FOREWORD

The Council adopted on 16 February 2012 the *Recommendation of the Council on International Mobile Roaming* which provides a set of policy principles to ensure effective competition, consumer awareness and protection, and a fair price level in international mobile roaming services.

The objective of the report was to provide an overview of progress made in the implementation of the Recommendation to determine whether any further action is necessary in this area, based on the responses to the questionnaire of Member's and Partner's experiences.

The report was presented to the Committee on Digital Economy Policy (CDEP) in June 2015 and the Committee approved the report to be transferred to Council for declassification. The Council adopted the report and agreed to declassify it in December 2015. It is published under the responsibility of the Secretary-General of the OECD.

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DEVELOPMENTS IN INTERNATIONAL MOBILE ROAMING

Main Points

Significant progress has been made in reducing international mobile roaming (IMR) prices since 2012, either by ensuring effective competition or, in its absence, applying regulation. Of note, since the adoption of the Recommendation of the Council on International Mobile Roaming Services (OECD, 2012a) offers have developed from some mobile network operators of 'Roam Like at Home' (RLAH) plans, which do not require purchasing 'add-ons' and rather use the subscriber's domestic mobile package. This could, if such offers develop more widely, help in resolving the problem of high mobile roaming prices. These offers are more prevalent in markets with four rather than three mobile network operators (MNOs), which is likely the result of the additional competition provided by more players. Since 2012, examples of countries with four MNOs include Denmark, France, Japan, Luxembourg, Sweden, the United Kingdom and the United States. Finland, Portugal and Switzerland were exceptions with only three facilities based market players. Meanwhile, in mid-2015, Mexico witnessed the introduction of a number of RLAH offers for users travelling to the United States (Telefonica, 2015; Fiercewireless, 2015a).This reflects increasing competition following market reforms, introduced into the Mexican telecommunication market starting in 2014, and the launch by a number of United States operators of RLAH offers for their customers travelling to Mexico.

The reforms have attracted new foreign investment including by AT&T, which is completing the integration of two Mexican MNOs following its acquisition of both companies (Harrup, 2015). While this reduces the number of MNOs from four to three in Mexico, this will be offset by the plans to introduce a national wholesale wireless network. The flurry of RLAH offers is likely; however, the result of AT&T announcing it would like to create a borderless footprint encompassing both Mexico and the United States. As a first step, AT&T allows its Mexican customers to use their individual plans for voice, texting and data while in the United States at no added charge, and to make calls to the United States to users on AT&T's network as an inclusive part of their bundle (Fiercewireless, 2015b). This led to smaller rivals T-Mobile (United States) and Sprint announcing RLAH offers for their customers travelling to Canada and Mexico while for their part, Mexico's other two MNOs (Telefonica and America Movil) announced RLAH offers for their customers travelling to the United States.

Many mobile network operators have introduced specific roaming packages as 'add-ons' to existing subscriber contracts, in particular for mobile data roaming but retail prices and wholesale costs remain high in some countries. In addition, industry consolidation, in some countries, may reduce the competitive discipline from having additional mobile network operators. The changes in the roaming market also reflect demand-driven factors: that is, more and more people are now expecting to use their mobile devices while traveling abroad. This has raised IMR to be a more significant market over which operators compete. In addition, the development of the smartphone and all of its data apps, such as Wi-Fi calling, Skype, FaceTime, Twitter, and so forth, for communications have created at least in part substitutable and therefore competitive alternatives to IMR cellular services. Further, as network technologies have harmonized towards HSPA and 4G LTE, and away from incompatible ones like TDMA, CDMA or iDEN, this has increased the number of potential roaming partners for foreign carriers – increasing competitive pressure on prices.

Competition provided by more MNOs is also key to the competitive contribution from Mobile Virtual Network Operators (MVNOs). Since 2014, some MVNOs in countries such as France,the Netherlands, the United Kingdom and the United States have begun to offer RLAH offers covering continents – Europe, in the case of the Netherlands and France, and most of North and South America in the case of the United

States, as well as one MVNO data RLAH offer announced in April 2015 for over 120 countries for users travelling from the United States.

In the absence of sufficient competition, however, authorities have applied regulation in the European Union and European Economic Area (EEA). The European Union (EU) regulatory initiatives in the international mobile roaming market have provided a benchmark for many countries outside the EU, both Members and non-Members, have shown the role that regional bodies can play in significantly reducing prices and creating competition in IMR services. Outside of the EU there have been few specific regulatory initiatives to reduce roaming prices to competitive levels, though a consideration of competition dynamics is inherent in any review of industry consolidation or the introduction of new MNOs. In responding to the questionnaire as to the continued relevance of the Recommendation many EU and EEA countries noted that the EU regulations had gone significantly further than the Recommendation. However, many also noted that for non-EU roaming destinations the Recommendation was still valid. Some countries anticipate that market forces, including technological solutions, will over time reduce high international roaming prices.

Several new bilateral agreements which have been concluded or are in the process of finalisation among Members and non-Members should lead to price reduction and also provide a paradigm for other countries to follow suit where there is insufficient competition. Some of these bilateral agreements have also been undertaken between countries with free trade arrangements and could provide a framework to follow for other regions with free trade arrangements and could help alleviate some concerns that bilateral or regional agreements may have to be opened up to third parties as part of most favoured nation obligations.

Since 2012 when the Recommendation was adopted, the transparency of roaming prices has improved considerably resulting from regulatory initiatives and increased sensitivity of MNOs to the problem of bill shock. In addition, measures to protect consumers when roaming and increase their awareness of high roaming prices have also helped reduce bill shock.

While there has been an increased recognition of the need for regional and bilateral initiatives to lower high roaming prices, there is also an acknowledgement that it is necessary to create competition in the IMR market, which can be sustained without recourse to continuing and intrusive regulation. Structural measures, as is the case of the EU Regulation III, maintaining a sufficient number of players to enable wholesale competition for MVNOs and technological change, may help such competition emerge and may provide the basis to reduce the need for regulation in the future. However, the introduction of such measures should be carefully assessed before being implemented as some mobile operators say the European experience suggests that they require high investments from operators while their efficacy has not been proven. Obtaining further transparency on inter-operator tariffs and the benefits of doing so would also facilitate discussions on how to move forward in creating further IMR market competition.

Introduction

The Council adopted the Recommendation of the Council on International Mobile Roaming (OECD, 2012) in February 2012 and instructed the Committee on Digital Economy Policy (CDEP; then the Committee for Information, Computer and Communications Policy, ICCP) to promote and monitor the implementation of this Recommendation and report to the Council within three years of its adoption to assess progress made in this area. The purpose of this report is to provide an overview of progress made that will serve as background for gathering Members' input on their respective implementation of the Recommendation and for determining whether any further action is necessary.

The Recommendation was based on several reports undertaken by the ICCP over 2009-2010 which examined and analysed IMR service market developments, retail pricing and, where available, wholesale prices and international mobile data roaming. Two reports benchmarked retail and wholesale charges for voice roaming services and SMS and data roaming services (OECD, 2009, 2011). They concluded that price levels for international mobile roaming services were unreasonably high.

The causes for high roaming prices included the non-competitive characteristics of the roaming market which led to high wholesale charges and, in turn, high roaming retail charges. For example, in some cases the wholesale rates charged by foreign operators could account for up to three quarters of the retail rate. Other factors leading to high retail roaming prices included the fact that consumers did not take into account roaming services when choosing a bundled mobile offer, lack of market contestability and low consumer awareness of roaming prices.

Although substitutes have developed many require that subscribers change their mobile number or do not provide mobility (e.g. they require the use of Wi-Fi for voice in the event a number can be forwarded). The implications of taxation on the cost of roaming was also highlighted resulting in some cases from instances of probable double taxation, including authorities from some jurisdictions taxing the tax applied by authorities in foreign countries. A follow-up report provided an analysis of options available to policy makers in order to lower prices and increase transparency for end-users and put forward a set of recommendations that could be implemented by governments, should it be necessary, after assessing the specific situation in a given country (OECD, 2010) .

The Recommendation put forward a set of measures (Box 1) aimed at ensuring effective competition, consumer awareness and protection and a fair price level in IMR service markets.

Box 1. Recommendation: set of measures for establishing or reviewing roaming services policies

- Promoting transparent information on roaming services

- Promoting awareness of roaming prices and substitutes

- Facilitating trans-national networks and alliances

- Transparency of inter operator tariffs

- Facilitating access to wholesale mobile services on local terms and conditions

- Wholesale price regulation

- Retail price regulation

- Assessment of costs and benefits

Recent developments in IMR markets

In the period since the Recommendation was adopted in 2012 there have been a marked reduction in international roaming prices and a range of new service offers, in particular for mobile data roaming, by mobile network operators (MNOs) that have aimed at responding to the demand of roaming customers. Mobile subscribers, to a large extent, have become more aware of high roaming prices and, therefore, more cautious when roaming adjusting their consumption to limit expenditures and increasingly following procedures to limit mobile data consumption. Nevertheless, there still remain a number of cases of bill shock. Increased awareness of problems raised by high roaming prices has also stimulated further action by the relevant authorities and engendered wider public discussion of the issue. In turn, this has placed pressure on MNOs to reduce prices. Transparency of roaming prices has also improved considerably over the last few years although there is room for improvement.

Despite the reduction in prices, however, roaming prices in many countries are far from competitive [1]. In many regions the perception is that price reductions have been insufficient and this has been reinforced by the fact that domestic mobile (and fixed) telecommunication prices have fallen considerably in competitive markets. In several countries, a number of mobile network operators are offering domestic monthly packages which include unlimited calls to fixed and mobile phones, unlimited SMS and generous mobile data packages. These price reductions in national mobile markets have led to considerable changes in consumption patterns for mobile phone services.

Mobile data traffic already accounts for a large majority of traffic in terms of volume. Estimates for the United States, for example, indicate that mobile data traffic accounted for 99.1 percent of total national mobile traffic in volume terms in 2012 and will increase to 99.5 percent by 2016. The growth in the use of mobile data for the EU and EEA members is shown here (Figure 1). Recent estimates of global traffic indicate that data traffic almost doubled between 2012 and 2013 while the increase in voice traffic during the same period was two percent (Ericcson, 2013). Projections by Cisco, which monitors such traffic, are for a compound growth in mobile devices over 2013-18 of 11.6 percent in North America and 9.7 percent in Western Europe resulting in a 7.6 and 7.5 fold increase in mobile data traffic respectively in those regions. The average mobile traffic per user is also predicted by Cisco to increase tenfold over 2013-18 (Cisco, 2016).

This significant shift toward the use of mobile data services poses a further challenge to international mobile roaming policy. The significant reductions in domestic prices for mobile data have not always been reflected in international mobile data roaming prices, which to some extent could reflect that roaming implies, as might reasonably be expected, some added costs to domestic services . At the same time, users,

whose demand for mobile data services has increased, do not always fully adjust their consumption of mobile data roaming services when roaming to take into account higher prices.

Growth in mobile data is driven by the availability of higher speeds as subscribers adopt smartphones and move to 4G connections. In turn, higher speeds have led to a rapid development and diffusion of a range of applications for use on mobile devices. Many of these applications have become commonplace and are used on a daily basis. There is a demand by international travelers to continue using these applications as they roam in other countries. In many cases, access to mobile data is necessary when roaming, for example, to check email, obtain information on transport and reservations, online banking and, increasingly, will be necessary for mobile payments. Many mobile applications also remain active when roaming as a result of automatic updates, obtaining location data, and so forth. In so doing they generate, unknown to many subscribers, more mobile data traffic adding to the subscriber's data consumption and potentially his or her bill.

