



**FEDERAL COMMUNICATIONS COMMISSION**  
International Bureau

# The Effect of Foreign Mobile Termination Rates on U.S. Carriers and Consumers

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**TABLE OF CONTENTS**

- I. INTRODUCTION AND EXECUTIVE SUMMARY..... 4
- II. BACKGROUND ..... 7
- III. KEY FINDINGS OF THE REPORT..... 12
- IV. DESCRIPTION OF THE DATA USED IN THE STUDY ..... 13
- V. GROWTH OF MOBILE-TERMINATED MINUTES..... 14
  - A. Growth in the Absolute Levels of Mobile and Fixed-Line Terminated Minutes ..... 14
  - B. Growth in the Relative Level of Mobile-Terminated Minutes ..... 15
- VI. METHOD FOR CALCULATING WORLD AVERAGE MSR PREMIUM AND SETTLEMENT RATES ..... 16
- VII. TIME TREND OF WORLD AVERAGE SETTLEMENT RATES AND MOBILE SETTLEMENT RATE PREMIUMS ..... 19
  - A. The Time Trend of World Average Fixed-Line and Mobile Settlement Rates ..... 19
  - B. Time Trend of World Average MSR Premiums ..... 20
  - C. The Effect of Currency Fluctuations on the Time Trend of MSR Premiums ..... 21
- VIII. ESTIMATES OF THE AMOUNT OF MSR PREMIUMS THAT ARE POTENTIALLY ABOVE COST ..... 23
  - A. Estimates of the Number of Countries That Have Potentially Above-Cost MSR Premiums ..... 23
  - B. Estimates of the Percentage of U.S. Mobile-Terminated Traffic with Potentially Above-Cost MSR Premiums ..... 25
  - C. Estimates of Annual Excess Costs Due to Potentially Above-Cost MSR Premiums ..... 26
- IX. MOBILE SURCHARGES AND MARK-UP OF MSR PREMIUMS BY U.S. CARRIERS ..... 28
- X. REGIONAL AND COUNTRY FINDINGS..... 30
  - A. MSR Premium Trends by Region..... 31
  - B. Large Routes with Above-Cost MSR Premiums ..... 33
  - C. Regional Trends in Mobile-Terminated U.S. Traffic ..... 34
  - D. Country Trends in Mobile-Terminated U.S. Traffic..... 35

E.	Country-Specific Comparison of Fixed-Line and Mobile Settlement Rates for 2010 .....	36
F.	Country-Specific Comparison of Fixed-Line and Mobile Settlement Rates for 2003 .....	37

## I. INTRODUCTION AND EXECUTIVE SUMMARY

This report presents the results of a study conducted by FCC staff to quantify and assess the effect of foreign mobile termination rates on U.S. telephone companies (“U.S. carriers”) and consumers. The staff conducted the study as part of its continued monitoring of foreign mobile termination rates. It has monitored these rates for several years as a result of concerns initially raised by U.S. international carriers and also by the Commission in two proceedings as to the potential effect on U.S. consumers.<sup>1</sup> Over the last several years, the Commission has used the data contained in this report to inform itself of the international situation with respect to mobile termination rates and to influence foreign counterparts to take action to lower rates. As documented in this report, many national regulators as well as the European Union have, in fact, taken action to reduce mobile termination rates to more cost-based levels. This report makes public much of the data that the Commission has collected.

Mobile termination rates are the per-minute fees that mobile carriers in most countries charge unaffiliated domestic carriers to terminate calls on their networks. In most countries, mobile termination rates are substantially higher than termination rates on fixed-line networks. Foreign mobile termination rates affect U.S. carriers indirectly through international termination rates that U.S. carriers pay foreign correspondent carriers to terminate traffic on mobile networks in the foreign country. These international termination rates are termed *mobile settlement rates*. Mobile settlement rates are set to recover the costs of international transport, domestic long-distance transport in the foreign country, and termination on a mobile network in the foreign country. These same cost components are recovered by fixed-line settlement rates, except that fixed-line settlement rates recover the cost of termination on fixed-line networks instead of mobile networks. In most cases, terminating on a mobile network is more expensive than terminating on a fixed-line network. The amount by which mobile termination rates exceed fixed-line termination rates is flowed through to mobile settlement rates and largely explains the extra amount, termed a *mobile settlement rate premium* in this report, by which mobile settlement rates exceed fixed-line settlement rates. In essence, the mobile settlement rate premium is the extra fee that U.S. carriers pay their foreign correspondents to terminate traffic on foreign mobile networks. U.S. payments for foreign mobile termination are asymmetrical, as there are no extra fees to terminate foreign traffic on mobile networks in the United States.

This report focuses on the extra fees paid by U.S. carriers and examines data provided by U.S. carriers for the years 2003-2010 for all 212 international routes on which there are separate fixed and mobile settlement rates. The report also examines *mobile surcharges* that U.S. carriers charge consumers to recoup mobile settlement rate premiums and compares the surcharges to the premiums. Depending on the country called, such surcharges can be substantially greater than ordinary international calling charges and may result in “bill shock” to U.S. callers (who may not be aware they are calling a mobile phone or that extra charges apply). The focus of this report is on mobile settlement rate premiums and mobile surcharges, rather than mobile termination rates or mobile settlement rates, because mobile settlement premiums and mobile surcharges are direct measures of the extra costs that U.S. carriers and consumers pay to terminate on foreign mobile networks and also because of the difficulty of obtaining global data on mobile termination rates on a periodic basis.

In conducting the study, FCC staff gathered information from the four largest U.S. international carriers (AT&T, IDT, Sprint, and Verizon/MCI). The staff constructed a database of payment and traffic amounts in order to calculate mobile settlement rates, fixed settlement rates, and mobile settlement rate

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<sup>1</sup> See *International Settlements Policy Reform; International Settlement Rates*, IB Docket Nos. 02-324 & 96-261, First Report and Order, FCC 04-53, 19 FCC Rcd 5709 (2004) (*2004 International Settlement Policy Reform Order*). See also *Effect of Foreign Mobile Termination Rates on U.S. Customers*, IB Docket No. 04-398, Notice of Inquiry, 19 FCC Rcd 21395 (2004) (*Foreign Mobile Termination Rate NOI*).

premiums paid by the reporting carriers for each international route over the study period. These data enabled the staff to evaluate mobile settlement rate premiums on a “cross-sectional” (country-by-country) and “time-series” (year-by-year) basis. In addition, the staff compared mobile premiums paid by the reporting carriers to mobile surcharges that these companies charged consumers. In conformance with the request by the reporting carriers for confidential treatment of their data, all statistics presented in this report are averages based on the combined data of the four reporting carriers. This report does not make public any carrier-specific data or any data from which carrier-specific data can be inferred. The carriers’ combined data, including the data supporting each chart in the report, is available on the FCC’s website (*forthcoming*).

Briefly, the major staff findings of the report are as follows:

- On a world-wide basis, the amount of U.S. traffic terminated on foreign mobile networks has increased substantially in absolute and relative terms over the study period, with major shifts of traffic from Western Europe to Asia.
- The world average mobile settlement rate premium increased from 2003 to 2007 by 31 percent and then decreased significantly, to slightly below its 2003 level by 2010. The increase to the 2007 peak appears to be due to the introduction of separate mobile settlement rates in some countries during the time leading up to the peak, as well as successful efforts of mobile carriers in many calling-party-pays countries<sup>2</sup> to raise mobile termination rates above cost.<sup>3</sup> The decrease from the 2007 peak appears due to activity by many national regulators to cap mobile termination rates, with a resulting decline in mobile settlement rate premiums.
- Mobile settlement rate premiums vary greatly from country to country and region to region, with negligible premiums in some countries and regions and extremely high premiums in others. Based on various cost studies in the public domain (but not necessarily endorsed by the FCC or FCC staff), mobile settlement rate premiums in 2010 (the most recent year for which the staff was able to obtain data) may have been above-cost in as many as 85 to 121 countries, depending on how costs are measured. The annual amount of above-cost payments in 2010 was \$228 to \$450 million (USD) for the four reporting carriers (again, depending on how costs are measured), an amount equal to 8 to 16 percent of their total annual settlement payments. The amount of above-cost payments peaked in 2007 and decreased to below the 2003 level by 2010, mimicking the trend of the world average mobile settlement rate premium itself.
- The reporting U.S. carriers add a substantial mark-up to premiums when passing them through to their customers as mobile surcharges, thereby compounding the impact of the premiums on U.S. consumers. The average mark-up for U.S. landline calls to foreign mobile phones is 71 percent, and the average mark-up for U.S. mobile calls to foreign mobile phones is 94 percent.<sup>4</sup> However,

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<sup>2</sup> “Calling-party-pays” refers to an interconnection regime in which the cost of terminating a call on the network of the receiving party is borne primarily or entirely by the calling party’s network (and, ultimately, by the calling party). See the Background section, below.

<sup>3</sup> See, e.g., Ofcom (United Kingdom), *Mobile Termination Review Statement*, March 15, 2011, available at <http://stakeholders.ofcom.org.uk/consultations/mtr/statement> (finding the existence of “significant market power” in markets for mobile call termination and capping mobile termination rates of the four national mobile communication providers).

<sup>4</sup> These figures reflect a weighted average of the four reporting companies for all foreign routes for which data is available and for which mobile and fixed settlement rates differ.

there is wide variation among the reporting carriers, and individual reporting carriers may have mark-ups substantially below or above these averages.<sup>5</sup>

This report shows a mixed picture of positive and negative developments regarding the effects of mobile termination rates on U.S. carriers and consumers:

- On the positive side, many national regulators have taken action to reduce mobile termination rates to more cost-based levels, and premiums paid by U.S. carriers have decreased significantly since their 2007-2008 peak.<sup>6</sup>
- On the negative side, premiums may be above cost in roughly half of the countries of the world, resulting in potentially hundreds of millions of dollars in possibly excess payments by U.S. carriers and consumers each year as well as reduced U.S. international calling volumes.<sup>7</sup>
- Also on the negative side, U.S. carriers are passing through premiums to consumers with substantial mark-ups, making calls to foreign mobile phones even more expensive and further reducing U.S. international calling volumes.

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<sup>5</sup> Due to requests by the reporting carriers for confidential treatment of their data, this report does not disclose mark-ups for individual reporting carriers.

<sup>6</sup> Technological progress in the provision of mobile telephony may have decreased costs and may explain some of the decrease in the price of mobile termination during the study. The main reason for the decrease, however, appears to be vigorous government regulation. See, e.g., Ofcom's *Mobile Termination Review Statement*, March 15, 2011, above (creating a glide path to substantially decreased mobile termination rates over the next several years).

<sup>7</sup> The Office of the United States Trade Representative has identified several countries in which government actions with respect to international termination charges (including mobile charges) may not be in conformance with their international trade obligations, including discriminatory taxes (El Salvador and Tonga), government mandated termination increases (Ghana), and universal service surcharges (Jamaica). See Office of the United States Trade Representative, *2012 Section 1377 Review On Compliance with Telecommunications Trade Agreements*, at 10-12, available at <http://www.ustr.gov/about-us/press-office/reports-and-publications/2012>.

## II. BACKGROUND

In much of the world today, mobile carriers charge higher rates to terminate traffic on their networks than do fixed-line telephone companies. The interconnection charges set by mobile carriers are termed “mobile termination rates” (MTRs).<sup>8</sup> MTRs are carrier-to-carrier charges. These higher MTRs are assessed by mobile carriers on calls originating from other networks, including both fixed-line networks and rival mobile networks, with identical charges usually applied to all off-net calls,<sup>9</sup> irrespective of whether they are local, long-distance, or international calls.<sup>10</sup> The higher rates are passed on to U.S. international carriers by their foreign correspondent carriers (usually long-distance carriers operating fixed-line networks in the foreign country) in the form of mobile settlement rates (MSRs).<sup>11</sup> In this report, the amount by which the MSR settlement rate exceeds the fixed-line settlement rate is termed the “mobile settlement rate premium” (MSR premium). The MSR premium largely reflects the difference between the MTR and fixed-line termination rate in a given foreign country, because most of the other costs of terminating U.S. international traffic are the same. U.S. international carriers, in turn, mark-up the MSR premium and pass it on to U.S. callers in the form of a “mobile surcharge” that U.S. callers pay when calling a foreign mobile phone from the United States, in addition to ordinary international calling charges. For example, a person in the United States can call a party in the United Kingdom for \$0.07 a minute, using a popular international calling plan offered by one of the major U.S. carriers. If the caller reaches a mobile phone in the United Kingdom, that carrier will add a mobile surcharge of \$0.20 per minute for that call, resulting in a total charge of \$0.27 per minute. A similar scenario (with different charges) applies on most U.S. international routes. See **Figure 1** for a summary of the different kind of charges discussed in this report.

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<sup>8</sup> MTRs should be distinguished from roaming charges, which are charges assessed by mobile carriers on non-subscribers that originate or receive calls over their networks. MTRs, in contrast, are charges for terminating calls on mobile networks. The levels of both MTRs and roaming charges are controversial issues and have been subject to action by various regulatory authorities, *e.g.*, in the European Community. This report addresses MTRs only.

<sup>9</sup> An “off-net call” is a telephone call to, or from, an unaffiliated telecommunications network.

<sup>10</sup> Until several years ago, Mexico and Japan were exceptions to this rule. In Mexico, MTRs were not assessed on domestic long-distance or international traffic. Mexico switched from a “receiving party pays” interconnection regime to a “calling party pays” regime for long-distance and international calling in late 2006. In Japan, MTRs assessed on international traffic were *lower* than those assessed on domestic traffic, but this is no longer the case.

<sup>11</sup> Foreign correspondent carriers in the destination country interconnect with the mobile networks in that country and pay MTRs for the traffic that they terminate on behalf of the U.S. carrier.

**Figure 1**

**TERMINOLOGY: TYPES OF CHARGES and RELATED TERMS**

There are three basic types of charges:

1. Charges paid by foreign carriers to terminate traffic on local networks in their own country:
  - **Mobile Termination Rate (MTR):** The rate that the owners of mobile telephone networks charge other carriers to terminate traffic on their networks.
  - **Fixed-Line Termination Rate (FTR):** The rate that owners of fixed-line networks charge other carriers to terminate traffic on their networks.
2. Charges paid by U.S. carriers to foreign correspondent carriers for foreign termination services:
  - **Mobile Settlement Rate (MSR):** The rate that a foreign correspondent carrier charges a U.S. international carrier to terminate traffic on a foreign mobile network.
  - **Fixed-Line Settlement Rate (FSR):** The rate that a foreign correspondent carrier charges a U.S. international carrier to terminate traffic on a foreign fixed-line network.
  - **MSR Premium:** The difference between the mobile settlement rate and the fixed-line settlement rate on a given route.
3. Charges paid by U.S. callers to U.S. carriers for international calling:
  - **Mobile Surcharge:** The rate that a U.S. carrier charges a U.S. caller for calling a foreign mobile phone from the United States, in addition to ordinary international calling charges.
  - **Mobile Surcharge Mark-Up (Mark-Up):** The difference between the Mobile Surcharge and the MSR Premium.

