Inter-American Roaming

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"Inter-American Roaming"
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For the conference on "Universal Personal Communications:
Achieving Global Connectivity through Wireless"
Columbia University Graduate School of Business
New York, N.Y.
May 13, 1994

Roaming is a vital part of cellular service because it allows customers to make or receive calls at any time, from any place. The typical subscriber is not concerned with the artificial boundaries of a carrier's cellular service area -- he just wants to complete the call. This is a primary reason why roaming is a big business for carriers, but it also imposes upon carriers the responsibility to provide roaming service that is top-quality and transparent to the customer.

In addition to its European GSM cellular operations, BellSouth operates cellular systems across the United States and in Argentina, Chile, Venezuela and Uruguay. The company's vision is to provide its customers with seamless inter-American roaming. Many interim steps must be taken to reach this goal, and these steps include the cooperative actions of carriers and regulators throughout the Americas, as I will describe in this paper.

As BellSouth's Director of Operations for Latin America, my job is to focus on the establishment of roaming to the U.S. for all of BellSouth's affiliated carriers and to assist these carriers in implementing roaming agreements with other carriers in the Latin American region. My observations are based on experience with Latin American companies establishing roaming arrangements.

U.S. cellular customers obviously understand the value of roaming. Roaming has been particularly well-received in the U.S. As reported by the Cellular Telephone Industry Association (CTIA), in the three years from June 1989 to June 1992, the percentage of subscribers who roam increased from 8.9 percent to 12.0 percent. The largest single six-month increase occurred in the last half of 1991 when the figure reached 13.2 percent.

Roaming has a very positive impact on a carrier's revenues. The roaming market in the U.S. for 1991 was about $703 million, about $974 million for 1992 and $1.4 billion in 1993. In the last six months of 1993 alone, roaming revenues increased 32 percent to a record $774 million. The U.S. cellular industry now derives about 13 percent of total subscriber revenues from calls made while roaming. The trend has been one that has continually increased since CTIA began tracking this data in 1989.

There are also, without question, a lot of areas in which customers can roam. There are 1,529 cellular systems in the U.S. alone, composed of more than 12,800 total cell sites. That's an indication that there are a lot of calls being handed off.

According to visa entry figures supplied by the U.S. Department of Commerce, one indicator of the inter-American roaming market potential can be the fact that more than two million people traveled to the U.S. from South American countries in 1993 – and more than 321,000 of them were classified as business travelers. More than 1.5 million people traveled from Mexico to the U.S., with 316,000 of them classified as business travelers. Another 537,000 travelers from Central American countries came to the U.S. in 1993, with 117,000 of them classified

as business travelers. It is reasonable to assume that a significant percentage of the business travelers own or have access to cellular phones, which gives you an idea of the potential market for roaming.

Another indicator of the inter-American roaming market potential can be deduced from international telephone calling profiles as shown in a recent study of the Latin American cellular market by Economic Management Consultants International, Inc. (EMCI). In Argentina, for example, the largest percentage of international long-distance calls are placed to the U.S. This is also true of Brazil, Colombia, Chile, Costa Rica, Ecuador, Honduras, Mexico, Panama, Peru and Venezuela. In some of these countries, as many as 70 percent or 80 percent of international long-distance calls are placed to the U.S.

In data published by the World Tourism Organization it can be seen that travel between countries is on the increase. As an example, Costa Rica had an increase in tourism from 'the Americas' of 20 percent from 1991-92, while Honduras showed an 8 percent increase, Argentina registered a 3 percent increase, Colombia a 25 percent increase and Brazil a 29 percent increase. Travel from Peru to Chile increased 16% while the reverse travel shows a rise of 48%.

The EMCI study also indicates that the growth of cellular in Latin America has been even more dramatic than in the U.S. A sample of the growth rates from 1992 to 1993 show Brazil with 509%, Argentina at 146%, Venezuela at 100%, Peru with a 67% growth, Chile at 38%, and Mexico with 32%. In the U.S. cellular markets, by comparison, the growth rate ranges from 35 to 45 percent annually. The total cellular subscribers for all Latin American countries combined was only 1,000 in 1988. This grew to more than one million subscribers by 1993, and is projected to

increase to more than six million subscribers by 1998. The 1993 distribution of these subscribers reveals that Mexico with 39% is the largest, followed by Brazil with 19%, Venezuela with 17%, Argentina with 11%, Chile with 9%, and the remaining 5% distributed among the others.

