country. The prices offered by these new entrants are quite different and very difficult for the average person roaming to decipher and decide which is the best buy. It is also important that the subscriber has some notion of what usage they require and whether to favour mobile data or voice. The length of the period that a subscriber expects to roam, the number of times in a year that the subscriber roams and the countries visited, all play a part in deciding which alternative roaming package is the most economical.

Miscalculations may result in roaming being more expensive with the alternative solution than relying on the home operator for IMR. However, certain services which are essentially *pay-as-you-go* and provide mobile data access appear to be significantly cheaper than mobile data services provided by the traditional mobile network operators.

Regulators can help by informing users that alternative solutions exist and of the need to carefully research their requirements and relative prices before making choices. It is not up to regulators to choose what substitutes are best for their national subscribers who travel. Nevertheless, by providing information they can facilitate choices. One example, at the national level, where regulators help consumers is in Ireland where the regulator, Comreg, developed a web site (*callcosts*) to help consumers compare the

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150 See, www.zain.com/media-center/press-releases/zain-group-to-launch-global-wi-fi-data-roaming-service-based-on-ipass-open-mobile-exchange/

151 www.ipass.com/press-releases/kddi/

152 http://corp.fon.com/blog/#.UfasEo03B8E

153 www.boingo.com/pr/articles/?a=2013-04-09-boingo-announces-global-wi-fi-roaming-agreement-with-atandt&id=871&date=2013-04-09

154 www.xcomglobal.com/plans

costs of fixed phones, mobile phones and broadband.[155] An equivalent site for mobile roaming could be developed allowing consumers to calculate relative costs before travelling.

More importantly, however, regulators should ensure that there are no obstacles to the take-up of alternative technologies. For example, many mobile operators have prevented users from downloading *Skype, WhatsApp,* or similar VoIP services which would help bypass high charges. For GSM phones regulatory initiatives, such as allowing subscribers to unlock their phones and use the SIM cards of alternate providers and from operators in visited countries are important to take advantage of substitutes.

Despite a range of near substitute technologies it seems that they serve a niche market for the more experienced traveller and do not seem to have made a significant impact in terms of attracting mainstream customers or on prices in IMR markets. Returning to the analogy with call-back providers in the fixed international telephone service market, call-back technology provided a close alternative to international voice calls, but the technology was insufficient to create competition in that market and change the accounting rate system which was in place. The creation of competition in that market required the opening of national markets to competition allowing direct access by national service providers to foreign markets so they could terminate cross-border calls locally. However, it is worth noting that there is more competition among the range of alternative roaming providers than there is in the traditional IMR market by MNOs. Although these alternative roaming service providers perform a useful service, they are unlikely at this stage to significantly transform the IMR market. Based on the EU benchmarks set for roaming services within Europe there still remains a significant gap between wholesale and retail prices.

For competition to eventually work in the IMR market there will be a need for structural solutions as proposed by EU which essentially requires allowing a subscriber to choose their roaming provider independently from their mobile network operator if a cheaper solution is available. This would require the decoupling of IMR from the standardized package that subscribers obtain from their mobile network provider (see Section 3 above on structural solutions). The global MVNOs provide such a separate service but with the added complication of having to change SIM cards and with no access to the home mobile number (other than through reinserted the SIM or carrying two phones) or subscribing to a service which 'parks' their local number so that it redirects calls to the SIM they use while travelling.

6 International, regional and bilateral initiatives

As noted earlier, price regulation of IMR charges is not very effective if carried out unilaterally by a country since the only prices they can regulate are the retail margin imposed on the wholesale roaming charges faced by national clients when roaming internationally and the wholesale charges imposed by national operators on foreign operators entering into roaming agreements. However, bilateral and regional agreements can be effective in lowering IMR charges where there is agreement by one or more countries and where the national regulators have the legal authority to implement changes. The section of price regulation above shows the significant price reduction that has taken place in the EU and EEA countries and initiatives in the GCC region and SADC region, which are expected to lower prices.

This section examines the role of trade in service agreements in the context of international mobile roaming, initiatives by international organisations and a synopsis of the regional and bilateral initiatives.

[155] www.callcosts.ie/home/default.asp

6.1 The role of cross-border and trade agreements

Domestic ICT regulators do not have any jurisdiction over wholesale rates for international mobile roaming charged by operators in foreign countries. As such, some form of cross-border co-operation is required which could be at the bilateral, regional or international level. The EU has shown the role that regional bodies can play in reducing prices and creating competition in IMR services. Clearly, a global agreement would be the preferred way forward, but is also the most difficult, and is unlikely to be the most rapid given the number of countries involved. While a number of regulators wish to move ahead with bilateral or regional agreements, there has been concern by some that trade negotiators will be reluctant to allow such initiatives arguing that a bilateral or regional agreements may have to be opened up to third parties as part of *most favoured nation* obligations.[156] [157]

Bilateral IMR service agreements, which have only begun to be implemented, have not to date been challenged by other countries in the context of the GATS MFN commitments. In the case of a bilateral agreement it may be possible for third countries to request their operators obtain the same treatment in the two countries that have a bilateral agreement and the request could be refused. This could lead to a dispute procedure at the World Trade Organization (WTO). However, it should be noted that the IMR bilaterals are unlikely to have an impact on third countries. As the OECD has stressed:

> "*It is noteworthy that the WTO framework is normally used by governments to conduct claims against other countries on behalf of their industry, that is, it is the trade barriers posed by a country to a third country's industry that ultimately make the third country's government initiate a dispute settlement procedure. In the roaming case, as the industry generally is against further regulation of roaming services, it would be somewhat unusual that a government intervened initiating a dispute under GATS lacking support from industry, or rather, against its will.*"[158]

Where a Free Trade Agreement exists between several countries a bilateral agreement between two countries covered by that agreement may provide a "free-ride" to operators from a third country. The benefits from the bilateral need to be examined relative to the costs of providing that "free-ride". If the economic and social links between the bilateral partners is high – and they usually are since that is the *raison d'être* of the bilateral agreement - then the benefits are likely to outweigh any costs.

Given the large number of governments and regional intergovernmental organizations that have raised the issue of international mobile roaming as a concern and the steps that they have taken to try and find solutions, it is highly unlikely that a WTO member would take the step towards lodging a complaint following a bilateral agreement. It could also be argued that such a process would be welcomed since it would bring clarity on the applicability of the Basic Telecommunications Agreement (and Reference

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[156] *Most Favoured Nation(MFN) treatment is an obligation under the General Agreement on Trade in Services (Article II) which requires that a signatory accords "... immediately and unconditionally to services and service suppliers of any other* Member *treatment no less favourable than that it accords to like services and service suppliers of any other country*"(Article II, 1.). *Common markets, customs unions, and free trade areas, however, are exempt from MFN provisions*, www.wto.org/english/docs_e/legal_e/26-gats_01_e.htm.

[157] See for example, Sydney Morning Herald | July 18, 2011, Hitch in bid to curb phone roaming costs by Lucy Battersby, "Federal [Australian Government] attempts to reduce global-roaming fees between Australia and New Zealand could be stymied by a free-trade agreement with the United States. The Department of Foreign Affairs and Trade is investigating if the introduction of price caps on mobile roaming fees will have an impact on the free-trade agreement with the US and agreements with Pacific countries. DFAT is concerned that under the US treaty Australian carriers may have to offer US visitors lower rates but Australians would not receive the same treatment there."