MTRs arise depending on whether a country’s mobile sector operates under either a “receiving-party-pays” or “calling-party-pays” interconnection regime. “Receiving-party-pays” (RPP) refers to an interconnection regime in which the cost of terminating a call on the network of the called or “receiving” party is borne primarily or entirely by the receiving party’s network (and, ultimately, by the receiving party).<sup>12</sup> RPP countries typically have no MTRs or MTRs set at levels equal to that of fixed-line termination rates.<sup>13</sup> The United States, Canada, China, Russia, and Singapore, among others, are RPP for mobile termination.<sup>14</sup> In contrast, “calling-party-pays” (CPP) refers to an interconnection regime in which the cost of terminating a call on the network of the receiving party is borne primarily or entirely by the calling party’s network (and, ultimately, by the calling party). Many CPP countries have MTRs

<sup>12</sup> An RPP regime is sometimes is described as “bill-and-keep,” since customer revenue is not shared among interconnecting carriers.

<sup>13</sup> Fixed-line termination rates in most countries are subject to regulation and set at low levels by regulatory authorities – typically a penny or less.

<sup>14</sup> In the United States, RPP for mobile termination is not mandated by the FCC or other authorities. It is the outcome of commercial negotiations among fixed and mobile networks subject to the reciprocal compensation requirements of the Communications Act.

substantially in excess of fixed-line termination rates. Most countries in the world follow CPP for mobile termination, and the practices of mobile carriers in these countries are the focus of this report.<sup>15</sup>

In the early 2000s, separate settlement rates did not exist for termination of international traffic on mobile networks.<sup>16</sup> As the use of mobile telephony grew throughout the world, and more international traffic was terminated on foreign mobile networks, this arrangement began to change. Foreign carriers began to charge separate mobile and fixed-line settlement rates. On many routes, mobile settlement rates were set above fixed-line settlement rates to defray the higher charges mobile carriers imposed to terminate traffic on their networks. For instance, on the U.K. route, in October 2008, fixed-line settlement rates paid by one major U.S. carrier were \$0.043 per minute.<sup>17</sup> Mobile settlement rates were \$0.116 per minute,<sup>18</sup> thereby resulting in a MSR premium of \$0.074 per minute (with rounding). The U.S. carrier passed through the MSR premium to U.S. callers, along with a mark-up, as a mobile surcharge totaling \$0.20 per minute.<sup>19</sup> Thus, in addition to normal international long-distance charges, U.S. customers were required to pay \$0.20 per minute to call a mobile party abroad. In many cases, U.S. callers may have been unaware that they were placing calls to mobile phones, and that they would incur substantial mobile surcharges for those calls. This example of the charges paid and passed on by a U.S. carrier is displayed in **Figure 2**.

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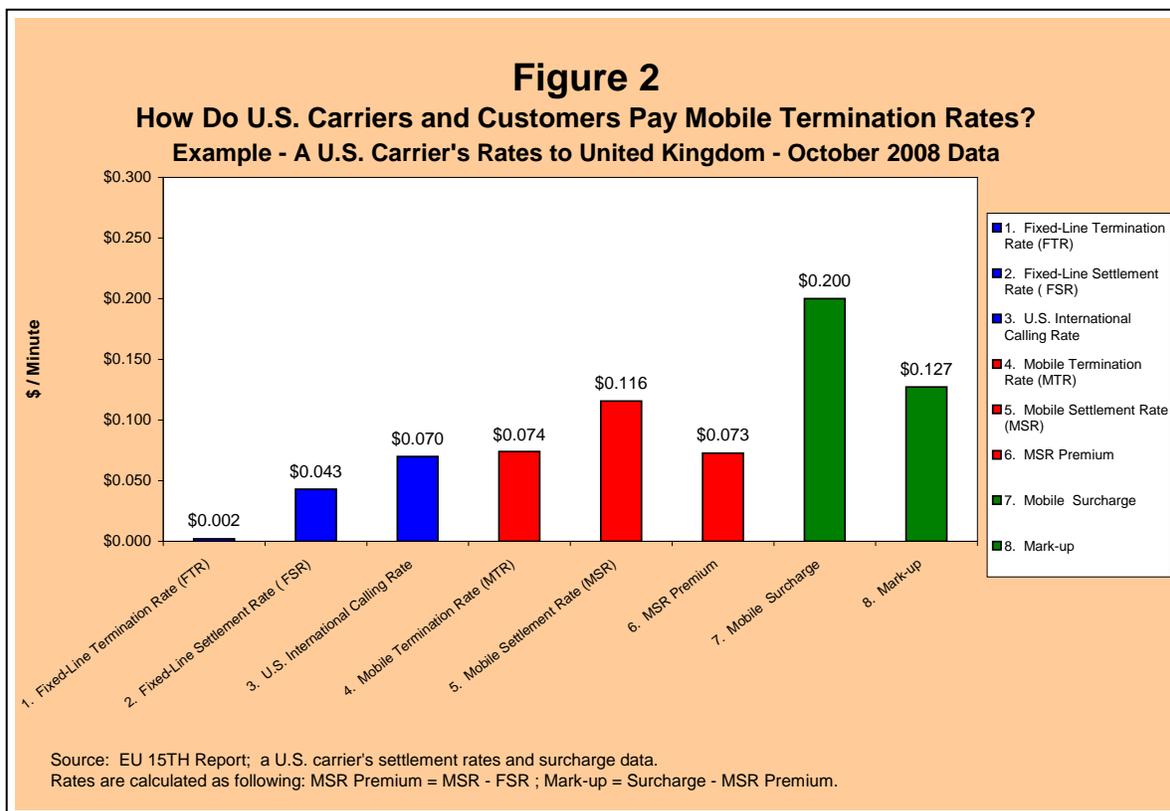
<sup>15</sup> This report does not address the merits of whether RPP is a preferable interconnection regime to CPP.

<sup>16</sup> In the early 2000s, in some countries, MTRs applied to the termination of domestic calls, but not international calls. One interesting consequence of the lack of consistency between domestic and international rates was a kind of arbitrage termed “tromboning.” With settlement rates cheaper than MTRs, off-net providers in these countries found it cheaper to trunk their domestic calls through the United States and back again than to terminate them directly on mobile networks in their country. Hence, the term “tromboning.”

<sup>17</sup> Confidential data from one of the reporting carriers.

<sup>18</sup> *Id.*

<sup>19</sup> Data from reporting carrier’s website.



In 2002, AT&T, MCI, and Sprint informally expressed concern to the FCC staff that, in many countries, excessive MTRs were leading to unreasonably high mobile settlement rates, thereby reducing gains achieved for U.S. customers by the FCC's 1997 benchmarks policy promoting cost-based settlement rates.<sup>20</sup> Since the adoption of benchmarks by the FCC, mobile telephony has become the primary form of telephone service in the world. The International Telecommunications Union estimates that, in 2013, mobile-cellular global penetration is 96 percent, with 6.8 billion subscriptions.<sup>21</sup> From 2003 to 2010, U.S. traffic subject to separate mobile settlement rates grew from 17 percent of U.S. international minutes to 44 percent.<sup>22</sup> The appearance of mobile settlement rates substantially in excess of fixed-line

<sup>20</sup> See *International Settlement Rates*, IB Docket No. 96-261, Report and Order, FCC 97-280, 12 FCC Rcd 19806 (1997) (*Benchmarks Order*); Report and Order on Reconsideration and Order Lifting Stay, 14 FCC Rcd 9256 (1999); *aff'd sub nom Cable & Wireless P.L.C. v. FCC*, 166 F.3d 1224 (D.C. Cir. 1999). The FCC adopted the *Benchmarks Order* due to concern about above-cost settlement rates, prior to the advent of separate settlement rates for termination on foreign mobile networks. After failing to achieve multilateral international action to reduce excessive settlement rates, the FCC capped settlement rates paid by U.S. carriers in the 1997 *Benchmarks Order*. Market forces, in addition to FCC regulation, helped to drive settlement rates down. Many countries opened their telecommunications markets to greater competition in a wave of global liberalization in the mid-1990s. Also, carriers began using computer technology to bypass monopoly bottlenecks in foreign networks. By 2010, the most recent year for which data are available, average settlement rates paid by U.S. carriers (for mobile and fixed-line termination combined) had decreased from a high of \$0.71 per minute (in 1988) to \$0.05 per minute, saving U.S. carriers and callers billions of dollars and leading to a rapid expansion of U.S. international calling. See FCC Section 43.61 *International Telecommunications Data* annual reports.

<sup>21</sup> See International Telecommunications Union's *The World in 2013: ICT Facts and Figures*, available at <http://www.itu.int/en/ITU-D/Statistics/Pages/facts/default.aspx>.

<sup>22</sup> See **Figure 4**, below.

settlement rates raised concern that progress achieved in lowering excessive settlement rates is in danger of reversal.

The FCC expressed its concern about the potentially harmful impact of foreign MTRs on U.S. consumers in the *2004 International Settlement Policy Reform Order*<sup>23</sup> proceeding. On October 26, 2004, the FCC released the *Foreign Mobile Termination Rate NOI* soliciting comment and information on the effect of foreign MTRs on U.S. customers and competition.<sup>24</sup> Since that time, the FCC staff has closely monitored the evolution of mobile termination arrangements throughout the world and has collected data periodically from major U.S. carriers regarding U.S. traffic terminating on foreign fixed-line and mobile networks and fixed-line and mobile settlement rates.

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<sup>23</sup> See *2004 International Settlement Policy Reform Order*, 19 FCC Rcd 5709.

<sup>24</sup> See *Foreign Mobile Termination Rate NOI*, 19 FCC Rcd 21395. Comments and information filed in response to the NOI are available at <http://apps.fcc.gov/ecfs/proceeding/view?z=eypyn&name=04-398>.

### III. KEY FINDINGS OF THE REPORT

The major findings in this report are as follows:

- Traffic terminated on foreign mobile networks by the four largest U.S. carriers has increased from 640 million minutes (October 2003) to 1.7 billion minutes (October 2010), an increase of 167 percent. See **Figure 3**.
- The percentage of minutes terminated on foreign mobile networks compared to foreign mobile and fixed-line networks combined increased from 17 percent (2003) to 44 percent (2010). See **Figure 4**.
- Both the world average mobile settlement rate (MSR) and world average fixed-line settlement rate (FSR) have decreased in the past 8 years. See **Figure 7**.
- However, the world average MSR premium – the average extra cost to U.S. carriers of terminating on mobile networks throughout the world – has fluctuated. The world average MSR premium increased by 31 percent from 2003 to 2007 and then decreased significantly, to slightly below its 2003 level by 2010. See **Figure 8**.
- The world average MSR premium (2010) conceals a great diversity among individual countries' rates, which vary from zero or close to zero (Canada and India) to 16 cents (Brazil) and 22 cents (Morocco). See **Figure 15**.
- Long-run incremental cost (LRIC) studies from many countries indicate that the economic cost of mobile termination exceeds that of fixed-line termination by no more than 2-5 cents. If these studies are correct, and if MSR premiums reflect only this cost difference, then premiums should be 2-5 cents at most. As of 2010, there are 85 countries with an MSR premium greater than 5 cents, down from a high of 102 countries in 2006. Also, as of 2010, there are 121 countries with an MSR premium greater than 2 cents, down from a high of 135 in 2006. See **Figure 10**.
- Based on a cost threshold of 5 cents, the study finds that 31 percent of U.S. traffic terminating on foreign mobile networks was being charged above-cost in 2010. Alternatively, based on a cost threshold of 2 cents, the study finds that 49 percent of U.S. traffic terminating on foreign mobile networks was being charged above cost in 2010. See **Figure 11**.
- The four U.S. carriers in our study pay a MSR premium of \$733 million a year. Based on a cost threshold of 5 cents, annual above-cost payments by these carriers are about \$228 million in 2010, or 8.0 percent of their total settlement payments. Alternatively, based on a cost threshold of 2 cents, annual above-cost payments by these carriers are about \$450 million in 2010, or 15.7 percent of their total settlement payments. See **Figure 12** and **Figure 13**.
- U.S. carriers flow through the MSR premium to U.S. consumers along with a substantial mark-up as mobile surcharges. Depending on how the mark-up is measured, customers of the largest U.S. carriers paid an average mark-up of between 71 percent and 94 percent over the MSR premium to place calls to foreign mobile networks. In dollar terms, the mark-up was between \$517 million and \$690 million annually. See **Figure 13**.

#### IV. DESCRIPTION OF THE DATA USED IN THE STUDY

In order to study the effect of mobile termination rates on U.S. carriers and consumers, the International Bureau obtained data for calculating MSRs, FSRs, and MSR premiums from the four largest U.S. international facilities-based carriers: AT&T, IDT, Verizon/MCI, and Sprint.<sup>25</sup> With a few exceptions, the FCC staff obtained such data for the month of October annually from 2003 to 2010. The data consisted of fixed-line and mobile settlement payouts and minutes for all 212 foreign countries with separate fixed-line and mobile settlement rates. (Settlement rates can be calculated as settlement payouts divided by settlement minutes.) The amount of data collected was substantial: For each of four companies, eight monthly periods (2003-2010), and 212 international routes, the FCC staff collected four statistics (mobile settlement payouts and minutes, and fixed-line settlement payouts and minutes), totaling 27,136 data points. This is the first time that such an extensive data set has been available to the Commission. All the statistics displayed in charts in this report are based on the data set, with few exceptions.

Working with the data posed several challenges. The data provided by the companies was raw monthly data as initially booked, and did not typically include out-of-period adjustments to correct for late billings, true-ups, or errors. Moreover, the data were for a single month each year, and were, therefore, subject to greater statistical fluctuations than would be a full year of aggregated data (where high and low months would average out).<sup>26</sup> Despite these limitations, the staff believes that the data collected are adequate for study purposes. The staff tested the data in several ways to ensure that there were no obvious reporting errors and engaged in extensive efforts with the reporting carriers to validate or correct suspect data.<sup>27</sup> Data quality problems were further reduced through averaging, as all of the statistics presented in this report combine data from all four reporting carriers, and many of the statistics are averaged across all countries in a region or the world.<sup>28</sup> Statistics for individual countries, however, are less accurate than for regions or the world-total.