Figure 1. Volumes of retail data in Q2 2014, prepaid + post-paid, Index (Q2 2008 = 100)
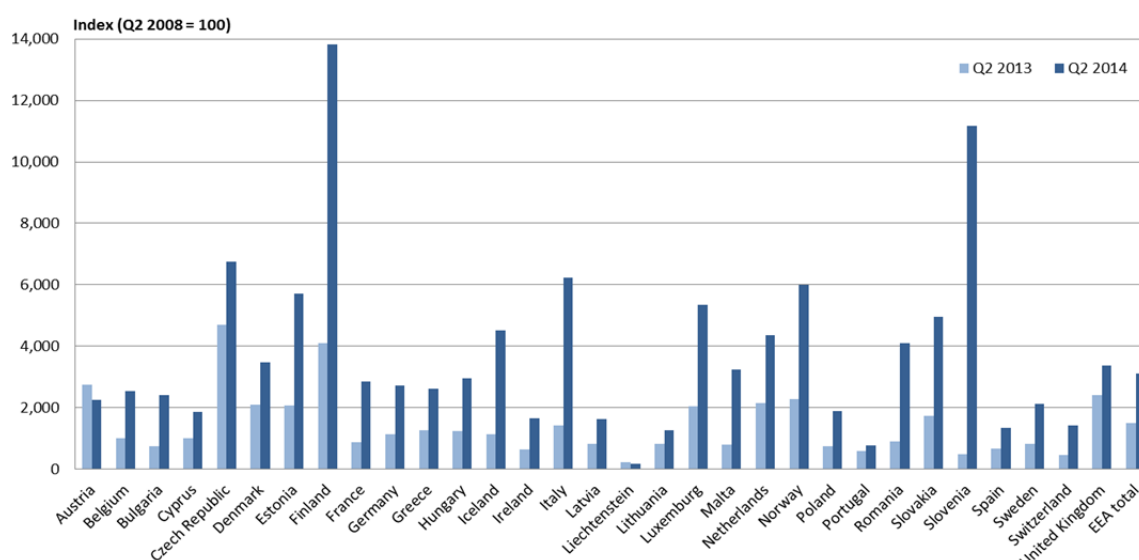
Note: Note by Turkey: The information in this document with reference to « Cyprus » relates to the southern part of the Island. There is no single authority representing both Turkish and Greek Cypriot people on the Island. Turkey recognises the Turkish Republic of Northern Cyprus (TRNC). Until a lasting and equitable solution is found within the context of the United Nations, Turkey shall preserve its position concerning the "Cyprus issue".

Note by all the European Union Member States of the OECD and the European Union:The Republic of Cyprus is recognised by all members of the United Nations with the exception of Turkey. The information in this document relates to the area under the effective control of the Government of the Republic of Cyprus.

Source: International roaming BEREC benchmark data report April 2014 – September 2014, BoR(15)29, http://berec.europa.eu/eng/document_register/subject_matter/berec/reports/4922-international-roaming-berec-benchmark-data-report-april-8211-september-2014.pdf

Prices

Since the adoption of the Recommendation, EU and EEA members have made significant reductions in international mobile roaming (IMR) prices, both wholesale and retail. Wholesale price data are not available across the OECD to judge whether similar reductions have taken place. However, while retail prices may have declined in other countries the depth of price cuts has not been as significant as in in the

EU/EEA, except where 'Roam Like at Home' (RLAH) offers have been introduced by some MNOs. 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, starting in 2007 with the adoption of a roaming regulation, which was subsequently amended in 2009 and further amended in 2012 (European Parliament and European Council, 2007, 2009, 2012). The EU, in its third Roaming Regulation, agreed that the average mobile termination rate for mobile network operators provided the most appropriate benchmark for wholesale roaming call origination and termination on mobile networks. The glide path followed by the EU in reducing both wholesale and retail voice roaming charges is shown here (Figure 2). The wholesale caps imposed on all roaming services by the different EU roaming regulations are also set out (Table 1). Benchmarking by the Body of European Regulators of Electronic Communications (BEREC) (as of March 2014) indicates that retail prices for voice services are close to the regulated caps despite a significant margin between the retail caps and wholesale prices. The EEA average retail price for voice (making calls) is 86 percent of the cap whereas the average EEA wholesale price is 60 percent of the cap for voice. There is a much larger margin between the regulated caps for mobile data services and the data wholesale caps. This is viewed by some as the beginning of wholesale competition in the EU/EEA market.

Despite these extensive mobile roaming price reductions in the EU since 2007, surveys indicate that prices are viewed as too high by many European subscribers. For example, a European Commission survey in early 2014 found that 94 percent of the travellers outside their home country limit their use of services, and approximately 25 percent of subscribers switch off their mobiles when travelling (EC, 2014).

Figure 2. European Union glide path, wholesale and retail roaming voice charges
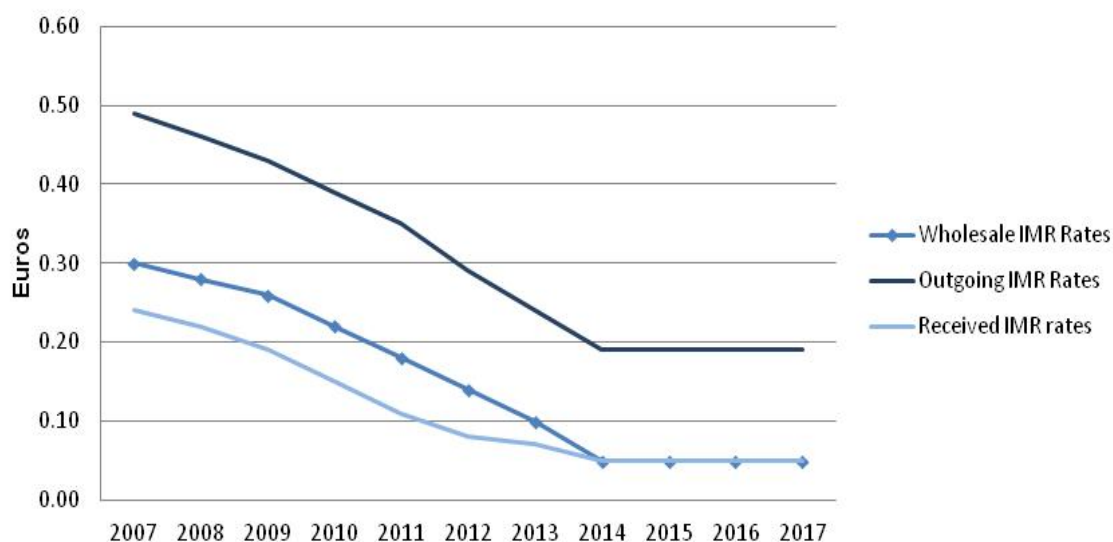
Source: Extracted from BEREC, International Roaming BEREC Benchmark Data Reports, http://berec.europa.eu/eng/document_register/subject_matter/berec/reports/

As the OECD recognised in its earlier document, the international roaming market is not contestable in that the current structure of the IMR market does not lend itself to the creation of long-lasting competition (OECD, 2010). This is because IMR 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. In this context, the European Commission considered that structural measures would be required for competition to emerge. Without such measures the EU considered that regulatory price caps would remain necessary. The third roaming regulation, adopted in 2012 by the EU, was significant since it recognised that structural

measures may be required in the IMR market to create meaningful competition and avoid the need for ongoing price regulation.

The key changes, which became effective in the EU, from 1 July 2014, provide subscribers with an option to find an alternative roaming provider while still keeping their home mobile number - essentially decoupling home services from roaming services. In addition, there is a requirement that subscribers should not be prevented from accessing data roaming directly from an alternative provider when roaming in a visited country (referred to as Local Break-out) without the need to change SIM cards. Moreover, MVNOs and resellers can have regulated access to MNO networks throughout the EU/EEA. By decoupling the roaming data market from the home provider the aim is to generate new service providers who will provide mobile roaming data access, and other mobile roaming services, at competitive prices. However, in September 2013, the European Commission tabled legislative proposals on international roaming as part of its "Connected Continent" legislative package whereby mobile operators would be able to obtain an exemption from the decoupling measures under certain circumstances, mainly related to the phased introduction of RLAH tariffs. On 3 April 2014, the European Parliament adopted its first-reading resolution on the "Connected Continent" proposal (EC, 2013). This resolution includes eliminating roaming surcharges by 15 December 2015. According to the European Parliament's first-reading resolution, as of that date, any roaming service offered by a mobile network operator would not be charged more when roaming within the EU than on the mobile operator's own network, provided the consumption of roaming services does not exceed fair use criteria to prevent anomalous or abusive usage of retail roaming services. Beyond fair use limits, operators could charge the 'eurotariff' defined in the 2012 EU roaming regulation currently in force. The European Parliament's first-reading proposal would thereby create a RLAH market structure. The concept of RLAH is being defined with reference to fair use criteria.

On 4 March 2015, the Council of the European Union adopted a negotiation mandate for the Council Presidency on the Commission's "Connected Continent" proposal. The Council Presidency mandate involves a transitional period whereby a basic volume of roaming consumption would be priced to the consumer at domestic level (i.e. with no roaming surcharge), and a small retail surcharge, not higher than the current wholesale roaming cap level, would be applied beyond the basic volume. According to the proposal, this transitional regime would apply until wholesale roaming prices fall to a level that allows the provision of roaming services at domestic level, either through market forces or another regulatory intervention after the necessary wholesale review has been conducted. Since the end of March 2015, starting from their respective proposals, the European Parliament and the EU Council have been negotiating in order to elaborate a common text for the 'Connected Continent legislative package.

It is difficult to predict the outcome of the structural measures, in particular given the continued legislative uncertainty over the two RLAH proposals referred to above and whether they will in fact be implemented or become redundant under a new roaming settlement, In fact, so far they haven't produced any effect on the market as the new legislative proposals have de facto inhibited any new entrant, thereby rendering fruitless the investments made by the infrastructure operators. If the structural measures were to result in increased competition and lower prices in the absence of RLAH, it would be likely that MNOs would significantly reduce their prices in order to maintain their existing subscribers as roaming clients. The development of resellers or regional MVNOs may depend on the volume of roaming traffic in a particular country and the extent to which MNOs reduce their roaming charges below regulated prices. In order to create a separate IMR market, regulatory initiatives need to be implemented and, while wide-ranging, in the long term they can ensure that the IMR market will no longer be subject to regulation. As an example, the 2012 EU regulation requires MNOs to provide wholesale access and to publish a reference offer, including a service level agreement with respect to IMR markets. 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) to MVNOs. In Mexico, mobile operators designated as having preponderant market power are obliged to provide MVNOs with wholesale access to international roaming services.

Table 1. European Union wholesale caps for mobile roaming within EU & EEA (Euros)

Effective from	30.07.2007	30.08.2007	01.07.2009	01.07.2010	01.07.2011	01.07.2012	01.07.2013	01.07.2014
Outgoing calls to any EU/EEA number	0.3	0.28	0.26	0.22	0.18	0.14	0.10	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	0.8	0.5	0.25	0.15	0.05

Note: EU average termination rate was Euro 0.0357 per minute in 2012; EU average termination rate was Euro 0.032 per SMS in 2012

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

The European Union's wide ranging initiatives on mobile roaming prices are unique within the OECD and globally. There have been, nevertheless, other initiatives aimed at reducing prices. Australia and New Zealand agreed in February 2013 to regulate high trans-Tasman mobile roaming rates through a bilateral agreement and released a joint report which 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 regulators to apply price caps on wholesale and retail roaming charges and a regulated terms of access and mobile-local access services (Australian Government and Ministry of Business, Innovation and Employment, 2013). The agreement requires a legislative change which is presently underway.[2] Legislation would allow the national regulatory bodies to impose retail and wholesale price caps on MNOs and require wholesale access obligations. The threat of future action led to some adjustments in roaming prices in both countries by the main mobile operators. For example, Telstra (Australia) now offers a range of mobile roaming data bundles to meet customer demand and Vodafone New Zealand provides an offer which allows a subscriber to use their existing plans voice, text and data at domestic prices for an additional charge of USD 3.88 (NZD 5) per day.

Other bilateral agreements involving Members include an agreement in December 2012 between Israel and the Russian Federation (hereafter "Russia"), and a memorandum of understanding (MoU) between Israel and Poland also in December 2012. Both agreements cover prices and will use the EU tariffs as "benchmark rates" for ongoing negotiations. The agreements are still under negotiation and have yet to affect prices. Israel is also examining structural solutions to reduce roaming charges. In September 2014, the Israeli Ministry of Communications announced a consultation procedure proposing that it would allow mobile network operators, as well as other telecommunication service providers, to offer roaming as a separate service to the customer of another mobile subscriber without the need to change the number of the subscriber (Raz-Chaimovich, 2014). This would be similar to the decoupling requirement adopted by the EU. The Ministry also proposes to require one second billing for voice and 1KB billing for mobile data as a way to reduce prices (Raz-Chaimovich, 2014). In 2014, the Norwegian mobile operators signed an MoU with Russia with the aim to reduce roaming charges between the two countries. Denmark and the People's Republic of China (hereafter "China") have signed a bilateral agreement aimed at reducing roaming prices between the two countries, as have Russia and Argentina (Ministry of Business and Growth,

Denmark, 2014),.Japan and Australia have also begun discussions aimed at reducing roaming prices between the two countries (Bender, 2015).