[158] OECD, International mobile roaming services: analysis and policy recommendations, DSTI/ICCP/CISP(2009)12/FINAL, Paris, 2010, page 19, www.oecd.org/dataoecd/22/56/48460109.pdf

Paper) to international mobile roaming. Regional bodies which have economic integration as part of their mandate may be less likely to be concerned with such arguments.[159]

By allowing third countries to join bilateral agreements on IMR and adhere to the same principles as the initial partners would also help to reduce the risk of disputes. The OECD in its policy paper argued that bilateral agreements should be open to all countries that were willing to reciprocate and take action against their operators wholesale rates, citing the framework developed (but not agreed to) by AREGNET, which was in the form of a MoU, as one example which could be used.[160] In the case of the EU/EEA region in the opinion of BEREC the roaming regulations, while only covering roaming services within the EEA area "... *domestic providers can freely settle commercial agreements to allow their customers to use local data roaming services outside the EEA and also considers that there is nothing in the Regulation preventing voluntary extension outside the EEA*."[161] BEREC also notes that the EU regulations do not prevent non-EEA customers from using the Access Pont Names which are used in data access networks.

The OECD in its work on international mobile roaming services suggested that the WTO framework could be used to provide a multilateral framework for international roaming services.[162] This framework has the advantage that once agreement is reached it would be binding on signatories. The disadvantage could be that, from experience, multilateral trade agreements often require protracted negotiations.

WTO adopted the Fourth Protocol of the General Agreement on Trade in Services[163] (more commonly referred to as the Basic Telecommunications Agreement) which came into force in January 1998. In conjunction with the Basic Telecommunication Agreement a number of WTO members developed, and adopted, a Reference Paper which provided a general framework for basic telecommunication regulation by which WTO members could comply with the Basic Telecommunications Agreement. The Reference Paper sets out some definitions (see Box 7) and a number of pro-competitive regulatory principles some of which could be interpreted as being applicable to international mobile roaming. The commitments in the context of the GATS regarding market access and national treatment members were based on four modes of supply (i) cross-border supply (ii) consumption abroad (iii) commercial presence and (iv) presence of natural persons.

[159] The GATS provisions on economic integration, Article V) specify that the GATS "does not prevent any of its Members from being a party to or entering into an agreement liberalizing trade in services between or among the parties to such an agreement.." subject to certain provisos.

[160] OECD (2010) op.cit. page 29.

[161] BEREC, BoR (13)53, BEREC guidelines on the separate sale of regulated retail roaming services and the implementation of separate sale of regulated retail roaming services under article 4 & 5 of the roaming regulation – a consultation, http://berec.europa.eu/eng/document_register/subject_matter/berec/download/0/1263-consultation-on-the-berec-guidelines-on-_0.pdf

[162] OECD (2010) op.cit. , page 15.

[163] www.wto.org/english/tratop_e/serv_e/4prote_e.htm

Box 7: Telecommunication services: Extracts from WTO Reference Paper[164]

Definitions

Users mean service consumers and service suppliers.

Essential facilities mean facilities of a public telecommunication transport network or service that

(a) are exclusively or predominantly provided by a single or limited number of suppliers; and

(b) cannot feasibly be economically or technically substituted in order to provide a service.

A major supplier is a supplier which has the ability to materially affect the terms of participation (having regard to price and supply) in the relevant market for basic telecommunication services as a result of:

(a) control over essential facilities; or

(b) use of its position in the market.

The reference paper also puts forward six principles on the regulatory framework for basic telecommunication services. Of relevance is the principle on interconnection:

2.2 Interconnection to be ensured

Interconnection with a major supplier will be ensured at any technically feasible point in the network. Such interconnection is provided.

(a) under non-discriminatory terms, conditions (including technical standards and specifications) and rates and of a quality no less favourable than that provided for its own like services or for like services of non-affiliated service suppliers or for its subsidiaries or other affiliates;

(b) in a timely fashion, on terms, conditions (including technical standards and specifications) and cost-oriented rates that are transparent, reasonable, having regard to economic feasibility, and sufficiently unbundled so that the supplier need not pay for network components or facilities that it does not require for the service to be provided; and

(c) upon request, at points in addition to the network termination points offered to the majority of users, subject to charges that reflect the cost of construction of necessary additional facilities.

2.3 Public availability of the procedures for interconnection negotiations

The procedures applicable for interconnection to a major supplier will be made publicly available.

2.4 Transparency of interconnection arrangements

It is ensured that a major supplier will make publicly available either its interconnection agreements or a reference interconnection offer.

Under the GATS there are general obligations regarding market access and national treatment as well as a requirement for member countries to accord each other most favoured nation (MFN) treatment.[165] The Basic Telecommunications Agreement requires that members ensure that "... any service supplier of any other Member is accorded access to and use of public telecommunications transport networks and

[164] www.wto.org/english/tratop_e/serv_e/telecom_e/tel23_e.htm

[165] MFN implies a prohibition on discrimination that requires countries to afford treatment no less favourable than that accorded to like services and service suppliers of any other country (Article II of the GATS, see www.wto.org/english/docs_e/legal_e/26-gats_01_e.htm).

services on reasonable and non-discriminatory terms and conditions..."[166], and that "... service suppliers of any other Member have access to and use of any public telecommunications transport network or service offered within or across the border of that Member..."[167] allowing such suppliers ".. to interconnect private leased or owned circuits with public telecommunications transport networks and services or with circuits leased or owned by another service supplier".[168]

There is no explicit mention of international mobile roaming services (or for that matter mobile services) in the WTO text dealing with telecommunications. In effect, this means that there needs to be agreement on a number of points. These include whether the wholesale provision of roaming services in a visited country can be considered as an essential facility and whether the providers of such services can be considered as "major suppliers". Furthermore, there is need for agreement as to whether the term "interconnection" covers access to the wholesale provision of international mobile roaming services.

A priori there is essentially no difference between wholesale mobile interconnection (mobile termination) and international mobile wholesale interconnection. Further, as highlighted earlier, the international wholesale market is a separate market and is not contestable, that is, it has monopoly characteristics. Based on this, it could be argued that the wholesale suppliers of international mobile roaming services in any given country should be considered as "major suppliers". These arguments would imply that the Basic Telecommunications Agreement applies to wholesale international roaming services and if this is the case then there would be a requirement to offer non-discriminatory terms and conditions for interconnection. This means that a foreign operator should be in a position to obtain the same terms for interconnection in a visited country as domestic operators get in that country (clearly additional costs incurred would need to be factored in). There is also a potentially wider interpretation and that is that a foreign mobile operator could request, and should obtain, the right to setup their own mobile virtual network operator (MVNO) in a visited country aimed for the provision of mobile roaming services i.e. through commercial presence in a country (mode of supply 3 of the GATS). Within the EU there is a requirement in article 4(1) of the Access Directive that states "...operators shall offer access and interconnection to other undertakings on terms and conditions consistent with obligations imposed by the national regulatory authority..."[169] The obligation to provide interconnection is aimed at ensuring the provision of communication services within countries as well as throughout the European Community. The interconnection frameworks of most countries with a liberalised national contain similar provisions.

Some of these issues where discussed in an informal Symposium on International Mobile Roaming held at WTO in March 2012 and hosted by the Australian Mission to WTO.[170] An earlier Secretariat note to the WTO Council for Trade in Services, although cautious, provided some encouragement to indicate that the WTO framework was both relevant to international mobile roaming services and could be supportive of bilateral and regional initiatives.[171] It is also worth considering the 2004 WTO report[172] "Mexico –

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166 www.wto.org/english/docs_e/legal_e/26-gats_02_e.htm, Annex on Telecommunications, paragraph 5 (a).

167 bid. 5 (b).

168 ibid. 5(b)(ii).

169 Article 2, Directive 2009/140/EC of the European Parliament and of the Council of 25 November 2009 amending Directives 2002/21/EC on a common regulatory framework for electronic communications networks and services, 2002/19/EC on access to, and interconnection of, electronic communications networks and associated facilities, and 2002/20/EC on the authorization of electronic communications networks and services, http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:337:0037:0069:EN:PDF

170 See, WT/DS204/R, www.wto.org/english/tratop_e/serv_e/sym_march12_e/sym_march12_e.htm

171 See World Trade Organization, S/C/W/337, 13 July 2011, Council for Trade in Services, International Mobile Roaming: Possible Implications for GATS, note by the Secretariat.