The reporting carriers requested that their data be treated as proprietary, with the understanding that any statistics made available to the public by the FCC consist of data aggregated across at least three companies (so that the data of any one company would not be detectable). Accordingly, this report does not make public any company-specific data or any data from which company-specific data can be inferred.

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<sup>25</sup> With limited exceptions (*e.g.*, the European Union), extensive cross-sectional and time-series data are not generally available for mobile and fixed-line termination rates and settlement rates.

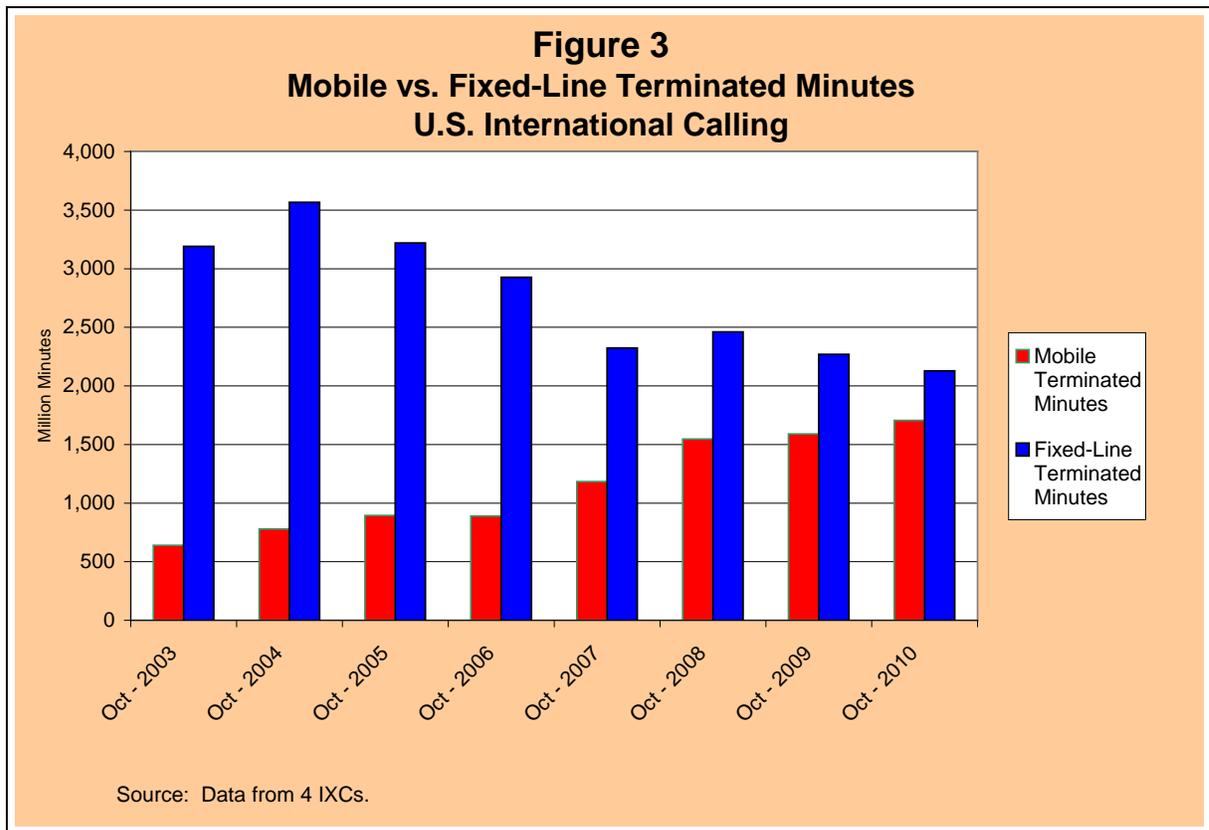
<sup>26</sup> In several cases where the data were unavailable for a particular year, the staff interpolated the data using data from the previous or subsequent years.

<sup>27</sup> The staff identified anomalies in the data by performing cross-sectional comparisons among the four reporting carriers and time-series comparisons for each carrier separately. The staff requested the carriers to review and, if necessary, correct the identified anomalies. In addition, the staff validated the carriers' data by testing it against similar data obtained by the Commission under a proprietary commercial arrangement with Arbinet, a company offering real-time international termination services via spot-market auctions.

<sup>28</sup> Statistical theory assures us that averaging and trending data can reduce the effects of measurement errors ("noise").

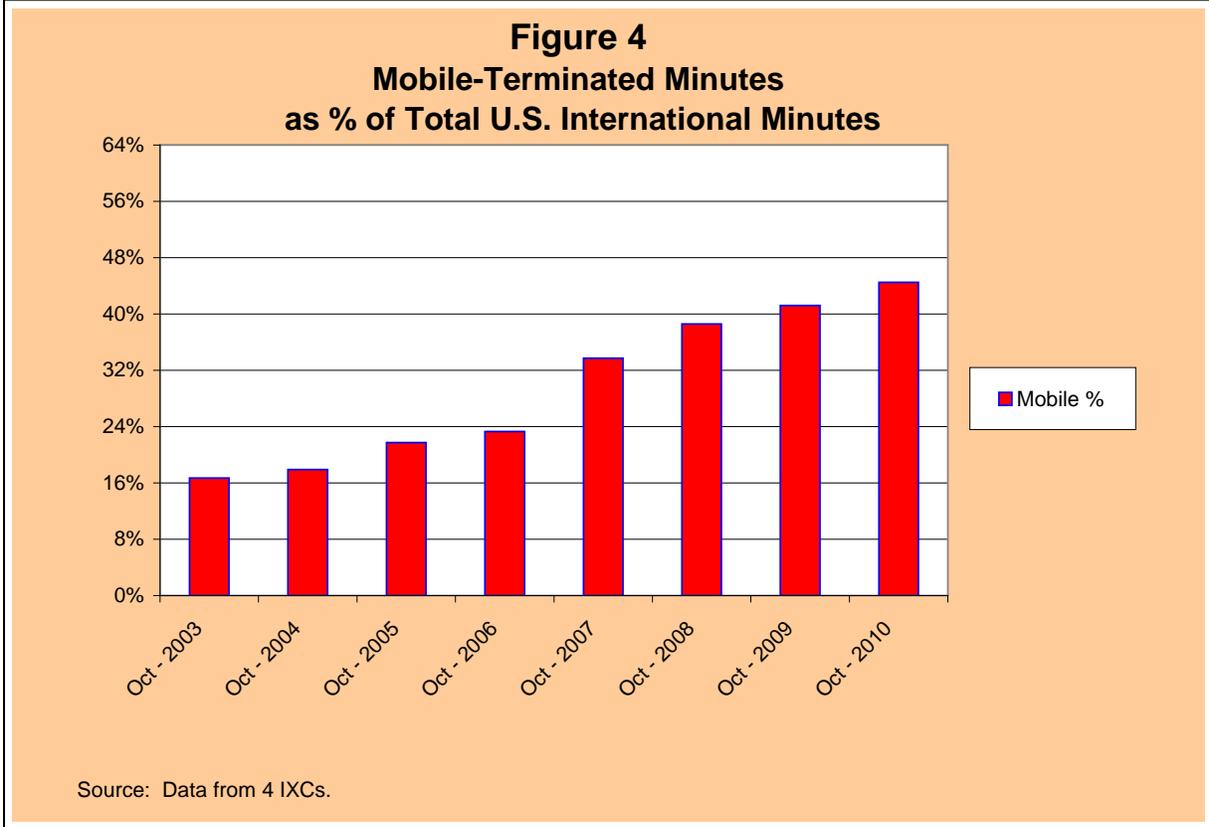
## V. GROWTH OF MOBILE-TERMINATED MINUTES

### A. Growth in the Absolute Levels of Mobile and Fixed-Line Terminated Minutes



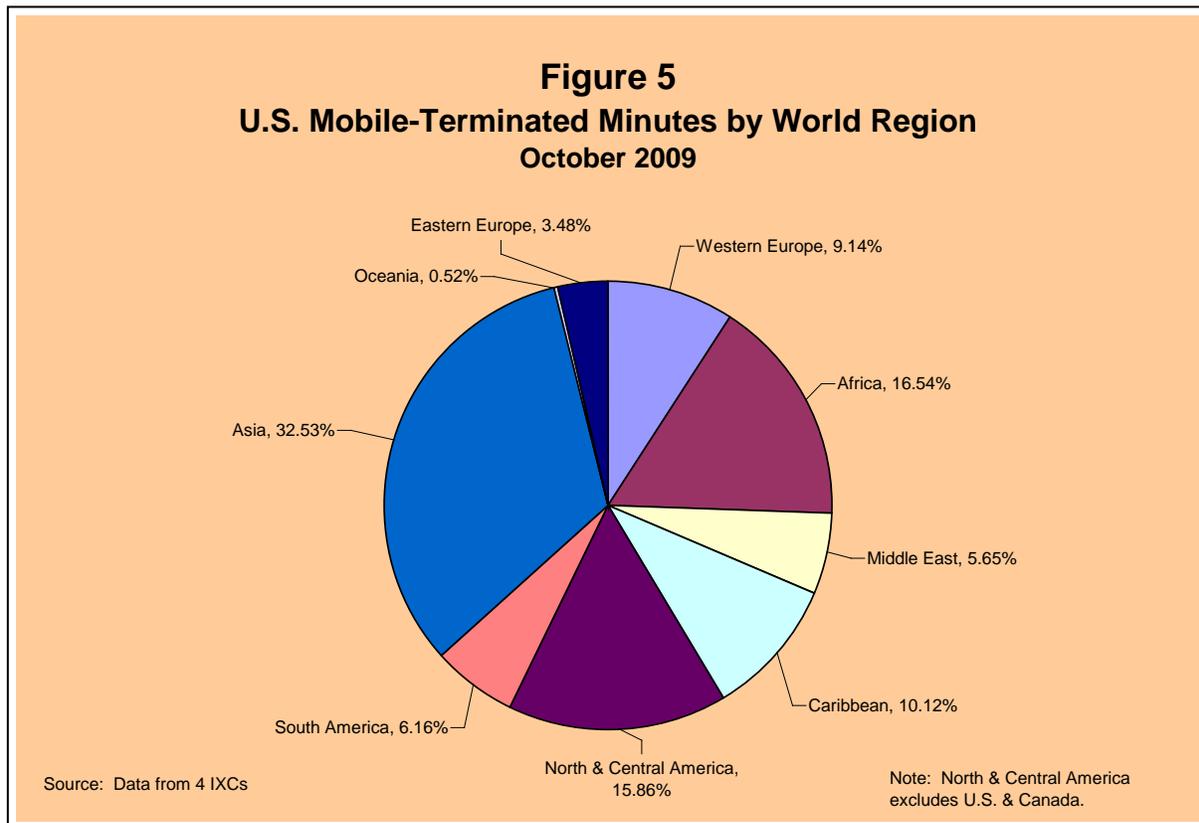
**Figure 3** shows that the amount of U.S. international traffic terminated by the four largest U.S. carriers on mobile networks abroad is increasing over time, while the amount of traffic terminated on fixed lines is decreasing. Thus not only is the proportion of traffic terminated on mobile versus fixed-line networks changing in favor of mobile, but the absolute amount of fixed-line traffic is declining. However, the absolute decline in traffic terminated on fixed-line networks is probably an artifact due to the shift of traffic from traditional telephone companies to VoIP providers. In actuality, while the proportion of minutes terminated on fixed-line or mobile networks abroad is changing in favor of mobile networks, the absolute amount of traffic terminated on either type of network is increasing as the cost of international calling in the United States continues to decline.

**B. Growth in the Relative Level of Mobile-Terminated Minutes**



**Figure 4** highlights one of the points evident from **Figure 3**: The proportion of traffic terminated on mobile versus fixed-line networks is changing rapidly in favor of mobile, with the percentage growing from 17 percent of total traffic in October 2003 to 44 percent in October 2010, reflecting the growing use of mobile phones in foreign countries.

## VI. METHOD FOR CALCULATING WORLD AVERAGE MSR PREMIUM AND SETTLEMENT RATES



**Figure 5** shows the distribution of U.S. mobile-terminated minutes among world regions in October 2009. The figure displays the regional destination of U.S. calling volumes to foreign mobile phones and shows how world regions are weighted in the construction of the world average MSR premium (a key statistic described in this study) and world average settlement rates.<sup>29</sup> To create a world average MSR premium for a single year, the staff weighted each country's MSR premium by the relative number of U.S. minutes terminated on mobile networks in that country. Calculating a world average entails weighting the data of the four reporting carriers for 212 foreign countries.<sup>30</sup>

Constructing an annual time-series<sup>31</sup> for the world average MSR premium entails calculating a world average MSR premium for each of the eight years of the study period (2003-2010). An important methodological question in calculating the time-series is whether to use constant weights,<sup>32</sup> variable

<sup>29</sup> Country weights rather than regional weights are used to create world averages, but a graphic display of the country-by-country distribution would not be graphically feasible due to the large number of countries.

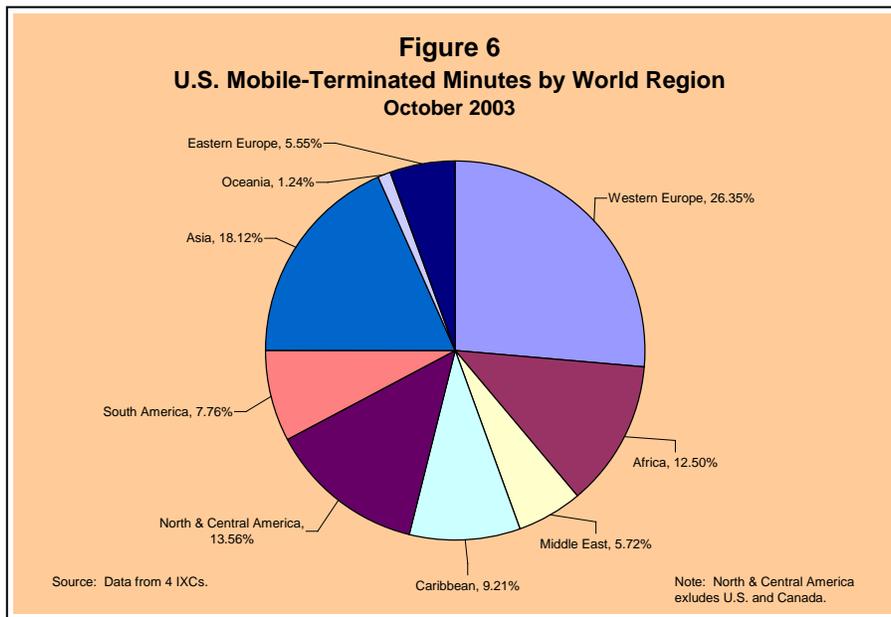
<sup>30</sup> The world average excludes Canada, which does not have separate mobile settlement rates.