Chile and Argentina are working towards eliminating roaming charges between the two countries following an agreement by the presidents of these countries taken in May 2014. Chile is also discussing with Peru the possibility of reducing roaming charges between the two countries. Chile has also required that voice roaming must be billed on a per second basis and data roaming per 1KB (SUBTEL, 2012). Colombia has entered into an agreement with Peru with the aim to reduce roaming prices and is in the process of negotiating a regional agreement with Mexico, Peru and Chile aimed, inter alia, to promote the contestability of the international mobile roaming market in the region, adopt measures to make users able to control their usage of voice, SMS and data in IRS and reduce roaming charges.

The Colombian regulator, Comisión de Regulación de Comunicacione (CRC), has indicated that as a result of measures taken to protect consumers (see section below) roaming prices declined between 2013-15, on average, by 41 percent for outgoing voice calls, 44 percent for incoming voice calls and up to 68 percent for mobile data services (Figure 3). Chile is also discussing with Peru the possibility of reducing roaming charges between the two countries. Latvia has engaged in talks to reduce roaming tariffs with Russia and Belarus, resulting in tariff reductions with Russia between 15–25 percent and tariff reductions with Belarus between 35–55 percent (Telecompaper, 2012a).

Figure 3. Colombia, reduction in international roaming
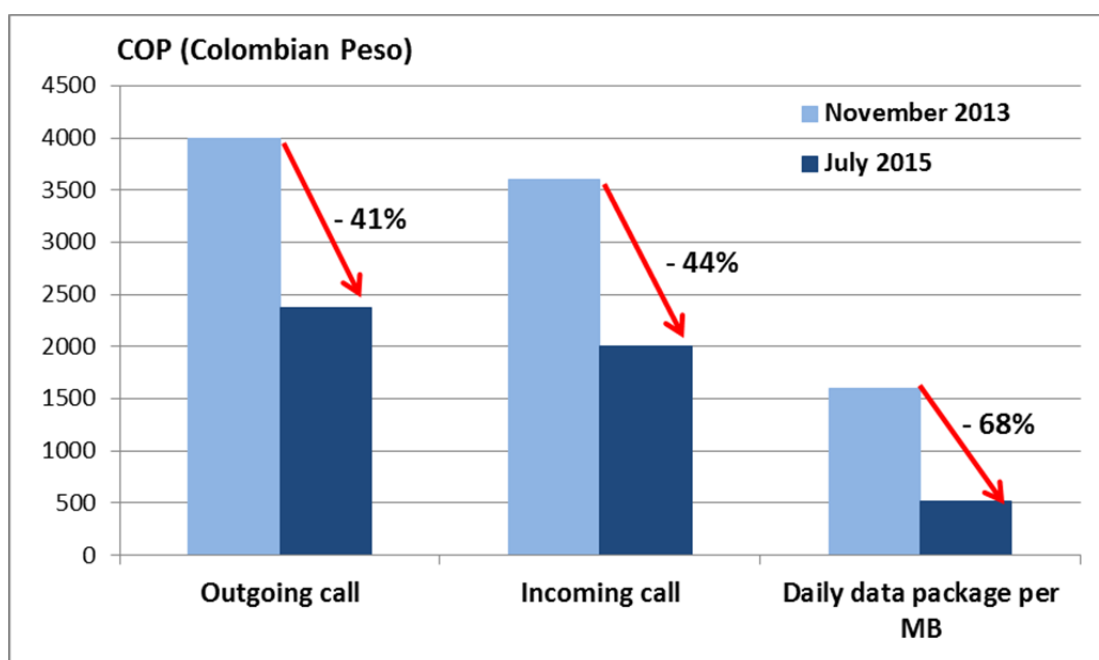
Tariffs

Non-Members have also been active in trying to reduce international mobile roaming prices. The Gulf Cooperation Council (GCC) had implemented an agreement using price caps with price reductions staggered over 2010 and 2011.[3] The agreement, which was fully implemented by February 2012 and which only covered outgoing roaming calls, resulted in price reductions of up to 70 percent. The GCC Roaming Working Group is proposing to extend the existing regulation to cover incoming calls, SMS and mobile data roaming. The proposed changes would also cover wholesale and retail roaming prices. In

addition, it is proposed to require per second billing for outgoing and received calls after a flag-fall charge of 30 seconds.

Wholesale and retail roaming rates between Singapore and Malaysia have been reduced by up to 30 percent for voice calls and up to 50 percent for SMS over two phases starting on 1 May 2011. Brunei Darussalam and Singapore also agreed, in June 2012, to reduce roaming rates for SMS and data roaming charges and further reduce the price of voice calls by the first quarter of 2013. As part of the agreement both the wholesale inter-operator charges and retail charges were reviewed.[4] A further agreement has been reached to reduce prices from 1 January 2015 up to 10 percent for voice and up to 50 percent for messaging, video calls and data. The arrangement is covered under the Association of South East Asia Nations (ASEAN) Framework Agreement for Services (AFAS). The AFAS is a regional free trade agreement notified under and likely consistent with GATS Article 5, which should cover any most favoured nation departure. Similar to the foregoing, Singapore and Malaysia, following their 2011 bilateral agreement reduced roaming voice prices between 30 to 50 percent over 2011-2012 (IDA, 2011). By August 2015, the first RLAH offers were introduced for Singaporean users roaming in Malaysia (Today, 2015).Additionally, in Southeast Asia, the telecommunication regulators in Cambodia and Thailand have signed an agreement for a single flat rate for roaming between both countries to commence in 2016 (Tortermvasana, 2015). The National Broadcasting and Telecommunications Commission (NBTC) and the Telecommunication Regulator of Cambodia said the agreement is aimed at boosting cross-border trade, investment and tourism. In the context of the Trans-Pacific Partnership (TPP) Agreement the twelve countries are also addressing the high cost of international mobile roaming.[5] In October 2015, Australia and Canada said that the TPP Agreement included a provision addressing this issue in the text agreed among negotiating countries (Australian Government, 2014; Global Affairs Canada, 2015).

In September 2014, Turkey, Albania, Bosnia and Herzegovina, Kosovo, Montenegro, and Serbia agreed to examine how to create a roaming free zone covering their territories. In advance, Serbia, Montenegro, Bosnia and Herzegovina and the Former Yugoslav Republic of Macedonia have signed an agreement on lowering mobile roaming charges with a view to lowering prices to the same level as the EU within three years. This agreement sets maximum wholesale and retail prices of roaming services over three periods: from 30 June 2015 to 30 June 2016, from 1 July 2016 to 30 June 2017 and from 1 July 2017 onwards. From 30 June 2015, the maximum retail price of an outgoing call will be EUR 0.29/minute (a 50 percent reduction on average prices); incoming calls will be priced at EUR 0.08/minute (a 70 percent reduction); text messages will be priced at EUR 0.09 and data services EUR 0.70/MB (respectively a 50 percent and 70 percent decline).

In Africa, the Economic Community of West African States[6] (ECOWAS) has improved regional roaming arrangements, through intra-operator agreements. The agreements allow roaming subscribers to receive calls without additional charges 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. The East African Community[7] (EAC) plans to eliminate roaming charges for the region by adopting a RLAH framework and the Southern African Development Community[8] (SADC) ministers agreed in November 2014 that the region should adopt a RLAH framework and approved a glide path to reduce retail and wholesale roaming tariffs for the region (SADC, 2014).

The increased business and consumer awareness of high international roaming prices, together with the public debate this has engendered, and a number of high profile cases of bill shock have played a role in leading MNOs to reduce their prices. In addition, downward pressure on IMR prices has come from subscribers demanding more reasonable roaming data prices and from roaming substitutes that provide some competition especially in the roaming data market. While some attribute the improved offers to operators, acting ahead of regulatory intervention, it is nevertheless the case that some offers have gone far beyond those suggested by authorities. In the EU, for example, a number of European MNOs have gone

beyond the requirements of the EU roaming regulations. Examples include offers that allow subscribers to use their mobile services in a number of visited countries without any extra charges, i.e. "Roam Like at Home" (subject to a limited time frame).

Since first seen in 2013, the key difference of RLAH offers, as opposed to others, is that they involve services being included in a customer's bundle without additional charges or being necessarily "on-net" with foreign MNOs sharing the same ownership. While there had been some earlier examples of such offers in Africa, the Middle East and Europe, they were limited to on-net roaming or required additional charges.

A recent OECD report has attributed these developments to more competition existing in markets with four or more MNOs as opposed to those with three MNOs where, to date they are much less prevalent (OECD, 2014). This includes countries that have increased the number of MNOs from three to four and countries that have rejected mergers or other developments that would have resulted in a reduction of players from four to three.

Roam like at home pricing

At the time of the Recommendation, in February 2012, no mobile operator in any Member included a "Roam Like at Home" service as an integral part of their offer. While similar services were on offer consumers needed to purchase these roaming services at an additional charge to the price of their regular bundle. In addition, these services were only valid for on-net roaming, that is the user had to roam in a visited country where there was an affiliate of their domestic mobile network operator. This limited the international coverage of these roaming packages and required that a roaming user in a visited country ensure that their mobile terminal connects only to the affiliate's network. Although pricing international mobile services separately should be unproblematic, particularly for on-net services for the same company, in practice this had led to unreasonable mark-ups compared to services purchased as part of a bundle.

Since 2012, the first offers from MNOs that include international mobile roaming, as an integral part of their bundles have been made almost entirely in Members with four or more operators. Such offers have largely not yet emerged in countries with three operators. One exception is Portugal where one MNO offers roaming as an integrated part of a premium offer for up to 15 days, as well as with other offers requiring an additional charge per day for a number of countries in Europe (Table 2). The other country is Switzerland, where one MNO's offers include between 30 to 360 days of roaming in the EU and Western European countries.[9]

While some offers are still restricted to on-net roaming (e.g. in Sweden), others represent a fundamental change in the market. They include the first off-net offers for international mobile roaming from operators based in France, Israel, Luxembourg, the United Kingdom and the United States. Moreover, these offers include not only off-net international mobile roaming but also roaming in some countries where these operators do not have a network with shared ownership. Most of the networks that have launched off-net international mobile roaming to date are those with the smallest market shares suggesting they view this as a strategy to gain customers. At the same time, some of the owners of these operators own networks in countries with three MNOs or are incumbents but have not launched similar offers.

While having four or more operators has not necessarily led to the integration of international mobile roaming in all countries, it has improved non-integral offers in countries with those numbers of players, such as Canada. Nonetheless, when the smallest players launch integral offers their larger rivals, as occurred in France, Israel and Luxembourg, sometimes follow them. Outside the OECD, the smallest players in markets with four MNOs are also adopting elements of the RLAH strategy. In 2014, in Malaysia, for example "U Mobile" - the smallest player in that country - began to offer 50 MB per day to roamers in

Southeast Asia as well as in Australia (U Mobile, 2014). It was the first company in Malaysia to make such an offer.

Table 2. Challenger brands influence in international mobile roaming.

	MNOs*	International Roaming included in Bundle**	Challenger MNO*** offering services	Territories covered
Australia	4 to 3	No		
Austria	4 to 3	No		
Denmark	4	Yes (May 2014)	Hi3G	Austria, Germany, Ireland, Italy, Liechtenstein, Luxembourg, Netherlands, Norway, San Marino, Sweden, Switzerland, United Kingdom and Hong Kong (China)
France	3 to 4	Yes (Apr 2013)	Free Mobile****	Austria, Belgium, Canada, Czech Republic, French West Indies and French Guiana, Germany, Greece, Ireland, Israel, Netherlands, Poland, Portugal, Romania, Spain, the United Kingdom and all other EU countries from July 2015.
Israel	4 to 5	Yes (September 2014)	Golan Mobile ****	Czech Republic, France, Germany, Greece, Ireland, Netherlands, Romania, Hungary, Italy, Malta, New Zealand, Portugal, Spain, South Africa, Turkey and the United Kingdom
Japan	4	Yes (September 2014)	Softbank	United States
Luxembourg	3 to 4	Yes (Jan 2014)	Join Experience****	European Union
Netherlands	3 to 4	Yes	T-Mobile	European Union
Portugal	3	Yes (Mar 2013)	Vodafone Red Top*****	19 European countries
Sweden	4	Yes	Hi3G	Denmark
Switzerland	3	Yes	Swisscom	European Union and Western Europe
United Kingdom	4	Yes (Aug 2013)	3-UK****	Australia, Austria, Denmark, Finland, France, Hong Kong (China), Indonesia, Ireland, Israel, Italy, Macau (China), Norway, Sri Lanka, Sweden, Switzerland, and the United States.
United States	4	Yes (Oct 2013)	T-Mobile US****	More than 100 countries

Notes: * Changes between 2012-2015. ** Roaming services included as part of a bundle for which no additional or metered charges are incurred. ***MNOs selected have the smallest nationwide market share in those countries. ****The companies have off-net international mobile roaming. ***** With this offer no additional or metered charges are incurred for 15 days/year after which users pay 2.99€/day.