172 www.wto.org/english/tratop_e/dispu_e/204r_e.pdf

measures affecting Telecommunications services" which was released by a Panel examining the dispute between the United States and Mexico regarding provisions in the Mexico domestic laws and regulations on telecommunications. The report provides interpretation of the Fourth Protocol and Reference Paper which seem to be generally applicable and not necessarily specific to the dispute. The panel noted that:

> *"Trade in services is defined in Article I:2 to include the cross-border supply of a service "from the territory of one Member into the territory of any other Member". This mode of supply, together with supply through commercial presence, is particularly significant for trade in international telecommunications services. There is no reason to suppose that provisions that ensure interconnection on reasonable terms and conditions for telecommunications services supplied through the commercial presence should not benefit the cross-border supply of the same service, in the absence of clear and specific language to that effect. Since the GATS deals specifically with international trade in services by four modes of supply that are considered comprehensive, it would indeed be unusual for interconnection disciplines not to extend to an obvious and important mode of international supply of telecommunications services – cross border."*[173]

This could be interpreted as implying that there is no difference in how national and international interconnection should be treated in that they provide a similar service. Further, it is also interesting that the Panel implicitly argued that cost-orientation also should apply to domestic and international interconnection and that implicitly the domestic rates provided a benchmark for international interconnection.[174] Furthermore the conclusions of the Panel would indicate that international mobile roaming is covered by the provisions of the Telecommunication Annex.[175] However, at this stage there is no consensus among WTO members on IMR issues and how they should be treated.

In the opinion of the GSMA *"[The] heterogeneity of market conditions within regions around the world means that a global regulatory approach would be unworkable, and could have unintended consequences for the market and consumers".* It also argues that *"..even though regulators within different regions around the world may share a common concern about the level of roaming charges and consumer bill-shock, this concern cannot be addressed by one global solution".*[176]

Nevertheless, it should be noted that in most countries where telecommunication markets have opened to competition, the regulatory frameworks adopted have been fairly similar and have tried to follow the same best practice irrespective of the level of development in the market. It should also be stressed that all the regional bodies that have examined the issue of IMR have reached very similar conclusions as to the cause of high prices and to potential solutions.

At the same time the WTO Basic Telecommunications Services Agreement, which has been a success in opening up the global telecommunication market, has shown that, even where there are significant differences between countries, consensus can be reached to open markets to competition. The growth in companies such as Zain which developed in countries with relatively low GDP shows not only the need for

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[173] ibid., Section 7.121.

[174] The Panel argued that "*We think it is justified to presume that the aggregate price charged by Telmex for the use of network components, when used for purely domestic traffic, is an indication of the cost-oriented rate, ... for the use of these same network components in terminating an international call*." ibid., section 7.191. In applying this argument to mobile inter-operator tariffs the conclusion would be that IOTs should be closely linked to domestic mobile termination rates.

[175] ibid., Section 7.319, " *....[the]Annex applies to the access to and use of public telecommunications transport networks and services for the supply of all transportation services, including basic telecommunications services. ....We therefore consider that foreign suppliers of basic telecommunications services require access to and use of public telecommunications transport networks and services* ***for the supply*** *of their services*." (emphasis in original).

[176] GSMA, Information Paper Overview of the Global Roaming Market outside of the European Union, October 2011, page 8. www.wto.org/english/tratop_e/serv_e/sym_march12_e/doc_gsma.pdf

cross-border roaming offers in lower income economies lower prices in lower income countries but also how these prices have helped grow the market. According to World Bank data the stock of emigrants amounted to 3 per cent of global population and 43 per cent of emigrants had developing countries as their destination.[177] As an example, estimates for Africa show that the intra-Africa emigration rate is about 52 per cent and for Sub-Saharan Africa 65 per cent. [178] Given the high percentage of mobile phones in Africa relative to fixed phones it can be expected that mobile roaming would be the preferred means of communications among the diaspora and that low prices would be of significant benefit to them in view of their relatively lower income levels.

Progress in resolving the high prices paid for the range of international mobile roaming services will only occur through appropriate bilateral, regional and/or international agreements. While the initial steps that are being taken in some of the bilateral and regional agreements (see below) are useful in lowering IMR prices for users they will be insufficient to result in longer term competition in the market, that is competition which can be sustained without intrusive regulation. The EU Regulation No 531/2012 with its structural measures is moving toward a framework which will help such competition emerge. The earlier EU Regulation I and II were successful in lowering prices but clearly showed that, unless there was a desire to maintain continuous price regulation, steps were required to create conditions of competition in a market which was not contestable.

WTO has taken an initial step in informally discussing international mobile roaming. It needs to move forward rapidly to bring clarity as to whether international mobile roaming services are covered by existing trade in services frameworks as applied to the telecommunications sector. Bilateral agreements and regional agreements should be encouraged but should be opened to other countries if they are willing, and able, to make the same commitments as the initial countries.

International Telecommunication Union (ITU)

As mentioned above, ITU has also taken steps to tackle the issue of high IMR charges. In addition to the Recommendation on empowering consumers Recommendation D.98 contains principles for lowering IMR rates through market-based solutions (section 5.2) and regulatory intervention (section 5.3).

The main recommendations, which are non-binding, are highlighted in Box 8.[179]

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[177] http://siteresources.worldbank.org/INTPROSPECTS/Resources/334934-1199807908806/Developing.pdf

[178] Abebe Shimeles, Migration Patterns, Trends and Policy Issues in Africa, African Development Bank Group, Working Paper**,** Number 119, December 2010.

[179] ITU-T, Recommendation ITU-T D.98, Charging in International Mobile Roaming Service, 09/2012, www.itu.int/rec/T-REC-D.98-201209-I.

Box 8: ITU Recommendation D.98 Charging in International Mobile Roaming Service[180]

Market-based solutions

1. provision of roaming pricing plans which fit different users;
2. support substitutes like local SIM cards, and provision of IMR by other means;
3. regional and interregional cooperation;
4. cooperation of mobile operators to lower wholesale tariffs.

Regulator intervention

This section of the Recommendation states:

"regulators and policy makers, taking into account specific national or regional conditions, may introduce regulatory interventions on international mobile roaming service tariffs for the benefit of users by encouraging competition. Possible interventions may include a range of regulatory measures such as usage alerts, bill caps, tariff caps and pre-selection."

The signatories to the ITU World Conference on International Telecommunications 2012 (WCIT-12), which met in December 2012, reviewed the International Telecommunication Regulations (ITRs), which is an international treaty. The revised ITRs state that "*Member States shall endeavour to promote competition in the provision of international roaming services and are encouraged to develop policies that foster competitive roaming prices for the benefit of end users*."[181] The provisions of Article 4 covering IMR services are shown in Box 9.

[180] ITU Telecommunication Standardization Sector, Recommendation ITU-T D.98, Charging in International Mobile Roaming Service, www.itu.int/rec/T-REC-D.98-201209-I

[181] ITRs Article 4, 4.7, www.itu.int/en/wcit-12/Pages/itrs.aspx. See also the background paper on international mobile roaming at: www.itu.int/en/wcit-12/Documents/WCIT-background-brief10.pdf

Box 9: Article 4, Final Acts of the World Conference on International Telecommunications (Dubai 2012)[182]

Article 4: International telecommunication services

4.1 Member States shall promote the development of international telecommunication services and shall foster their availability to the public.

4.2 Member States shall endeavour to ensure that authorized operating agencies cooperate within the framework of these Regulations to provide, by agreement, a wide range of international telecommunication services which should conform, to the greatest extent practicable, to the relevant ITU-T Recommendations.

4.3 Subject to national law, Member States shall endeavour to ensure that authorized operating agencies provide and maintain, to the greatest extent practicable, a satisfactory quality of service corresponding to the relevant ITU-T Recommendations with respect to:

a) access to the international network by users using terminals which are permitted to be connected to the network and which do not cause harm to technical facilities and personnel;

b) international telecommunication facilities and services available to users for their dedicated use;

c) at least a form of telecommunication service which is reasonably accessible to the public, including those who may not be subscribers to a specific telecommunication service; and

d) a capability for interworking between different services, as appropriate, to facilitate international telecommunication services.