<sup>31</sup> A time-series is a sequence of data points, measured typically at successive time instants spaced at uniform time intervals.

<sup>32</sup> The method of constant weights applies weights derived from mobile-terminated minutes for a single base year to the rates or premiums for all years.

weights,<sup>33</sup> or some other weighting method. If constant weights are chosen, an appropriate base year must be identified.

The staff adopted the method of constant weights, based on 2009 minutes for each country. Changes in relative traffic during the study period are significant, as a comparison of **Figure 5** to **Figure 6** shows.<sup>34</sup> In fact, there was a major shift in the relative share of mobile-terminated minutes from high-cost Western Europe to low-cost Asia during the study period. Typically, in a situation such as this, a variable weight, or “chain-weighted,” index would be employed precisely to capture this shift, as well as capture price changes within individual countries. However, in this study the central interest is in whether foreign countries have been making progress controlling MTRs and MSR premiums. Thus, a fixed-weight index is employed in order not to capture the overall price effect due to changes in relative traffic among countries, but focus instead on price changes within individual countries.



The staff chose 2009 as the base year for which to calculate constant weights instead of 2003 or 2010 for several reasons. Although the 2010 traffic data is more recent than 2009 data, there are some unexplained anomalies in the 2010 minute data, so using 2010 was ruled out. An important advantage in using 2009 as a base year, in contrast to 2003, is that it captures the upward impact on world average MSR premiums that occurs when a country introduces a MSR premium in the middle of the study period. Use of 2003 as the base year would fail to reflect the introduction of an MSR premium as an increase in the world-average MSR premium in the year in which it was introduced or in subsequent years.<sup>35</sup> This is

<sup>33</sup> The method of variable weights applies weights derived from mobile-terminated minutes for each year to the rates or premiums for that year.

<sup>34</sup> **Figure 6** is displayed as smaller than **Figure 5** to make the point that the 2003 weights in **Figure 6** are *not* being used in the calculation of weighted averages.

<sup>35</sup> Prior to a country’s introduction of an MSR premium, the number of mobile-terminated minutes for the country is reported as zero even though there may be substantial mobile-terminated traffic. (The U.S. reporting carriers are not able to separately identify mobile-terminated minutes if settlement rates are the same for mobile and fixed-line terminated minutes.) With the use of 2009 constant weights, both the zero MSR premium (pre-introduction) and the non-zero MSR premium (post-introduction) are assigned a non-zero weight from the 2009 base year. When the  
(continued....)

important because Mexico, one of the largest U.S. routes, introduced a substantial MSR premium in the middle of the study period. Another reason for choosing 2009 as the base year is that the time-series will incorporate the most current, reliable country weights and reflect most appropriately the rapidly evolving state of mobile telephony.

In the following sections of the report, 2009 constant weights are used to calculate time-series of: (1) world average mobile and fixed-line settlement rates (**Figure 7**); (2) world average MSR premiums (**Figure 8**); and (3) world average MSR premiums, as adjusted for fluctuations in the value of the U.S. dollar (**Figure 9**).

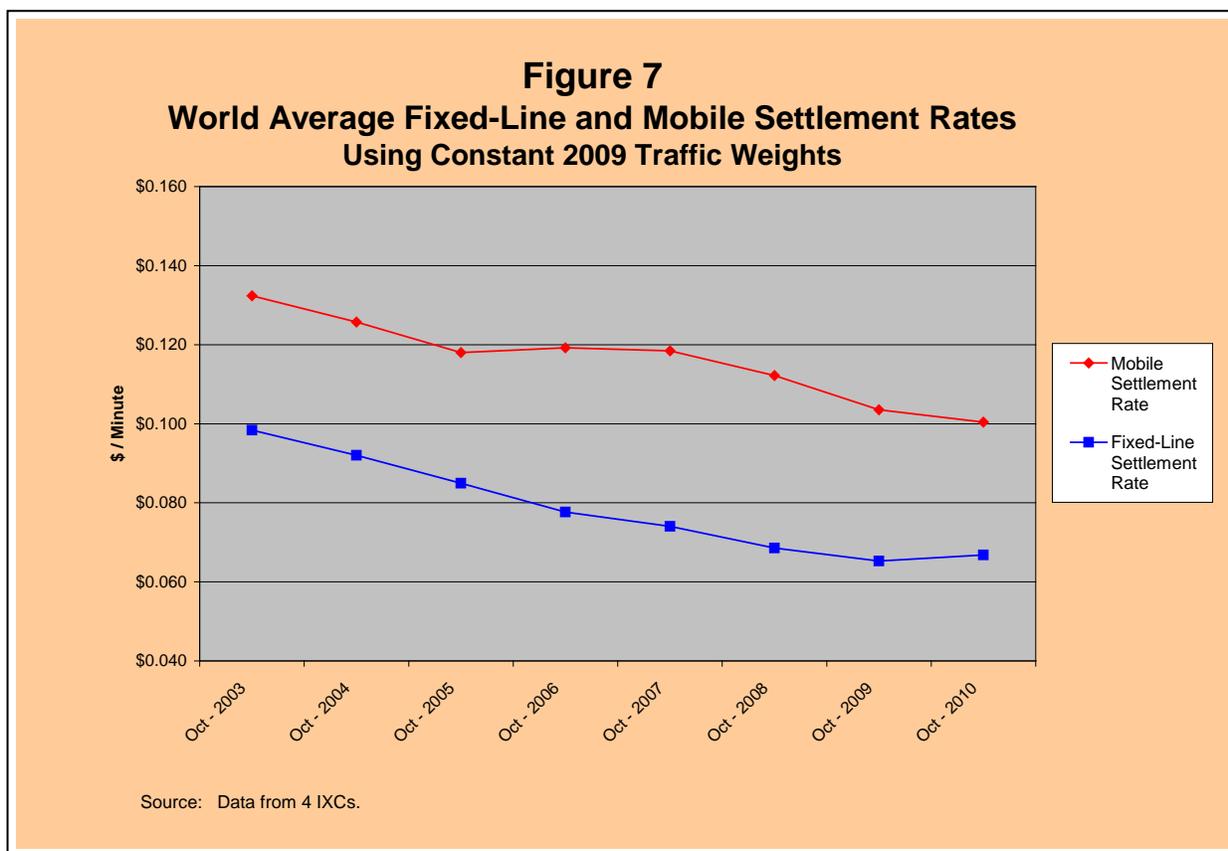
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MSR premium becomes positive upon introduction of the MSR premium in some year subsequent to 2003, the positive MSR premium is multiplied by a non-zero weight and the world average MSR increases to reflect the newly introduced charges. If 2003 constant weights were used, however, both the zero MSR premium and the non-zero MSR premium would be assigned zero weights from the 2003 base year and the introduction of an MSR premium would not cause the world average MSR premium to increase. This problem would also occur in chain-weighted indexes that use Laspeyres base years.

## VII. TIME TREND OF WORLD AVERAGE SETTLEMENT RATES AND MOBILE SETTLEMENT RATE PREMIUMS

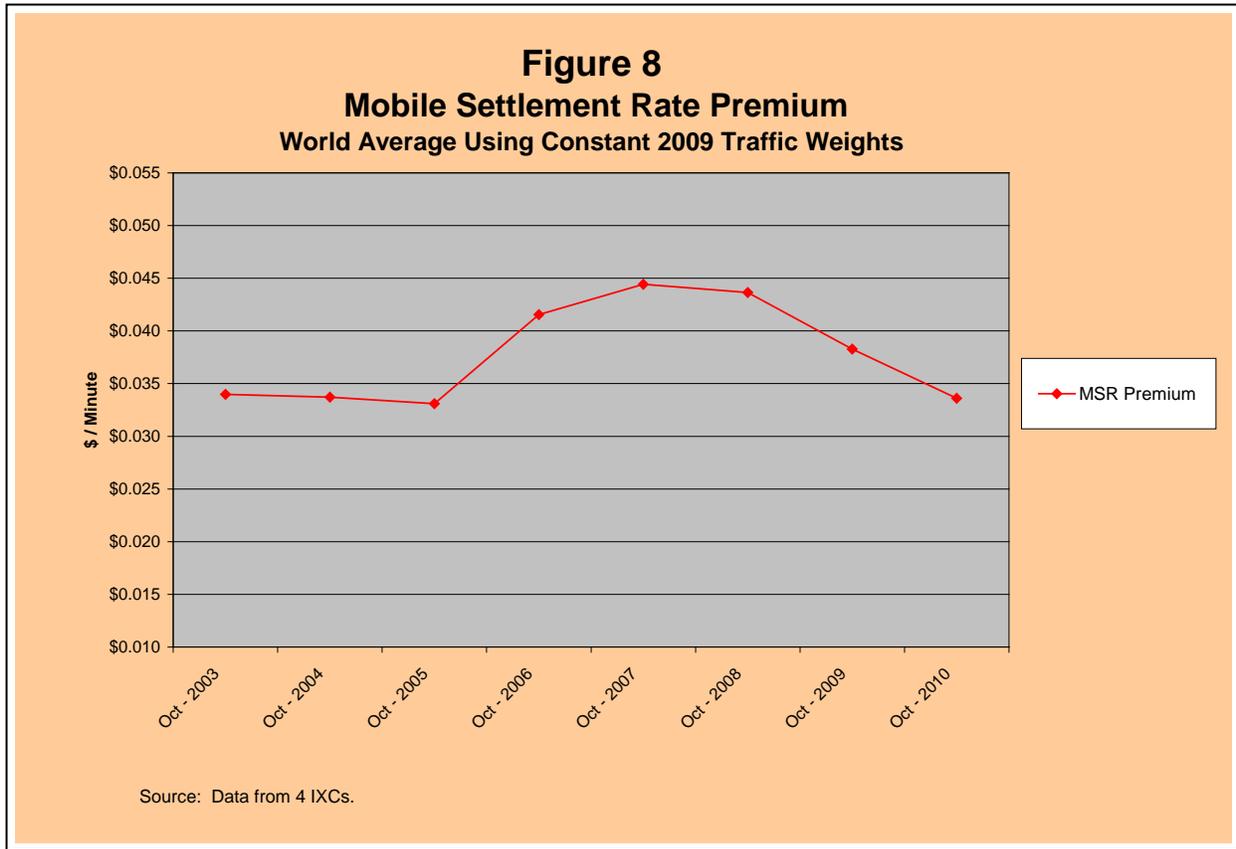
### A. The Time Trend of World Average Fixed-Line and Mobile Settlement Rates



**Figure 7** shows that both the world average fixed-line and mobile settlement rates have declined over the study period. However, the difference between the two rates – shown as the vertical distance between the red and blue lines – has fluctuated. This difference is the world average MSR premium, *i.e.*, the extra average cost to U.S. carriers of terminating on foreign mobile networks throughout the world, described in the next subsection.<sup>36</sup>

<sup>36</sup> A technical note: The world average MSR premium is a weighted average of the difference between the fixed-line settlement rate and the mobile settlement rate for each country, with the weights being each country's mobile-terminated minutes. The construction of the average MSR premium requires, in effect, that the weights for the fixed-line settlement rate for each country be the *mobile-terminated* minutes for that country. To ensure that the difference between mobile and fixed-line settlement rates in **Figure 7** match the MSR premium in **Figure 8**, the world average fixed-line settlement rate in **Figure 7** is calculated using mobile-terminated minute weights.

**B. Time Trend of World Average MSR Premiums**



**Figure 8** shows the world average MSR premium over time, *i.e.*, the difference between the time-series of world average fixed-line and mobile settlement rates shown in **Figure 7**. From the figure, the world average MSR premium climbed by 31 percent to its highest point in 2007 and then declined to slightly below its 2003 starting point. The reason for the increase up to 2007 appears to be successful efforts by mobile operators in many countries to increase MTRs, thereby either introducing or increasing MSR premiums during the first part of the study period.<sup>37</sup> The reason for the decrease after 2007 appears to be successful efforts of national regulators to lower MTRs (and thus MSR premiums).<sup>38</sup> **Figure 8** is

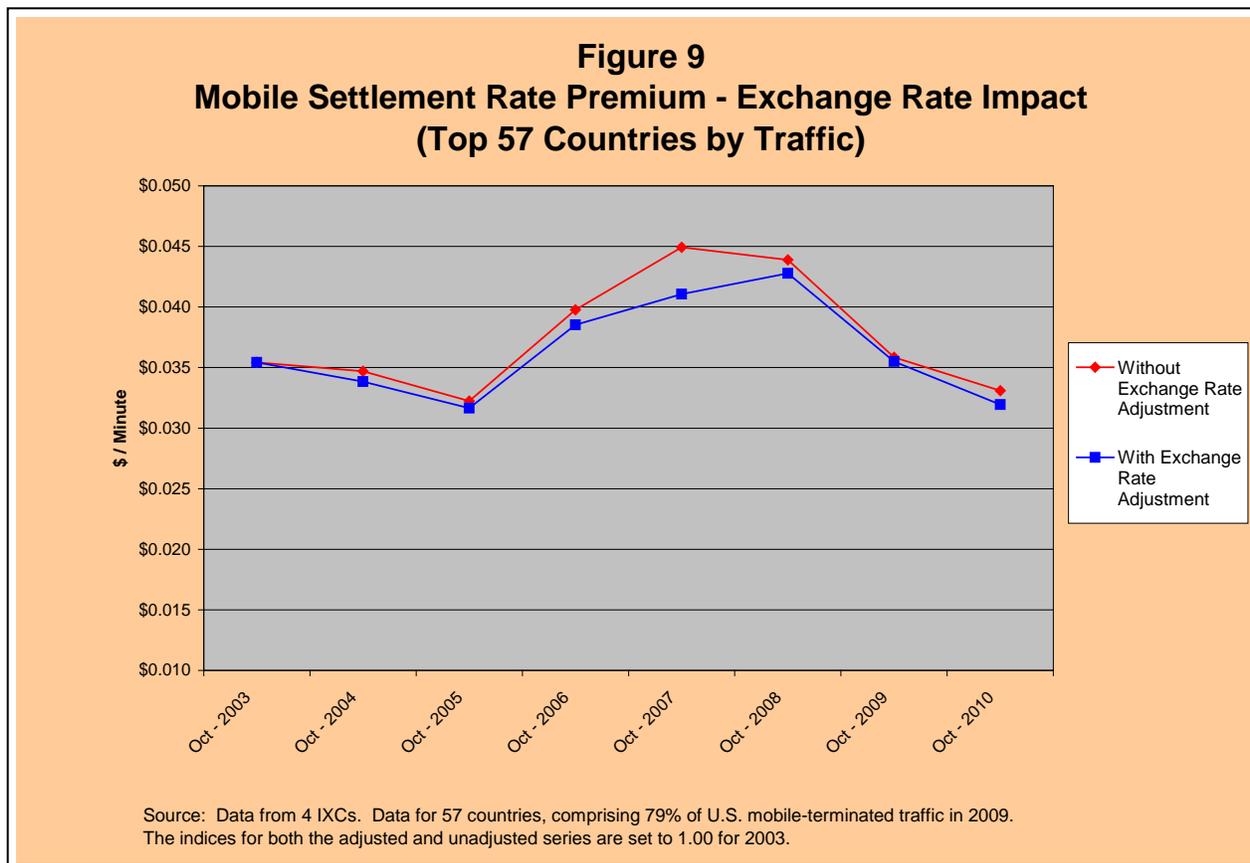
<sup>37</sup> Average MSR premiums for most world regions increased up to 2007, with the exception of Western Europe. See **Figure 14** for regional trends. MTRs and MSR premiums in Western Europe, unlike other world regions, were already established at historically high levels at the beginning of the study period (2003), with efforts by national regulators to control them underway. Declines in MSR premiums in Western Europe began as early as 2004 and mitigate what otherwise would have been an even greater increase in the world average MSR premium in **Figure 8** between 2003 and 2007.