Source: OECD

In 2013, for example, *Iliad (Free)* in France introduced a RLAH plan for its customers roaming in a number of countries in the European Union and expanded this offer to include Canada and Israel. It is limited to a period of 35 days for any single country, i.e. during this period a subscriber can use his or her mobile service to make local calls in the visited country, receive calls at no cost and access data on the same terms as at home (e.g. 3GB for 3G coverage). A call back home would be priced at the same rate as if the subscriber were at home, that is, there would be no charge. The market has shown a dynamic trend in offering such roaming services. Another company in France, *Bouygues*, has followed with bundles which include, when roaming in Europe, unlimited voice (limited to the calls to France) and text and up to 3GB

of data (depending on the bundle). The new fourth mobile network operator in Luxembourg offers a RLAH subscription covering all of Europe without the need for add-on charges or limits to the number of days; this is available as part of an existing bundle. For EUR 29.95 (USD 38) a subscriber obtains 200 minutes of voice and 400 SMS which can be used either at home or across Europe. The package provides 1GB of mobile data but only 100 MB can be used outside of Luxembourg at no extra charge. In the Netherlands, following the introduction of a fourth operator, T-Mobile introduced an offer which allows customers to use minutes from their domestic bundles when roaming in the EU (up to a limit of 120 minutes per month) and incoming calls as well as SMS are not charged. This offer, introduced in January 2015, does not include data (Telecompaper, 2015).

In September 2014, *Golan Telecom* in Israel, introduced a similar offer to that of Free in France. The plan includes unlimited calls (domestic and fixed lines in 55 countries) and SMS, along with 6GB of data, priced at USD 27 per month (NIS 99). When roaming there are no additional charges with the service being valid for 30 days. Golan Telecom's current subscribers with the Golan Telecom Unlimited Plan at NIS99 per month received the service automatically. This announcement was followed by larger rival Pelephone Communications launching, for the same price, its own service in 87 countries with a limit of 100 MB per day.

In the United Kingdom, Hutchison 3G UK ("Three") announced its so called "Feel at Home" offer for seven countries around the world on 30 August 2013. The offer was later expanded to 16 countries. While the Three offer includes voice, text and data, voice calls and SMS messages are only included when they are made back to the customer's home country. In earlier years, *Three* had offered an on-net roaming service on MNOs in the same group but this had been withdrawn. One of the reasons given for its withdrawal had been that customers roamed onto other networks, without being necessarily aware of the change, and this led to "bill shock". Some MNOs still require that the user remain on the network of MNOs in the same group or partner networks. *Telia* Denmark, for example, offers a RLAH plan for the Nordic and Baltic countries although this is subject to the subscriber remaining on the networks of preferred partners when roaming and does not cover mobile data services. Finland has a bilateral Memorandum with Russia concerning actions to decrease roaming pricing. It does not include any detailed price limits but expresses in general terms the political will to reduce the level of roaming tariffs in both countries and the mobile operators in the two countries commit themselves to negotiate with one another. The Memorandum was signed in 2011 and since then roaming prices in Russia have decreased. The largest Finnish operator Elisa has the same Russian and EU-area roaming charges but two other operators maintain higher roaming prices in Russia than in EU countries. Also in Finland, TeliaSonera offers a subscription (Sonera Sopiva) which includes calls, SMS and data in Baltic and Nordic countries with the same tariffs as domestic traffic when roaming on its own networks.

In 2013, *T-Mobile* (US) introduced an international roaming offer which does not incur an extra charge and provides unlimited 2G data access and text messaging to 120 countries at no extra charge, and roaming voice calls for USD 0.20 per minute. This compares to USD 0.24 for intra-European Union roaming voice calls. There is no action the customer needs to take to avail themselves of these services.

An example where cross-border investment has led to lower IMR charges is in Japan where Softbank recently introduced a roaming plan for the United States providing unlimited calling and data within the United States, but limited to customers using the iPhone 6 and who have a domestic subscription providing flat rate calling and data. The offer is on Sprint, an MNO in the United States for which Softbank is the largest shareholder. [10]

It needs to be recalled that IMR prices in the past were extremely high and, in many cases, still remain high despite significant reductions. The examples below are indicative of some of the reductions that have taken place.

Price trends for voice and SMS

As indicated above the most significant reductions in international mobile roaming prices have been associated with bundles that include RLAH offers and elements. How much a consumer benefits depends on their usage pattern but some examples can be given. From 2009, when the OECD reviewed all international roaming prices between Members for voice and text service, the following examples can be highlighted (OECD, 2009):

- A user in France travelling to Israel and making a three-minute call home would have paid USD 11.14. Following the entry into the French market by *Free* (Iliad) at the beginning of 2012 and inclusion of Israel in *Free's* RLAH bundle the same call for one of their customers would incur no additional charge. The cost of two three-minute calls from Israel to France in 2009 was equivalent to the price of a mobile monthly bundle of a *Free* subscriber.

- A user travelling from Israel to Germany or Italy would have paid USD 5.40 and USD 7.46 respectively to make a three-minute call home. In 2014, both calls would be included in their bundle with *Golan Telecom*. A Golan Telecom user now pays the same amount for their entire monthly bundle of services as a single roaming call from Italy to Israel for 11 minutes in 2009.

- A user travelling from Japan to the United States would have paid USD 4.04 for a *call* home. Following *Softbank's* RLAH offer they would pay no charge over and above their regular monthly bill for such a call. To receive a call from home they would have paid USD 5.66 in 2009 compared to no charge in 2014.

- A user traveling from the United Kingdom to Australia would have paid USD 3.87 *f*or a three-minute call back to the United Kingdom. For the same user travelling to the United States they would have paid USD 5.92 for the equivalent call. Following the introduction of *3G-UK's* RLAH offer they would not pay any additional charge.

- A user travelling from the United States to an OECD Member would have paid an average of USD 0.55 per SMS. Following the introduction of the RLAH offer from T-Mobile (US) such a text would not incur any additional charge. T-Mobile (US) still bills per call but the price would have reduced from an average USD 5.16 for a three-minute call home from another Member to USD 0.60.

Price trends for data

In 2011, in the lead up to the Recommendation, the OECD surveyed the prices for data roaming (OECD, 2011). The OECD compared a variety of data roaming plans based on the amount of data users could send or receive when abroad. For 1Mb of data, for example, the equivalent of sending 10 photos, the average price by country across the OECD was USD 9.48 (based on purchasing power parity). Canadians travelling abroad paid the most (USD 24.61), followed by people from the United States (USD 22.06) and Mexicans (USD 19.85). Greeks abroad paid the least (USD 4.17), followed by subscribers from Iceland (USD 4.42) and Luxembourg (USD 4.46). The wide difference in prices, according to the report, could be explained either by Greek mobile phone companies being charged less by wholesale operators than Canadian operators and passing those savings onto customers. Or it could have reflected greater competition in the Greek retail roaming market than in Canada.[11]

By 2015, it was possible to compare some more recent international roaming offers for Canadians for data introduced over the previous three years with the rates gathered in 2011. While no RLAH offer had yet emerged there have been substantial changes especially for offers involving the United States.

Given that Canadians paid the highest charges for international roaming in 2011 it is worth noting these developments. For example, the packs introduced by *Bell* and *Roger*s provide lower data roaming prices in the United States than in the past. One of the more striking offers has been made by *WIND Mobile*, which in August 2014 reduced rates for roaming in the United States by 95 percent. Following the change a Canadian *WIND* customer could pay USD 0.038 per MB while in the United States. The changes since 2011 are even more striking and support the efforts by policy makers in that country to increase competition, in particular by creating policies to facilitate new MNOs in the market. In 2011 a subscriber in Canada paid USD 27.34 (PPP) for 20 MB whereas today the subscriber could pay USD 0.76 (PPP). Alternatively the same subscriber could pay USD 11.36 (PPP) for unlimited data access.

For the RLAH offers the savings for data roaming are also striking. In 2014, customers in all the selected operators could pay for their entire monthly subscription just on the savings for 20 MB of international mobile roaming data at the 2011 rates. To appreciate such a change from a different angle a customer of *Softbank* would pay off the price of a new iPhone 6 (16 GB) from the equivalent savings on 60 MB of international roaming data in the United States at 2009 rates.

Table 3. Recent price changes for data roaming

USD PPP		2011	2014	2011	2014	Operator used for 2014	Note
Home Country	Roaming in:	1 MB	1MB	20 MB	20 MB		
Canada	United States	10.02	0* or 0.038	27.34	0* or 0.76	WIND Mobile	*Unlimited subject to USD PPP 11.36 (USD 13.2) or USD 0.038 PPP (USD 0.044) per MB
Denmark	See Table 2	5.54	0	93.31	0	Hi 3G	
France	See Table 2	5.24	0	27.2	0	Iliad Free	
Israel	See Table 2	15.15	0	130.4	0	Golan Telecom	
Japan	United States	13.44	0	198.16	0	Softbank	Users need an iPhone 6
Luxembourg	Europe Union	4.46	0	49.86	0	Join	Limit of 100 MB for Europe on basic plan
Portugal	19 European Countries	6.45	0	82.55	0	Vodafone	15 days for a "Red Top" subscription
Sweden	See Table 2	6.35	0	127.02	0	Hi 3G	
Switzerland	See Table 2	6.92	0	65.16	0	Swisscom	
United Kingdom	16 countries	6.02	0	99.23	0	3G-UK	Includes 4G roaming
United States	Over 120 countries	22.06	0	155.71	0	T-Mobile (US)	2G Edge speeds unless upgraded.**

Notes. For 1 MB in one session - average price by country of origin of the traveller - intra EU/EEA routes excluded. For 20 MB in one session, average price by country of origin of the traveller, price of the least expensive destination of the traveller. The data for 2011 are only indicative as they involve different operators and destinations. For T-Mobile customers who require higher speeds, the carrier offers Speed Passes for 3G HSPA+ network access. The plans range from 100 MB for one day at USD 15 to a two-week, 500 MB pass for USD 50.

Source: OECD

Caveats on above price trends

As might be expected the changes made to international mobile roaming offers have substantially influenced the behaviours of customers and their usage patterns. For example, T-Mobile (US) reports its customers make three times more calls, sent seven times more SMS texts, and used 28 times more data than they did under the previous plans when roaming (Thomas, 2014). Strikingly, 53 percent more of its customers now roam on cellular in supported countries than prior to the price changes. For its part, 3G-UK says it experienced a "1000x" increase in data usage by its customers in Australia in the first three months following its RLAH offer (Kelly, 2013). By August 2015, 3G-UK said that on average their customers used 500 MB per trip and, the two million that had travelled since the introduction of the RLAH offer, had saved in total) USD 2 billion (£1.3 billion if this level usage had been at the previous rates (Three, 2015).

While the changes to the international roaming market are very propitious, for countries where RLAH or similar offers have emerged, the price comparisons exemplified here are still the exception rather than the rule. Outside these countries prices remain high unless curbed as a result of regulatory intervention, such as in the European Union but only for intra-European traffic. Moreover, it can be noted that RLAH offers have mainly emerged in countries with four or more MNOs and arguably, there is a possibility that the momentum for such developments could be substantially reduced in those countries that have experienced or are witnessing mergers. The extent of price reductions shows that either the previous prices had little relationship to cost or that costs have decreased allowing for price reductions. However, if the latter is the case a more widespread reduction in retail prices might be expected across the market if there was some semblance of competition. For this trend to continue it is important that regulators ensure that sufficient competition continues developing in mobile markets.