4.4 Member States shall foster measures to ensure that authorized operating agencies provide free-of-charge, transparent, up-to-date and accurate information to end users on international telecommunication services, including international roaming prices and the associated relevant conditions, in a timely manner.

4.5 Member States shall foster measures to ensure that telecommunication services in international roaming of satisfactory quality are provided to visiting users.

4.6 Member States should foster cooperation among authorized operating agencies in order to avoid and mitigate inadvertent roaming charges in border zones.

4.7 Member States shall endeavour to promote competition in the provision of international roaming services and are encouraged to develop policies that foster competitive roaming prices for the benefit of end users.

OECD

The OECD began work on roaming in 2008 by examining roaming retail prices for voice and SMS and providing a preliminary assessment of policy issues. This report found that roaming prices were excessive in the OECD area compared to underlying costs or compared to the retail price of a domestic mobile call plus an international call from the fixed network.[183] This was followed up by a report on providing an analysis of potential policy recommendations.[184] A report on data roaming prices was carried out over

[182] ITU, International Telecommunication Regulations: www.itu.int/en/wcit-12/Pages/itrs.aspx

[183] OECD (2009), *op.cit.*

[184] OECD (2009a), International Mobile Roaming Services: Analysis And Policy Recommendations, DSTI/ICCP/CISP (2009)12/Final, Paris 2010.

2010-11 which analysed pricing data for data roaming (including for laptop use) and used the data to estimate total expenditures for several mobile roaming usage patterns. Most OECD operators have optional data plans available (usually daily, weekly and monthly plans). Information to users is facilitated somewhat in that operators categorize countries by zones and provide a single price for each zone.

Following this work a non-binding set of measures was adopted by the OECD in February 2012 (OECD Council Recommendation) which put forward a series of measures that policy makers could use to raise consumer awareness and protection, ensure lower prices and encourage effective competition. The main points of the Recommendation are highlighted in Box 10.

Box 10: OECD Council Recommendation on International Mobile Roaming[185]

The OECD Recommendation encourages governments to:

- promote awareness of consumers and businesses about the cost of roaming services and the availability of substitutes; and encourage them to compare the functionalities, limitations, distribution channels and cost of these various options;
- promote transparency of information provided to customers by international roaming providers regarding the use and billing of roaming services;
- provide data roaming customers with information on the risk of automatic and uncontrolled data roaming connections and downloads and explanations about how to switch off these connections;
- provide customers with agreed financial limits, beyond which data roaming transmission would be stopped, unless the customer follows an indicated procedure and personalised notifications when data roaming services have reached a certain proportion of an agreed financial limit;
- assess and remove barriers that may prevent smaller players from competing with larger players to offer roaming services, in particular by forming trans-national alliances. In removing such barriers, Members should pay due attention that they do not protect inefficient operators, and that these alliances do not in fact reduce competition;
- encourage discussions with the industry about the transparency of IOTs to inform future or current regulatory proceedings in relation to these services. Members could consider collecting data on wholesale roaming rates (discounted IOTs) and publishing benchmarks of aggregate rates that preserve commercial confidentiality;
- assess and remove barriers that may prevent mobile virtual network operators to have access to local wholesale mobile services for the purpose of offering roaming services on fair and reasonable conditions;
- if Members determine that market dynamics are insufficient to produce reasonably competitive wholesale prices, they are encouraged to regulate wholesale roaming prices, including by reaching bi- or multilateral agreements between Members, as appropriate, and/or through the introduction of price caps based on commonly established principles;
- as a last resort, implement retail price regulation to protect customers from paying excessive prices for using roaming services.

[185] OECD, 16 February 20102, Recommendation of the Council on International Mobile Roaming Services, Paris 2012

6.2 Regional and bilateral initiatives

There have been a number of regional and bilateral initiatives to reduce cross-border roaming charges usually taken between countries that have free trade or regional economic agreements and, in the case of bilateral initiatives between neighbouring countries that have close trade, tourism ties or population links. In many cases the agreement to move forward on reducing IMR charges has taken place at the political level but often it has been necessary to provide statutory power to regulators/ministries to enable agreements to be implemented and enforced. In certain cases political pressure on the incumbents in the two countries involved may be sufficient to reduce roaming prices between the two destinations.

For regional or bilateral agreements to be effective there are a number of elements which may be required. These would include the methodology used to reduce prices and a decision on whether only wholesale prices or wholesale and retail prices would be targeted. A decision on whether reductions in prices will be "one-off", or take place in steps over time and whether this will be based on a cost model or agreement on a benchmarked "glide path". In this context there also has to be agreement as to whether wholesale prices, if regulated, will be the same for participating countries or differ, and if retail prices, if regulated, will be the same or differ. The participants would need to have the legal power for enforcement of any agreement that takes place and an effective dispute resolution mechanism needs to be in place. There also has to be an agreement to monitor progress to ensure that the agreed framework is in fact being effectively implemented. The foregoing requires that the parties involved are well co-ordinated. Consideration also needs to be given to whether structural measures will also be implemented in the longer term to ensure that bilateral arrangements lead to longer term competition allowing the eventual phasing-out of regulatory measures.

To be effective an agreement, irrespective of whether it is regional or bilateral would require that country *A* agrees to require its MNOs to reduce origination and termination charges faced by MNOs in country *B* if these charges are also reduced for the MNOs from country *A*. Retail charges for IMR would not necessarily have to be similar in bilateral agreements although it would be expected that, following the reduction in wholesale charges, that retail prices would decline. Wholesale charges would be expected to be similar unless there are well defined cost differences between the two countries.

European Union

As noted earlier, the EU/ EEA have taken three regulatory decisions on mobile roaming in June 2007, in June 2009 and in June 2012. These decisions followed a European Parliamentary resolution in 2004, which requested the European Commission to develop initiatives to reduce the high cost of mobile roaming. The decision also followed up from work undertaken by the European Regulators Group (ERG - the predecessor of BEREC) which indicated that it was not possible for national regulatory authorities to take any action with respect to the wholesale national market for international roaming in EU given the cross-border nature of the problem. As a result national regulatory authorities could not review or take decisions following the 2002 EU Directive which identified that market as a relevant market susceptible to *ex ante* regulations. A sample of the documentation undertaken for this work is shown in Box 11. Other works, not included in the Box were analytical papers, opinions, consultation papers etc. In short, developing a bilateral or regional agreement in this area can be complex.

Box 11: A Sample of BEREC work on IMR[186]

- BoR (12) 24 BEREC International Roaming Benchmark Data Report July 2011
- BoR (12) 14 BEREC Analysis of Wholesale Roaming Costs
- BoR (11) 51 International Roaming BEREC Benchmark Data Report January 2011 – June 2011
- BoR (11) 46 BEREC Analysis of the European Commission Proposal for a Regulation on Roaming COM (2011) 402 of 6 July 2011
- BoR (11) 21 7th IR Benchmark Data Report
- BoR (11) 22 BEREC International Roaming compliance report
- BoR (11) 08 BEREC report on alternative roaming tariffs
- BoR (11) 09 BEREC response to public consultation on roaming
- BoR (10) 58 BEREC Report on International Mobile Roaming Regulation
- BoR (10) 50 International Roaming BEREC Benchmark Data Report for January 2010 – June 2010
- BoR (10) 20 BEREC International Roaming Report
- BoR (10) 13 BEREC report on alternative roaming tariffs
- BoR (10) 12 BEREC Roaming compliance report
- ERG Documentation: ERG (09) 24 International roaming regulation – ERG guidelines

AREGNET and GCC

As noted earlier, one of the early attempts to reduce the price of international mobile roaming at the regional level was the work of the Arab Regulators Network, AREGNET, that had been given the responsibility by Ministers to follow-up on a 2005 report which examined international mobile roaming prices in the region and found them to be excessive relative to domestic mobile prices. Despite the concern on high IMR prices agreement could not be reached on the AREGNET proposal, however, Ministers of the Gulf Cooperation Council (GCC) agreed in 2008 to follow-up on the AREGNET proposals and reached agreement on a formula to determine retail and wholesale rates using price caps with reductions in prices staggered over 2010 and 2011.