<sup>38</sup> See, e.g., OECD, *Developments in Mobile Termination*, OECD Digital Economy Papers, No. 193, OECD Publishing (2012), available at <http://dx.doi.org/10.1787/5k9f97dxnd9r-en>, at 4, 11-12. (“Following intervention by regulators, the rates for interconnection, between and to mobile service providers have decreased.”); and European Commission, *Progress Report on the Single European Electronic Communications Market 2009 (15th Report)*, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, Aug. 25, 2010, available at,

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perhaps the most important figure in this report, because it summarizes the trajectory of MSR premiums for the entire world over the entire study period.

### C. The Effect of Currency Fluctuations on the Time Trend of MSR Premiums



**Figure 9** shows the effect of fluctuating exchange rates for the U.S. dollar on the MSR premium time trend by displaying the time trend with, and without, exchange rate adjustments for the top 57 countries by traffic. The red line shows MSR premiums denominated in U.S. dollars. The blue line shows MSR premiums after conversion to a weighted average of foreign correspondent carriers' own currencies, removing the effect of dollar fluctuations and revealing the MSR premiums that foreign correspondents receive in their own currencies. Given the relative similarity of the two trend lines, fluctuating exchange rates do not appear to be a major factor in shaping the world average MSR premium trend line.

Unlike MTRs, which are denominated in each country's own currency, the settlement rate data used in this study to calculate MSR premiums are denominated in U.S. dollars. Fluctuations in settlement rates and MSR premiums may be due to changes in the exchange rate for the U.S. dollar rather than to changes in foreign countries' fixed-line or mobile termination rates. For instance, if the value of the dollar falls, a foreign correspondent may have to raise dollar-denominated settlement rates to defray its domestic

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<http://ec.europa.eu/digital-agenda/en/news/progress-report-single-european-electronic-communications-market-2009-15th-report-sec2010630>, Part I, at 16 ("Regulation is effectively bringing down [mobile] interconnection rates in the EU [European Union] as a whole through glide-path mechanisms. Further reductions are expected as the NRAs [national regulatory authorities] implement the Commission Recommendation on termination rates.")

termination costs even if such costs are unchanged in the domestic currency. Thus, without adjustment, the MSR premium could increase solely because of changes in the value of the U.S. dollar.<sup>39</sup>

**Figure 9** shows, in blue, the weighted average MSR premium for the top 57 countries by traffic<sup>40</sup> after removing the effect of fluctuations in the U.S. dollar. For comparison purposes, **Figure 9** also shows, in red, the weighted average MSR premium for the top 57 countries, unadjusted for fluctuations in the U.S. dollar. The red trend line is similar to the world average MSR premium trend line in **Figure 8**, except for the exclusion of smaller countries. Both the adjusted and unadjusted trend lines have the same general shape, and this indicates that fluctuations in the value of the U.S. dollar have not played a major role in shaping the world average MSR premium trend line. The only notable difference between the two trend lines is that the adjusted trend line shows the peak in the world average MSR premium occurring in 2008 rather than 2007. The 2007 peak in the unadjusted trend line appears to be the result of a rapid but temporary devaluation of the U.S. dollar between 2006 and 2007.

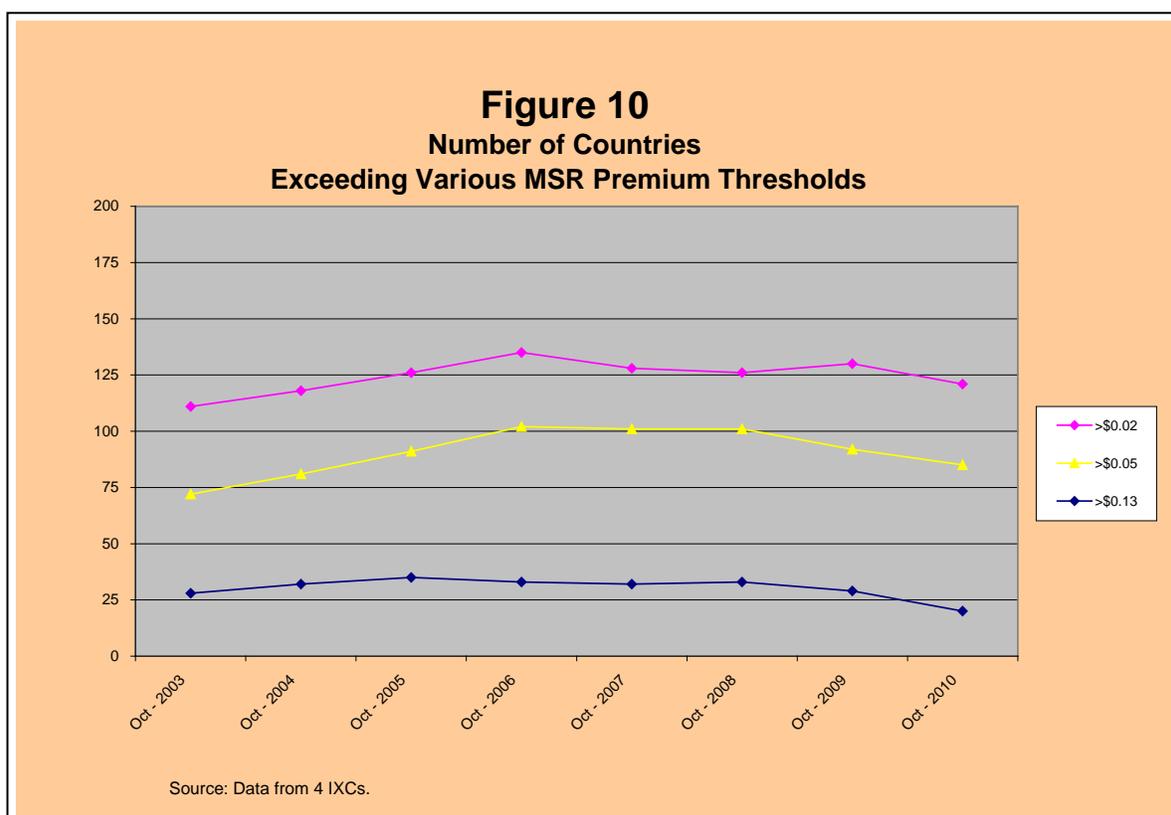
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<sup>39</sup> Another way of looking at the effect of currency fluctuations is that an unadjusted MSR premium trend reveals the MSR premiums that U.S. carriers pay in dollars, but not the value of the MSR premiums that foreign correspondents receive in their own currencies.

<sup>40</sup> These 57 countries comprise 79 percent of U.S. minutes billed by the reporting carriers as terminating on foreign mobile networks in 2009. It was not feasible to make currency adjustments for all 212 countries. The 57 countries used to generate **Figure 9** consist of the largest U.S. routes for mobile-terminated traffic, with minor exceptions. By world region, they are Belgium, France, Germany, Greece, Ireland, Italy, Netherlands, Spain, Switzerland, Turkey, United Kingdom (Western Europe); Albania, Poland, Romania, Russia, Ukraine (Eastern Europe); Egypt, Ghana, Kenya, Morocco, Nigeria (Africa); Israel, Jordan, Lebanon, Saudi Arabia, United Arab Emirates (Middle East); Dominican Republic, Haiti, Jamaica (Caribbean); Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama (Central America); Brazil, Chile, Colombia, Ecuador, Peru, Venezuela (South America); Bangladesh, China, Hong Kong, India, Indonesia, Japan, South Korea, Malaysia, Pakistan, Philippines, Sri Lanka, Taiwan, Thailand, Vietnam (Asia); and Australia (Oceania).

## VIII. ESTIMATES OF THE AMOUNT OF MSR PREMIUMS THAT ARE POTENTIALLY ABOVE COST

### A. Estimates of the Number of Countries That Have Potentially Above-Cost MSR Premiums



**Figure 10** displays the number of countries with MSR premiums over thresholds of \$0.02, \$0.05, and \$0.13, for each year of the study period. In reading the chart, the reader should note that, for any given year, the counts are cumulative, *e.g.*, countries with premiums above \$0.13 are included in the count of countries with premiums above \$0.05 or \$0.02.

The reason for choosing these specific thresholds is to count the number of countries with above-cost MSR premiums, based on various estimates of cost. The FCC has not made findings regarding the cost of mobile termination; nor does the FCC staff make any findings in this study. Various long-run incremental cost (LRIC) studies in the public domain indicate, however, that cost-based MTRs are in the range of \$0.02 - \$0.05.<sup>41</sup> If these estimates are correct, they should be upper bounds on cost-based MSR

<sup>41</sup> The traditional economic cost standard is forward-looking incremental cost (LRIC) plus a reasonable contribution to network and corporate overheads (“LRIC +”). This is the standard adopted by the FCC in the *Benchmarks Order*, in which the cost basis of settlement rates paid by U.S. carriers was evaluated. (“Because settlement rates in effectively competitive markets would tend to the level of TSLRIC [total service long-run incremental costs] plus a reasonable contribution to joint and common costs, our settlement rate benchmarks ideally should be set at that level.” *Benchmarks Order*, ¶ 42.) Many LRIC+ studies for or by regulatory authorities show costs between \$0.02 and \$0.05 per minute. See, *e.g.*, Ofcom’s *Mobile Termination Review Statement*, March 15, 2011, available at <http://stakeholders.ofcom.org.uk/consultations/mtr/statement> (identifying LRIC+ to be £0.0161, or \$0.026);

(continued....)

premiums.<sup>42</sup> Accordingly, the FCC staff chose \$0.02 and \$0.05 as thresholds for MSR premiums that may be above cost. In addition, the staff chose \$0.13 as a threshold to illustrate that MSR premiums for many countries may be substantially above cost.

According to the most recent data (2010), 121 countries had MSR premiums exceeding \$0.02; 85 countries had MSR premiums exceeding \$0.05; and 20 countries had MSR premiums exceeding \$0.13.

The trend lines of country counts for each threshold have the same general shape as the trend line for the world average MSR premium in **Figure 8**. Each trend line rises until the middle of the study period and then declines. The count of countries exceeding the \$0.05 threshold rises from 72 in the beginning of the study period (2003) to a peak of 102 in the middle of the study period (2006) and then declines to 85 at the end of the study period (2010). The count of countries exceeding the \$0.02 threshold rises from 111 in the beginning of the study period (2003) to a peak of 135 in the middle of the study period (2006) and then declines to 121 at the end of the study period (2010).

It is important to note that an MSR premium below \$0.02 or \$0.05 is not a guarantee that the MSR itself is cost-based. The MSR premium is merely the difference between the MSR and the FSR. Both the MSR and the FSR could be excessive, but if the difference between them is small, the MSR premium would be small. In fact, this seems to be the case with many African countries. In 2010, the average MSR in Africa was about \$0.16 and the average FSR was about \$0.13, resulting in an MSR premium of about \$0.03. Thus while the MSR premium – the *difference* between mobile and fixed settlement rates – was possibly cost-based, both the MSR and the FSR are likely far above cost. This issue will be explored in more detail in several charts at the end of this report. As explained in the Introduction, it is worth emphasizing that the focus of this report is whether the imposition of separate rates for mobile termination have added unreasonably to the costs of foreign termination of U.S. traffic. In other words, the focus of the report is not whether settlement rates are cost-based, but whether the differences between mobile and fixed-line settlement rates are cost-based and whether the differences have led to unreasonable, *additional* costs for U.S. carriers and consumers connecting to mobile phones in foreign countries.