Add-on roaming packages

Strictly defined, the concept of RLAH implies that mobile subscribers, when visiting another country, can use their mobile phone as if they were in their home country without incurring any extra charges. That is, they can make a local call in the visited country, call back home, call a third country, access mobile data and use SMS on the same commercial terms as their home mobile subscription incurring no extra charges. If any charges were involved they would occur if usage, when roaming, went beyond their allocation of minutes and/or data of their monthly subscription and these charges would be at the same level as if the subscribers were in their home country. In many cases MNOs have advertised RLAH tariffs but these have required subscribers to pay an extra surcharge either on a daily, weekly or monthly basis. In other cases so-called RLAH offers have been limited to only a few mobile services, e.g. calls back home are not charged and sending and/or receiving SMS is not charged or RLAH offers only apply if subscribers in visited countries use networks of MNOs affiliated with their home country MNO. They rarely include calls to third countries. Some say the limitations in the ability to offer RLAH are due to differences in cost structures in the two countries involved (i.e. negotiated wholesale rates between home and visited networks not being conducive to such offers).

Some examples that diverge from a strict RLAH definition include Japan's Softbank offer, which requires roaming on specific networks. The operator *Three* Ireland, where the number of MNOs is being reduced from four to three, also offers a plan advertised as a RLAH plan to five European countries and Hong Kong, China, and subject to the subscriber using MNOs in the Hutchison group.[12] The offer requires an extra payment to roam on these networks rather than being inclusive in the customer's existing bundle, except for incoming text messages (customers on an unlimited plan also obtain 2GB of data).

One difference that sets apart Three's (Ireland) offer from 3G (UK) or T-Mobile (US) is that in order to qualify customers need to pay for an add-on in Ireland even if on prescribed networks. While add-on packages are available for 3G or 4G data for different prices depending on the period of time and how much data is required for a company such as T-Mobile (US) the baseline offer does not impose an extra cost for a customer. In other words, the customer does not need to sign up for anything that is not already included in their regular plan or take any action to benefit when roaming.

Several other operators have launched plans which are referred to as "*Roam Like at Home*", but require extra outlays by the subscriber. For example, in the United Kingdom, *Vodafone* has an add-on roaming offer requiring a per day payment supplement for its Vodafone Eurotraveller or Vodafone Worldtraveller options allowing the subscriber to use their United Kingdom minutes, text and data, and 02 offers data roaming add-ons to its monthly subscribers and pay-as-you-go customers. In Australia and New Zealand, Vodafone has offered daily roaming plans to specific countries for an additional charge (e.g. for New Zealand USD 4 per day) allowing subscribers to use their existing bundles. In Canada, Rogers also advertises RLAH plans to allow their customers to use their Canadian minutes, text and data, but also requires signing up for additional per day, week, or month fees.

In the United States, for USD 30, *AT&T* offers a Passport package that in addition to providing 120 MB of data, also gives a 33% discount (to USD 1 per minute) for voice calls and permits the sending of unlimited text, picture and video messages, along with unlimited Wi-Fi hotspot access.[13]

While many MNOs have introduced new offers, lowered prices and provide roaming data packages as an add-on, prices still remain high in some countries as are roaming relations for some mobile operators in terms of wholesale costs. The intra-European retail price for mobile data has been capped at USD 0.26 per MB (without VAT), which is substantially higher than the average negotiated wholesale rates for data reported in recent BEREC roaming data benchmark reports (for example, the 13th international roaming BEREC benchmark report covering the period October 2013 to March 2014 states that the average EEA

wholesale roaming inbound cost for data per MB (prepaid and post-paid) was EUR 0.042 in the first quarter of 2014 compared to the applicable wholesale cap of EUR 0.15 (BEREC, 2014). However, while EU MNOs cannot exceed this rate for data roaming within the EU, they can, and do, exceed the rate for data roaming outside the European Union. For example, one United Kingdom MNO charges USD 1.30 for data roaming outside the EU compared to USD 0.31 (including VAT) within the European Union. In comparison one US MNO charges USD 1 per MB when roaming internationally and an overage charge of USD 10 per MB, an Australian MNO charges USD 0.26 per MB for its low roaming data pack, and a New Zealand MNO charges USD 0.81 per MB for data roaming.

Substitute services and pricing

Roaming prices across the OECD remain sufficiently high as to continue to provide arbitrage opportunities for substitute service providers to enter the market. Although the Recommendation stressed the importance of increasing awareness of substitutes only some regulatory bodies mention the availability of substitutes on their web sites. Increased public awareness of substitutes has come mainly from media attention rather than from explicit action by government authorities.

Substitute roaming providers offer a range of services and prices which, at times, may be difficult for the average person roaming to decipher and decide which is the best deal. Some substitutes require inserting a new SIM card and, therefore, losing the home mobile number while roaming. Other substitutes require a monthly subscription, or a 30 day subscription, which for the occasional roamer or for short periods of travel, increases rather than reduces the cost of roaming. They often require the use of a smartphone, with various levels of inconvenience and technical proficiency as well as some not offering all services (e.g. voice without SMS or data without voice). The most economical alternative roaming package may depend on 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. Some, by far from exhaustive, examples can be given here:

> *Roam Mobility* (Canada) caters to Canadians roaming in the United States and offers a daily plan, which requires using the company's SIM card. The plan costs USD 3.56 and offers unlimited calls within the United States, unlimited calls back to Canada, unlimited SMS and 300MB of mobile data.[14] The price and offer compare extremely favourably to those charged by the largest MNOs in Canada: *Bell* offers unlimited voice and text in the United States for USD 30 per month, and a 200MB data plan for USD 20 and a 500MB for USD 50. *TELUS* also offers a range of add-on plans for United States roaming, all of which include unlimited text and voice. The most basic plan offer 150MB of data for three days for USD 25, and the largest plan offers 1GB of data for 30 days for USD 80. *Rogers* in Canada offers their customers the ability to use their domestic voice, text, and data allotments in the United States for USD 5 per day. *WIND Mobile*, a small challenger MNO in Canada, has an add-on plan that provides unlimited voice, text, and data in the United States for USD 15 per month.

> *Roamer*: Latvia and United Kingdom based company offers users the ability to download an app for iOS and Android smartphones. A user then purchases a local SIM card with the app enabling them to use it in conjunction with their regular telephone number (this number is "parked" before the user leaves their home country of origin and forwarded). A user from the United States roaming in France would pay USD 0.028 to call a fixed or mobile number in the United States.[15] They could receive calls for USD 0.019 per minute while in France. Added to these costs are those for purchasing a local SIM card. The system, which relies on call back for outgoing calls, does not enable SMS (Yam, 2014). There are also a number of smart-phone apps that provide access to VoIP services such as Viber. Viber uses the consumer's regular mobile telephone number as the ID for the

service.[16] This enables the roamer to purchase a local SIM card or use Wi-Fi to make and receive VoIP calls.

Cell Buddy: This Israeli company has developed a wireless identification technology based on the GSM encryption algorithm which makes it possible for mobile network providers to check the authenticity of user identities (Cell Buddy, 2014). This means users can travel without having to change their SIM card to switch from one operator to another. The accompanying app enables a user to select the local plan that best suits them in the country where they are roaming. Customers use a universal SIM card provided by Cell Buddy. They turn on their unlocked smartphones and launch a Cell Buddy app once they reach their destination. The app finds local carriers and lets the user compare prices, data packages, download speeds and other factors. A user is assigned a local phone number and can continue to use their regular phone number back home, at regular prices, using the same SIM card. The service, in effect, eliminates roaming charges to the home carrier with Cell Buddy acting as an intermediary, between SIM card resellers and customers, and charging USD 5 per day (AP, 2013).

In 2011, the OECD proposed that:

"Further liberalisation, in wireless markets, could enable M2M-users to buy wholesale access to mobile networks, to change mobile networks without switching SIM-cards and to directly negotiate national and international roaming. This would, however, involve changes to current numbering policies regarding IMSI-numbers for SIM-cards and telephone numbers, so that not only traditional telecommunication companies, but also M2M-users could access these numbers. Such changes could lead to a more dynamic market for mobile wholesale access, mobile roaming and a strengthening of competition between mobile network operators (OECD, 2012b)."

The Netherlands has reformed regulations allowing private companies to have access to IMSI number ranges without the intervention of a MNO allowing businesses more flexibility on how to provide (non-public communication services) across borders.[17] In Belgium, the Belgian Institute for Postal services and Telecommunications (BITP) have published the outcome of a consultation on numbering, including IMSI numbers (BIPT, 2015a). The outcome is that IMSI-ranges will be available on application for entities wishing to use them for IoT, mostly likely by 2017. Other countries, such as Germany and Ireland, have launched inquiries in this area. The Recommendation deals with services provided by mobile network operators, namely voice, SMS and mobile data. Increasingly, however, automobiles and consumer electronic devices (e.g. e-books, GPS devices, etc.) use SIM cards and require access to networks when outside the home country. A range of businesses use SIM cards in products (e.g. containers) and for the provision of transformer services. The wider scope of roaming is becoming increasingly important as the "Internet of Things" develops. High roaming charges will slow innovation in these areas. That being said, roaming charges that do not allow an appropriate remuneration of the visited network could also raise questions in the absence of a "sender-keep-all" or other commercial model emerging. For the IoT, international roaming can be one option to enable an effective deployment of services across borders. In this regard, it is important that actors in the market are given the flexibility to select a model that best facilitates a rapid and economically viable deployment of the IoT and that no specific model is preferred, mandated or imposed by regulatory action and any reforms further open the market to more competitive outcomes.

In April 2015, the Belgian and Luxembourg telecommunication regulators, BIPT and ILR (Institut Luxembourgeois de Régulation) concluded an agreement that makes it possible to link a Belgian mobile number to a Luxembourg network, while these are in principle nationally segmented. This enables operators to offer mobile calling, texting and data in each country at the same rate on both sides of the border, thereby clearing the way for operators to eliminate roaming charges should they so wish to do so

(i.e. a RLAH offer) (BIPT, 2015b). The agreement between the two regulators makes it possible to link a Luxembourg IMSI-number to a Belgian mobile number, while these are in principle nationally segmented. JOIN Experience, a new Luxembourg MNO, proposes to provide services directly to Belgian users based on its existing roaming agreements concluded in Luxembourg. In addition, BIPT reports that a Ministerial order was adopted in order to make extraterritorial use of IMSIs possible according to the International Telecommunication Union (ITU) guidance and based on reciprocity. This means that, conversely, Belgian operators also get the same rights in Luxembourg.

Mobily (Saudi Arabia) offers a roaming service (*Mobiliy Roamtalk*) with no add-on charge, which allows roamers to call home at local call rates and receive calls and SMS at no charge. It also provides and innovative service allowing subscribers unlimited access to *Facebook* when roaming for SAR5 (USD1.33) per day including viewing videos and with no limit on the data volume used.

MNO self-substitutes

Some mobile network operators have also begun to offer substitutes. For example, *KDDI* of Japan has offered a limited package to its users by providing Wi-Fi access for smartphones across 100 countries also with iPass (iPass, 2012). *SFR* (France) has an agreement with *Fon* allowing *SFR* customers access to eight million *Fon* hotspots across the globe (and *Fon* clients can use *SFR* hotspots in France).[18] *AT&T* and *Boingo Wireless* also agreed in 2013 to a reciprocal Wi-Fi roaming deal giving *AT&T* subscribers access to *Boingo's* global Wi-Fi hotspots while *Boingo* customers travelling to the United States obtain access to *AT&T's* Wi-Fi hotspot network (Etherington, 2013). Meanwhile *NTT DoCoMo*, *KT* and *China Mobile* have announced a new partnership on both WiFi and NFC roaming plans across their respective countries using EAP-SIM for seamless authentication for their customers roaming on each other's networks (Ong ,2013).

MVNOs and pricing

Increased regulatory recognition of the role that MVNOs can play in stimulating national mobile competition has been facilitated by regulations in some countries that require MNOs to allow MVNOs to connect to their network. However, to date MVNOs have largely not played a notable role in international mobile roaming although many do offer stand-alone substitute services. MVNOs could also be expected to play an increased role if structural measures in the European Union begin to develop. One example of an MVNO offering a competitive service is the Netherlands where a new fourth MNO will launch a 4G network in 2014. It is notable, ahead of that launch, MVNOs offers are becoming more competitive and, in one case, included European wide roaming for consumers as part of a bundle (Telecompaper, 2014). Such a development depends on a competitive wholesale market as MVNOs are often reliant on the roaming agreements of MNOs. In 2015, *Carphone Warehouse*, an MVNO, which operates in the United Kingdom under the brand 'iD', began an offer, which included RLAH for 18 countries, such as Indonesia, Israel and New Zealand (Trenholm, 2015).