The study stated that in most cellular markets today in Latin America, roaming minutes account for less than 5 percent of total use. However, as seen from the total expansion of the cellular markets, it is anticipated that international roaming will certainly increase, especially if we are able to overcome many of the existing barriers to roaming that exists today. With implementation of NAFTA-type agreements, the American hemisphere will certainly become a tighter entity with more business development and trade, resulting in more business travel and more requirements for roaming. Additionally, Latin American subscribers use their cellular phones more often, and in a wider range of circumstances, than U.S. customers. In Latin America, more than 80 percent of cellular phones are handheld and more than 90 percent are either handheld or transportable – which is contrary to the U.S. situation, where many phones are car-mounted. A new roaming study is being sponsored by ALACEL, the (Asociación Latinoamerica de Telefonía Celular). ALACEL is a trade organization for the Latin America region whose goal is to unite the efforts of companies, associations and entities involved in the cellular industry. ALACEL represents 40 operators in 30 countries.

Cellular licensing in Latin America falls under three major categories: nationwide monopolies, where only a single nationwide license is issued (Bolivia, Nicaragua, El Salvador, Paraguay and Guatemala); nationwide competition, where more than one national license is issued (Ecuador, Costa Rica, Panama and Venezuela); and regional licenses that are issued according to geographic market

areas (Argentina, Brazil, Chile, Colombia, Mexico and Peru). Many of the licenses are issued to the national telephone companies. For those licenses issued to non-governmental entities, local companies or individuals generally are a part of the partnerships. Many foreign companies form joint ventures with the local entities to secure the license. Of the non-Latin companies, most are from the U.S. and are associated with the U.S. cellular market, notably BellSouth, Southwestern Bell, Bell Atlantic, Motorola, GTE, AT&T, and McCaw. Telefonica (Spain), Millicom (U.K.), and Comvik (Sweden) are also involved in the Latin American market.

In an effort to validate the desire for roaming from Latin America to the U.S. markets, I have tracked those markets where roaming has occurred, from the last half of 1992 to the present, by customers from the BellSouth-affiliated companies in Argentina, Uruguay, and Chile. In addition to the U.S., these customers have traveled to Canada, Hawaii, Puerto Rico, Mexico, and the Bahamas. These locations are served by more than 35 different cellular carriers.

For many Latin American customers, the cellular phone is the primary means of communication and is carried wherever the customer goes, whether at home, to work, or to a restaurant. Latin Americans depend upon cellular in a way that closely resembles a PCS (or Personal Communications Service) style of telecommunications. Roaming would appear to be a natural extension of this heavy usage trend. Add to that the tremendous flow of people among Latin American countries and with the U.S., and the potential for roaming becomes readily apparent.

Before discussing some of the issues associated with roaming, it would be useful to review how roaming can be provided and how each method of roaming

can be utilized. Roaming can be handled in many ways, with some companies making local variations to these basic methods. described herein.

The preferred method is "Automatic" roaming that allows the user to move between different carrier systems with no need to make advance arrangements. The phone works in one system as easily as in another. This method utilizes the services of one of the two U.S.-based clearinghouses. The roamers are validated as they move between systems and the financial settlements are handled by the clearinghouse.

In a "semi-automatic" arrangement used by some Latin American carriers, the roamer must obtain, in advance, a temporary number from the system where he will be roaming. That number is obtained from the customer's home carrier through an agreement with the serving carrier in the system where the customer will be roaming. Under this arrangement, the two carriers exchange billing data, and the home carrier bills the roaming charges to the subscriber. Roaming can take place in both directions between the carriers.

The "BellSouth Semi-Automatic" arrangement is currently used between three of the BellSouth Latin American carriers and BellSouth Mobility Inc (BMI) in the United States. This provides one-way roaming from the Latin American carriers to the U.S. by utilizing BMI numbers, which provides access to all major U.S. markets. BMI bills the carriers, who in turn bill their subscribers.

"Credit card plus" is a variation of the credit card arrangement, except that the home carrier will pre-assign a temporary number from a block of numbers of the serving carrier and will notify the serving carrier by fax of the numbers and all

pertinent information on that subscriber, including the credit card information. However, the subscriber still must go to the serving carrier office upon arrival and sign the credit card voucher, allowing all charges to be billed directly to the credit card instead of to the home carrier.

"Credit card" roaming is the most basic of roaming methods, requiring no prearrangements by the roamer. The roamer simply uses a credit card in the foreign market for all charges that are applicable. In most Latin American countries, the roamer must go to the foreign cellular carrier's location to sign a credit card voucher in the presence of an employee. Currently, the only known use of this arrangement is for roamers from the U.S. coming into a Latin American market.