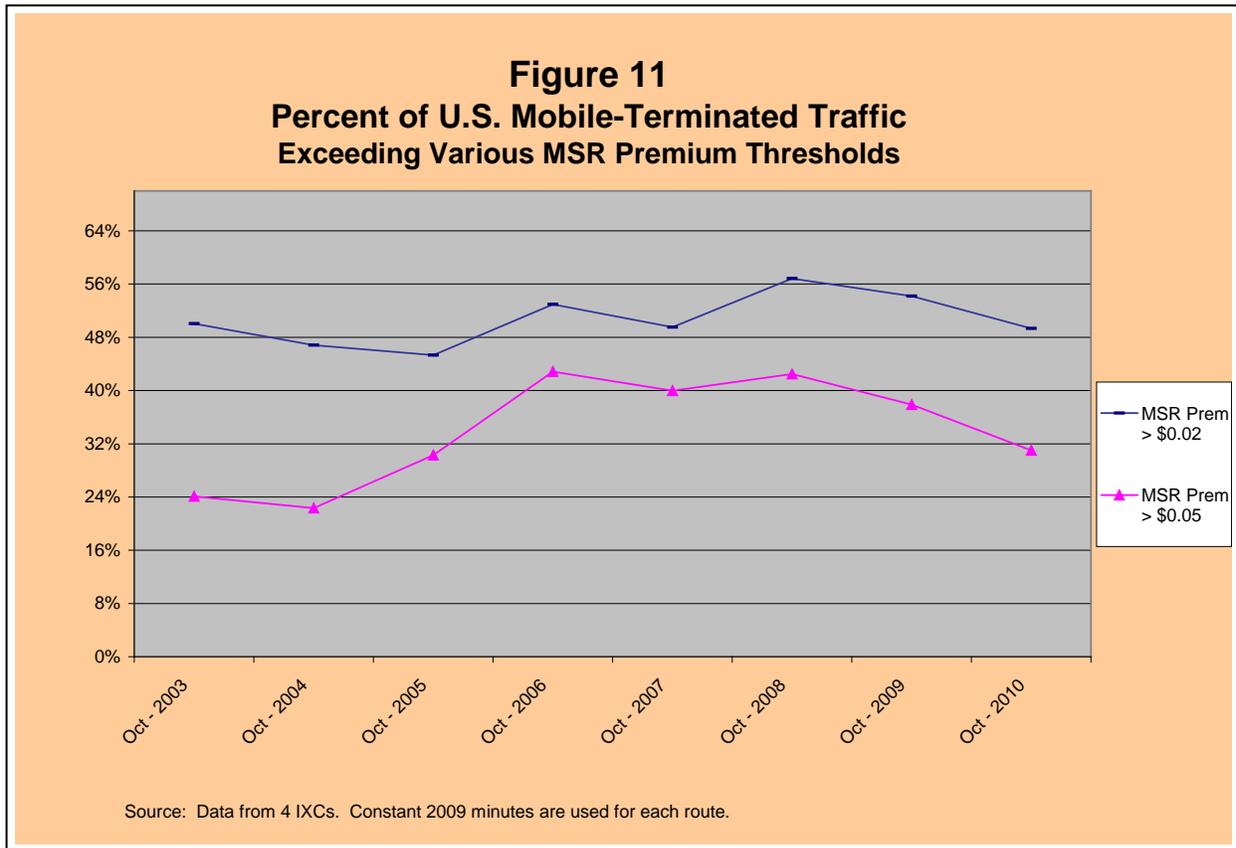
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Analysys, *A Study of Mobile Termination Charges*, Report for the Israel Ministry of Communications and Ministry of Finance, July 22, 2004, available at [http://www.moc.gov.il/new/documents/about/analisis\\_10.2.05.pdf](http://www.moc.gov.il/new/documents/about/analisis_10.2.05.pdf) (identifying LRIC+ to be NIS 0.144, or \$0.038); Malaysian Communications and Multimedia Commission, *Access Pricing*, A Report on a Public Inquiry, Nov. 30, 2005, available at <http://www.skmm.gov.my/skmmgovmy/media/General/pdf/PIReportAccessPricing-MCMC-Final.pdf> (identifying LRIC+ to be MYR 0.0832, or \$0.027); and Australia Competition and Consumer Commission, *Inquiry to Make a Final Access Determination for the Domestic Mobile Terminating Access Service (MTAS)*, Access Determination Explanatory Statement, Dec. 7, 2011, available at <https://www.accc.gov.au/system/files/MTAS%20FAD%20explanatory%20statement%20and%20instrument.pdf> (identifying LRIC+ to be between AUD 0.036 and 0.06, averaging AUS 0.048; or between \$0.037 and \$0.062, averaging \$0.049). Note that Ofcom, in 2011, switched from LRIC+ to “pure LRIC” (LRIC exclusive of joint and common costs) in capping MTRs, because a “pure LRIC would be more likely to promote efficiency, sustainable competition and would confer the greatest possible benefit on consumers.” Ofcom’s *Mobile Termination Review Statement at 2*. Ofcom calculated pure LRIC costs to be £0.0069 (\$0.011), compared to LRIC+ costs of £0.0161 (\$0.026). The difference is common costs of £0.0092 (\$0.015), a mark-up of 133 percent above pure LRIC.

<sup>42</sup> Cost-based MSR premiums primarily reflect the difference between cost-based MTRs and FTRs. (MSR premiums are the difference between mobile and fixed-line settlement rates, with cost components other than MTRs and FTRs – national extension and international transport – largely the same for both.) Cost-based FTRs are probably between \$0.00 and \$0.01. With cost-based MTRs between \$0.02 and \$0.05, MSR premiums that are solely cost-based should be slightly less than the MTR.

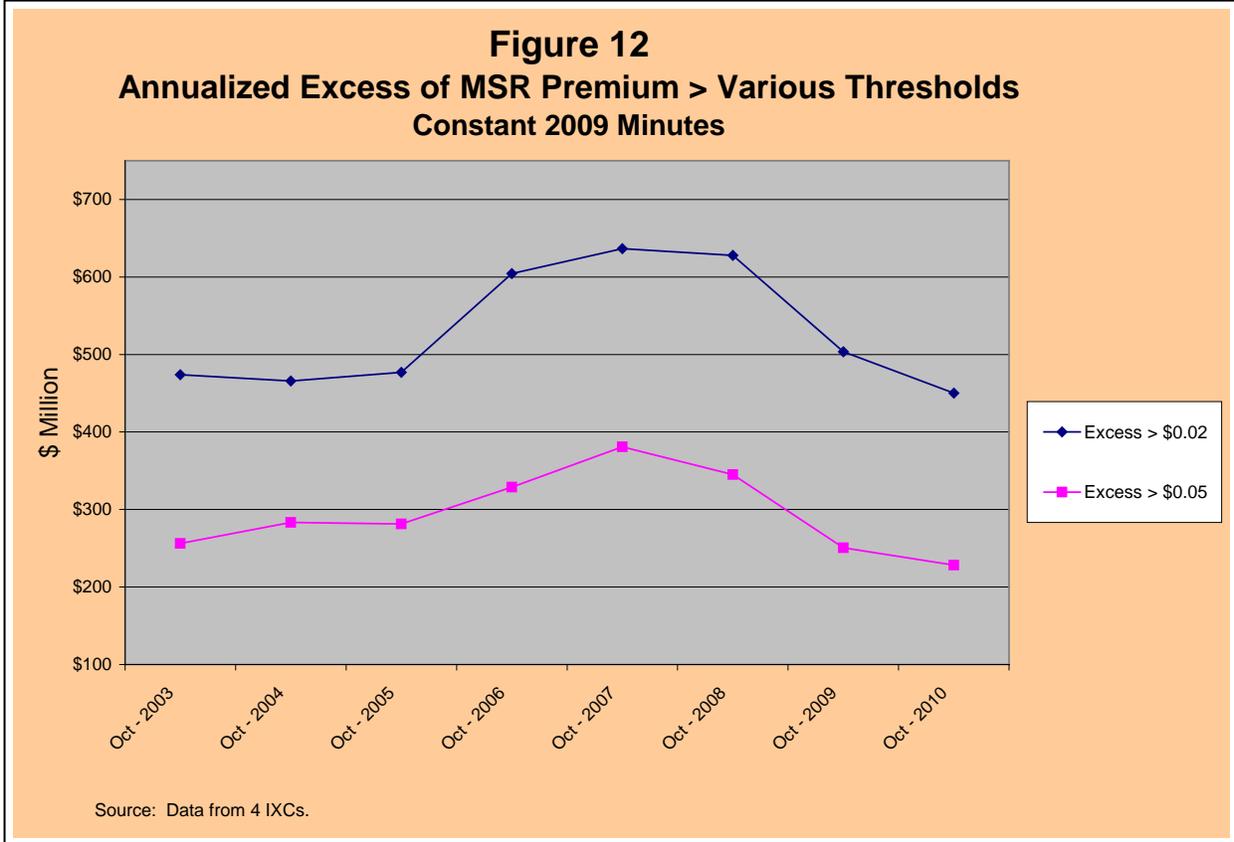
**B. Estimates of the Percentage of U.S. Mobile-Terminated Traffic with Potentially Above-Cost MSR Premiums**



**Figure 11** shows the percentage of U.S. mobile-terminated traffic charged above the \$0.02 and \$0.05 MSR premium thresholds discussed in the previous subsection. The percentage of traffic above the \$0.05 threshold grew from 24 percent in 2003 to a peak of 43 percent in 2006. It then remained at a plateau of about that level through 2008, and decreased to 31 percent in 2010. The percentage of traffic above the \$0.02 threshold grew from 50 percent in 2003 to a peak of 57 in 2008, and then decreased to 49 percent in 2010.

The trends of the percent of traffic with MSR premiums above the \$0.02 and \$0.05 thresholds have the same general shape as the trend of the world average MSR premium in **Figure 8**, albeit with some statistical variation.

C. Estimates of Additional Annual Costs Due to Potentially Above-Cost MSR Premiums



**Figure 12** shows estimates of additional annual costs due to potentially above-cost MSR premiums. These additional annualized costs were calculated by (1) identifying each country with MSR premiums greater than the threshold (either \$0.02 or \$0.05); (2) calculating the amount by which the MSR premium of each such country exceeded the threshold; and (3) multiplying that excess by the annualized number of U.S. minutes terminating on mobile networks in each such country.

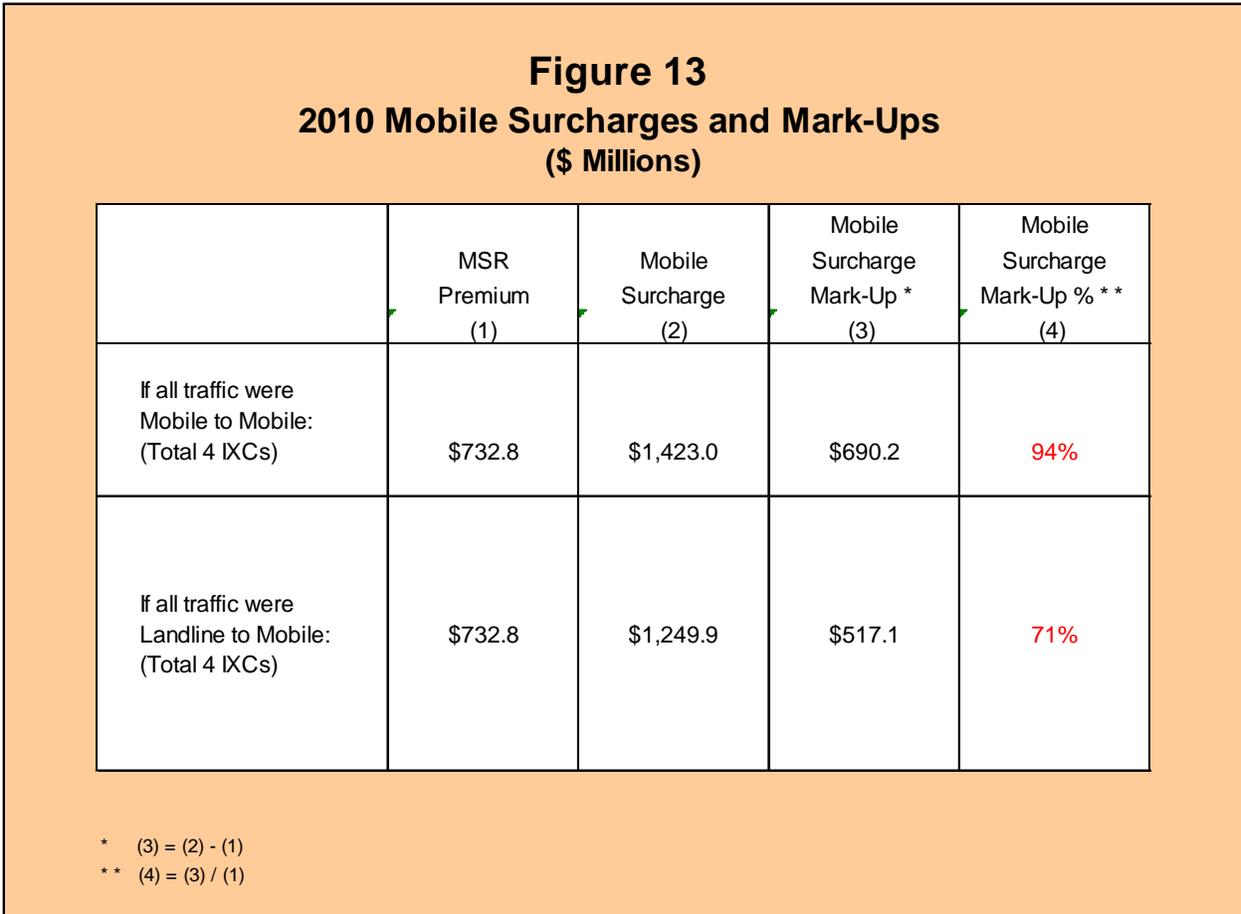
As calculated, MSR premiums above \$0.05 resulted in \$228 million in above-cost payments by the reporting carriers in 2010, down from peak of \$381 million in 2007. The \$228 million in above-cost payments represents 8.0 percent of the reporting carriers’ total annualized settlement payments of \$2,868 million.<sup>43</sup>

MSR premiums above \$0.02 resulted in \$450 million dollars in above-cost payments by the reporting carriers in 2010, down from peak of \$636 million in 2007. The \$450 million in above-cost payments represents 15.7 percent of the reporting carriers’ total annualized settlement payments. The trend lines of

<sup>43</sup> The \$2,868 million amount is calculated by multiplying the reporting carriers’ mobile and fixed-line settlement rates in October 2010 by their mobile and fixed-line minutes of use, respectively, for the base period October 2009, and annualizing the amount by multiplying by 12.

above-cost payments in **Figure 12** have the same general shape as the trend of the world average MSR premium in **Figure 8**.

**IX. MOBILE SURCHARGES AND MARK-UP OF MSR PREMIUMS BY U.S. CARRIERS**



**Figure 13** shows MSR premiums paid by the reporting U.S. carriers in 2010, as well as mobile surcharges and mobile mark-ups under two different measurement assumptions, described below.

On most routes, U.S. callers pay a per-minute *mobile surcharge* to U.S. carriers for calling a foreign mobile phone, in addition to the regular international calling rate. The mobile surcharge reimburses the U.S. carrier who must pay the MSR premiums. (The regular international rate is set to recover the fixed-line settlement rate only.) U.S. carriers typically mark up MSR premiums, sometimes substantially, in passing them on to U.S. callers as mobile surcharges, thus adding to the charges that U.S. callers must pay. The mark-ups vary widely by carrier and route. Also, some U.S. carriers charge different mobile surcharges for their own wireline and wireless customers. **Figure 13** shows the percentage amount of the mark-ups and the dollar impact of mobile surcharges on U.S. callers, based on aggregate data from the four reporting U.S. carriers.

In order to estimate mark-ups, the staff compared the MSR premium that carriers paid on each route to the mobile surcharge posted on their websites for that route. To get the average mark-up, the staff then multiplied the results by the amount of mobile-terminated minutes the carriers reported for each route.<sup>44</sup>

<sup>44</sup> To make the calculations, the staff used the most recent MSR premium data, for October 2010. Mobile surcharge data for 2010 were not available in all cases, and in such cases the staff used mobile surcharge data in effect in 2011 (continued....)