In February 2015, in the United States, *Univision Mobile*, an MVNO using T-Mobile (US), launched a bundle that includes roaming, in a group of mostly Spanish speaking countries, at no additional charge (T-mobile, 2015). Customers of *Univision Mobile* can roam (for voice and text) while in Argentina, Brazil, Canada, Colombia, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Peru, Spain, and Venezuela. Usage is deducted from their allowance at standard long distance rates to fixed or mobile lines making this a RLAH offer. By way of example, a call to a Mexican landline while roaming is USD 0.03 per minute and for Spain the equivalent is USD 0.029 per minute while for Canada USD 0.033 per minute.

In April 2015, in the United States, *Google* announced it intended to launch an MVNO using *T-Mobile* and *Sprint* as wholesale providers.[19] *Google*'s so-called Project Fi offers unlimited voice and text

services domestically for USD 20, together with blocks of data at USD 10 for 1 GB. International texts are included in the bundle to more than 120 countries. In addition, when travelling in those countries, data usage costs the same USD 10 per GB as it does in the United States (data speed is limited to 256kbps/3G and users need to use a Nexus 6). Roaming calls are USD 0.20 per minute, together with the same unlimited international texts back to the United States or the other countries covered. In terms of data, *Google*'s proposed tariffs are effectively an RLAH offer but with the added advantage of them being charged only for the data they use. In other words, if a user purchased 2 GB of data for a month for USD 20, on top of the base fee of USD 20, and used 500 MB domestically and 1 GB roaming they would be refunded USD 5 for the unused 500 MB.

Roaming MVNOs

A number of MVNOs specialise in providing roaming services, either with the full range of service or only mobile data services. One thing that sets these "Roaming MVNOs" apart is that they do not provide their customers with their regular domestic service, such as an MVNO like Univision Mobile. Some of these MVNOs only offer services between two countries while others are "global MVNOs". By obtaining access to local mobile and fixed networks in several countries and paying local wholesale termination rates, MVNOs can by-pass high inter-operator tariffs (IOTs). An example of a company specialising in one market is *Roam Mobility.* Based in Canada it offers roaming for Canadians visiting the United States and provides a United States number to customers and unlimited calls and text to Canada and the United States for a fixed per day charge.[20] In France, Virgin Mobile, a MVNO, offers a monthly package including unlimited voice for 67 roaming destinations in addition to unlimited SMS and Internet for roaming in week-ends in Europe.[21]

An example of a more global company is *Woolworths Mobile Global Roaming* (Australia) which provides customers with a global SIM covering over 200 countries. The SIM comes with a United Kingdom 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 USD 25 which includes a USD 9 credit. Data rates for destinations such as Japan, Europe and the United States were charged at USD 0.39 per MB -- though USD 0.69 for New Zealand.[22] By way of comparison Telstra Australia offers data packs for USD 2.61 per MB.[23] This is between 125 to 441 times Telstra's domestic prices for mobile data.[24] This underlines the differences between even a less expensive brand such as Woolworths compared to domestic prices.

Roaming One (France) offers plans for data roaming covering 160 countries. For Europe it charges USD 0.21/MB compared to the regulated retail cap of USD 0.26/MB. *Dataroam* (United Kingdom) offers a prepaid data SIM for USD 24.50 for 50MB which can be used in 40 countries at a flat rate. Other companies include data-only roaming for specific regions including *Ukko Mobile* (Europe) (Sarle, 2013)or selected countries around the world such as *Goodspeed* [25]which requires the purchase of a device.

Improving awareness and transparency

There has been considerable progress in Members in promoting awareness of roaming prices. Much of this has come about as a result of improvements in transparency. In addition, as already noted, high mobile roaming prices have become a public issue in the last few years and the discussion of the issue, by policy makers and in the media, has helped improve the awareness of customers of the pricing issue. As noted earlier few national regulators provide information on substitutes.[26] At the same time there has been increased recognition by mobile network operators of the need to meet the demands of subscribers for clearer and more accessible access to roaming prices and tools needed to help them limit consumption when roaming and manage their bills.

This has led many mobile operators to inform customers that they need to limit their usage when roaming, in particular for mobile Internet access, as well as providing information on best practices which should be followed when roaming to ensure that there is no "bill shock" when returning to the home country. In addition, the ability of smartphone users to access apps provided by over-the-top entities or others offering alternative roaming has proliferated.

Transparency requires that price and other relevant information on roaming is readily available and can be clearly understood by a user. Much effort has been made since the Recommendation at the international, regional and national level to put forward best practice procedures to protect and empower consumers. In September 2012, the International Telecommunication Union (ITU) approved a new Recommendation D.98 on Charging in International Mobile Roaming Service (ITU, 2012). Section 4 of this Recommendation contains principles for lowering IMR rates including empowering consumers (see Box 2).

Box 2. Excerpt from ITU Recommendation D.98 Charging in International Mobile Roaming Service

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;

Source: ITU, Telecom Standardization Bureau, new Recommendation ITU-T D.98, Charging in International Mobile Roaming Service, www.itu.int/ITU-T/recommendations/index_sg.aspx?sg=3

The main provisions of the European Union's Roaming Regulation III adopted in June 2012 can be highlighted here (Box 3). This regulation built on the previous two European Union's roaming regulations by increasing transparency for mobile subscribers as well as introducing additional measures to protect subscribers. Earlier measures also aimed at reducing "bill shock" by introducing a cut-off mechanism once a data roaming bill had reached EUR 50. Mobile operators are also required to send an SMS message to subscribers once they have reached 80 and 100 percent of the EUR 50 limit.[27] Once the limit is reached, operators must stop charging for data and providing data access unless the customer consents to lifting the limit. The European Union roaming regulations apply to roaming services made within the European Union, however, the transparency requirements and cut-off limits apply both for services within the European Union and outside the European Union. An important transparency initiative on the part of the European Union has been the publication by BEREC of a number of reports on wholesale and retail prices. These reports provide information on the development of retail and wholesale charges for voice, SMS and data roaming and help in formulating regulatory decisions (BEREC, 2014a). BEREC has also published a "Report on transparency and comparability of international roaming tariffs (BEREC, 2014b)" aimed at assessing the availability for customers of clear information on roaming prices and the ability for customers to compare different price offers allowing them to choose the best offers for their use. In the United Kingdom, Office of Communications (Ofcom) has published a consumer guide on using a mobile phone abroad supported by a range of associations, including links to related guides and various tips including advice on password protecting smartphones and on how consumers can switch off data if they do not want to use it when roaming (Ofcom, 2015). In Australia the Australian Competition and Consumer

Commission (ACCC) provides guidance to mobile roaming users on how to reduce their bills (Box 4) (ACCC, n.d.).

Box 3. Consumer protection: main provisions of the EU Roaming Regulation III

- An obligation for operators to automatically provide customers - via a messaging service - with basic personalised 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 per month excluding VAT by default applied to all roaming services whether within or outside the EEA area) 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 on a visited network while in EEA countries (they can be charged for listening to such messages);

- Customers should pay on a per kilobyte basis and only for data services actually consumed.

- Customers are further protected by price caps in the form of 'euro-tariffs' that limit the amount that operators can charge customers for making and receiving calls, for sending text messages and for using data.

- Customers are nevertheless able to choose alternative products to the euro-tariffs.

- Operators should take reasonable steps to protect their customers from paying roaming charges for inadvertently accessed roaming services, and they should make information available to their customers on how to avoid inadvertent roaming in border regions.

Source: http://ec.europa.eu/information_society/activities/roaming/regulation/archives/current_rules/index_en.htm

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Box 4. ACCC advice to minimising roaming bills

- buy a SIM card that is aimed at overseas travellers. There are many international roaming or global roaming SIMs available

- use SMS rather than phone calls to keep in contact with people

- turn off any voicemail services or diversions you have

- turn off data roaming or buy a pre-paid data pack

- download a mobile phone usage app so that you can keep track of how much you are spending while overseas

- change your mobile phone settings to minimise the amount of data you use. For example, turn off features on your mobile phone or tablet that automatically use data, like 'push' notifications and automatic software updates

- try to avoid using mobile networks to access data. Instead try and use WiFi services where possible

- tell family and friends that contacting you on your phone will be expensive, and that different ways of communicating, like email, may be better.

    Source: ACCC, (n.d.)

In 2012, in the United States, the CTIA, the industry wireless association, offered a series of commitments that would help eliminate the problem of "bill shock" by April 2013. The commitment included alerts when the devices of consumers without an international roaming plan register abroad, and thus charges for international usage may be incurred. All the major MNOs now provide alerts. The Federal Communications Commission (FCC) also provides a guide for international roaming (FCC, 2015).

Following up on the APEC *"Guidelines for the Provision of Consumer Information on International Mobile Roaming",* the Asia Pacific Telecommunity (APT) International Mobile Roaming Working Group also developed guidelines in 2012 for regulators and for operators aimed at enhancing transparency of information (APT, 2012). APT also adopted *Guidelines for Regulators to Provide Information on International Mobile Roaming (IMR) Services* aimed at suggesting what type of information regulators should make available to the public including informing consumers of the high cost of IMR and providing information on alternatives to IMR services. The guidelines also suggested that regulators should have a dedicated page on their website on IMR issues. 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 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 African Union, in September 2013, adopted guidelines which address transparency, bill-shock and substitutes for IMR services (AU, 2013).

Regional bodies, such as the Southern Africa Development Community adopted transparency guidelines in June 2013 for their member countries aimed at improving consumer protection and increasing the transparency of roaming prices through SMS notification when travelling.The MNO industry group, the GSMA, in June 2012, obtained agreement in Asia among 24 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. In Latin America the GSMA, working with 40 MNOs agreed in 2012 to implement by mid-2013 mobile transparency measures which included sending text messages to subscribers to inform them of data tariffs, implementing a spending limit and sending alerts when this limit has been attained.

In addition to the European Union's roaming regulations a number of OECD regulatory authorities have begun to provide information on their websites aimed at enhancing consumer awareness of high IMR prices and the steps they should take to prevent "bill shock". For example, Ofcom in the United Kingdom, has a page providing consumers with advice on roaming (Ofcom, 2015). In 2013 Australia enacted the Telecommunications (International Mobile Roaming) Industry Standard which places obligations on MNOs to help prevent bill shock (ACMA, 2013). MNOs are required to send an SMS warning to customers when arriving in another country. The SMS should contain roaming price information. Roaming customers must also be warned once they have incurred AUD 100 (USD 87) of charges for IMR services. Customers with add-on roaming packs must be notified once the customer reaches 50 percent, 85 percent and 100 percent of the included value.

In Canada the regulator (Canadian Radio-television and Telecommunications Commission (CRTC)) recently adopted a *Wireless Code* which contains provisions to protect and increase the awareness of subscribers of their data consumption when roaming. The *Wireless Code* requires MNOs to notify subscribers when they roam of associated roaming prices. MNOs also need to provide tools to customers to monitor roaming data usage and to suspend international data roaming once the bill has reached CAD 100 (USD 88), unless a customer explicitly consents to pay additional charges (CRTC, 2013a). Japan is

tackling the issue of high roaming rates experienced by visitors to that country in a unique way. The aim is to promote access to mobile services in Japan by visitors on the same terms as Japanese subscribers. For example, through simplification of procedures to obtain Japanese SIM cards, providing information to foreigners on free Wi-Fi hotspots and facilitating access to free Wi-Fi. Japan has also revised the guideline that specifies that Japanese mobile operators basically have to unlock all smartphones and tablets sold from May 2015 if users request it and at no cost to users. This means that users who would previously have been tied to a specific mobile operator have the option to insert another mobile operator's SIM cards such as the SIM card of a local operator in a visited country.