Each of these methods is used in the markets served by BellSouth throughout the Americas. For example, in the U.S., BellSouth Mobility provides automatic roaming in more than 1,300 U.S. cities to its 1.3 million subscribers. In Argentina, a subscriber of the Movicom affiliate can roam to Uruguay or Chile by using the semi-automatic method. Roaming to the U.S. (including Canada, Hawaii, Puerto Rico and selected markets in Mexico) is accomplished by using the BellSouth semi-automatic arrangement. Roaming to Brazil and Paraguay is achieved by using the credit card plus arrangement.

Cidcom subscribers in Chile can roam to Movicom in Argentina or into any part of Chile served by other carriers by using the semi-automatic method. By using the credit card plus roaming, customers can roam to Paraguay, Peru, Uruguay, and Venezuela. Roaming to the U.S uses the BellSouth semi-automatic arrangement.

Customers from the BellSouth affiliate in Uruguay can roam to Argentina

and Chile using the semi-automatic method, or to the U.S. with the BellSouth semi-automatic method. They can roam to Brazil and Paraguay using the credit card plus method.

Customers of the Venezuelan carrier, Telcel, also can roam to Peru and Chile using the credit card plus arrangement. Roaming in the U.S. utilizes a special modification of the BellSouth semi-automatic arrangement.

With the exceptions of the inter-carrier roaming within Mexico and the roaming between Argentina and Uruguay, the majority of roaming today occurs from the Latin American carriers to the U.S., so the major portion of roaming revenues go to the U.S. carriers. Because there is no agreed-upon, documented method for using roaming in Latin America, there is no coordinated effort to inform the U.S. carriers of roaming capabilities in Latin American countries. Through the efforts of ALACEL , it is hoped this will change in the near future.

As a way to promote roaming from the U.S. to Latin America, I proposed to the board of directors of ALACEL, and they proposed to their members, that each carrier agree to accept credit card roaming. Each carrier would also provide a uniform number for roamers to contact for service upon arriving in the market. ALACEL could notify all U.S. carriers of this roaming agreement and could even advertise this arrangement in such publications as airline magazines. Implementation of this plan will not be accomplished quickly, but it is important to make a start.

Although the cellular industry is making progress in the area of roaming, there is a lot of ground to cover before the goal of true Inter-American roaming can

be accomplished. Several key issues must be confronted.

Taxes are one of the biggest governmental issues. A customer's home country may apply a tax on roaming calls even though the service was delivered outside the country. This will certainly affect roamer agreements, because the billing carrier must include this tax as part of the bill to the home carrier. Customs can be involved, as well. Some countries may require the use of a domestically manufactured handset, which means that an international roamer may not be allowed to use his own equipment in that country. Customers also might need some type of purchase documentation so that phones can clear customs upon re-entry. These items must be addressed in roaming agreements.

Technical factors also come into play. Customers need to be aware of voltage differences in order to recharge batteries and travel with the right kinds of adapters. Variations in dialing plans among carriers must also be considered as subscribers travel between countries. Again, this is an item that should be stipulated in roaming agreements. And, of course, billing is affected. In what currency will billing be made? Will exchange rates be based on the day the call was made, or the billing date? Will all Latin American countries agree to the use of the U.S. dollar as the currency in their roaming agreements with the U.S. carriers? This monetary exchange may be more of a problem in agreements between certain Latin American countries, where neither country uses the U.S. dollar.

Perhaps most important of all are the cultural factors. Roaming often requires a subscriber to interact with the carrier where he is roaming to ask questions and receive instructions. Customer care for roamers will be very difficult unless carriers make it easy to reach a customer service representative who speaks

the same language as the roamer.

These same factors, plus some others, also define the challenges faced by carriers. First, carriers must address the billing challenge. All carriers on the American continent should move to the use of the CTIA CIBER (Cellular Industry Billing Exchange Record) record. When it comes to billing, carriers must all speak the same language.

Another key step is the establishment of a clearinghouse function that allows billing to be routed efficiently, promptly, and accurately back to the home carrier. Carriers can make net settlements with each other covering all roaming minutes in a single transaction, and, through the use of an international bank, eliminate the problem of currency exchange.

There are more than 1,500 systems and 300 carriers in the U.S. today. Latin American roamers, like U.S. roamers, find it difficult to understand the U.S. cellular systems because they operate in many different ways, and the billing varies among the operators. Because of the complexity of the bills issued by U.S. carriers, some Latin American carriers are considering simplifying the billing to their customers by increasing the per-minute rate to include such miscellaneous charges as busy/no answer, landline, and roaming location activation and deactivation.