Because some carriers set different mobile surcharges for mobile and landline customers, and for different calling plans, and because the staff did not know the traffic volumes for each type of customer or plan, it was only possible to calculate the dollar amount of mobile surcharges and the percentage mark-ups within a range. **Figure 13** displays the dollar amount of mobile surcharges and percentage mark-ups in two ways: (1) assuming that all U.S. traffic terminated by the reporting carriers on foreign mobile networks originated on U.S. mobile phones served by the reporting carriers; or (2) assuming that all U.S. traffic terminated by the reporting carriers on foreign mobile networks originated on U.S. landline phones served by the reporting carriers.<sup>45</sup> For mobile to mobile, the average mark-up of mobile surcharges over MSR premiums is 94 percent.<sup>46</sup> For landline to mobile, it is 71 percent. As displayed in **Figure 13**, mark-ups would have transferred approximately \$517-\$690 million annually from U.S. consumers to the reporting U.S. carriers if the reporting carriers had sold service directly to consumers. By any measure, mark-ups comprise a substantial amount of the mobile surcharges paid by U.S. callers. The staff does not know whether the mark-ups charged by the four reporting U.S. carriers are representative of other U.S. carriers.

Figure 13 reflects a weighted average of the four reporting companies for all foreign routes for which data are available and for which mobile and fixed settlement rates differ. As noted above, mark-ups vary widely among routes and among the reporting carriers. Individual reporting carriers may have mark-ups substantially below or above the average. Due to requests by the reporting carriers for confidential treatment of their data, this report does not disclose mark-ups for individual reporting carriers.

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or January 2012. The staff's research indicates that carriers do not frequently change their mobile surcharges, and that mobile surcharges in effect in 2011 and January 2012 were either the same as for October 2010 or sufficiently similar as to be adequate proxies for October 2010. To calculate the dollar amounts, the staff used 2009 traffic volumes.

<sup>45</sup> In order to estimate the dollar amount of mobile surcharges paid by customers, several simplifying assumptions were necessary. The staff assumed that the mobile surcharges listed on each reporting carrier's website apply to all its mobile-terminated traffic, although the reporting carriers sell a substantial portion of their traffic to resellers under wholesale arrangements rather than to retail consumers. Also, where a carrier had more than one schedule of mobile surcharges for mobile or landline phones, the schedule for its flagship calling plan or prepaid calling service was used.

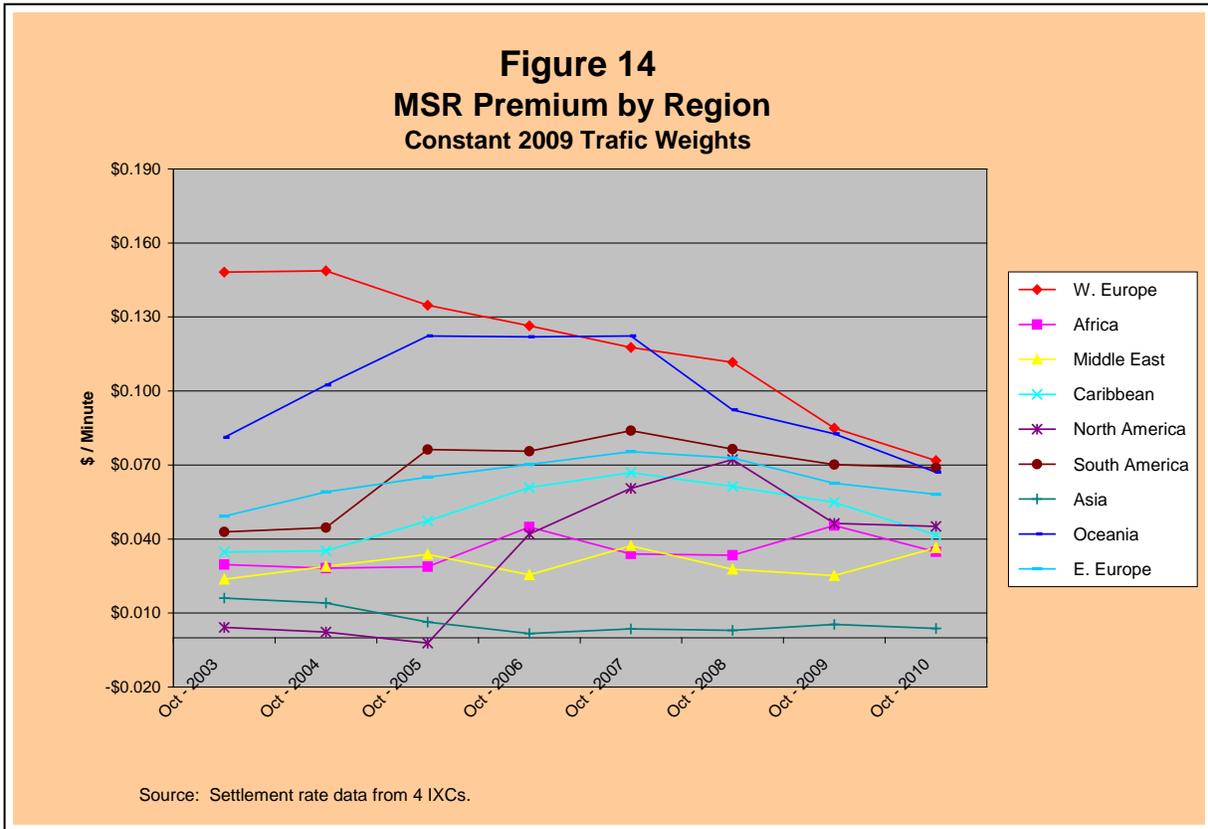
<sup>46</sup> This figure is a weighted average for all four reporting carriers. To ensure confidentiality of individual carriers' data, mark-ups for individual reporting carriers are not included in this report, although they vary substantially.

## X. REGIONAL AND COUNTRY FINDINGS

The following charts provide more detailed information on each region as well as additional country-specific information. Our main findings are:

- The MSR premium by region is much more varied and volatile over time, than the world average. See **Figure 14**.
- Except for Asia, regional MSR premiums converged by the end of the study period to a range of \$0.03-\$0.07. Asia's MSR premium has been uniformly low, at \$0.01 or less, during the entire study period.
- Western Europe, a highly developed region, economically, had higher MSR premiums than any other region over the entire study period. Oceania, another highly developed region, was a close second.
- In Western Europe, and to a lesser degree in some other regions, efforts by foreign regulators have helped push down mobile termination rates and MSR premiums substantially.
- As discussed earlier, many individual countries have MSR premiums greater than \$0.05. The largest of these countries by traffic are listed in **Figure 15**.
- As discussed earlier, the relative distribution of mobile-terminated traffic among countries and regions has changed substantially over the eight years of the study period.
  - **Figure 16** presents side-by-side 2003 and 2009 comparisons of the relative volume of U.S. mobile-terminated traffic for each of the world regions, showing a major shift in traffic from Western Europe to Asia.
  - **Figure 17** lists the top countries by mobile-terminated traffic. Four of the top ten countries in 2003 were no longer among the top ten in 2010.

**A. MSR Premium Trends by Region**



**Figure 14** shows regional average MSR premiums over time. The staff calculated regional average MSR premiums using the same method that it used for world average MSR premiums – constant 2009 weights based on mobile-terminated minutes for each country. As **Figure 14** shows, the regional MSR premium trends are much more varied, and volatile over time, than the world average trend. (Compare **Figure 14** to **Figure 8**.)

Each region has its own distinctive history with regard to MSR premiums and government regulation of MTRs. Several regions – Oceania,<sup>47</sup> South America, the Caribbean, Eastern Europe, and North America – exhibit the same upside-down “U” shape as that of the world-average trend and for the same reason: Gradual imposition of above-cost MTRs by mobile networks, followed by government efforts to reduce such charges. Of this group, Oceania had the highest MSR premiums for most of the study period, followed by South America.

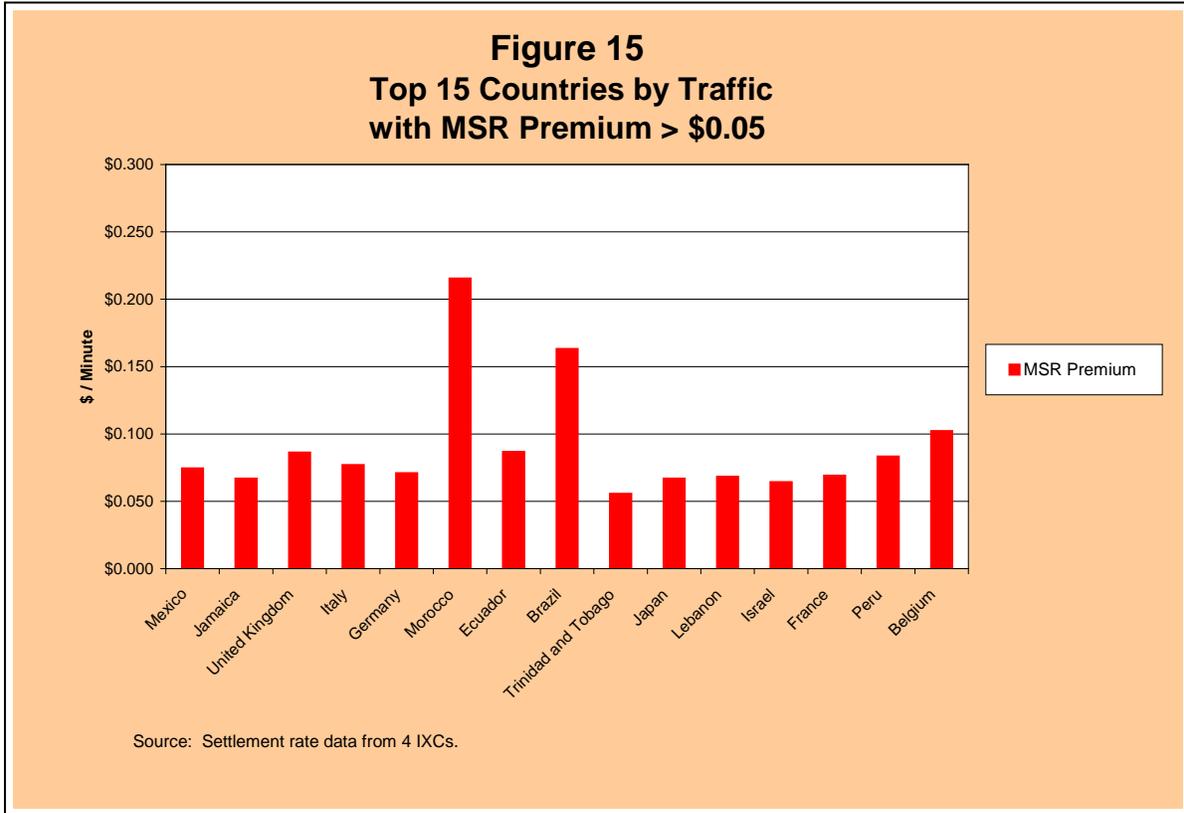
Several regions do not exhibit the upside-down “U” shape of the world-average trend. Western Europe starts from a very high level and decreases monotonically over time. Mobile networks in Western Europe apparently established very high MTRs before the study period. With fixed settlement rates among the lowest in the world, the result was very high MSR premiums in the early years of the study period. Over time, however, Western European governments began actively regulating MTRs, and MSR premiums decreased sharply (before decreases began to occur in most other regions), although they remain the highest of any region. MSR premiums for Africa, the Middle East, and Asia, on the other

<sup>47</sup> Oceania is composed primarily of Australia and New Zealand. Philippines and Indonesia are included in Asia.

hand, remained relatively steady over the period, with MSR premiums in mid-range (Africa and the Middle East) or low-range (Asia). For these countries, there is not much difference between fixed and mobile termination rates or settlement rates, and governments have not been as active in reducing MTRs or MSR. As will be shown in subsequent charts, in Africa and the Middle East, both fixed and mobile rates are relatively high, but in Asia, both fixed and mobile rates tend to be at low, cost-based levels. Either pattern – fixed-line and mobile settlement rates both high or both low – will result in a low MSR premium, since the MSR premium is the difference between the two types of settlement rates.

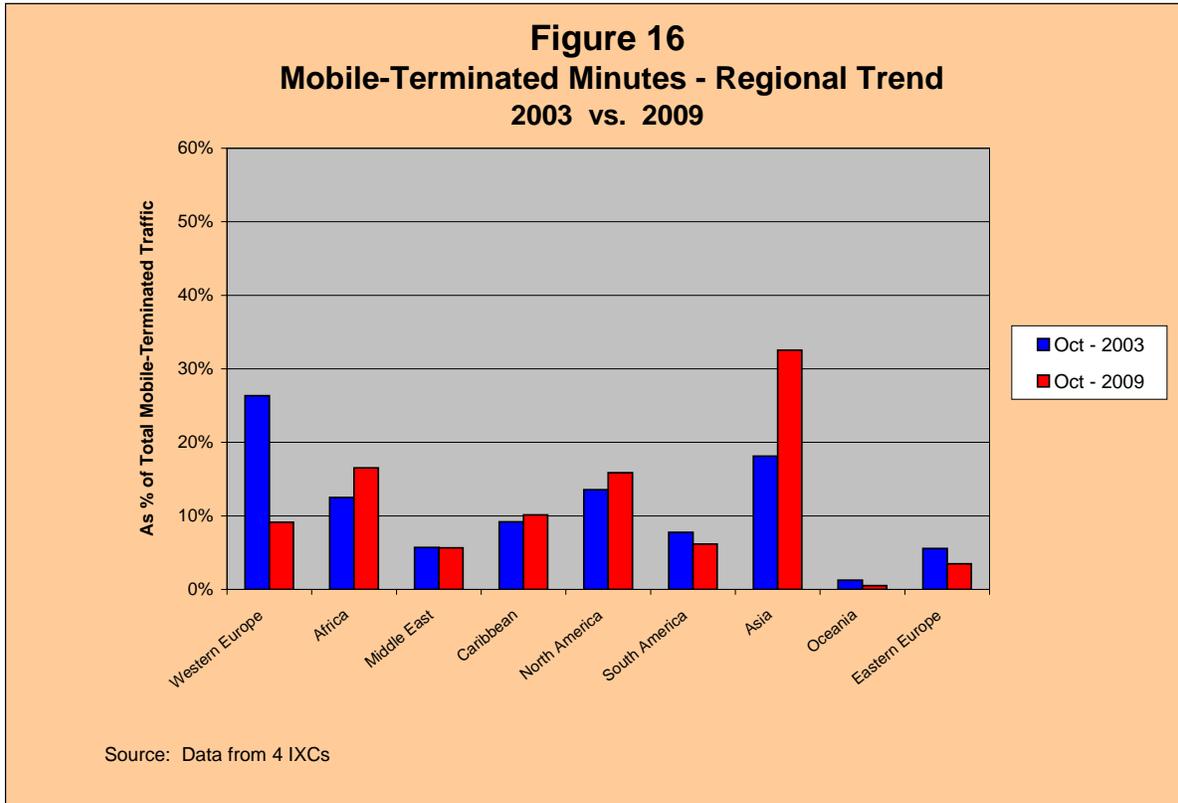
Interestingly, many of the regional trends, starting from high or low levels, appear to be converging toward a mid-range between \$0.03-0.07 over time. This may represent a common view of many national regulators that MSR premiums in this price range are acceptable.