Chile has taken a different approach to consumer protection by requiring that international roaming needs to be explicitly enabled by a subscriber. When subscribers log on to activate international roaming the MNO is required to send a message confirm activation of roaming and providing roaming prices. In addition, the MNOs should inform users of data usage when roaming. Other initiatives by OECD national regulatory authorities include a 'roaming calculator',[28] by Commission for Communications Regulation (ComReg) in Ireland, allowing users to calculate roaming costs before going abroad and many regulators have web pages providing advice to subscribers so that they are aware of high roaming charges and steps which should be taken to reduce roaming costs.[29] Colombia has also adopted a regulation requiring an MNO to obtain the consent of the subscriber to activate roaming and is required to send an SMS to the subscriber proving information on the consumption of data services when roaming. MNOs can either provide subscribers a data plan with consumption limits or a fixed price plan valid for a period of time (daily, weekly and so forth) and must warn subscribers when they have consumed 80 percent of their data allocation (CRC, 2014).

Many mobile operators have also reacted to the increased concern with high IMR prices to improve awareness of roaming costs and information on how to limit these costs as well as improving access to price information. For example, several MNOs provide "data calculators" (e.g. AT&T, Telstra) to allow customers to estimate their likely data consumption before roaming in order to purchase the package which meets their requirements. Nevertheless, a number of MNOs have yet to improve transparency by facilitating access to roaming prices on their web sites or providing clear information on the potential data consumption of different applications and their cost.

Wholesale and retail price regulation

The earlier work by the OECD on international mobile roaming, as well as the work that has been undertaken by other organisations, regional bodies and countries have all reached similar conclusions, namely that retail prices for IMR are very high and bear little relation to the cost of the provision of these services.[30] In addition, there has been general agreement that the high wholesale prices in many countries, IOTs are for the most part responsible for high prices. This seems not to be the case for the European Union, where data gathered by BEREC shows a certain level of competition on the wholesale market, though this follows regulatory intervention. There has also been recognition that a national regulator can only take limited measures to create effective competition in the market. Regulating IOTs, which national MNOs charge foreign MNOs, would have little or no effect on roaming prices faced by residents of that country in foreign markets. There is no incentive for a regulator to take such action unless the regulator in a visited country reciprocates.

The national regulator can intervene to reduce the retail prices charged by its national MNOs for IMR services provided in a visited country. This could provide an incentive for the national MNOs to try and negotiate better wholesale prices, in particular because lowering retail rates may subject them, as the Recommendation warns, to a price squeeze. The level of roaming wholesale charges, and the complexity or inability in many countries to reduce these charges through a competitive market process, while allowing for the recovery of roaming-specific costs, is one of the key issues facing policy makers for IMR

charges. For this reason the European Union decided that it was necessary to institute regulated caps for roaming wholesale rates (IOTs), which appears to have contributed to some degree of competition as actual prices are below regulated caps.

There is insufficient transparency, however, on the wholesale IOT tariffs. The IOTs are transparent to the mobile operators but not to the regulators, so that they are unable to determine the evolution of the roaming market in terms of competition without access to wholesale rates.[31] The work by BEREC, which provided the basis for EU roaming regulations, helped shed light on roaming wholesale rates, including through the publication of data. The bilateral work by Australia-New Zealand on roaming also provided further information on wholesale rates and, as noted above, the CRTC in Canada is starting a process to collect domestic wholesale rate information. The CRC in Colombia has begun to collect on a quarterly basis data from MNOs including IOT rates for voice, SMS and data, revenues of billed roaming traffic, the outgoing and incoming volume of roaming traffic and the volume of roaming by users.

In the past, for international long distance calls, 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. The OECD, at that time, had played an important role in improving transparency of accounting rates. More recently these data, which are today only made public by the FCC, provide a key indicator to monitor the competitiveness of a market for consumers in the United States (Gonzalez Fanfalone, Paltridge, van der Berg, 2014).

Similarly, 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. Transparency of IOTs needs to be further promoted. As stated in the Australia-New Zealand *Trans-Tasman Roaming Report "The information disclosed* [i.e. wholesale rates] *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* (Australian Government and Ministry of Business, Innovation and Employment, New Zealand, 2013)."

As noted, retail prices have declined, in particular for IMR services within the European Union. However, for other roaming relations between OECD countries there is still scope for price reduction as there is for roaming between most roaming relations outside of the European Union region. Market dynamics have not been sufficient to lead to a reasonable level of prices. The existing regional (EU, GCC) and bilateral agreements on price regulation in other regions have been shown to be effective in lowering IMR charges and further agreements need to be encouraged where there is insufficient competition.

In the context of bilateral arrangements the CISP also prepared a paper which explored the principles that could form the basis for good practices in the establishment IMR agreements between two or more countries (OECD, 2013). The report highlighted the need for bilateral agreements to include a mechanism to monitor compliance and enforcement, procedures for co-ordination and ensuring coherence in price reductions across participating countries.

A more efficient solution, however, would be a global agreement and, as argued in the OECD analytical paper the "...World Trade Organisation (WTO) framework could also be used to provide a cross-country legal framework for roaming services. Roaming services are arguably covered by the General Agreement on Trade in Services (GATS), since they are important for access to and use of public communications (OECD, 2010)."[32] The Recommendation invited Members to liaise with the World Trade Organisation with respect to the trade implication of roaming services as well as with other international organisations with relevant interest or ongoing work on roaming services. In this context the Australian Mission to the WTO hosted a Symposium on International Mobile Roaming in March 2012 to provide WTO members with more ample information on industry trends and possible regulatory solutions to

address high mobile roaming charges. The OECD Secretariat participated in the meeting and presented the Recommendation (Díaz-Pinés, 2012). There has been no follow-up to the Australian initiative to date. The Secretariat also presented the Recommendation to the Internet Governance Forum, in Baku, Azerbaijan in November 2012.

One of the recommendations was to facilitate trans-national networks and alliances. The WTOs Basic Telecommunications Agreement has, as one mode of supply, commercial presence, which in principle should facilitate the setup of MVNOs in visited countries. Potentially, this would allow an MNO to bypass IOTs by terminating traffic within a visited country using that country's interconnection framework. At the same time, setting up alliances in a visited country could help reduce IOTs. This already occurs where multinational MNOs charge low roaming rates when traffic remains "on-net", that is with affiliates in a visited country. However, there is no need for such alliances to only be with affiliates. Such initiaitives would be in line with the Recommendation to facilitate access to wholesale mobile services on local terms and conditions. Examples given above in this document of the emergence of RLAH since the adoption of the Recommendation indicate that wholesale arrangements seem to be taking place which by-pass IOTs. The investment by Softbank of Japan in Sprint (United States) has also led to Softbank providing a limited form of RLAH.

Assessment of costs and benefits

In general it has become a well-established procedure for national regulatory authorities when taking action on IMR prices to assess the effects on MNOs and on subscribers of a number of policy options and to provide interested parties an opportunity to provide comments. The roaming initiatives that have been taken have followed this procedure before final decisions were taken. For example, the European Union prepared an assessment statement of the different policy options available and BEREC and the European Commission have conducted an impact assessment before each of the three Roaming Regulations (EC, 2011). Further work was also undertaken to evaluate the costs and benefits of international mobile roaming by the European Parliament (European Parliament, 2013). BEREC, in December 2014, examined the risks and effects of the European Parliament's proposals on RLAH (BEREC, 2014c). The European Parliament's proposal made in April 2014 was to abolish retail roaming surcharges in order to allow customers to RLAH subject to a fair use limit. BEREC's conclusion was that the European Parliament's proposal is not currently sustainable or feasible. Regulators in other regions should, therefore, carefully evaluate the possible unintended consequences before introducing such measures as well as the commercial drivers in the most competitive markets leading to RLAH offers that are becoming more widespread.

Monitoring price changes is a key element of the assessment of different approaches to the issues around international mobile roaming. This includes changes following regulatory intervention. The Recommendation highlighted the need to assess "Potential effects on pricing behaviour, including possible waterbed effects or tariff rebalancing that may influence domestic mobile prices, or wholesale roaming prices faced by operators in countries without roaming price regulation;". In Europe BEREC collects and publishes the average wholesale and retail prices for roaming calls made and received by EEA customers outside EEA. These data indicate a decline on average for this metric, most evident in the period from 2011-2012 onwards (BEREC, 2015). At least for this single indicator it would seem that there has not been a waterbed effect. There are, however, examples of rising prices for this metric for some countries. In 2014, by way of example, Comreg reported that on average it cost EUR 1.34 per minute to make a call when roaming in non-EU countries, compared to just EUR 0.66 a year previous (Weckler, 2014). The Irish regulator also found it cost EUR 0.77 per minute to receive a call, double the rate for the same time in 2013. Attributing such changes to a single factor is challenging. While some commentators look to a potential waterbed effect others may note the proposed reduction from four to three MNOs in that market and the implications that has for competition.

The Australia-New Zealand bilateral agreement, as well, reviewed policies and their likely impacts. (Australian Government, 2013; Australian Government and Ministry of Business, Innovation and Employment, New Zealand, 2013) The GCC in considering extending its roaming regulation issued a consultation document examining various options and requesting comments (GCC, 2014). The CRTC in Canada undertook an assessment of domestic roaming arrangements in 2013 following this with a consultation procedure on whether there was unjust discrimination in wholesale wireless roaming (CRTC, 2013b).

Are the dynamics of the international roaming market changing?

From 1 July 2014, as noted above, a mobile subscriber from an EU/EEA country visiting another EU/EEA country will be able to choose an alternative roaming provider in the domestic or visited country, if such offers are commercially available. There are two kinds of alternative roaming providers (ARPs) - those providing full services i.e. voice, text and data in the domestic country, and those local data roaming services (referred to as local breakout). The roaming subscriber would be billed directly by the ARP. Although so far no alternative roaming provider offer is commercially available, and the structural measures and not yet proved their efficacy, this structural change has already started to have spill over effects outside the EU/EEA as Israel begins to examine structural measures (Raz-Chaimovich, 2014).

A significant commercial development, which also has the potential to change the dynamics of the international mobile market, is the introduction in October 2014 of a new range of iPads by *Apple*. These include a feature entitled "Apple SIM". If obtained directly from *Apple*, this SIM card enables consumers to choose, from the menu settings on their device, the mobile network they prefer to use for data. Consumers also have the option to purchase a carrier specific SIM-card from their operator, as they have always done, but these are not reprogrammable and changing a MNO would require inserting a separate SIM-card. In addition, carriers have the option of "locking" the *Apple* SIM card following a consumer selecting their network from the menu of participating MNOs. What sets *Apple*'s SIM card apart, however, from one provided by an MNO or MVNO, is that it comes with a reprogrammable SIM card that can be used, on unlocked iPads, to select a carrier of choice, together with whatever plans are offered by the participating carriers.

Apple's approach could in the longer term provide consumers in all countries an additional option for mobile data roaming in that they could select a participating mobile network operator in a visited country and pay online for a short term roaming mobile data access without the need to change SIM cards. At the time of launch, the choice of MNOs was limited to the United Kingdom's *EE* along with *Sprint* and *T-Mobile* from the United States, for SIM cards obtained directly from *Apple* (Table 4). This means that an *EE* subscriber from the United Kingdom visiting the United States could either use *EE* to access mobile data when roaming or choose a short term service from one of the two United States MNOs. If more MNOs from different countries choose to support *Apple*'s iPad SIM this could assist in fostering competition in the mobile data roaming market.

Table 4.   MNOs participating in "Apple SIM" at the time of launch

MNO	Conditions
EE, SPRINT and T-Mobile (US)	Customers obtaining the SIM card directly from *Apple* could swap between these MNOs in the United Kingdom and United States.
AT&T	Available on the menu of providers from a SIM card obtained directly from *Apple* but once activated the *Apple* SIM can only be used with *AT&T* and a new *Apple* SIM is required to change carriers in the future or when roaming.
Other MNOs in the United Kingdom and United States	Other carriers did not participate at the time of launch.

Non-United Kingdom or non-United States based consumers with an iPad, can still use a physical SIM from the operator of their choice and when roaming can continue to use the services of their MNO or use a local SIM card in the visited country. Alternatively, iPad *Apple* SIM users, when visiting the United Kingdom or United States, can pay for data service from *EE* in the United Kingdom or one of the two United States MNOs with minimal switching costs and even the option to change between these operators as they see fit. As more MNOs sign on and participate on *Apple*'s iPad, roaming data subscribers will effectively have access to a "local breakout" service similar to that which the European Union regulations have put in place. Although, at the moment, the *Apple* SIM is limited to data services, the widespread adoption and use of programmable SIMs on tablets, other wireless portable devices and eventually smartphones could result in a significant change in the roaming market. Such a change, given it results from a commercial rather than regulatory initiative, would also have the benefit in that it avoids intrusive regulation.