One area in which I have worked extensively with our companies in Latin America and a major economic challenge that must be addressed is fraud prevention. Although at this time there are no estimates on fraud in Latin America, in the U.S. cellular fraud is thought to exceed one million dollars per day. Carriers must know that a roaming customer is in good standing with the home

carrier so that payment is assured. Specifically, a carrier needs to be able to validate a subscriber's ESN, or Electronic Serial Number, and the Mobile Identification Number (MIN), his assigned cellular number. The fastest and surest method is automatic, on-line validation.

Another validation method used by some Latin American carriers is semi-automatic validation, in which carriers periodically exchange switch data. Semi-automatic validation works well as an interim step, but as calling volumes grow, it will have a difficult time keeping pace and it will not be accepted by U.S. carriers for validating roamers. As in the U.S. today, use of a recognized clearinghouse will be a requirement for all roaming agreements with U.S. carriers.

Prior to 1993 in the U.S., most validation of roamers was accomplished on a "post call" basis where the MIN/ESN was verified to the "home" switch following the first call. The "serving" switch recognized that the roamer had not been validated, so a validation request was forwarded to the "home" switch. This condition allowed for "tumbling" fraud, which was caused by having the cellular phone modified to tumble the MIN/ESN after each call, making the combination look like a new roamer to the serving switch. With the implementation of IS-41 in 1992, "per call" validation became possible and eliminated this type of fraud. However, as with most new technologies, this comes with a large price tag, so some of the smaller carriers have not been able to install this feature.

IS-41 is a standard for exchanging subscriber and call information between different cellular systems. As a means of preventing fraud, IS-41 allows a carrier with one type of switching equipment to exchange information quickly with a carrier who may use another kind of equipment. By using this technical standard

on both ends, a system in which a customer is roaming can check a MIN/ESN combination with the customer's home carrier within a matter of seconds. This pre-call validation can be handled so quickly that if a customer supplies an invalid MIN/ESN combination, the network will not set up the call. For IS-41 to work, of course, both of the switches involved must be equipped with IS-41 software.

With the implementation of IS-41, cellular defrauders looked for a new way to defraud. This resulted in the "cloning" of cellular telephones. With a small investment today, a defrauder can make his cellular telephone appear to the switch as if it belongs to a valid user (either a local or roaming user). Cloned telephones are used in two different types of fraud – "call sell" and "no bill" arrangements.

In one variation of "call sell," a defrauder will offer calls (usually international) to individuals using a cloned telephone, and the real customer will receive a surprisingly large bill for the month. Generally, this operation takes places in low-income areas where the residents may not even have a landline telephone. The other type of call sell involves using two telephones and three-way conferencing to bridge two parties from different countries together. This first started because of restrictions on Arabs communicating with Israelis. The two governments forbade calls between Arab countries and Israel, so a Palestinian-born American entrepreneur by the name of Frank Amigo decided to take orders in these countries for calls, and have the calls bridged in one of the cellular markets. These operations typically run 18 hours a day for about four to five days, so the bill for the cellular calls is astronomical.

In another type of operation, a defrauder will clone a number of phones and sell them locally as "no bill" phones – the buyer will not receive a bill, but the true

cellular subscriber will get the bill for all airtime and toll charges.

Several software manufacturers have programs to monitor cellular subscriber usage and report abnormal usage patterns to detect cloning fraud. This works very well in the local market, but is more difficult when roaming is involved. These software packages are very sophisticated and very expensive.

It is projected that in the U.S., about 50 percent of all cellular lines will be equipped with IS-41 by the end of 1994. Carriers in Mexico have installed IS-41 in their networks, and a few other Latin American carriers (including Cidcom Celular and Telecom of Chile) have begun to install this feature.

Most large carriers in the U.S. have installed IS-41 for pre-call validation and many have either installed or are testing the cloning software. I am aware of "call sell" operations in several Latin American countries and "no bill" operations in several others. Tumbling became a big problem in Mexico, so IS-41 was installed to alleviate that situation, but I have every reason to suspect that cloning is now the fraud of choice in Mexico.

International dialing, which often is involved in roaming, increases the need to be alert to fraud. Most U.S. carriers require all international calls by roamers to go through an operator with an international calling card number being supplied. This presents a big problem because a Latin American roamer might not have such a card. BellSouth's Latin American roamers are currently using a couple of different arrangements that allow the roamers to use an international credit card (Visa and Master Card) to bill international calls. The reverse of this condition is true if a Latin American carrier restricts international dialing from their country -- the U.S.

roamer may not have a way to call home since the U.S. interexchange carrier calling cards are not recognized in some countries. This is a consideration that should be taken into account in the roamer agreements. Additionally, agreements should include a list of the country codes used for international dialing and a listing of all national dialing codes that might be used by the roamer.