**B. Large Routes with Above-Cost MSR Premiums**



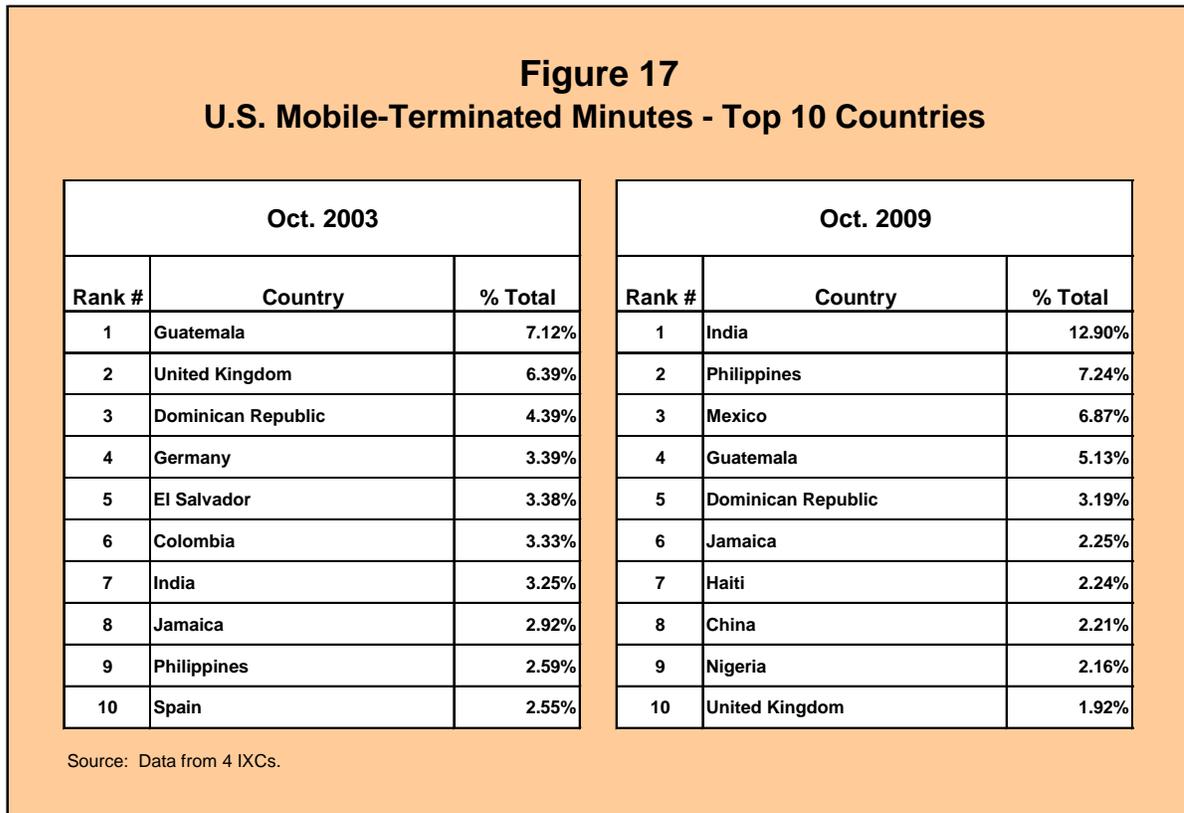
**Figure 15** shows the top 15 countries by traffic that had MSR premiums above \$0.05. The staff sorted all 212 routes by the volume of mobile-terminated traffic in October 2010 (as reported by the four U.S. carriers in our study) and identified the first 15 countries by traffic volume with an MSR premium over \$0.05, a threshold for potentially above-cost MSR premiums. The results are displayed in **Figure 15**. Note that there were many countries with less traffic that had higher MSR premiums than those displayed in **Figure 15**. The staff focused on the top routes by traffic volume, because such routes are the ones that would affect U.S. consumers the most. Note that five of the 15 routes identified are in Western Europe, which has had the highest MSR premiums of any region throughout the study period.

C. Regional Trends in Mobile-Terminated U.S. Traffic



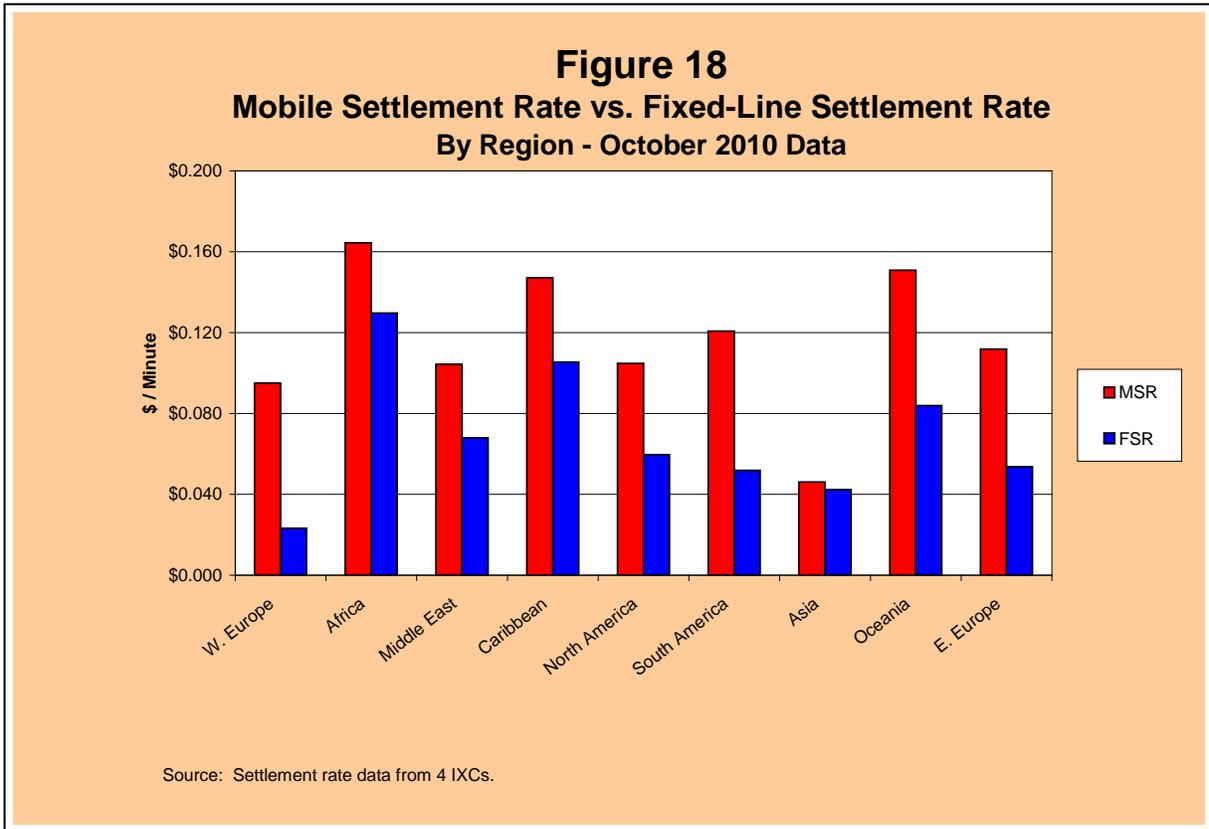
**Figure 16** reprises the data displayed in **Figure 5** and **Figure 6** and shows the regional distribution of mobile-terminated traffic in 2003 and 2009. The difference between **Figure 16** and the earlier charts is that **Figure 16** presents the 2003 and 2009 data for each region side-by-side for easy comparison. It is clear from the chart that the global development of mobile networks in recent years has had a major impact on whom U.S. callers call. Relative calling to Western Europe has markedly decreased as calling to Africa, the Caribbean, North America, and especially Asia has increased.

**D. Country Trends in Mobile-Terminated U.S. Traffic**



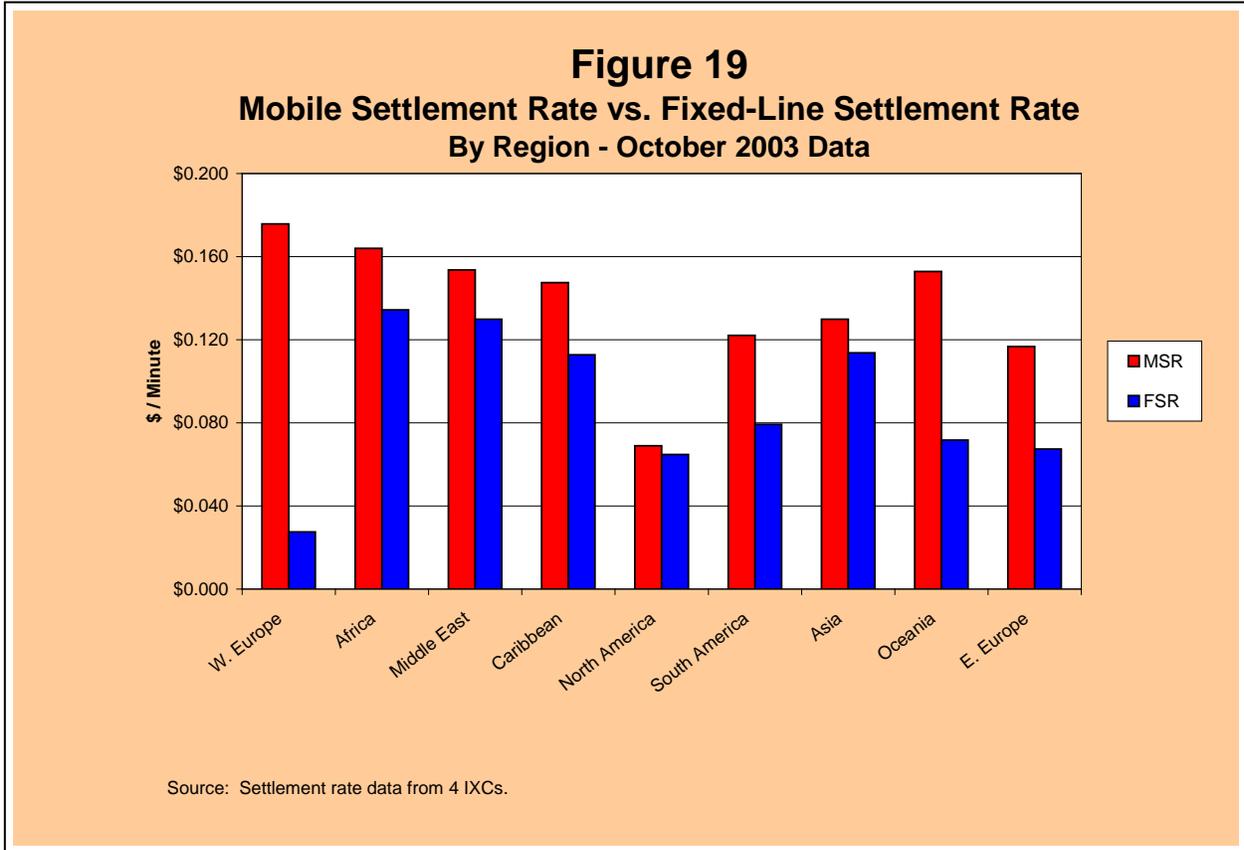
**Figure 17** identifies the 10 countries in 2003 and 2009 with the greatest percentage of U.S. mobile-terminated minutes. **Figure 17** displays country-specific data, in contrast to **Figure 16**, which displays regional data. **Figure 17** reinforces our finding in **Figure 16** that the identities of foreign mobile networks called from the United States have changed dramatically in relative importance over the study period. Only six of the top 10 countries in 2009 were on the list in 2003, and the United Kingdom is the only European country on the 2009 list. India and the Philippines greatly increased their relative percentage of mobile-terminated traffic over the study period. Mexico appears in third place on the 2009 list although it was absent in 2003. This is because Mexico did not introduce separate fixed-line and mobile settlement rates until after 2003 and so mobile-terminated traffic was not separately identified by U.S. carriers at that time.

E. Country-Specific Comparison of Fixed-Line and Mobile Settlement Rates for 2010



**Figure 18** displays the fixed-line and mobile settlement rates underlying the MSR premium for various regions, based on 2010 settlement rates. The MSR premium is the difference in height between the red and blue bars. In 2010, Western Europe had very low fixed termination rates and moderate mobile settlement rates (compared to other regions), resulting in a high MSR premium. Africa, in contrast, had substantially higher fixed and mobile settlement rates, but the difference between them was less than the difference for Western Europe. Thus, Africa had lower MSR premiums than Western Europe and the extra cost of calling mobile networks in Africa was much less than that of calling mobile networks in Western Europe. Asia had relatively low fixed and mobile settlement rates, resulting in an almost zero difference between them. Therefore, the extra cost of calling mobile networks in Asia was very low.

**F. Country-Specific Comparison of Fixed-Line and Mobile Settlement Rates for 2003**



**Figure 19** replicates **Figure 18**, but for 2003. By comparing the two charts, it is possible to analyze changes in the level of MSR premiums over time as the result of underlying changes in the level of fixed-line and mobile settlement rates. For instance, comparison of the two charts indicates that Western Europe’s MSR premium decreased over the study period because its mobile settlement rate decreased substantially, and its fixed-line settlement rate held steady. The Middle East’s MSR premium increased slightly over the study period because both its fixed-line and mobile settlement rates decreased over this period, with the fixed-line settlement rate decreasing slightly more. North America’s MSR premium increased over the study period, because its mobile settlement rate increased, and fixed-line settlement rate remained about the same. Asia’s MSR premium decreased to almost zero by 2010, because both its fixed-line and mobile settlement rates decreased substantially, with the mobile settlement rate only slightly higher than the fixed-line settlement rate.