While price is only one factor used by consumers to assess carrier selection, it is one of the most important and having a menu of offers on a user's device should make that element more transparent. The other major benefit for consumers is convenience. In many countries, consumers have to go through a series of steps to purchase a local SIM card, which are not required if they roam with their home operator SIM card or potentially through a reprogrammable SIM card.

One way to look at the opportunity offered by the *Apple* SIM is that it empowers roaming subscribers in that they, rather than "home operators", directly select the charges they pay for data roaming. In effect, consumers from both the United Kingdom and United States, when roaming in the other country, can disintermediate their home carrier such that the foreign operator treats them as one of their own customers instead of the customer of someone else. This disintermediation eliminates considerations between MNOs, such as the amount of traffic a foreign carrier can send to them, when negotiating wholesale rates. MNOs would have an incentive to compete for visiting roaming subscribers and their offers would be expected to closely mirror prices paid by domestic customers of that operator. They could also, however, introduce offers via the iPad menu. At the time of launch, for example, *T-Mobile* (US) offered a pre-paid USD 10 per 5 GB plan for use up to 150 days. This offer was only available via the *Apple* SIM card and not the regular online store.

Although limited to two countries, at the time of writing, some examples can be given for potential price reductions. The very large price differences when using a local carrier in a visited country compared to a home network roaming plan are dramatic (Table 5). They underline the dysfunctional nature of the international roaming market and the issue that use of a technology, such as the *Apple* SIM may address. Some examples can be provided:

- A *Sprint* customer from the United States roaming in the United Kingdom could pay USD 40 for 40 MB of data and if they exceeded that amount and additional USD 10 per MB. The same user switching to a local offer from *EE* could use 1 GB for just USD 16. In other words, swapping carriers provides data at USD 0.016 per MB instead of USD 1 per MB.

- An *EE* customer from the United Kingdom visiting the United States would pay USD 5 or USD 16 for 20 MB or 100 MB respectively. On the other hand a prepay data option with *Sprint* of USD 15 would entitle them to the use of 1 GB. In other words, swapping carriers provides data at 0.015 per MB instead of USD 0.25 or USD 0.16.

Table 5.   Prices for using local carrier instead of roaming

Domestic rates with local SIM card				Regular roaming			
Days Included	Data Included	EE (USD)	Sprint (USD)	Days included	Data Included (MB)	EE (USD)	Sprint (USD)
30	100 MB		10	1	20 MB	5	
30	1 GB	16	15	30	40 MB		40
30	3 GB	24	35	30	85 MB		80
30	6 GB		50	1	100 MB	16	
30	12 GB		80	7	200 MB	32	
				7	500 MB	64	

Source: Sprint and EE websites (22 October 2014)

At present the *Apple* SIM card is only available for data and only on the iPad (i.e. as opposed to also being on an iPhone for voice services). Nonetheless, a combination of over-the-top voice services and possibly tethering devices (i.e. making and receiving calls over Wi-Fi) will likely add competitive pressure to the prices for traditional roaming via a home operator SIM-card.

This development also offers smaller networks and those operating in a single country an opportunity to overcome certain limitations. They no longer have to compete unevenly against players in their own market that can negotiate superior wholesale deals in foreign markets since they can provide their roaming customers with similar rates as paid by local consumers in a foreign market. This alone provides an incentive for the "challenger brands" or the single market players to enter into arrangements with companies, such as *Apple* and those that will likely follow. Meanwhile, by doing so, they place their offers squarely before customers, with iPad *Apple* SIMs, as they enter that country. This means they may give up little (i.e. high wholesale rates make them uncompetitive in foreign markets leading to low usage by their own customers of roaming) while potentially attracting new customers for their local services.

While *Apple* was the first manufacturer to include a reprogrammable SIM card in a tablet it has been rapidly followed by a number of other manufacturers including in smartphones. In December 2014, *Huawei* launched the "Honor 6 Plus", a smartphone that includes a SIM card enabling access to data services in 18 countries without purchasing a local SIM card. The service enables users roaming from China to access unlimited data for USD 4.50 per day or USD 0.04 per MB for pay as you go (i.e. 20 MB blocks at USD 0.80). Meanwhile, in March 2015, *Xiaomi* introduced a "Roaming Card", included in a smartphone, which also meant users did not need to purchase a local SIM in order to get cellular telephone and Internet services while abroad (Li, 2015). At the time, *Xiaomi* Roaming Card was being tested by roamers in a number of Members such as Canada, Japan, Korea and the United States. In August 2015, the company followed this up by announcing the Chinese version of its mobile software will include on-demand roaming data (Ghoshal, 2015). When a user from China travels abroad, this creates a virtual local SIM card based on that user's location, without the need to switch carriers or purchase a local SIM card.

Xiaomi says its average price for data roaming is about USD 0.02 MB over 36 countries, including Australia and the United Kingdom.

The steps being taken my these Chinese smartphone manufacturers, in turn follow the integration of software defined SIM cards in small external devices by companies such as *uCloudlink*'s GlocalMe service, which was launched in May 2014 (uCloudlink, 2014). In this case, the device doubles as a reserve battery for a device such as a smartphone acting as a personal hotspot and connected to a cellular network when roaming. A roamer does not need to purchase a local SIM with the device determining which of 100 countries they are in at any given time and using a local cellular network. The device itself costs USD 129 after which GlocalMe says data can be up to 98% less than roaming rates. Customers can buy a pack for a specific country or a pack for countries on a pay as you go basis (Table 6). By way of example a user can roam in Chile or Luxembourg for USD 0.001 per MB or using a package in Korea at USD 0.013 per MB.

Apart from any differences in technology, the main thing that sets *Apple*'s approach apart from the one taken by the Chinese manufacturers is their business model (Glocalme, 2015). *Apple*'s approach enables MNOs to offer services at local rates and, therefore, for those MNOs to determine the prices for incoming roamers, with those being the same as local rates. Meanwhile, the Chinese manufacturers are acting as resellers applying whatever margin they add for retail services to wholesale rates. MNOs can, if they wish, not participate in *Apple* service but once they make wholesale offers to foreign MNOs these rates can be passed on to resellers. From a consumers perspective this enables the selection of a participating MNO in a foreign market using an *Apple* SIM. Alternatively under the approach taken by the Chinese suppliers, it enables the selection of a reseller that may be located in any country where MNOs have negotiated wholesale rates that permit competitive retail prices for roamers. Both possibilities hold out the potential to fundamentally change the international roaming market if these and other manufacturers build these capabilities into more smartphones and tablets.

Finally, *Google*'s Project Fi offers a further model where it is acting directly as an MVNO but enabling users to switch seamlessly between open Wi-Fi networks and the cellular networks of its two wholesale providers in the United States and MNO's in other countries through roaming agreements. To achieve this functionality, *Google* has developed its own SIM card, which can store 10 different network profiles for the Nexus 6 (AP, 2015). Project Fi will also store the telephone numbers of subscribers in *Google*'s data centres enabling them to be accessed on other devices besides smartphones when a user is roaming. When logged in they can send and receive texts, or make or receive calls, on computers, tablets or even other smartphones. With an effective rate of USD 0.01 per MB when roaming, *Google*'s price is competitive with or better than some MNO offers in visited countries, if a user purchased a local SIM, and much less expensive than the historical roaming fees when visiting those countries. While limited to 3G speeds this may be offset by the seamless nature of handoffs to open Wi-Fi networks when available.

Table 6.   Selected GlocalMe rates (USD, March 2015)

	Pay as you go per 1MB	Package 500 MB for 7 Days	1MB price using Package
Australia	0.054	13.07	0.026
Bangladesh	0.001		
Canada	0.109	19.60	0.039
Chile	0.001		
Costa Rica	0.001		
Germany	0.054	16.34	0.033
Ghana	0.001		

France	0.054	16.34	0.033
Italy	0.054	16.34	0.033
Japan	0.054	13.07	0.026
Korea	0.054	6.53	0.013
Lithuania	0.001		
Luxembourg	0.001		
New Zealand	0.109	19.60	0.039
Portugal	0.054	16.34	0.033
Spain	0.054	16.34	0.033
United Kingdom	0.054	10.89	0.022
United States	0.054	16.34	0.033
China and Hong Kong (China) (3 GB 180 Days)		29.16	0.009
Worldwide (1 GB 30 days)		31.32	0.031

Source: GlocalMe

NOTES

[1]   According to an example presented by Japan at the CISP meeting in June 2015, a mobile operator in Japan charges 40.32 USD/month for domestic mobile data communication with 5GB monthly allowance. For international roaming, they charge 7.9USD/day with 30MB daily allowance. In other words, international roaming price for data communication per megabyte is roughly 33 times higher than domestic price.

[2]   The Australian Parliament is considering the Telecommunications Legislation Amendment (International Mobile Roaming) Bill 2014 (the IMR Bill) which, if approved, would empower the Australian Competition and Consumer Commission to, where necessary and where bilateral agreements have been entered into, take coordinated action pricing action with other countries. This need for this draft legislation is being considered in the context of recent market trends, with an initial focus on the Trans-Tasman roaming environment.

[3]   The six GCC countries entered into a free trade agreement in 1981, which calls for greater integration of telecommunications and improving economic efficiency in this area.

[4]   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.

[5]   The countries are: Australia, Brunei Darussalam, Canada, Chile, Japan, Malaysia, Mexico, New Zealand, Peru, Singapore, Viet Nam, and the United States.

[6]   Member countries are Benin, Burkina Faso, Cape Verde, Gambia, Ghana, Guinea, Guinea-Bissau, Ivory Coast, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone and Togo.

[7]   Member countries are Burundi, Kenya, Rwanda, the United Republic of Tanzania, and Uganda.

[8]   Member countries are Angola, Botswana, Democratic Republic of the Congo, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe.

[9]   See https://www.swisscom.ch/en/residential/mobile/subscription-tariffs/infinity.html#interesse

[10] For its part, in April 2015, Sprint introduced a new approach providing customers the ability to travel to major areas in Latin America, Europe and Japan and roam with up to 2G speeds to read emails and surf the web at no additional charge. See www.sprint.com/landings/international-value-roaming/?ECID=vanity:internationalroaming#!/

[11] In Greece, although voice services were, in 2011, subject to EU regulations this was not the case for mobile data which became subject to regulation in July 2012.

[12] See https://apps.three.ie/roaming/pages/display/three-like-home

[13] See www.att.com/shop/wireless/international/roaming.html

[14] There is a one-off charge to purchase the SIM card.

[15] See https://roamerapp.com/en/rates/

[16] See https://support.viber.com/customer/portal/articles/1379334-using-viber-while-abroad#.VQLu70KjLS4

[17]   The IMSI number is the unique number of a SIM card and consists of a mobile country code, mobile network code and phone number.

[18]   See http://corp.fon.com/blog/#.UfasEo03B8E

[19]   See https://fi.google.com/about/plan/

[20]   See www.roammobility.com/

[21]   See www.virginmobile.fr/offre-mobile/forfaits-sans-engagement

[22]   See www.woolworthsglobalroaming.com.au/Info/CompareRates.aspx

[23]   See www.telstra.com.au/mobile-phones/international-roaming/data-packs/

[24]   See www.telstra.com.au/broadband/mobile-broadband/plans/

[25]   See https://goodspeed.io

[26]   For Example, the Hong Kong, China Communications Authority has a web page providing detailed information on substitutes to consumers, http://m.mobilenet.gov.hk/en/consumer_tips/substitutes_for_mobile_voice_roaming_services/index.html

[27]   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 percent of their agreed limit.

[28]   See http://www.callcosts.ie/mobile_phones/roaming_calculator.293.LE.asp

[29]   For example, the Austrian regulatory authority, RTR, prepared following webpage; https://www.rtr.at/de/tk/TKKS_Roaming

[30]   Retail prices for IMR have not been subject to any regulation in the past so that there has been no cost orientation requirement imposed on retail prices.

[31]   The Global System for Mobile Communications Association (GSMA) has Standard Terms for International Roaming Agreement (STIRA) under which wholesale international roaming services are to be charged on a non-discriminatory basis and are transparent to all GSMA members on a confidential basis. In practice there is less transparency due to bilateral volume discounts, traffic redirection, shared billing platforms and so forth.

[32]   As an example of an global agreement, Japan is proposing to set up a principle on an appropriate level of IOT.

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