The closer economic ties between GCC countries including a commitment to economic integration, much like the EU, facilitated the success of the GCC relative to AREGNET. The GCC agreement, which is in the form of a Memorandum of Understanding, foresees that other countries may join but need to have adequate provisions to enforce the agreement. The work undertaken by AREGNET recognised that, unlike the EU, there was not a common regulatory framework and there were still important differences in regulatory frameworks in the region. For example, there was not a single framework to determine mobile termination rates and no regulation within the region for intra-AREGNET interconnection.

[186] http://berec.europa.eu/eng/search?q=roaming; ERG, www.irg.eu/render.jsp?categoryId=260347&themeMenu=1

CRASA[187]

The Communication Regulators' Association of Southern Africa (CRASA) set up a Regional Alliance Task Team (RATT) in 2008 to examine the problem of high IMR charges and subsequently commissioned a study published in 2010 and which put forward a number of short term goals for SADC consideration.[188] These included regular roaming data collection, multilateral cost reduction measures and roaming hubbing, increased transparency and consumer protection and price control by agreement. Some of these have been implemented by the RATT in particular greater IMR price transparency through SMS notification when travelling, collection of comparable roaming price data by regulators, setting and notifying users of bill limits. On-going work is underway to examine the underlying costs of roaming in the Southern African Development Community.[189]

The Economic Community for the West African States (ECOWAS) has undertaken important initiatives in developing regional roaming arrangements.[190] These have been undertaken through intra-operator agreements which allow roaming subscribers to receive free calls when roaming and pay local rates for outgoing calls. The arrangements however are not generalized in that they only cover specific networks and do not apply completely to all ECOWAS countries. According to the West African Telecommunications Regulatory Assembly (WATRA) an association of telecommunication regulators in West Africa, high call prices are also due to the lack of seamless cross-border infrastructure in the region so that some calls are routed through Europe or North America before reaching their final destination. Regional roaming has been facilitated by the close co-operation between the regional telecommunication authorities.[191] Nevertheless, the initial ambition to develop a more harmonized framework for IMR has been slow in developing.

In Africa, the African Union has also examined the possibility of affordable roaming tariffs through regulation.[192] In this context the Commission put forward a number of proposals including:

- require transparency for roaming tariffs
- develop a single web site showing roaming tariffs
- coordinate and adopt common regulations which are obligatory
- try and obtain common acceptable rules among the African mobile operators

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187 See www.crasa.org/

188 Regulatory Impact Assessment Study SADC Home and Away, 23 April 2010, Ref. 15493-154, available at www.crasa.org

189 See, Christian Mhlanga, presentation at the IMR Symposium, Geneva, 22 March 2012, A South African Perspective On International Mobile Roaming, www.wto.org/english/tratop_e/serv_e/sym_march12_e/presentation_mhlanga.pdf - 2012-03-29 -

190 International Telecommunication Union, West African Common Market Project: Harmonization of Policies Governing the ICT Market in the UEMOA-ECOWAS Space Interconnection, 2004, www.itu.int/ITU-D/treg/projects/itu-ec/Ghana/modules/FinalDocuments/Interconnexion.pdf

191 See Rupa Ranganathan and Vivien Foster, *ECOWA's infrastructure: a regional perspective*, The World BankAfrica Region, Sustainable Development Unit, Policy Research Working Paper 5899, December 2011, "*The national members of the West Africa Telecommunications Regulators Association (WATRA) communicate regularly to keep abreast of telecom issues in the region and share information. The existence of this relatively developed institutional structure has helped to facilitate the roaming arrangements that are observed in the region*", page 59, www-wds.worldbank.org/servlet/WDSContentServer/WDSP/IB/2011/12/05/000158349_20111205145616/Rendered/PDF/WPS5899.pdf

192 *Commission de l'Union Africaine, Pré-étude de faisabilité pour le développement d'un programme pour la mise en place de tarifs de roaming abordables en Afrique, Synthèse, Juin 2011*, www.itu.int/ITU-D/finance/work-cost-tariffs/events/tariff-seminars/Cotonou-12/pdf/Session6_1_Guellouz.pdf

The breakdown of IMR charges in many parts of Africa developed largely by the fact that operators had licences in contiguous countries and also through effective co-operation between regional regulatory associations. This provides an important lesson which is that competition can work if a mobile operator is willing to break the mould (such as *Celtel/Zain*) but only if the conditions allow this to occur. The crucial factor has been that operators had licences in several countries in the region.

APEC TEL and Asia Pacific Telecommunity

APEC Ministers first discussed the issue of IMR in 2008 followed up by further analysis in APEC TEL. Emphasis was placed on developing guidelines to protect consumers and in 2010 APEC TEL produced *"Guidelines for the Provision of Consumer Information on International Mobile Roaming"* which put forward best practice suggestions on providing IMR information to consumers.[193] As part of its strategic action plan for 2010-15, APEC TEL aims to continue "*to promote competition and transparency in areas such as interconnection and international mobile roaming markets*."[194]

The guidelines suggested the types of information that should be provided to consumers, how to provide this information as well as the need to provide information on alternative technologies to consumers. The Asia Pacific Telecommunity International Mobile Roaming Working Group developed guidelines for regulators and for operators aimed at enhancing transparency of information. [195] The *Guidelines for Regulators to Provide Information on International Mobile Roaming (IMR) Services* (Box 8) is aimed at suggesting what type of information regulators should make available to the public including informing consumers of the high cost of IMR, providing information on alternatives to IMR services and that regulators should have a dedicated page on their website on IMR issues with the following information.

A similar set of *Guidelines for Operators to Provide Information on International Mobile Roaming (IMR) Services* (Box 12) from APT emphasised similar requirements to improve transparency by providing subscribers with information. The guidelines also put forward suggestions for reducing "bill shock". They also suggested that operators provide subscribers with information highlighting differences in charging structures between IMR services and domestic mobile services, and how subscribers can deactivate part or all of the IMR services. The Guidelines also suggested that home operators may choose to adopt zonal charging for IMR service, under which the same rate would be applied to a set of countries that fall under the same zone and inform subscribers as to which countries are covered by zonal pricing.

[193] www.apec.org/Groups/SOM-Steering-Committee-on-Economic-and-Technical-Cooperation/Working-Groups/Telecommunications-and-Information.aspx

[194] Tel 46 Chair's Summary, APEC TEL Strategic Action Plan: 2010-2015, http://mddb.apec.org/Documents/2012/TEL/TEL46-PLEN/12_tel46_summary.doc

[195] APT Working Group Report, 15 May 2012, www.apt.int/sites/default/files/2012/05/APT_IMR_Working_Group_Report_Final.pdf

Box 12: APT guidelines for regulators and for operators[196]

Guidelines for regulators:

1. A plain description of IMR services;
2. A prominent notification that using IMR services may be significantly more expensive than using domestic mobile services;
3. That IMR charges may apply to the following activities undertaken on a mobile phone while travelling overseas:

   – making and receiving calls
   – receiving and retrieving voicemail messages
   – sending and receiving SMS messages and multi-media messages
   – using mobile data services, including but not limited to browsing the internet, sending and receiving emails;

4. Before their departure, consumers are highly encouraged to obtain from their mobile service providers the detailed information of IMR charges applicable to their visited countries, and should take note of the following:

(e) whether there would be any difference in charges among different mobile networks in the visited country, and remind consumers that they may manually select the designated network under the "manual" mode of the network selection when travelling in the visited country

5. Hyperlinks to the web pages of individual operators dedicated for IMR-related information; (regulators should work with their operators to ensure that their operators have followed the "Guidelines for Operators to Provide Information on IMR Services" when providing information on their websites;)
6. Information of various types of alternatives to IMR services, including but not limited to a description of how these alternatives are used, their advantages and limitations, etc.;

Guidelines for Operators:

1. Operators are recommended to provide clear, accurate and easy to understand information on IMR services to customers;
2. Customers should be informed that in general IMR is significantly more expensive than using their national mobile services;
3. Subscribers should be informed that, when roaming, they may be paying for making and receiving calls and SMS messages as well as using mobile data services including email;
4. Operators are recommended to inform subscribers of different charging structures for IMR compared to national services;
5. Customers should be provided with information on how to deactivate all or some IMR services;
6. Customers should be notified by SMS messages when they roam outside their home country.