Our third area of challenge is technical compatibility. Agreements must be in place between carriers to assure that interconnection of systems can occur. This is the basic criteria for a seamless network where the customer does not have to anticipate a call being dropped as he moves among the various systems. A major step toward alleviating interconnection problems will be the implementation of IS-41 and Signaling System 7 (SS7) technical standards to enable calls to be handed off between systems, but this will take time to implement, especially on an international scale.

Our technical people also must deal with the fact that dialing plans and numbering plans might cause problems between two countries. This is a government issue, too, of course. If the country and city codes of a Latin American market duplicate the NPA codes of the U.S., the system won't know how to bill the call. Various worldwide standards organizations are reviewing this issue. Also, as new technology is introduced (E-TDMA, CDMA, N-AMPS, etc.) the carrier must be aware of any impact on customers that roam (the phone may not function as the roamer moves between systems with varying technologies).

Roamer locating presents both technical and cultural dilemmas. In most systems, for a roamer to have calls reach him in another system, he must take one of two actions. One method is to activate a dynamic roaming mechanism when

moving into the new system, in which case calls automatically find the subscriber in the new system. This mechanism is not uniform throughout the U.S. and must be re-activated each day and each time the customer moves out of one system and into another, except for those carriers using IS-41 technology, which allows for autonomous registration. This capability also takes on a new dimension when international roaming is involved because the cost for one of these forwarded calls from Latin America to the U.S. can be expensive to the roamer.

The second method is manual location, where calls reach the customer through roamer access ports – a different one for each system in which he will travel. With the manual method, subscribers must leave roamer access port numbers with any likely callers. This requires callers to know the subscriber's itinerary in order to dial the right system and roamer access port. Furthermore, they must also have a touch-tone phone to dial the roamer number after reaching the access port, which presents a problem to many Latin American landline users because touchtone phones are not as widely available there as they are in the U.S. Either of these locating methods is complex enough to present a host of problems in practical application, making roamer locating a barrier to easy roaming.

Roaming administration is our fourth big challenge. Roaming is a specialty within the larger framework of cellular. Each carrier must treat it that way by dedicating a special internal organization to handle roaming agreements, monitor clearinghouse activities, handle financial reconciliation and assist customer service personnel.

To help the Roaming Administration groups in the Latin American affiliates overcome some of the barriers, I have found that one very helpful tool is a privately

published roaming directory showing most of the information required to roam in a given location. Most companies listed show coverage maps in addition to information relating to wholesale prices, dialing instructions, customer service telephone numbers, etc.

ALACEL is collecting a standard set of data from its member carriers similar to that contained in these roaming directories. At some point there should be databases on both North American and Latin American carriers that can be accessed to obtain roaming data. Such data could become part of Appendix IV of the model CTIA Roamer Agreement and the corresponding ALACEL agreement.

Each carrier should create an informative guide that gives the customer detailed information on roaming in other countries. This should include, among other things, how to change bands to take advantage of better pricing and/or coverage, how to arrange for credit card roaming in markets not covered by a roaming agreement, how to receive calls, names of carriers serving that market, customer care number, etc. Additionally, to provide customers the information they need to be able to roam between countries, a detailed survey of where the customers plan to roam is very important to ensure adequate roamer agreements. We must learn what the customer expects in price, visiting locations, and so on.

The major cultural obstacle will be to break the language barrier. For roamers from Argentina, Uruguay and Chile, BellSouth has arranged to have toll-free access to Spanish-speaking customer care representatives at BellSouth Mobility in Miami. It is my understanding that in Mexico City, one of the carriers allows roamers to dial *611 for English speaking operators and *711 for Spanish operators. How we expand this capability is a critical question that must be addressed.

The cellular industry is aware that much needs to be done to accomplish the goal of seamless international roaming. Many of the issues discussed in this paper must be covered in roaming agreements, reflecting a desire of all carriers to work together for the benefit of their customers. The trends in cellular usage and international travel throughout the Americas indicate that customers need roaming now, and they'll need it more and more as time goes on. To take full advantage of the roaming capabilities, they'll need for it to be simple to understand, easy to use, and uniform in its application.

The industry won't get to that point overnight, but progress can continue to be made, step by step, in that direction. The underlying prerequisite for achieving seamless roaming throughout the Americas will be the active, committed cooperation of all parties involved -- with each other directly, and through cellular organizations like CTIA and ALACEL. Working together, we can make seamless Inter-American roaming a reality -- a vital, value-added element of the cellular mix that enhances what the customer receives and dramatically increases the size of the total cellular market.