The APT also suggested that regulators should examine whether regulatory barriers exist in their countries which could create obstacles to potential substitutes for IMR services and should also take steps to educate subscribers as to the available substitutes they could use to reduce the cost of roaming.

196 www.apt.int/sites/default/files/2012/05/APT_IMR_Working_Group_Report_Final.pdf

ASEAN

The Association of Southeast Asian Nations (ASEAN) telecommunication and IT ministers have, as their goal, a roaming policy where users that roam across the 10 member countries pay the same charges as in their home country. The ASEAN Telecommunication Regulators' Council (ATRC) adopted a *Record of Intent* aimed at strengthening cooperation in telecommunication regulations, focusing in particular, in the short term, on lowering intra-ASEAN roaming charges. In 2011 ASEAN Ministers issued a Joint Ministerial Statement at the 11th ASEAN Telecommunications and Information Technology Ministers Meeting (TELMIN) welcoming this initiative.[197] Reducing roaming charges in the region has also been highlighted in the ASEAN ICT Masterplan 2015 (AIM2015).[198] Progress has mainly been through bilateral agreements (see below). More recently, the Indonesia Minister indicated support for a "roaming-free" Asian region.[199]

South Asian Association for Regional Cooperation (SAARC)

The 2008 SAARC meeting of the Heads of State of the SAARC, in 2008, urged that mobile roaming tariffs in the region be reduced viewing this as an important step to stimulate regional trade. The Colombo Declaration they adopted stated that:[200]

"The Heads of State or Government observed that an effective and economical regional telecommunication regime is an essential factor of connectivity, encouraging the growth of people-centric partnerships. They stressed the need for the Member States to endeavour to move towards a uniformly applicable low tariff, for international direct dial calls within the region."

Latin America

A number of bodies in South America have been dealing with roaming including those focused mainly on telecommunications (Regulatel and CITEL) and those dealing with regional economic integration (MERCOSUR, CAN and IIRSA).[201] A number of projects have been undertaken in the different bodies dealing with cross-border roaming in the region. IIRSA (Iniciativa para la integración de la infraestructura regional Suramericana) began examining roaming prices in 2008 and followed up with a workshop later in that year.[202] Its work is aimed at prompting a competitive roaming market in the region and improving costs, quality and coverage in the context of a South American Roaming Cross-border Agreement[203]. The project was also aimed at improving regional coordination by the regulators from participating countries

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197 See, Joint Ministerial Statement of the 11th ASEAN Telecommunications and Information Technology Ministers Meeting (TELMIN) and its Related Meeting with External Parties Myanmar, 9 December 2011, www.aseansec.org/25751.htm

198 See *Evolving Towards Asean 2015*, Asean Annual Report, 2011-12, www.aseansec.org/documents/annual%20report%202011-2012.pdf

199 www.thejakartaglobe.com/tech/indonesia-wants-roaming-free-mobile-phone-coverage-in-asean-by-2014/537512

200 See, www.slmission.com/statements/88-ministry-statements/109-colombo-declaration-of-the-15th-saarc-summit.html

201 Regulatel is the Latin American Forum of Telecommunication Regulatory Entities (*Foro Latinoamericano de Entes Reguladores de Telecomunicaciones*) which created a Working group on Roaming in 2012. CITEL the Inter-American Telecommunication Commission is an entity of the Organization of American States and the regional intergovernmental telecommunication advisory body. Mercosur, or Southern Common Market, is an economic and political agreement among Argentina, Brazil, Paraguay and Uruguay. CAN is the Andean Community (*Comunidad Andina*) which is a customs Union between Bolivia, Columbia, Ecuador and Peru. IIRSA is the Initiative for the Integration of the South American Regional Infrastructure created in September 2000 during a meeting of Presidents from the 12 official South American countries (Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Guyana, Paraguay, Peru, Suriname, Uruguay and Venezuela) aimed at the integration of the physical infrastructure in South America to promote economic growth throughout the region.

202 www.iirsa.org/BancoConocimiento/R/roaming_suramericano/roaming_suramericano_ENG.asp?CodIdioma=ENG

203 www.iirsa.org/BancoConocimiento/R/roaming_suramericano/roaming_suramericano.asp?CodIdioma=ESP

to facilitate the development of regional roaming. CITEL has also put forward proposals to increase transparency on IMR charges in the region. The IIRSA project has placed emphasis on double taxation issues related to roaming and the issue of inadvertent roaming. Although pricing issues have been highlighted as important in the context of market integration there has been little progress in tackling this issue to date.

The Caribbean

The Caribbean Community (Caricom) in a Draft Regional Information and Communication Technology (ICT) for Development Strategy, Telecommunications Services Sector of 2010 suggests several challenges relevant to roaming that the region should take-up including establishing a single mobile numbering plan for the region and removing mobile roaming charges and remove mobile termination for data and voice.[204] CARICOM began in 2013 to undertake a study on the "*Development of a Regional ICT Space for CARICOM countries*" which includes as a module an examination of new regulations for mobile roaming charges. The Caribbean Telecommunications Union (CTU) in discussions with the leading mobile operator in the region, Digicel, has indicated that from 1 October 2013 voice roaming charges in the region would be eliminated. Subscribers roaming in the region would be charged for outgoing calls at their home country prices. CTU aims to continue discussions with the company to eliminate data roaming charges as well.[205]

Bilateral arrangements

There are not a large number of bilateral agreements that have taken place with respect to IMR charges and in some cases the details of these agreements have not been well publicized. Examples of bilateral agreements some of which are underway and others under discussion are highlighted below.

Singapore and Malaysia were the first ASEAN countries to take action on IMR prices through an agreement entered into by the regulators in the two countries.[206] The regulators agreed to implement a number of measures which increased transparency for consumers. In addition they agreed that consumers would have the option of capping their data roaming usage. Price reductions of up to 30 per cent for voice calls and 50 per cent for SMS were agreed to beginning in May 2011 for roaming services in Singapore and Malaysia and phased in over time. The agreement covered both wholesale and retail prices. The two regulators have also agreed to continue examining what actions to take to reduce mobile data prices and MMS and video calls. However, details on how price reductions were determined are not available nor whether it is expected that this process will continue.

Brunei Darussalam and Singapore, similar to the Singapore-Malaysia agreement, in June 2012 agreed to reduce roaming rates for mobile voice calls, SMS and data roaming charges by the first quarter of 2013. As part of the agreement both the wholesale inter-operator wholesale charges and retail charges will be reviewed.[207] Similar to the foregoing, **Brunei Darussalam and Malaysia** have agreed to discuss the reduction of roaming rates but no announcements have been made to indicate whether there is progress although it would be expected that such an agreement would reflect decisions taken between Brunei and Singapore and Singapore and Malaysia.

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[204] www.gov.ms/wp-content/uploads/2011/02/Draft-RDdS-Nov-2010.pdf

[205] See, www.jis.gov.jm/news/leads/34771

[206] The Infocomm Development Authority of Singapore (IDA) and the Malaysian Communications and Multimedia Commission (MCMC).

[207] The Info-communications Development Authority of Singapore and the Authority for Info-communications Technology Industry of Brunei Darussalam were charged with examining roaming charges between the two countries and reaching an agreement with the operators on lower charges.

Australia and New Zealand issued a joint report[208] in 2010 which reviewed mobile roaming between the two countries and recognised that prices, both wholesale and retail, were high and transparency for users was inadequate. The report concluded with a potential list of possible actions that could be taken to reduce IMR prices. The report examined the pros and cons of a number of measures. Those measures viewed as having some potential included rerouting technologies for outgoing calls viewed as reducing wholesale charges, improving transparency through a centralised website showing the roaming rates of all national operators, SMS on arrival in the visited country and SMS after a roaming charge has been incurred in the visited country showing the price of the communication. Billing caps were also put forward as a suggesting for controlling charges for users. The potential for price controls, on either wholesale or retail or both, was also raised in the discussion paper. Further solutions raised was to mandate wholesale IMR services to any home network (Australian or New Zealand) upon request and using MVNOs to offer inbound services to foreign MNOs. Other potential structural solutions discussed were unbundling mobile roaming services. The report recognised that there could be a need for harmonisation in legislative provisions between the two countries in order to implement certain recommendations. Following this report (which had the status of a discussion paper) the Ministers of the two countries agreed in 2011 to undertake a full market investigation into trans-Tasman mobile roaming. Australia and New Zealand have a Free Trade Agreement which covers the telecommunication sector and which was being reviewed over 2012 as an option to be used to put in place a bilateral agreement on IMR.

In February 2013, the Prime Ministers of Australia and New Zealand agreed to regulate high trans-Tasman mobile roaming rates and released a joint report on roaming rates following industry consolations.[209] The report recommended that the regulators in both countries be provided with sufficient powers allowing them to co-operate and to intervene in the IMR market. These powers would allow the regulators to apply price caps on wholesale and retail roaming charges. The agreement will require legislative changes which could delay implementation. In this context Australia introduced a *Telecommunications (International Mobile Roaming) Bill* to amend existing telecommunication legislation so that international mobile roaming services are deemed as services that can be regulated where reciprocal arrangements apply with another country.

The Russian Federation had discussions with Finland and with Poland on the possibility of a bilateral roaming agreement. Russia had initially sought to have an EU-Russia agreement but this effort was not successful. Israel had similarly tried unsuccessfully to join the EU agreement and had suggested to EU that it widen its proposed roaming area to include any county that would harmonise its regulations on a reciprocal basis. According to Israel this was rejected on the grounds that EU could not enforce its regulations outside Europe.[210] Russia has opted to try and follow a bilateral approach with border EU countries. The intent of the Polish-Russia discussions in 2011-2012 was to enter into a Memorandum of Understanding between the operators of the two countries and the Ministries. Although the MoU was agreed to by the Polish operators and the two Ministries the Russian operators did not sign. The MoU was only valid until the end of 2011 and has not been renewed. Furthermore, the Russian authorities apparently did not have the authority to require their operators to adhere to a MoU. The situation with respect to discussions between Finland and Russia, also during 2011-2012, has been similar to that between Poland and Russia. The fact that the Russian authorities do not have the legal power to implement an agreement which would lower the wholesale roaming charges of their operators has meant that, despite the desire of the Russian authorities, discussions are at an impasse.

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[208] See Trans-Tasman mobile roaming Discussion document May 2010, www.dbcde.gov.au/__data/assets/pdf_file/0008/127709/Trans-Tasman_mobile_roaming_discussion_document.pdf

[209] Trans-Tasman roaming, Final Report, February 2013, www.dbcde.gov.au/__data/assets/pdf_file/0003/161274/TTR_Final_Report.pdf

[210] See Dr. Assaf Cohen, Widening the EU Roaming Zone, Vienna, April 23, 2008, www.moc.gov.il/sip_storage/FILES/5/1375.pdf

7 Conclusions and best practice recommendations

The IMR market has shown considerable improvement over the last few years. Prices have declined, the choices in the market provided by alternative service providers has widened and mobile subscribers who roam have become more aware of the high prices they face when roaming and the steps they need to take to ensure that they are not subject to "bill shock". These changes have been helped, to a large extent, by the policy and regulatory initiatives that have been taken and that have developed best practices for price regulation, to increase transparency and awareness for users and for operators to follow in offering IMR services.

7.1 Best practice for price regulation

In the EU price regulation has been successful to the extent that there were obligations to reduce prices and these obligations were met. The European Commission objective is to try and eliminate the difference between roaming tariffs and national tariffs by 2015.[211] There is also a commitment to withdraw price regulation once structural measures are shown to have been successful in developing competition. The GCC set obligations which were met but are not as far reaching as the EU's.

Price regulation, where it has taken place, has benefitted users, however, it has not created conditions of competition and this was recognised in the EU Roaming Regulation No 531/2012. BEREC monitoring of IMR price developments, both wholesale and retail, proved to be of importance.[212] BEREC undertook ten reviews and by showing that prices had been reduced showed that regulation was working, but also in showing that price reductions were at, or just under, the price caps there was a clear indication that competition was not developing and other measures were required to develop effective competition. Publishing wholesale IMR prices has not caused any apparent harm to mobile operators.

The EU and GCC procedures were based on simplicity and ease of administration. An important aspect of the EU regulation was the obligation for operators to charge roaming subscribers for actual consumption. This resulted in the imposition of per second pricing for voice and pricing per kilobyte for data.

Based on the work of the different regional bodies and international organisations some best practice recommendations can be developed which can provide guidance for other regional bodies or bilateral initiatives. These are set out in Box 13.

[211] See The Digital Agenda, http://ec.europa.eu/digital-agenda/about-our-goals

[212] BEREC, International Roaming BEREC Benchmark Data Report January 2012 – June 2012, BoR (13)05, http://berec.europa.eu/eng/document_register/subject_matter/berec/reports/1159-international-roaming-berec-benchmark-data-report-january-2012-8211-june-2012.

Box 13: Best practice for price regulation

- Price regulation of IMR wholesale and retail charges in a bilateral or regional context should ensure that all participating regulatory authorities have the legal power to enforce these regulations. In many cases this may entail a change in the telecommunication law and/or the mandate of the regulatory authority.
- In the regional context it is simpler for subscribers roaming if retail prices to call home from visited countries in the region are the same; it is also simpler if prices to call third countries within the region when roaming in the region are the same.
- Price regulation needs to cover voice, SMS and data.
- National regulators may decide to regulate both wholesale IMR prices as well as retail. Experience has shown that, at least initially, both wholesale and retail prices should be regulated.
- Regulation of roaming prices, wholesale and retail, have been mainly undertaken using price caps and, in some cases, with a well-defined "glide path" for future price reductions.
- Regulators may choose in a bilateral or regional roaming agreement to have asymmetric prices (retail and or wholesale) in particular when the level of competition or market development are different.
- Roaming prices structures should ensure that users do not pay for services which are not rendered/used. This requires that actual charges for wholesale and retail IMR services are per second (or Kb for data).
- Regulators need to collect wholesale and retail data in order to benchmark progress in reducing prices. For this to occur, regulators need to have the authority to obtain information on wholesale IMR rates charged by their national operators to foreign operators.
- National mobile termination rates, where these are regulated on the basis of a cost model, can be used as a benchmark for setting wholesale roaming voice charges for regional or bilateral roaming arrangements. If cost models are not available a 'retail minus' methodology can be used to determine wholesale rates.
- Incoming SMS need not be charged since any associated costs are covered by outgoing SMS.
- Cost models for data roaming are often not available so home and visited country retail prices offer benchmarks to set wholesale and retail prices given that wholesale access and call origination set-up charges are viewed as being relatively low.
- Co-ordination between national regulatory authorities is essential in monitoring progress and for this they need to have the authority to share information including wholesale IMR rates when entering into bilateral or regional agreements.
- Regulatory authorities should work together in co-ordination with relevant tax authorities and, in view of any double taxation treaties to ensure that there is no double taxation imposed on retail IMR charges.

7.2 Best practice to increase user awareness and transparency

"Bill shock" has been an important factor in focusing the attention of policy makers and regulators on IMR prices. It has also led to the realisation that consumers and other users did not have adequate information on mobile roaming prices consequently many mobile subscribers did not adjust their consumption patterns in visited countries sufficiently given high prices.

A number of regional and international bodies have put forward recommendations as outlined above on improving transparency of IMR prices and providing information to travellers to ensure that they are more aware of the charges they are facing. Some of the transparency measures have in certain regions been regulated. In many cases mobile operators have reacted to transparency concerns by ensuring that their subscribers become more aware of roaming prices.

Box 14 synthesises the main transparency requirements which the different bodies have put forward as a minimum set of requirements.

Box 14: Best practice to increase transparency and awareness for users when roaming internationally

- Users need to be made aware before travelling as to any technological limitations in using their handset when travelling (different standards) and any restrictions which may limit their ability to use alternate technologies (e.g. SIM locked handsets preventing the use of local SIMs in the visited country). Increased awareness should be made through mobile operator websites but also through the websites of consumer and regulatory authorities.
- Users should be informed through mobile operator websites of the differences in pricing structures when roaming compared to their national pricing structures.
- Prices for international roaming for voice, SMS/MMS and data should be easily available from mobile operators to their subscribers e.g. through a web link on the main page of the operator website.
- Price structures should ensure that users do not pay for services which are not rendered/used. This requires that actual charges for voice services are per second or per kilobyte for mobile data roaming.
- Mobile operators should supply clear and understandable information to users through websites on prices charged for roaming onto partner providers' networks if available, how to configure their handset so that it only roams on those networks and whether and how they are able to voluntarily select other networks.
- Mobile operators should be obligated to send personalised SMS messages detailing retail prices for all roaming services in the visited country on arrival in that country. This would include the price to call home, the cost of a local call in the visited country and the cost of sending/receiving a SMS and the cost of mobile data.
- Mobile service providers should warn users when roaming through personalised SMS messages once a predetermined level of usage (in financial terms) is attained.
- Pricing information should be in the users' home currency and the message should also contain a customer service telephone number of the provider from which service charges and further roaming information can be obtained free of charge.
- Mobile operators should have special user protection in place for inadvertent roaming in border regions through technical means (border roaming gateways, lower power levels) and/or special tariffs.
- Mobile operators should be obligated to send personalised SMS messages in the case of mobile data usage on the risk of inadvertent automatic data roaming and information on how to turn off data roaming on the handset.
- Mobile operators should set reasonable data or financial limits on data roaming and provide users with a SMS warning when this limit is approached and stop data roaming when this limit is attained, unless the customer follows a set procedure to continue data roaming.
- Mobile operators should be encouraged to provide information on their web site of the data consumed by the most common used mobile applications.
- Regulators should be encouraged to way to increase user awareness of alternate technologies and services which they may be able to use to make and receive calls, to obtain messages and to access the Internet when travelling outside of their home country.
- Dispute resolution procedures should be developed to resolve billing problems arising from roaming. Operators should be encouraged to put in place such procedures also for cross-border disputes regarding billing.

Note: Box 14 draws on ITU Recommendation ITU-T D98 and International Telecommunication Regulations (ITRs), the OECD Council Recommendation, the European Union directives on roaming, the APECTEL guidelines on the provision of consumer information on international mobile roaming, and the GSMA data roaming transparency initiative.

7.3 Best practice for regulators in IMR markets

In addition to price regulation and improving transparency and awareness for users, regulators can also play an important role in improving market conditions and enhancing competition in IMR markets. Box 15 highlights several areas where regulatory initiatives can improve the functioning of IMR markets.

Box 15: Best practice for regulators in IMR markets

- Regulators should be encouraged to take steps to remove any unjustifiable obstacles which may limit the availability of substitutes to international mobile roaming voice, messaging and data services and the ability of these services to compete in traditional mobile roaming markets;
- Regulators should liberalise international gateways;
- Although the unlocking of SIM cards is a more general regulatory issue, in the context of mobile roaming it is important and needs to be resolved by regulators to allow users to take advantage of alternative roaming services in visited countries;
- By facilitating market entry of MVNOs and ensuring that they can interconnect on reasonable terms with MNOs regulators can improve competition in the IMR market in particular if this stimulates entry of global MVNOs;
- Regulators can play an important role in improving IMR competition by ensuring that mobile operators follow network neutrality principles by not blocking the use of VoIP and other messaging applications on smartphones;
- Prices structures should ensure that users do not pay for services which are not rendered/used. This requires that actual charges for wholesale and retail IMR services are per second (or Kb for data);
- Regulators working together at the regional level or in bilateral agreements on improving the IMR market may consider structural measures in addition to any price regulatory measures that are taken. Such structural measures could include unbundling IMR services from domestic services and allowing market entry to foreign MVNOs to interconnect with local MNOs;
- In the context of bilateral or regional initiatives government authorities aimed at reaching agreements to lower IMR prices, the regulatory authorities need to ensure that they have the legal authority to obtain data, such as those on wholesale prices, enforce measures agreed to, monitor development in the IMR markets, and can enter into agreements, including the sharing of information, with counterparts in other countries or at the regional level;
- Bilateral or regional agreements need to be clear as to the responsibility of regulators, including the methodologies to be followed and the data requirements for monitoring developments in IMR markets as well as ensure that developments in the market, in particular price changes, are monitored on a regular basis. Bilateral and regional agreements should also consider follow-up in terms of structural measures which would allow for the development of IMR services as separate unbundled services;
- Bilateral or regional agreements should provide for third party membership on condition that participating countries are legally able to ensure full compliance with all the requirements of the framework;
- Bilateral or regional agreements need to decide on whether only wholesale prices regulation or wholesale and retail prices would be targeted and the time frame for price reductions.

International organisations have played an important role in improving conditions in the IMR market and in increasing awareness of the issues and developing appropriate recommendations'. They need to continue in these efforts and, in particular the WTO and ITU. An important role can be played by the WTO in determining the applicability of existing commitments to IMR and by encouraging regional economic integration agreements that cover international telecommunications to open up the mobile roaming market to competition.

ITU can play an important role in developing and diffusing best practice regulation for IMR among its members, notably in the revised ITRs, and in particular acting as a forum to exchange experiences based on the lessons learned by those countries that have already moved forward and taken action to lower prices and develop competition in IMR markets. ITU can also play an important role in the development of an international framework, in the context of WTO, both as technical advisor and, subsequently in monitoring developments and providing recommendations as appropriate.

Steps taken to lower mobile roaming prices and improve roaming market efficiency will increase the welfare of consumers and other users, will help grow the market for IMR services and have wider economic benefits for all countries.

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Appendix A – Glossary of terms

APEC	Asia-Pacific Cooperation Telecommunications and Information Working Group
APT	Asia Pacific Telecommunity
AREGNET	Arab Regulators Network of telecommunications and information technologies
BEREC	Body of European Regulators for Electronic Communications
CITEL	Inter-American Telecommunications Commission
CRASA	Communications Regulatory Association of Southern Africa
EC	European Commission
ECOWAS	Economic Community for the West African States
EEA	European Economic Area
EU	European Union
GCC	Gulf Cooperation Council
GDP	Gross Domestic Product
GSM	*Groupe Spéciale Mobile*
GSMA	GSM Association
IOT	Inter-operator tariff
IMR	International mobile roaming
IMSI	International Mobile Subscriber Identity
M2M	Machine-to-machine
MNO	Mobile network operator
MoU	Memorandum of Understanding
MVNO	Mobile virtual network operator
OECD	Organisation for Economic Co-operation and Development
REGULATEL	Latin American Forum of Telecom Regulators
SADC	Southern African Development Community
SIM	Subscriber identity module
SMS	Short message service
VAT	Value-added tax
VoIP	Voice over Internet Protocol
WCIT	World Conference on International Telecommunications
Wi-Fi	Wireless fidelity (IEEE 802.11 standard)
WTO	World Trade Organization

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